TURNING TOOLS / ROTATING TOOLS / TOOLING SOLUTIONS

MITSUBISHI

2015
2016

MITSUBISHI MATERIALS

C007B



YOUR GLOBAL CRAFTSMAN STUDIO

USING THIS CATALOGUE

- This catalogue is as of April 2015.
- Please note that products in this catalogue are continuously reviewed and updated. The products therefore may be changed in the future and thus become different from the catalogue.
- Stock status is mentioned for the products in this catalogue. However, please note that the products here may be replaced by new grades and products in the future.

- Stock status indication
  - **● : Inventory maintained.**
  - **□ : Non stock, produced to order only.**
  - **▲ : Inventory maintained. To be replaced by new products.**

(Note) Please contact us regarding order numbers and grades that are not mentioned in this catalogue.

HOW TO USE THIS CATALOGUE

In this catalogue our cutting tools are classified into three main categories, turning tools, milling tools and drilling tools, which are arranged according to types of machining. This helps to find the most suitable products through various references as follows. Please read the instructions to find the best products for your purpose.

①To find the products through the INDEX.
- Turning tools are classified by a green colour.
- Milling tools are classified by a blue colour.
- Drilling tools are classified by a red colour.

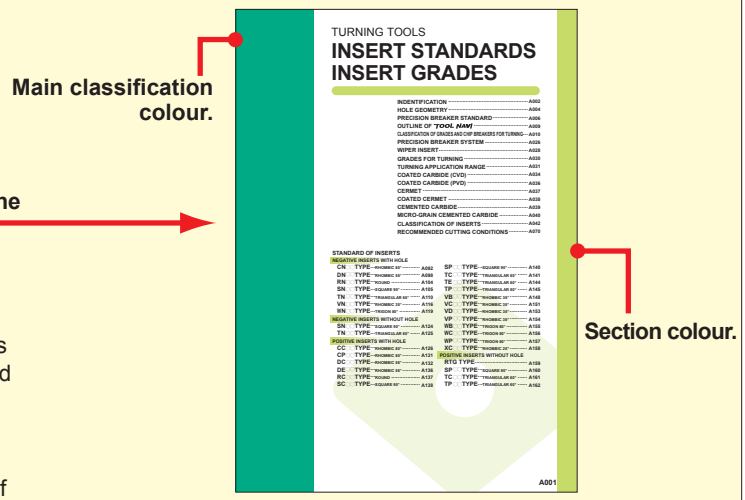
For the others, refer to the index on the following page.

②To find the series of products from the contents of the inside title.
Contents of each block are listed on each inside title.

③To find the product according to application.
The classification page of each block provides the series of products to be selected according to applications and purposes.

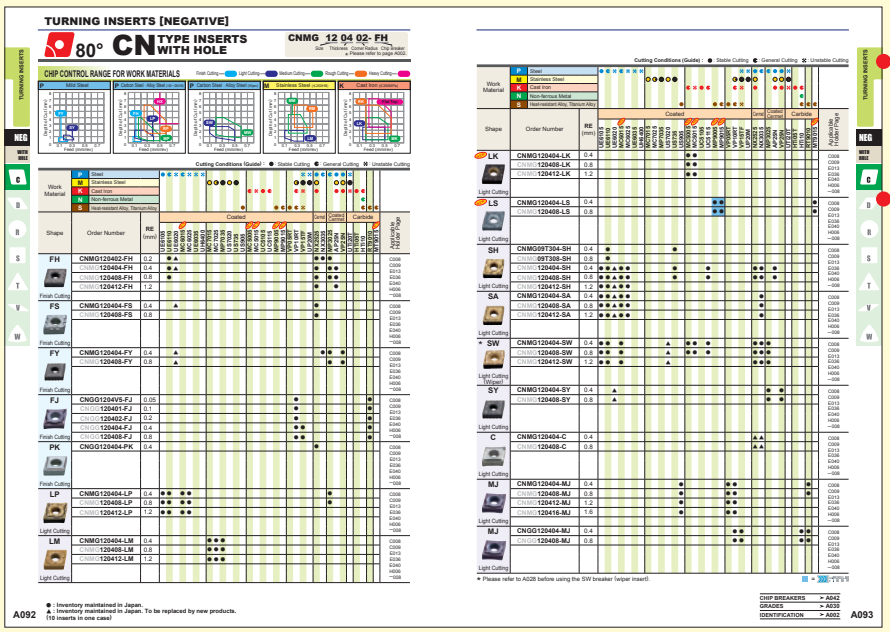
④Alphabetical index.
All tools are listed in the alphabetical index at the front of the catalogue.

⑤How to use the block sections.
A usage guide for each block is shown on the left of each index (not for all blocks). Refer to this page to know how to read the product information and how the page is organized.



Inside Title for Turning Inserts

●How Text and Index are organized



2015-2016

INDEX

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	BORING BARS	E001
	GROOVING	F001
	THREADING	G001
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MITSUBISHI

MITSUBISHI MATERIALS













Mitsubishi Materials is changing and moving forward.

To get closer to our customers and offer customized solutions to every problem.
To increase customer satisfaction.
To spread our enthusiasm as professional craftsmen.
We have therefore created a new brand message.
Our global family will retain this message in their hearts and minds and will always strive to deliver superior service and solutions meeting our customers' needs.





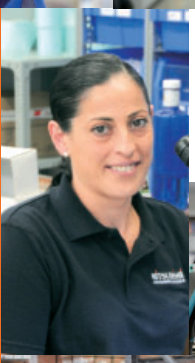


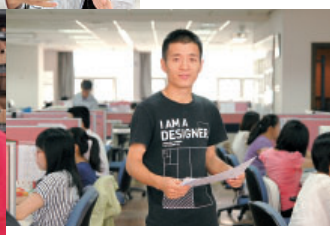















NEW BRAND MESSAGE

YOUR GLOBAL CRAFTSMAN STUDIO

Mitsubishi Materials is not just a tool manufacturer.
We are committed to promptly responding to customers' challenges with the dedication of a professional craftsman and doing our best to actively contribute to their success.
We strive to become the only tool manufacturer globally offering "your personal craftsman studio", a unique service for our customers.

It is the place where you can:

Find state-of-the-art technologies and products.
Find solutions, anytime, anywhere in the world.
Share our excitement on the latest technology trends and product innovation.

It is the studio where we think, share, create and develop together with our customers exciting solutions to meet their specific needs.

YOUR GLOBAL CRAFTSMAN STUDIO
MITSUBISHI MATERIALS

[The meaning of our logo] ▶▶▶
Our logo shows people, standing on a circle, holding hands. The circle represents the earth. Holding hands reflect our commitment to grow and succeed "hand in hand" with our customers and closely work with them improving performance across the globe.
The shape of the logo embodies a variety of ideas. It captures the image of "cutting tools" combined with the dominant letter "M" of the Mitsubishi Materials brand name. It also depicts a flame that symbolizes our passion for craftsmanship.

Available database of cutting tools (ISO 13399 compliance)

1. What is ISO 13399?

International standard with Cutting tool data representation and exchange.
Cutting tools are required to have parameters up to the world standards like in the regulation of the database and CAD data. Another purpose of ISO 13399 is to establish smooth data communication between systems.

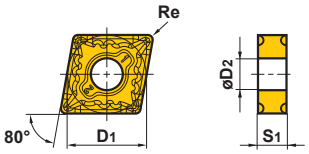
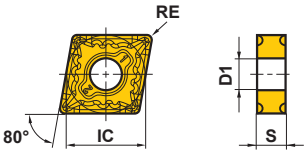
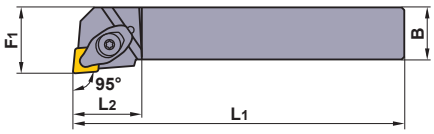
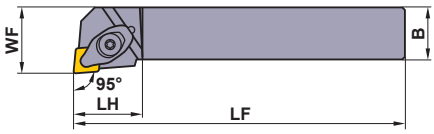
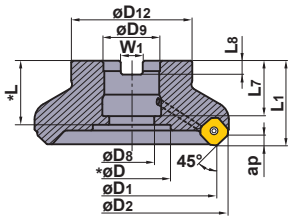
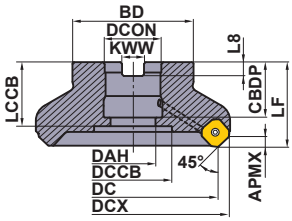
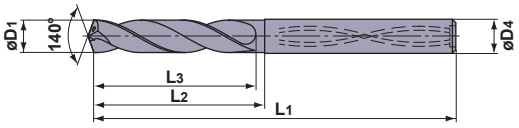
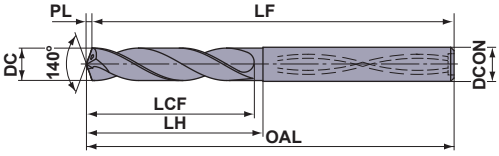
2. Purpose

Troublesome conversion with the manufacturers is unnecessary when you have cutting tool data that complies with ISO 13399. This can then be imported to PLM, CAM, CAM, CNC, or even as a tool management system.
Mitsubishi Materials offers cutting tool data based on ISO 13399 to support effectively improved quality and cost reduction efficiency in your improved threading and new products creation.

3. Dimension symbols conforming to ISO 13399

As shown below, new dimension symbols complying with ISO 13399.

Examples of change in dimensions

	Previous	New
① Inserts		
② Holder		
③ Milling Cutter		
④ Solid Drills		

*Note 1 See pages 5 to 6 for details.

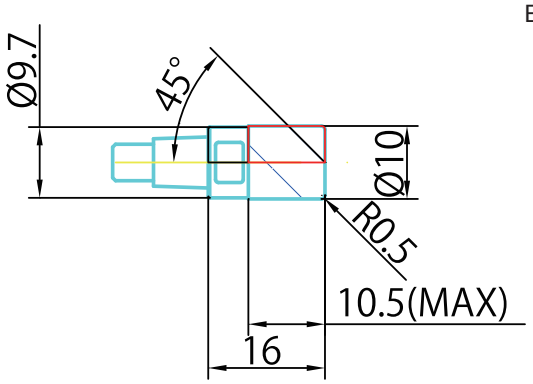
4. CAD (ISO13399 compliance)

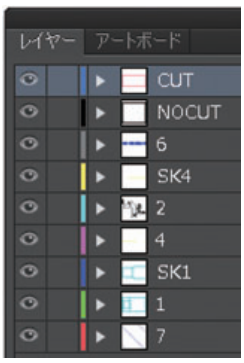
As shown below, DXF (2 dimensions) and STEP (3 dimensions) data complying with ISO 13399 are updated regularly to the Web CATALOG.

①DXF
(Full layer)

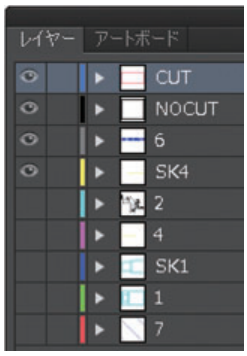
②DXF
(CUT/NO CUT layer)

Ex. IMX10C4HV100R05010

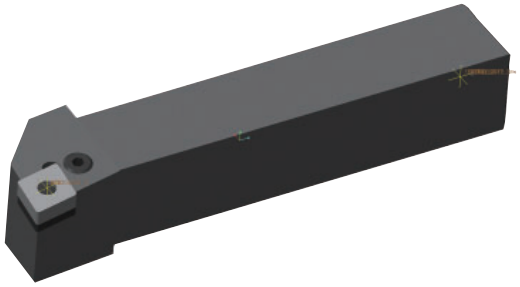


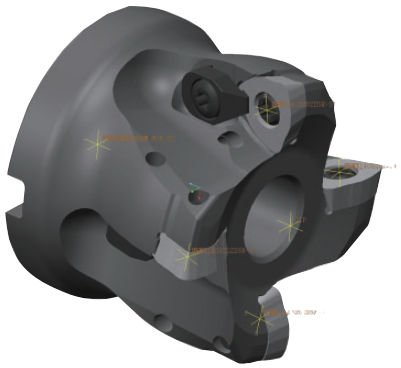




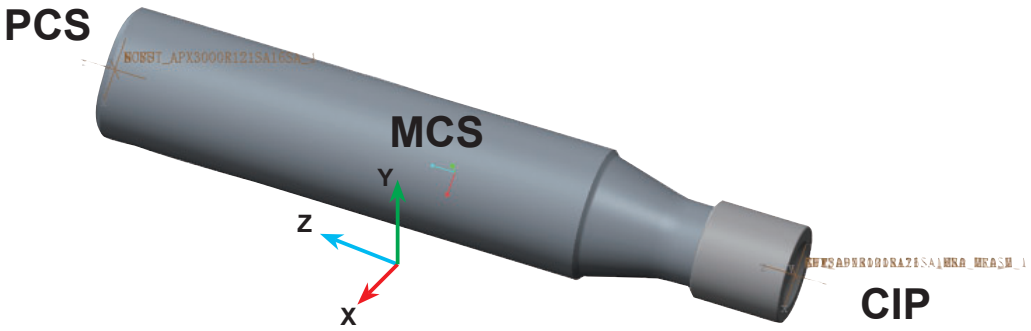


③STEP data (details, insert assembled model)





④STEP data (simple model)



✱Note 2 Download and refer to the "Web CATALOGUE" of PR17
✱Note 3 CAD is updated regularly. However, in rare cases, it may not be possible to provide the desired product. Please consult us.

Dimensions and symbols (ISO 13399 compliance)

Alphabetical

① Inserts

Symbol	Content
AN	Clearance angle major
AS	Clearance angle wiper edge
BCH	Corner chamfer length
BS	Wiper edge length
CDX	Maximum groove depth
CF	Blade tip
CW	Cutting width
D1	Fixing hole diameter
DC	Cutting diameter
DCON	Fixing part diameter
DMIN	Minimum cutting diameter
DMM	Shank diameter
EDR	Radius honing
EPSR	Insert included angle
FHCSA	Fixing hole countersunk angle
FHCSD	Fixing hole diameter top
GAN	Insert rake angle
IC	Inscribed circle
INSL	Insert length
KAPR	Tool cutting edge angle
KRINS	Cutting edge angle major
L	Cutting edge length
LBB	Breaker width
LE	Cutting edge effective length
LF	Cutting Edge, Length
LU	Usable length
M	m-dimension
PDPT	Overhang
PDX	Profile distance X
PDY	Profile distance Y
PNA	Profile included angle
PSIRL	Cutting edge angle major left hand
PSIRR	Cutting edge angle major right hand
RAL	Relief angle left hand
RAR	Relief angle right hand
RE	Corner radius
S	Thickness
W1	Insert width

② Turning

Symbol	Content
B	Shank width
CDX	Maximum groove depth
CUTDIA	Maximum cut off diameter
DAXN	Axial groove outside diameter minimum
DAXX	Axial groove outside diameter maximum
DCB	Fixing hole diameter
DCON	Fixing part depth
DMIN	Min. Cutting Diameter
DMM	Shank diameter
GAMF	Rake angle normal
H	Shank height
HBH	Head bottom offset height
HBKW	Head back offset width
HF	Functional height
HTB	Body height
KAPR	Cutting edge angle
LB	Body length
LDRED	Neck length
LF	Functional length
LH	Head length
LU	Usable length
OAH	Overall height
OAL	Overall length
OAW	Overall width
PSIR	Lead angle
WF	Functional width

*Note 1 This symbol complies with TS standard or DTS standard of ISO 13399.

*Note 2 The above does not include the unset symbols or original Mitsubishi Materials symbols of ISO 13399.

*Note 3 Changes and additions may be made because the table above also includes symbols under deliberation.

③ Milling

Symbol	Content
APMX	Max. depth of cut
AZ	Plunge depth maximum
BD	Body diameter
BHTA	Neck taper half angle
CBDP	Connection bore depth
CRKS	Connection retention knob thread size
DAH	Diameter access hole
DBC	Diameter bolt circle
DC	Cutting diameter
DCB	Fixing hole diameter
DCCB	Fixing bolt seat diameter
DCON	Fixing part depth
DCON_MS	Contact surface diameter machine side
DCON_WS	Contact surface diameter workpiece side
DCX	Maximum hole diameter
DHUB	Contact surface diameter
DMM	Shank diameter
GAMF	Rake angle radial
GAMP	Rake angle axial
KAPR	Tool cutting edge angle
KWW	Keyway width
LCCB	Fixing bolt seat thickness
LE	Cutting edge effective length
LF	Functional length
LH	Neck length
LPCON	Overall head length
LU	Cutting edge length
LUX	Maximum neck length
OAL	Overall length
PRFRAD	Profile radius
PSIR	Lead angle
RMPX	Ramping angle
WT	Weight of item
ZEFP	Peripheral effective cutting edge count

④ Drilling

Symbol	Content
BD	Body diameter
CDN	Front oil filling hole diameter
CNT	Rear oil filling hole diameter
CRKS	Connection retention knob thread size
CZC	Connection size code
DC	Cutting diameter
DCSFMS	Flange diameter
DCON	Fixing part depth
DMM	Shank diameter
LCF	Length chip flute
LF	Functional length
LH	Neck length
LPR	Protruding length
LU	Usable length
OAL	Overall length
PL	Point length
SDL	Step diameter length
ZEFP	Peripheral effective cutting edge count

⑤ Others

Symbol	Content
ASP	Adjusting screw protrusion
BD	Body diameter
CRKS	Connection retention knob thread size
CZC	Taper size
DBC	Diameter bolt circle
DC	Cutting diameter
DCB	Fixing hole diameter
DCON	Fixing part diameter
DCON_MS	Contact surface diameter machine side
DCON_WS	Contact surface diameter workpiece side
DF	Flange outer diameter
DMM	Shank diameter
FLGT	Flange diameter
HF	Fixing seat dimension
KWW	Keyway width
LB	Body length
LF	Functional length
LP	Overhang
LPR	Distance from end of collar
LS	Shank length
LSCX	Clamping length maximum
LU	Usable length
MHA	Mounting hole angle
MHD	Mounting hole distance
MHH	Mounting hole height
OAL	Overall length
RE	Corner radius
RPMX	Ramping angle

NEW PRODUCTS

MIRACLE SIGMA

What is MIRACLE SIGMA?

1. Next-generation PVD
2. PVD coating technology
3. Shape maintainability

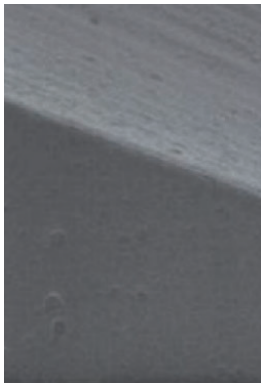
Long life & high quality
High efficiency

Improved productivity and cost reduction

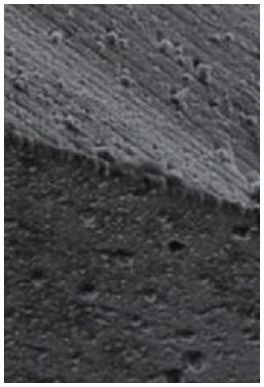
PVD coating and its peripheral technology displays the performance of new generation miracle coating and shape maintainability giving you the MIRACLE SIGMA.

Highest efficiency offers further productivity and cost cutting.

The following is an example.



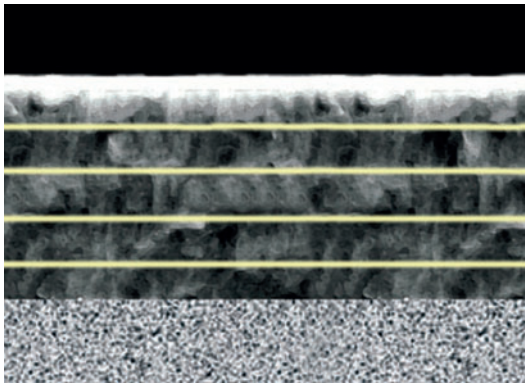
SMART MIRACLE coating



Conventional cutting edge

ZERO-μ

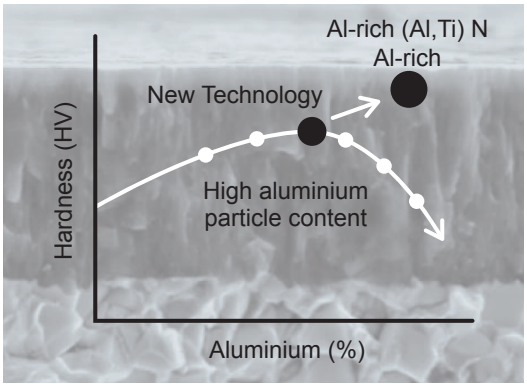
The unique ZERO-μ Surface achieved an unique coating.
Extremely smooth and dense surface.
Sharp cutting edges with low friction coefficient.



*Laminated coating (image)

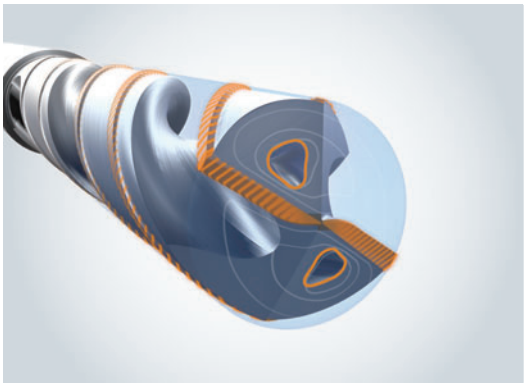
TOUGH-Σ

INNOVATIVE PVD COATING TECHNOLOGY
Extremely tough, smooth and wear resistant for high productivity milling.



Al-rich (Al,Ti) N

New Al-rich (Al, Ti)N with increased Al content improves film hardness and stabilizes the hardness aspect. Additionally, resistance to wear,abrasion and welding are drastically improved in turning to high heat resistance alloy.



TRI-cooling Technology®

Unique coolant hole shape improves flow and stabilizes the high hardness aspect (more than φ6) to offer the longer-life.



Double sided Z Geometry

Unique insert minimizes chatter and vibration Z Insert Geometry provides lower cutting resistance

Mitsubishi Materials' proprietary double sided, Z Geometry insert features a sharp cutting edge with low cutting resistance by utilizing features from both conventionally positive and negative rake inserts.

✱NOTE 1. MIRACLE SIGMA products are not given the MIRACLE SIGMA mark.

NEW PRODUCTS

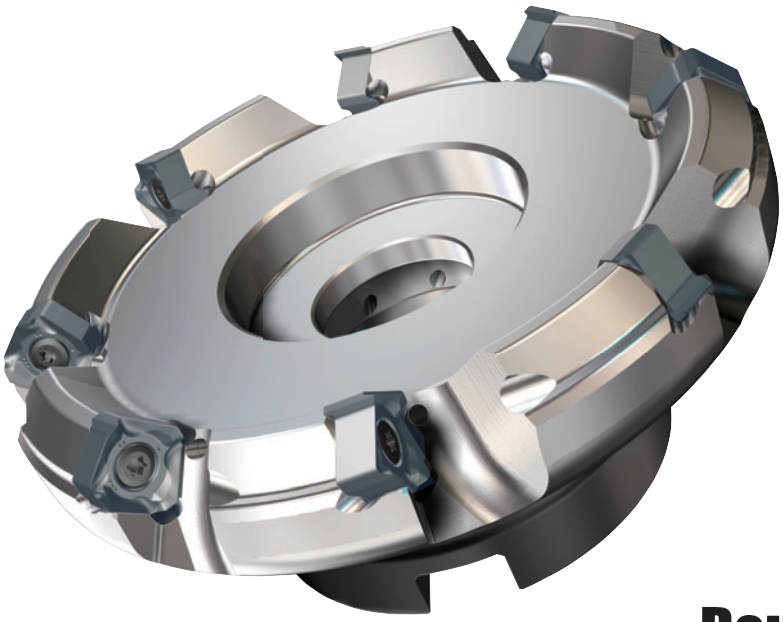
L010

Low cutting resistance and double sided insert face mill for general machining

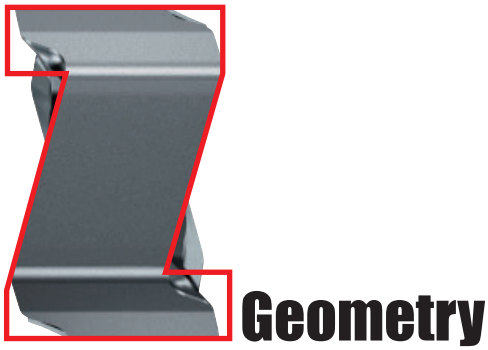
WSX445

Unique geometry minimizes chatter and vibration!

Mitsubishi Materials' proprietary double sided, Z Geometry insert features a sharp cutting edge with low cutting resistance by utilizing features from both conventionally positive and negative rake inserts.

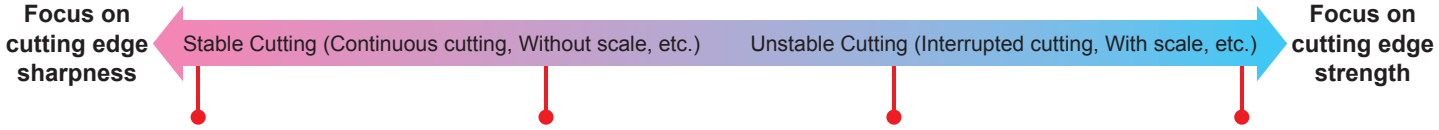


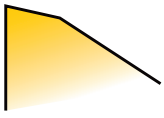




BREAKER SYSTEM

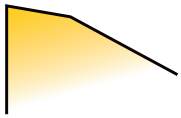
Breaker series for varied depths of cut and feeds





Lbreaker

The high rake angle boosts cutting performance. Positive land retains strength and provides low cutting resistance.



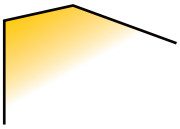
Mbreaker

First recommendation for general applications. A good balance of edge strength and sharpness is provided by the optimized positive land and rake angle.



Rbreaker

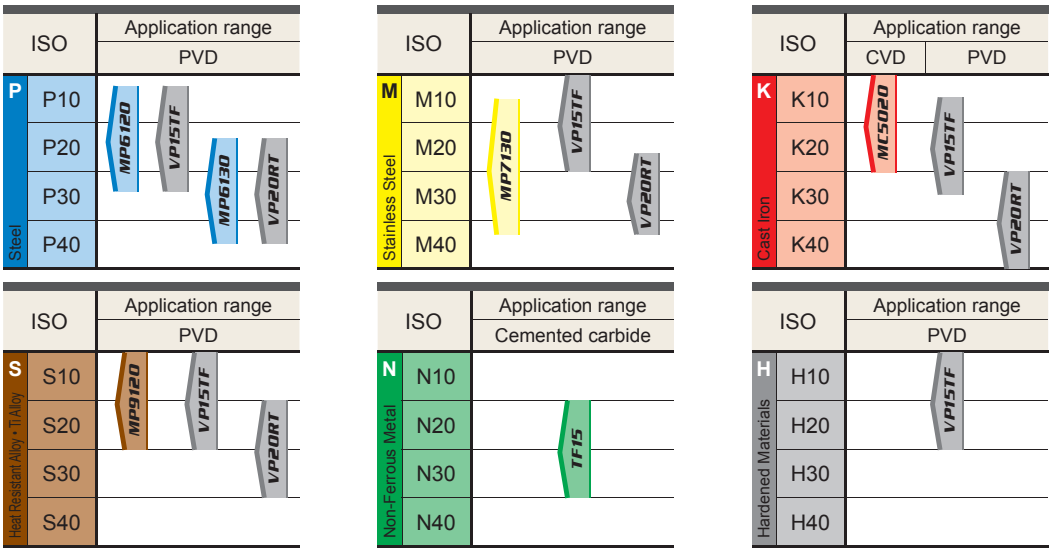
For unstable applications. Enhanced edge strength and retention of sharpness is provided by the negative land and positive rake angle respectively.



Hbreaker

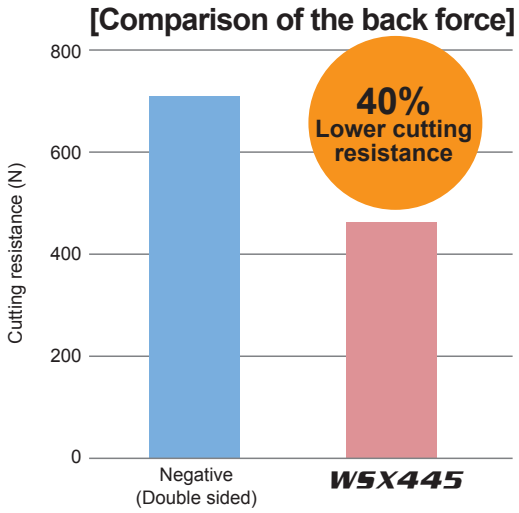
For demanding applications. A stronger land and reduced positive rake angle provides maximum edge strength.

INSERT GRADE FOR A WIDE RANGE OF MATERIALS



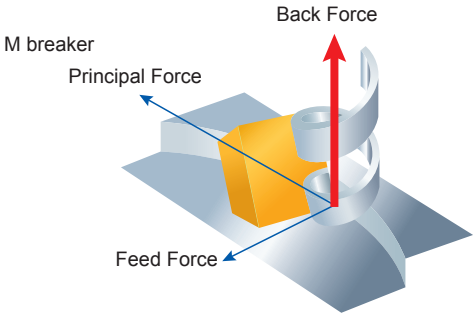
CUTTING RESISTANCE

WSX445's low cutting resistance equals to that of single sided insert cutters.The low axial and radial forces reduce vibrations to a minimum.



WSX445
Conventional insert

<Cutting condition>
Work material : SCM440
Cutter Dia. : 125 mm
Cutting speed : 200 m/min
Feed per tooth : 0.2 mm/tooth
Depth of cut : ap=4.0 mm
ae=100 mm
Coolant : Dry cutting,
Single insert



<Back force>
Cutting force in the axial direction. Back force can cause inaccuracy and vibration, resulting in deflection of the work piece as well as cutting tools.

CHIP DISCHARGE EFFECT

Chips are discharged outwardly because of the negative/positive edge design.
This helps prevent jamming of continuous chips also damage to the coolant holes.

WSX445



The chips generated are helical and discharged outwardly.

Conventional negative insert A



Conventional negative insert B



Chips can be discharged inwardly and can cause problems.

<Cutting condition>
Work material : SCM440
Cutting speed : 150m/min
Feed per tooth : 0.2mm/tooth
Depth of cut : ap=4mm
ae=100mm
Coolant : Dry cutting

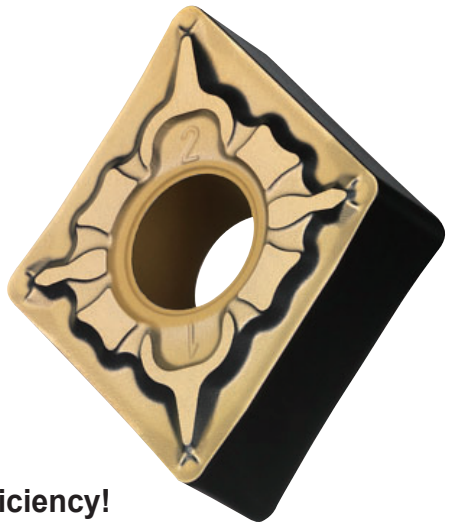
NEW PRODUCTS

A034

P

ISO Turning Inserts for Steels

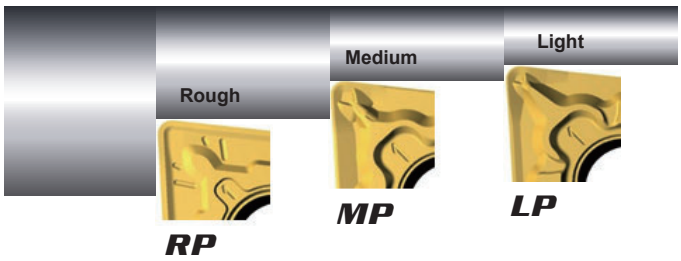
MC6015
MC6025 + **LP**
MP
RP



Opening of a new high efficiency in steel.
Ultra-thick film nano texture TOUGH grip and 2 in 1 technology realize long life without regret to high-speed cutting.
Combination with new breaker vastly increases efficiency!

ISO USE CLASSIFICATION SYMBOLS	APPLICATION RANGE
P01	MC6015
P10	MC6025
P20	
P30	
P40	

For General Steel

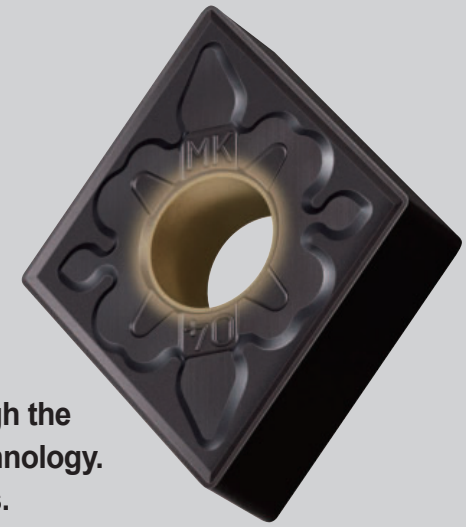


A035

K

ISO Turning Inserts for Cast Iron

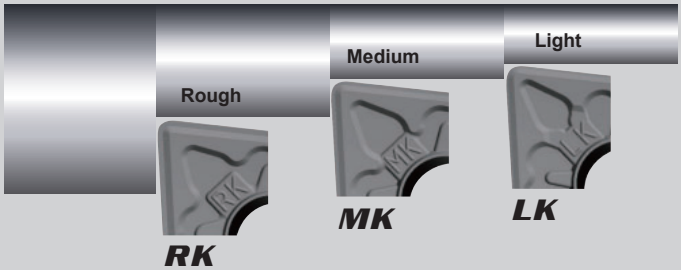
MC5005
MC5015 + **LK**
MK
RK



Reduced cycle time and cost!
High efficiency examples exceeding 600m/min cutting velocity appearing one after the other through the use of ultra-thick film nano texture, TOUGH grip technology.
Line up of new breakers selected by load conditions.

ISO USE CLASSIFICATION SYMBOLS	APPLICATION RANGE
K01	MC5005
K10	
K20	MC5015
K30	
K40	

For cast iron



M

ISO Turning Inserts for Stainless Steel

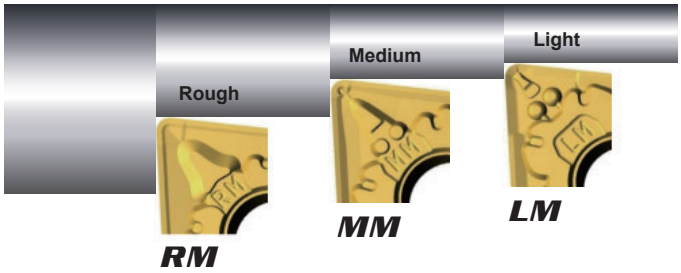
MC7015
MC7025
MP7035
+
LM
MM
RM



Stainless steel turning revolution!
New ultra-hard substrate realizes long life at high deformation resistance by controlling boundary wear and burrs.
New breaker with sharpness and strength.

ISO USE CLASSIFICATION SYMBOLS	APPLICATION RANGE
M01	MC7015
M10	MC7015
M20	MC7025
M30	MC7025 / MP7035
M40	MP7035

For Stainless Steel

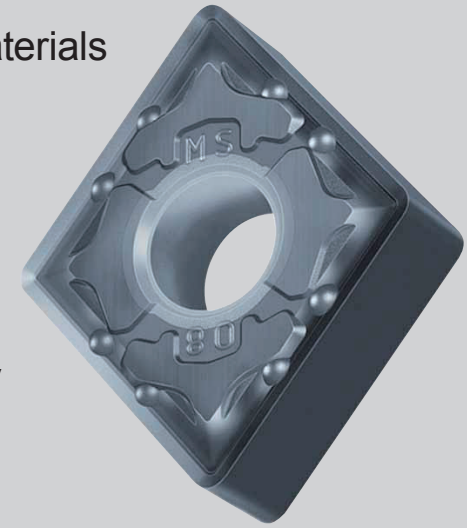


A036

S

ISO Turning Inserts for Difficult-to-Cut Materials

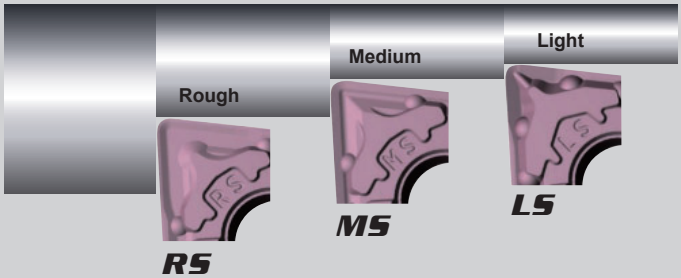
MP9005
MP9015
MT9015
+
LS
MS
RS



Cutting edge boundary fracturing and chipping of high heat resistance alloy turning completely solved!
Al-rich (Al,Ti)N coating realizes improved film hardness and stable high hardness aspect.

ISO USE CLASSIFICATION SYMBOLS	APPLICATION RANGE
S01	MP9005
S10	MP9005 / MP9015
S20	MP9015 / MT9015
S30	MT9015
S40	MT9015

For Super Alloy



NEW PRODUCTS

B004

MIRACLE SIGMA

Coated CBN Grade for High Hardened Steel Turning

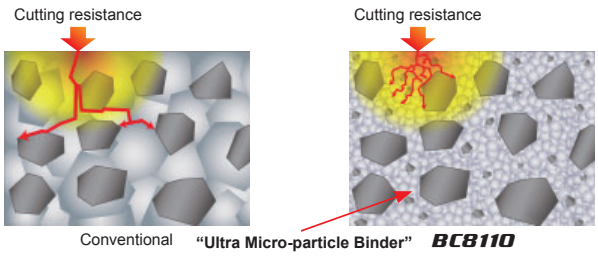
BC8110



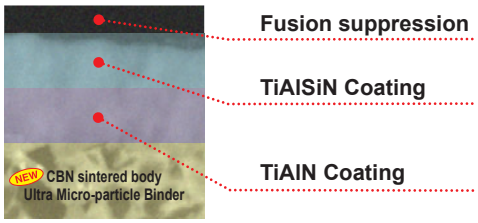


New Generation Coating Technology. Excellent wear resistance provides increased efficiency when turning hardened steels.

The newly developed Ultra Micro-particle Binder prevents sudden fracturing.



Newly developed special ceramic coating



F004

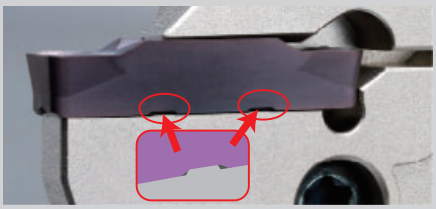
Grooving System

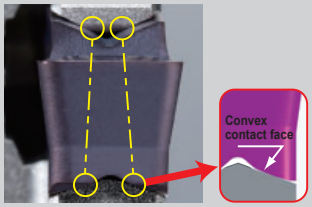
GY Series



Grooving Revolution
Innovative clamping system ensures reliable grooving.
Application expanded

Highly reliable insert clamping





J436

Exchangeable Head End Mills

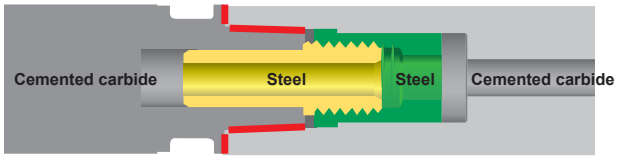
iMX Endmill Series





Carbide + Carbide Double face contact with head type expands the application possibilities.

Rigidity near that of a solid tool secured by ultra-hardening of all head and holder clamping surfaces.
Varied head replacement is associated with high efficiency.



J026

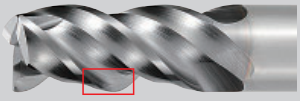
Vibration Control End Mills for Machining Difficult-to-Cut Materials

SMART MIRACLE®

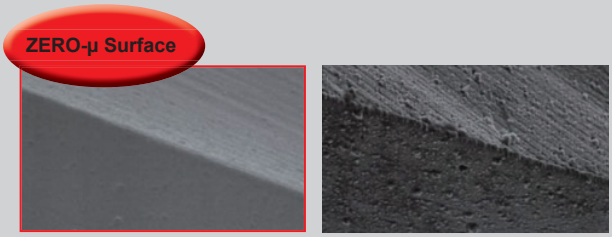




Revolutionary performance for difficult-to-cut materials.
Application to a wide range of cutting by series addition.



ZERO-μ Surface



SMART MIRACLE coating | Conventional

NEW PRODUCTS

J024

MIRACLE SIGMA

Carbide End Mills

MS plus





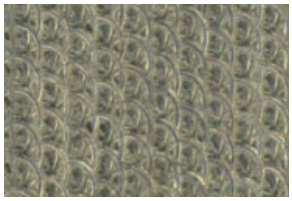
High precision end mills with excellent wear resistance for general machining.

Applicable to finish cutting by improved edge sharpness cutting edge shape.

MS plus

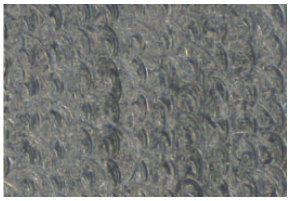


End cutting edge shape



Regular cutting path

Conventional



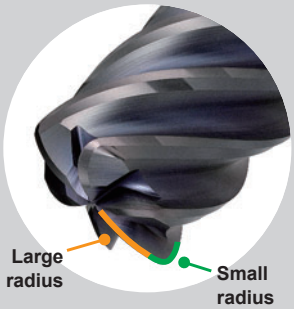
Unclear cutting path

J314

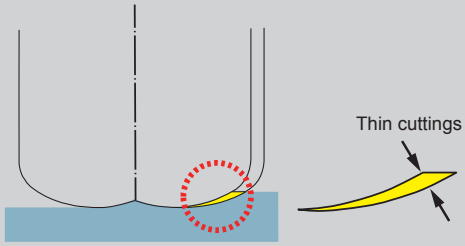
Corner Radius End mill for High Efficiency Machining Series

VFFDRB

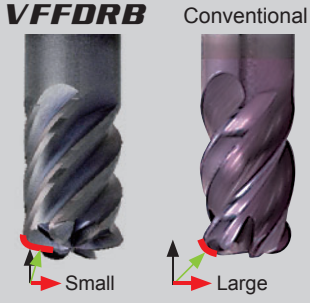




High hardness and high efficiency machining realized



Thin cuttings and a long cutting edge combine for high performance and long life.



Reduced cutting resistance in the radial direction suppresses tool vibration and deflection.

N012

MIRACLE SIGMA

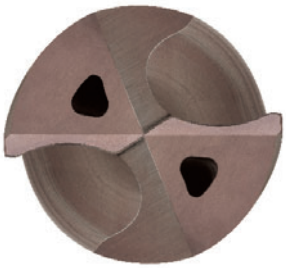
Carbide Solid Drills

WSTAR Drill Series

MVE/MVS

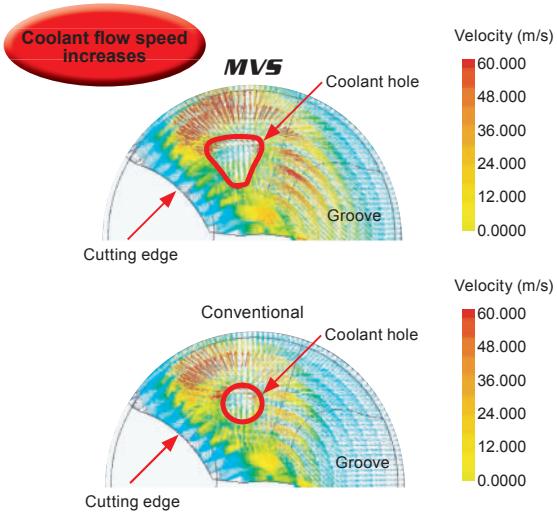
PVD coating provides long tool life for a wide range of applications.





TRI-cooling Technology®

On drills over ø6mm



N212

MIRACLE SIGMA

Indexable Drill

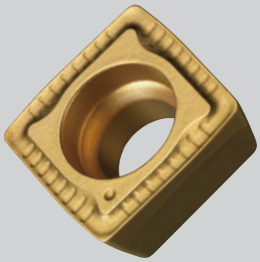
MVX



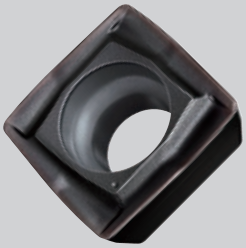
High rigidity body produced by utilizing the cutting-edge technology. Economical 4-corner insert.



Ideal combination of outer CVD insert and inner PVD insert.



All-round UM breaker

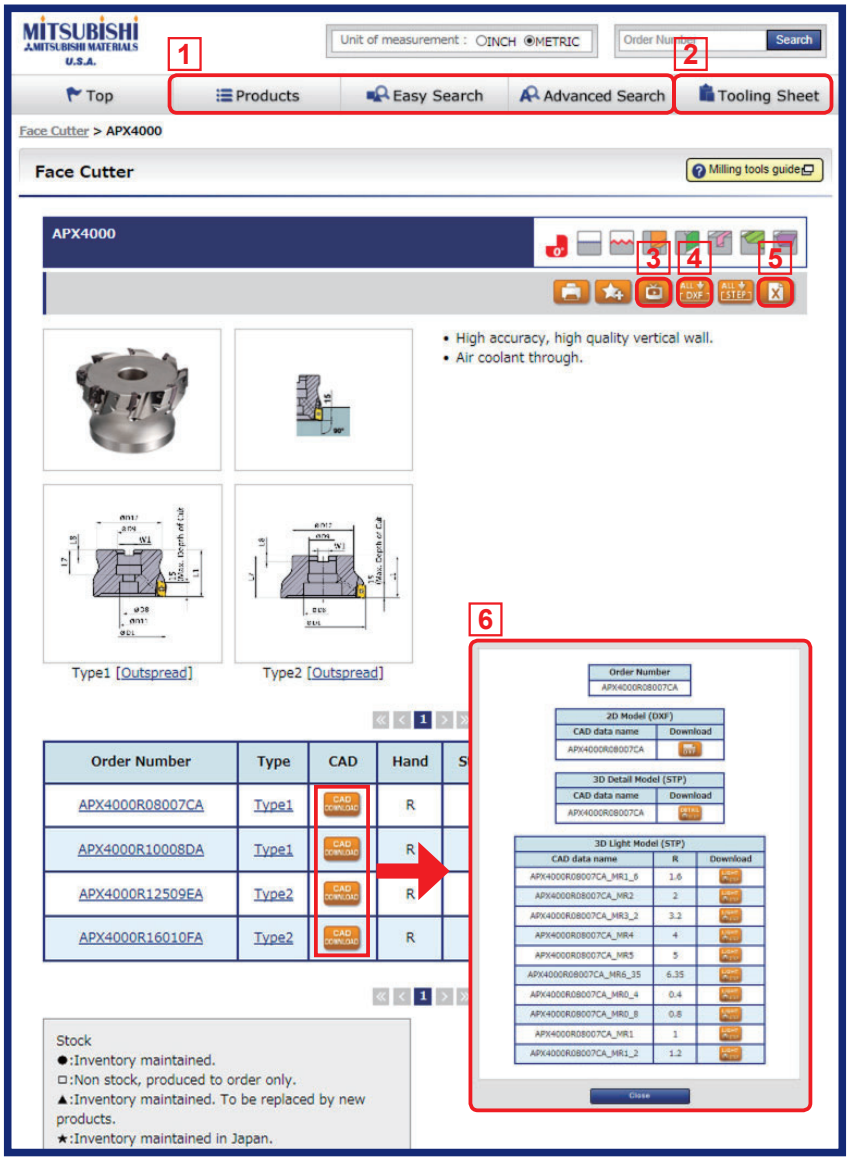


US breaker for Stainless Steel

Mitsubishi Material Web catalogue

Web CATALOGUE

Language: Japanese, English, Chinese, Brazilian Portuguese

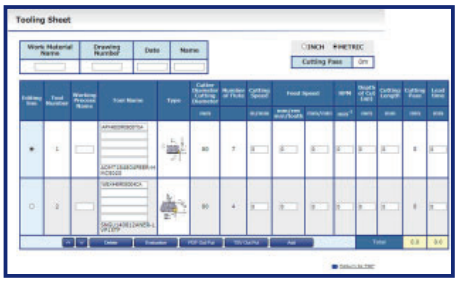


1 Enhanced search function!

Optimum tool can be selected from cutting mode, work, and cutting conditions as well as item number.

2 Tooling sheet mounting

Tooling Sheet "Simple registration in tooling sheet by pressing a button. Cutting time and operation time can be calculated in no time at all"



3 Favorite registration function

Favorite product can be registered.

4 Youtube

Product screen can be viewed.

5 Excel & image data download

Product image and dimensional drawings as well as product information data (excel) can also be downloaded.

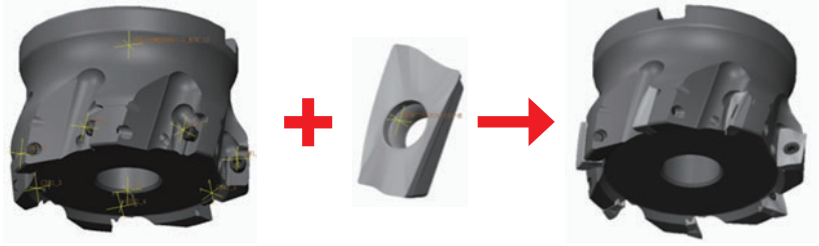
6 ISO 13399 compatible CAD data updated regularly!

ISO 13399 compliance DXF/STEP (simple/detailed) data can be downloaded.

3D simple model (STEP) example



3D detailed model (STEP) example



* CAD is updated regularly. However, in rare cases, it may not be possible to provide the desired product. Please consult us.

Access the Web catalog here.
http://www.mitsubishicarbide.net

e-Learning system

Mitsubishi Materials EXPERT program
You can study cutting technology.

http://mmc-permanent.learnways.com

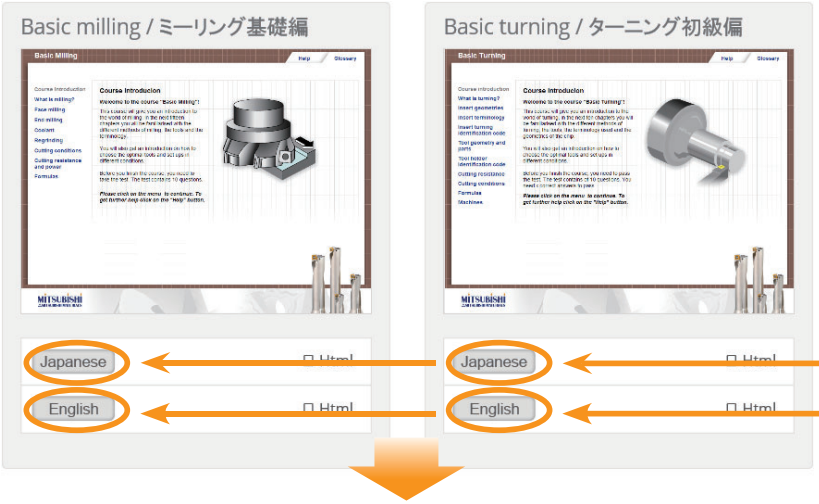
Language: Japanese, English



http://www.mitsubishicarbide.com

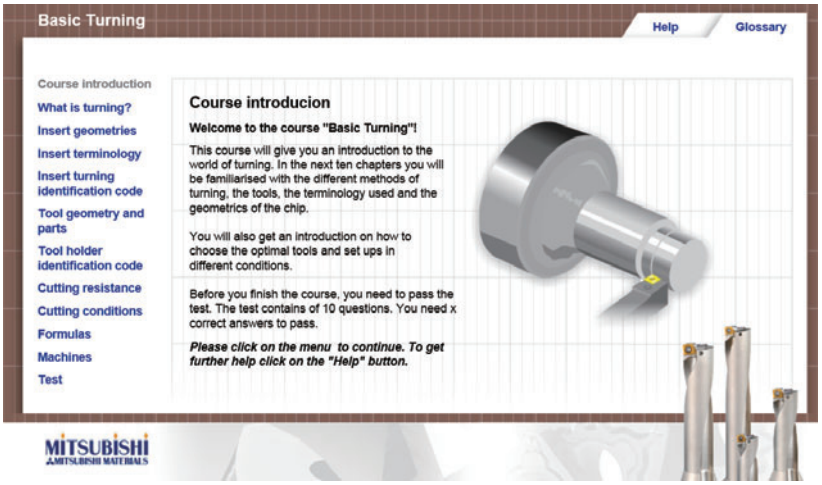
To selection screen of each cutting technology course without the need for registration.





Can participate in milling, turning, drilling, and other courses for free.

●Can select English/Japanese



Can participate even with tablet PC and smart phone for free.



Memo

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BF-DNGG○○○○○○○TA4	Insert (Class G tolerance)	B025
BF-DNGM○○○○○○○○2	Insert (Class G tolerance)	B027

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BM-CNGM○○○○○○TA2	Insert (Class G tolerance)	B024
BM-DNGM○○○○○○TA2	Insert (Class G tolerance)	B027
BM-TNGM○○○○○○TA3	Insert (Class G tolerance)	B031
BN425 type	BN425 type face mill	P027
BOES○○○	Set bolt (For OCTACUT type cutter)	P009
BOE type	BOE type face mill	P027
BOE type	BOE type end mill	P031
BPT322	Shim	P010
BRA○○○○S○○	BRA type drill	N206
BRB○○○○S○○M	BRB type drill	N205
BRE type	BRE type end mill	P031
BRL○○○○S○○	BRL type drill	N208
BRM○○○○S○○	BRM type drill	N202
BRMB○○○○S○○	BRMB type drill	N204
BRP○○R○○○ELS○○	BRP type end mill	L102
BRP○○R○○○LS○○	BRP type end mill	L102
BRP○○R○○○S○○	BRP type end mill	L102
BRP○P○○○○○○○	BRP type face mill	L103
BRP○P-○○○A○○R	BRP type face mill	L104
BRS○○○	Wedge screw	P003
BRS○○○○S○○	BRS type drill	N200
BRSB○○○○S○○	BRSB type drill	N204
BSX400 type	BSX400 type face mill	P028
BSX500 type	BSX500 type face mill	P028
BSX type	BSX type end mill	P031
BTAHR/L○○○○-50	Small tools holder (External back turning)	D012
BTAT○○○○○○R/L-B	Insert for external back turning	D012
BTAT605000RX	Insert for external back turning	D012
BTBT○○○○○○R/L	Insert for external back turning	D013
BTBT○○○○○○R/L-B	Insert for external back turning	D013
BTVHR○○○○-○○	Small tools holder (External back turning)	D014
BTVT○○○○○○R-B	Insert for external back turning	D014
BXD4000-○○○○○○RA/B	BXD4000 type face mill	L072,L073
BXD4000R○○○○○○A/B	BXD4000 type face mill	L072
BXD4000R○○○SA○○ELA/ELB	BXD4000 type end mill	L074
BXD4000R○○○SA○○SA/SB	BXD4000 type end mill	L074
BXD4001R○○○SA○○ELA/ELB	BXD4000 type end mill	L074
BXD7000 type	BXD7000 type face mill	P028
BXD7000 type	BXD4000 type end mill	P032
BZC400 type	BZC400 type face mill	P028
BZC400 type	BZC400 type end mill	P032

C

C○○○R-BLS	MICRO-MINI boring bar (Solid carbide)	E022,F125
C○○○SCLCR/L○○	S type boring bar/MICRO-MINI (Carbide shank)	E016,E030,P023
C○○○SCZCR/L○○	S type boring bar (Carbide shank)	P023
C○○○SDQCR○○	S type boring bar (Carbide shank)	E031
C○○○SDUCR/L○○	S type boring bar (Carbide shank)	E029,P023
C○○○SDZCR/L○○	S type boring bar (Carbide shank)	P023
C○○○SSKCR/L○○	S type boring bar (Carbide shank)	P023
C○○○STFCR○○	S type boring bar (Carbide shank)	E028
C○○○STUCR06	MICRO-DEX boring bar (Carbide shank)	E017
C○○○SVQCR○○	S type boring bar (Carbide shank)	E032
C○○○SVUCR/L○○	S type boring bar (Carbide shank)	P023
C○○○SWUBR○○	MICRO-DEX boring bar (Carbide shank)	E016
C2JS	Carbide end mill	J095
C2LA	Carbide end mill	J100
C2LS	Carbide end mill	J096
C2MA	Carbide end mill	J098
C2MB	Carbide end mill	J269
C2MHA	Carbide end mill	J104
C2MS	Carbide end mill	J092
C2SA	Carbide end mill	J102
C2SS	Carbide end mill	J091
C3SA	Carbide end mill	J124
C3SARB	Carbide end mill	J304
C4JC	Carbide end mill	J174
C4LC	Carbide end mill	J175
C4MC	Carbide end mill	J173
CA○○○	Clamp bridge	P014
CAS51T	Set screw	P003
CB○○RS	MICRO-MINI TWIN	E019
CB○○RS-B	MICRO-MINI TWIN	E019
CBJPR○○○S○○	CBJP type end mill	L137
CBMPR○○○S○○	CBMP type end mill	L137
CBN2XLB	CBN end mill	J267
CBN2XLRB	CBN end mill	J302
CBS○○	Breaker piece	P016
CBT○○	Breaker piece	P016
CBT○○○○	Breaker piece	P016
CCET○○○○○○R/L-SN	Insert (Class E tolerance)	A129
CCET○○○○○○R/L-SR	Insert (Class E tolerance)	A129
CCET○○○○○○R/LW-SN	Insert (Class E tolerance)	A130
CCGH○○○○○○R/L-F	Insert (Class G tolerance)	A127
CCGT○○○○○○-AZ	Insert (Class G tolerance)	A126
CCGT○○○○○○-FJ	Insert (Class G tolerance)	A126
CCGT○○○○○○L-F	Insert (Class G tolerance)	A127
CCGT○○○○○○M-SMG	Insert (Class G tolerance)	A130
CCGT○○○○○○R/L-SN	Insert (Class G tolerance)	A130
CCGT○○○○○○R/L-SS	Insert (Class G tolerance)	A127
CCGW○○○○○○	Insert (Class G tolerance)	A130
CCGW○○○○○○FS	Insert (Class G tolerance)	B041
CCK○○	Clamp bridge	P014
CCMH○○○○○○-MV	Insert (Class M tolerance)	A128
CCMH○○○○○○-SV	Insert (Class M tolerance)	A127
CCMT○○○○○○	Insert (Class M tolerance)	A128
CCMT○○○○○○-FM	Insert (Class M tolerance)	A126
CCMT○○○○○○-FP	Insert (Class M tolerance)	A126
CCMT○○○○○○-FV	Insert (Class M tolerance)	A126
CCMT○○○○○○-LM	Insert (Class M tolerance)	A127
CCMT○○○○○○-LP	Insert (Class M tolerance)	A127
CCMT○○○○○○-MK	Insert (Class M tolerance)	A128
CCMT○○○○○○-MM	Insert (Class M tolerance)	A128
CCMT○○○○○○-MP	Insert (Class M tolerance)	A128
CCMT○○○○○○-MW	Insert (Class M tolerance)	A129
CCMT○○○○○○-SW	Insert (Class M tolerance)	A127

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CCMX09T308EN-B	Insert (For DCCC type end mill)	K024
CCP○○	Shim pin	P013
CCTC1	Clamp bridge	P014
CESPR○○○**S**○○	CESP type end mill	L113
CFM○○○○○	Shim screw	P021
CFSPR○○○**S**○○	CFSP type end mill	L113
CG○○**RS-**○○○	MICRO-MINI TWIN	F126
CGSPR○○○**S**○○	CGSP type end mill	L113
CK○○○	Clamp bridge	P014
CKW6	Clamp bridge	P015
CMH	Carbide end mill	J123
CMRA	Carbide end mill	J195
CNGA○○○○○○	Insert (Class G tolerance)	B024
CNGG○○○○○○**-FJ**	Insert (Class G tolerance)	A092
CNGG○○○○○○**-MJ**	Insert (Class G tolerance)	A093
CNGG○○○○○○**-PK**	Insert (Class G tolerance)	A092
CNGN○○○○○○	Insert (Class G tolerance)	B035
CNMA○○○○○○	Insert (Class M tolerance)	A097,B024,B055
CNMG○○○○○○	Insert (Class M tolerance)	A095
CNMG○○○○○○**-C**	Insert (Class M tolerance)	A093
CNMG○○○○○○**-FH**	Insert (Class M tolerance)	A092
CNMG○○○○○○**-FS**	Insert (Class M tolerance)	A092
CNMG○○○○○○**-FY**	Insert (Class M tolerance)	A092
CNMG○○○○○○**-GH**	Insert (Class M tolerance)	A097
CNMG○○○○○○**-GJ**	Insert (Class M tolerance)	A097
CNMG○○○○○○**-GK**	Insert (Class M tolerance)	A094
CNMG○○○○○○**-GM**	Insert (Class M tolerance)	A094
CNMG○○○○○○**-LK**	Insert (Class M tolerance)	A093
CNMG○○○○○○**-LM**	Insert (Class M tolerance)	A092
CNMG○○○○○○**-LP**	Insert (Class M tolerance)	A092
CNMG○○○○○○**-LS**	Insert (Class M tolerance)	A093
CNMG○○○○○○**-MA**	Insert (Class M tolerance)	A095
CNMG○○○○○○**-MH**	Insert (Class M tolerance)	A095
CNMG○○○○○○**-MJ**	Insert (Class M tolerance)	A093
CNMG○○○○○○**-MK**	Insert (Class M tolerance)	A094
CNMG○○○○○○**-MM**	Insert (Class M tolerance)	A094
CNMG○○○○○○**-MP**	Insert (Class M tolerance)	A094
CNMG○○○○○○**-MS**	Insert (Class M tolerance)	A095
CNMG○○○○○○**-MW**	Insert (Class M tolerance)	A095
CNMG○○○○○○**-RK**	Insert (Class M tolerance)	A096
CNMG○○○○○○**-RM**	Insert (Class M tolerance)	A096
CNMG○○○○○○**-RP**	Insert (Class M tolerance)	A096
CNMG○○○○○○**-RS**	Insert (Class M tolerance)	A096
CNMG○○○○○○**-SA**	Insert (Class M tolerance)	A093
CNMG○○○○○○**-SH**	Insert (Class M tolerance)	A093
CNMG○○○○○○**-SW**	Insert (Class M tolerance)	A093
CNMG○○○○○○**-SY**	Insert (Class M tolerance)	A093
CNMM○○○○○○**-HV**	Insert (Class M tolerance)	A097
CNMM○○○○○○**-HX**	Insert (Class M tolerance)	A097
CNMM○○○○○○**-HZ**	Insert (Class M tolerance)	A097
CPGT○○○○○○	Insert (Class G tolerance)	A131,B059
CPGT○○○○○○**R/L-F**	Insert (Class G tolerance)	A131
CPMH○○○○○○**-FV**	Insert (Class M tolerance)	A131
CPMH○○○○○○**-MV**	Insert (Class M tolerance)	A131
CPMH○○○○○○**R/L-F**	Insert (Class M tolerance)	A131
CPMH○○○○○○**-SV**	Insert (Class M tolerance)	A131
CPMT○○○○**ZPEN-M**○	Insert (For PMR type end mill)	K024,L143
CPMX○○○○○○	Insert (Class M tolerance)	A131
CR○	Stop ring	G013,H016,P021,P025
CR○○**RS-01**	MICRO-MINI TWIN	E020
CR○○**RS-01B**	MICRO-MINI TWIN	E020
CRN2MB	CRN end mill	J254
CRN2MRB	CRN end mill	J298
CRN2MS	CRN end mill	J081
CRN2XL	CRN end mill	J083
CRN2XLB	CRN end mill	J256
CRN2XLRB	CRN end mill	J300
CRN4JC	CRN end mill	J166
CS○	Clamp screw	P003
CS○○	Shim	P010
CS○○○○○○**T**	Clamp screw	P003
CSAF○○	Stop screw	P029
CSBPR/L○○○○	MC holder	P018
CSF401260T	Clamp screw	P003
CSKPR/L○○○○	MC holder	P018
CSKPR○○**CA**○○	BC type cartridge	M004
CSRA	Carbide end mill	J193
CSRARB	Carbide end mill	J306
CSSNR/L○○○○○○○	MC holder	P018
CSSPR/L○○○○	MC holder	P018
CSSPR○○**CA**○○	BC type cartridge	M004
CSTNR/L○○○○○○○	MC holder	P018
CSVHR/L○○○○	Small tools holder (For cam tool posts)	D027
CSVTB○○○**R/L**	Insert for external back turning	D028
CSVTB○○○**R-B**	Insert for external back turning	D028
CSVTBXL	Insert for external back turning	D028
CSVTC○○○○**R/L**	Insert for external cutting off	D028
CSVTC○○○○**R-B**	Insert for external cutting off	D028
CSVTF○○○**R/L**	Insert for external front turning	D027
CSVTF○○○**R/L-B**	Insert for external front turning	D027
CSVTFXL	Insert for external front turning, Copying	D027
CSVTG○○○○○**R/L**	Insert for grooving	D029
CSVTT○○○○○**RR/L**	Insert for threading	D029
CT○○	Shim	P010
CT○○**RS-M**○○	MICRO-MINI TWIN	G026
CT○○**T**○	Shim	P011
CTAHR/L○○○○**-120**	Small tools holder (For external cutting off)	D018
CTAHR1010-120S	Small tools holder (For external cutting off)	D018
CTANR/L○○○○	MC holder	P018
CTAPR/L2020	MC holder	P018
CTAT○○○○○○○○○**-B**○	Insert for cutting off	D019
CTAT○○○○○○○**LL/RR**	Insert for cutting off	D019
CTBHR/L○○○○**-**○○○	Small tools holder (For external cutting off)	D013,D020

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CTBT○○○○○○○○○○**-B**	Insert for cutting off	D020
CTCHR/L○○○○**-200**	Small tools holder (For external cutting off)	D021
CTCPR/L○○○○○○○○	MC holder	P018
CTCT○○○○○○○○○**-B**	Insert for cutting off	D021
CTDHR/L1616-○○○	Small tools holder (For external cutting off)	D022
CTDT○○○○○○○○**N/R-B**	Insert for cutting off	D022
CTDT25350V5R-BS	Insert for cutting off	D022
CTE○○**T**○○○	Shim (For MMTE holder)	G012
CTEHR/L1616-○○○	Small tools holder (For external cutting off)	D023
CTET○○○○○○○○○**-B**	Insert for cutting off	D023
CTET30350V5R-BS	Insert for cutting off	D023
CTGNR/L○○○○	MC holder	P018
CTGPR○○**CA**○○	BC type cartridge	M004
CTI○○**T**○○○	Shim (For MMTI holder)	G013
CV type	CV type end mill	P032
CWAF10N	Adjusting screw (For NF/NR10000/QF10000 type end mill)	P029,P030
CWAF10R○	Wedge	L148,P029,P030
CWAF5R/L	Wedge	P027
CWAHX640WN	Wedge	L031
CWAOX445N	Wedge	L032
CWCV20	Wedge	P032
CWFSTE	Wedge	P032
CWMSE445R○	Wedge	P029,P033
CWNSE300TR	Wedge-T	P030
CWS○	Wedge	L151,P028
CWS○**R/L**	Wedge	P028,P029
CWS42SER/L	Wedge	L152
CWS42SPR/L	Wedge	L150
CWS43SNN	Wedge	P027
CWSE○○○**SN**	Wedge-S	L034,P030,P033
CWSE○○○**TN**	Wedge-T	P030
CWSE○○○**TR/L**	Wedge-T	L034,P028,P030,P033
CWSF○○○**TR**○	Wedge-T	P027,P029,P030
CWSG20SN	Wedge-S	L033
CWSG20TR	Wedge-T	L033

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DC○○○○**T**	Clamp screw	P003
DCBSS	Diamond coated drill, For hard brittle materials	N256
DCET○○○○○○**R/L-SN**	Insert (Class E tolerance)	A134
DCET○○○○○○**R/L-SR**	Insert (Class E tolerance)	A134
DCET○○○○○○○**R/LW-SN**	Insert (Class E tolerance)	A135
DCGT○○○○○○○**-AZ**	Insert (Class G tolerance)	A132
DCGT○○○○○○○**M-SMG**	Insert (Class G tolerance)	A135
DCGT○○○○○○○**R/L-F**	Insert (Class G tolerance)	A132
DCGT○○○○○○○**R/L-SN**	Insert (Class G tolerance)	A135
DCGT○○○○○○○**R/L-SS**	Insert (Class G tolerance)	A133
DCGW○○○○○○○	Insert (Class G tolerance)	A135
DCGW○○○○○○○**FS**	Insert (Class G tolerance)	B044
DCK○○○○	Clamp bridge	P015
DCLNR/L○○○○○○○○	DOUBLE CLAMP holder	C008
DCMT○○○○○○○	Insert (Class M tolerance)	A133
DCMT○○○○○○○**-FM**	Insert (Class M tolerance)	A132
DCMT○○○○○○○**-FP**	Insert (Class M tolerance)	A132
DCMT○○○○○○○**-FV**	Insert (Class M tolerance)	A132
DCMT○○○○○○○**-LM**	Insert (Class M tolerance)	A133
DCMT○○○○○○○**-LP**	Insert (Class M tolerance)	A132
DCMT○○○○○○○**-MK**	Insert (Class M tolerance)	A133
DCMT○○○○○○○**-MM**	Insert (Class M tolerance)	A133
DCMT○○○○○○○**-MP**	Insert (Class M tolerance)	A133
DCMT○○○○○○○**-MV**	Insert (Class M tolerance)	A134
DCMT○○○○○○○**-SV**	Insert (Class M tolerance)	A133
DCMW○○○○○○○	Insert (Class M tolerance)	A135,B044,B060
DCS○	Spring	C008,C010,C016,C018－C021 E013－E015,H006－H011
DCSD○○○○○○○○	DCSD type end mill	P032
DCSN○○○○○○○○	DCSN type end mill	P032
DCSSM	Diamond coated drill, Medium, For non-ferrous material	N254
DCSSS	Diamond coated drill, Short, For non-ferrous material	N254
DCSVN32	Shim	P010
DCTU○○○**R/L**	D type boring head	P024
DDJNR/L○○○○○○○○	DOUBLE CLAMP holder	C010
DEGX○○○○○○○**R/L**	Insert (For AL holder)	A136
DEGX○○○○○○○**R/L-F**	Insert (For AL holder)	A136,B066
DF2MB	Diamond coated end mill	J260
DF2XLB	Diamond coated end mill	J261
DF3XB	Diamond coated end mill	J278
DF4JC	Diamond coated end mill	J167
DF4XL	Diamond coated end mill	J168
DFC4JC	DFC type end mill	J171
DFCJRT	DFC type end mill	J172
DFPSRB	Diamond coated end mill	J345
DGHR/L○○○○○○○○	DG holder	P022
DKS○	Clamp screw	P003
DLC2MA	DLC coated end mill	J086
DLC2MB	DLC coated end mill	J265
DNGA○○○○○○○	Insert (Class G tolerance)	A103,B027,B055
DNGG○○○○○○○**-FJ**	Insert (Class G tolerance)	A098
DNGG○○○○○○○**-PK**	Insert (Class G tolerance)	A098
DNGG○○○○○○○**R/L**	Insert (Class G tolerance)	A102
DNGM○○○○○○○**-MJ**	Insert (Class G tolerance)	A100
DNGN○○○○○○○	Insert (Class G tolerance)	B035
DNMA○○○○○○○	Insert (Class M tolerance)	A103
DNMG○○○○○○○	Insert (Class M tolerance)	A101
DNMG○○○○○○○**-C**	Insert (Class M tolerance)	A100
DNMG○○○○○○○**-FH**	Insert (Class M tolerance)	A098
DNMG○○○○○○○**-FS**	Insert (Class M tolerance)	A098
DNMG○○○○○○○**-FY**	Insert (Class M tolerance)	A098
DNMG○○○○○○○**-GH**	Insert (Class M tolerance)	A103
DNMG○○○○○○○**-GJ**	Insert (Class M tolerance)	A103
DNMG○○○○○○○**-GK**	Insert (Class M tolerance)	A101

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DNMG○○○○○○-LM	Insert (Class M tolerance)	A099
DNMG○○○○○○-LP	Insert (Class M tolerance)	A098
DNMG○○○○○○-LS	Insert (Class M tolerance)	A099
DNMG○○○○○○-MA	Insert (Class M tolerance)	A101
DNMG○○○○○○-MH	Insert (Class M tolerance)	A101
DNMG○○○○○○-MJ	Insert (Class M tolerance)	A100
DNMG○○○○○○-MK	Insert (Class M tolerance)	A100
DNMG○○○○○○-MM	Insert (Class M tolerance)	A100
DNMG○○○○○○-MP	Insert (Class M tolerance)	A100
DNMG○○○○○○-MS	Insert (Class M tolerance)	A102
DNMG○○○○○○-RK	Insert (Class M tolerance)	A102
DNMG○○○○○○-RM	Insert (Class M tolerance)	A102
DNMG○○○○○○-RP	Insert (Class M tolerance)	A102
DNMG○○○○○○-RS	Insert (Class M tolerance)	A103
DNMG○○○○○○-SA	Insert (Class M tolerance)	A099
DNMG○○○○○○-SH	Insert (Class M tolerance)	A099
DNMG○○○○○○-SY	Insert (Class M tolerance)	A099
DNMM○○○○○○-HZ	Insert (Class M tolerance)	A103
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DPCL○○○R/L	D type boring head	E040,P024
DPDH○○○R/L	D type boring head	E040,P024
DPDU○○○R/L	D type boring head	E039,P024
DPDZ○○○R/L	D type boring head	P024
DPSK○○○R/L	D type boring head	P024
DPT2○○○R	D type boring head	G032,P024
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DVJNR/L○○○○○○○	DOUBLE CLAMP holder	C018
DVPNR/L○○○○○○○	DOUBLE CLAMP holder	C020
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E

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EGS○○○○○	Clamp screw	P004
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ESDNR/L○○○○○○○	ML holder	P018
ESENR/L○○○○○○○	ML holder	P018
ESKNR/L○○○○○○○	ML holder	P018
ESS42	Shim	P010
EST○○	Shim	P010

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ETNNR/L○○○○○S	SL holder	P019
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F

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FA○-FASC○○○	Boring unit (Angular type)	M008
FA○-FASP○○○	Boring unit (Angular type)	M008
FAPN○○	Cartridge (For boring unit)	M008
FASC○○	Cartridge (For boring unit)	M008
FASP○○	Cartridge (For boring unit)	M008
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FC400890T	Clamp screw	P004
FCDG4○○○R/L○○	FCDG4 type boring bar	P025
FCL5○○○R/L	FCL5 type boring bar	P025
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FSCLP○○○○R/L-○○E	DIMPLE BAR (Carbide shank)	E006
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FSTUP○○○○R/L-○○E	DIMPLE BAR (Carbide shank)	E007
FSTUP○○○○R/L-○○S	DIMPLE BAR	E007
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FSWL○○○R/L○	FSWL type boring bar	E027
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FSWUB○○○○R/L-○○S	DIMPLE BAR	E010
FSWUB○○○○R-○○E-○/○	DIMPLE BAR (Carbide shank)	E010
FSWUP○○○○R/L-○○E	DIMPLE BAR (Carbide shank)	E010
FSWUP○○○○R/L-○○S	DIMPLE BAR	E010
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FV○	Boring unit (Vertical type)	M008
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FVSC○○○	Cartridge (For boring unit)	M008
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G

G2MS	HSS end mill	J387
G4LC	HSS end mill	J410
G4MC	HSS end mill	J404
GBE	GBE type end mill	J192
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GDCN2004PDR	Insert (For AF10000 type cutter)	K044
GDCN2004ZDTR1	Insert (For NR10000 type cutter)	K044
GMR	HSS end mill	J428
GPMT○○○○○○-U○	Insert (For TAF type drill)	K048,N244
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GSFPR	HSS end mill	J414
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GT○T○○○○○○○R/L-E	Insert (For small tools holder)	D017
GT○T○○○○○○○R/L-U	Insert (For small tools holder)	D016
GT○T○○○○○○○R-VT	Insert (For small tools holder)	D017
GT○TR/L	Insert (Blank)	D017
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GY1B○○○○○020N	Insert (For GY holder)	F014
GY1G○○○○○○○○N-GFGS	Insert (For GY holder)	B053,F013
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GYHR/L○○○○○50-M○○R/L	GY holder	F050－F051
GYHR/L○○○○○90-M○○R/L	GY holder	F044－F049,F084－F093
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H63TH-DCLNL-L12-3	HSK DCLN type holder	H008
H63TH-DCLNR/L-DX12	HSK DCLN type holder	H006
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H63TH-EV2525R/L-112	HSK boring bar holder	H019
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MMT○○**IR**○○○○○○○	Insert (For MMTI boring bar)	G015,G017,G019,G021
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SNMG○○○○○○**-GH**	Insert (Class M tolerance)	A109
SNMG○○○○○○**-GK**	Insert (Class M tolerance)	A107
SNMG○○○○○○**-GM**	Insert (Class M tolerance)	A107
SNMG○○○○○○**-LK**	Insert (Class M tolerance)	A105
SNMG○○○○○○**-LM**	Insert (Class M tolerance)	A105
SNMG○○○○○○**-LP**	Insert (Class M tolerance)	A105
SNMG○○○○○○**-MA**	Insert (Class M tolerance)	A107
SNMG○○○○○○**-MH**	Insert (Class M tolerance)	A107
SNMG○○○○○○**-MK**	Insert (Class M tolerance)	A106
SNMG○○○○○○**-MM**	Insert (Class M tolerance)	A106
SNMG○○○○○○**-MP**	Insert (Class M tolerance)	A106
SNMG○○○○○○**-MS**	Insert (Class M tolerance)	A107
SNMG○○○○○○**R/L-1G**	Insert (Class M tolerance)	A106
SNMG○○○○○○**-RK**	Insert (Class M tolerance)	A108
SNMG○○○○○○**-RM**	Insert (Class M tolerance)	A108
SNMG○○○○○○**-RP**	Insert (Class M tolerance)	A108
SNMG○○○○○○**-RS**	Insert (Class M tolerance)	A108
SNMG○○○○○○**-SA**	Insert (Class M tolerance)	A105
SNMG○○○○○○**-SH**	Insert (Class M tolerance)	A105
SNMG○○○○○○**-SY**	Insert (Class M tolerance)	A106
SNMM○○○○○○**-HV**	Insert (Class M tolerance)	A109
SNMM○○○○○○**-HX**	Insert (Class M tolerance)	A109
SNMM○○○○○○**-HZ**	Insert (Class M tolerance)	A109
SNMN○○○○○○	Insert (Class M tolerance)	A124,K031
SNMU○○○○○○**ANER-**○	Insert (For WSX445 type cutter)	K031,L013
SNTF○○○○**R**	SNT holder	P025
SOET12T308PEER-JL	Insert (For ASX400 type cutter)	K031,L043
SOGT12T308PEFR-JP	Insert (For ASX400 type cutter)	K031,L043
SOMT12T308PEER/L-JM	Insert (For ASX400 type cutter)	K032,L043
SOMT12T308PEER-JH	Insert (For ASX400 type cutter)	K031,L043
SOMT12T320PEER-FT	Insert (For ASX400 type cutter)	K032,L043
SOMX○○○○○○○**-**○○	Insert (For MVX type drill)	K048,N218
SONX1206PER	Insert (For VOX400 type cutter)	K032,L037
SPCA53Z	Insert (For FF3000 type face mill)	K032,L149
SPCG53Z	Insert (For FF3000 type face mill)	K032,L149
SPEN○○○○**EDR**	Insert (For corner angle 15° type cutter)	K033
SPEN○○○**A**	Insert (For FP490/590 type cutter)	K032,L150,L151
SPEN1203EEER/L1	Insert (For FBP415/QBP415 type cutter)	K033

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SPER1203EEER-JS	Insert (For FBP415/QBP415 type cutter)	K033
SPGN○○○○○○	Insert (For S400/500 type cutter)	A160,B051,B068,K033
SPGR○○○○○○○R	Insert (Class G tolerance)	A160
SPGX○○○○○○	Insert (Class G tolerance)	A140,B060
SPKN○○○○EDR	Insert (For corner angle 15° type cutter)	K033
SPMB1204APT	Insert (For BSP type end mill)	K033
SPMN○○○○○○	Insert (Class M tolerance)	A160,K033
SPMN○○○○○○T	Insert (Class M tolerance)	K033
SPMR○○○○○○	Insert (Class M tolerance)	A160
SPMT○○○○○○	Insert (Class M tolerance)	A140
SPMT120408-A	Insert (For TBE1 type end mill)	K034
SPMW○○○○○○	Insert (Class M tolerance)	A140,K034,L113
SPMX120408-○○	Insert (For SPX type end mill)	K034,L110
SPNN1203EEER/L1	Insert (For FBP415 type cutter)	K033
SPS1	Locator screw	P006
SPSE○○○R/L	Locator	L034,P030,P033
SPSEW○○○R/L	Locator	P030
SPSG20R	Locator	L033
SPSHP400R/L	Locator	P030,P033
SPSVN32	Shim	P012
SPX4-○○○A24A058RA	SPX type end mill	L109
SPX4R○○○○○○○A058A	SPX type end mill	L109
SPX4R○○○○○BT50N○○	SPX type end mill	L108
SPX4R○○○○○MT5N○	SPX type end mill	L108
SPX4R○○○○○WN○○	SPX type end mill	L108
SR	HSS end mill	J426
SRBT○○	Insert (For SRF type end mill)	K034,L122
SRDCN○○○○○○○	SP holder	C025,P019
SRE type	SRE type end mill	P033
SRFH○○AM○○○○	SRF type end mill	L121,L125
SRFH○○S○○○	SRF type end mill	L120,L124
SRFH○○S○○○W	SRF type end mill (Carbide shank)	L121,L125
SRFT○○	Insert (For SRF type end mill)	K034,L122
SRG○○C	Insert (For SRM2 type end mill)	K035,L129,L134
SRG○○E	Insert (For SRM2 type end mill)	K035,L129,L134
SRGCR/L○○○○○○○	SP holder	C025,P019
SRK1R	Clamp bridge	P015
SRM○○C-M	Insert (For SRM2 type end mill)	K035,L129
SRM○○E-M	Insert (For SRM2 type end mill)	K035,L129
SRM2○○○AM○○S/L○○	SRM2 type end mill	L130
SRM2○○○M/S/WNL○	SRM2 type end mill	L134
SRM2○○○S○○	SRM2 type end mill	L128,L129
SRS5	Clamp screw	P006,P033
SRSGN○○○○○○○	SR holder	P020
SRSGR/L○○○○○○○	SR holder	P020
SRXCR/L○○○○○○○	SP holder	P019
SSBCR/L1616H09	SP holder	P019
SSE41R/L	Locator (For E404 type face mill)	P028
SSKPR○○CA○○	SS type cartridge	M006
SSP○○R/L	Locator	P029
SSSCR/L○○○○○○○	SP holder	C026
SSSPR○○CA○○	SS type cartridge	M006
SSYPR○○CA○○	SS type cartridge	M006
STASX○○○N	Shim	P012
STAW○N○○○○S○○	STAW type drill (General use)	N220
STAW○S○○○○S○○	STAW type drill (General use)	N220
STAWK○○○○TG	Insert (For STAW type drill)	K055,N220,N223
STAWN○○○○T	Insert (For STAW type drill)	K054,N220,N223
STAWN○○○○TH	Insert (For STAW type drill)	K053,N220,N223
STBE445NF	Shim	P028
STBS500N	Shim	P012
STFER/L○○○○○○○	AL holder	C033
STFPR/L○○CA○○	SS type cartridge	M006
STGCR/L○○○○○○○	SP holder	C027
STGER/L○○○○○○○	AL holder	C033
STGPR○○CA○○	SS type cartridge	M006
STPMR○N	Shim	L143
STS1	Clamp screw	P006
STSE○○○R/L	Shim	L034
STSP415R	Shim	P030
STTPR○○CA○○	SS type cartridge	M006
SUFT○○R○○	Insert (For SUF type end mill)	K036,L126
SVJBR/L○○○○○○○-SM	Small tools holder (External front turning)	D010
SVJCR/L○○○○○○○	SP holder	C028,P019
SVJDR/L○○○○○○○	AL holder	C034
SVLPR/L○○○○○○○-SM	Small tools holder (External front turning)	D010
SVPCR/L○○○○○○○	SP holder	C029,P019
SVPDR/L○○○○○○○	AL holder	P020
SVPPR/L○○○○○○○-SM	Small tools holder (External front turning)	D011
SVVBR/L○○○○○○○-SM	Small tools holder (External front turning)	D011
SVVCN○○○○○○○	SP holder	C028,P019
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TASS○○○○C/S○○	TASS type drill	P035
TAW○B○○○○S32	TAW type drill (For bridge construction)	N239
TAW○H○○○○T	Insert (For TAW type drill)	K049,K050,N229 N234,N239
TAW○N○○○○S○○	TAW type drill (General use)	N229
TAWKH○○○○TG	Insert (For TAW type drill)	K051,N229,N236
TBE1 type	TBE1 type end mill	P034
TBE2 type	TBE2 type end mill	P034
TBGN○○○○○○	Insert (Class G tolerance)	B052
TCGN○○○○○○	Insert (Class G tolerance)	A161
TCGT○○○○○○-AZ	Insert (Class G tolerance)	A141
TCGT○○○○○○R/L-F	Insert (Class G tolerance)	A141
TCGW○○○○○○	Insert (Class G tolerance)	B061
TCGW○○○○○○FS	Insert (Class G tolerance)	B045
TCMT○○○○○○	Insert (Class M tolerance)	A142
TCMT○○○○○○-FM	Insert (Class M tolerance)	A141
TCMT○○○○○○-FP	Insert (Class M tolerance)	A141
TCMT○○○○○○-FV	Insert (Class M tolerance)	A141

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TCMT○○○○○○-LM	Insert (Class M tolerance)	A142
TCMT○○○○○○-LP	Insert (Class M tolerance)	A141
TCMT○○○○○○-MK	Insert (Class M tolerance)	A142
TCMT○○○○○○-MM	Insert (Class M tolerance)	A142
TCMT○○○○○○-MP	Insert (Class M tolerance)	A142
TCMW○○○○○○	Insert (Class M tolerance)	A143,B045,B061
TD	Taper shank drill	N185
TECN○○○○PE○R1	Insert (For NSE300/NSE400 type cutter)	K037,K045
TECN1603PE○1W	Insert (For NSE300/SE300 type cutter)	K037
TEEN○○○○PE○R1	Insert (For NSE300/NSE400 type cutter)	K036,K037
TEER○○○○PEER-JS	Insert (For NSE300/400/SE300 type cutter)	K037
TEGX○○○○○○	Insert (For AL holder)	B066
TEGX○○○○○○R/L	Insert (For AL holder)	A144,B066
TEKN○○○○PE○R	Insert (For NSE400/SE400 type cutter)	K037
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TKY○○F	Flag wrench	P002
TKY○○R	L-wrench	P002
TKY○○T	T-wrench	P002
TKY○○W	Flag wrench	P002
TLHR○○○○	TL holder	C035
TNGA○○○○○○	Insert (Class G tolerance)	A115,B031,B056
TNGG○○○○○○-PK	Insert (Class G tolerance)	A110
TNGG○○○○○○R/L	Insert (Class G tolerance)	A114
TNGG○○○○○○R/L-F	Insert (Class G tolerance)	A110
TNGG○○○○○○R/L-FS	Insert (Class G tolerance)	A110
TNGG○○○○○○R/L-K	Insert (Class G tolerance)	A112
TNGN○○○○○○	Insert (Class G tolerance)	A125,B038
TNMA○○○○○○	Insert (Class M tolerance)	A115
TNMG○○○○○○	Insert (Class M tolerance)	A113
TNMG○○○○○○-C	Insert (Class M tolerance)	A111
TNMG○○○○○○-FH	Insert (Class M tolerance)	A110
TNMG○○○○○○-FS	Insert (Class M tolerance)	A110
TNMG○○○○○○-FY	Insert (Class M tolerance)	A110
TNMG○○○○○○-GH	Insert (Class M tolerance)	A115
TNMG○○○○○○-GK	Insert (Class M tolerance)	A112
TNMG○○○○○○-GM	Insert (Class M tolerance)	A112
TNMG○○○○○○-LK	Insert (Class M tolerance)	A111
TNMG○○○○○○-LM	Insert (Class M tolerance)	A111
TNMG○○○○○○-LP	Insert (Class M tolerance)	A110
TNMG○○○○○○-LS	Insert (Class M tolerance)	A111
TNMG○○○○○○-MA	Insert (Class M tolerance)	A113
TNMG○○○○○○-MH	Insert (Class M tolerance)	A113
TNMG○○○○○○-MJ	Insert (Class M tolerance)	A112
TNMG○○○○○○-MK	Insert (Class M tolerance)	A112
TNMG○○○○○○-MM	Insert (Class M tolerance)	A112
TNMG○○○○○○-MP	Insert (Class M tolerance)	A112
TNMG○○○○○○-MS	Insert (Class M tolerance)	A113
TNMG○○○○○○R/L-1G	Insert (Class M tolerance)	A111
TNMG○○○○○○R/L-2G	Insert (Class M tolerance)	A114
TNMG○○○○○○R/L-ES	Insert (Class M tolerance)	A113
TNMG○○○○○○-RK	Insert (Class M tolerance)	A115
TNMG○○○○○○-RM	Insert (Class M tolerance)	A114
TNMG○○○○○○-RP	Insert (Class M tolerance)	A114
TNMG○○○○○○-RS	Insert (Class M tolerance)	A115
TNMG○○○○○○-SA	Insert (Class M tolerance)	A111
TNMG○○○○○○-SH	Insert (Class M tolerance)	A111
TNMG○○○○○○-SY	Insert (Class M tolerance)	A111
TNMM○○○○○○-HZ	Insert (Class M tolerance)	A115
TNMN○○○○○○	Insert (Class M tolerance)	A125
TNMX○○○○○○-MW	Insert (Class M tolerance)	A113
TNMX○○○○○○-SW	Insert (Class M tolerance)	A111
TNP-CCGW○○○○○○G2	Insert (Class G tolerance)	B040
TNP-CNGA○○○○○○○2	Insert (Class G tolerance)	B023
TNP-DCGW○○○○○○G2	Insert (Class G tolerance)	B043
TNP-DNGA○○○○○○○2	Insert (Class G tolerance)	B026
TNP-SNGA○○○○○○○2	Insert (Class G tolerance)	B028
TNP-TNGA○○○○○○○3	Insert (Class G tolerance)	B031
TNP-VNGA○○○○○○○2	Insert (Class G tolerance)	B032
TPEN○○○○P○R	Insert (For corner angle 0° type cutter)	K037
TPEW○○○○ZP○R2	Insert (For PMF type end mill)	K037,K046,L142
TPGH○○○○○○R/L-FS	Insert (Class G tolerance)	A145
TPGN○○○○○○	Insert (Class G tolerance)	A162,B052,B068
TPGR○○○○○○R/L	Insert (Class G tolerance)	A162
TPGT○○○○○○R/L-F	Insert (Class G tolerance)	B062
TPGV○○○○○○R/L-F	Insert (Class G tolerance)	B063
TPGX○○○○○○	Insert (Class G tolerance)	A147,B047,B063
TPGX○○○○○○R/L	Insert (Class G tolerance)	A146
TPKN○○○○P○R	Insert (For corner angle 0° type cutter)	K037
TPMH○○○○○○-FV	Insert (Class M tolerance)	A145
TPMH○○○○○○-MV	Insert (Class M tolerance)	A147
TPMH○○○○○○-SV	Insert (Class M tolerance)	A146
TPMN○○○○○○	Insert (Class M tolerance)	A162,K038
TPMR○○○○○○	Insert (Class M tolerance)	A162
TPMX○○○○○○	Insert (Class M tolerance)	A146
TPMX○○○○○○L	Insert (Class M tolerance)	A146
TPNX1605N	Insert (For VIPER type end mill)	K038
TPS○○	Clamp screw	P007
TRM2○○○S○	TRM2 type end mill	P034
TS○	Clamp screw	P007
TS○○	Clamp screw	P007
TS○○○	Clamp screw	P007
TSMPR○○○S○○	TSMP type end mill	L136
TSR○○○○○○S	Clamp screw	P008
TSS○○○○○	Radial screw	P008
TTAHR/L○○○○	Small tools holder (External threading)	D024
TTAT○○○○○○○R/L○-B	Insert (For small tools holder)	D024
TTD	Taper shank drill, For steel frame	N196

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UGS1	Wrench	F121

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VAJR	VIOLET end mill	J422
VALR	VIOLET end mill	J424
VAMFPR	VIOLET end mill	J418
VAMH	VIOLET end mill	J397
VAMR	VIOLET end mill	J420
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VAPDMSUS	VIOLET drill, Medium, High precision, For stainless steel	N152
VAPDS	VIOLET drill, Short, High precision	N137
VAPDSCB	VIOLET drill, Short flute length, High precision, For counter boring	N159
VAPDSSUS	VIOLET drill, Short, High precision, For stainless steel	N146
VASFPR	VIOLET end mill	J416
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VBET○○○○○○○**R/L-SR**	Insert (Class E tolerance)	A150
VBET○○○○○○○**R/LW-SN**	Insert (Class E tolerance)	A150
VBGT○○○○○○○**R/L-F**	Insert (Class G tolerance)	A148
VBMT○○○○○○○	Insert (Class M tolerance)	A149
VBMT○○○○○○○**-FM**	Insert (Class M tolerance)	A148
VBMT○○○○○○○**-FP**	Insert (Class M tolerance)	A148
VBMT○○○○○○○**-FV**	Insert (Class M tolerance)	A148
VBMT○○○○○○○**-LM**	Insert (Class M tolerance)	A148
VBMT○○○○○○○**-LP**	Insert (Class M tolerance)	A148
VBMT○○○○○○○**-MK**	Insert (Class M tolerance)	A149
VBMT○○○○○○○**-MM**	Insert (Class M tolerance)	A149
VBMT○○○○○○○**-MP**	Insert (Class M tolerance)	A149
VBMT○○○○○○○**-MV**	Insert (Class M tolerance)	A149
VBMT○○○○○○○**-SV**	Insert (Class M tolerance)	A149
VBMW○○○○○○○	Insert (Class M tolerance)	A150
VC2C	MIRACLE end mill	J377
VC2ESB	MIRACLE end mill	J243
VC2JS	MIRACLE end mill	J079
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VC4MC	MIRACLE end mill	J160
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VC6MH	MIRACLE end mill	J189
VC8MH	MIRACLE end mill	J191
VCGT○○○○○○○**-AZ**	Insert (Class G tolerance)	A151
VCGT○○○○○○○**R/L-F**	Insert (Class G tolerance)	A151
VCHFRB	MIRACLE end mill	J339
VCHSM	MIRACLE drill, Medium, For hardened material	N128
VCLD	MIRACLE end mill	J188
VCMDSC	MIRACLE end mill	J164
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VCMT○○○○○○○	Insert (Class M tolerance)	A152
VCMT○○○○○○○**-FM**	Insert (Class M tolerance)	A151
VCMT○○○○○○○**-FP**	Insert (Class M tolerance)	A151
VCMT○○○○○○○**-FV**	Insert (Class M tolerance)	A151
VCMT○○○○○○○**-LM**	Insert (Class M tolerance)	A151
VCMT○○○○○○○**-LP**	Insert (Class M tolerance)	A151
VCMT○○○○○○○**-MK**	Insert (Class M tolerance)	A152
VCMT○○○○○○○**-MM**	Insert (Class M tolerance)	A152
VCMT○○○○○○○**-MP**	Insert (Class M tolerance)	A152
VCMT○○○○○○○**-MV**	Insert (Class M tolerance)	A152
VCMT○○○○○○○**-SV**	Insert (Class M tolerance)	A152
VCMW○○○○○○○	Insert (Class M tolerance)	A152
VCPSRB	MIRACLE end mill	J292
VCSFPR	MIRACLE end mill	J202
VCSSS	MIRACLE drill, Short, For steel (3mm shank series)	N127
VCT13R	Cartridge (For V10000 type cutter)	L147
VCXB	MIRACLE end mill	J251
VDGX○○○○○○○**R/L**	Insert (Class G tolerance)	A153
VDGX○○○○○○○**R/L-F**	Insert (Class G tolerance)	B067
VF2MD	IMPACT MIRACLE end mill	J067
VF2MV	IMPACT MIRACLE end mill	J069
VF2SB	IMPACT MIRACLE end mill	J229
VF2SDB	IMPACT MIRACLE end mill	J232
VF2SDBL	IMPACT MIRACLE end mill	J233
VF2SSB	IMPACT MIRACLE end mill	J228
VF2WB	IMPACT MIRACLE end mill	J227
VF2XL	IMPACT MIRACLE end mill	J071
VF2XLB	IMPACT MIRACLE end mill	J237
VF2XLBS	IMPACT MIRACLE end mill	J236
VF3XB	IMPACT MIRACLE end mill	J271
VF4MB	IMPACT MIRACLE end mill	J281
VF4MD	IMPACT MIRACLE end mill	J143
VF4MV	IMPACT MIRACLE end mill	J145
VF4SVB	IMPACT MIRACLE end mill	J279
VF6MHV	IMPACT MIRACLE end mill	J183
VF6MHVCH	IMPACT MIRACLE end mill	J187
VF6MHVRB	IMPACT MIRACLE end mill	J348
VF6MHVRBCH	IMPACT MIRACLE end mill	J353
VF6SVRCH	IMPACT MIRACLE end mill	J204
VF8MHVCH	IMPACT MIRACLE end mill	J190
VF8MHVRBCH	IMPACT MIRACLE end mill	J354
VFFDRB	IMPACT MIRACLE end mill	J314
VFHVRB	IMPACT MIRACLE end mill	J315
VFJHV	IMPACT MIRACLE end mill	J148

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VFMD	IMPACT MIRACLE end mill	J185
VFMDRB	IMPACT MIRACLE end mill	J351
VFMFPR	IMPACT MIRACLE end mill	J199
VFMHV	IMPACT MIRACLE end mill	J146
VFMHVCH	IMPACT MIRACLE end mill	J150
VFMHVRB	IMPACT MIRACLE end mill	J325
VFMHVRBCH	IMPACT MIRACLE end mill	J327
VFSD	IMPACT MIRACLE end mill	J184
VFSDRB	IMPACT MIRACLE end mill	J350
VFSFPR	IMPACT MIRACLE end mill	J197
VFSFPRCH	IMPACT MIRACLE end mill	J201
VFX5-○○○○○○**A**○○○**R**	VFX5 type end mill	L114
VFX6-○○○**A**○○**A**○○○**R**	VFX6 type end mill	L117
VIP400 type	VIP400 type face mill	P030
VIP445 type	VIP445 type face mill	P030
VIPER type	VIPER type end mill	P033
VNGA○○○○○○	Insert (Class G tolerance)	A118,B033,B057
VNGG○○○○○○**-FJ**	Insert (Class G tolerance)	A116
VNGG○○○○○○**R/L**	Insert (Class G tolerance)	A118
VNGG○○○○○○**R/L-F**	Insert (Class G tolerance)	A116
VNGM○○○○○○**-MJ**	Insert (Class G tolerance)	A117
VNMG○○○○○○	Insert (Class M tolerance)	A118
VNMG○○○○○○**-FH**	Insert (Class M tolerance)	A116
VNMG○○○○○○**-FS**	Insert (Class M tolerance)	A116
VNMG○○○○○○**-GK**	Insert (Class M tolerance)	A117
VNMG○○○○○○**-GM**	Insert (Class M tolerance)	A117
VNMG○○○○○○**-LK**	Insert (Class M tolerance)	A116
VNMG○○○○○○**-LM**	Insert (Class M tolerance)	A116
VNMG○○○○○○**-LP**	Insert (Class M tolerance)	A116
VNMG○○○○○○**-LS**	Insert (Class M tolerance)	A117
VNMG○○○○○○**-MA**	Insert (Class M tolerance)	A118
VNMG○○○○○○**-MH**	Insert (Class M tolerance)	A118
VNMG○○○○○○**-MJ**	Insert (Class M tolerance)	A117
VNMG○○○○○○**-MK**	Insert (Class M tolerance)	A117
VNMG○○○○○○**-MM**	Insert (Class M tolerance)	A117
VNMG○○○○○○**-MP**	Insert (Class M tolerance)	A117
VNMG○○○○○○**-MS**	Insert (Class M tolerance)	A118
VNMG○○○○○○**-SH**	Insert (Class M tolerance)	A117
VOX400-○○○○○○**R**	VOX400 type face mill	L036,L037
VOX400R○○○○○○	VOX400 type face mill	L036
VPET○○○○○○**R/L-SRF**	Insert (Class E tolerance)	A154
VPGT○○○○○○**M-SMG**	Insert (Class G tolerance)	A154
VQ4SVB	SMART MIRACLE end mill	J283
VQJHV	SMART MIRACLE end mill	J155
VQMHV	SMART MIRACLE end mill	J151
VQMHVRB	SMART MIRACLE end mill	J328
VQMHVRBF	SMART MIRACLE end mill	J333
VQMHZV	SMART MIRACLE end mill	J112
VQMHZVOH	SMART MIRACLE end mill	J118
VQSVR	SMART MIRACLE end mill	J180
VQXL	SMART MIRACLE end mill	J157
VSD	VIOLET drill, Straight shank	N162
VSD645 type	VSD645 type face mill	P030
VTDS	VIOLET drill, Short, Taper shank	N164

W

ORDER NUMBER	PRODUCT NAME	PAGE
WBGT○○○○○○**R/L-F**	Insert (Class G tolerance)	A155
WBMT○○○○○○**R/L-MV**	Insert (Class M tolerance)	A155
WCGT○○○○○○**R/L**	Insert (Class G tolerance)	A156
WCMT○○○○○○	Insert (Class M tolerance)	A156
WCMW○○○○○○	Insert (Class M tolerance)	B065
WCS○○○○○○**H**	Shim screw	P008
WEC○○**AF**○**R5C**	Wiper insert (For SE445/545 type cutter)	K042
WEC○○**EF**○**R5C**	Wiper insert (For SE415/515 type cutter)	K042,L035
WEEW13T3AG○**R3C**	Wiper insert (For ASX445 type cutter)	K047,L021
WEEW13T3AG○**R8C**	Wiper insert (For ASX445 type cutter)	K042,L021
WFC42ZFER2	Wiper insert (For BF407/QBF407 type cutter)	K047
WNEU2006ZEN7C-WK	Wiper insert (For AHX640W type cutter)	K043,L028,L030
WNEU2007ZEN7C-WP	Wiper insert (For AHX640S type cutter)	K043,L028
WNGU1406ANEN8C-M	Wiper insert (For WSX445 type cutter)	K043,L013
WNMA○○○○○○	Insert (Class M tolerance)	A123
WNMG○○○○○○	Insert (Class M tolerance)	A122
WNMG○○○○○○**-C**	Insert (Class M tolerance)	A120
WNMG○○○○○○**-FH**	Insert (Class M tolerance)	A119
WNMG○○○○○○**-FS**	Insert (Class M tolerance)	A119
WNMG○○○○○○**-FY**	Insert (Class M tolerance)	A119
WNMG○○○○○○**-GH**	Insert (Class M tolerance)	A123
WNMG○○○○○○**-GJ**	Insert (Class M tolerance)	A123
WNMG○○○○○○**-GK**	Insert (Class M tolerance)	A121
WNMG○○○○○○**-GM**	Insert (Class M tolerance)	A121
WNMG○○○○○○**-LK**	Insert (Class M tolerance)	A119
WNMG○○○○○○**-LM**	Insert (Class M tolerance)	A119
WNMG○○○○○○**-LP**	Insert (Class M tolerance)	A119
WNMG○○○○○○**-LS**	Insert (Class M tolerance)	A119
WNMG○○○○○○**-MA**	Insert (Class M tolerance)	A121
WNMG○○○○○○**-MH**	Insert (Class M tolerance)	A121
WNMG○○○○○○**-MJ**	Insert (Class M tolerance)	A120
WNMG○○○○○○**-MK**	Insert (Class M tolerance)	A121
WNMG○○○○○○**-MM**	Insert (Class M tolerance)	A121
WNMG○○○○○○**-MP**	Insert (Class M tolerance)	A121
WNMG○○○○○○**-MS**	Insert (Class M tolerance)	A122
WNMG○○○○○○**-MW**	Insert (Class M tolerance)	A122
WNMG○○○○○○**-RK**	Insert (Class M tolerance)	A122
WNMG○○○○○○**-RM**	Insert (Class M tolerance)	A122
WNMG○○○○○○**-RP**	Insert (Class M tolerance)	A122
WNMG○○○○○○**-RS**	Insert (Class M tolerance)	A123
WNMG○○○○○○**-SA**	Insert (Class M tolerance)	A120
WNMG○○○○○○**-SH**	Insert (Class M tolerance)	A120
WNMG○○○○○○**-SW**	Insert (Class M tolerance)	A120
WNMG○○○○○○**-SY**	Insert (Class M tolerance)	A120

ORDER NUMBER	PRODUCT NAME	PAGE
WOEW12T308PE○○8C	Wiper insert (For ASX400 type cutter)	K043,L043
WOEX1206PER5C	Wiper insert (For VOX400 type cutter)	K043,L037
WPC42EEER/L10C	Wiper insert (For FBP415/QBP415 type cutter)	K043
WPC42W3GR	Wiper insert (For P425/DP type cutter)	K043
WPGT○○○○○○	Insert (Class G tolerance)	B065
WPGT○○○○○○R/L-FS	Insert (Class G tolerance)	A157
WPMT○○○○○○-MV	Insert (Class M tolerance)	A157
WPSTN○○	Shim	P012
WPSWC43	Shim	P012
WPSWN43	Shim	P012
WS○○○○○○T	Clamp screw	P008
WS○○○○○○TPS	Clamp screw	N228
WS○○LH	Stopper	N228
WS1	Wedge screw	P008
WSX445-○○○○○○○R	WSX445 type face mill	L010,L011
WSX445R○○○○○○○	WSX445 type face mill	L010
WSX445R○○○○SA32M	WSX445 type end mill	L012

X

ORDER NUMBER	PRODUCT NAME	PAGE
XCMT○○○○○○-SVX	Insert (Class M tolerance)	A158
XDGT1550PD○R-G○○	Insert (For BXD type cutter)	K038,L075
XDGT1550PDFR-GL○○	Insert (For BXD type cutter)	K038,L075
XDGX1750○○PD○R-GM	Insert (For AXD4000 type cutter)	K039,L062
XDGX1750○○PDFR-GL	Insert (For AXD4000 type cutter)	K039,L062
XDGX2270○○PDFR-GL	Insert (For AXD7000 type cutter)	K039,L068
XNMU160○○○R-○S	Insert (For VFX5 type cutter)	K040,L115
XNMU190○○○R-○S	Insert (For VFX6 type cutter)	K040,L118
XPGT○○○○PD○R-G○○	Insert (For BAP3500 type cutter)	K041
XPMT○○○○PDER-M○○	Insert (For BAP3500 type end mill)	K041

Z

ORDER NUMBER	PRODUCT NAME	PAGE
ZCMX○○○○○○ER-○	Insert (For DCCC type end mill)	K041
ZR○○○C	C type head (For ZR type end mill)	P033
ZR○○○T	T type head (For ZR type end mill)	P033
ZRM○○○○R-M○	Insert (For BAP300 type end mill)	K041

NUMBER•OTHERS

ORDER NUMBER	PRODUCT NAME	PAGE
01-○	Insert (For brazed tools holder)	I002
02-○	Insert (For brazed tools holder)	I002
03-○	Insert (For brazed tools holder)	I002
04-○	Insert (For brazed tools holder)	I002
05-○	Insert (For brazed tools holder)	I002
06-○	Insert (For brazed tools holder)	I002
07-○	Insert (For brazed tools holder)	I003
08-○	Insert (For brazed tools holder)	I003
09E1	Insert (For brazed tools holder)	I003
1LA	HSS end mill	J379
1MA	HSS end mill	J378
2LS	HSS end mill	J391
2MK	HSS end mill	J394
2MS	HSS end mill	J389
2SS	HSS end mill	J383
31-○	31 type brazed tools holder	I005
32-○	32 type brazed tools holder	I005
33-○	33 type brazed tools holder	I005
34-○	34 type brazed tools holder	I005
35-○	35 type brazed tools holder	I005
36-○	36 type brazed tools holder	I005
37-○	37 type brazed tools holder	I006
38-○	38 type brazed tools holder	I006
39-○	39 type brazed tools holder	I006
3KD	Triangular shank drill, (Type 6.5)(Type 10)(Type 13)	N197
40-○	40 type brazed tools holder	I006
41-○	41 type brazed tools holder	I006
42-○	42 type brazed tools holder	I006
43-○	43 type brazed tools holder	I006
47-○	47 type brazed tools holder	I007
49-○	49 type brazed tools holder	I007
4LC	HSS end mill	J412
4MC	HSS end mill	J406
51-○	51 type brazed tools holder	I007
95-○	95 type brazed tools holder	I007

SAFETY OF CUTTING TOOL PRODUCTS

1. Use of Cutting Tool Products

Packages of Mitsubishi products carry a safety warning label. However, tools are not labeled with detailed warning indications. Please read the "Safety of Cutting Tool Products" in this catalogue before handling cutting tool products and cemented carbide materials. Moreover, as a part of your workers' safety education, please notify the contents of the "Safety of Cutting Tool Products" to all workers.

2. Basic Characteristics of Hard Tool Materials

In Terms of "Safety of Cutting Tool Products"

Hard Tool Materials : General term for tool materials like cemented carbide alloy, cermet, ceramics, sintered CBN, sintered diamond, high speed steel and alloy steel, etc.

Physical Characteristics

Appearance : Varies depending on the type of material. Eg. grey, black, gold, etc.
Smell : None
Hardness, Specific Gravity :

Hard Tool Materials	Hardness (HV)	Specific Gravity	Hard Tool Materials	Hardness (HV)	Specific Gravity
High Speed Steel (HSS)	200－1200kg/mm^2	7－9	Sintered CBN	2000－5000kg/mm^2	3－5
Cemented Carbide	500－3000kg/mm^2	9－16	Sintered Diamond	8000－12000kg/mm^2	3－5
Cermet	500－3000kg/mm^2	5－9	Alloy Steel	200－1200kg/mm^2	7－9
Ceramics	1000－4000kg/mm^2	2－7	Diamond Electroforming Product	8000－12000kg/mm^2	3－5

Constituents

Carbide, nitride, carbon nitride, oxide, such as W, Ti, Al, Si, Ta, B, V and metals such as Fe, Co, Ni, Cr, Mo.

3. Safety of Cutting Tool Products

○Hard tool materials have a large specific gravity. Thus, they require special attention as heavy materials when the size or quantity is large.

○Cutting tool products generate dust and mist during grinding operations or heating. This dust and mist can be harmful when coming in contact with the eyes or skin, or if substantial quantities are swallowed. When grinding and machining, it is recommended to use local exhaust ventilation and respirators, a dust protective mask, glasses, gloves etc. If dust makes contact with the hands, thoroughly wash the affected area with soap and water. Don't eat in the exposed area, and wash hands thoroughly before eating. Remove dust from the clothing by a cleaning or washing, but don't shake off.

○Cobalt and nickel contained in carbide or other cutting tool materials are reported as possibly carcinogenic to humans. It is also reported that cobalt and nickel dust and mist can affect the skin, respiratory organs and heart through repeated or prolonged contact.

○For further information, please refer to **MSDS** (Material Safety Data Sheet).
MSDS=Material Safety Data Sheet
Home page: http://www.mitsubishicarbide.com/msds/

4. Handling Cutting Tool Products

○Surface conditions affect toughness of cutting tools. Therefore, use a diamond grinding wheel for finishing.

○Hard tool materials are extremely hard and brittle at the same time. Thus, they may be broken by shocks and tightening with excess force.

○Hard tool materials and ferrous materials have different thermal expansion ratios. Shrinkage or swell fit products may suffer from cracks when applied temperature is higher or lower than the appropriate temperature for the tool.

○Pay special attention on storing hard tool materials. Toughness of hard tool materials is lowered when they corrode due to coolant and other liquid.

○When brazing hard tool materials, if the temperature is too high or too low from the melting point of the brazing material, loosening and breakage may occur.

○After regrinding cutting tools, make sure that there are no cracks.

○Machining hard tool materials on EDM may cause cracks on the surface due to electrons remaining after the EDM operation, resulting in lowering of the toughness. Eliminate these cracks by grinding, etc.

SUGGESTIONS ON HOW TO USE CUTTING TOOLS

Products	Hazard	Countermeasure
All Cutting Tools	◎Cutting tools have sharp cutting edges. Handling them with bare hands may cause injuries.	✱Take precautions such as wearing gloves especially when handling tools and during installation.
	◎Improper use of tools and application of inappropriate cutting conditions may cause the tool to break and be expelled from the machine providing risk of injury.	✱Ensure safety guards and goggles are used. ✱Refer to handling explanatory notes and catalogues. Use tools under recommended cutting conditions.
	◎Impact load and rapid increase of cutting resistance due to excessive wear may cause the tool to break and be expelled from the machine providing risk of injury.	✱Ensure safety guards and goggles are used. ✱Exchange tools before excessive wear occurs.
	◎Cutting tools and workpieces become extremely hot during cutting. Touching them with bare hands may cause burns.	✱Take precautions such as wearing gloves.
	◎Expelled hot chips produced in cutting produces risk of injuries and burns.	✱Ensure safety guards and goggles are used. ✱During swarf removal and machine cleaning ensure the machine is stopped and wear gloves. Please use tools, such as cutting nippers and cutting clippers.
	◎In cutting, sparks, hot chips and heat generation caused by tool breakage provides a risk of igniting a fire.	✱Avoid using cutting tools in places where there is a possibility of igniting a fire. ✱In case of using non-water soluble oil, make sure to have a fire prevention countermeasure.
	◎Using machines, chucks, and tools with poor balance at high revolutions may cause tools to break providing risk of injuries.	✱Ensure safety guards and goggles are used. ✱Check the machine for vibration, chattering, and abnormal noise.
	◎Handling machined parts with burrs using bare hands may cause injuries.	✱Wear gloves.
Indexable Inserts Type Tools	◎If inserts and spare parts are not held securely, they may become loose and be expelled producing risk of injuries.	✱Clean insert locating seat and spare parts before setting inserts. ✱Use the tool provided for setting inserts, and ensure the inserts and spare parts are clamped securely. Do not use the tool provided for things other than prescribed inserts and spare parts.
	◎Clamping inserts and spare parts too tightly by using tools such as extension pipes may cause them to break and be expelled.	✱Do not use extra tools for more leverage. Only use the tool provided.
	◎When applying high cutting speed, spare parts and inserts may be expelled due to centrifugal force. Pay special attention on each safety guidline.	✱Refer to the handling explanatory notes and catalogues. Use tools under recommended cutting conditions.
Cutters and Other Rotating Tools	◎Milling cutters have sharp edges. Handling them with bare hands may cause injuries.	✱Take precautions such as wearing gloves.
	◎Poor balance or off center revolving of tools may cause vibration and chattering which could cause the tool to break and be expelled.	✱Apply cutting speed within the range of recommended cutting conditions. ✱Adjust accuracy and balance of spindles and bearings periodically to prevent off center revolving and chattering caused by wear on these parts.
Drilling Tools	◎Through cutting in cases when the workpiece revolves may produce a disk shaped peice with sharp edges when the cutting tool breaks through.	✱Ensure safety guards and goggles are used. Also install a cover on the chuck.
	◎Drills with an extremely small diameter have a very sharp point which may puncture the skin if not handled carefully. If the drill breaks during cutting, the broken pieces may be expelled.	✱Handle with care. Take precautions such as wearing gloves and goggles.
Brazed Tools	◎Weakening of the braze and breakage of inserts may cause injury.	✱Before using them, ensure they are brazed securely. ✱Do not use them under conditions which produce very high temperature.
Others	◎Machine and tools may be damaged if they are used for purposes other than the prescribed application.	✱Use them strictly for the prescribed application.

INFORMATION

This catalogue completes the basic precautions for safety use of our company's products.
For further information, please refer to the guideline, catalogs or contact us. We are not responsible for any accidents causing by modifying tools without our permission.

HOW TO READ THE STANDARD OF TURNING INSERTS

●How this section page is organized

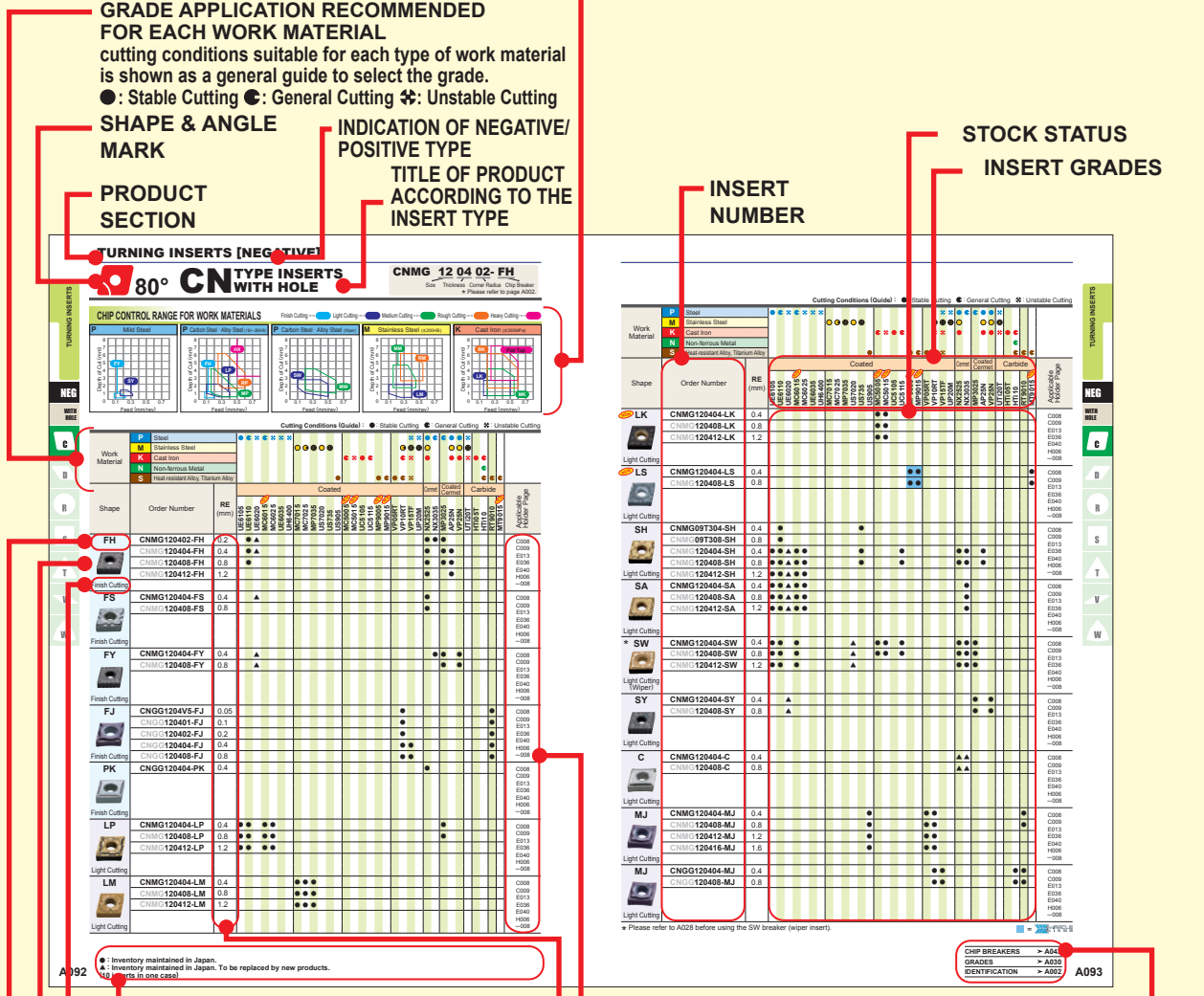
①Organized according to turning insert shape.
(Refer to the index on the next page.)
②Inserts are arranged in order of :
- Negative inserts (with hole|without hole)
- Positive inserts (with hole|without hole)

③Breakers are arranged in order of :
Finish Cutting→Light Cutting→Medium Cutting →Rough Cutting→Heavy Cutting

●Graph of chip control by work material

Shows recommended chip breakers and chip control range according to work material and cutting application.
Graphs are colored according to cutting applications (Finish→Light→Medium→Rough→Heavy) and contain recommended breakers for each application.

Finish Cutting : Light Cutting : Medium Cutting :
Rough Cutting : Heavy Cutting :



●To Order : Please specify
①insert number and ②grade.

TURNING TOOLS

INSERT STANDARDS
INSERT GRADES

INDENTIFICATION ····· A002
HOLE GEOMETRY ····· A004
PRECISION BREAKER STANDARD ····· A006
OUTLINE OF TOOL NAVI ····· A009
CLASSIFICATION OF GRADES AND CHIP BREAKERS FOR TURNING ··· A010
PRECISION BREAKER SYSTEM ····· A026
WIPER INSERT ····· A028
GRADES FOR TURNING ····· A030
TURNING APPLICATION RANGE ····· A031
COATED CARBIDE (CVD) ····· A034
COATED CARBIDE (PVD) ····· A036
CERMET ····· A037
COATED CERMET ····· A038
CEMENTED CARBIDE ····· A039
MICRO-GRAIN CEMENTED CARBIDE ····· A040
CLASSIFICATION OF INSERTS ····· A042
RECOMMENDED CUTTING CONDITIONS ····· A070

STANDARD OF INSERTS

NEGATIVE INSERTS WITH HOLE

CN○○TYPE···RHOMBIC 80° ····· A092
DN○○TYPE···RHOMBIC 55° ····· A098
RN○○TYPE···ROUND ····· A104
SN○○TYPE···SQUARE 90° ····· A105
TN○○TYPE···TRIANGULAR 60° ····· A110
VN○○TYPE···RHOMBIC 35° ····· A116
WN○○TYPE···TRIGON 80° ····· A119

NEGATIVE INSERTS WITHOUT HOLE

SN○○TYPE···SQUARE 90° ····· A124
TN○○TYPE···TRIANGULAR 60° ····· A125

POSITIVE INSERTS WITH HOLE

CC○○TYPE···RHOMBIC 80° ····· A126
CP○○TYPE···RHOMBIC 80° ····· A131
DC○○TYPE···RHOMBIC 55° ····· A132
DE○○TYPE···RHOMBIC 55° ····· A136
RC○○TYPE···ROUND ····· A137
SC○○TYPE···SQUARE 90° ····· A138
SP○○TYPE···SQUARE 90° ····· A140
TC○○TYPE···TRIANGULAR 60° ····· A141
TE○○TYPE···TRIANGULAR 60° ····· A144
TP○○TYPE···TRIANGULAR 60° ····· A145
VB○○TYPE···RHOMBIC 35° ····· A148
VC○○TYPE···RHOMBIC 35° ····· A151
VD○○TYPE···RHOMBIC 35° ····· A153
VP○○TYPE···RHOMBIC 35° ····· A154
WB○○TYPE···TRIGON 80° ····· A155
WC○○TYPE···TRIGON 80° ····· A156
WP○○TYPE···TRIGON 80° ····· A157
XC○○TYPE···RHOMBIC 25° ····· A158

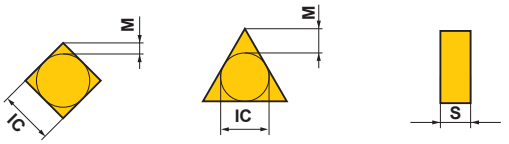
POSITIVE INSERTS WITHOUT HOLE

RTG TYPE ····· A159
SP○○TYPE···SQUARE 90° ····· A160
TC○○TYPE···TRIANGULAR 60° ····· A161
TP○○TYPE···TRIANGULAR 60° ····· A162

IDENTIFICATION

Symbol	Insert Shape
H	Hexagonal
O	Octagonal
P	Pentagonal
S	Square
T	Triangular
C	Rhombic 80°
D	Rhombic 55°
E	Rhombic 75°
F	Rhombic 50°
M	Rhombic 86°
V	Rhombic 35°
W	Trigon
L	Rectangular
A	Parallelogram 85°
B	Parallelogram 82°
K	Parallelogram 55°
R	Round
X	Special Design

① Insert Shape





Triangular insert with a facet (Secondary Cutting Edge)

③ Tolerance Class

Symbol	Tolerance of Nose Height **M** (mm)	Tolerance of Inscribed Circle **IC** (mm)	Tolerance of Thickness **S** (mm)
A	±0.005	±0.025	±0.025
F	±0.005	±0.013	±0.025
C	±0.013	±0.025	±0.025
H	±0.013	±0.013	±0.025
E	±0.025	±0.025	±0.025
G	±0.025	±0.025	±0.13
J	±0.005	±0.05−±0.15	±0.025
K*	±0.013	±0.05−±0.15	±0.025
L*	±0.025	±0.05−±0.15	±0.025
M*	±0.08−±0.18	±0.05−±0.15	±0.13
N*	±0.08−±0.18	±0.05−±0.15	±0.025
U*	±0.13−±0.38	±0.08−±0.25	±0.13

The surface of insert with * mark is sintered.

Detail of M Class Insert Tolerance

●Tolerance of Nose Height **M** (mm)

D.I.C.	Triangular	Square	Rhombic 80°	Rhombic 55°	Rhombic 35°	Round
6.35	±0.08	±0.08	±0.08	±0.11	±0.16	–
9.525	±0.08	±0.08	±0.08	±0.11	±0.16	–
12.70	±0.13	±0.13	±0.13	±0.15	–	–
15.875	±0.15	±0.15	±0.15	±0.18	–	–
19.05	±0.15	±0.15	±0.15	±0.18	–	–
25.40	–	±0.18	–	–	–	–
31.75	–	±0.20	–	–	–	–

●Tolerance of Inscribed Circle **IC** (mm)

D.I.C.	Triangular	Square	Rhombic 80°	Rhombic 55°	Rhombic 35°	Round
6.35	±0.05	±0.05	±0.05	±0.05	±0.05	–
9.525	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05
12.70	±0.08	±0.08	±0.08	±0.08	–	±0.08
15.875	±0.10	±0.10	±0.10	±0.10	–	±0.10
19.05	±0.10	±0.10	±0.10	±0.10	–	±0.10
25.40	–	±0.13	–	–	–	±0.13
31.75	–	±0.15	–	–	–	±0.15

③ Tolerance Class

①	②	③	④
C	N	M	G

② Normal Clearance

Symbol	Normal Clearance
A	3°
B	5°
C	7°
D	15°
E	20°
F	25°
G	30°
N	0°
P	11°
O	Other Normal Clearance

Major Normal Clearance

④ Fixing and/or for Chip Breaker

Metric

Symbol	Hole	Hole Configuration	Chip Breaker	Figure	Symbol	Hole	Hole Configuration	Chip Breaker	Figure
W	With Hole	Cylindrical Hole + One Countersink (40−60°)	No		A	With Hole	Cylindrical Hole	No	
T	With Hole		One Sided		M	With Hole	Cylindrical Hole	Single Sided	
Q	With Hole	Cylindrical Hole + Double Countersink (40−60°)	No		G	With Hole	Cylindrical Hole	Double Sided	
U	With Hole		Double Sided		N	Without Hole	–	No	
B	With Hole	Cylindrical Hole + One Countersink (70−90°)	No		R	Without Hole	–	Single Sided	
H	With Hole		One Sided		F	Without Hole	–	Double Sided	
C	With Hole	Cylindrical Hole + Double Countersink (70−90°)	No		X	–	–	–	Special Design
J	With Hole		Double Sided						

Symbol R	Symbol W	Symbol V	Symbol D	Symbol C	Symbol S	Symbol T	Diameter of Inscribed Circle (mm)
	02		04	03	03	06	3.97
	L3	08	05	04	04	08	4.76
	03	09	06	05	05	09	5.56
06							6.00
	04	11	07	06	06	11	6.35
	05	13	09	08	07	13	7.94
08							8.00
09	06	16	11	09	09	16	9.525
10							10.00
12							12.00
12	08	22	15	12	12	22	12.70
15	10		19	16	15	27	15.875
16							16.00
19	13		23	19	19	33	19.05
20							20.00
			27	22	22	38	22.225
25							25.00
25			31	25	25	44	25.40
31			38	32	31	54	31.75
32							32.00

⑤ Insert Size



*Thickness is from the bottom of the insert to the top of the cutting edge.

Symbol	Thickness (mm)
S1	1.39
01	1.59
T0	1.79
02	2.38
T2	2.78
03	3.18
T3	3.97
04	4.76
06	6.35
07	7.94
09	9.52

⑥ Insert Thickness

⑤	⑥	⑦	⑧	⑨	⑩
12	04	08	(E)	(N)	-MP

⑦ Insert Corner Configuration

Symbol	Corner Radius (mm)
00	Sharp Nose
V3	0.03
V5	0.05
01	0.1
02	0.2
04	0.4
08	0.8
12	1.2
16	1.6
20	2.0
24	2.4
28	2.8
32	3.2
00 : Inch M0 : Metric	Round Insert

⑧ Cutting Edge Condition

Figure	Cutting Edge	Symbol
	Sharp Cutting Edges	F
	Round Cutting Edges	E
	Chamfered Cutting Edges	T
	Chamfered and Rounded Cutting Edges	S

Mitsubishi Materials omit the honing symbol.

⑨ Cutting Direction

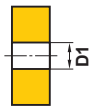
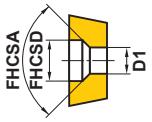
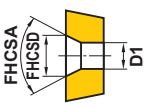
Figure	Hand	Symbol
	Right	R
	Left	L
	Neutral	N

⑩ Chip Breaker

LP	MP	RP
LM	MM	RM
LK	MK	RK
LS	MS	RS
FP	LP	MP
MA	SW	MW
HZ	HX	HV

(Refer to JIS-B4120-1998)

HOLE GEOMETRY

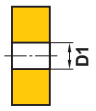
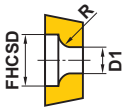
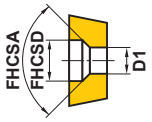
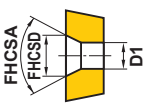
Type A	Type B	Type C	Type D
			

NEGATIVE

Insert Number		Dimensions (mm) D1	Hole Type
CNGA CNGG CNMA CNMG CNMM CNMP	0903○○	3.81	A
	0904○○	3.81	A
	1204○○	5.16	A
	1606○○	6.35	A
	1906○○	7.93	A
	2509○○	9.12	A
DNGA DNGG DNGM DNMA DNMG DNMM DNMX	1104○○	3.81	A
	1504○○	5.16	A
	1506○○	5.16	A
SNGA SNGG SNMA SNMG SNMM	0903○○	3.81	A
	1204○○	5.16	A
	1506○○	6.35	A
	1906○○	7.93	A
	2507○○	9.12	A
	2509○○	9.12	A
TNGA TNGG TNMA TNMG TNMM TNMX	1103○○	2.26	A
	1603○○	3.81	A
	1604○○	3.81	A
	2204○○	5.16	A
	2706○○	6.35	A
	3309○○	7.93	A
VNGA VNGM VNGG VNMG VNMM	1604○○	3.81	A
WNMA WNMG	0603○○	3.81	A
	06T3○○	3.81	A
	0604○○	3.81	A
	0804○○	5.16	A
RNMG RNMA	090300	3.81	A
	120400	5.16	A
	150600	6.35	A
	190600	7.93	A
	250900	9.12	A
	310900	12.7	A

POSITIVE

Insert Number		Dimensions (mm) D1	FHCSD	FHCSA (°)	Hole Type
CCET	0602○○	2.8	3.8	R	B
	09T3○○	4.4	6.0	R	B
CCGB CCMB CCGH CCMH	0602○○	2.8	3.9	R	B
CCGT	03S1○○	2.0	2.9	R	B
	04T0○○	2.4	3.5	R	B
	0602○○	2.8	3.8	R	B
	09T3○○	4.4	6.0	R	B
	1204○○	5.5	7.5	R	B
CCMT	0602○○	2.8	3.8	R	B
	0803○○	3.4	4.5	R	B
	09T3○○	4.4	6.0	R	B
	1204○○	5.5	7.5	R	B
CCGW CCMW	03S1○○	2.0	2.9	R	B
	04T0○○	2.4	3.5	R	B
	0602○○	2.8	3.8	R	B
	09T3○○	4.4	6.0	R	B
	1204○○	5.5	7.5	R	B
CPGT	0802○○	3.4	4.5	R	B
	0903○○	4.4	6.0	R	B
CPGB CPMB CPMH	0802○○	3.5	5.3	78°	D
	0903○○	4.5	6.3	78°	D
CPMX	0802○○	3.5	5.6	78°	D
	0903○○	4.6	6.6	80°	D
DCET DCGT	0702○○	2.8	3.8	R	B
	11T3○○	4.4	6.0	R	B
DCGW DCMW DCMT	0702○○	2.8	3.8	R	B
	11T3○○	4.4	6.0	R	B
	1504○○	5.5	7.5	R	B
DEGX	1504○○	5.1	7.0	85°	C
RCMX	1003M0	3.6	4.6	21°	D
	1204M0	4.2	5.4	21°	D
	1606M0	5.2	6.7	21°	D
	2006M0	6.5	8.0	21°	D
	2507M0	7.2	9.1	21°	D
	3209M0	9.5	11.7	21°	D

Type A	Type B	Type C	Type D
			

POSITIVE

Insert Number		Dimensions (mm)			Hole Type
		D1	FHCSD	FHCSA (°)	
RCGT RCMT	0602M0	2.8	3.8	R	B
	0803M0	3.4	4.5	R	B
	10T3M0	4.4	6.0	R	B
SCMT SCMW	09T3○○	4.4	6.0	R	B
	1204○○	5.5	7.5	R	B
SPMW	0903○○	4.6	6.0	R	B
	1203○○	5.7	7.5	R	B
SPMT	0903○○	4.4	6.0	R	B
	1203○○	5.5	7.5	R	B
SPGX	0903○○	4.8	6.4	58°	D
	1203○○	5.9	7.7	58°	D
TCGT TCMT TCGW TCMW	0601○○	2.3	3.2	R	B
	0802○○	2.3	3.0	R	B
	0902○○	2.5	3.3	R	B
	1102○○	2.8	3.8	R	B
	1303○○	3.4	4.5	R	B
	16T3○○	4.4	6.0	R	B
TEGX	1603○○	4.4	6.1	88°	D
TPGX	0802○○	2.5	3.8	88°	C
	0902○○	3.0	4.3	88°	C
	1103○○	3.5	4.8	88°	C
	1603○○	4.8	6.5	58°	D
TPMX	0802○○	2.7	3.8	88°	C
	0902○○	3.2	4.3	88°	C
	1103○○	3.7	4.8	88°	C
	1603○○	4.8	6.4	58°	D
TPGB TPMB TPGH TPMH	0802○○	2.4	4.0	78°	D
	0902○○	2.9	4.3	78°	D
	1103○○	3.4	4.8	78°	D
	1603○○	4.4	6.5	78°	D
TPGT	1603○○	4.4	6.0	R	B
TPGV	0902○○	2.8	3.8	R	B
	1103○○	3.4	4.5	R	B

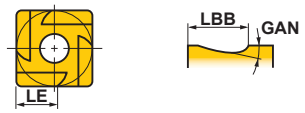
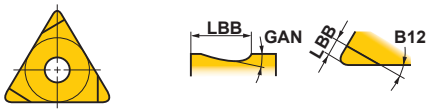
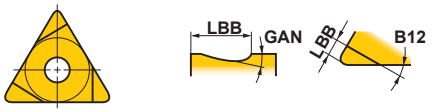
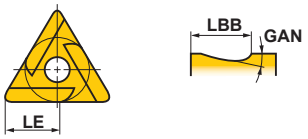
Insert Number		Dimensions (mm)			Hole Type
		D1	FHCSD	FHCSA (°)	
VBET VBGT VBMT VBGW	1103○○	2.9	3.8	R	B
	1604○○	4.4	6.0	R	B
VCGT VCMT VCGW VCMW	0802○○	2.4	3.2	R	B
	1103○○	2.8	3.8	R	B
	1604○○	4.4	6.0	R	B
	2205○○	7.5	5.5	R	B
VDGX	1603○○	4.5	6.1	88°	D
WBGT WBMT	0201○○	2.3	3.2	R	B
	L302○○	2.3	3.2	R	B
WCGT WCMT WCGW WCMW	0201○○	2.3	3.0	R	B
	L302○○	2.3	3.0	R	B
	0402○○	2.8	3.8	R	B
	06T3○○	4.4	6.0	R	B
WPGT WPMT	0402○○	2.8	3.8	R	B
	0603○○	4.4	6.0	R	B
XCMT	1503○○	2.8	3.8	R	B

PRECISION BREAKER SYSTEM

STANDARD OF INSERTS WITH HAND OF TOOL

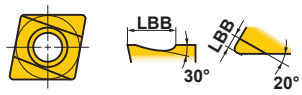
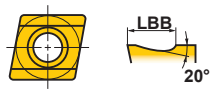
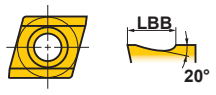
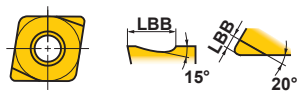
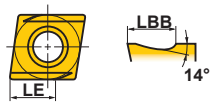
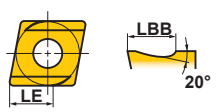
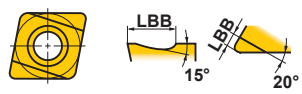
NEGATIVE INSERTS

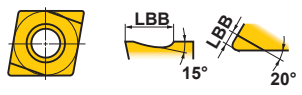
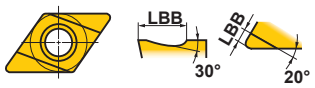
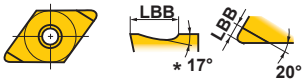
Unit : mm

Geometry	Insert Number	LBB	LE	GAN	B12
 Right hand insert shown.	**DNGG150404R/L**	2.8	–	15	–
	DNGG**150408R/L**	2.8	–	15	–
 Right hand insert shown.	**SNGG090304R/L**	1.8	1.6	15	–
	SNGG**090308R/L**	1.8	1.6	15	–
	SNGG**120404R/L**	2.3	3.7	15	–
	SNGG**120408R/L**	2.3	3.7	15	–
 Right hand insert shown.	**TNGG160402R/L-FS**	1.3	–	15	30°
	TNGG**160404R/L-FS**	1.3	–	15	30°
	TNGG**160408R/L-FS**	1.3	–	15	30°
 Right hand insert shown.	**TNGG160402R/L-F**	2.5	–	15	30°
	TNGG**160404R/L-F**	2.5	–	15	30°
	TNGG**160408R/L-F**	2.5	–	15	30°
 Right hand insert shown.	**TNGG160402R/L-K**	1.5	7.1	15	–
	TNGG**160404R/L-K**	1.5	5.4	15	–
 Right hand insert shown.	**TNGG110302R/L**	1.3	3.2	15	–
	TNGG**110304R/L**	1.3	3.0	15	–
	TNGG**110308R/L**	1.3	2.7	15	–
	TNGG**160304R/L**	2.3	5.4	15	–
	TNGG**160402R/L**	1.3	8.7	15	–
	TNGG**160404R/L**	2.3	5.4	15	–
	TNGG**160408R/L**	2.3	5.1	15	–
	TNGG**220404R/L**	2.8	9.4	15	–
	TNGG**220408R/L**	2.8	9.1	15	–
 Right hand insert shown.	**VNGG160404R/L**	1.8	–	15	–
	VNGG**160408R**	1.8	–	15	–

POSITIVE INSERTS

Unit : mm

Geometry	Insert Number	LBB	LE
 Right hand insert shown.	CCET0602V3R/L-SR	2.2	—
	CCET060201R/L-SR	2.2	—
	CCET060202R/L-SR	2.2	—
	CCET060204R/L-SR	2.2	—
	CCET09T3V3R/L-SR	3.2	—
	CCET09T301R/L-SR	3.2	—
	CCET09T302R/L-SR	3.2	—
	CCET09T304R/L-SR	3.2	—
 Right hand insert shown.	CCET060200R/L-SN	1.0	—
	CCET0602V3R/L-SN	1.0	—
	CCET060201R/L-SN	1.0	—
	CCET060202R/L-SN	1.0	—
	CCET060204R/L-SN	1.0	—
	CCET09T300R/L-SN	1.5	—
	CCET09T3V3R/L-SN	1.5	—
	CCET09T301R/L-SN	1.5	—
	CCET09T302R/L-SN	1.5	—
	CCET09T304R/L-SN	1.5	—
 Right hand insert shown.	CCET0602V3R/LW-SN	1.0	—
	CCET09T3V3R/LW-SN	1.5	—
 Right hand insert shown.	CCGH060202R/L-F	1.2	—
	CCGH060204R/L-F	1.4	—
 Left hand insert shown.	CCGT03S1V3L-F	0.8	—
	CCGT03S101L-F	0.8	—
	CCGT03S102L-F	0.8	—
	CCGT03S104L-F	0.8	—
	CCGT04T0V3L-F	1.0	—
	CCGT04T001L-F	1.0	—
	CCGT04T002L-F	1.0	—
	CCGT04T004L-F	1.0	—
 Right hand insert shown.	CCGT0602V3R/L-SS	1.0	3.0
	CCGT060201R/L-SS	1.0	3.0
	CCGT060202R/L-SS	1.0	3.0
	CCGT09T3V3R/L-SS	1.0	5.0
	CCGT09T301R/L-SS	1.0	5.0
	CCGT09T302R/L-SS	1.0	5.0
 Right hand insert shown.	CCGT0602V3R-SN	1.0	3.0
	CCGT060201R/L-SN	1.0	3.0
	CCGT060202R/L-SN	1.0	3.0
	CCGT09T3V3R/L-SN	1.5	5.0
	CCGT09T301R/L-SN	1.5	5.0
	CCGT09T302R/L-SN	1.5	5.0
	CCGT09T304R/L-SN	1.5	5.0
 Right hand insert shown.	CPGT080204R/L-F	0.6	—
	CPGT090302R/L-F	0.8	—
	CPGT090304R/L-F	0.8	—

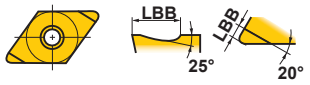
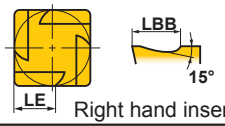
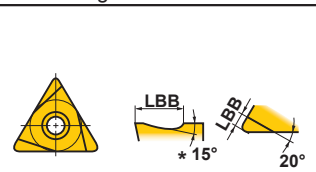
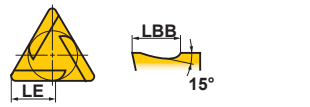
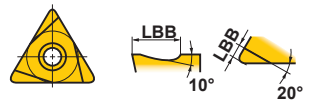
Geometry	Insert Number	LBB	LE
 Right hand insert shown.	CPMH080204R/L-F	1.0	—
	CPMH090304R/L-F	1.4	—
 Right hand insert shown.	DCET0702V3R/L-SR	2.5	—
	DCET070201R/L-SR	2.5	—
	DCET070202R/L-SR	2.5	—
	DCET070204R/L-SR	2.5	—
	DCET11T3V3R/L-SR	3.7	—
	DCET11T301R/L-SR	3.7	—
	DCET11T302R/L-SR	3.7	—
	DCET11T304R/L-SR	3.7	—
 Right hand insert shown.	DCET070200R/L-SN	1.0	—
	DCET0702V3R/L-SN	1.0	—
	DCET070201R/L-SN	1.0	—
	DCET070202R/L-SN	1.0	—
	DCET070204R/L-SN	1.0	—
	DCET11T300R/L-SN	1.5	—
	DCET11T3V3R/L-SN	1.5	—
	DCET11T301R/L-SN	1.5	—
	DCET11T302R/L-SN	1.5	—
	DCET11T304R/L-SN	1.5	—
 Right hand insert shown.	DCET0702V3R/LW-SN	1.0	—
	DCET11T3V3R/LW-SN	1.5	—
 *DCGT11T3□□type : 14° Right hand insert shown.	DCGT070202R/L-F	1.0	—
	DCGT070204R/L-F	1.0	—
	DCGT11T302R/L-F	1.0	—
	DCGT11T304R/L-F	1.0	—
 Right hand insert shown.	DCGT0702V3R/L-SS	1.0	3.5
	DCGT070201R/L-SS	1.0	3.5
	DCGT070202R/L-SS	1.0	3.5
	DCGT11T3V3R-SS	1.0	6.5
	DCGT11T301R-SS	1.0	6.5
	DCGT11T302R-SS	1.0	6.5
 Right hand insert shown.	DCGT0702V3R-SN	1.0	3.5
	DCGT070201R-SN	1.0	3.5
	DCGT070202R/L-SN	1.0	3.5
	DCGT11T3V3R/L-SN	1.5	6.5
	DCGT11T301R/L-SN	1.5	6.5
	DCGT11T302R/L-SN	1.5	6.5
	DCGT11T304R/L-SN	1.5	6.5
 Right hand insert shown.	DEGX150402R/L	2.8	—
	DEGX150404R/L	2.8	—

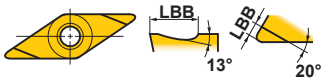
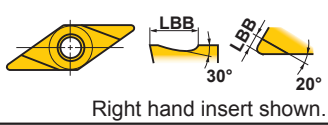
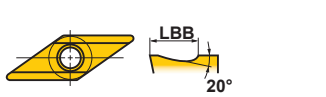
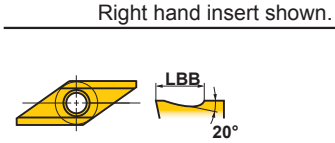
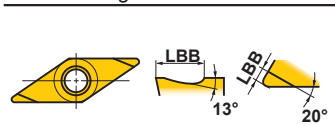
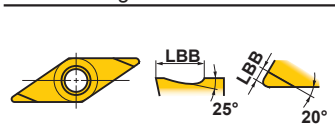
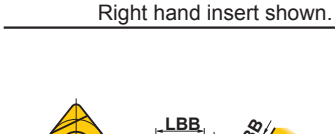
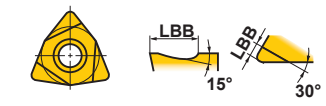
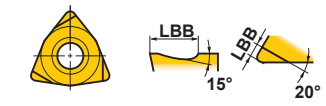
PRECISION BREAKER SYSTEM

STANDARD OF INSERTS WITH HAND OF TOOL

POSITIVE INSERTS

Unit : mm

Geometry	Insert Number	LBB	LE
 Right hand insert shown.	DEGX150402R/L-F	2.5	—
	DEGX150404R/L-F	2.5	—
 Right hand insert shown.	SPGR090304R	1.8	1.6
 Left hand insert shown.	TCGT0601V3L-F	1.0	—
	TCGT060101L-F	1.0	—
	TCGT060102R/L-F	1.0	—
	TCGT060104R/L-F	1.0	—
 Right hand insert shown.	TEGX160302R/L	2.0	6.0
	TEGX160304R/L	2.0	6.0
 ✱TPGH1603□□type : 14° Right hand insert shown.	TPGH080202R/L-FS	0.9	—
	TPGH080204R/L-FS	0.9	—
	TPGH090202R/L-FS	1.0	—
	TPGH090204R/L-FS	1.0	—
	TPGH110302R/L-FS	1.4	—
	TPGH110304R/L-FS	1.4	—
	TPGH160304R/L-FS	2.0	—
	TPGH160308R/L-FS	2.0	—
 Right hand insert shown.	TPGR110304R/L	1.3	3.0
	TPGR160304R/L	2.3	5.4
	TPGR160308R/L	2.3	5.1
 Right hand insert shown.	TPGX080202R/L	1.3	—
	TPGX080204R/L	1.3	—
	TPGX090202R/L	1.6	—
	TPGX090204R/L	1.6	—
	TPGX090208R/L	1.4	—
	TPGX110302L	1.8	—
	TPGX110304R/L	1.8	—
	TPGX110308R/L	1.8	—

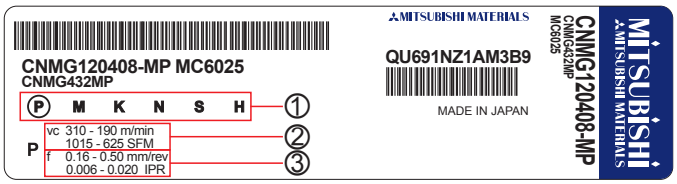
Geometry	Insert Number	LBB	LE
 Right hand insert shown.	VBGT110302R/L-F	1.0	—
	VBGT110304R/L-F	1.0	—
	VBGT160402R/L-F	1.5	—
	VBGT160404R/L-F	1.5	—
 Right hand insert shown.	VBET1103V3R/L-SR	2.5	—
	VBET110301R/L-SR	2.5	—
	VBET110302R/L-SR	2.5	—
	VBET110304R/L-SR	2.5	—
 Right hand insert shown.	VBET110300R/L-SN	1.0	—
	VBET1103V3R/L-SN	1.0	—
	VBET110301R/L-SN	1.0	—
	VBET110302R/L-SN	1.0	—
	VBET110304R/L-SN	1.0	
 Right hand insert shown.	VBET1103V3R/LW-SN	1.0	—
 Right hand insert shown.	VCGT080202R/L-F	0.8	—
	VCGT080204R/L-F	0.8	—
 Right hand insert shown.	VDGX160302R/L	2.0	—
	VDGX160304R/L	2.0	—
 Right hand insert shown.	WBGT0201V3L-F	1.0	—
	WBGT020101L-F	1.0	—
	WBGT020102L-F	1.0	—
	WBGT020104L-F	1.0	—
	WBGTL302V3L-F	1.0	—
	WBGTL30201L-F	1.0	—
	WBGTL30202R/L-F	1.0	—
	WBGTL30204R/L-F	1.0	—
 Right hand insert shown.	WCGT020102R/L	1.0	—
	WCGT020104R/L	1.0	—
	WCGTL30202L	1.0	—
	WCGTL30204L	1.0	—
 Right hand insert shown.	WPGT040204R/L-FS	1.0	—
	WPGT060304R/L-FS	1.0	—

TOOL NAVI

OUTLINE

TOOL NAVI supports our customers with information and suitable cutting conditions for each work material by selecting an optimal indexable insert together with the optional tool.

LABEL INDICATION



*1 The above is an example. There may be inserts recommended for multiple work materials.
*2 Please contact us for recommended cutting conditions using coefficient values other than the above.

①Work materials

P : Steel (Material reference : Carbon steel, alloy steel 180HB)
M : Stainless steel (Material reference : Austenitic stainless steel 180HB)
K : Cast iron (Material reference : Gray cast iron, ductile cast iron 180HB)
N : Aluminium alloy, non-ferrous metal
S : Material reference : Titanium alloy 320HB, Ni, Co-Based Alloy 400HB
H : Hardened steel 60HRC

②CUTTING SPEED STANDARDS

Work Material	Tool Life		Work Material	Hardness
	Life	Performance		
P	90min	15min	Carbon steel, alloy steel	180HB
M	90min	15min	Stainless steel	180HB
K	90min	15min	Cast iron	180HB
S	25min	5min	Titanium alloy	320HB
			Ni, Co-Based alloy	400HB
H	80min	10min	Hardened steel	HRC60

③Feed rate

Minimum and maximum feed rate settings are based on the chip control range of the chip breaker.

*3. N :Life based on each grade. For stable choose the performance cutting speed and for unstable choose the tool life feed rate.
*4. The tool life is based on the following (VB wear). Some materials include elements other than this.
PMKS ··· VB=0.3mm
H ··· VB=0.1mm

TOOL LIFE

Cutting speed has a large affect on tool life. TOOL NAVI is based on Taylor's equation (relationship vc T^n=C between tool grade, cutting conditions, and tool life). Therefore, performance speed and tool life is found for each work material. When the customer requires a different tool life, obtain coefficient values of the grade you use from the charts below. Multiply the coefficient values by the cutting speed to calculate a new cutting speed.

P Grade (Steel) cutting speed coefficient values.

Grade \ Tool life	15min	30min	45min	60min	90min
UE6105	1.00	0.79	0.69	0.63	0.55
MC6015	1.00	0.82	0.72	0.67	0.59
MC6025	1.00	0.83	0.75	0.69	0.62
UE6035	1.00	0.88	0.82	0.78	0.73
MP3025	1.00	0.85	0.77	0.72	0.65
NX2525	1.00	0.87	0.80	0.76	0.70

M Grade (Stainless Steel) cutting speed coefficient values.

Grade \ Tool life	15min	30min	45min	60min	90min
MC7015	1.00	0.83	0.75	0.70	0.63
MC7025	1.00	0.90	0.84	0.80	0.75
MP7035	1.00	0.84	0.76	0.71	0.62
US735	1.00	0.78	0.68	0.61	0.53

K Grade (Cast Iron) cutting speed coefficient values.

Grade \ Tool life	15min	30min	45min	60min	90min
MC5005	1.00	0.83	0.75	0.70	0.63
MC5015	1.00	0.83	0.75	0.69	0.62

(ex.) Medium cutting of steel
The 1st recommendation : MC6025
Indexable inserts : CNMG120408-MP
Recommended cutting speed : vc=310m/min
(Tool life : 15min.)

⬇

Tool life required by the customer : 30min.

310×0.83≒257m/min

HARDNESS OF THE WORK MATERIAL

Hardness of the work material also affects tool life. Mitsubishi's TOOL NAVI suggests cutting speed variations when hardness differs. Obtain the suitable coefficient value for each type of work material from the chart below. Multiply the coefficient value by the recommended cutting speed of the grade you use to calculate a new cutting speed.

Work material	Soft ← (Hardness of workpiece) → Hard											
	120HB	140HB	160HB	180HB	200HB	220HB	240HB	260HB	280HB	300HB	320HB	340HB
P	1.34	1.19	1.08	1.00	0.92	0.85	0.80	0.75	0.71	0.68	0.64	0.61
M	1.41	1.23	1.10	1.00	0.91	0.85	0.78	0.72	0.68	0.64	0.61	0.58
K	1.27	1.19	1.09	1.00	0.97	0.91	0.88	0.85	0.81	0.78	0.75	0.72

OPTIMUM GRADES AND CHIP BREAKERS FOR EXTERNAL TURNING

Selection of optimum inserts for turning

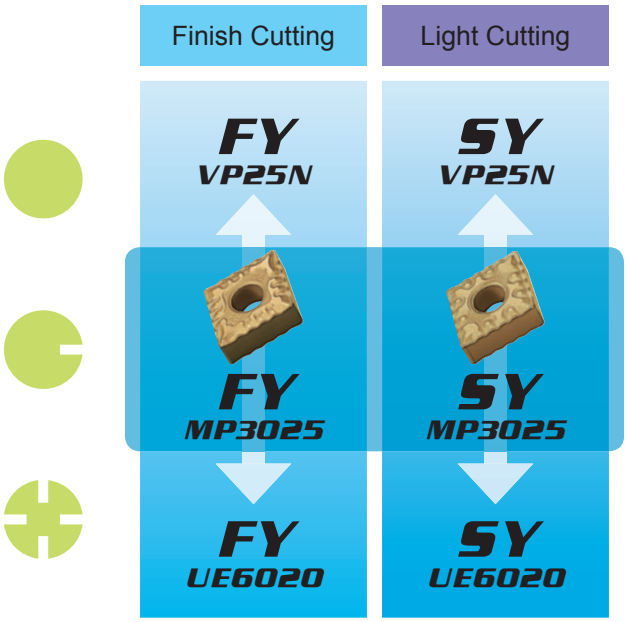
The following diagrams show for each type of work material, the optimal combination of suitable grades and chip breakers for each application area in turning.

CUTTING CONDITIONS

Stable Cutting	Continuous Cutting Constant Depth of Cut Pre-Machined Securely Clamped Component Cutting
General Cutting	
Unstable Cutting	Heavy Interrupted Cutting Irregular Depth of Cut Low Clamping Rigidity Cutting

CUTTING AREA

- F Finish Cutting
- L Light Cutting
- M Medium Cutting
- R Rough Cutting
- H Heavy Cutting



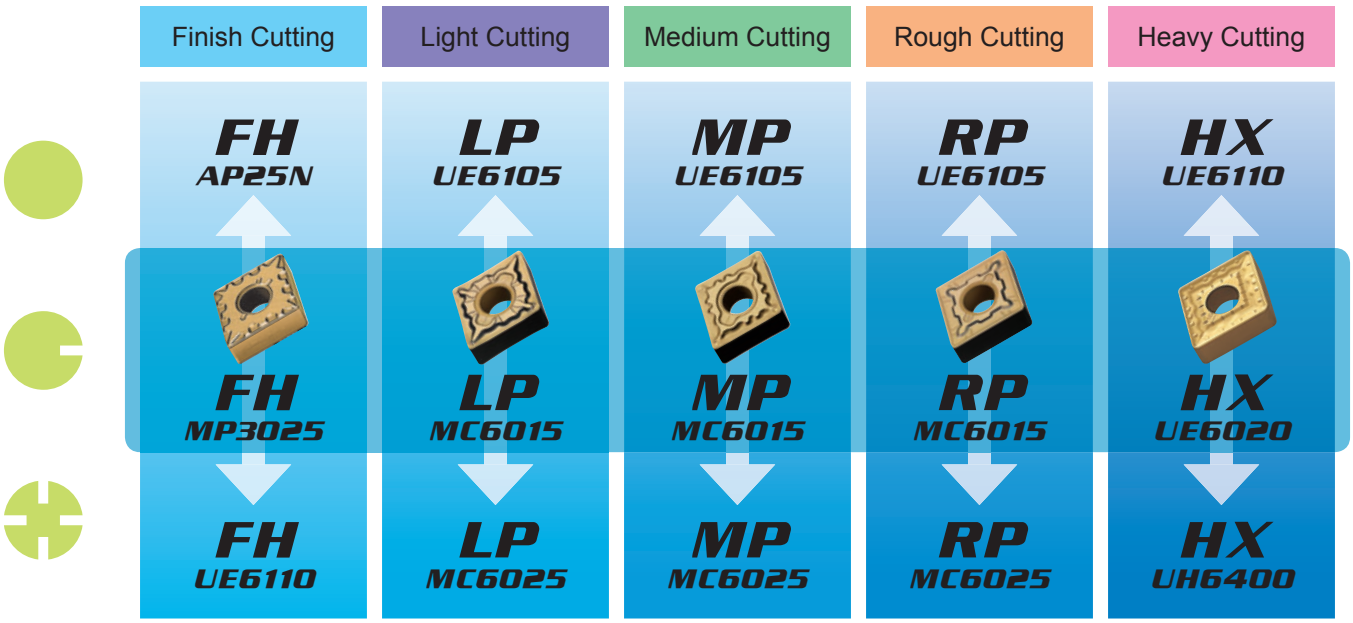
P Mild Steel (Ex : SS400, S10C)

NEGATIVE INSERTS

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	FY	VP25N	285—445	0.09—0.23	0.20—0.80
	L	SY	VP25N	260—405	0.16—0.33	0.50—1.20
General Cutting	F	FY	MP3025	275—420	0.09—0.23	0.20—0.80
	L	SY	MP3025	250—385	0.16—0.33	0.50—1.20
Unstable Cutting	F	FY	UE6020	285—460	0.09—0.23	0.20—0.80
	L	SY	UE6020	260—420	0.16—0.33	0.50—1.20

Stable Cutting	F Finish Cutting
General Cutting	L Light Cutting
Unstable Cutting	M Medium Cutting
	R Rough Cutting
	H Heavy Cutting



P Carbon Steel • Alloy Steel (Ex : S45C, SCM440)

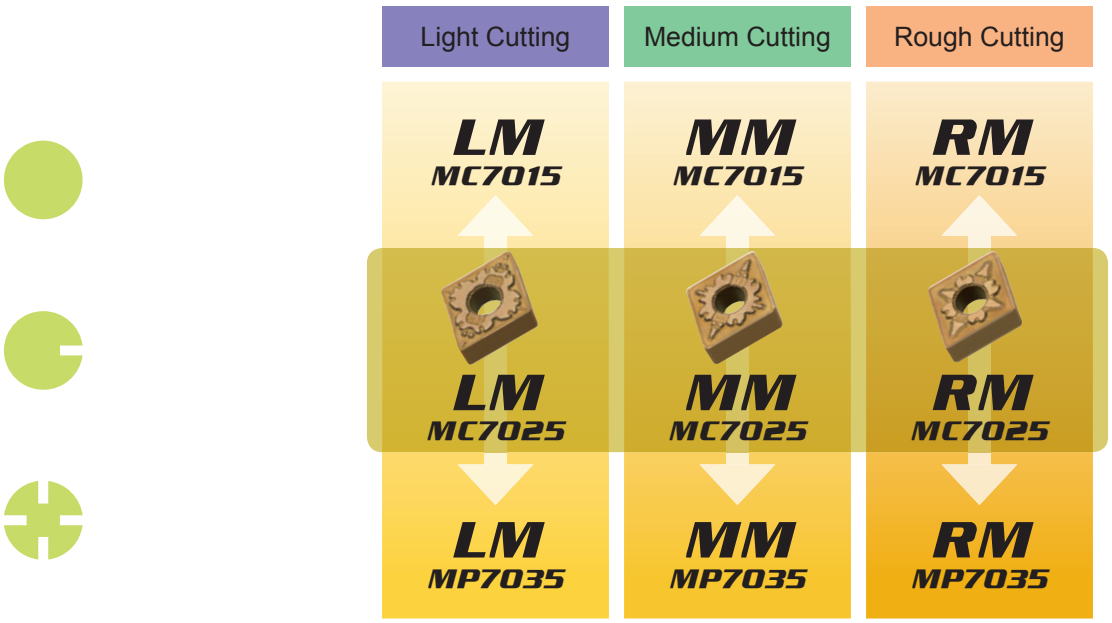
NEGATIVE INSERTS

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	FH	AP25N	215—340	0.08—0.20	0.20—1.00
	L	LP	UE6105	220—405	0.10—0.40	0.30—2.00
	M	MP	UE6105	200—370	0.16—0.50	0.30—4.00
	R	RP	UE6105	190—350	0.25—0.60	1.50—6.00
	H	HX	UE6110	160—275	0.50—1.26	3.00—11.00
General Cutting	F	FH	MP3025	210—325	0.08—0.20	0.20—1.00
	L	LP	MC6015	210—355	0.10—0.40	0.30—2.00
	M	MP	MC6015	190—325	0.16—0.50	0.30—4.00
	R	RP	MC6015	180—310	0.25—0.60	1.50—6.00
	H	HX	UE6020	155—250	0.50—1.26	3.00—11.00
Unstable Cutting	F	FH	UE6110	230—390	0.08—0.20	0.20—1.00
	L	LP	MC6025	210—340	0.10—0.40	0.30—2.00
	M	MP	MC6025	190—310	0.16—0.50	0.30—4.00
	R	RP	MC6025	180—295	0.25—0.60	1.50—6.00
	H	HX	UH6400	135—195	0.50—1.26	3.00—11.00

OPTIMUM GRADES AND CHIP BREAKERS FOR EXTERNAL TURNING

Stable Cutting	L Light Cutting
General Cutting	M Medium Cutting
Unstable Cutting	R Rough Cutting



M Stainless Steel (Ex : SUS304, SUS316)

NEGATIVE INSERTS

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	L	LM	MC7015	180—285	0.10—0.30	0.30—2.00
	M	MM	MC7015	160—255	0.15—0.45	0.70—5.00
	R	RM	MC7015	155—245	0.25—0.55	1.50—6.00
General Cutting	L	LM	MC7025	160—215	0.10—0.30	0.30—2.00
	M	MM	MC7025	145—195	0.15—0.45	0.70—5.00
	R	RM	MC7025	140—185	0.25—0.55	1.50—6.00
Unstable Cutting	L	LM	MP7035	95—155	0.10—0.30	0.30—2.00
	M	MM	MP7035	85—140	0.15—0.45	0.70—5.00
	R	RM	MP7035	85—135	0.25—0.55	1.50—6.00

Stable Cutting	L Light Cutting
General Cutting	M Medium Cutting
Unstable Cutting	R Rough Cutting
	H Heavy Cutting



K Cast Iron • Ductile Cast Iron (Ex : FC300)

NEGATIVE INSERTS

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	L	**LK**	**MC5005**	235—375	0.10—0.40	0.30—2.00
	M	**MK**	**MC5005**	210—335	0.20—0.55	1.00—4.00
	R	**RK**	**MC5005**	195—315	0.25—0.60	1.50—6.00
	H	**Flat Top**	**MC5005**	195—315	0.20—0.60	2.50—6.00
General Cutting	L	**LK**	**MC5015**	205—335	0.10—0.40	0.30—2.00
	M	**MK**	**MC5015**	190—305	0.20—0.55	1.00—4.00
	R	**RK**	**MC5015**	180—285	0.25—0.60	1.50—6.00
	H	**Flat Top**	**MC5015**	180—285	0.20—0.60	2.50—6.00
Unstable Cutting	L	**LK**	**MC5015**	205—335	0.10—0.40	0.30—2.00
	M	**MK**	**MC5015**	190—305	0.20—0.55	1.50—4.00
	R	**RK**	**MC5015**	180—285	0.25—0.60	1.50—6.00
	H	**Flat Top**	**MC5015**	180—285	0.20—0.60	2.50—6.00

OPTIMUM GRADES AND CHIP BREAKERS FOR EXTERNAL TURNING

Stable Cutting	F Finish Cutting
General Cutting	L Light Cutting
Unstable Cutting	M Medium Cutting
	R Rough Cutting



S Titanium Alloy (Ex : Ti-6Al-4V)

NEGATIVE INSERTS

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	FJ	RT9010	45—95	0.07—0.20	0.10—1.00
	L	LS	MT9015	40—85	0.10—0.25	0.20—0.80
	M	MS	MT9015	40—80	0.10—0.25	0.50—4.00
	R	RS	MT9015	35—75	0.20—0.35	1.00—4.00
General Cutting	F	FJ	RT9010	45—95	0.07—0.20	0.10—1.00
	L	LS	MT9015	40—85	0.10—0.25	0.20—0.80
	M	MS	MT9015	40—80	0.10—0.25	0.50—4.00
	R	RS	MT9015	35—75	0.20—0.35	1.00—4.00
Unstable Cutting	F	FJ	RT9010	45—95	0.07—0.20	0.10—1.00
	L	MJ	RT9010	40—80	0.07—0.25	0.40—1.50
	M	MS	RT9010	40—80	0.10—0.25	0.50—4.00
	R	GJ	RT9010	35—75	0.16—0.35	1.00—3.00

Stable Cutting	F Finish Cutting
General Cutting	L Light Cutting
Unstable Cutting	M Medium Cutting
	R Rough Cutting



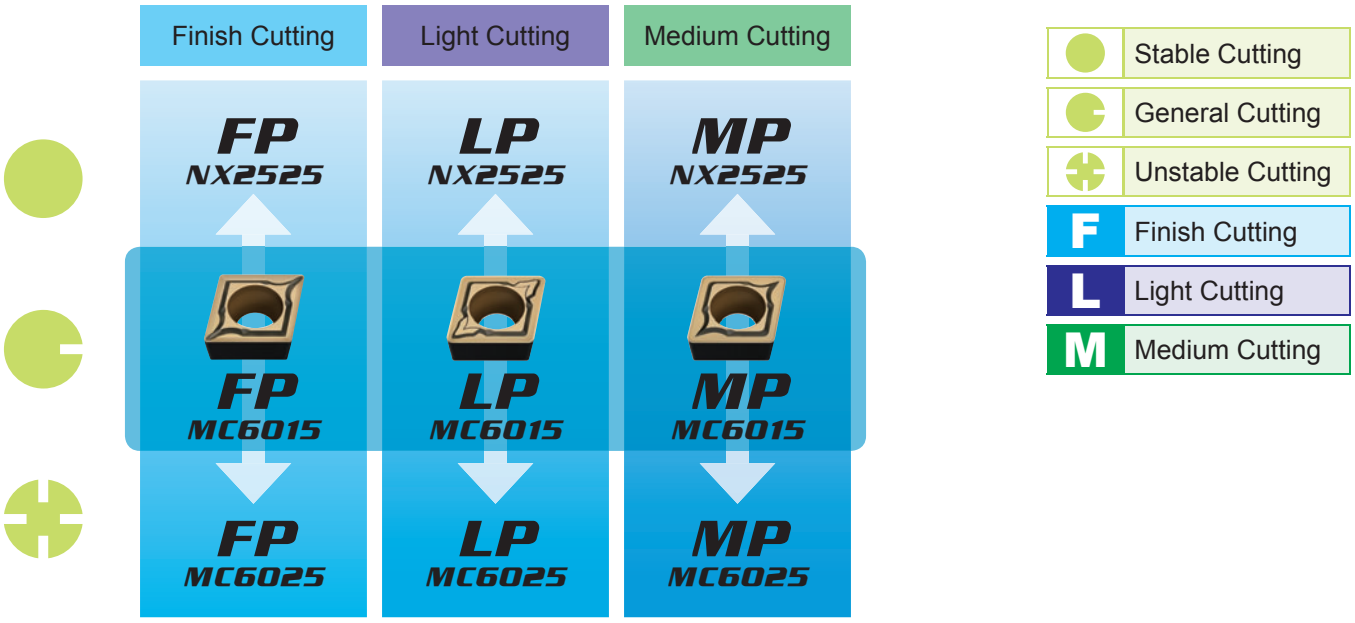
S Ni, Co-Based Alloy (Ex : Inconel®718)

NEGATIVE INSERTS

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	FJ	VP10RT	30—60	0.07—0.20	0.10—1.00
	L	LS	MP9005	30—110	0.10—0.25	0.20—0.80
	M	MS	MP9005	30—100	0.10—0.25	0.50—4.00
	R	RS	MP9015	20—75	0.20—0.35	1.00—4.00
General Cutting	F	FJ	VP10RT	30—60	0.07—0.20	0.10—1.00
	L	LS	MP9015	25—85	0.10—0.25	0.20—0.80
	M	MS	MP9015	25—80	0.10—0.25	0.50—4.00
	R	RS	MP9015	20—75	0.20—0.35	1.00—4.00
Unstable Cutting	F	FJ	VP15TF	20—40	0.07—0.20	0.10—1.00
	L	MJ	VP15TF	20—35	0.07—0.25	0.40—1.50
	M	MS	VP15TF	20—35	0.10—0.25	0.50—4.00
	R	GJ	VP15TF	15—30	0.16—0.35	1.00—3.00

OPTIMUM GRADES AND CHIP BREAKERS FOR EXTERNAL TURNING

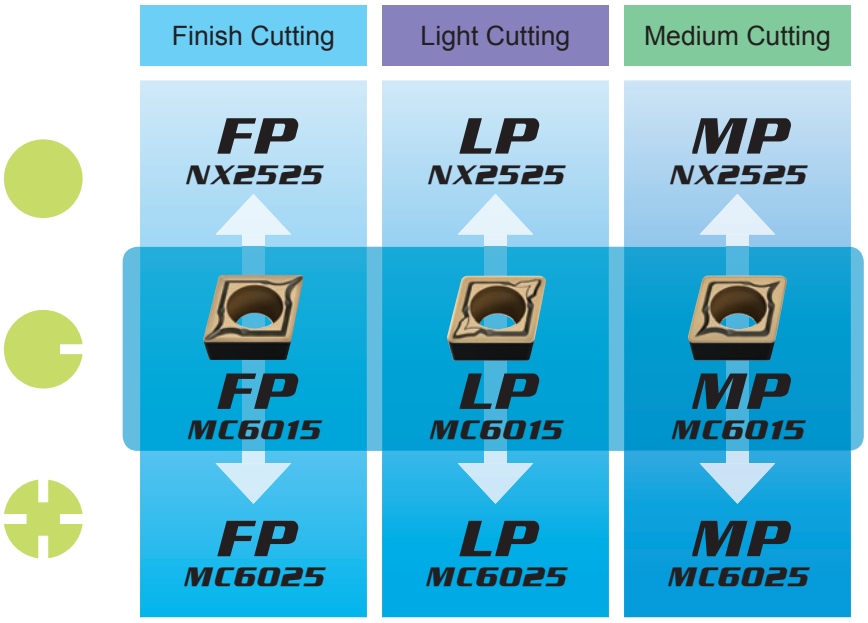


P Mild Steel (Ex : SS400, S10C)

7°POSITIVE INSERTS WITH HOLE

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	FP	NX2525	225—320	0.04—0.20	0.20—0.90
	L	LP	NX2525	225—320	0.06—0.25	0.20—1.00
	M	MP	NX2525	185—265	0.08—0.30	0.30—2.00
General Cutting	F	FP	MC6015	250—425	0.04—0.20	0.20—0.90
	L	LP	MC6015	250—425	0.06—0.25	0.20—1.00
	M	MP	MC6015	205—350	0.08—0.30	0.30—2.00
Unstable Cutting	F	FP	MC6025	250—405	0.04—0.20	0.20—0.90
	L	LP	MC6025	250—405	0.06—0.25	0.20—1.00
	M	MP	MC6025	205—335	0.08—0.30	0.30—2.00



Stable Cutting
General Cutting
Unstable Cutting
F Finish Cutting
L Light Cutting
M Medium Cutting

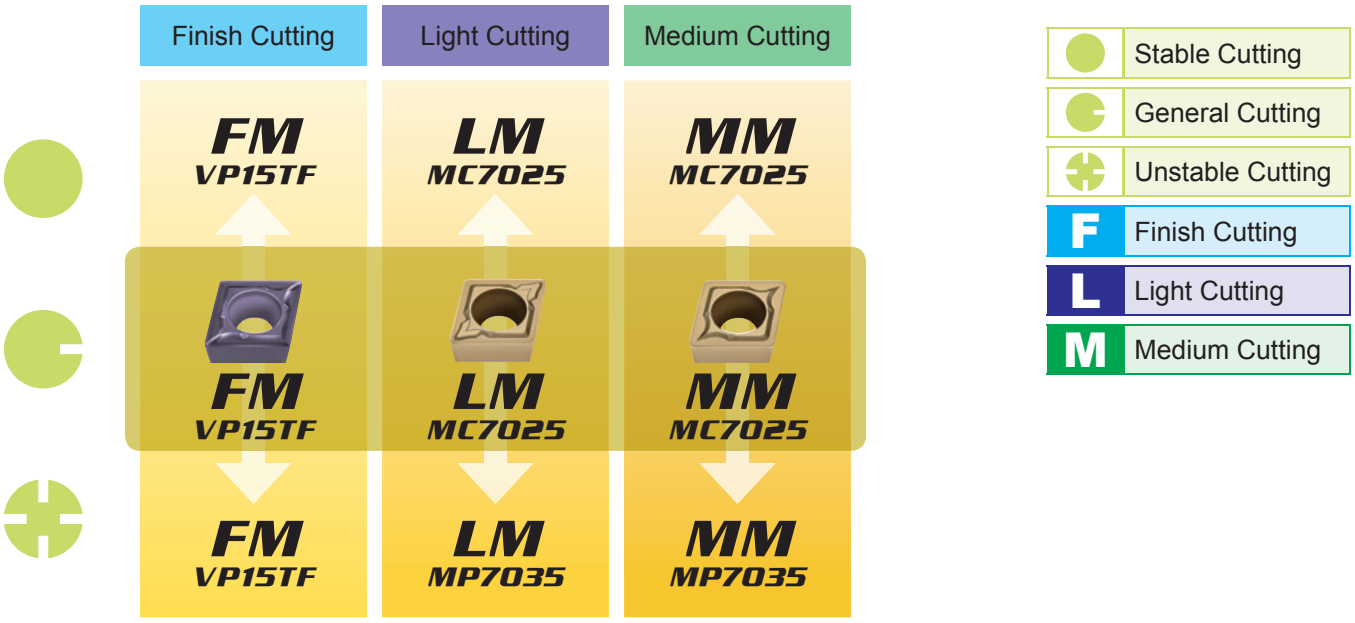
P Carbon Steel • Alloy Steel (Ex : S45C, SCM440)

7°POSITIVE INSERTS WITH HOLE

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	FP	NX2525	165—235	0.04—0.20	0.20—0.90
	L	LP	NX2525	165—235	0.06—0.25	0.20—1.00
	M	MP	NX2525	135—195	0.08—0.30	0.30—2.00
General Cutting	F	FP	MC6015	185—310	0.04—0.20	0.20—0.90
	L	LP	MC6015	185—310	0.06—0.25	0.20—1.00
	M	MP	MC6015	150—260	0.08—0.30	0.30—2.00
Unstable Cutting	F	FP	MC6025	185—295	0.04—0.20	0.20—0.90
	L	LP	MC6025	185—295	0.06—0.25	0.20—1.00
	M	MP	MC6025	150—245	0.08—0.30	0.30—2.00

OPTIMUM GRADES AND CHIP BREAKERS FOR EXTERNAL TURNING

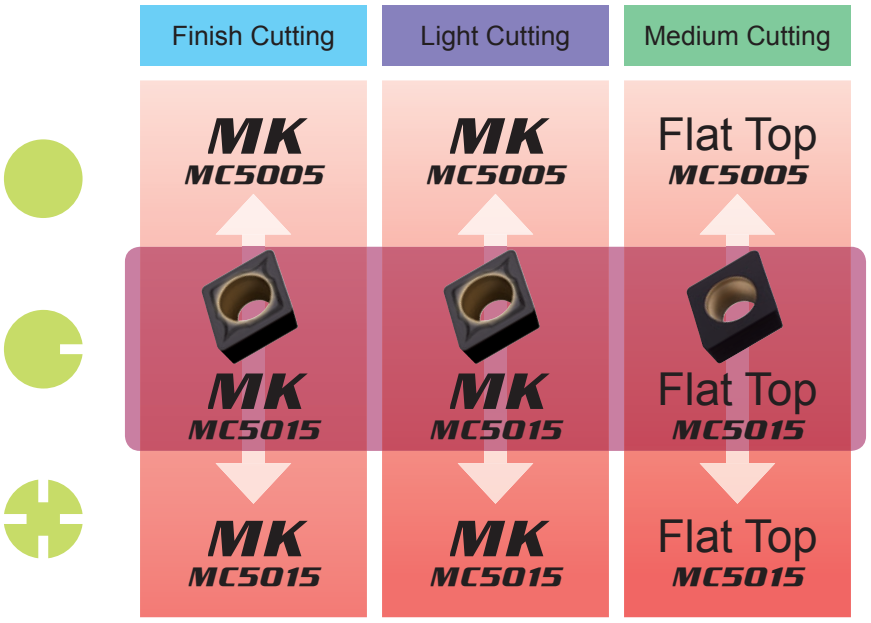


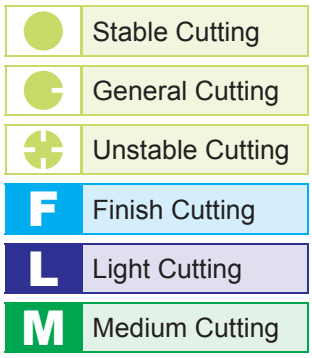
M Stainless Steel (Ex : SUS304, SUS316)

7°POSITIVE INSERTS WITH HOLE

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	FM	VP15TF	75—125	0.04—0.20	0.20—0.90
	L	LM	MC7025	140—190	0.06—0.25	0.20—1.00
	M	MM	MC7025	115—155	0.08—0.30	0.30—2.00
General Cutting	F	FM	VP15TF	75—125	0.04—0.20	0.20—0.90
	L	LM	MC7025	140—190	0.06—0.25	0.20—1.00
	M	MM	MC7025	115—155	0.08—0.30	0.30—2.00
Unstable Cutting	F	FM	VP15TF	75—125	0.04—0.20	0.20—0.90
	L	LM	MP7035	85—135	0.06—0.25	0.20—1.00
	M	MM	MP7035	70—115	0.08—0.30	0.30—2.00





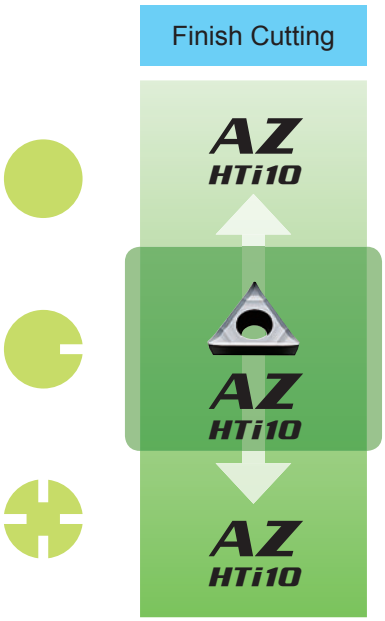
K Cast Iron • Ductile Cast Iron (Ex : FC300)

7°POSITIVE INSERTS WITH HOLE

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	**MK**	**MC5005**	170—270	0.08—0.30	0.30—2.00
	L	**MK**	**MC5005**	170—270	0.08—0.30	0.30—2.00
	M	**Flat Top**	**MC5005**	170—270	0.08—0.30	0.30—2.00
General Cutting	F	**MK**	**MC5015**	155—245	0.08—0.30	0.30—2.00
	L	**MK**	**MC5015**	155—245	0.08—0.30	0.30—2.00
	M	**Flat Top**	**MC5015**	155—245	0.08—0.30	0.30—2.00
Unstable Cutting	F	**MK**	**MC5015**	155—245	0.08—0.30	0.30—2.00
	L	**MK**	**MC5015**	155—245	0.08—0.30	0.30—2.00
	M	**Flat Top**	**MC5015**	155—245	0.08—0.30	0.30—2.00

OPTIMUM GRADES AND CHIP BREAKERS FOR EXTERNAL TURNING



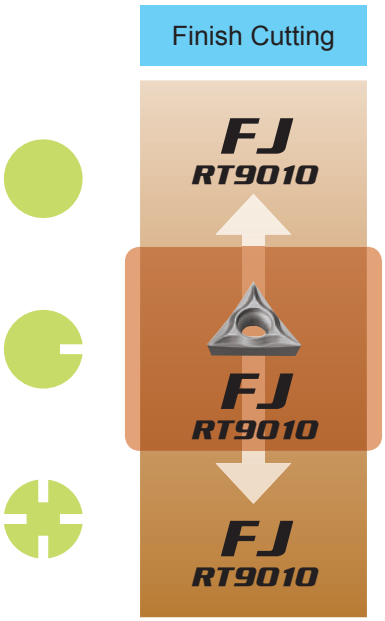
- Stable Cutting
- General Cutting
- Unstable Cutting
- F Finish Cutting

N Aluminium Alloy (Ex : A6061, A7075)

7°POSITIVE INSERTS WITH HOLE

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	**AZ**	**HTi10**	300—700	0.10—0.40	0.20—3.00
General Cutting	F	**AZ**	**HTi10**	300—700	0.10—0.40	0.20—3.00
Unstable Cutting	F	**AZ**	**HTi10**	300—700	0.10—0.40	0.20—3.00



	Stable Cutting
	General Cutting
	Unstable Cutting
F	Finish Cutting

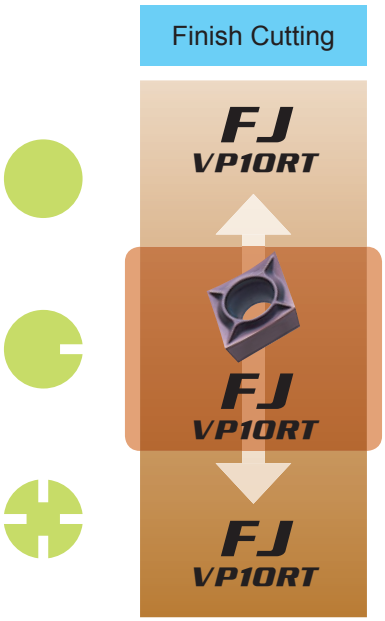
S Titanium Alloy (Ex : Ti-6Al-4V)

7°POSITIVE INSERTS WITH HOLE

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	**FJ**	**RT9010**	30—75	0.04—0.12	0.20—1.40
General Cutting	F	**FJ**	**RT9010**	30—75	0.04—0.12	0.20—1.40
Unstable Cutting	F	**FJ**	**RT9010**	30—75	0.04—0.12	0.20—1.40

OPTIMUM GRADES AND CHIP BREAKERS FOR EXTERNAL TURNING



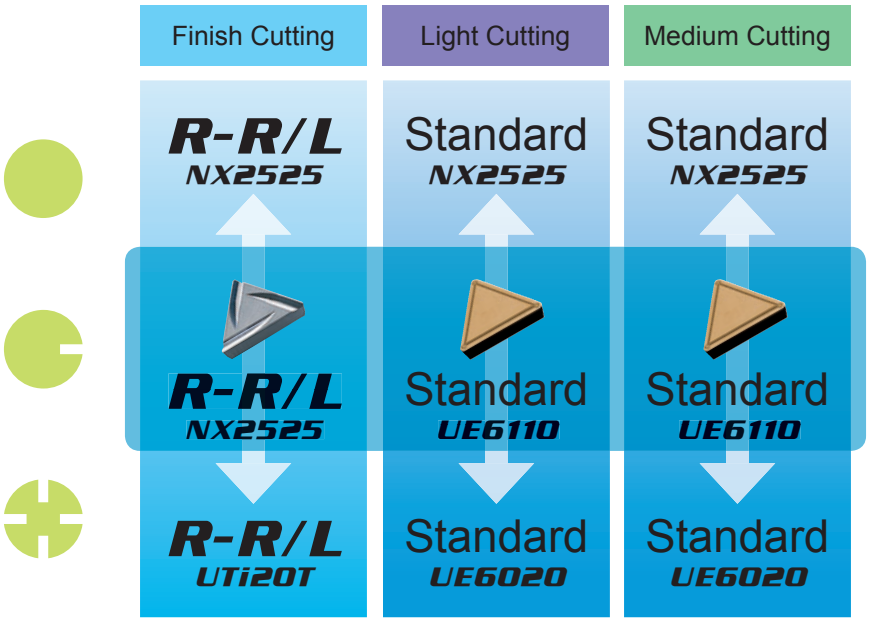
Stable Cutting
General Cutting
Unstable Cutting
F Finish Cutting

S Ni, Co-Based Alloy (Ex : Inconel®718)

7°POSITIVE INSERTS WITH HOLE

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	**FJ**	**VP10RT**	20—45	0.04—0.12	0.20—1.40
General Cutting	F	**FJ**	**VP10RT**	20—45	0.04—0.12	0.20—1.40
Unstable Cutting	F	**FJ**	**VP10RT**	20—45	0.04—0.12	0.20—1.40



Stable Cutting
General Cutting
Unstable Cutting
F Finish Cutting
L Light Cutting
M Medium Cutting

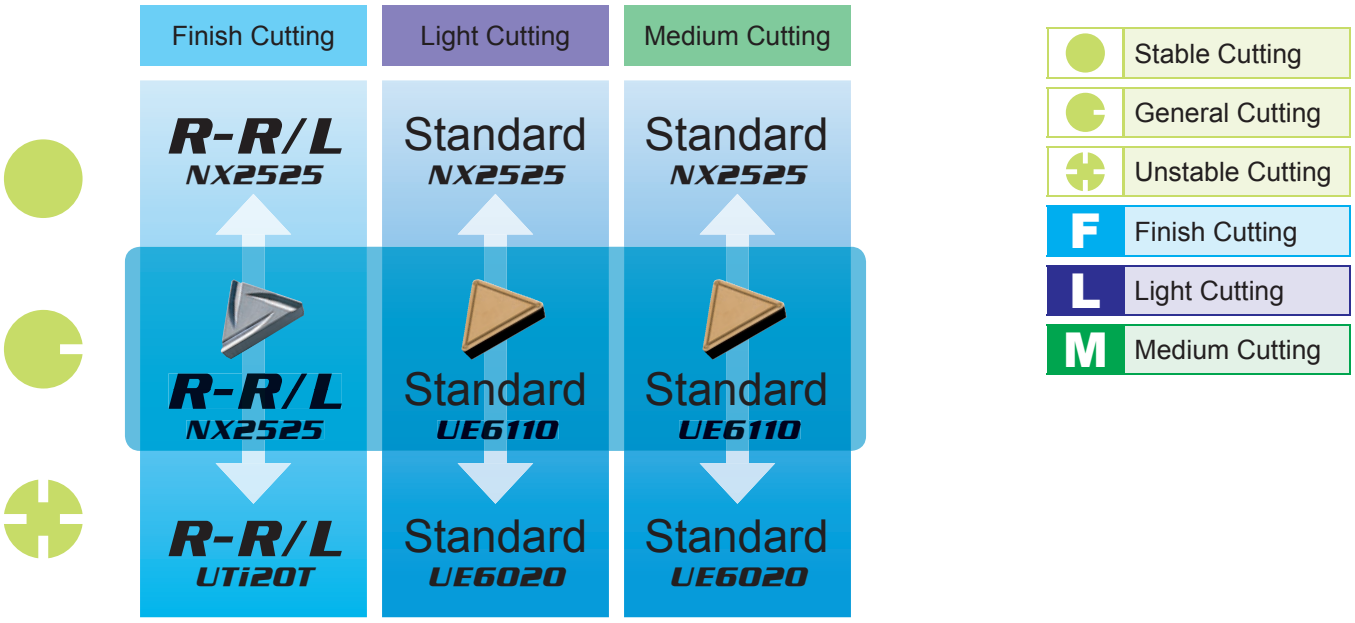
P Mild Steel (Ex : SS400, S10C)

11°POSITIVE INSERTS WITHOUT HOLE

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	**R-R/L**	**NX2525**	225—320	0.05—0.12	0.20—0.60
	L	**Standard**	**NX2525**	185—265	0.08—0.30	0.30—2.00
	M	**Standard**	**NX2525**	185—265	0.08—0.30	0.30—2.00
General Cutting	F	**R-R/L**	**NX2525**	225—320	0.05—0.12	0.20—0.60
	L	**Standard**	**UE6110**	205—350	0.08—0.30	0.30—2.00
	M	**Standard**	**UE6110**	205—350	0.08—0.30	0.30—2.00
Unstable Cutting	F	**R-R/L**	**UTi20T**	115—165	0.05—0.12	0.20—0.60
	L	**Standard**	**UE6020**	195—320	0.08—0.30	0.30—2.00
	M	**Standard**	**UE6020**	195—320	0.08—0.30	0.30—2.00

OPTIMUM GRADES AND CHIP BREAKERS FOR EXTERNAL TURNING

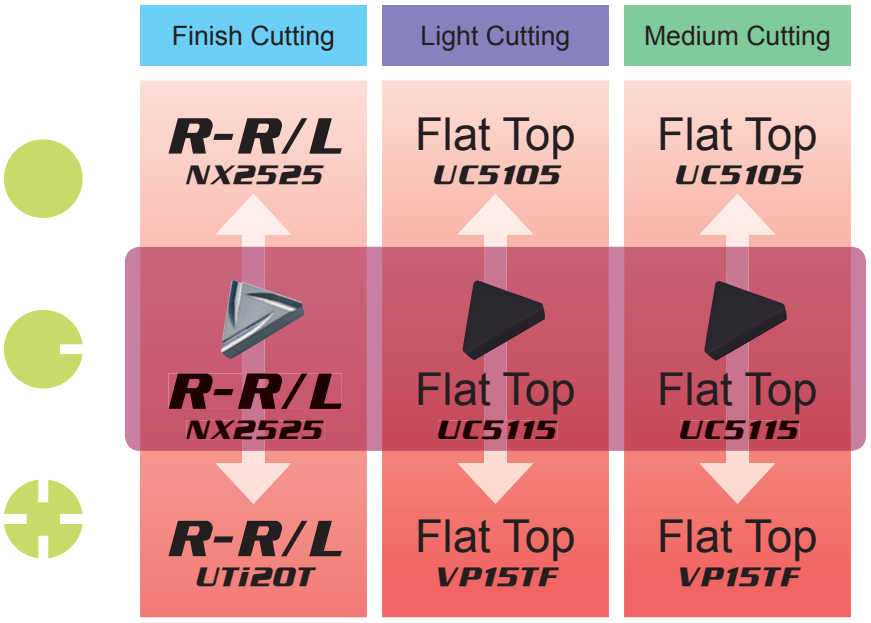


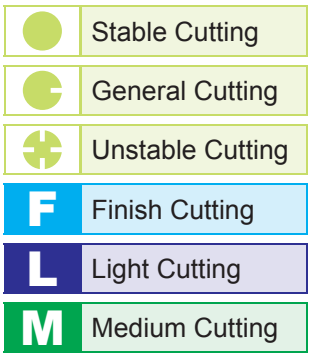
P Carbon Steel • Alloy Steel (Ex : S45C, SCM440)

11°POSITIVE INSERTS WITHOUT HOLE

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	**R-R/L**	**NX2525**	165—235	0.05—0.12	0.20—0.60
	L	**Standard**	**NX2525**	135—195	0.08—0.30	0.30—2.00
	M	**Standard**	**NX2525**	135—195	0.08—0.30	0.30—2.00
General Cutting	F	**R-R/L**	**NX2525**	165—235	0.05—0.12	0.20—0.60
	L	**Standard**	**UE6110**	150—260	0.08—0.30	0.30—2.00
	M	**Standard**	**UE6110**	150—260	0.08—0.30	0.30—2.00
Unstable Cutting	F	**R-R/L**	**UTi20T**	85—120	0.05—0.12	0.20—0.60
	L	**Standard**	**UE6020**	145—235	0.08—0.30	0.30—2.00
	M	**Standard**	**UE6020**	145—235	0.08—0.30	0.30—2.00





K Cast Iron • Ductile Cast Iron (Ex : FC300)

11°POSITIVE INSERTS WITHOUT HOLE

vc : Cutting Speed
f : Feed
ap : Depth of Cut

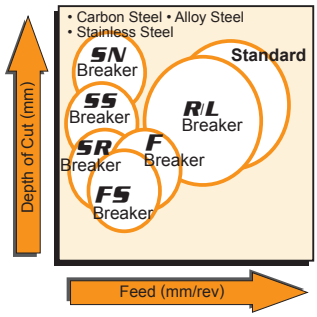
	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	**R-R/L**	**NX2525**	150—205	0.05—0.12	0.20—0.60
	L	**Flat Top**	**UC5105**	135—250	0.08—0.30	0.30—2.00
	M	**Flat Top**	**UC5105**	135—250	0.08—0.30	0.30—2.00
General Cutting	F	**R-R/L**	**NX2525**	150—205	0.05—0.12	0.20—0.60
	L	**Flat Top**	**UC5115**	130—245	0.08—0.30	0.30—2.00
	M	**Flat Top**	**UC5115**	130—245	0.08—0.30	0.30—2.00
Unstable Cutting	F	**R-R/L**	**UTi20T**	80—115	0.05—0.12	0.20—0.60
	L	**Flat Top**	**VP15TF**	115—160	0.08—0.30	0.30—2.00
	M	**Flat Top**	**VP15TF**	115—160	0.08—0.30	0.30—2.00

PRECISION BREAKER SYSTEM

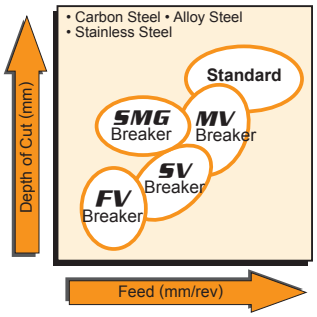
ANGULAR AND PARALLEL CHIP BREAKER

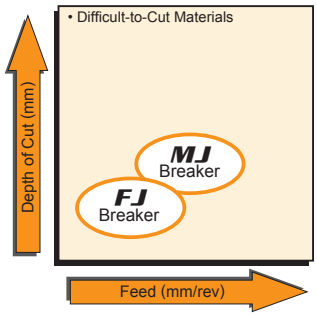
3-D CHIP BREAKER

CHIP CONTROL RANGE



CHIP CONTROL RANGE





FEATURES OF CHIP BREAKER

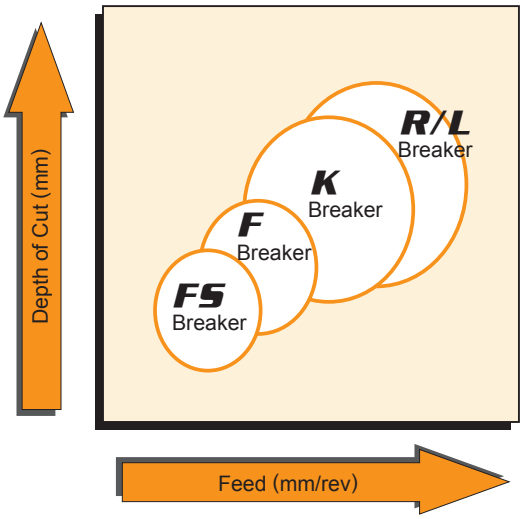
Breaker	Features	CCGH/CCGT Type	CCMH/CCMT CPMH/CPMT Type	DCMT Type	DCGT Type	TCGT/TCMT Type	TPMH Type	VBGT/VBMT Type	VCMT Type	WBMT/WCGT Type
SMG (G class)	● For medium cutting. ● 3D moulded chipbreaker provides good chip control. ● G class insert gives sharp cutting action, allowing high precision machining.		—	—		—	—	—	—	—
FV (M class)	● Sharp cutting edge and low resistance design achieves excellent cutting performance. ● Suitable for low depths of cut and low feed rates.	—			—					—
SV (M class)	● For light cutting. ● A peninsular dot ensures chip control at depths of cut under 1mm.	—			—	—				—
MV (M class)	● A positive insert and the large rake angle achieve sharp cutting edge performance. ● The double breakers and round-shaped dots in the rake face achieve a wide range of chip discharge.	—			—	—				
Standard (M class)	● For medium cutting. ● Balance of edge strength and sharpness due to a combination of a flat land and large rake angle.	—			—		—			—
FJ	● The curved edge allows smooth chip discharge. ● The large rake angle highly suitable for finishing difficult-to-cut materials.		—	—			—	—	—	
MJ	● The curved edge allows smooth chip discharge. ● Large rake angle highly suitable for finish-light cutting difficult-to-cut materials.		—	—			—	—	—	

Breaker	Features	CCGH/CCGT Type	CPGT Type	DCGT Type	TPGH Type	TPGV/TPGT Type	TCGT Type	VBGT/VCGT Type	WBGT Type	WCGT Type	WPGT Type
FS	● For precision finishing. ● Small width lead breaker for excellent chip control. ● Sharp cutting edge gives a good surface finish.	—	—	—		—	—	—	—	—	
F	● For finish cutting. ● Lead breaker controls chip flow. ● Sharp cutting edge gives a good surface finish.				—					—	—
R/L	● Lead breaker for light cutting. ● Good chip control for low to medium feed rates.	—	—	—	—	—	—	—	—		—
Standard	● For light cutting. ● Good chip control for low to medium feed rates.	—		—	—	—	—	—	—	—	

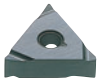
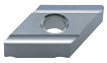
Breaker	Features	**CCET** Type	**CCGT** Type	**DCET** Type	**DCGT** Type	**VBET** Type
SR	● The wide lead breaker for medium cutting is suitable for automatic lathe machining. ● The insert design for low resistance controls chip flow.		—		—	
SS	● The parallel breaker for light cutting is suitable for automatic lathe machining. ● Excellent chip control at low feed rates.	—		—		—
SN	● The parallel breaker for general purpose is suitable for automatic lathe machining. ● Excellent chip control for low to medium feed rates.					

ANGULAR AND PARALLEL CHIP BREAKERS (NEGATIVE INSERTS)

CHIP CONTROL RANGE



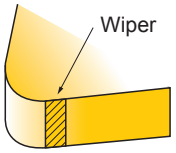
FEATURES OF CHIP BREAKER

Breaker	Features	DNGG Type	SNGG Type	TNGG Type	VNGG Type
FS	● For precision finishing. ● Small width lead breaker for good chip control. ● Sharp cutting edge gives a good surface finish.	—	—		—
F	● For finish cutting. ● Lead breaker controls chip flow. ● Sharp cutting edge gives a good surface finish.	—	—		—
K	● Parallel breaker for light cutting. ● Excellent chip control for low to medium feed rates.	—	—		—
R/L	● Parallel breaker for medium cutting. ● Good chip control for medium feed rates.				

WIPER INSERT

What is a Wiper Insert?

- The wiper insert is designed with a wiper edge that is situated where the straight edge meets the corner radius.
- In comparison to conventional breakers, the surface finish does not deteriorate even if the feed rate is doubled.
- Machining at high feed rates improves cutting efficiency.



●Improving Surface Finish
Under the same machining conditions as conventional breakers, but with the feed rate increased, the surface finish of the workpiece can be improved.

●Improving Efficiency
High feed rates not only shortened machining times but also make it possible to combine roughing and finishing operations.

●Increased Tool Life
When a change to high feed conditions, the time required to cut one component is decreased, thus more parts can be machined with each insert. In addition, the high feed rate prevents rubbing, therefore, delaying the progression of wear and increasing the tool life of the insert.

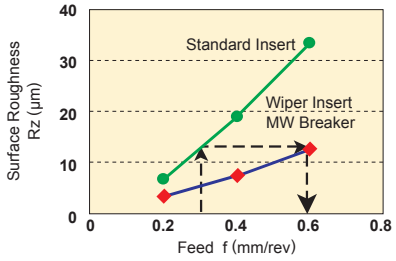
●Improving Chip Control
Under high feed conditions, the chips generated become thicker and are more easily broken, thus, chip control is improved.

Wiper insert + High feed (The feed rate is doubled.)

Finished surface Same surface roughness =

Standard insert + The conventional feed condition

*Please use a wiper insert at high feed rate.



<Cutting Conditions>
Workpiece : JIS S45C
Insert : CNMG120408-○○
Cutting Speed=200m/min
Depth of Cut=1.5mm
Feed Speed=0.2−0.6mm/rev
Wet Outer Diameter Cutting

<Ex>The surface roughness does not deteriorate even if the feed rate is doubled (0.3→0.6)!

■A wiper insert + machining at high feed rate
- Reduced machining time (per workpieces)
- Increased number of workpieces (per definitive time period)
- Improving chip control

■A wiper insert + machining at conventional feed rate
- Eliminating the finishing step by roughing and finishing together (Separate roughing and finishing steps → Single-step machining)

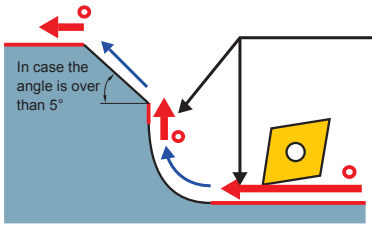
- Reducing cycle times
- Increased productivity
- Avoiding Line-Stoppage

<The realization of Reduced Costs!!>

The estimate of finished surface roughness when using a wiper insert

The effects of wiper inserts on external machining, boring and facing.

*The surface roughness when machining at corner R or taper angle over 5°, is the same as machining with standard inserts.



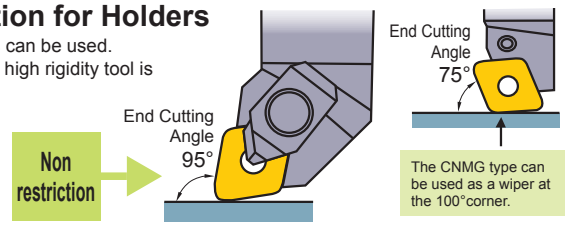
Rz(W)=Rz×0.5

Rz(W) = Finished surface roughness when using a wiper insert.
Rz : Finished surface roughness from conventional conditions. (When using a standard insert)

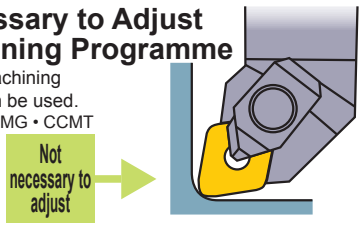
Effective uses of a wiper insert
Non effective uses of a wiper insert

Special attention is not necessary when using CNMG • WNMG • CCMT types

■No Restriction for Holders
A standard holders can be used.
(*A double clamp, high rigidity tool is recommended.)



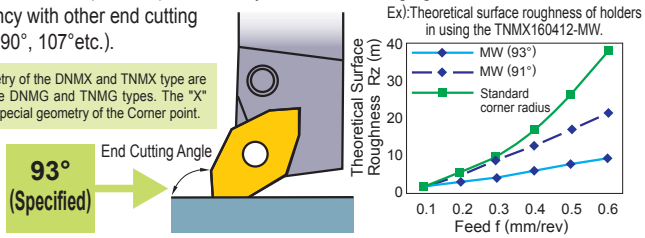
■Not Necessary to Adjust the Machining Programme
Conventional machining programmes can be used. (The CNMG • WNMG • CCMT types are based on the ISO/ANSI.)



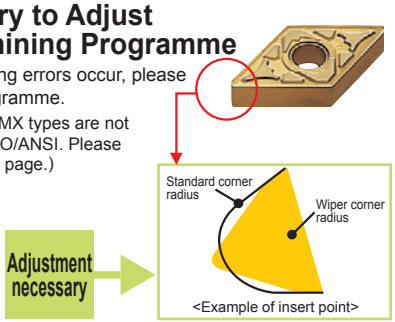
Special attention is necessary when using the DNMX • TNMX types due to the special top face geometry

■Restriction for Holders
Use a holder with end cutting angle 93° for improving wiper efficiency. A holder with end cutting angle 91° can improve wiper efficiency (see the following figure), however, there is no wiper efficiency with other end cutting angles (60°, 90°, 107°etc.).

The hole geometry of the DNMX and TNMX type are the same as the DNMG and TNMG types. The "X" represents the special geometry of the Corner point.



■Necessary to Adjust the Machining Programme
When machining errors occur, please adjust the programme.
(The DNMX•TNMX types are not based on the ISO/ANSI. Please refer to the next page.)

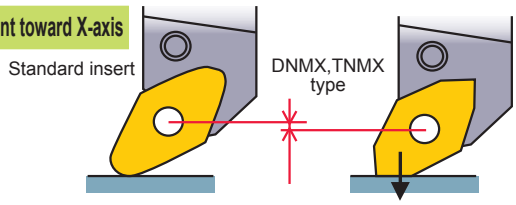


Adjustment of machining programmes for DNMX • TNMX types

Basic Process) Adjusting Toward X-axis and Z-axis

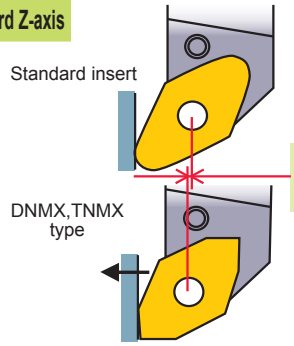
Adjusting the differential between a standard insert and Z-axis / X-axis.

Adjustment toward X-axis



Corner radius 0.4,0.8: **0.04 mm**
Corner radius 1.2 : **0.05 mm**

Adjustment toward Z-axis

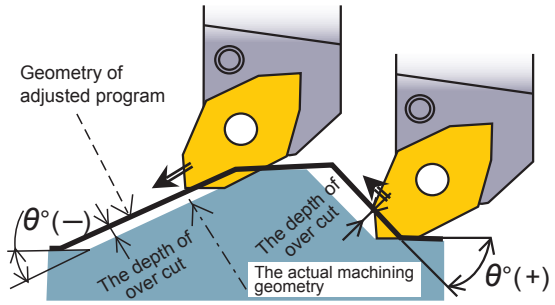


(Not closed to Corner R)
0.01mm

A) Adjusting a Taper ＊Necessary to maintain a correct taper.

Adjust the relief angle toward the normal line.

Note) Adjust the angle toward the normal line in the case where the adjustment number is minus (θ =60°—70°) and is not machined completely.



Classification

Corner radius	Taper Angle θ°															
	-25—-15	-10	-5	**0**	5	10	15	20—35	40	45	50	55	60—65	70	75—85	**90**
1.2	0.04	0.03	0.01	**0**	0.02	0.03	0.04	0.05	0.04	0.04	0.02	0.01	-0.01	0	0.01	**0**
0.8	0.03	0.02	0.01	**0**	0.01	0.02	0.03	0.04	0.03	0.03	0.02	0	-0.01	0	0.01	**0**
0.4	0.02	0.01	0.01	**0**	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0	-0.01	-0.01	0	**0**

The number→+numbers:adjustment of relief angle, -numbers:adjustment of drive-in angle (mm)

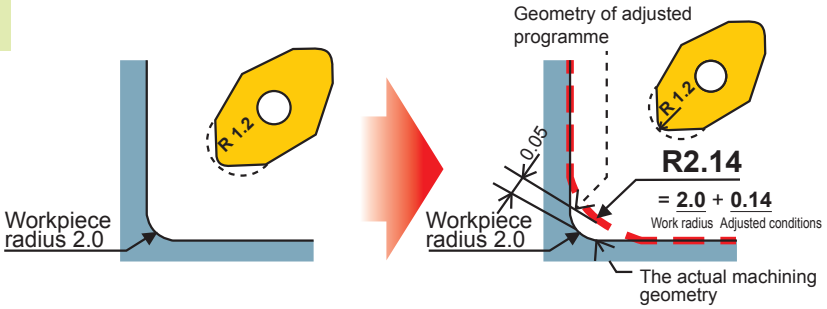
B) Adjusting a Corner R ＊Necessary to maintain a correct corner radius.

Adjust the work diameter same as the taper to prevent cut-over.

The value of adjustment to work R
= Work R + the adjustment value
＊No adjusting the corner radius in this case.

The corner radius of the insert	The adjustment amount on the workpiece radius.
Corner Radius 0.4 →	Work Radius**+0.05**(mm)
Corner Radius 0.8 →	Work Radius**+0.11**(mm)
Corner Radius 1.2 →	Work Radius**+0.14**(mm)

Ex) : In case of machining R 2.0 when using a corner R 1.2 type insert.



The Easy-to-correct Method

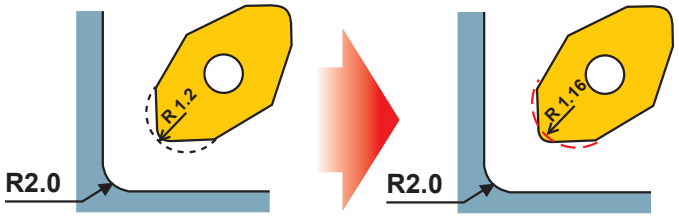
In correcting corner radius:
It is not necessary to adjust the machining programme, however, machining errors can occur within max. ±0.03mm due to correcting by an approximate number.

Corner Radius Correction Input the correction number of each corner radius.

The value of corrected corner radius
= approximation
＊No adjusting the machining the programme in this case.

The corner radius of a insert	The value of corrected corner radius = approximation
Corner Radius 0.4 →	**R0.36**(mm)
Corner Radius 0.8 →	**R0.76**(mm)
Corner Radius 1.2 →	**R1.16**(mm)

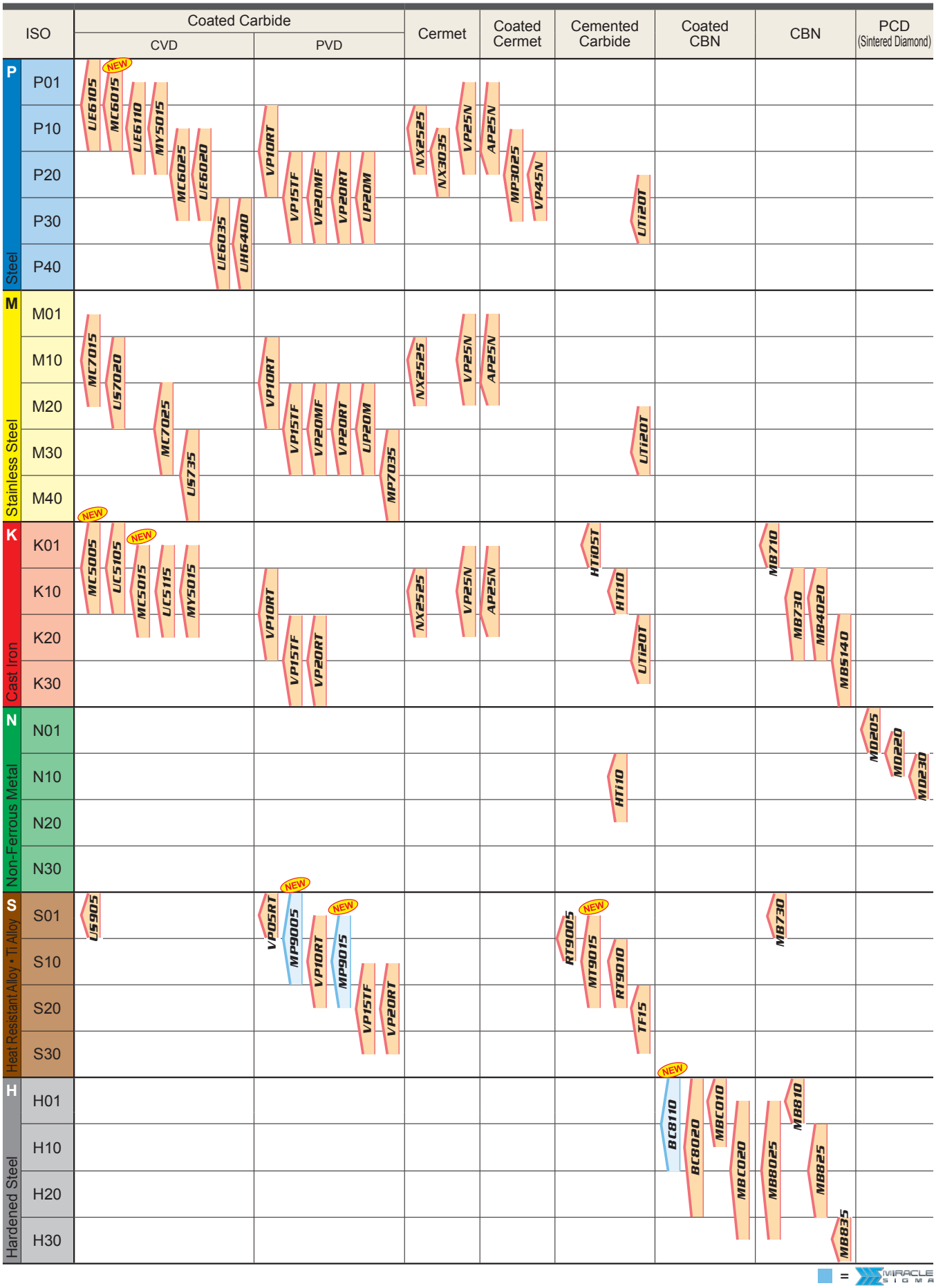
Ex):In the case of machining a corner with a radius R 2.0 when using an insert with a corner radius R 1.2.



Others) The value of correction is same for both DNMX and TNMX. Discriminate them by the size of corner radius.

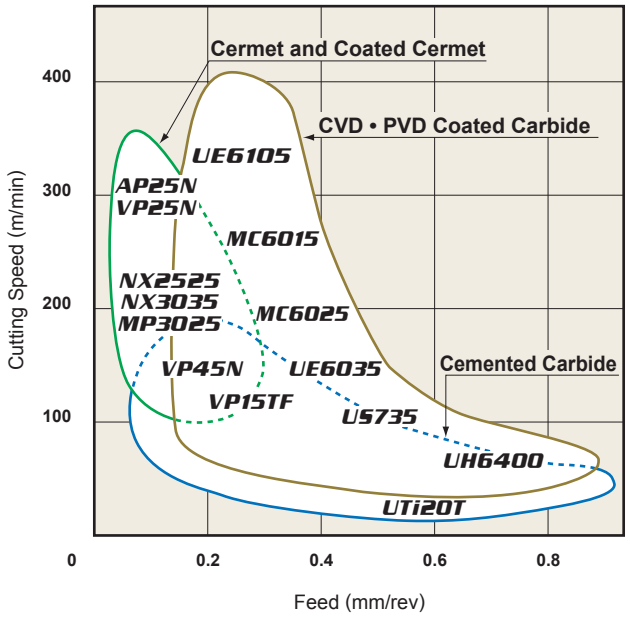
GRADES FOR TURNING

●INDEXABLE INSERT GRADES FOR TURNING

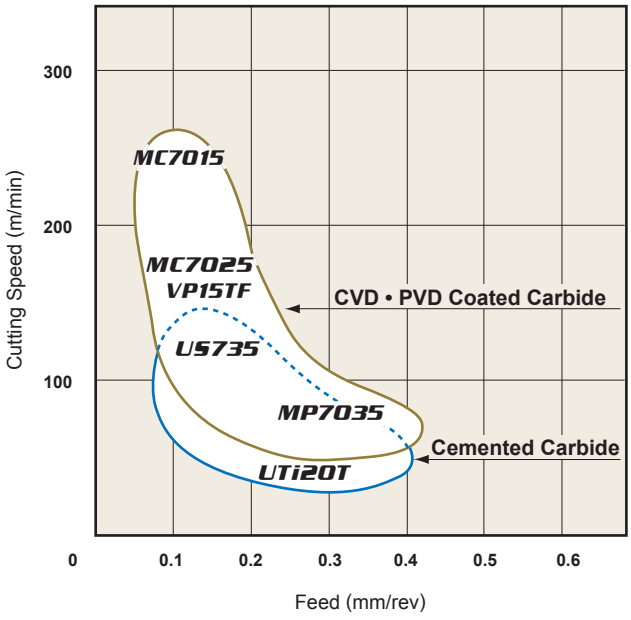


TURNING APPLICATION RANGE

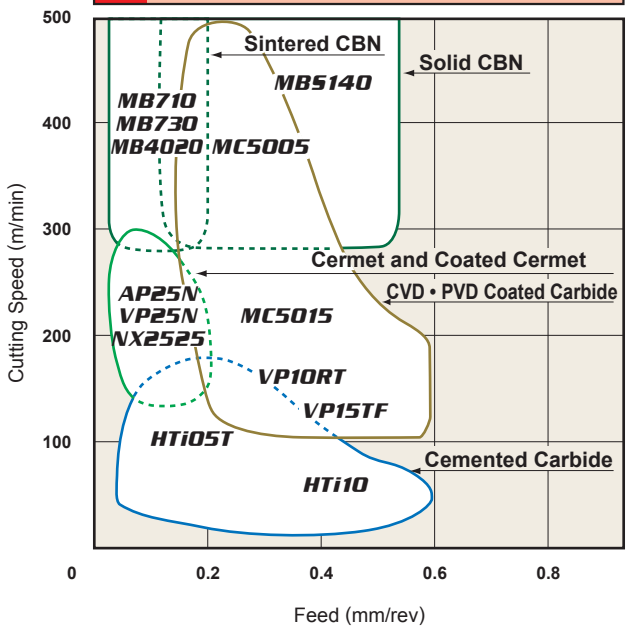
P STEEL



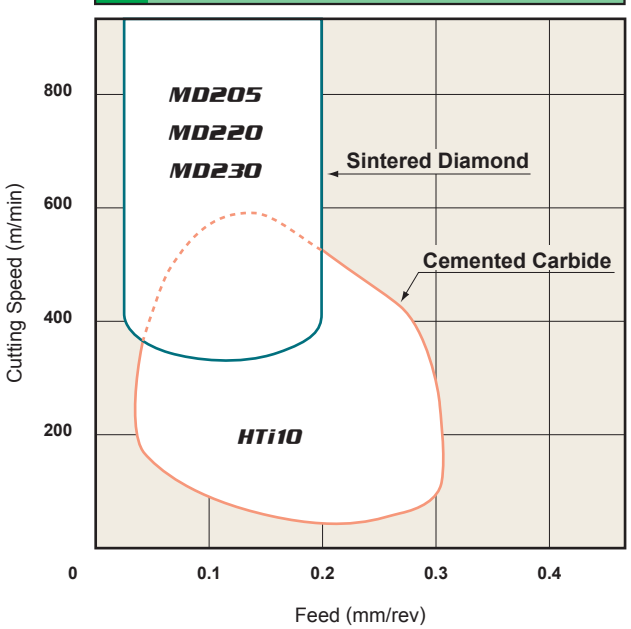
M STAINLESS STEEL



K CAST IRON



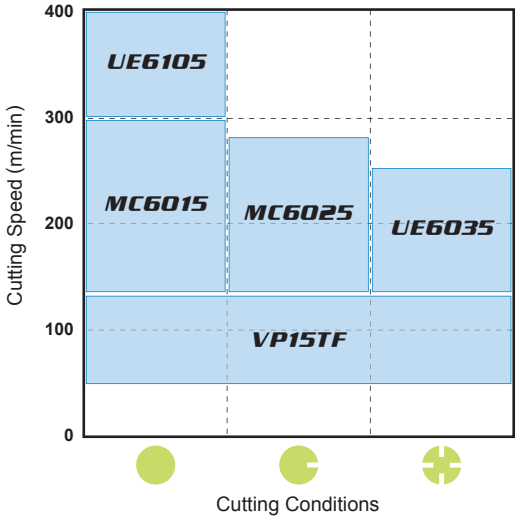
N NON-FERROUS METAL



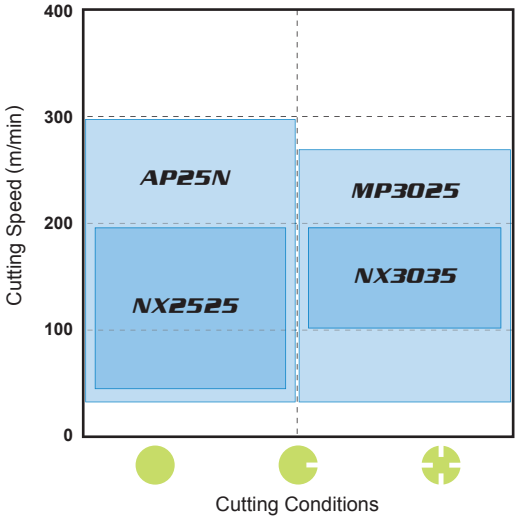
TURNING APPLICATION RANGE

●Recommendation of the insert grade based on cutting speed and conditions for each workpiece.

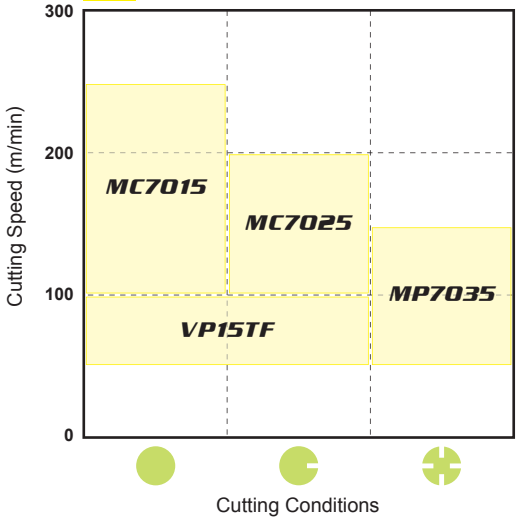
P STEEL (Medium to Rough Cutting)



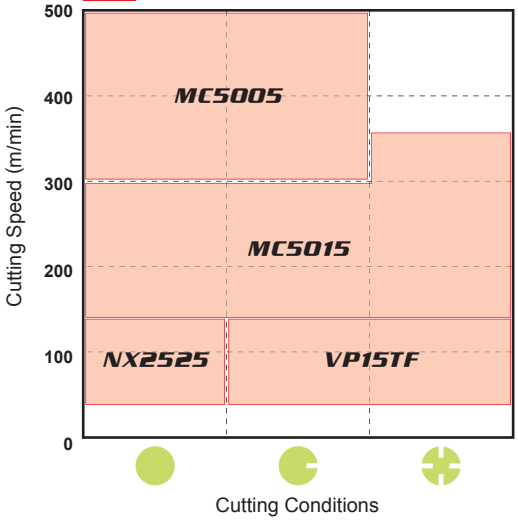
P STEEL (Finish Cutting)



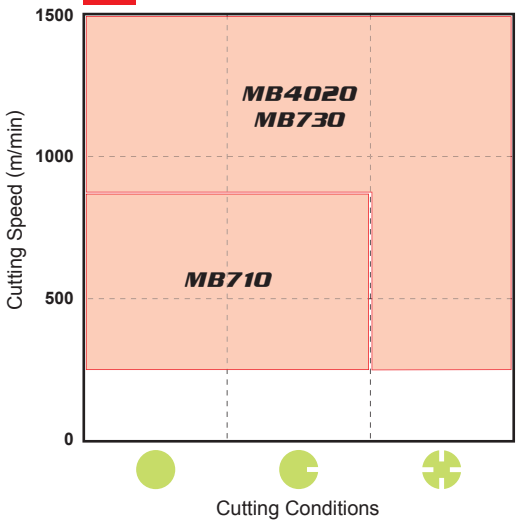
M STAINLESS STEEL



K CAST IRON



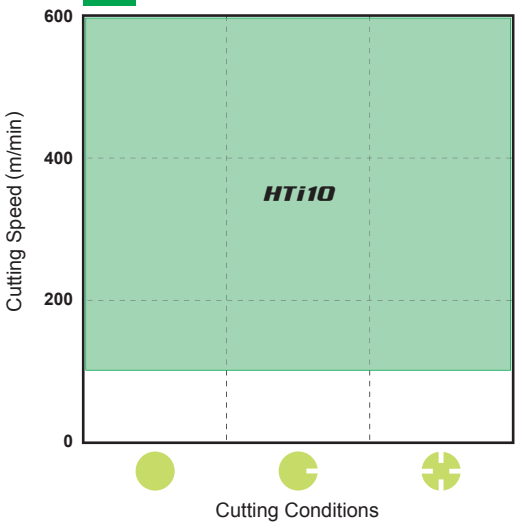
K CAST IRON (CBN)



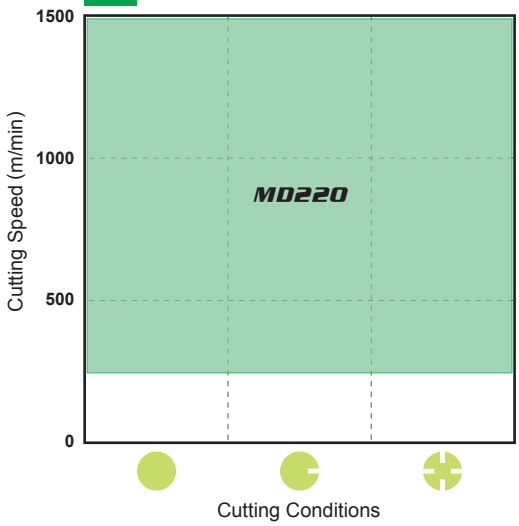
CUTTING CONDITIONS

Stable Cutting	Continuous Cutting Constant Depth of Cut Pre-Machined Securely Clamped Component Cutting
General Cutting	
Unstable Cutting	Heavy Interrupted Cutting Irregular Depth of Cut Low Clamping Rigidity Cutting

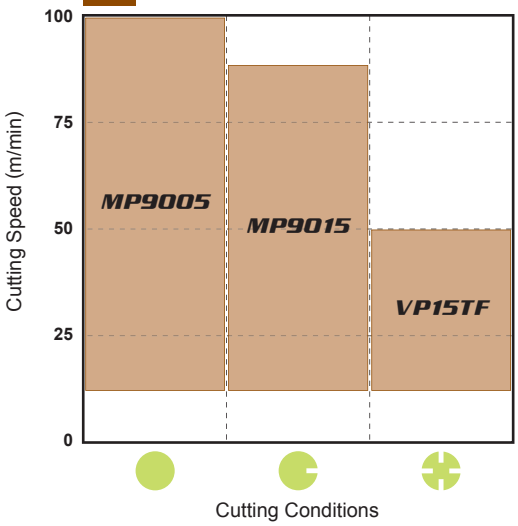
N NON-FERROUS METAL



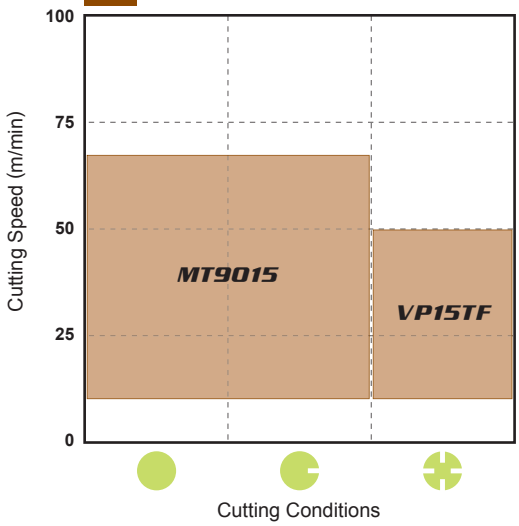
N NON-FERROUS METAL (PCD)



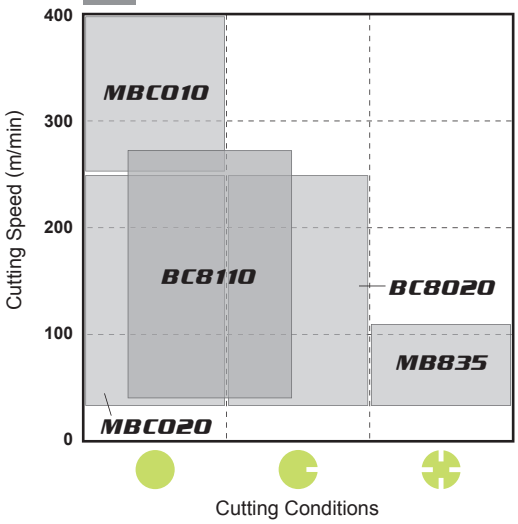
S HEAT RESISTANT ALLOY



S TITANIUM ALLOY



H HARDENED MATERIALS (CBN)



COATED CARBIDE (CVD)

- Special tough fibrous structure improves wear and fracture resistance.
- It covers a wide application range and thus reduces the number of tools required.

SELECTION STANDARD

TURNING

	Work Material	Cutting Mode	Recommended Grade	Recommended Cutting Speed (m/min)	ISO	Application Range
P	Steel	Continuous Cutting	**UE6105**	300 (200 — 400)	P01	UE6105
			MC6015	250 (150 — 400)	P10	NEW MC6015
			MC6025	200 (100 — 280)	P20	UE6110 MY5015 MC6025 UE6020
		Interrupted Cutting	**UE6035**	150 (80 — 200)	P30	UE6035 UH6400
					P40	
M	Stainless Steel	Continuous Cutting	**MC7015**	200 (160 — 250)	M01	MC7015
			MC7025	150 (120 — 200)	M10	US7020
		Continuous and Interrupted Cutting	**US735**	100 (80 — 120)	M20	MC7025
					M30	US735
					M40	
K	Cast Iron Ductile Cast Iron	Continuous Cutting	**UC5105**	300 (200 — 400)	K01	NEW MC5005
					K10	UC5105 NEW MC5015 UC5115 MY5015
		Interrupted Cutting	**UC5115**	250 (150 — 300)	K20	
					K30	
S	Heat Resistant Alloy	Continuous and Interrupted Cutting	**US905**	80 (50 — 100)	S01	US905

High reliability for a wide range of steel machining.

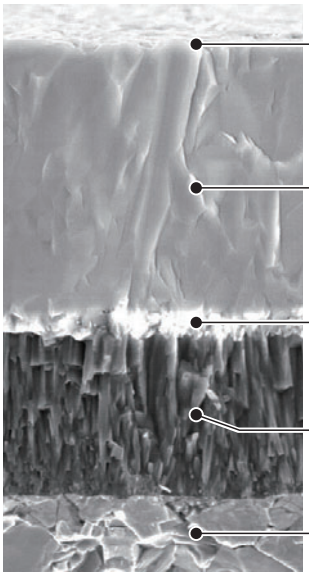
NEW

MC6015

Nano-Texture Technology
The optimised crystal growth, Nano-Texture coating technology gives outstanding wear and chipping resistance.

TOUGH-Grip Technology
The interface between the layers is controlled at the nano level, allowing the TOUGH GRIP layer extremely high levels of adhesion to prevent delamination.





Smooth coating surface
Prevents abnormal damage, welding and chipping

Ultra thick layer Nano-texture Al_2O_3
Delivers outstanding wear resistance even at high temperature

TOUGH-Grip
Prevents delamination of a coating

Nano-texture TiCN
Provides superior wear resistance and chipping resistance

Special carbide substrate
Prevents crack development
Stable tool life

GRADE CHARACTERISTICS

Grade	Substrate			Coating Layer	
	Hardness (HRA)	T.R.S (GPa)	Surface	Composition	Thickness
UC5105	92.2	2.0	–	TiCN-Al_2O_3	Thick
NEW **MC5005**	91.0	2.2	–	TiCN-Al_2O_3	Thick
UC5115	91.0	2.2	–	TiCN-Al_2O_3	Thick
NEW **MC5015**	91.0	2.2	–	TiCN-Al_2O_3	Thick
UE6105	90.8	1.8	Tough	Accumulated TiCN-Al_2O_3-Ti Compound	Thick
UE6110	90.3	2.0	Tough	Accumulated TiCN-Al_2O_3-Ti Compound	Thick
UE6020	90.0	2.2	Tough	Accumulated TiCN-Al_2O_3-Ti Compound	Thick
NEW **MC6015**	90.2	2.2	Tough	Accumulated TiCN-Al_2O_3-Ti Compound	Thick
MC6025	90.2	2.2	Tough	Accumulated TiCN-Al_2O_3-Ti Compound	Thick
UE6035	89.5	2.3	Tough	TiCN-Al_2O_3-TiN	Thick
UH6400	89.5	2.3	Tough	Accumulated TiCN-Al_2O_3-Ti Compound	Thick
MC7015	90.7	2.0	Tough	TiCN-Al_2O_3-TiN	Thin
US7020	90.5	2.0	Tough	TiCN-Al_2O_3-TiN	Thin
MC7025	89.4	2.4	–	TiCN-Al_2O_3-TiN	Thin
US735	89.0	2.6	–	Ti Compound	Thin
US905	92.2	2.0	–	TiCN-Al_2O_3-TiN	Thin
MY5015	91.2	2.4	–	TiCN-Al_2O_3-TiN	Thin

* 1GPa=102kg/mm^2

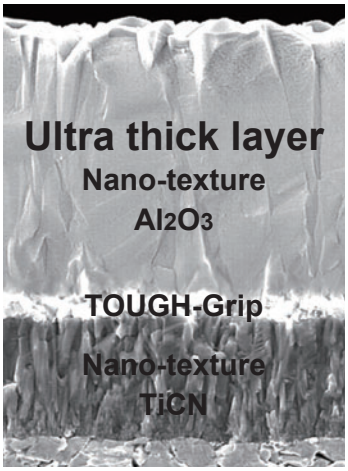
ISO Insert Series for Cast Iron Turning

NEW

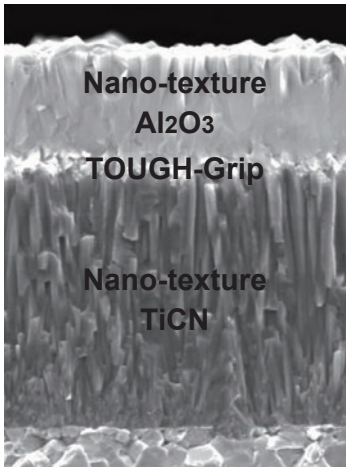
MC5005/MC5015

The CVD nano-coated layer with high strength is formed by the synergistic effects between “Nano-texture coating technology” and “TOUGH-GRIP Technology”,thereby achieving superior wear resistance in the turning for cast iron.





MC5005



MC5015

COATED CARBIDE (PVD)

- PVD coating prolongs tool life under the same cutting conditions compared to uncoated carbide.
- Coating of tools with sharp edges is possible without softening or changing the edge quality of the substrate.

SELECTION STANDARD

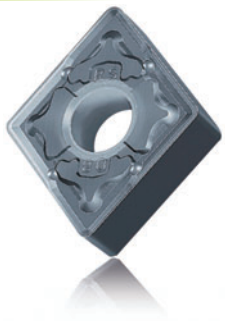
TURNING

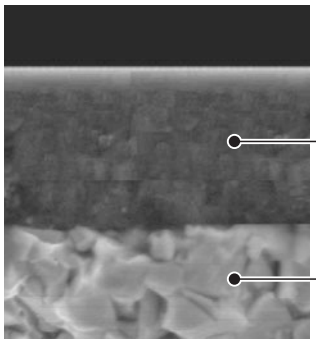
	Work Material	Recommended Grade	Recommended CuttingSpeed (m/min)	ISO	Application Range
P	Steel	**VP10RT**	120 (100 — 150)	P01	
		VP15TF	120 (100 — 150)	P10	VP10RT
		VP20MF	120 (100 — 150)	P20	VP15TF, VP20MF
		VP20RT	120 (100 — 150)	P30	VP20RT, UP20M
		UP20M	120 (100 — 150)	P40	
M	Stainless Steel	**VP10RT**	120 (100 — 150)	M01	
		VP15TF	120 (100 — 150)	M10	VP10RT
		VP20MF	120 (100 — 150)	M20	VP15TF, VP20MF
		VP20RT	120 (100 — 150)	M30	VP20RT, UP20M, MP7035
		UP20M	120 (100 — 150)	M40	
K	Cast Iron	**VP10RT**	120 (100 — 150)	K01	
		VP15TF	120 (100 — 150)	K10	VP10RT
				K20	VP15TF, VP20RT
		VP20RT	120 (100 — 150)	K30	
S	Heat Resistant Alloy	**MP9005**	60 (30 — 100)	S01	NEW MP9005, VP05RT
		MP9015	50 (25 — 80)	S10	NEW MP9015, VP10RT
		VP15TF	40 (20 — 50)	S20	VP15TF, VP20RT
		VP20RT	40 (20 — 50)	S30	

■ = MIRACLE SIGMA

ISO Turning Inserts for Difficult to Cut Materials

NEW **MP9005/MP9015**





MIRACLE SIGMA

New technology
High Al-(Al,Ti)N single layer coating

Special carbide substrate

ISO Grade	Grade	Concept	Application
S01	**MP9005**	Top-quality grade focusing on wear resistance	Heat Resistant Alloy Finish-Medium Cutting
S10	**MP9015**	First recommendation for general applications	Heat Resistant Alloy Medium-Rough Cutting

CERMET

- The optimized alloy structure and special alloy binder improves both wear and fracture resistance.
- It covers a wide application range and reduces the number of tools required.
- NX3035 for wet cutting.
- NX2525 for dry cutting.

SELECTION STANDARD

TURNING

	Work Material	Cutting Mode	Recommended Grade	Recommended Cutting Speed (m/min)	ISO	Application Range
P	Steel	Continuous Cutting	**NX2525**	220 (180 — 250)	P01	NX2525
					P10	NX2525
		Interrupted Cutting	**NX3035**	200 (190 — 260)	P10	NX3035
					P20	NX3035
K	Cast Iron Ductile Cast Iron	Finishing	**NX2525**	180 (150 — 210)	K01	NX2525
					K10	NX2525

GRADE CHARACTERISTICS

Grade	Hardness (HRA)	T.R.S (GPa)	Thermal Conductivity (W/m • K) *	Thermal Expansion ($\times 10^{-6}$/K)
NX2525	92.2	2.0	33	7.8
NX3035	91.5	2.1	35	7.8

* 1GPa=102kg/mm^2, 1W/m•K=2.39$\times 10^{-3}$cal/cm•sec•℃

COATED CERMET

●Coated cermet (PVD coating) has superior wear and fracture resistance, and therefore provides a stable cutting performance.

SELECTION STANDARD

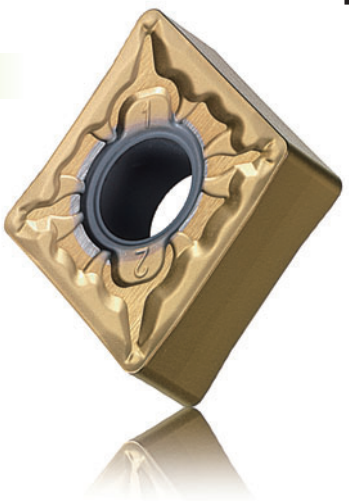
●TURNING

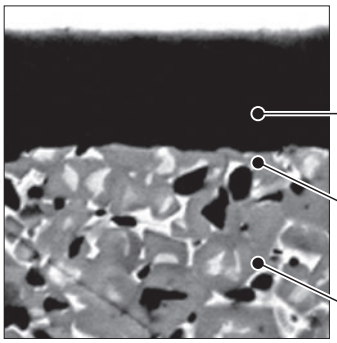
Work Material		Cutting Mode	Recommended Grade	Recommended CuttingSpeed (m/min)	ISO	Application Range
P	Steel	Continuous Cutting	**VP25N AP25N**	240 (190 — 290)	P01 P10	VP25N, AP25N
		Interrupted Cutting	**MP3025**	230 (180 — 280)	P20 P30	MP3025, VP45N, AP25N
K	Cast Iron Ductile Cast Iron	Finishing	**VP25N AP25N**	160 (110 — 230)	K01 K10 K20	VP25N, AP25N

Effective for production of small parts.

MP3025

MP3025 provides improved adhesion for coating layer due to the newly-developed special substrate. Uniform flank wear allows prolonged machining that maintains excellent surface finish.





Ti-compound PVD coating provides excellent wear and welding resistance.

Substrate surface provides excellent adhesion strength for coating layer.

Substrate with superior fracture resistance and thermal shock resistance.

CEMENTED CARBIDE

●UTi grades are available for steel and cast iron. HTi grades are available for non-ferrous and non-metal materials and are also suitable for cast iron.

SELECTION STANDARD

●TURNING

Work Material		Recommended Grade	Recommended Cutting Speed (m/min)	ISO	Application Range
P	Steel	**UTi20T**	100 (60 — 130)	P10	
				P20	UTi20T
				P30	
M	Stainless Steel	**UTi20T**	100 (60 — 130)	M10	
				M20	UTi20T
				M30	
K	Cast Iron	**HTi05T**	120 (80 — 150)	K01	HTi05T
		HTi10	100 (50 — 150)	K10	HTi10
		UTi20T	100 (50 — 150)	K20	UTi20T
				K30	
N	Non-Ferrous Metal	**HTi10**	600 (400 — 800)	N01	
				N10	HTi10
				N20	
				N30	
S	Heat-resistant Alloy Ti Alloy	**RT9005**	70 (50 — 100)	S01	RT9005
		MT9015 RT9015	60 (40 — 80)	S10	NEW MT9015
				S20	RT9010
		TF15	50 (40 — 70)	S30	TF15

MAIN COMPONENT AND APPLICATION

ISO	Main Component	Characteristics	Work Material
P M	WC-TiC-TaC-Co	Heat / deformation resistance.	Carbon steel, alloy steel, stainless steel and cast iron
K N	WC-Co	High rigidity and wear resistance.	Cast iron, non-ferrous metals, and non-metal
S	WC-Co	High heat resistance and wear resistance.	Heat-resistant alloy, Ti alloy

GRADE CHARACTERISTICS

ISO	Grade	Hardness (HRA)	Thermal Conductivity (W/m•K)*	Thermal Expansion (x10^{-6}/K)	Young's Modulus (GPa)*	T.R.S(GPa)*
P M	**UTi20T**	90.5	38	5.5	520	2.0
K N	**HTi05T**	92.5	79	4.5	600	1.5
	HTi10	92.0	79	4.6	630	2.0
S	**RT9005**	92.2	79	4.5	600	2.0
	MT9015/RT9010	92.0	79	4.6	630	2.2
	TF15	91.5	71	5.3	580	2.5

* 1GPa=102kg/mm^2, 1W/m•K=2.39×10^{-3}cal/cm•sec•℃

MICRO-GRAIN CEMENTED CARBIDE (SOLID TOOLS)

●Compared to normal cemented carbide, micro-grain types have higher wear resistance and toughness.

SELECTION STANDARD

Cutting Tool	Recommended Grade	Work Material
PCB Miniature Drill	**SF10** **MF10** **MF20**	Non-Metal
Solid Carbide Drill Turning Inserts Milling Inserts	**TF15**	Steel • Cast Iron
Solid End Mill	**HTi10** **TF15** **MF10**	Steel • Cast Iron
Gear Hob Reamer Tap etc.	**TF15** **MF20** **MF30**	Steel • Cast Iron, etc.

GRADE CHARACTERISTICS

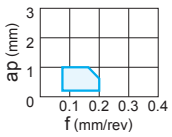
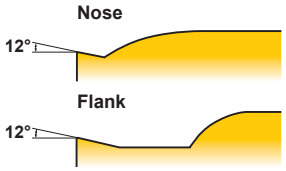
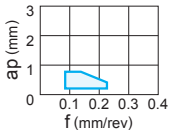
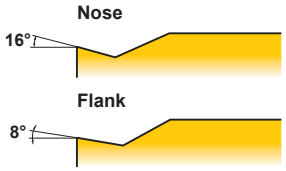
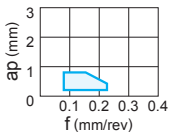
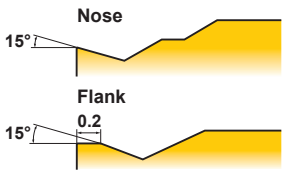
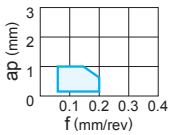
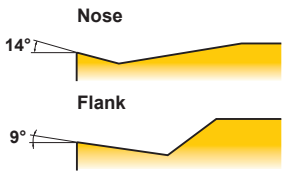
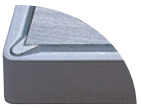
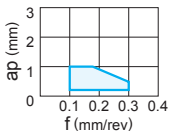
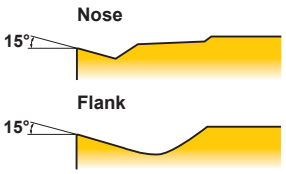
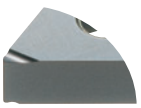
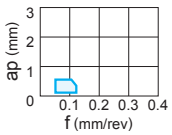
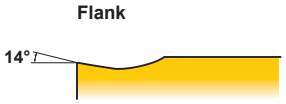
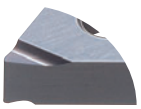
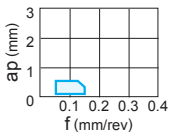
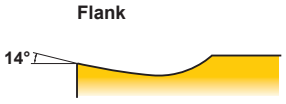
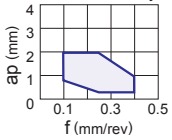
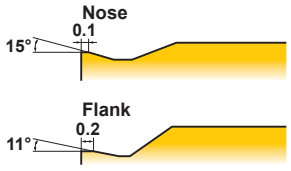
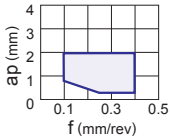
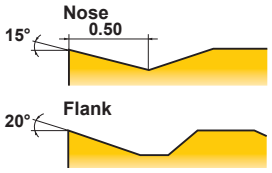
Grade	Grade Characteristics **			ISO	Wear Resistance	Fracture Resistance	Corrosion Resistance
	Specific Gravity	Hardness (HRA)	T.R.S (GPa)*				
HTi10	**14.9**	92.0	3.2	K10	◎	○	○
TF15	**14.5**	91.0	4.0	K20	◎	○	◎
SF10	**14.9**	92.7	3.8	K01	◎	○	◎
MF10	**14.6**	93.0	4.0	K01	◎	○	◎
MF20	**14.2**	92.0	4.4	K10	○	◎	◎
MF30	**13.7**	90.7	4.3	K20	○	◎	◎

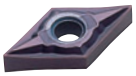
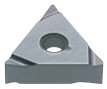
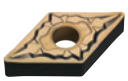
* 1GPa=102kg/mm^2
** After HIP

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CLASSIFICATION

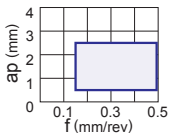
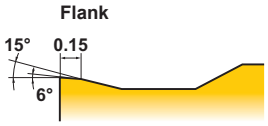
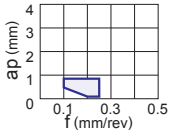
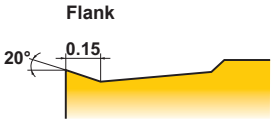
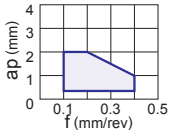
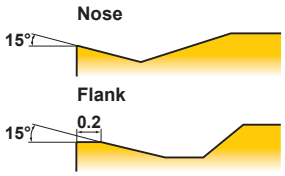
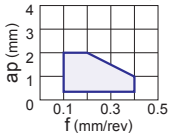
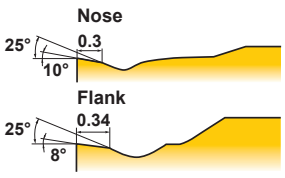
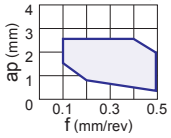
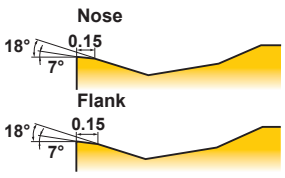
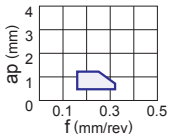
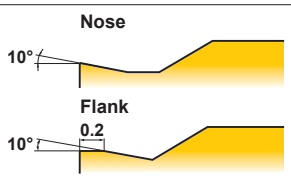
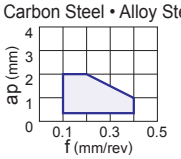
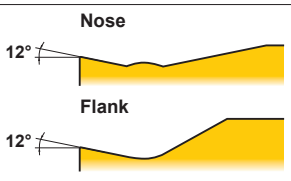
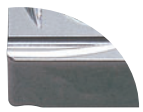
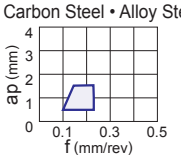
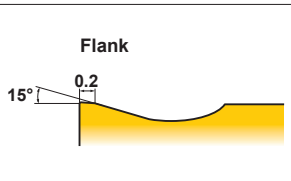
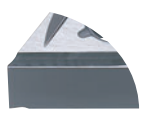
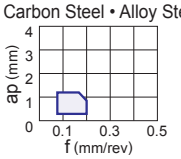
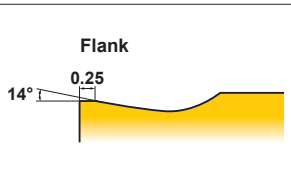
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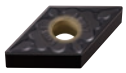
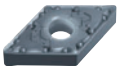
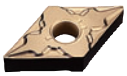
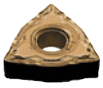
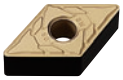
Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Finish Cutting	M	**FH** 	**First recommendation for finishing carbon steel, alloy steel and stainless steel** Double sided chipbreaker. Stable chip control even at small depth of cut.	Carbon Steel • Alloy Steel  
		FS 	**Alternative chipbreaker for finishing mild steel** Double sided chipbreaker. Stable chip control even at small depth of cut. Sharp edge gives best performance.	Mild Steel  
		FY 	**First recommendation for finishing mild steel** Double sided chipbreaker. Effectively controls adhesive chips. Suitable for mild steel finishing.	Mild Steel  
	G	**FJ** 	**First recommendation for finishing difficult-to-cut materials** Double sided chipbreaker. Ideal for heat-resistant alloy and titanium alloy. The sharp edge produces good cutting surface. The curved edge allows smooth chip discharge.	Difficult-to-Cut Materials  
		PK 	**Alternative chipbreaker for finishing carbon steel and alloy steel** Double sided chipbreaker. G class insert tolerance is suitable for workpieces requiring close dimensional tolerances. Stable chip control even at small depth of cut.	Carbon Steel • Alloy Steel  
		R/L-FS 	**Precise finishing** Double sided chipbreaker. A narrow lead chipbreaker for good chip control. The sharp edge produces a good surface finish.	Carbon Steel • Alloy Steel  
		R/L-F 	**Finishing** Double sided chipbreaker. Lead chipbreaker controls chip flow. The sharp edge produces a good surface finish.	Carbon Steel • Alloy Steel  
Light Cutting	M	**LP** 	**First recommendation for light cutting of carbon steel and alloy steel** Double sided chipbreaker. Stable chip control at light cutting range. The curved edge allows smooth chip discharge.	Carbon Steel • Alloy Steel  
		LM 	**First recommendation for light cutting of stainless steel** M class double sided chip breaker. Stable chip control at light cutting range. Breaker with high rake angle provides excellent burr control.	Stainless Steel  

	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
	CNMG_FH  A092	DNMG_FH  A098	SNMG_FH  A105	TNMG_FH  A110	VNMG_FH  A116	WNMG_FH  A119		FH 
	CNMG_FS  A092	DNMG_FS  A098	SNMG_FS  A105	TNMG_FS  A110	VNMG_FS  A116	WNMG_FS  A119		FS 
	CNMG_FY  A092	DNMG_FY  A098		TNMG_FY  A110		WNMG_FY  A119		FY 
	CNGG_FJ  A092	DNGG_FJ  A098			VNGG_FJ  A116			FJ 
	CNGG_PK  A092	DNGG_PK  A098		TNGG_PK  A110				PK 
				TNGG_R/L-FS  A110				R/L-FS 
				TNGG_R/L-F  A110	VNGG_R/L-F  A116			R/L-F 
	CNMG_LP  A092	DNMG_LP  A098	SNMG_LP  A105	TNMG_LP  A110	VNMG_LP  A116	WNMG_LP  A119		LP 
	CNMG_LM  A092	DNMG_LM A099	SNMG_LM A105	TNMG_LM A111	VNMG_LM A116	WNMG_LM A119		LM

CLASSIFICATION

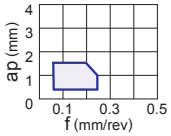
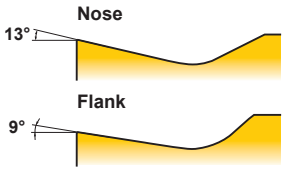
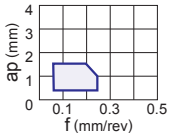
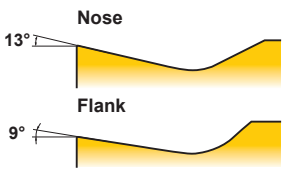
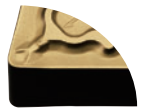
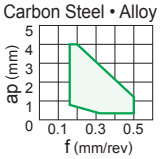
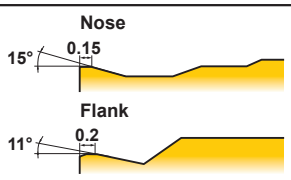
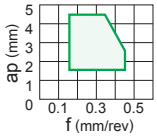
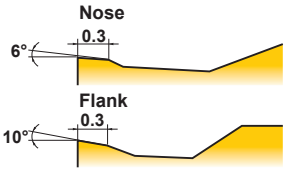
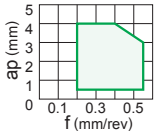
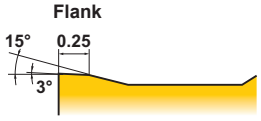
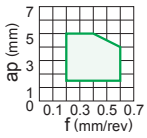
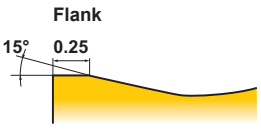
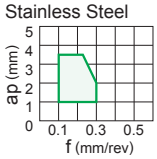
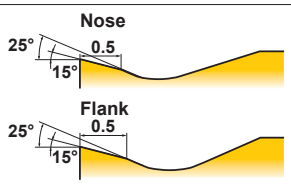
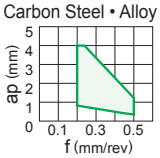
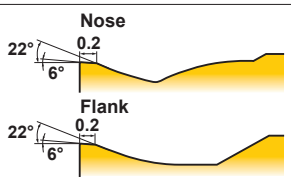
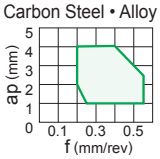
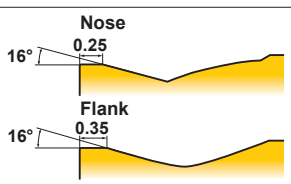
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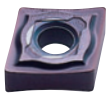
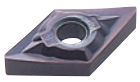
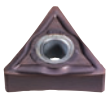
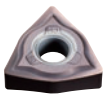
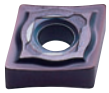
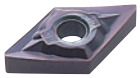
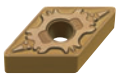
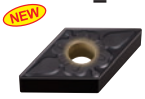
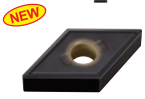
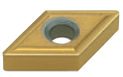
Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Light Cutting	M	NEW **LK** 	**First recommendation for light cutting of cast iron** Narrow positive land provides low cutting resistance and excellent finish.	Cast Iron  
		NEW **LS** 	**First recommendation for light cutting of difficult-to-cut materials** Enhanced chip disposal for depth of cut smaller than the corner R.	 
		SH 	**Alternative chipbreaker for light cutting of carbon steel and alloy steel** Double sided chipbreaker. Can be used at low depth of cuts and high feed rates. The curved edge allows smooth chip discharge. Recommended for workpieces in the 160—250HB range.	Carbon Steel • Alloy Steel  
		SA 	**Alternative chipbreaker for light cutting of carbon steel and alloy steel** Double sided chipbreaker. Superior chip control at small depth of cuts. Covers copying and back turning with wavy edge. Recommended for workpieces in the 200—300HB range.	Carbon Steel • Alloy Steel  
		SW 	**Wiper insert for light cutting of carbon steel and alloy steel** Double sided chipbreaker. The wiper allows up to two times higher feed. Wiper design for increased productivity and improved surface finish.	Carbon Steel • Alloy Steel  
		SY 	**First recommendation for light cutting of mild steel** Double sided chipbreaker. Effectively controls adhesive chips. Suitable for mild steel light cutting.	Mild Steel  
		C 	**Alternative chipbreaker for light cutting of carbon steel and alloy steel** Double sided chipbreaker. Suitable for light cutting. The curved edge allows smooth chip discharge.	Carbon Steel • Alloy Steel  
		R/L-1G 	**Alternative chipbreaker for light cutting of carbon steel and alloy steel** Double sided chipbreaker. Parallel chipbreaker controls chip flow. Suitable for finish-light cutting. Precision chipbreaker.	Carbon Steel • Alloy Steel  
	G	**R/L-K** 	**Light cutting** Double sided chipbreaker. Parallel chipbreaker. Excellent chip control at low to medium feed rates.	Carbon Steel • Alloy Steel  

	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
	CNMG_LK (NEW)  A093	DNMG_LK (NEW)  A099	SNMG_LK (NEW)  A105	TNMG_LK (NEW)  A111	VNMG_LK (NEW)  A116	WNMG_LK (NEW)  A119		LK 
	CNMG_LS (NEW)  A093	DNMG_LS (NEW)  A099		TNMG_LS (NEW)  A111	VNMG_LS (NEW)  A117	WNMG_LS (NEW)  A119		LS 
	CNMG_SH  A093	DNMG_SH  A099	SNMG_SH  A105	TNMG_SH  A111	VNMG_SH  A117	WNMG_SH  A120		SH 
	CNMG_SA  A093	DNMG_SA  A099	SNMG_SA  A105	TNMG_SA  A111		WNMG_SA  A120		SA 
	CNMG_SW  A093	DNMX_SW  A099		TNMX_SW  A111		WNMG_SW  A120		SW 
	CNMG_SY  A093	DNMG_SY  A099	SNMG_SY  A106	TNMG_SY  A111		WNMG_SY  A120		SY 
	CNMG_C  A093	DNMG_C  A100	SNMG_C  A106	TNMG_C A111		WNMG_C A120		C
			SNMG_R/L-1G A106	TNMG_R/L-1G A111				R/L-1G
				TNGG_R/L-K A112				R/L-K

CLASSIFICATION

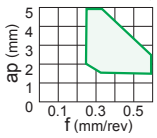
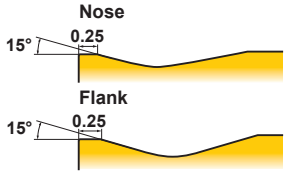
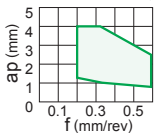
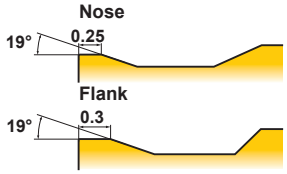
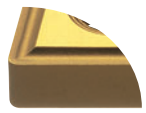
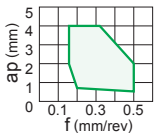
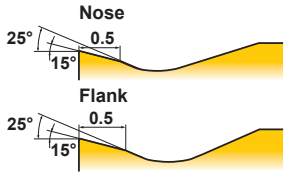
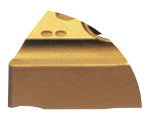
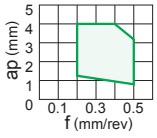
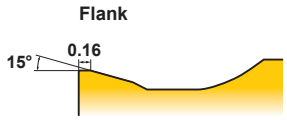
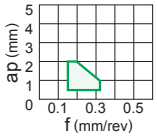
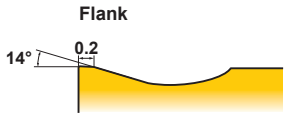
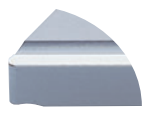
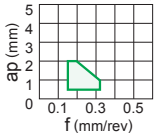
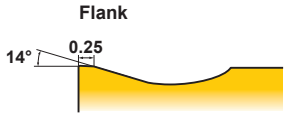
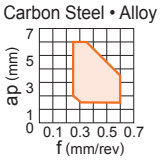
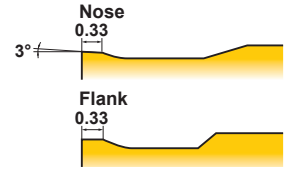
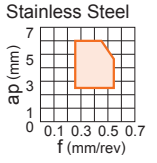
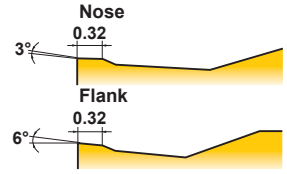
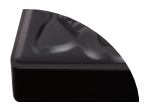
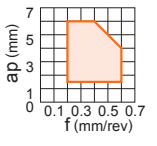
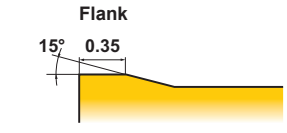
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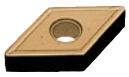
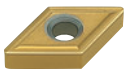
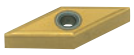
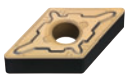
Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Light Cutting	M	MJ 	**First recommendation for light cutting of difficult-to-cut materials** Double sided chipbreaker. Ideal for heat-resistant alloy and titanium alloy. The sharp edge produces a good surface finish. The curved edge allows smooth chip discharge.	Difficult-to-Cut Materials  
	G	MJ 	**First recommendation for light cutting of difficult-to-cut materials** Double sided chipbreaker, Single sided chipbreaker (D type, V type). The sharp edge produces a good surface finish. Ideal for heat-resistant alloy and titanium alloy. The curved edge allows smooth chip discharge.	Difficult-to-Cut Materials  
Medium Cutting	M	MP 	**First recommendation for medium cutting of carbon steel and alloy steel** Double sided chipbreaker. Suitable for medium to light cutting. Breaker geometry appropriate for copying and back turning. Cutting edge geometry for an optimum balance of sharpness and fracture resistance.	Carbon Steel • Alloy Steel  
		MM 	**First recommendation for medium cutting of stainless steel** M class double sided chip breaker. Optimized land geometry by simulation analysis technology controls the plastic deformation of the corner and achieves the long tool life.	Stainless Steel  
		NEW MK 	**First recommendation for medium cutting of cast iron** Optimum balance between sharpness and high edge strength for general use.	Cast Iron  
		NEW GK 	**Alternative chip breaker for medium cutting for cast iron** Breakers are suitable for a wide range of applications. Maintenance of high stability by the flat-land.	Cast Iron  
		GM 	**Alternative chip breaker for light to medium cutting of stainless steel** M class double sided chip breaker. Alternative chip breaker of main chip breaker LM and MM. Excellent notch wear resistance for light to medium cutting.	Stainless Steel  
		MA 	**First recommendation for medium cutting of carbon steel and alloy steel** **Alternative chipbreaker for finishing and light cutting of cast iron** Double sided chipbreaker. Positive land provides sharp cutting action.	Carbon Steel • Alloy Steel  
		MH 	**First recommendation for rough cutting of mild steel** **Alternative chipbreaker for medium cutting of carbon steel and alloy steel** Double sided chipbreaker. Flat land offers high edge strength.	Carbon Steel • Alloy Steel  

Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
CNMG_MJ  A093	DNMG_MJ  A100		TNMG_MJ  A112	VNMG_MJ  A117	WNMG_MJ  A120		MJ(M) 
CNGG_MJ  A093	DNGM_MJ  A100			VNGM_MJ  A117			MJ(G) 
CNMG_MP  A094	DNMG_MP  A100	SNMG_MP  A106	TNMG_MP  A112	VNMG_MP  A117	WNMG_MP  A121		MP 
CNMG_MM  A094	DNMG_MM  A100	SNMG_MM  A106	TNMG_MM  A112	VNMG_MM  A117	WNMG_MM  A121		MM 
CNMG_MK NEW  A094	DNMG_MK NEW  A100	SNMG_MK NEW  A106	TNMG_MK NEW  A112	VNMG_MK NEW  A117	WNMG_MK NEW  A121		NEW MK 
CNMG_GK NEW  A094	DNMG_GK NEW  A101	SNMG_GK NEW  A107	TNMG_GK NEW  A112	VNMG_GK NEW  A117	WNMG_GK NEW  A121		NEW GK 
CNMG_GM  A094	DNMG_GM  A101	SNMG_GM A107	TNMG_GM A112	VNMG_GM A117	WNMG_GM A121		GM
CNMG_MA A095	DNMG_MA A101	SNMG_MA A107	TNMG_MA A113	VNMG_MA A118	WNMG_MA A121		MA
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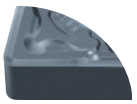
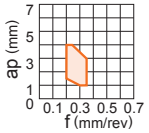
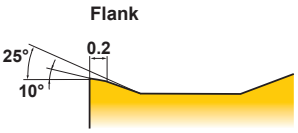
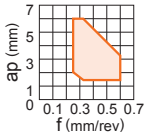
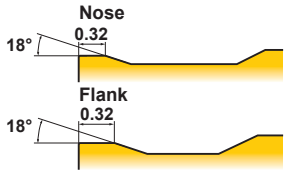
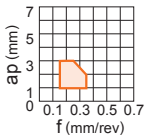
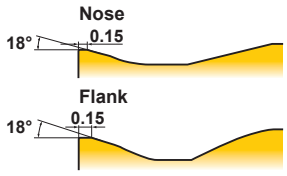
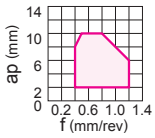
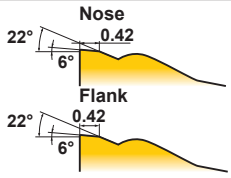
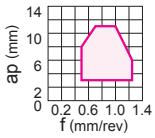
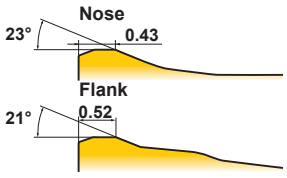
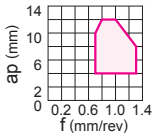
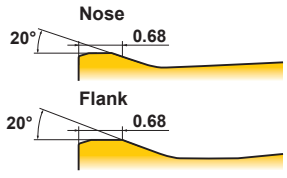
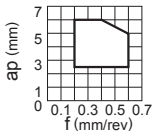
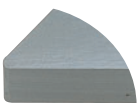
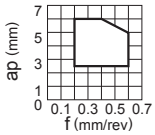
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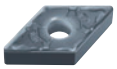
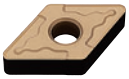
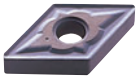
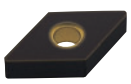
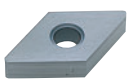
Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Medium Cutting	M	**Standard** 	**First recommendation for medium cutting of cast iron Alternative chipbreaker for medium cutting of carbon steel and alloy steel** Double sided chipbreaker. Flat land offers high edge strength.	Carbon Steel • Alloy Steel  
		MW 	**Wiper insert for medium cutting carbon steel and alloy steel** Double sided chipbreaker. The wiper allows up to two times higher feed. A wide chip pocket prevents chip jamming.	Carbon Steel • Alloy Steel  
		MS 	**First recommendation for medium cutting of stainless steel, mild steel and difficult-to-cut materials** Double sided chipbreaker. The sharp edge gives best performance.	Stainless Steel  
		R/L-ES 	**Alternative chipbreaker for medium cutting of stainless steel** Double sided chipbreaker. Good balance of edge strength and sharpness. Right- or left-hand breaker for unidirectional chip control.	Stainless Steel  
		R/L-2G 	**Alternative chipbreaker for medium cutting of carbon steel and alloy steel** Double sided chipbreaker. Parallel chipbreaker controls chip flow. Suitable for light to medium cutting.	Carbon Steel • Alloy Steel  
	G	**R/L** 	**Medium cutting** Double sided chipbreaker. Parallel chipbreaker. Good chip control for medium feed rates.	Carbon Steel • Alloy Steel  
Rough Cutting	M	**RP** 	**First recommendation for rough cutting of carbon steel and alloy steel** Double sided chip breaker. For interrupted cuts and removing scale. Good balance of cutting edge strength and low cutting resistance because of suitable rake angle.	Carbon Steel • Alloy Steel  
		RM 	**First recommendation for rough cutting of stainless steel** M class double sided chip breaker. Excellent fracture resistance at interrupted cutting due to the optimum land angle and honing geometry.	Stainless Steel  
		NEW **RK** 	**For rough cutting of carbon steel, alloy steel and stainless steel** Seating surface and wide land 3 or more times that of conventional products and provide high cutting stability for interrupted machining and scale removal.	Cast Iron  

	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
	CNMG  A095	DNMG  A101	SNMG  A107	TNMG  A113	VNMG  A118	WNMG  A122	RNMG  A104	Standard 
	CNMG_MW  A095	DNMX_MW  A101		TNMX_MW  A113		WNMG_MW  A122		MW 
	CNMG_MS  A095	DNMG_MS  A102	SNMG_MS  A107	TNMG_MS  A113	VNMG_MS  A118	WNMG_MS  A122		MS 
				TNMG_R/L-ES  A113				R/L-ES 
				TNMG_R/L-2G  A114				R/L-2G 
		DNGG_R/L  A102	SNGG_R/L  A108	TNGG_R/L  A114	VNGG_R/L  A118			R/L 
	CNMG_RP  A096	DNMG_RP  A102	SNMG_RP  A108	TNMG_RP  A114		WNMG_RP  A122		RP 
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CLASSIFICATION

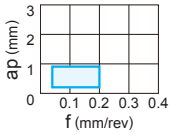
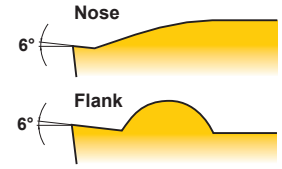
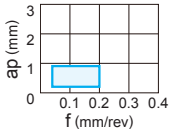
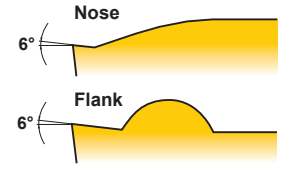
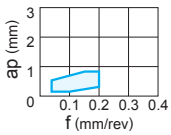
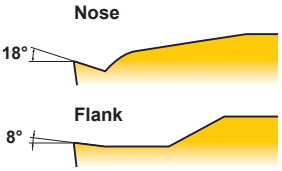
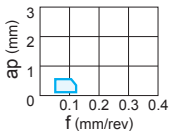
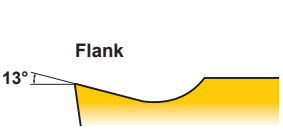
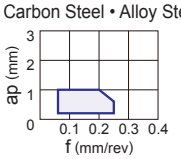
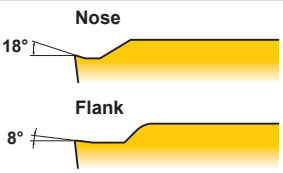
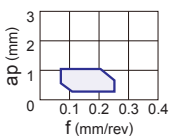
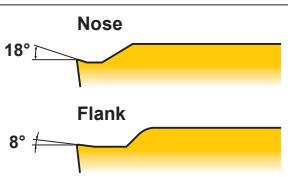
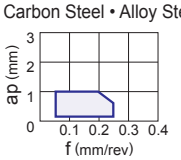
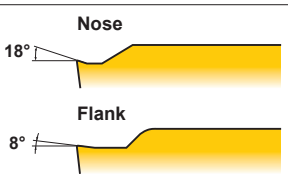
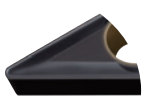
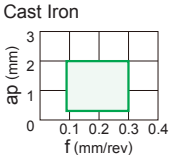
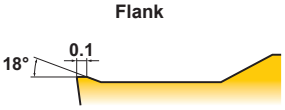
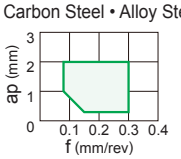
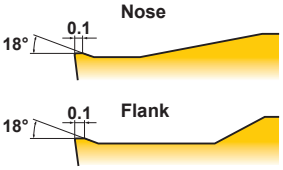
NEGATIVE INSERTS WITH HOLE

Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Rough Cutting	M	NEW **RS** 	**First recommendation for rough cutting of difficult-to-cut materials** Positive land increases welding resistance and suppresses chip welding and abrasion at low speed cutting.	 
		GH 	**For rough cutting of carbon steel, alloy steel and stainless steel** Double sided chipbreaker. For interrupted cuts and removing scale. A combination of wide land and a large chip pocket allows high feed rates.	Carbon Steel • Alloy Steel  
		GJ 	**First recommendation for rough cutting of difficult-to-cut materials** Double sided chipbreaker. Excellent balance of edge sharpness and strength. Edge geometry with high face wear resistance.	Difficult-to-Cut Materials  
Heavy Cutting	M	**HZ** 	**First recommendation for heavy cutting of mild steel and stainless steel** Single sided chipbreaker. Covers the lower end of the heavy cutting region. Low cutting resistance due to positive land and curved edge. Teardrop dots improve chip control without increasing cutting resistance.	Mild Steel  
		HX 	**First recommendation for heavy cutting of carbon steel and alloy steel** Single sided chipbreaker. Covers the medium range of the heavy cutting region. Owing to the straight edge and chamfer, it gives a balance of sharpness and strength. Variable land and a wavy chipbreaker for good chip control.	Carbon Steel • Alloy Steel  
		HV 	**Alternative chipbreaker for heavy cutting of carbon steel and alloy steel** Single sided chipbreaker. Covers the upper end of the heavy cutting region. Wide land and large chamfer offer high edge strength. A wide chipbreaker prevents chip jamming.	Carbon Steel • Alloy Steel  
For Cast Iron	M	**Flat Top** 	**First recommendation for rough cutting of cast iron** Double sided flat insert. Most effective for unstable machining due to its high edge strength.	Cast Iron  
	G	**Flat Top** 	**For cast iron** Double sided flat insert. Most effective for unstable machining due to its high edge strength. Can be used on workpieces requiring close tolerances due to G class insert tolerance.	Cast Iron  

	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
	CNMG_RS NEW  A096	DNMG_RS NEW  A103	SNMG_RS NEW  A108	TNMG_RS NEW  A115		WNMG_RS NEW  A122		NEW RS 
	CNMG_GH  A097	DNMG_GH  A103	SNMG_GH  A109	TNMG_GH  A115		WNMG_GH  A123		GH 
	CNMG_GJ  A097	DNMG_GJ  A103				WNMG_GJ  A123		GJ 
	CNMM_HZ  A097	DNMM_HZ  A103	SNMM_HZ  A109	TNMM_HZ  A115				HZ 
	CNMM_HX  A097		SNMM_HX  A109					HX 
	CNMM_HV  A097		SNMM_HV  A109					HV 
	CNMA  A097	DNMA  A103	SNMA  A109	TNMA  A115		WNMA  A123		Flat Top(M) 
		DNGA  A103	SNGA  A109	TNGA  A115	VNGA  A118			Flat Top(G) 

CLASSIFICATION

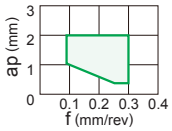
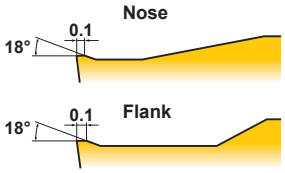
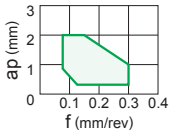
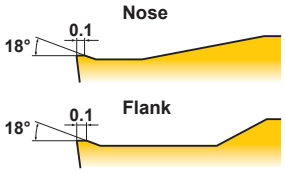
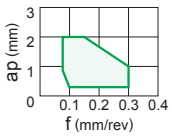
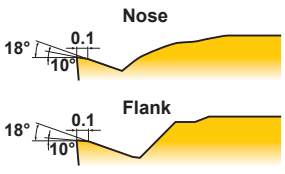
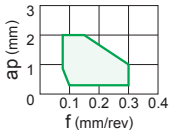
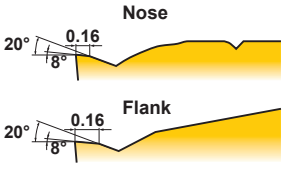
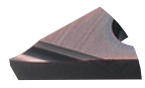
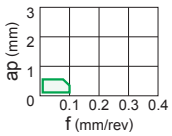
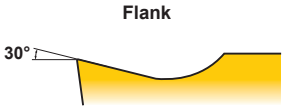
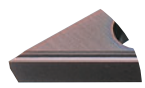
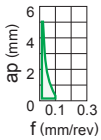
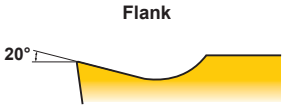
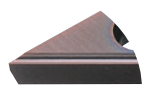
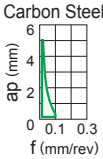
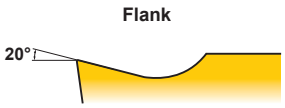
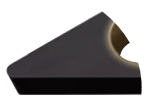
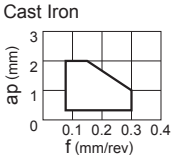
5° POSITIVE INSERTS WITH HOLE

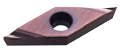
Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Finish Cutting	M	FP 	**First recommendation for finishing carbon steel and alloy steel** Breaker protrusion at the corner tip controls chips even at small depth of cut. Maintains the edge strength at the corner and prevents sudden fractures.	Carbon Steel • Alloy Steel  
		FM 	**First recommendation for finishing stainless steel** Breaker protrusion at the corner tip controls chips even at small depth of cut. Maintains the edge strength at the corner and prevents sudden fractures.	Stainless Steel  
		FV 	**First recommendation for finishing carbon steel, alloy steel, mild steel and stainless steel** Suitable for low depths of cut and low feed rates. Sharp cutting edge and low resistance design achieves excellent cutting performance.	Carbon Steel • Alloy Steel  
	G	R/L-F 	**Finishing** Lead chipbreaker controls chip flow. Sharp cutting edge gives a good surface finish.	Carbon Steel • Alloy Steel  
Light Cutting	M	LP 	**First recommendation for light cutting of carbon steel and alloy steel** Sharp cutting edge due to a large rake angle. Prevents welding of the insert and controls white turbidity of the surface finish. Breaker protrusion suitable for depth of cut area achieves a wide range of chip control.	Carbon Steel • Alloy Steel  
		LM 	**First recommendation for light cutting of stainless steel** Sharp cutting edge due to a large rake angle. Prevents welding of the insert and controls white turbidity of the surface finish. Breaker protrusion suitable for depth of cut area achieves a wide range of chip control.	Stainless Steel  
		SV 	**Light cutting of carbon steel, alloy steel, mild steel and stainless steel** Large rake angle provides sharp cutting action. A peninsular dot ensures chip control at depths of cut under 1mm.	Carbon Steel • Alloy Steel  
Medium Cutting	M	NEW MK 	**First recommendation for medium cutting of cast iron** Optimum balance between sharpness and high edge strength for general use.	Cast Iron  
		MP 	**First recommendation for medium cutting of carbon steel and alloy steel** Good balance of wear resistance and fracture resistance because of the flat land cutting edge. A wide chip pocket controls increasing of the cutting resistance and reduces vibration and chip jamming even at large depth of cut.	Carbon Steel • Alloy Steel  

	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
					VBMT_FP  A148			FP 
					VBMT_FM  A148			FM 
					VBMT_FV  A148			FV 
					VBGT_R/L-F  A148	WBGT_R/L-F  A155		R/L-F 
					VBMT_LP  A148			LP 
					VBMT_LM  A148			LM 
					VBMT_SV  A149			SV 
					VBMT_MK NEW  A149			NEW MK 
					VBMT_MP  A149			MP 

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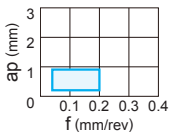
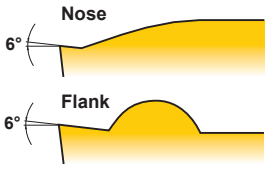
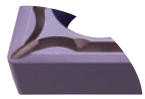
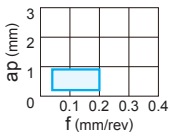
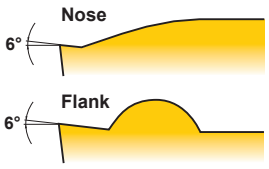
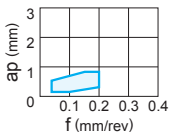
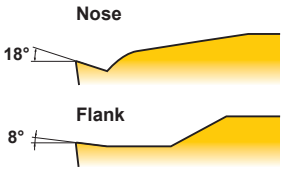
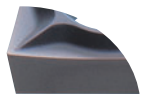
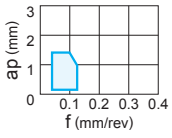
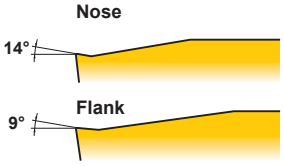
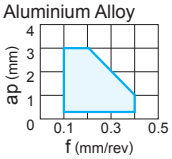
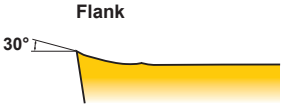
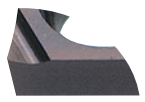
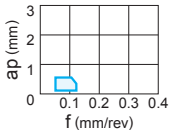
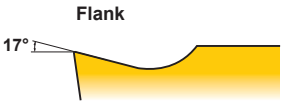
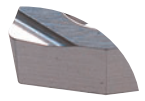
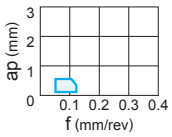
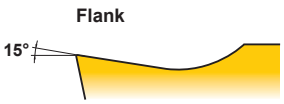
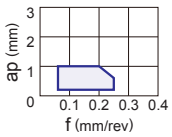
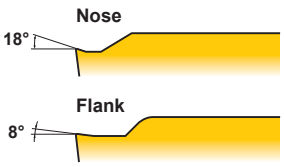
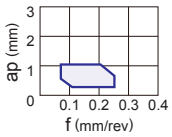
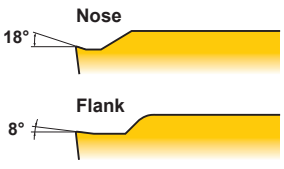
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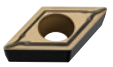
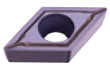
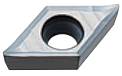
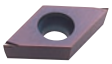
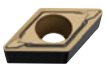
Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Medium Cutting	M	**MM** 	**First recommendation for medium cutting of stainless steel** Good balance of wear resistance and fracture resistance because of the flat land cutting edge. A wide chip pocket controls increasing of the cutting resistance and reduces vibration and chip jamming even at large depth of cut.	Stainless Steel  
		Standard 	**Medium cutting of carbon steel, alloy steel and stainless steel** Balance of edge strength and sharpness due to a combination of a flat land and large rake angle.	Carbon Steel • Alloy Steel  
		MV 	**Medium cutting of carbon steel, alloy steel, mild steel and stainless steel** A positive insert with a large rake angle achieves sharp cutting edge performance. The double breakers and round-shaped dots in the rake face achieve a wide range of chip discharge.	Carbon Steel • Alloy Steel  
		R/L-MV 	**Medium cutting of carbon steel, alloy steel, mild steel and stainless steel** A positive insert with a large rake angle achieves sharp cutting edge performance. The double breakers and round-shaped dots in the rake face achieve a wide range of chip discharge.	Carbon Steel • Alloy Steel  
	E	**R/L-SR** 	**Medium cutting of automatic lathe machining** A wide lead chipbreaker. Insert designed for low resistance chip control.	Carbon Steel • Alloy Steel  
		R/L-SN 	**Medium cutting of automatic lathe machining** A parallel chipbreaker. Excellent chip control for low to medium feed rates.	Carbon Steel • Alloy Steel  
		R/LW-SN 	**Medium cutting of automatic lathe machining** A parallel chipbreaker. Excellent chip control for low to medium feed rates. The wiper produces good cutting surface.	Carbon Steel • Alloy Steel  
For Cast Iron	M	NEW **Flat Top** 	**Heavy cutting of cast iron** Flat top. Most effective for unstable machining due to its high edge strength.	Cast Iron  

	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
					VBMT_MM  A149			MM 
					VBMT  A149			Standard 
					VBMT_MV  A149			MV 
						WBMT_R/L-MV  A155		R/L-MV 
					VBET_R/L-SR  A150			R/L-SR 
					VBET_R/L-SN  A150			R/L-SN 
					VBET_R/LW-SN  A150			R/LW-SN 
					NEW VBMW  A150			NEW Flat Top(M) 

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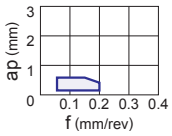
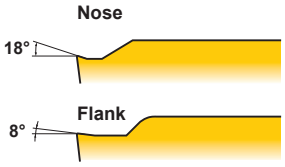
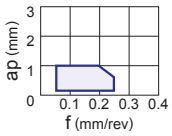
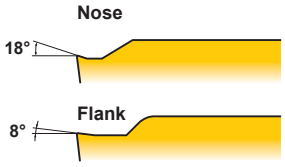
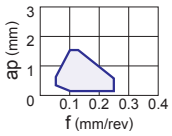
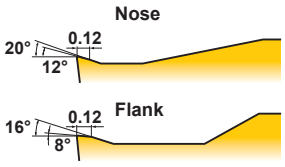
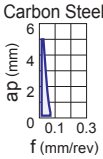
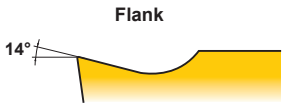
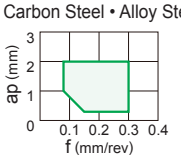
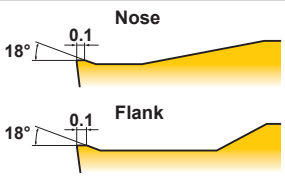
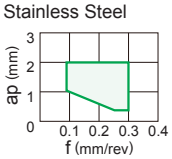
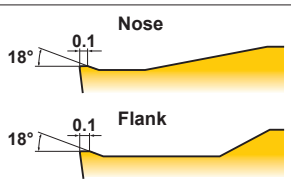
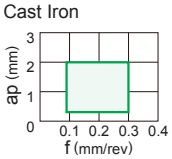
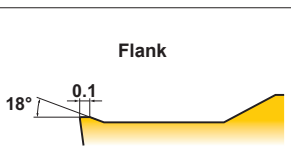
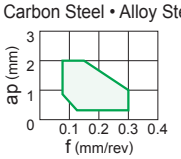
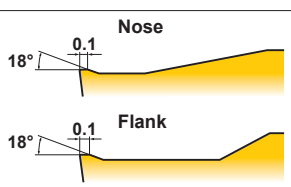
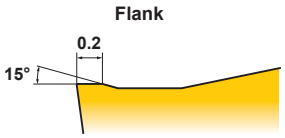
7° POSITIVE INSERTS WITH HOLE

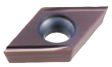
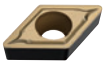
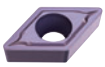
Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Finish Cutting	M	**FP** 	**First recommendation for finishing carbon steel and alloy steel** Breaker protrusion at the corner tip controls chips even at small depth of cut. Maintains the edge strength at the corner and prevents sudden fractures.	Carbon Steel • Alloy Steel  
		FM 	**First recommendation for finishing stainless steel** Breaker protrusion at the corner tip controls chips even at small depth of cut. Maintains the edge strength at the corner and prevents sudden fractures.	Stainless Steel  
		FV 	**First recommendation for finishing carbon steel, alloy steel, mild steel and stainless steel** Suitable for low depths of cut and low feed rates. Sharp cutting edge and low resistance design achieves excellent cutting performance.	Carbon Steel • Alloy Steel  
	G	**FJ** 	**First recommendation for finishing difficult-to-cut materials** Ideal for heat-resistant alloy and titanium alloy. The sharp edge produces a good surface finish. The curved edge allows smooth chip discharge.	Difficult-to-Cut Materials  
		AZ 	**For aluminium alloy** The high rake angle and 3D curved cutting edge provides sharpness at the cutting point. Additionally the 3D shape of the rake face enables excellent chip control. Lapping of the top surface gives a mirror finish for improved welding resistance.	Aluminium Alloy  
		R/L-F 	**Finishing** Lead chipbreaker controls chip flow. Sharp cutting edge gives a good surface finish.	Carbon Steel • Alloy Steel  
		R/L 	**Finishing** Lead chipbreaker. Excellent chip control at low feed rates.	Carbon Steel • Alloy Steel  
Light Cutting	M	**LP** 	**First recommendation for light cutting of carbon steel and alloy steel** Sharp cutting edge due to a large rake angle. Prevents welding of the insert and controls white turbidity of the surface finish. Breaker protrusion suitable for depth of cut area achieves a wide range of chip control.	Carbon Steel • Alloy Steel  
		LM 	**First recommendation for light cutting of stainless steel** Sharp cutting edge due to a large rake angle. Prevents welding of the insert and controls white turbidity of the surface finish. Breaker protrusion suitable for depth of cut area achieves a wide range of chip control.	Stainless Steel  

Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Rhombic 25°	Round	Breaker Name and Cross Section
CCMT_FP  A126	DCMT_FP  A132	SCMT_FP  A138	TCMT_FP  A141	VCMT_FP  A151				FP 
CCMT_FM  A126	DCMT_FM  A132	SCMT_FM  A138	TCMT_FM  A141	VCMT_FM  A151				FM 
CCMT_FV  A126	DCMT_FV  A132	SCMT_FV  A138	TCMT_FV  A141	VCMT_FV  A151				FV 
CCGT_FJ  A126								FJ 
CCGT_AZ  A126	DCGT_AZ  A132		TCGT_AZ  A141	VCGT_AZ  A151			RCGT_AZ  A137	AZ 
CCGT_L-F CCGH_R/L-F  A127	DCGT_R/L-F  A132		TCGT_R/L-F  A141	VCGT_R/L-F  A151				R/L-F 
					WCGT_R/L  A156			R/L 
CCMT_LP  A127	DCMT_LP  A132	SCMT_LP  A138	TCMT_LP  A141	VCMT_LP  A151				LP 
CCMT_LM  A127	DCMT_LM A133	SCMT_LM A138	TCMT_LM A142	VCMT_LM A151				LM

CLASSIFICATION

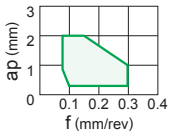
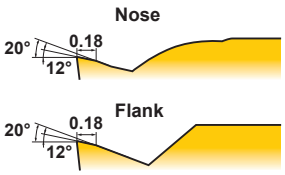
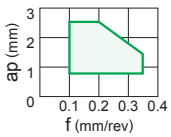
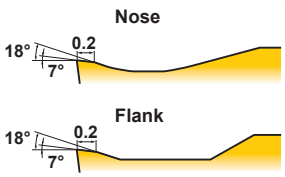
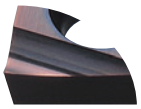
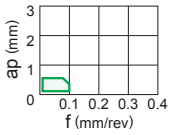
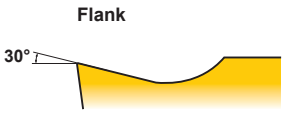
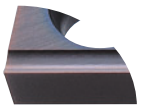
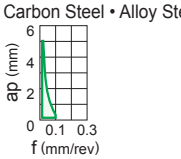
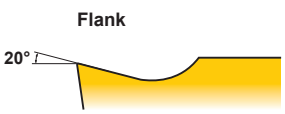
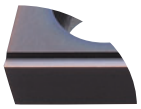
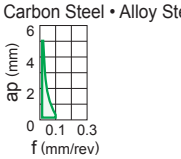
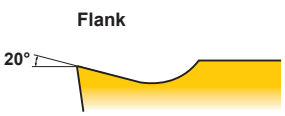
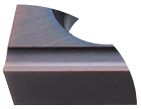
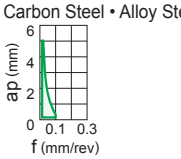
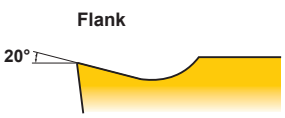
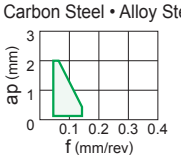
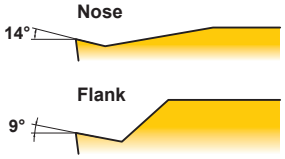
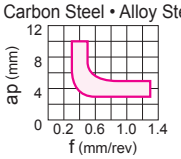
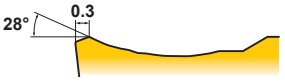
7° POSITIVE INSERTS WITH HOLE

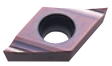
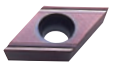
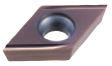
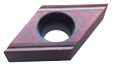
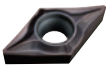
Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Light Cutting	M	SVX 	**Light cutting of carbon steel and alloy steel** Chip control is improved by having a chip breaker geometry suitable for copying.	Carbon Steel • Alloy Steel  
		SV 	**Alternative chipbreaker for light cutting of carbon steel, alloy steel, mild steel and stainless steel** Large rake angle provides sharp cutting action. A peninsular dot ensures chip control at depths of cut under 1mm.	Carbon Steel • Alloy Steel  
		SW 	**Wiper insert for light cutting of carbon steel, alloy steel, mild steel and stainless steel** The wiper allows up to two times higher feed. Positive land improves sharpness.	Carbon Steel • Alloy Steel  
	G	R/L-SS 	**Light cutting of automatic lathe machining** A parallel chipbreaker. Excellent chip control at low feed rates.	Carbon Steel • Alloy Steel  
Medium Cutting	M	MP 	**First recommendation for medium cutting of carbon steel and alloy steel** Good balance of wear resistance and fracture resistance because of the flat land cutting edge. A wide chip pocket controls increasing of the cutting resistance and reduces vibration and chip jamming even at large depth of cut.	Carbon Steel • Alloy Steel  
		MM 	**First recommendation for medium cutting of stainless steel** Good balance of wear resistance and fracture resistance because of the flat land cutting edge. A wide chip pocket controls increasing of the cutting resistance and reduces vibration and chip jamming even at large depth of cut.	Stainless Steel  
		NEW MK 	**First recommendation for medium cutting of cast iron** Optimum balance between sharpness and high edge strength for general use.	Cast Iron  
		Standard 	**First recommendation for medium cutting of carbon steel, alloy steel, mild steel, stainless steel and cast iron** Balance of edge strength and sharpness due to a combination of a flat land and large rake angle.	Carbon Steel • Alloy Steel   

Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Rhombic 25°	Round	Breaker Name and Cross Section
						XCMT_SVX  A158		SVX 
CCMH_SV  A127	DCMT_SV  A133			VCMT_SV  A152				SV 
CCMT_SW  A127								SW 
CCGT_R/L-SS  A127	DCGT_R/L-SS  A133							R/L-SS 
CCMT_MP  A128	DCMT_MP  A133	SCMT_MP  A138	TCMT_MP  A142	VCMT_MP  A152				MP 
CCMT_MM  A128	DCMT_MM  A133	SCMT_MM  A139	TCMT_MM  A142	VCMT_MM  A152				MM 
CCMT_MK NEW  A128	DCMT_MK NEW  A133	SCMT_MK NEW  A138	TCMT_MK NEW  A142	VCMT_MK NEW  A152				NEW MK 
CCMT  A128	DCMT  A133	SCMT  A139	TCMT  A142	VCMT  A152	WCMT  A156		RCMT  A137	Standard
							RCMX  A137	

CLASSIFICATION

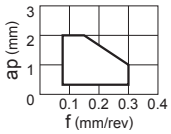
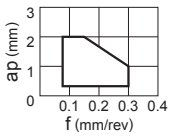
7° POSITIVE INSERTS WITH HOLE

Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Medium Cutting	M	**MV** 	**Alternative chipbreaker for medium cutting of carbon steel, alloy steel, mild steel and stainless steel** A positive insert and the large rake angle achieve sharp cutting edge performance. The double breakers and round shape in the rake face achieve a wide range of chip discharge.	Carbon Steel • Alloy Steel  
		MW 	**Wiper insert for medium cutting of carbon steel, alloy steel, mild steel and stainless steel** The wiper allows up to two times higher feed. A wide chip pocket prevents chip jamming.	Carbon Steel • Alloy Steel  
	E	**R/L-SR** 	**Medium cutting of automatic lathe machining** A wide lead chipbreaker. Insert designed for low resistance chip control.	Carbon Steel • Alloy Steel  
		R/L-SN 	**Medium cutting of automatic lathe machining** A parallel chipbreaker. Excellent chip control at low to medium feed rates. Suitable for precise machining with E class tolerance.	Carbon Steel • Alloy Steel  
	G	**R/L-SN** 	**Medium cutting of automatic lathe machining** A parallel chipbreaker. Excellent chip control at low to medium feed rates.	Carbon Steel • Alloy Steel  
	E	**R/LW-SN** 	**Medium cutting of automatic lathe machining** A parallel chipbreaker. Excellent chip control at low to medium feed rates. The wiper produces a good surface finish.	Carbon Steel • Alloy Steel  
	G	**SMG** 	**Medium cutting of automatic lathe machining** 3D moulded chipbreaker provides good chip control. G class insert gives sharp cutting action, allowing high precision machining. Breaker geometry appropriate for copying and back turning.	Carbon Steel • Alloy Steel  
Heavy Cutting	M	**RR** 	**Heavy cutting of carbon steel and alloy steel** A wide groove chipbreaker prevents chips from jamming at large depths of cut. Small dimples improve chip control at small depths of cut.	Carbon Steel • Alloy Steel  

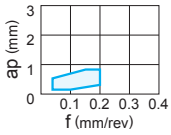
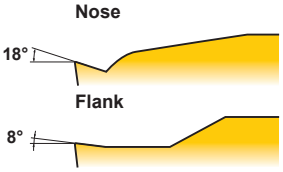
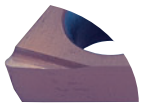
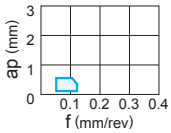
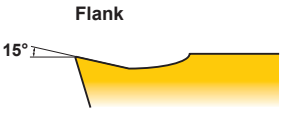
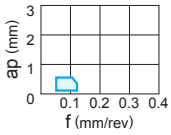
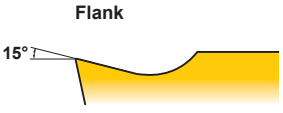
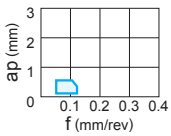
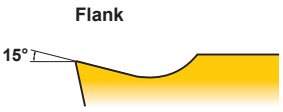
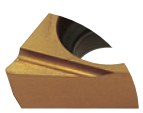
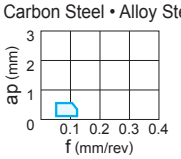
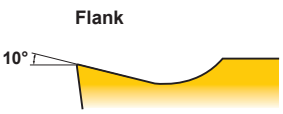
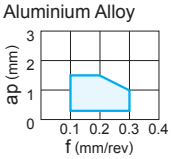
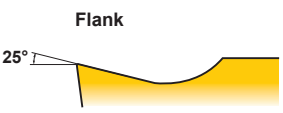
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	CCMT_MW  A129							MW 
	CCET_R/L-SR  A129	DCET_R/L-SR  A134						R/L-SR 
	CCET_R/L-SN  A129	DCET_R/L-SN  A134						R/L-SN(E) 
	CCGT_R/L-SN  A130	DCGT_R/L-SN  A135						R/L-SN(G) 
	CCET_R/LW-SN  A130	DCET_R/LW-SN  A135						R/LW-SN 
	CCGT_SMG  A130	DCGT_SMG  A135						SMG 
							RCMX_RR  A137	RR 

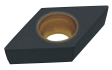
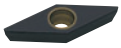
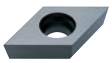
CLASSIFICATION

7° POSITIVE INSERTS WITH HOLE

Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
For Cast Iron	M	**Flat Top** 	**Heavy cutting of cast iron** Flat top. Most effective for unstable machining due to its high edge strength.	Cast Iron  
	G	**Flat Top** 	**For cast iron** Flat top. Most effective for unstable machining due to its high edge strength. Can be used on workpieces requiring close tolerances due to G class insert tolerance.	Cast Iron  

11° POSITIVE INSERTS WITH HOLE

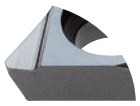
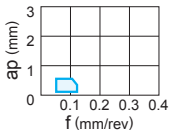
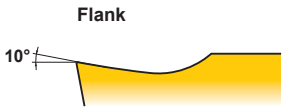
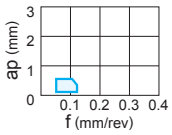
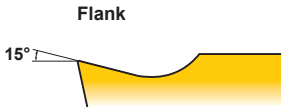
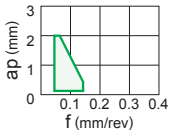
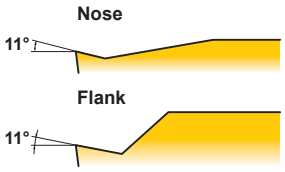
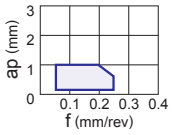
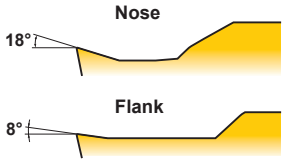
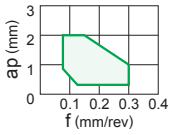
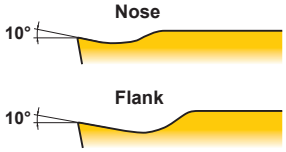
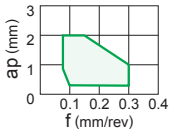
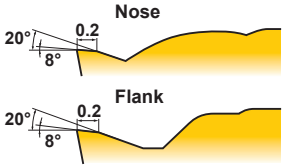
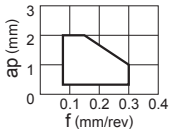
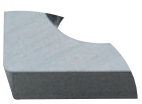
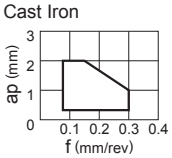
Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Finish Cutting	M	**FV** 	**First recommendation for finishing carbon steel, alloy steel, mild steel and stainless steel** Suitable for low depths of cut and low feed rates. Sharp cutting edge and low resistance design achieves excellent cutting performance.	Carbon Steel • Alloy Steel  
	G	**R/L-FS** 	**Alternative chipbreaker for finishing carbon steel, alloy steel, stainless steel, cast iron and aluminium alloy** Small wide lead chipbreaker. Sharp cutting edge gives a good surface finish.	Carbon Steel • Alloy Steel  
	M	**R/L-F** 	**Finishing** Lead chipbreaker controls chip flow. Sharp cutting edge gives a good surface finish.	Carbon Steel • Alloy Steel  
	G	**R/L-F** 	**Finishing** Lead chipbreaker controls chip flow. Sharp cutting edge gives a good surface finish.	Carbon Steel • Alloy Steel  
	G	**R/L** 	**Finishing** Lead chipbreaker controls chip flow. Good chip control for low to medium feed rates.	Carbon Steel • Alloy Steel  
		Standard 	**Finishing** Lead chipbreaker controls chip flow. Good chip control for low to medium feed rates.	Aluminium Alloy  

	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
	CCMW  A130	DCMW  A135	SCMW  A139	TCMW  A143	VCMW  A152			Flat Top(M) 
	CCGW  A130	DCGW  A135						Flat Top(G) 

	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
	CPMH_FV  A131			TPMH_FV  A145				FV 
				TPGH_R/L-FS  A145		WPGT_R/L-FS  A157		R/L-FS 
	CPMH_R/L-F  A131							R/L-F(M) 
	CPGT_R/L-F  A131							R/L-F(G) 
				TPGX_R/L  A146				R/L 
	CPGT  A131							Standard 

CLASSIFICATION

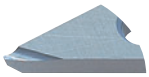
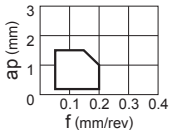
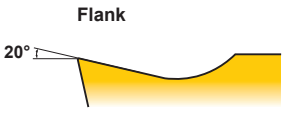
11° POSITIVE INSERTS WITH HOLE

Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Finish Cutting	M	**L** 	**Finishing** Lead chipbreaker controls chip flow. Good chip control for low to medium feed rates.	Carbon Steel • Alloy Steel  
	E	**SRF** 	**Finishing** Lead chipbreaker controls chip flow. Sharp cutting edge gives a good surface finish.	Carbon Steel • Alloy Steel  
	G	**SMG** 	**Medium cutting of automatic lathe machining** 3D moulded chipbreaker provides good chip control. G class insert gives sharp cutting action, allowing high precision machining. Breaker geometry appropriate for copying and back turning.	Carbon Steel • Alloy Steel  
Light Cutting	M	**SV** 	**First recommendation for light cutting of carbon steel, alloy steel, mild steel, stainless steel and cast iron** Large rake angle provides sharp cutting action. A peninsular dot ensures chip control at depths of cut under 1mm.	Carbon Steel • Alloy Steel  
Medium Cutting	M	**Standard** 	**Alternative chipbreaker for medium cutting of carbon steel, alloy steel and stainless steel** Standard, general purpose chipbreaker.	Carbon Steel • Alloy Steel  
		MV 	**First recommendation for medium cutting of carbon steel, alloy steel, mild steel, stainless steel and cast iron** A positive insert and large rake angle achieves sharp cutting edge performance. Double breakers in the rake face achieve a wide range of chip discharge.	Carbon Steel • Alloy Steel  
For Cast Iron	M	**Flat Top** 	**Heavy cutting of cast iron** Flat top. Most effective for unstable machining due to its high edge strength.	Cast Iron  
	G	**Flat Top** 	**For cast iron** Flat top. Most effective for unstable machining due to its high edge strength. Can be used on workpieces requiring close tolerances due to G class insert tolerance.	Cast Iron  

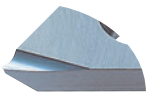
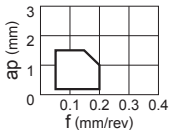
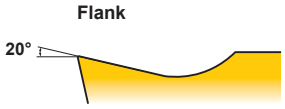
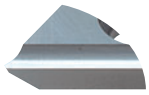
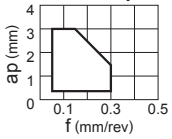
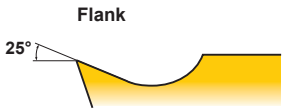
	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
				TPMX_L  A146				L 
					VPET_R/L-SRF  A154			SRF 
					VPGT_SMG  A154			SMG 
	CPMH_SV  A131			TPMH_SV  A146				SV 
	CPMX  A131		SPMT  A140	TPMX  A146				Standard 
	CPMH_MV  A131			TPMH_MV  A147		WPMT_MV  A157		MV 
			SPMW  A140					Flat Top(M) 
			SPGX  A140	TPGX  A147				Flat Top(G) 

CLASSIFICATION

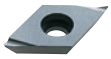
15° POSITIVE INSERTS WITH HOLE

Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
For Aluminium Alloy	G	R/L 	**For aluminium alloy cutting** Lead chipbreaker. Sharp cutting edge gives a good surface finish.	Aluminium Alloy  

20° POSITIVE INSERTS WITH HOLE

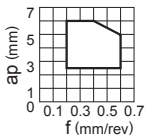
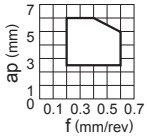
Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
For Aluminium Alloy	G	R/L-F 	**For aluminium alloy cutting** Lead chipbreaker. Sharp cutting edge gives a good surface finish.	Aluminium Alloy  
		R/L 	**For aluminium alloy cutting** A parallel chipbreaker. Sharp cutting edge gives a good surface finish. Good chip control for medium feed rates.	Aluminium Alloy  

	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
					VDGX_R/L  A153			R/L 

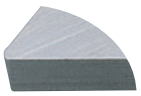
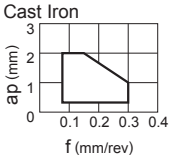
	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°	Round	Breaker Name and Cross Section
		DEGX_R/L-F  A136						R/L-F 
		DEGX_R/L  A136		TEGX_R/L  A144				R/L 

CLASSIFICATION

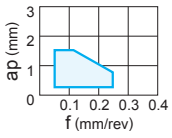
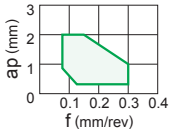
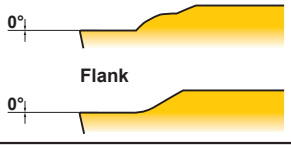
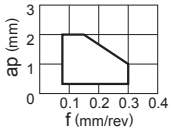
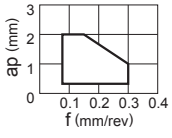
NEGATIVE INSERTS WITHOUT HOLE

Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
For Cast Iron	M	**Flat Top** 	**Heavy cutting of cast iron** Double sided flat insert. Most effective for unstable machining due to high edge strength and stable insert clamping.	Cast Iron  
	G	**Flat Top** 	**For cast iron** Double sided flat insert. Most effective for unstable machining due to high edge strength and stable insert clamping. Can be used on workpieces requiring close tolerances due to G class insert tolerance.	Cast Iron  

7° POSITIVE INSERTS WITHOUT HOLE

Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
For Cast Iron	G	**Flat Top** 	**For cast iron** Double sided flat insert. Most effective for unstable machining due to high edge strength and stable insert clamping. Can be used on workpieces requiring close tolerances due to G class insert tolerance.	Cast Iron  

11° POSITIVE INSERTS WITHOUT HOLE

Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Finish Cutting	G	**R/L** 	**Finishing** A parallel chipbreaker. Good chip control for low to medium feed rates.	Carbon Steel • Alloy Steel  
Light to Medium Cutting	M	**Standard** 	**Light to medium cutting of carbon steel, alloy steel and stainless steel** Standard, general purpose chipbreaker.	Carbon Steel • Alloy Steel  
For Cast Iron	M	**Flat Top** 	**Heavy cutting of cast iron** Flat top. Most effective for unstable machining due to high edge strength and stable insert clamping.	Cast Iron  
	G	**Flat Top** 	**For cast iron** Flat top. Most effective for unstable machining due to high edge strength and stable insert clamping. Can be used on workpieces requiring close tolerances due to G class insert tolerance.	Cast Iron  

SPECIAL PURPOSE INSERTS

Application	Tolerance	Tool Holder Type	Inserts
Special	G	TL Type	RTG  A159

	Square 90°	Triangular 60°	Breaker Name and Cross Section
	SNMN  A124	TNMN  A125	Flat Top(M) 
	SNGN  A124	TNGN  A125	Flat Top(G) 

	Square 90°	Triangular 60°	Breaker Name and Cross Section
		TCGN  A161	Flat Top 

	Square 90°	Triangular 60°	Breaker Name and Cross Section
	SPGR_R  A160	TPGR_R/L  A162	R/L 
	SPMR  A160	TPMR  A162	Standard 
	SPMN  A160	TPMN  A162	Flat Top(M) 
	SPGN  A160	TPGN  A162	Flat Top(G) 

RECOMMENDED CUTTING CONDITIONS

NEGATIVE INSERTS

Breker : **Std** : Standard **Flat** : Flat Top

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P									
Mild Steel (ASTM A36, AISI 1010)	≤180HB	●	F	1	FY	VP25N	285—445	0.09—0.23	0.20—0.80
		●	F	2	FS	NX2525	270—385	0.09—0.23	0.20—0.70
		●	L	1	SY	VP25N	260—405	0.16—0.33	0.50—1.20
		◐	F	1	FY	MP3025	275—420	0.09—0.23	0.20—0.80
		◐	F	2	FY	NX3035	260—370	0.09—0.23	0.20—0.80
		◐	F	3	FS	NX2525	270—385	0.09—0.23	0.20—0.70
		◐	L	1	SY	MP3025	250—385	0.16—0.33	0.50—1.20
		◐	L	2	SY	NX3035	235—335	0.16—0.33	0.50—1.20
		✣	F	1	FY	UE6020	285—460	0.09—0.23	0.20—0.80
		✣	F	2	FS	UE6020	285—460	0.09—0.23	0.20—0.70
		✣	L	1	SY	UE6020	260—420	0.16—0.33	0.50—1.20
Carbon Steel • Alloy Steel (AISI 1045, AISI 4140)	180 | 280HB	●	F	1	FH	AP25N	215—340	0.08—0.20	0.20—1.00
		●	F	2	FH	NX2525	205—295	0.08—0.20	0.20—1.00
		●	F	3	R/L-F	MP3025	210—325	0.05—0.15	0.10—0.50
		●	F	4	PK	NX2525	195—280	0.10—0.30	0.20—1.00
		●	L	1	LP	UE6105	220—405	0.10—0.40	0.30—2.00
		●	L	2	SH	UE6105	220—405	0.10—0.40	0.30—2.00
		●	L	3	LP	MP3025	195—295	0.10—0.40	0.30—2.00
		●	L	4	SH	AP25N	200—315	0.10—0.40	0.30—2.00
		●	L	5	SH	NX2525	190—270	0.10—0.40	0.30—2.00
		●	L	6	SA	UE6105	220—405	0.10—0.40	0.30—2.00
		●	L	7	SW	UE6105	220—405	0.10—0.50	0.30—2.50
		●	L	8	SW	MP3025	195—295	0.10—0.50	0.30—2.50
		●	L	9	SW	NX2525	190—270	0.10—0.50	0.30—2.50
		●	L	10	R/L-K	MP3025	195—295	0.08—0.20	0.30—1.20
		●	M	1	MP	UE6105	200—370	0.16—0.50	0.30—4.00
		●	M	2	MP	MP3025	175—270	0.16—0.50	0.30—4.00
		●	M	3	MA	UE6105	200—370	0.20—0.50	0.30—4.00
		●	M	4	MH	UE6105	200—370	0.20—0.55	1.00—4.00
		●	M	5	Std	UE6105	200—370	0.25—0.60	1.50—5.00
		●	M	6	Std	MP3025	175—270	0.25—0.60	1.50—5.00
		●	M	7	Std	NX2525	170—245	0.25—0.60	1.50—5.00
		●	M	8	Std	UTi20T	85—125	0.25—0.60	1.50—5.00
		●	M	9	MW	UE6105	200—370	0.20—0.60	0.90—4.00
		●	M	10	R/L	MP3025	175—270	0.15—0.32	0.40—2.00
		●	R	1	RP	UE6105	190—350	0.25—0.60	1.50—6.00
		●	R	2	GH	UE6105	190—350	0.25—0.60	1.50—6.00
		●	H	1	HX	UE6110	160—275	0.50—1.26	3.00—11.00
		●	H	2	HV	UE6110	135—225	0.70—1.30	4.00—12.00
		◐	F	1	FH	MP3025	210—325	0.08—0.20	0.20—1.00
		◐	F	2	FH	NX3035	200—285	0.08—0.20	0.20—1.00
		◐	F	3	FH	UE6110	230—390	0.08—0.20	0.20—1.00
		◐	L	1	LP	MC6015	210—355	0.10—0.40	0.30—2.00
		◐	L	2	LP	UE6110	210—355	0.10—0.40	0.30—2.00
		◐	L	3	SH	UE6110	210—355	0.10—0.40	0.30—2.00
		◐	L	4	SA	UE6110	210—355	0.10—0.40	0.30—2.00
		◐	L	5	LP	MP3025	195—295	0.10—0.40	0.30—2.00

CUTTING CONDITIONS : ● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting
CUTTING AREA : **F** : Finish Cutting **L** : Light Cutting **M** : Medium Cutting **R** : Rough Cutting **H** : Heavy Cutting

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P									
Carbon Steel • Alloy Steel (S45C, SCM440)	180 | 280HB		L	6	SH	NX3035	185—260	0.10—0.40	0.30—2.00
			L	7	SA	NX3035	185—260	0.10—0.40	0.30—2.00
			L	8	SW	UE6110	210—355	0.10—0.50	0.30—2.50
			L	9	SW	NX3035	185—260	0.10—0.50	0.30—2.50
			M	1	MP	MC6015	190—325	0.16—0.50	0.30—4.00
			M	2	MP	UE6110	190—325	0.16—0.50	0.30—4.00
			M	3	MA	MC6015	190—325	0.20—0.50	0.30—4.00
			M	4	MA	UE6110	190—325	0.20—0.50	0.30—4.00
			M	5	MA	NX3035	165—235	0.20—0.50	0.30—4.00
			M	6	MH	MC6015	190—325	0.20—0.55	1.00—4.00
			M	7	MH	UE6110	190—325	0.20—0.55	1.00—4.00
			M	8	Std	UE6110	190—325	0.25—0.60	1.50—5.00
			M	9	Std	NX3035	165—235	0.25—0.60	1.50—5.00
			M	10	MW	MC6015	190—325	0.20—0.60	0.90—4.00
			M	11	MW	UE6110	190—325	0.20—0.60	0.90—4.00
			R	1	RP	MC6015	180—310	0.25—0.60	1.50—6.00
			R	2	RP	UE6110	180—310	0.25—0.60	1.50—6.00
			R	3	GH	UE6110	180—310	0.25—0.60	1.50—6.00
			H	1	HX	UE6020	155—250	0.50—1.26	3.00—11.00
			H	2	HV	UE6020	125—205	0.70—1.30	4.00—12.00
			H	3	HZ	UE6110	160—275	0.40—1.20	2.00—10.00
			F	1	FH	UE6110	230—390	0.08—0.20	0.20—1.00
			F	2	FH	UE6020	215—355	0.08—0.20	0.20—1.00
			L	1	LP	MC6025	210—340	0.10—0.40	0.30—2.00
			L	2	SH	UE6020	200—325	0.10—0.40	0.30—2.00
			L	3	SA	UE6020	200—325	0.10—0.40	0.30—2.00
			M	1	MP	MC6025	190—310	0.16—0.50	0.30—4.00
			M	2	MA	MC6025	190—310	0.20—0.50	0.30—4.00
			M	3	MP	UE6020	180—295	0.16—0.50	0.30—4.00
			M	4	MA	UE6020	180—295	0.20—0.50	0.30—4.00
			M	5	MA	UE6035	170—235	0.20—0.50	0.30—4.00
			M	6	MH	UE6020	180—295	0.20—0.55	1.00—4.00
			M	7	MH	UE6035	170—235	0.20—0.55	1.00—4.00
			M	8	Std	UE6020	180—295	0.25—0.60	1.50—5.00
			M	9	Std	UE6035	170—235	0.25—0.60	1.50—5.00
			M	10	MW	MC6025	190—310	0.20—0.60	0.90—4.00
			M	11	MW	UE6020	180—295	0.20—0.60	0.90—4.00
			R	1	RP	MC6025	180—295	0.25—0.60	1.50—6.00
			R	2	GH	UE6020	170—280	0.25—0.60	1.50—6.00
			H	1	HX	UH6400	135—195	0.50—1.26	3.00—11.00
			H	2	HV	UH6400	110—160	0.70—1.30	4.00—12.00
			H	3	HZ	UH6400	135—195	0.40—1.20	2.00—10.00
			H	4	HZ	UE6020	155—250	0.40—1.20	2.00—10.00

RECOMMENDED CUTTING CONDITIONS

NEGATIVE INSERTS

Breker : **Std** : Standard **Flat** : Flat Top

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
M									
Austenitic Stainless Steel (AISI 304, AISI 316)	≤200HB	●	L	1	LM	MC7015	180—285	0.10—0.30	0.30—2.00
		●	L	2	SH	US735	95—185	0.10—0.40	0.30—2.00
		●	L	3	SH	NX2525	65—135	0.10—0.40	0.30—2.00
		●	L	4	SW	US7020	105—270	0.10—0.50	0.30—2.50
		●	M	1	MM	MC7015	160—255	0.15—0.45	0.70—5.00
		●	M	2	GM	MC7015	160—255	0.16—0.50	0.50—4.00
		●	M	3	MS	US7020	95—245	0.16—0.50	0.50—4.00
		●	M	4	MA	US7020	95—245	0.20—0.50	0.30—4.00
		●	M	5	MH	US7020	95—245	0.20—0.55	1.00—4.00
		●	M	6	MW	US7020	95—245	0.20—0.60	0.90—4.00
		●	R	1	RM	MC7015	155—245	0.25—0.55	1.50—6.00
		●	R	2	GH	US7020	90—235	0.25—0.60	1.50—6.00
		◐	L	1	LM	MC7025	160—215	0.10—0.30	0.30—2.00
		◐	L	2	SH	US735	95—185	0.10—0.40	0.30—2.00
		◐	M	1	MM	MC7025	145—195	0.15—0.45	0.70—5.00
		◐	M	2	GM	MC7025	145—195	0.16—0.50	0.50—4.00
		◐	M	3	MA	MC7025	145—195	0.20—0.50	0.30—4.00
		◐	M	4	MS	US735	85—165	0.16—0.50	0.50—4.00
		◐	M	5	MA	US735	85—165	0.20—0.50	0.30—4.00
		◐	R	1	RM	MC7025	140—185	0.25—0.55	1.50—6.00
		◐	R	2	GH	US735	85—160	0.25—0.60	1.50—6.00
		✣	L	1	LM	MP7035	95—155	0.10—0.30	0.30—2.00
		✣	L	2	SH	US735	95—185	0.10—0.40	0.30—2.00
		✣	M	1	MM	MP7035	85—140	0.15—0.45	0.70—5.00
		✣	M	2	GM	MP7035	85—140	0.16—0.50	0.50—4.00
		✣	M	3	MA	MP7035	85—140	0.20—0.50	0.30—4.00
		✣	M	4	MS	US735	85—165	0.16—0.50	0.50—4.00
		✣	M	5	MS	VP15TF	75—130	0.16—0.50	0.50—4.00
		✣	M	6	MS	UP20M	95—145	0.16—0.50	0.50—4.00
		✣	M	7	MS	UTi20T	75—110	0.16—0.50	0.50—4.00
		✣	M	8	MA	VP15TF	75—130	0.20—0.50	0.30—4.00
		✣	M	9	Std	VP15TF	75—130	0.25—0.60	1.50—5.00
		✣	R	1	RM	MP7035	85—135	0.25—0.55	1.50—6.00
		✣	R	2	GH	US735	85—160	0.25—0.60	1.50—6.00
Austenitic Stainless Steel (AISI 304LN, AISI 316LN)	>200HB	●	L	1	LM	MC7015	150—240	0.10—0.30	0.30—2.00
		●	L	2	SH	US735	80—155	0.10—0.40	0.30—2.00
		●	L	3	SH	NX2525	55—115	0.10—0.40	0.30—2.00
		●	L	4	SW	US7020	90—230	0.10—0.50	0.30—2.50
		●	M	1	MM	MC7015	135—215	0.15—0.45	0.70—5.00
		●	M	2	GM	MC7015	135—215	0.16—0.50	0.50—4.00
		●	M	3	MS	US7020	80—205	0.16—0.50	0.50—4.00
		●	M	4	MA	US7020	80—205	0.20—0.50	0.30—4.00
		●	M	5	MH	US7020	80—205	0.20—0.55	1.00—4.00
		●	M	6	MW	US7020	80—205	0.20—0.60	0.90—4.00
		●	R	1	RM	MC7015	130—205	0.25—0.55	1.50—6.00
		●	R	2	GH	US7020	75—195	0.25—0.60	1.50—6.00
		◐	L	1	LM	MC7025	135—180	0.10—0.30	0.30—2.00

CUTTING CONDITIONS : ● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting
CUTTING AREA : **F** : Finish Cutting **L** : Light Cutting **M** : Medium Cutting **R** : Rough Cutting **H** : Heavy Cutting

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
M									
Austenitic Stainless Steel (AISI 304LN, AISI 316LN)	>200HB		**L**	2	**SH**	**US735**	80—155	0.10—0.40	0.30—2.00
			M	1	**MM**	**MC7025**	125—165	0.15—0.45	0.70—5.00
			M	2	**GM**	**MC7025**	125—165	0.16—0.50	0.50—4.00
			M	3	**MA**	**MC7025**	125—165	0.20—0.50	0.30—4.00
			M	4	**MS**	**US735**	75—140	0.16—0.50	0.50—4.00
			M	5	**MA**	**US735**	75—140	0.20—0.50	0.30—4.00
			R	1	**RM**	**MC7025**	115—155	0.25—0.55	1.50—6.00
			R	2	**GH**	**US735**	70—135	0.25—0.60	1.50—6.00
			L	1	**LM**	**MP7035**	80—130	0.10—0.30	0.30—2.00
			L	2	**SH**	**US735**	80—155	0.10—0.40	0.30—2.00
			M	1	**MM**	**MP7035**	75—120	0.15—0.45	0.70—5.00
			M	2	**GM**	**MP7035**	75—120	0.16—0.50	0.50—4.00
			M	3	**MA**	**MP7035**	75—120	0.20—0.50	0.30—4.00
			M	4	**MS**	**US735**	75—140	0.16—0.50	0.50—4.00
			M	5	**MS**	**VP15TF**	65—110	0.16—0.50	0.50—4.00
			M	6	**MS**	**UP20M**	80—125	0.16—0.50	0.50—4.00
			M	7	**MS**	**UTi20T**	65—95	0.16—0.50	0.50—4.00
			M	8	**MA**	**VP15TF**	65—110	0.20—0.50	0.30—4.00
			M	9	**Std**	**VP15TF**	65—110	0.25—0.60	1.50—5.00
			R	1	**RM**	**MP7035**	70—115	0.25—0.55	1.50—6.00
			R	2	**GH**	**US735**	70—135	0.25—0.60	1.50—6.00
Two-phase Stainless Steel (AISI 329)	≤280HB		**L**	1	**LM**	**MC7015**	120—195	0.10—0.30	0.30—2.00
			L	2	**SH**	**US735**	65—125	0.10—0.40	0.30—2.00
			L	3	**SH**	**NX2525**	45—90	0.10—0.40	0.30—2.00
			L	4	**SW**	**US7020**	75—185	0.10—0.50	0.30—2.50
			M	1	**MM**	**MC7015**	110—175	0.15—0.45	0.70—5.00
			M	2	**GM**	**MC7015**	110—175	0.16—0.50	0.50—4.00
			M	3	**MS**	**US7020**	65—170	0.16—0.50	0.50—4.00
			M	4	**MA**	**US7020**	65—170	0.20—0.50	0.30—4.00
			M	5	**MH**	**US7020**	65—170	0.20—0.55	1.00—4.00
			M	6	**MW**	**US7020**	65—170	0.20—0.60	0.90—4.00
			R	1	**RM**	**MC7015**	105—165	0.25—0.55	1.50—6.00
			R	2	**GH**	**US7020**	60—160	0.25—0.60	1.50—6.00
			L	1	**LM**	**MC7025**	110—150	0.10—0.30	0.30—2.00
			L	2	**SH**	**US735**	65—125	0.10—0.40	0.30—2.00
			M	1	**MM**	**MC7025**	100—135	0.15—0.45	0.70—5.00
			M	2	**GM**	**MC7025**	100—135	0.16—0.50	0.50—4.00
			M	3	**MA**	**MC7025**	100—135	0.20—0.50	0.30—4.00
			M	4	**MS**	**US735**	60—115	0.16—0.50	0.50—4.00
			M	5	**MA**	**US735**	60—115	0.20—0.50	0.30—4.00
			R	1	**RM**	**MC7025**	95—125	0.25—0.55	1.50—6.00
			R	2	**GH**	**US735**	55—110	0.25—0.60	1.50—6.00
			L	1	**LM**	**MP7035**	65—105	0.10—0.30	0.30—2.00
			L	2	**SH**	**US735**	65—125	0.10—0.40	0.30—2.00
			M	1	**MM**	**MP7035**	60—95	0.15—0.45	0.70—5.00
			M	2	**GM**	**MP7035**	60—95	0.16—0.50	0.50—4.00
			M	3	**MA**	**MP7035**	60—95	0.20—0.50	0.30—4.00

RECOMMENDED CUTTING CONDITIONS

NEGATIVE INSERTS

Breker : **Std** : Standard **Flat** : Flat Top

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
M									
Two-phase Stainless Steel (AISI 329)	≤280HB	✣	M	4	MS	US735	60—115	0.16—0.50	0.50—4.00
		✣	M	5	MS	VP15TF	50—90	0.16—0.50	0.50—4.00
		✣	M	6	MS	UP20M	65—100	0.16—0.50	0.50—4.00
		✣	M	7	MS	UTi20T	50—75	0.16—0.50	0.50—4.00
		✣	M	8	MA	VP15TF	50—90	0.20—0.50	0.30—4.00
		✣	M	9	Std	VP15TF	50—90	0.25—0.60	1.50—5.00
		✣	R	1	RM	MP7035	55—90	0.25—0.55	1.50—6.00
		✣	R	2	GH	US735	55—110	0.25—0.60	1.50—6.00
Ferritic and Martensitic Stainless Steel (AISI 410, AISI 430)	≤200HB	●	L	1	LM	MC7015	180—285	0.10—0.30	0.30—2.00
		●	L	2	SH	US735	95—185	0.10—0.40	0.30—2.00
		●	L	3	SH	NX2525	65—135	0.10—0.40	0.30—2.00
		●	L	4	SW	US7020	105—270	0.10—0.50	0.30—2.50
		●	M	1	MM	MC7015	160—255	0.15—0.45	0.70—5.00
		●	M	2	GM	MC7015	160—255	0.16—0.50	0.50—4.00
		●	M	3	MS	US7020	95—245	0.16—0.50	0.50—4.00
		●	M	4	MA	US7020	95—245	0.20—0.50	0.30—4.00
		●	M	5	MH	US7020	95—245	0.20—0.55	1.00—4.00
		●	M	6	MW	US7020	95—245	0.20—0.60	0.90—4.00
		●	R	1	RM	MC7015	155—245	0.25—0.55	1.50—6.00
		●	R	2	GH	US7020	90—235	0.25—0.60	1.50—6.00
		◐	L	1	LM	MC7025	160—215	0.10—0.30	0.30—2.00
		◐	L	2	SH	US735	95—185	0.10—0.40	0.30—2.00
		◐	M	1	MM	MC7025	145—195	0.15—0.45	0.70—5.00
		◐	M	2	GM	MC7025	145—195	0.16—0.50	0.50—4.00
		◐	M	3	MA	MC7025	145—195	0.20—0.50	0.30—4.00
		◐	M	4	MS	US735	85—165	0.16—0.50	0.50—4.00
		◐	M	5	MA	US735	85—165	0.20—0.50	0.30—4.00
		◐	R	1	RM	MC7025	140—185	0.25—0.55	1.50—6.00
		◐	R	2	GH	US735	85—160	0.25—0.60	1.50—6.00
		✣	L	1	LM	MP7035	95—155	0.10—0.30	0.30—2.00
		✣	L	2	SH	US735	95—185	0.10—0.40	0.30—2.00
		✣	M	1	MM	MP7035	85—140	0.15—0.45	0.70—5.00
		✣	M	2	GM	MP7035	85—140	0.16—0.50	0.50—4.00
		✣	M	3	MA	MP7035	85—140	0.20—0.50	0.30—4.00
		✣	M	4	MS	US735	85—165	0.16—0.50	0.50—4.00
		✣	M	5	MS	VP15TF	75—130	0.16—0.50	0.50—4.00
		✣	M	6	MS	UP20M	95—145	0.16—0.50	0.50—4.00
		✣	M	7	MS	UTi20T	75—110	0.16—0.50	0.50—4.00
		✣	M	8	MA	VP15TF	75—130	0.20—0.50	0.30—4.00
		✣	M	9	Std	VP15TF	75—130	0.25—0.60	1.50—5.00
		✣	R	1	RM	MP7035	85—135	0.25—0.55	1.50—6.00
		✣	R	2	GH	US735	85—160	0.25—0.60	1.50—6.00
Ferritic and Martensitic Stainless Steel (AISI 431, AISI 420)	>200HB	●	L	1	LM	MC7015	150—240	0.10—0.30	0.30—2.00
		●	L	2	SH	US735	80—155	0.10—0.40	0.30—2.00
		●	L	3	SH	NX2525	55—115	0.10—0.40	0.30—2.00
		●	L	4	SW	US7020	90—230	0.10—0.50	0.30—2.50
		●	M	1	MM	MC7015	135—215	0.15—0.45	0.70—5.00

CUTTING CONDITIONS : ● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting
CUTTING AREA : **F** : Finish Cutting **L** : Light Cutting **M** : Medium Cutting **R** : Rough Cutting **H** : Heavy Cutting

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
M									
Ferritic and Martensitic Stainless Steel (AISI 431, AISI 420)	>200HB	●	**M**	2	**GM**	**MC7015**	135—215	0.16—0.50	0.50—4.00
		●	**M**	3	**MS**	**US7020**	80—205	0.16—0.50	0.50—4.00
		●	**M**	4	**MA**	**US7020**	80—205	0.20—0.50	0.30—4.00
		●	**M**	5	**MH**	**US7020**	80—205	0.20—0.55	1.00—4.00
		●	**M**	6	**MW**	**US7020**	80—205	0.20—0.60	0.90—4.00
		●	**R**	1	**RM**	**MC7015**	130—205	0.25—0.55	1.50—6.00
		●	**R**	2	**GH**	**US7020**	75—195	0.25—0.60	1.50—6.00
		●	**L**	1	**LM**	**MC7025**	135—180	0.10—0.30	0.30—2.00
		◐	**L**	2	**SH**	**US735**	80—155	0.10—0.40	0.30—2.00
		◐	**M**	1	**MM**	**MC7025**	125—165	0.15—0.45	0.70—5.00
		◐	**M**	2	**MS**	**MC7025**	125—165	0.16—0.50	0.50—4.00
		◐	**M**	3	**MA**	**MC7025**	125—165	0.20—0.50	0.30—4.00
		◐	**M**	4	**MS**	**US735**	75—140	0.16—0.50	0.50—4.00
		◐	**M**	5	**MA**	**US735**	75—140	0.20—0.50	0.30—4.00
		◐	**R**	1	**RM**	**MC7025**	115—155	0.25—0.55	1.50—6.00
		◐	**R**	2	**GH**	**US735**	70—135	0.25—0.60	1.50—6.00
		✣	**L**	1	**LM**	**MP7035**	80—130	0.10—0.30	0.30—2.00
		✣	**L**	2	**SH**	**US735**	80—155	0.10—0.40	0.30—2.00
		✣	**M**	1	**MM**	**MP7035**	75—120	0.15—0.45	0.70—5.00
		✣	**M**	2	**GM**	**MP7035**	75—120	0.16—0.50	0.50—4.00
		✣	**M**	3	**MA**	**MP7035**	75—120	0.20—0.50	0.30—4.00
		✣	**M**	4	**MS**	**US735**	75—140	0.16—0.50	0.50—4.00
		✣	**M**	5	**MS**	**VP15TF**	65—110	0.16—0.50	0.50—4.00
		✣	**M**	6	**MS**	**UP20M**	80—125	0.16—0.50	0.50—4.00
		✣	**M**	7	**MS**	**UTi20T**	65—95	0.16—0.50	0.50—4.00
		✣	**M**	8	**MA**	**VP15TF**	65—110	0.20—0.50	0.30—4.00
		✣	**M**	9	**Std**	**VP15TF**	65—110	0.25—0.60	1.50—5.00
		✣	**R**	1	**RM**	**MP7035**	70—115	0.25—0.55	1.50—6.00
		✣	**R**	2	**GH**	**US735**	70—135	0.25—0.60	1.50—6.00
Hardened Stainless Steel (AISI 630, AISI 631)	<450HB	●	**L**	1	**LM**	**MC7015**	100—160	0.10—0.30	0.30—2.00
		●	**L**	2	**SH**	**US735**	55—105	0.10—0.40	0.30—2.00
		●	**L**	3	**SH**	**NX2525**	35—75	0.10—0.40	0.30—2.00
		●	**L**	4	**SW**	**US7020**	60—155	0.10—0.50	0.30—2.50
		●	**M**	1	**MM**	**MC7015**	90—145	0.15—0.45	0.70—5.00
		●	**M**	2	**GM**	**MC7015**	90—145	0.16—0.50	0.50—4.00
		●	**M**	3	**MS**	**US7020**	55—140	0.16—0.50	0.50—4.00
		●	**M**	4	**MA**	**US7020**	55—140	0.20—0.50	0.30—4.00
		●	**M**	5	**MH**	**US7020**	55—140	0.20—0.55	1.00—4.00
		●	**M**	6	**MW**	**US7020**	55—140	0.20—0.60	0.90—4.00
		●	**R**	1	**RM**	**MC7015**	85—135	0.25—0.55	1.50—6.00
		●	**R**	2	**GH**	**US7020**	50—130	0.25—0.60	1.50—6.00
		◐	**L**	1	**LM**	**MC7025**	90—120	0.10—0.30	0.30—2.00
		◐	**L**	2	**SH**	**US735**	55—105	0.10—0.40	0.30—2.00
		◐	**M**	1	**MM**	**MC7025**	80—110	0.15—0.45	0.70—5.00
		◐	**M**	2	**GM**	**MC7025**	80—110	0.16—0.50	0.50—4.00
		◐	**M**	3	**MA**	**MC7025**	80—110	0.20—0.50	0.30—4.00
		◐	**M**	4	**MS**	**US735**	50—95	0.16—0.50	0.50—4.00

RECOMMENDED CUTTING CONDITIONS

NEGATIVE INSERTS

Breker : **Std** : Standard **Flat** : Flat Top

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
M									
Hardened Stainless Steel (AISI 630, AISI 631)	<450HB	◐	**M**	5	**MA**	**US735**	50—95	0.20—0.50	0.30—4.00
		◐	**R**	1	**RM**	**MC7025**	80—105	0.25—0.55	1.50—6.00
		◐	**R**	2	**GH**	**US735**	45—90	0.25—0.60	1.50—6.00
		✣	**L**	1	**LM**	**MP7035**	55—85	0.10—0.30	0.30—2.00
		✣	**L**	2	**SH**	**US735**	55—105	0.10—0.40	0.30—2.00
		✣	**M**	1	**MM**	**MP7035**	50—80	0.15—0.45	0.70—5.00
		✣	**M**	2	**GM**	**MP7035**	50—80	0.16—0.50	0.50—4.00
		✣	**M**	3	**MA**	**MP7035**	50—80	0.20—0.50	0.30—4.00
		✣	**M**	4	**MS**	**US735**	50—95	0.16—0.50	0.50—4.00
		✣	**M**	5	**MS**	**VP15TF**	45—75	0.16—0.50	0.50—4.00
		✣	**M**	6	**MS**	**UP20M**	55—80	0.16—0.50	0.50—4.00
		✣	**M**	7	**MS**	**UTi20T**	45—60	0.16—0.50	0.50—4.00
		✣	**M**	8	**MA**	**VP15TF**	45—75	0.20—0.50	0.30—4.00
		✣	**M**	9	**Std**	**VP15TF**	45—75	0.25—0.60	1.50—5.00
		✣	**R**	1	**RM**	**MP7035**	45—75	0.25—0.55	1.50—6.00
		✣	**R**	2	**GH**	**US735**	45—90	0.25—0.60	1.50—6.00

CUTTING CONDITIONS : ● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting
CUTTING AREA : **F** : Finish Cutting **L** : Light Cutting **M** : Medium Cutting **R** : Rough Cutting **H** : Heavy Cutting

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
K									
Gray Cast Iron (FC300)	≤350MPa	●	L	1	LK	MC5005	235—375	0.10—0.40	0.30—2.00
		●	L	2	MA	MC5005	210—335	0.20—0.50	0.30—4.00
		●	L	3	MA	UC5105	170—315	0.20—0.50	0.30—4.00
		●	M	1	MK	MC5005	210—335	0.20—0.55	1.00—4.00
		●	M	2	GK	MC5005	210—335	0.25—0.60	1.50—5.00
		●	M	3	Std	UC5105	170—315	0.25—0.60	1.50—5.00
		●	M	4	Std	NX2525	155—210	0.25—0.60	1.50—5.00
		●	M	5	MW	UC5105	170—315	0.20—0.60	0.90—4.00
		●	R	1	RK	MC5005	195—315	0.25—0.60	1.50—6.00
		●	R	2	Flat	MC5005	195—315	0.25—0.60	2.50—6.00
		●	R	3	GH	UC5105	165—300	0.25—0.60	1.50—6.00
		●	R	4	Flat	UC5105	165—300	0.20—0.60	2.50—6.00
		●	R	5	Flat	HTi10	100—145	0.20—0.60	2.50—6.00
		●	R	6	Flat	HTi05T	110—185	0.20—0.60	2.50—6.00
		●	H	1	Flat	MC5005	195—315	0.20—0.60	2.50—6.00
		●	H	2	Flat	UC5105	165—300	0.20—0.60	2.50—6.00
		◐	L	1	LK	MC5015	205—335	0.10—0.40	0.30—2.00
		◐	L	2	MA	MC5015	190—305	0.20—0.50	0.30—4.00
		◐	L	3	MA	UC5115	165—305	0.20—0.50	0.30—4.00
		◐	L	4	MP	UC5115	165—305	0.16—0.50	0.30—4.00
		◐	L	5	SW	UC5115	185—335	0.10—0.50	0.30—2.50
		◐	M	1	MK	MC5015	190—305	0.20—0.55	1.00—4.00
		◐	M	2	GK	MC5015	190—305	0.25—0.60	1.50—5.00
		◐	M	3	Std	UC5115	165—305	0.25—0.60	1.50—5.00
		◐	M	4	Std	HTi10	105—150	0.25—0.60	1.50—5.00
		◐	M	5	MH	UC5115	165—305	0.20—0.55	1.00—4.00
		◐	M	6	MW	UC5115	165—305	0.20—0.60	0.90—4.00
		◐	R	1	RK	MC5015	180—285	0.25—0.60	1.50—6.00
		◐	R	2	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		◐	R	3	GH	UC5115	160—290	0.25—0.60	1.50—6.00
		◐	R	4	Flat	UC5115	160—290	0.20—0.60	2.50—6.00
		◐	H	1	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		◐	H	2	Flat	UC5115	160—290	0.20—0.60	2.50—6.00
		✣	L	1	LK	MC5015	205—335	0.10—0.40	0.30—2.00
		✣	L	2	MA	MC5015	190—305	0.20—0.50	0.30—4.00
		✣	L	3	MA	UC5115	165—305	0.20—0.50	0.30—4.00
		✣	M	1	MK	MC5015	190—305	0.20—0.55	1.50—4.00
		✣	M	2	GK	MC5015	190—305	0.25—0.60	1.50—5.00
		✣	M	3	Std	UC5115	165—305	0.25—0.60	1.50—5.00
		✣	M	4	Std	UTi20T	85—120	0.25—0.60	1.50—5.00
		✣	R	1	RK	MC5015	180—285	0.25—0.60	1.50—6.00
		✣	R	2	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		✣	R	3	GH	UC5115	160—290	0.25—0.60	1.50—6.00
		✣	R	4	Flat	UC5115	160—290	0.20—0.60	2.50—6.00
		✣	R	5	Flat	UTi20T	80—115	0.20—0.60	2.50—6.00
		✣	H	1	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		✣	H	2	Flat	UC5115	160—290	0.20—0.60	2.50—6.00

RECOMMENDED CUTTING CONDITIONS

NEGATIVE INSERTS

Breker : **Std** : Standard **Flat** : Flat Top

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
K									
Ductile Cast Iron (FCD450)	≤450MPa	●	L	1	LK	MC5005	220—355	0.10—0.40	0.30—2.00
		●	L	2	MA	MC5005	210—335	0.20—0.50	0.30—4.00
		●	L	3	MA	UC5105	160—295	0.20—0.50	0.30—4.00
		●	M	1	MK	MC5005	210—335	0.20—0.55	1.00—4.00
		●	M	2	GK	MC5005	210—335	0.25—0.60	1.50—5.00
		●	M	3	Std	UC5105	160—295	0.25—0.60	1.50—5.00
		●	M	4	Std	NX2525	145—200	0.25—0.60	1.50—5.00
		●	R	1	RK	MC5005	195—315	0.25—0.60	1.50—6.00
		●	R	2	Flat	MC5005	195—315	0.20—0.60	2.50—6.00
		●	R	3	GH	UC5105	155—280	0.25—0.60	1.50—6.00
		●	R	4	Flat	UC5105	155—280	0.20—0.60	2.50—6.00
		●	R	5	Flat	HTi10	95—135	0.20—0.60	2.50—6.00
		●	R	6	Flat	HTi05T	105—175	0.20—0.60	2.50—6.00
		●	H	1	Flat	MC5005	195—315	0.20—0.60	2.50—6.00
		●	H	2	Flat	UC5105	155—280	0.20—0.60	2.50—6.00
		◐	L	1	LK	MC5015	205—335	0.10—0.40	0.30—2.00
		◐	L	2	MA	MC5015	190—305	0.20—0.50	0.30—4.00
		◐	L	3	MA	UC5115	155—285	0.20—0.50	0.30—4.00
		◐	L	4	MP	UC5115	155—285	0.16—0.50	0.30—4.00
		◐	L	5	SW	UC5115	175—315	0.10—0.50	0.30—2.50
		◐	M	1	MK	MC5015	190—305	0.20—0.55	1.00—4.00
		◐	M	2	GK	MC5015	190—305	0.25—0.60	1.50—5.00
		◐	M	3	Std	UC5115	155—285	0.25—0.60	1.50—5.00
		◐	M	4	Std	HTi10	100—140	0.25—0.60	1.50—5.00
		◐	R	1	RK	MC5015	180—285	0.25—0.60	1.50—6.00
		◐	R	2	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		◐	R	3	GH	UC5115	150—275	0.25—0.60	1.50—6.00
		◐	R	4	Flat	UC5115	150—275	0.20—0.60	2.50—6.00
		◐	H	1	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		◐	H	2	Flat	UC5115	150—275	0.20—0.60	2.50—6.00
		✣	L	1	LK	MC5015	205—335	0.10—0.40	0.30—2.00
		✣	L	2	MA	MC5015	190—305	0.20—0.50	0.30—4.00
		✣	L	3	MA	UC5115	165—305	0.20—0.50	0.30—4.00
		✣	M	1	MK	MC5015	190—305	0.20—0.55	1.50—4.00
		✣	M	2	GK	MC5015	190—305	0.25—0.60	1.50—5.00
		✣	M	3	Std	UC5115	165—305	0.25—0.60	1.50—5.00
		✣	M	4	Std	UTi20T	85—120	0.25—0.60	1.50—5.00
		✣	R	1	RK	MC5015	180—285	0.25—0.60	1.50—6.00
		✣	R	2	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		✣	R	3	GH	UC5115	160—290	0.25—0.60	1.50—6.00
		✣	R	4	Flat	UC5115	160—290	0.20—0.60	2.50—6.00
		✣	R	5	Flat	UTi20T	80—115	0.20—0.60	2.50—6.00
		✣	H	1	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		✣	H	2	Flat	UC5115	160—290	0.20—0.60	2.50—6.00
Ductile Cast Iron (FCD700)	≤800MPa	●	L	1	LK	MC5005	195—315	0.10—0.40	0.30—2.00
		●	L	2	MA	MC5005	210—335	0.20—0.50	0.30—4.00
		●	L	3	MA	UC5105	160—295	0.20—0.50	0.30—4.00

CUTTING CONDITIONS : ● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting
CUTTING AREA : **F** : Finish Cutting **L** : Light Cutting **M** : Medium Cutting **R** : Rough Cutting **H** : Heavy Cutting

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
K									
Ductile Cast Iron (FCD700)	≤800MPa	●	M	1	MK	MC5005	210—335	0.20—0.55	1.00—4.00
		●	M	2	GK	MC5005	210—335	0.25—0.60	1.50—5.00
		●	M	3	Std	UC5105	160—295	0.25—0.60	1.50—5.00
		●	M	4	Std	NX2525	145—200	0.25—0.60	1.50—5.00
		●	R	1	RK	MC5005	195—315	0.25—0.60	1.50—6.00
		●	R	2	Flat	MC5005	195—315	0.20—0.60	2.50—6.00
		●	R	3	GH	UC5105	155—280	0.25—0.60	1.50—6.00
		●	R	4	Flat	UC5105	155—280	0.20—0.60	2.50—6.00
		●	R	5	Flat	HTi10	95—135	0.20—0.60	2.50—6.00
		●	R	6	Flat	HTi05T	105—175	0.20—0.60	2.50—6.00
		●	H	1	Flat	MC5005	195—315	0.20—0.60	2.50—6.00
		●	H	2	Flat	UC5105	155—280	0.20—0.60	2.50—6.00
		◐	L	1	LK	MC5015	205—335	0.10—0.40	0.30—2.00
		◐	L	2	MA	MC5015	190—305	0.20—0.50	0.30—4.00
		◐	L	3	MA	UC5115	155—285	0.20—0.50	0.30—4.00
		◐	L	4	MP	UC5115	155—285	0.16—0.50	0.30—4.00
		◐	L	5	SW	UC5115	175—315	0.10—0.50	0.30—2.50
		◐	M	1	MK	MC5015	190—305	0.20—0.55	1.00—4.00
		◐	M	2	GK	MC5015	190—305	0.25—0.60	1.50—5.00
		◐	M	3	Std	UC5115	155—285	0.25—0.60	1.50—5.00
		◐	M	4	Std	HTi10	100—140	0.25—0.60	1.50—5.00
		◐	R	1	RK	MC5015	180—285	0.25—0.60	1.50—6.00
		◐	R	2	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		◐	R	3	GH	UC5115	150—275	0.25—0.60	1.50—6.00
		◐	R	4	Flat	UC5115	150—275	0.20—0.60	2.50—6.00
		◐	H	1	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		◐	H	2	Flat	UC5115	150—275	0.20—0.60	2.50—6.00
		✣	L	1	LK	MC5015	205—335	0.10—0.40	0.30—2.00
		✣	L	2	MA	MC5015	190—305	0.20—0.50	0.30—4.00
		✣	L	3	MA	UC5115	165—305	0.20—0.50	0.30—4.00
		✣	M	1	MK	MC5015	190—305	0.20—0.55	1.00—4.00
		✣	M	2	GK	MC5015	190—305	0.25—0.60	1.50—5.00
		✣	M	3	Std	UC5115	165—305	0.25—0.60	1.50—5.00
		✣	M	4	Std	UTi20T	85—120	0.25—0.60	1.50—5.00
		✣	R	1	RK	MC5015	180—285	0.25—0.60	1.50—6.00
		✣	R	2	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		✣	R	3	GH	UC5115	160—290	0.25—0.60	1.50—6.00
		✣	R	4	Flat	UC5115	160—290	0.20—0.60	2.50—6.00
		✣	R	5	Flat	UTi20T	80—115	0.20—0.60	2.50—6.00
		✣	H	1	Flat	MC5015	180—285	0.20—0.60	2.50—6.00
		✣	H	2	Flat	UC5115	160—290	0.20—0.60	2.50—6.00

RECOMMENDED CUTTING CONDITIONS

NEGATIVE INSERTS

Breker : **Std** : Standard **Flat** : Flat Top

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
S									
Titanium Alloy (Ti-6Al-4V)	—	●	F	1	FJ	RT9010	45—95	0.07—0.20	0.10—1.00
		●	L	1	LS	MT9015	40—85	0.10—0.25	0.20—0.80
		●	L	2	MJ(M)	RT9010	40—80	0.07—0.25	0.40—1.50
		●	M	1	MS	MT9015	40—80	0.10—0.25	0.50—4.00
		●	M	2	MS	RT9010	40—80	0.10—0.25	0.50—4.00
		●	R	1	RS	MT9015	35—75	0.20—0.35	1.00—4.00
		●	R	2	GJ	RT9010	35—75	0.16—0.35	1.00—3.00
		◐	F	1	FJ	RT9010	45—95	0.07—0.20	0.10—1.00
		◐	L	1	LS	MT9015	40—85	0.10—0.25	0.20—0.80
		◐	L	2	MJ(M)	RT9010	40—80	0.07—0.25	0.40—1.50
		◐	L	3	MJ(G)	RT9010	40—80	0.07—0.25	0.40—1.50
		◐	M	1	MS	MT9015	40—80	0.10—0.25	0.50—4.00
		◐	M	2	MS	RT9010	40—80	0.10—0.25	0.50—4.00
		◐	R	1	RS	MT9015	35—75	0.20—0.35	1.00—4.00
		◐	R	2	GJ	RT9010	35—75	0.16—0.35	1.00—3.00
		✣	F	1	FJ	RT9010	45—95	0.07—0.20	0.10—1.00
		✣	L	1	MJ(M)	RT9010	40—80	0.07—0.25	0.40—1.50
		✣	L	2	MJ(G)	RT9010	40—80	0.07—0.25	0.40—1.50
		✣	M	1	MS	RT9010	40—80	0.10—0.25	0.50—4.00
		✣	R	1	GJ	RT9010	35—75	0.16—0.35	1.00—3.00
S									
Heat Resistant Alloy (Inconel®718)	—	●	F	1	FJ	VP10RT	30—60	0.07—0.20	0.10—1.00
		●	L	1	LS	MP9005	30—110	0.10—0.25	0.20—0.80
		●	L	2	MJ(M)	VP05RT	30—60	0.07—0.25	0.40—1.50
		●	L	3	MJ(M)	US905	50—100	0.07—0.25	0.40—1.50
		●	L	4	MJ(G)	VP10RT	25—50	0.07—0.25	0.40—1.50
		●	M	1	MS	MP9005	30—100	0.10—0.25	0.50—4.00
		●	M	2	MS	VP05RT	30—60	0.10—0.25	0.50—4.00
		●	M	3	MS	US905	50—100	0.10—0.25	0.50—4.00
		●	R	1	RS	MP9015	20—75	0.20—0.35	1.00—4.00
		●	R	2	GJ	VP10RT	20—45	0.16—0.35	1.00—3.00
		●	R	3	GJ	US905	45—95	0.16—0.35	1.00—3.00
		◐	F	1	FJ	VP10RT	30—60	0.07—0.20	0.10—1.00
		◐	L	1	LS	MP9015	25—85	0.10—0.25	0.20—0.80
		◐	L	2	MJ(M)	VP10RT	25—50	0.07—0.25	0.40—1.50
		◐	M	1	MS	MP9015	25—80	0.10—0.25	0.50—4.00
		◐	M	2	MS	VP10RT	25—50	0.10—0.25	0.50—4.00
		◐	R	1	RS	MP9015	20—75	0.20—0.35	1.00—4.00
		◐	R	2	GJ	VP10RT	20—45	0.16—0.35	1.00—3.00
		✣	F	1	FJ	VP15TF	20—40	0.07—0.20	0.10—1.00
		✣	L	1	MJ(M)	VP15TF	20—35	0.07—0.25	0.40—1.50
		✣	L	2	MJ(G)	VP15TF	20—35	0.07—0.25	0.40—1.50
		✣	M	1	MS	VP15TF	20—35	0.10—0.25	0.50—4.00
		✣	R	1	GJ	VP15TF	15—30	0.16—0.35	1.00—3.00

CUTTING CONDITIONS : ● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting
CUTTING AREA : **F** : Finish Cutting **L** : Light Cutting **M** : Medium Cutting **R** : Rough Cutting **H** : Heavy Cutting

7° POSITIVE INSERT TYPE

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P									
Mild Steel (ASTM A36, AISI 1010)	≤180HB	●	F	1	FP	NX2525	225—320	0.04—0.20	0.20—0.90
		●	F	2	FV	NX2525	225—320	0.04—0.20	0.20—0.90
		●	F	3	R/L-F	MP3025	230—350	0.05—0.12	0.10—0.50
		●	L	1	LP	NX2525	225—320	0.06—0.25	0.20—1.00
		●	L	2	Std	UE6110	205—350	0.08—0.30	0.30—2.00
		●	L	3	MV	MP3025	190—295	0.08—0.30	0.30—2.00
		●	L	4	Std	MP3025	190—295	0.08—0.30	0.30—2.00
		●	M	1	MP	NX2525	185—265	0.08—0.30	0.30—2.00
		◐	F	1	FP	MC6015	250—425	0.04—0.20	0.20—0.90
		◐	F	2	FP	UE6110	250—425	0.04—0.20	0.20—0.90
		◐	F	3	FP	MP3025	230—350	0.04—0.20	0.20—0.90
		◐	F	4	FV	MP3025	230—350	0.04—0.20	0.20—0.90
		◐	F	5	FV	NX3035	215—305	0.04—0.20	0.20—0.90
		◐	L	1	LP	MC6015	250—425	0.06—0.25	0.20—1.00
		◐	L	2	LP	UE6110	250—425	0.06—0.25	0.20—1.00
		◐	L	3	LP	MP3025	230—350	0.06—0.25	0.20—1.00
		◐	L	4	Std	UE6110	205—350	0.08—0.30	0.30—2.00
		◐	M	1	MP	MC6015	205—350	0.08—0.30	0.30—2.00
		◐	M	2	MP	UE6110	205—350	0.08—0.30	0.30—2.00
		◐	M	3	MP	MP3025	190—295	0.08—0.30	0.30—2.00
		✣	F	1	FP	MC6025	250—405	0.04—0.20	0.20—0.90
		✣	F	2	FV	UE6020	235—385	0.04—0.20	0.20—0.90
		✣	L	1	LP	MC6025	250—405	0.06—0.25	0.20—1.00
		✣	L	2	Std	UE6020	195—320	0.08—0.30	0.30—2.00
		✣	M	1	MP	MC6025	205—335	0.08—0.30	0.30—2.00
Carbon Steel • Alloy Steel (AISI 1045, AISI 4140)	180 | 280HB	●	F	1	FP	NX2525	165—235	0.04—0.20	0.20—0.90
		●	F	2	FV	NX2525	165—235	0.04—0.20	0.20—0.90
		●	F	3	R/L-F	MP3025	170—260	0.05—0.12	0.10—0.50
		●	L	1	LP	NX2525	165—235	0.06—0.25	0.20—1.00
		●	L	2	Std	UE6110	150—260	0.08—0.30	0.30—2.00
		●	L	3	MV	MP3025	140—215	0.08—0.30	0.30—2.00
		●	L	4	Std	MP3025	140—215	0.08—0.30	0.30—2.00
		●	L	5	SV	MP3025	170—260	0.06—0.25	0.20—1.00
		●	L	6	MW	MP3025	140—215	0.10—0.35	0.80—2.50
		●	M	1	MP	NX2525	135—195	0.08—0.30	0.30—2.00
		◐	F	1	FP	MC6015	185—310	0.04—0.20	0.20—0.90
		◐	F	2	FP	UE6110	185—310	0.04—0.20	0.20—0.90
		◐	F	3	FP	MP3025	170—260	0.04—0.20	0.20—0.90
		◐	F	4	FV	MP3025	170—260	0.04—0.20	0.20—0.90
		◐	F	5	FV	NX3035	160—225	0.04—0.20	0.20—0.90
		◐	F	6	SW	MP3025	170—260	0.06—0.24	0.20—1.50
		◐	L	1	LP	MC6015	185—310	0.06—0.25	0.20—1.00
		◐	L	2	LP	UE6110	185—310	0.06—0.25	0.20—1.00
		◐	L	3	LP	MP3025	170—260	0.06—0.25	0.20—1.00
		◐	L	4	Std	UE6110	150—260	0.08—0.30	0.30—2.00
		◐	M	1	MP	MC6015	150—260	0.08—0.30	0.30—2.00
		◐	M	2	MP	UE6110	150—260	0.08—0.30	0.30—2.00

RECOMMENDED CUTTING CONDITIONS

7° POSITIVE INSERT TYPE

Breker : **Std** : Standard **Flat** : Flat Top

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P									
Carbon Steel • Alloy Steel (AISI 1045, AISI 4140)	180 | 280HB	◐	**M**	3	**MP**	**MP3025**	140—215	0.08—0.30	0.30—2.00
		✣	**F**	1	**FP**	**MC6025**	185—295	0.04—0.20	0.20—0.90
		✣	**F**	2	**FV**	**UE6020**	175—285	0.04—0.20	0.20—0.90
		✣	**L**	1	**LP**	**MC6025**	185—295	0.06—0.25	0.20—1.00
		✣	**L**	2	**Std**	**UE6020**	145—235	0.08—0.30	0.30—2.00
		✣	**M**	1	**MP**	**MC6025**	150—245	0.08—0.30	0.30—2.00
Carbon Steel • Alloy Steel (AISI 4340)	280 | 350HB	●	**M**	1	**MP**	**NX2525**	95—140	0.08—0.30	0.30—2.00
		◐	**M**	1	**MP**	**MC6015**	110—185	0.08—0.30	0.30—2.00
		◐	**M**	2	**MP**	**UE6110**	110—185	0.08—0.30	0.30—2.00
		◐	**M**	3	**MP**	**MP3025**	100—155	0.08—0.30	0.30—2.00
		✣	**M**	1	**MP**	**MC6025**	110—175	0.08—0.30	0.30—2.00

CUTTING CONDITIONS : ● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting
CUTTING AREA : **F** : Finish Cutting **L** : Light Cutting **M** : Medium Cutting **R** : Rough Cutting **H** : Heavy Cutting

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
M									
Austenitic Stainless Steel (AISI 304, AISI 316)	≤200HB	●	F	1	FM	VP15TF	75—125	0.04—0.20	0.20—0.90
		●	F	2	Std	US735	70—135	0.08—0.30	0.30—2.00
		●	L	1	LM	MC7025	140—190	0.06—0.25	0.20—1.00
		●	L	2	Std	US735	70—135	0.08—0.30	0.30—2.00
		●	M	1	MM	MC7025	115—155	0.08—0.30	0.30—2.00
		◐	F	1	FM	VP15TF	75—125	0.04—0.20	0.20—0.90
		◐	F	2	Std	US735	70—135	0.08—0.30	0.30—2.00
		◐	L	1	LM	MC7025	140—190	0.06—0.25	0.20—1.00
		◐	L	2	Std	US735	70—135	0.08—0.30	0.30—2.00
		◐	M	1	MM	MC7025	115—155	0.08—0.30	0.30—2.00
		✣	F	1	FM	VP15TF	75—125	0.04—0.20	0.20—0.90
		✣	F	2	Std	US735	70—135	0.08—0.30	0.30—2.00
		✣	L	1	LM	MP7035	85—135	0.06—0.25	0.20—1.00
		✣	L	2	LM	VP15TF	75—125	0.06—0.25	0.20—1.00
		✣	L	3	Std	US735	70—135	0.08—0.30	0.30—2.00
		✣	M	1	MM	MP7035	70—115	0.08—0.30	0.30—2.00
		✣	M	2	MM	VP15TF	60—105	0.08—0.30	0.30—2.00
Austenitic Stainless Steel (AISI 304LN, AISI 316LN)	>200HB	●	F	1	FM	VP15TF	60—105	0.04—0.20	0.20—0.90
		●	F	2	Std	US735	60—110	0.08—0.30	0.30—2.00
		●	L	1	LM	MC7025	120—160	0.06—0.25	0.20—1.00
		●	L	2	Std	US735	60—110	0.08—0.30	0.30—2.00
		●	M	1	MM	MC7025	100—130	0.08—0.30	0.30—2.00
		◐	F	1	FM	VP15TF	60—105	0.04—0.20	0.20—0.90
		◐	F	2	Std	US735	60—110	0.08—0.30	0.30—2.00
		◐	L	1	LM	MC7025	120—160	0.06—0.25	0.20—1.00
		◐	L	2	Std	US735	60—110	0.08—0.30	0.30—2.00
		◐	M	1	MM	MC7025	100—130	0.08—0.30	0.30—2.00
		✣	F	1	FM	VP15TF	60—105	0.04—0.20	0.20—0.90
		✣	F	2	Std	US735	60—110	0.08—0.30	0.30—2.00
		✣	L	1	LM	MP7035	70—115	0.06—0.25	0.20—1.00
		✣	L	2	LM	VP15TF	60—105	0.06—0.25	0.20—1.00
		✣	L	3	Std	US735	60—110	0.08—0.30	0.30—2.00
		✣	M	1	MM	MP7035	60—95	0.08—0.30	0.30—2.00
		✣	M	2	MM	VP15TF	50—90	0.08—0.30	0.30—2.00
Two-phase Stainless Steel (AISI 329)	≤280HB	●	F	1	FM	VP15TF	50—85	0.04—0.20	0.20—0.90
		●	F	2	Std	US735	45—90	0.08—0.30	0.30—2.00
		●	L	1	LM	MC7025	95—130	0.06—0.25	0.20—1.00
		●	L	2	Std	US735	45—90	0.08—0.30	0.30—2.00
		●	M	1	MM	MC7025	80—105	0.08—0.30	0.30—2.00
		◐	F	1	FM	VP15TF	50—85	0.04—0.20	0.20—0.90
		◐	F	2	Std	US735	45—90	0.08—0.30	0.30—2.00
		◐	L	1	LM	MC7025	95—130	0.06—0.25	0.20—1.00
		◐	L	2	Std	US735	45—90	0.08—0.30	0.30—2.00
		◐	M	1	MM	MC7025	80—105	0.08—0.30	0.30—2.00
		✣	F	1	FM	VP15TF	50—85	0.04—0.20	0.20—0.90
		✣	F	2	Std	US735	45—90	0.08—0.30	0.30—2.00
		✣	L	1	LM	MP7035	55—95	0.06—0.25	0.20—1.00

RECOMMENDED CUTTING CONDITIONS

7° POSITIVE INSERT TYPE

Breker : **Std** : Standard **Flat** : Flat Top

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
M									
Two-phase Stainless Steel (AISI 329)	≤280HB	✣	L	2	LM	VP15TF	50—85	0.06—0.25	0.20—1.00
		✣	L	3	Std	US735	45—90	0.08—0.30	0.30—2.00
		✣	M	1	MM	MP7035	45—75	0.08—0.30	0.30—2.00
		✣	M	2	MM	VP15TF	40—70	0.08—0.30	0.30—2.00
Ferritic and Martensitic Stainless Steel (AISI 410, AISI 430)	≤200HB	●	F	1	FM	VP15TF	75—125	0.04—0.20	0.20—0.90
		●	F	2	Std	US735	70—135	0.08—0.30	0.30—2.00
		●	L	1	LM	MC7025	140—190	0.06—0.25	0.20—1.00
		●	L	2	Std	US735	70—135	0.08—0.30	0.30—2.00
		●	M	1	MM	MC7025	115—155	0.08—0.30	0.30—2.00
		◐	F	1	FM	VP15TF	75—125	0.04—0.20	0.20—0.90
		◐	F	2	Std	US735	70—135	0.08—0.30	0.30—2.00
		◐	L	1	LM	MC7025	140—190	0.06—0.25	0.20—1.00
		◐	L	2	Std	US735	70—135	0.08—0.30	0.30—2.00
		◐	M	1	MM	MC7025	115—155	0.08—0.30	0.30—2.00
		✣	F	1	FM	VP15TF	75—125	0.04—0.20	0.20—0.90
		✣	F	2	Std	US735	70—135	0.08—0.30	0.30—2.00
		✣	L	1	LM	MP7035	85—135	0.06—0.25	0.20—1.00
		✣	L	2	LM	VP15TF	75—125	0.06—0.25	0.20—1.00
		✣	L	3	Std	US735	70—135	0.08—0.30	0.30—2.00
		✣	M	1	MM	MP7035	70—115	0.08—0.30	0.30—2.00
		✣	M	2	MM	VP15TF	60—105	0.08—0.30	0.30—2.00
Ferritic and Martensitic Stainless Steel (AISI 431, AISI 420)	>200HB	●	F	1	FM	VP15TF	60—105	0.04—0.20	0.20—0.90
		●	F	2	Std	US735	60—110	0.08—0.30	0.30—2.00
		●	L	1	LM	MC7025	120—160	0.06—0.25	0.20—1.00
		●	L	2	Std	US735	60—110	0.08—0.30	0.30—2.00
		●	M	1	MM	MC7025	100—130	0.08—0.30	0.30—2.00
		◐	F	1	FM	VP15TF	60—105	0.04—0.20	0.20—0.90
		◐	F	2	Std	US735	60—110	0.08—0.30	0.30—2.00
		◐	L	1	LM	MC7025	120—160	0.06—0.25	0.20—1.00
		◐	L	2	Std	US735	60—110	0.08—0.30	0.30—2.00
		◐	M	1	MM	MC7025	100—130	0.08—0.30	0.30—2.00
		✣	F	1	FM	VP15TF	60—105	0.04—0.20	0.20—0.90
		✣	F	2	Std	US735	60—110	0.08—0.30	0.30—2.00
		✣	L	1	LM	MP7035	70—115	0.06—0.25	0.20—1.00
		✣	L	2	LM	VP15TF	60—105	0.06—0.25	0.20—1.00
		✣	L	3	Std	US735	60—110	0.08—0.30	0.30—2.00
		✣	M	1	MM	MP7035	60—95	0.08—0.30	0.30—2.00
		✣	M	2	MM	VP15TF	50—90	0.08—0.30	0.30—2.00
Hardened Stainless Steel (AISI 630, AISI 631)	<450HB	●	F	1	FM	VP15TF	40—70	0.04—0.20	0.20—0.90
		●	F	2	Std	US735	40—75	0.08—0.30	0.30—2.00
		●	L	1	LM	MC7025	80—105	0.06—0.25	0.20—1.00
		●	L	2	Std	US735	40—75	0.08—0.30	0.30—2.00
		●	M	1	MM	MC7025	65—90	0.08—0.30	0.30—2.00
		◐	F	1	FM	VP15TF	40—70	0.04—0.20	0.20—0.90
		◐	F	2	Std	US735	40—75	0.08—0.30	0.30—2.00
		◐	L	1	LM	MC7025	80—105	0.06—0.25	0.20—1.00
		◐	L	2	Std	US735	40—75	0.08—0.30	0.30—2.00

CUTTING CONDITIONS : ● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting
CUTTING AREA : **F** : Finish Cutting **L** : Light Cutting **M** : Medium Cutting **R** : Rough Cutting **H** : Heavy Cutting

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
M									
Hardened Stainless Steel (AISI 630, AISI 631)	<450HB		**M**	1	**MM**	**MC7025**	65—90	0.08—0.30	0.30—2.00
			F	1	**FM**	**VP15TF**	40—70	0.04—0.20	0.20—0.90
			F	2	**Std**	**US735**	40—75	0.08—0.30	0.30—2.00
			L	1	**LM**	**MP7035**	45—75	0.06—0.25	0.20—1.00
			L	2	**LM**	**VP15TF**	40—70	0.06—0.25	0.20—1.00
			L	3	**Std**	**US735**	40—75	0.08—0.30	0.30—2.00
			M	1	**MM**	**MP7035**	40—65	0.08—0.30	0.30—2.00
			M	2	**MM**	**VP15TF**	35—60	0.08—0.30	0.30—2.00

RECOMMENDED CUTTING CONDITIONS

7° POSITIVE INSERT TYPE

Breker : **Std** : Standard **Flat** : Flat Top

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
K									
Gray Cast Iron (FC300)	≤350MPa	●	F	1	MK	MC5005	170—270	0.08—0.30	0.30—2.00
		●	F	2	Std	UC5115	130—245	0.08—0.30	0.30—2.00
		●	L	1	MK	MC5005	170—270	0.08—0.30	0.30—2.00
		●	L	2	Std	UC5115	130—245	0.08—0.30	0.30—2.00
		●	M	1	Flat	MC5005	170—270	0.08—0.30	0.30—2.00
		●	M	2	Flat	UC5115	130—245	0.08—0.30	0.30—2.00
		◐	F	1	MK	MC5015	155—245	0.08—0.30	0.30—2.00
		◐	F	2	Std	UC5115	130—245	0.08—0.30	0.30—2.00
		◐	L	1	MK	MC5015	155—245	0.08—0.30	0.30—2.00
		◐	L	2	Std	UC5115	130—245	0.08—0.30	0.30—2.00
		◐	M	1	Flat	MC5015	155—245	0.08—0.30	0.30—2.00
		◐	M	2	Flat	UC5115	130—245	0.08—0.30	0.30—2.00
		✣	F	1	MK	MC5015	155—245	0.08—0.30	0.30—2.00
		✣	F	2	Std	UC5115	130—245	0.08—0.30	0.30—2.00
		✣	L	1	MK	MC5015	155—245	0.08—0.30	0.30—2.00
		✣	L	2	Std	UC5115	130—245	0.08—0.30	0.30—2.00
		✣	M	1	Flat	MC5015	155—245	0.08—0.30	0.30—2.00
		✣	M	2	Flat	UC5115	130—245	0.08—0.30	0.30—2.00
Ductile Cast Iron (FCD450)	≤450MPa	●	F	1	MK	MC5005	160—255	0.08—0.30	0.30—2.00
		●	F	2	Std	UC5115	125—230	0.08—0.30	0.30—2.00
		●	L	1	MK	MC5005	160—255	0.08—0.30	0.30—2.00
		●	L	2	Std	UC5115	125—230	0.08—0.30	0.30—2.00
		●	M	1	Flat	MC5005	160—255	0.08—0.30	0.30—2.00
		●	M	2	Flat	UC5115	125—230	0.08—0.30	0.30—2.00
		◐	F	1	MK	MC5015	145—235	0.08—0.30	0.30—2.00
		◐	F	2	Std	UC5115	125—230	0.08—0.30	0.30—2.00
		◐	L	1	MK	MC5015	145—235	0.08—0.30	0.30—2.00
		◐	L	2	Std	UC5115	125—230	0.08—0.30	0.30—2.00
		◐	M	1	Flat	MC5015	145—235	0.08—0.30	0.30—2.00
		◐	M	2	Flat	UC5115	125—230	0.08—0.30	0.30—2.00
		✣	F	1	MK	MC5015	140—225	0.08—0.30	0.30—2.00
		✣	F	2	Std	UC5115	125—230	0.08—0.30	0.30—2.00
		✣	L	1	MK	MC5015	140—225	0.08—0.30	0.30—2.00
		✣	L	2	Std	UC5115	125—230	0.08—0.30	0.30—2.00
		✣	M	1	Flat	MC5015	140—225	0.08—0.30	0.30—2.00
		✣	M	2	Flat	UC5115	125—230	0.08—0.30	0.30—2.00
Ductile Cast Iron (FCD700)	≤800MPa	●	F	1	MK	MC5005	140—225	0.08—0.30	0.30—2.00
		●	F	2	Std	UC5115	110—205	0.08—0.30	0.30—2.00
		●	L	1	MK	MC5005	140—225	0.08—0.30	0.30—2.00
		●	L	2	Std	UC5115	110—205	0.08—0.30	0.30—2.00
		●	M	1	Flat	MC5005	140—225	0.08—0.30	0.30—2.00
		●	M	2	Flat	UC5115	110—205	0.08—0.30	0.30—2.00
		◐	F	1	MK	MC5015	130—205	0.08—0.30	0.30—2.00
		◐	F	2	Std	UC5115	110—205	0.08—0.30	0.30—2.00
		◐	L	1	MK	MC5015	130—205	0.08—0.30	0.30—2.00
		◐	L	2	Std	UC5115	110—205	0.08—0.30	0.30—2.00
		◐	M	1	Flat	MC5015	130—205	0.08—0.30	0.30—2.00

CUTTING CONDITIONS : ● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting
CUTTING AREA : **F** : Finish Cutting **L** : Light Cutting **M** : Medium Cutting **R** : Rough Cutting **H** : Heavy Cutting

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
K									
Ductile Cast Iron (FCD700)	≤800MPa		**M**	2	**Flat**	**UC5115**	110—205	0.08—0.30	0.30—2.00
			F	1	**MK**	**MC5015**	130—205	0.08—0.30	0.30—2.00
			F	2	**Std**	**UC5115**	110—205	0.08—0.30	0.30—2.00
			L	1	**MK**	**MC5015**	130—205	0.08—0.30	0.30—2.00
			L	2	**Std**	**UC5115**	110—205	0.08—0.30	0.30—2.00
			M	1	**Flat**	**MC5015**	130—205	0.08—0.30	0.30—2.00
			M	2	**Flat**	**UC5115**	110—205	0.08—0.30	0.30—2.00

RECOMMENDED CUTTING CONDITIONS

7° POSITIVE INSERT TYPE

Breker : **Std** : Standard **Flat** : Flat Top

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
N									
Aluminium Alloy (A6061, A7075)	Si<5%	●	F	1	AZ	HTi10	300—700	0.10—0.40	0.20—3.00
		◐	F	1	AZ	HTi10	300—700	0.10—0.40	0.20—3.00
		✣	F	1	AZ	HTi10	300—700	0.10—0.40	0.20—3.00
Aluminium Alloy (AC4B)	5%≤Si≤10%	●	F	1	AZ	HTi10	300—700	0.10—0.40	0.20—3.00
		◐	F	1	AZ	HTi10	300—700	0.10—0.40	0.20—3.00
		✣	F	1	AZ	HTi10	300—700	0.10—0.40	0.20—3.00
Aluminium Alloy (ADC12, A390)	Si>10%	●	F	1	AZ	HTi10	300—700	0.10—0.40	0.20—3.00
		◐	F	1	AZ	HTi10	300—700	0.10—0.40	0.20—3.00
		✣	F	1	AZ	HTi10	300—700	0.10—0.40	0.20—3.00

CUTTING CONDITIONS : ● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting
CUTTING AREA : **F** : Finish Cutting **L** : Light Cutting **M** : Medium Cutting **R** : Rough Cutting **H** : Heavy Cutting

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
S									
Titanium Alloy (Ti-6Al-4V)	—	●	**F**	1	**FJ**	**RT9010**	35—75	0.04—0.12	0.20—1.40
		◐	**F**	1	**FJ**	**RT9010**	35—75	0.04—0.12	0.20—1.40
		✣	**F**	1	**FJ**	**RT9010**	35—75	0.04—0.12	0.20—1.40
S									
Heat Resistant Alloy (Inconel®718)	—	●	**F**	1	**FJ**	**VP10RT**	20—45	0.04—0.12	0.20—1.40
		◐	**F**	1	**FJ**	**VP10RT**	20—45	0.04—0.12	0.20—1.40
		✣	**F**	1	**FJ**	**VP10RT**	20—45	0.04—0.12	0.20—1.40

RECOMMENDED CUTTING CONDITIONS

11° POSITIVE INSERT TYPE

Breker : **Std** : Standard **Flat** : Flat Top

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P									
Mild Steel (ASTM A36, AISI 1010)	≤180HB	●	F	1	R-R/L	NX2525	225—320	0.05—0.12	0.20—0.60
		●	L	1	R-Std	NX2525	185—265	0.08—0.30	0.30—2.00
		●	M	1	R-Std	NX2525	185—265	0.08—0.30	0.30—2.00
		◐	F	1	R-R/L	NX2525	225—320	0.05—0.12	0.20—0.60
		◐	L	1	R-Std	UE6110	205—350	0.08—0.30	0.30—2.00
		◐	L	2	R-Std	MP3025	190—295	0.08—0.30	0.30—2.00
		◐	L	3	R-Std	NX3035	180—255	0.08—0.30	0.30—2.00
		◐	M	1	R-Std	UE6110	205—350	0.08—0.30	0.30—2.00
		◐	M	2	R-Std	MP3025	190—295	0.08—0.30	0.30—2.00
		◐	M	3	R-Std	NX3035	180—255	0.08—0.30	0.30—2.00
		✣	F	1	R-R/L	UTi20T	115—165	0.05—0.12	0.20—0.60
		✣	L	1	R-Std	UE6020	195—320	0.08—0.30	0.30—2.00
		✣	L	2	N-Flat	UE6020	195—320	0.08—0.30	0.30—2.00
		✣	L	3	N-Flat	UP20M	105—160	0.08—0.30	0.30—2.00
		✣	M	1	R-Std	UE6020	195—320	0.08—0.30	0.30—2.00
		✣	M	2	N-Flat	UE6020	195—320	0.08—0.30	0.30—2.00
		✣	M	3	N-Flat	UP20M	105—160	0.08—0.30	0.30—2.00
Carbon Steel • Alloy Steel (AISI 1045, AISI 4140)	180 | 280HB	●	F	1	R-R/L	NX2525	165—235	0.05—0.12	0.20—0.60
		●	L	1	R-Std	NX2525	135—195	0.08—0.30	0.30—2.00
		●	M	1	R-Std	NX2525	135—195	0.08—0.30	0.30—2.00
		◐	F	1	R-R/L	NX2525	165—235	0.05—0.12	0.20—0.60
		◐	L	1	R-Std	UE6110	150—260	0.08—0.30	0.30—2.00
		◐	L	2	R-Std	MP3025	140—215	0.08—0.30	0.30—2.00
		◐	L	3	R-Std	NX3035	130—190	0.08—0.30	0.30—2.00
		◐	M	1	R-Std	UE6110	150—260	0.08—0.30	0.30—2.00
		◐	M	2	R-Std	MP3025	140—215	0.08—0.30	0.30—2.00
		◐	M	3	R-Std	NX3035	130—190	0.08—0.30	0.30—2.00
		✣	F	1	R-R/L	UTi20T	85—120	0.05—0.12	0.20—0.60
		✣	L	1	R-Std	UE6020	145—235	0.08—0.30	0.30—2.00
		✣	L	2	N-Flat	UE6020	145—235	0.08—0.30	0.30—2.00
		✣	L	3	N-Flat	UP20M	75—115	0.08—0.30	0.30—2.00
		✣	M	1	R-Std	UE6020	145—235	0.08—0.30	0.30—2.00
		✣	M	2	N-Flat	UE6020	145—235	0.08—0.30	0.30—2.00
		✣	M	3	N-Flat	UP20M	75—115	0.08—0.30	0.30—2.00

CUTTING CONDITIONS : ● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting
CUTTING AREA : **F** : Finish Cutting **L** : Light Cutting **M** : Medium Cutting **R** : Rough Cutting **H** : Heavy Cutting

Work Material	Hardness	Cutting Mode		Priority	Breaker	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
K									
Gray Cast Iron (FC300)	≤350MPa	●	F	1	R-R/L	NX2525	150—205	0.05—0.12	0.20—0.60
		●	L	1	N-Flat	UC5105	135—250	0.08—0.30	0.30—2.00
		●	L	2	N-Flat	NX2525	125—170	0.08—0.30	0.30—2.00
		●	L	3	R-Std	NX2525	125—170	0.08—0.30	0.30—2.00
		●	M	1	N-Flat	UC5105	135—250	0.08—0.30	0.30—2.00
		●	M	2	N-Flat	NX2525	125—170	0.08—0.30	0.30—2.00
		◐	M	3	R-Std	NX2525	125—170	0.08—0.30	0.30—2.00
		◐	F	1	R-R/L	NX2525	150—205	0.05—0.12	0.20—0.60
		◐	F	2	R-R/L	HTi10	100—145	0.05—0.12	0.20—0.60
		◐	L	1	N-Flat	UC5115	130—245	0.08—0.30	0.30—2.00
		◐	L	2	N-Flat	UE6110	130—200	0.08—0.30	0.30—2.00
		◐	M	1	N-Flat	UC5115	130—245	0.08—0.30	0.30—2.00
		◐	M	2	N-Flat	UE6110	130—200	0.08—0.30	0.30—2.00
		✣	F	1	R-R/L	UTi20T	80—115	0.05—0.12	0.20—0.60
		✣	L	1	N-Flat	VP15TF	115—160	0.08—0.30	0.30—2.00
		✣	M	1	N-Flat	VP15TF	115—160	0.08—0.30	0.30—2.00
Ductile Cast Iron (FCD450)	≤450MPa	●	F	1	R-R/L	NX2525	140—190	0.05—0.12	0.20—0.60
		●	L	1	N-Flat	UC5105	130—235	0.08—0.30	0.30—2.00
		●	L	2	N-Flat	NX2525	115—160	0.08—0.30	0.30—2.00
		●	L	3	R-Std	NX2525	115—160	0.08—0.30	0.30—2.00
		●	M	1	N-Flat	UC5105	130—235	0.08—0.30	0.30—2.00
		●	M	2	N-Flat	NX2525	115—160	0.08—0.30	0.30—2.00
		●	M	3	R-Std	NX2525	115—160	0.08—0.30	0.30—2.00
		◐	F	1	R-R/L	NX2525	140—190	0.05—0.12	0.20—0.60
		◐	F	2	R-R/L	HTi10	95—135	0.05—0.12	0.20—0.60
		◐	L	1	N-Flat	UC5115	125—230	0.08—0.30	0.30—2.00
		◐	L	2	N-Flat	UE6110	120—190	0.08—0.30	0.30—2.00
		◐	M	1	N-Flat	UC5115	125—230	0.08—0.30	0.30—2.00
		◐	M	2	N-Flat	UE6110	120—190	0.08—0.30	0.30—2.00
		✣	F	1	R-R/L	UTi20T	75—110	0.05—0.12	0.20—0.60
		✣	L	1	N-Flat	VP15TF	110—150	0.08—0.30	0.30—2.00
		✣	M	1	N-Flat	VP15TF	110—150	0.08—0.30	0.30—2.00
Ductile Cast Iron (FCD700)	≤800MPa	●	F	1	R-R/L	NX2525	125—170	0.05—0.12	0.20—0.60
		●	L	1	N-Flat	UC5105	115—210	0.08—0.30	0.30—2.00
		●	L	2	N-Flat	NX2525	105—140	0.08—0.30	0.30—2.00
		●	L	3	R-Std	NX2525	105—140	0.08—0.30	0.30—2.00
		●	M	1	N-Flat	UC5105	115—210	0.08—0.30	0.30—2.00
		●	M	2	N-Flat	NX2525	105—140	0.08—0.30	0.30—2.00
		●	M	3	R-Std	NX2525	105—140	0.08—0.30	0.30—2.00
		◐	F	1	R-R/L	NX2525	125—170	0.05—0.12	0.20—0.60
		◐	F	2	R-R/L	HTi10	85—120	0.05—0.12	0.20—0.60
		◐	L	1	N-Flat	UC5115	110—205	0.08—0.30	0.30—2.00
		◐	L	2	N-Flat	UE6110	105—170	0.08—0.30	0.30—2.00
		◐	M	1	N-Flat	UC5115	110—205	0.08—0.30	0.30—2.00
		◐	M	2	N-Flat	UE6110	105—170	0.08—0.30	0.30—2.00
		✣	F	1	R-R/L	UTi20T	65—95	0.05—0.12	0.20—0.60
		✣	L	1	N-Flat	VP15TF	95—135	0.08—0.30	0.30—2.00
		✣	M	1	N-Flat	VP15TF	95—135	0.08—0.30	0.30—2.00

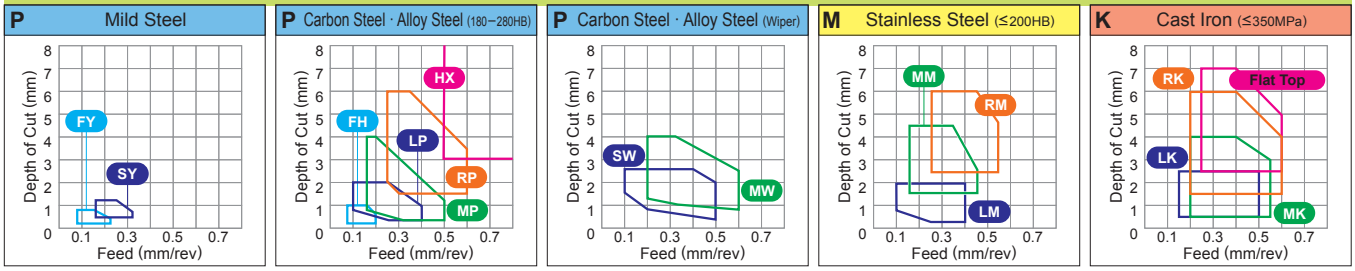
TURNING INSERTS [NEGATIVE]

80° CN TYPE INSERTS WITH HOLE

CNMG 12 04 02- FH
Size · Thickness · Corner Radius · Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Light Cutting ····· Medium Cutting ····· Rough Cutting ····· Heavy Cutting ·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material	
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-ferrous Metal
S	Heat-resistant Alloy, Titanium Alloy

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020 (NEW)	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	Carbide: UTi20T	HTi05T	HTi10	RT9010 (NEW)	MT9015 (NEW)	Applicable Holder Page
FH  Finish Cutting	**CNMG120402-FH**	0.2	●	▲																						●	●	●						●	
	CNMG**120404-FH**	0.4	●	▲																						●		●	●						
	CNMG**120408-FH**	0.8	●																							●		●	●						
	CNMG**120412-FH**	1.2																								●			●						
																																			C008 C009 E013 E036 E040 H006 −008
FS  Finish Cutting	**CNMG120404-FS**	0.4		▲																						●									
	CNMG**120408-FS**	0.8																								●									
																																			C008 C009 E013 E036 E040 H006 −008
FY  Finish Cutting	**CNMG120404-FY**	0.4		▲																							●	●		●					
	CNMG**120408-FY**	0.8		▲																								●		●					
																																			C008 C009 E013 E036 E040 H006 −008
FJ  Finish Cutting	**CNGG1204V5-FJ**	0.05																				●											●		
	CNGG**120401-FJ**	0.1																				●											●		
	CNGG**120402-FJ**	0.2																				●											●		
	CNGG**120404-FJ**	0.4																				●	●										●		
	CNGG**120408-FJ**	0.8																				●	●										●		
																																			C008 C009 E013 E036 E040 H006 −008
PK  Finish Cutting	**CNGG120404-PK**	0.4																								●									
																																			C008 C009 E013 E036 E040 H006 −008
LP  Light Cutting	**CNMG120404-LP**	0.4	●	●		●	●																					●							
	CNMG**120408-LP**	0.8	●	●		●	●																					●							
	CNMG**120412-LP**	1.2	●	●		●	●																												
																																			C008 C009 E013 E036 E040 H006 −008
LM  Light Cutting	**CNMG120404-LM**	0.4								●	●	●																							
	CNMG**120408-LM**	0.8								●	●	●																							
	CNMG**120412-LM**	1.2								●	●	●																							
																																			C008 C009 E013 E036 E040 H006 −008

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	● ◐ ✣ ● ✣ ✣ ✣ ◐ ◐ ✣ ◐ ✣ ● ◐ ✣ ✣ ◐ ✣ ✣ ● ◐ ● ◐ ✣ ● ◐ ✣ ◐ ◐ ✣ ● ◐ ◐ ✣
M	Stainless Steel	◐ ◐ ✣ ◐ ✣ ◐ ✣ ● ● ◐ ✣ ● ● ◐ ✣ ✣ ◐ ✣ ◐ ◐ ✣ ◐ ◐ ✣
K	Cast Iron	● ● ✣ ●
N	Non-ferrous Metal	● ●
S	Heat-resistant Alloy, Titanium Alloy	● ●

Shape	Order Number	RE (mm)	Coated																		Cermet		Coated Cermet			Carbide					Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015 (NEW)	
NEW LK  Light Cutting	CNMG120404-LK	0.4														●	●																		C008 C009 E013 E036 E040 H006 −008
	CNMG120408-LK	0.8														●	●																		
	CNMG120412-LK	1.2														●	●																		
NEW LS  Light Cutting	CNMG120404-LS	0.4																		●	●													●	C008 C009 E013 E036 E040 H006 −008
	CNMG120408-LS	0.8																		●	●													●	
SH  Light Cutting	CNMG09T304-SH	0.4		●										●																					C008 C009 E013 E036 E040 H006 −008
	CNMG09T308-SH	0.8		●																															
	CNMG120404-SH	0.4	●	●	▲	●	●							●				●								●	●		●						
	CNMG120408-SH	0.8	●	●	▲	●	●							●				●								●	●		●						
	CNMG120412-SH	1.2	●	●	▲	●	●																												
SA  Light Cutting	CNMG120404-SA	0.4	●	●	▲	●	●																			●									C008 C009 E013 E036 E040 H006 −008
	CNMG120408-SA	0.8	●	●	▲	●	●																			●									
	CNMG120412-SA	1.2	●	●	▲	●	●																			●									
* SW  Light Cutting (Wiper)	CNMG120404-SW	0.4	●	●		●							▲			●	●		●							●	●								C008 C009 E013 E036 E040 H006 −008
	CNMG120408-SW	0.8	●	●		●							▲			●	●		●							●	●								
	CNMG120412-SW	1.2	●	●		●							▲													●	●								
SY  Light Cutting	CNMG120404-SY	0.4			▲																							●		●					C008 C009 E013 E036 E040 H006 −008
	CNMG120408-SY	0.8			▲																							●		●					
C  Light Cutting	CNMG120404-C	0.4																								▲	▲								C008 C009 E013 E036 E040 H006 −008
	CNMG120408-C	0.8																								▲	▲								
MJ  Light Cutting	CNMG120404-MJ	0.4													●								●	●											C008 C009 E013 E036 E040 H006 −008
	CNMG120408-MJ	0.8													●								●	●											
	CNMG120412-MJ	1.2													●								●	●											
	CNMG120416-MJ	1.6													●								●	●											
MJ  Light Cutting	CNGG120404-MJ	0.4																					●	●								●	●		C008 C009 E013 E036 E040 H006 −008
	CNGG120408-MJ	0.8																					●	●								●	●		

* Please refer to A028 before using the SW breaker (wiper insert).

■ = MIRACLE SIGMA

CHIP BREAKERS ➤ A042
GRADES ➤ A030
IDENTIFICATION ➤ A002

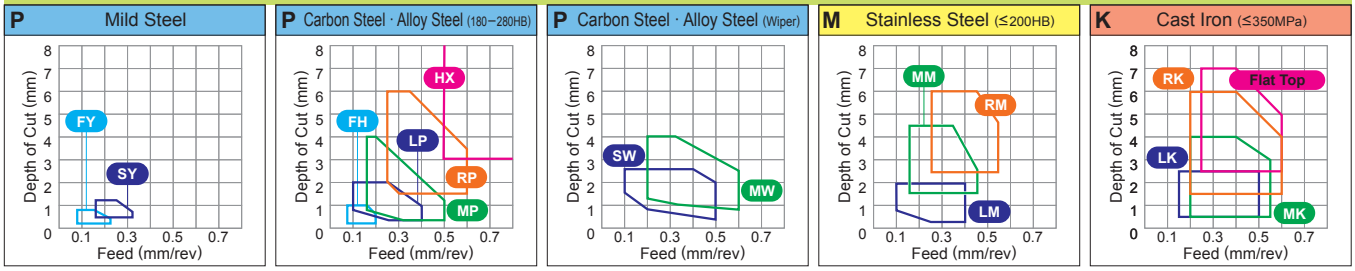
TURNING INSERTS [NEGATIVE]

80° CN TYPE INSERTS WITH HOLE

CNMG 12 04 04- MP
Size Thickness Corner Radius Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting····· Light Cutting····· Medium Cutting····· Rough Cutting····· Heavy Cutting·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	● ◔ ✣ ◔ ✣ ✣ ✣ ○ ◔ ✣ ○ ✣ ● ◔ ✣ ✣ ◔ ✣ ◔ ✣ ✣ ◔ ○ ◔ ○ ○ ✣ ● ◔ ◔ ◔ ◔
M	Stainless Steel	○ ◔ ✣ ○ ✣ ◔ ✣ ✣ ○ ○ ✣
K	Cast Iron	◔ ✣ ● ◔ ◔ ✣ ● ● ✣ ● ◔
N	Non-ferrous Metal	● ● ◔
S	Heat-resistant Alloy, Titanium Alloy	● ◔ ● ◔ ◔ ◔

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	Carbide: UTi20T	HTi05T	HTi10	RT9010	MT9015 (NEW)	Applicable Holder Page
MP	**CNMG120404-MP**	0.4	●	●	▲	●	●											●									●									
	CNMG120408-MP	0.8	●	●	▲	●	●											●									●									C008 C009 E013 E036 E040 H006 −008
	CNMG120412-MP	1.2	●	●	▲	●	●											●									●									
	CNMG120416-MP	1.6	●	●	▲	●	●											●																	
	CNMG160608-MP	0.8	●	●	▲		●											●																	
	CNMG160612-MP	1.2	●	●	▲		●											●																	
Medium Cutting	CNMG160616-MP	1.6	●	●	▲		●											●																	
MM	**CNMG120408-MM**	0.8								●	●	●																							C008 C009 E013 E036 E040 H006 −008
	CNMG120412-MM	1.2								●	●	●																							
	CNMG120416-MM	1.6								●	●	●																							
	CNMG160608-MM	0.8								●	●	●																							
	CNMG160612-MM	1.2								●	●	●																							
	CNMG160616-MM	1.6								●	●	●																							
	CNMG190608-MM	0.8								●	●	●																							
	CNMG190612-MM	1.2								●	●	●																							
Medium Cutting	CNMG190616-MM	1.6								●	●	●																							
NEW **MK**	**CNMG120404-MK**	0.4														●	●																		
	CNMG120408-MK	0.8														●	●																		C008 C009 E013 E036 E040 H006 −008
	CNMG120412-MK	1.2														●	●																		
	CNMG120416-MK	1.6														●	●																		
	CNMG160612-MK	1.2														●	●																		
	CNMG160616-MK	1.6														●	●																		
	CNMG190612-MK	1.2														●	●																		
Medium Cutting	CNMG190616-MK	1.6														●	●																		
NEW **GK**	**CNMG120404-GK**	0.4														●	●																		C008 C009 E013 E036 E040 H006 −008
	CNMG120408-GK	0.8														●	●																		
Medium Cutting	CNMG120412-GK	1.2														●	●																		
GM	**CNMG120404-GM**	0.4								●	●	●																							C008 C009 E013 E036 E040 H006 −008
	CNMG120408-GM	0.8								●	●	●																							
Medium Cutting	CNMG120412-GM	1.2								●	●	●																							

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																	Cermet		Coated Cermet			Carbide					Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010 (NEW)	MT9015 (NEW)	
MA	**CNMG120404-MA**	0.4	●	●	▲	●	●			●	●	▲	●			●	●	●					●		●									C008 C009 E013 E036 E040 H006 −008
	CNMG**120408-MA**	0.8	●	●	▲	●	●	●		●	●	▲	●			●	●	●					●		●									
	CNMG**120412-MA**	1.2	●	●	▲	●	●	●		●	●	▲	●			●	●	●					●		●									
	CNMG**120416-MA**	1.6	●	●	▲								▲	●				●																
	CNMG**160608-MA**	0.8	●	●	▲			●						●				●																
	CNMG**160612-MA**	1.2	●	●	▲			●					▲	●				●																
	CNMG**160616-MA**	1.6	●	●										●				●																
	CNMG**190612-MA**	1.2	●	●	▲			●					▲	●				●																
Medium Cutting	CNMG**190616-MA**	1.6		●	▲									●				●																
MH	**CNMG120404-MH**	0.4	●	●	▲			●					▲																					C008 C009 E013 E036 E040 H006 −008
	CNMG**120408-MH**	0.8	●	●	▲	●	●	●					▲					●																
	CNMG**120412-MH**	1.2	●	●	▲	●	●	●					▲					●																
	CNMG**120416-MH**	1.6	●	●	▲													●																
	CNMG**160608-MH**	0.8	●	●														●																
	CNMG**160612-MH**	1.2	●	●	▲								▲					●																
	CNMG**160616-MH**	1.6	●	●														●																
	CNMG**190612-MH**	1.2	●	●	▲			●					▲					●																
Medium Cutting	CNMG**190616-MH**	1.6	●	●	▲																													
Standard	**CNMG090308**	0.8		●																					●									C008 C009 E013 E036 E040 H006 −008
	CNMG**09T304**	0.4		●																					●									
	CNMG**09T308**	0.8		●																					●									
	CNMG**120404**	0.4	●	●	▲	●	●	●										●	●						●	●	●		●	●	●			
	CNMG**120408**	0.8	●	●	▲	●	●	●										●	●				●		●		●		●	●	●			
	CNMG**120412**	1.2	●	●	▲	●	●	●										●	●				●		●									
	CNMG**120416**	1.6	●	●														●	●															
	CNMG**160608**	0.8	●	●	▲		●																											
	CNMG**160612**	1.2	●	●	▲		●											●	●															
	CNMG**160616**	1.6	●	●			●											●	●															
	CNMG**190608**	0.8	●	●	▲		●	●																										
	CNMG**190612**	1.2	●	●	▲		●	●										●	●															
Medium Cutting	CNMG**190616**	1.6	●	●	▲		●	●										●																
*1 **MW**	**CNMG120408-MW**	0.8	●	●	▲	●	●						●			●	●	●	●															C008 C009 E013 E036 E040 H006 −008
	CNMG**120412-MW**	1.2	●	●	▲	●	●						●			●	●	●	●															
Medium Cutting (Wiper)																																		
*2 **MS**	**CNMG090304-MS**	0.4												●																				C008 C009 E013 E036 E040 H006 −008
	CNMG**090308-MS**	0.8		●										●																				
	CNMG**09T304-MS**	0.4												●																●				
	CNMG**09T308-MS**	0.8		●										●																				
	CNMG**120404-MS**	0.4		●	▲								▲	●	●				●	●	●	●	●	●							●	●	●	
	CNMG**120408-MS**	0.8		●	▲								▲	●	●				●	●	●	●	●	●						●		●	●	●	
Medium Cutting	CNMG**120412-MS**	1.2		●									▲	●	●				●	●	●	●	●										●	●	

*1 Please refer to A028 before using the MW breaker (wiper insert).
*2 Newly designed breakers : MP9005, MP9015, MT9015

■ = MIRACLE SIGMA

CHIP BREAKERS ➤ A042
GRADES ➤ A030
IDENTIFICATION ➤ A002

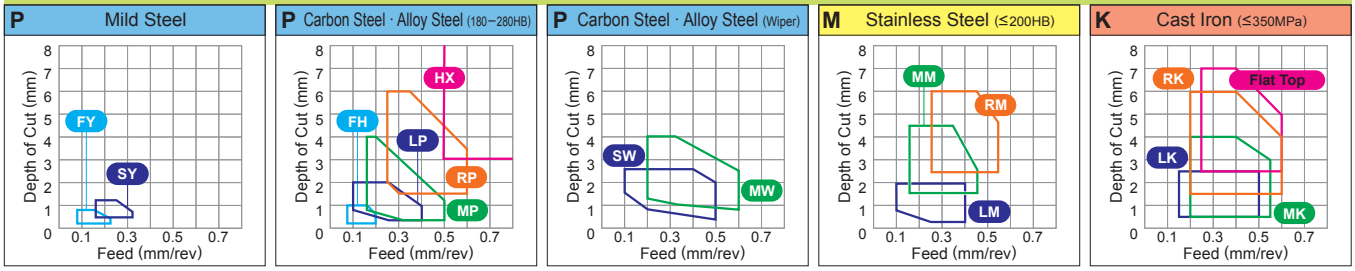
TURNING INSERTS [NEGATIVE]

80° CN TYPE INSERTS WITH HOLE

CNMG 16 06 08- MS
Size Thickness Corner Radius Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Light Cutting ····· Medium Cutting ····· Rough Cutting ····· Heavy Cutting ·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	● ◔ ✣ ◔ ✣ ✣ ✣ ○ ◔ ✣ ○ ◔ ● ✣ ✣ ◔ ◔ ◔ ◔ ◔ ✣ ◔ ◔ ◔ ✣ ◔ ◔ ◔
M	Stainless Steel	○ ◔ ✣ ○ ◔ ✣ ✣ ◔ ✣ ✣ ○ ○ ✣ ● ◔ ✣ ✣ ○ ○ ✣ ● ● ✣ ● ◔
K	Cast Iron	◔ ✣ ● ◔ ✣ ✣ ● ◔ ✣ ✣ ○ ● ◔ ✣ ✣ ● ◔
N	Non-ferrous Metal	◔
S	Heat-resistant Alloy, Titanium Alloy	● ◔ ◔ ◔

Shape	Order Number	RE (mm)	Coated																			Cermet		Coated Cermet			Carbide					Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015 (NEW)	
* MS	CNMG160608-MS	0.8												●																				C008 C009 E013 E036 E040 H006 –008
	CNMG160612-MS	1.2												●						● ●														●	
NEW	CNMG160616-MS	1.6																		● ●														●	
	CNMG190612-MS	1.2												●																					
Medium Cutting	CNMG190616-MS	1.6												●																					
RP	CNMG120408-RP	0.8	● ●			● ●																													
	CNMG120412-RP	1.2	● ●			● ●																													C008 C009 E013 E036 E040 H006 –008
	CNMG120416-RP	1.6	● ●			● ●																													
	CNMG160612-RP	1.2	● ●			● ●																													
	CNMG160616-RP	1.6	● ●			● ●																													
	CNMG190612-RP	1.2	● ●			● ●																													
Rough Cutting	CNMG190616-RP	1.6	● ●			● ●																													
RM	CNMG120408-RM	0.8								● ● ●																									
	CNMG120412-RM	1.2								● ● ●																									C008 C009 E013 E036 E040 H006 –008
	CNMG120416-RM	1.6								● ● ●																									
	CNMG160612-RM	1.2								● ● ●																									
	CNMG160616-RM	1.6								● ● ●																									
	CNMG190612-RM	1.2								● ● ●																									
Rough Cutting	CNMG190616-RM	1.6								● ● ●																									
NEW RK	CNMG120408-RK	0.8														● ●																			
	CNMG120412-RK	1.2														● ●																			C008 C009 E013 E036 E040 H006 –008
	CNMG120416-RK	1.6														● ●																			
	CNMG160612-RK	1.2														● ●																			
	CNMG160616-RK	1.6														● ●																			
	CNMG190612-RK	1.2														● ●																			
Rough Cutting	CNMG190616-RK	1.6														● ●																			
NEW RS	CNMG120408-RS	0.8																			●													●
	CNMG120412-RS	1.2																			●													●	C008 C009 E013 E036 E040 H006 –008
	CNMG120416-RS	1.6																			●													●	
	CNMG160612-RS	1.2																			●													●	
	CNMG160616-RS	1.6																			●													●	
	CNMG190612-RS	1.2																			●													●	
Rough Cutting	CNMG190616-RS	1.6																			●													●	

* Newly designed breakers : MP9005, MP9015, MT9015

■ = MIRACLE SIGMA

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																		Cermet		Coated Cermet			Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010 (NEW)	MT9015 (NEW)	
GH	**CNMG120408-GH**	0.8	●	●	▲								▲	●				●	●																C008 C009 E013 E036 E040 H006 −008
	CNMG120412-GH	1.2	●	●	▲								▲	●				●	●																
	CNMG120416-GH	1.6	●	●														●	●																
	CNMG160612-GH	1.2	●	●	▲								▲	●				●	●																
	CNMG160616-GH	1.6	●	●														●	●																
	CNMG190612-GH	1.2	●	●	▲									●				●	●																
Rough Cutting	CNMG190616-GH	1.6	●	●	▲								▲	●				●	●																
GJ	**CNMG120408-GJ**	0.8													●								●	●									●		C008 C009 E013 E036 E040 H006 −008
	CNMG120412-GJ	1.2													●								●	●									●		
	CNMG120416-GJ	1.6													●								●	●									●		
	CNMG160612-GJ	1.2													●								●										●		
	CNMG190612-GJ	1.2													●								●										●		
Rough Cutting	CNMG190616-GJ	1.6													●								●										●		
HZ	**CNMM120408-HZ**	0.8		●	▲																														C008 C009 E013 E036 E040 H006 −008
	CNMM120412-HZ	1.2		●	▲																														
	CNMM160612-HZ	1.2		●	▲																														
	CNMM160616-HZ	1.6		●	▲																														
	CNMM190612-HZ	1.2		●	▲				●																										
Heavy Cutting	CNMM190616-HZ	1.6		●	▲				●																										
HX	**CNMM190612-HX**	1.2		●	▲				●																										C008 C009
	CNMM190616-HX	1.6		●	▲				●																										
	CNMM190624-HX	2.4		●	▲				●																										
	CNMM250924-HX	2.4		●	▲				●																										
Heavy Cutting																																			
HV	**CNMM190616-HV**	1.6		●	▲				●																										C008 C009
	CNMM190624-HV	2.4		●	▲				●																										
	CNMM250924-HV	2.4		●	▲				●																										
Heavy Cutting																																			
Flat Top	**CNMA120404**	0.4														●	●	●	●													●	●		C008 C009 E013 E036 E040 H006 −008
	CNMA120408	0.8														●	●	●	●													●	●		
	CNMA120412	1.2														●	●	●	●																
	CNMA120416	1.6														●	●	●	●																
	CNMA160612	1.2														●	●	●	●																
	CNMA160616	1.6														●	●	●	●																
	CNMA190612	1.2														●	●	●	●																
	CNMA190616	1.6														●	●	●	●																

CHIP BREAKERS ➤ A042
GRADES ➤ A030
IDENTIFICATION ➤ A002

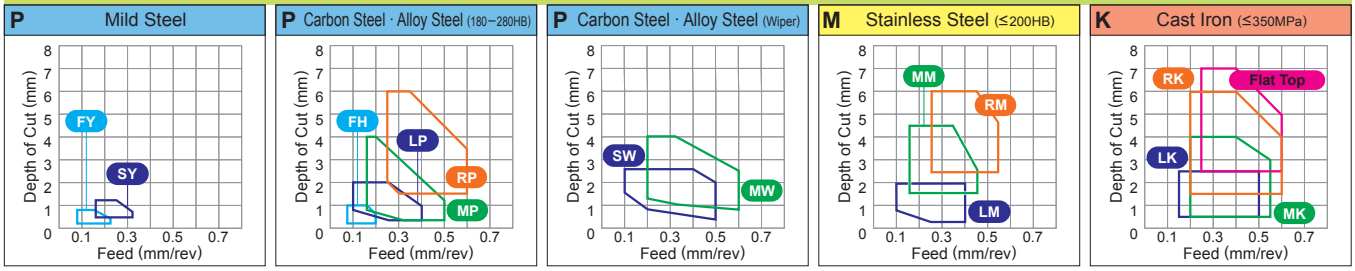
TURNING INSERTS [NEGATIVE]

55° DN TYPE INSERTS WITH HOLE

DNMG 15 04 02- FH
Size Thickness Corner Radius Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Light Cutting ····· Medium Cutting ····· Rough Cutting ····· Heavy Cutting ·····



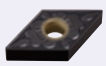
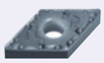
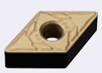
Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material	
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-ferrous Metal
S	Heat-resistant Alloy, Titanium Alloy

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020 (NEW)	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	Carbide: UTi20T	HTi05T	HTi10	RT9010 (NEW)	MT9015 (NEW)	Applicable Holder Page
FH	**DNMG150402-FH**	0.2	●	▲																						●	●	●								C010 C011 E013 E036 −040 H009 −011
	DNMG**150404-FH**	0.4	●																							●	●	●	●							
	DNMG**150408-FH**	0.8	●																							●		●	●							
	DNMG**150602-FH**	0.2	●	▲																						●	●	●								
	DNMG**150604-FH**	0.4	●	▲																								●								
Finish Cutting	DNMG**150608-FH**	0.8	●	▲																								●								
FS	**DNMG150404-FS**	0.4																								●										C010 C011 E013 E036 −040 H009 −011
	DNMG**150408-FS**	0.8		▲																						●										
Finish Cutting																																				
FY	**DNMG150404-FY**	0.4		▲																							●	●		●						C010 C011 E013 E036 −040 H009 −011
	DNMG**150408-FY**	0.8		▲																								●		●						
	DNMG**150604-FY**	0.4																										●								
Finish Cutting	DNMG**150608-FY**	0.8		▲																								●								
FJ	**DNGG150404-FJ**	0.4																					●	●										●		C010 C011 E013 E036 −040 H009 −011
	DNGG**150408-FJ**	0.8																					●	●										●		
Finish Cutting																																				
PK	**DNGG150404-PK**	0.4																								●										C010 C011 E013 E036 −040 H009 −011
Finish Cutting																																				
LP	**DNMG110404-LP**	0.4	●	●		●	●																					●								C010 C011 E013 E036 −040 H009 −011
	DNMG**110408-LP**	0.8	●	●		●	●																					●								
	DNMG**150404-LP**	0.4	●	●		●	●																					●								
	DNMG**150408-LP**	0.8	●	●		●	●																					●								
	DNMG**150412-LP**	1.2	●	●		●	●																					●								
	DNMG**150604-LP**	0.4	●	●		●	●																					●								
	DNMG**150608-LP**	0.8	●	●		●	●																					●								
Light Cutting	DNMG**150612-LP**	1.2	●	●		●	●																													

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✢ : Unstable Cutting

Shape	Order Number	RE (mm)	UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015 (NEW)	Applicable Holder Page
Work Material	P	Steel	●	◐	✢	◐	✢	✢	✢															✢	✢	●	◐	◐	●	●	✢					
	M	Stainless Steel								●	◐	✢	●	✢									◐	✢	✢	●			●	●	✢					
	K	Cast Iron														◐	✢	●	◐				◐	✢		●			●	●	✢	●	◐			
	N	Non-ferrous Metal																															◐			
	S	Heat-resistant Alloy, Titanium Alloy													●					●	◐	●	◐	✢									◐	◐	◐	
			Coated																							Cermet		Coated Cermet			Carbide					
LM	DNMG110404-LM	0.4								●	●	●																								C010 C011 E013 E036 –040 H009 –011
	DNMG110408-LM	0.8								●	●	●																								
	DNMG150404-LM	0.4								●	●	●																								
	DNMG150408-LM	0.8								●	●	●																								
	DNMG150412-LM	1.2								●	●	●																								
	DNMG150604-LM	0.4								●	●	●																								
	DNMG150608-LM	0.8								●	●	●																								
Light Cutting	DNMG150612-LM	1.2								●	●	●																								
NEW LK	DNMG150404-LK	0.4														●	●																			C010 C011 E013 E036 –040 H009 –011
	DNMG150408-LK	0.8														●	●																			
	DNMG150412-LK	1.2														●	●																			
	DNMG150604-LK	0.4														●	●																			
	DNMG150608-LK	0.8														●	●																			
Light Cutting	DNMG150612-LK	1.2														●	●																			
NEW LS	DNMG150404-LS	0.4																		●	●														●	C010 C011 E013 E036 –040 H009 –011
	DNMG150408-LS	0.8																		●	●														●	
	DNMG150604-LS	0.4																		●	●														●	
Light Cutting	DNMG150608-LS	0.8																		●	●														●	
SH	DNMG110404-SH	0.4	●	●										●																						C010 C011 E013 E036 –040 H009 –011
	DNMG110408-SH	0.8	●	●										●																						
	DNMG150404-SH	0.4	●	●	▲	●	●							●					●							●	●		●							
	DNMG150408-SH	0.8	●	●	▲	●	●							●					●							●	●		●							
	DNMG150412-SH	1.2	●	●	▲	●	●							●					●							●			●							
	DNMG150604-SH	0.4	●	●																																
	DNMG150608-SH	0.8	●	●															●																	
Light Cutting	DNMG150612-SH	1.2	●	●															●																	
SA	DNMG150404-SA	0.4	●	●	▲	●	●																				●									C010 C011 E013 E036 –040 H009 –011
	DNMG150408-SA	0.8	●	●	▲	●	●																				●									
	DNMG150412-SA	1.2	●	●	▲	●	●																				●									
	DNMG150604-SA	0.4	●	●	▲																						●									
	DNMG150608-SA	0.8	●	●	▲																						●									
Light Cutting	DNMG150612-SA	1.2	●	●	▲																						●									
* SW	DNMX110404-SW	0.4	●																																	C010 E013 E036 E038 E039 H009 H011
	DNMX110408-SW	0.8	●																																	
	DNMX150404-SW	0.4	●	●									▲													●	●	●								
	DNMX150408-SW	0.8	●	●									▲													●	●	●								
	DNMX150412-SW	1.2	●	●									▲													●	●									
	DNMX150604-SW	0.4	●	●									▲													●	●	●								
	DNMX150608-SW	0.8	●	●									▲													●	●	●								
Light Cutting (Wiper)	DNMX150612-SW	1.2	●	●									▲													●	●									
SY	DNMG150404-SY	0.4			▲																						●	●								C010 C011 E013 E036 –040 H009 –011
	DNMG150408-SY	0.8			▲																							●		●						
	DNMG150604-SY	0.4																										●								
Light Cutting	DNMG150608-SY	0.8			▲																							●								

* Please refer to A028 before using the SW breaker (wiper insert).

(highlighted) = MIRACLE SIGMA

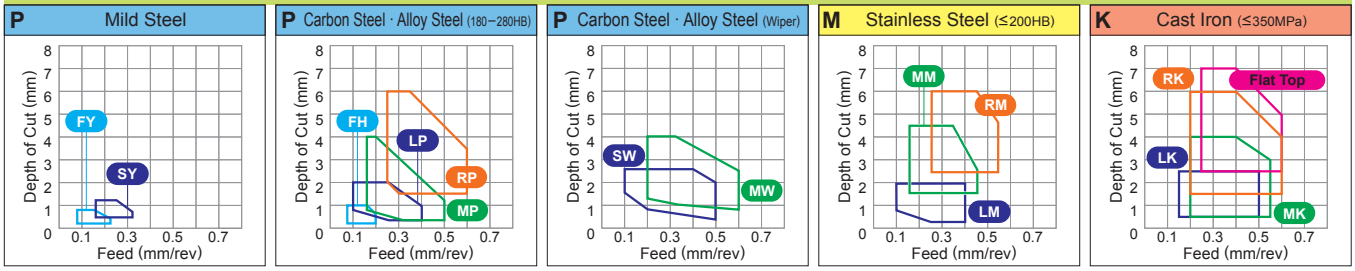
CHIP BREAKERS ➤ A042
GRADES ➤ A030
IDENTIFICATION ➤ A002

55° DN TYPE INSERTS WITH HOLE

DNMG 15 04 04- C
Size Thickness Corner Radius Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Light Cutting ····· Medium Cutting ····· Rough Cutting ····· Heavy Cutting ·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material	
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-ferrous Metal
S	Heat-resistant Alloy, Titanium Alloy

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	Carbide: UTi20T	HTi05T	HTi10	RT9010 (NEW)	MT9015 (NEW)	Applicable Holder Page
C	DNMG150404-C	0.4																							▲	▲									C010 C011 E013 E036 −040 H009 −011
	DNMG150408-C	0.8																							▲	▲									
	DNMG150604-C	0.4																							▲	▲									
	DNMG150608-C	0.8																							▲	▲									
Light Cutting																																			
MJ	DNMG150404-MJ	0.4													●							●	●										●		C010 C011 E013 E036 −040 H009 −011
	DNMG150408-MJ	0.8													●							●	●										●		
	DNMG150412-MJ	1.2													●							●	●												
	DNMG150416-MJ	1.6													●							●	●												
	DNMG150604-MJ	0.4													●							●	●												
	DNMG150608-MJ	0.8													●							●	●												
	DNMG150612-MJ	1.2													●							●	●												
Light Cutting	DNMG150616-MJ	1.6													●							●	●												
MJ	DNGM150404-MJ	0.4																					●	●									●	●	C010 C011 E013 E036 −040 H009 −011
	DNGM150408-MJ	0.8																					●	●									●	●	
Light Cutting																																			
MP	DNMG150404-MP	0.4	●	●	▲	●	●											●									●								C010 C011 E013 E036 −040 H009 −011
	DNMG150408-MP	0.8	●	●	▲	●	●											●									●								
	DNMG150412-MP	1.2	●	●	▲	●	●											●									●								
	DNMG150416-MP	1.6	●	●	▲	●	●											●																	
	DNMG150604-MP	0.4	●	●	▲	●	●											●									●								
	DNMG150608-MP	0.8	●	●	▲	●	●											●									●								
	DNMG150612-MP	1.2	●	●	▲	●	●											●									●								
Medium Cutting	DNMG150616-MP	1.6	●	●	▲	●	●											●																	
MM	DNMG150408-MM	0.8								●	●	●																							C010 C011 E013 E036 −040 H009 −011
	DNMG150412-MM	1.2								●	●	●																							
	DNMG150608-MM	0.8								●	●	●																							
	DNMG150612-MM	1.2								●	●	●																							
Medium Cutting																																			
NEW MK	DNMG150404-MK	0.4														●	●																		C010 C011 E013 E036 −040 H009 −011
	DNMG150408-MK	0.8														●	●																		
	DNMG150412-MK	1.2														●	●																		
	DNMG150604-MK	0.4														●	●																		
	DNMG150608-MK	0.8														●	●																		
Medium Cutting	DNMG150612-MK	1.2														●	●																		

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																		Cermet		Coated Cermet			Carbide					Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015	
NEW GK	DNMG150404-GK	0.4														●	●																		
	DNMG150408-GK	0.8														●	●																		C010 C011 E013 E036 –040 H009 –011
	DNMG150412-GK	1.2														●	●																		
	DNMG150604-GK	0.4														●	●																		
	DNMG150608-GK	0.8														●	●																		
Medium Cutting	DNMG150612-GK	1.2														●	●																		
GM	DNMG150404-GM	0.4								●	●	●																							
	DNMG150408-GM	0.8								●	●	●																							C010 C011 E013 E036 –040 H009 –011
	DNMG150412-GM	1.2								●	●	●																							
	DNMG150604-GM	0.4								●	●	●																							
	DNMG150608-GM	0.8								●	●	●																							
Medium Cutting	DNMG150612-GM	1.2								●	●	●																							
MA	DNMG110404-MA	0.4	●	●																															
	DNMG110408-MA	0.8	●	●																															
	DNMG110412-MA	1.2	●	●																															
	DNMG150404-MA	0.4	●	●	▲	●	●			●	●	▲	●			●	●	●	●					●			●								
	DNMG150408-MA	0.8	●	●	▲	●	●	●		●	●	▲	●			●	●	●	●					●			●								C010 C011 E013 E036 –040 H009 –011
	DNMG150412-MA	1.2	●	●	▲	●	●	●		●	●		●			●	●		●					●			●								
	DNMG150604-MA	0.4	●	●	▲	●	●			●	●	▲	●			●	●							●			●								
	DNMG150608-MA	0.8	●	●	▲	●	●	●		●	●	▲	●			●	●	●	●					●			●								
	DNMG150612-MA	1.2	●	●	▲	●	●			●	●	▲	●			●	●	●	●					●			●								
Medium Cutting	DNMG150616-MA	1.6		●																															
MH	DNMG150404-MH	0.4	●	●	▲																														
	DNMG150408-MH	0.8	●	●	▲	●	●	●				▲						●																	C010 C011 E013 E036 –040 H009 –011
	DNMG150412-MH	1.2	●	●	▲	●	●					▲						●																	
	DNMG150604-MH	0.4	●	●														●																	
	DNMG150608-MH	0.8	●	●	▲	●	●					▲						●																	
Medium Cutting	DNMG150612-MH	1.2	●	●	▲	●	●											●																	
Standard	DNMG110408	0.8		●																															
	DNMG150404	0.4	●	●	▲	●	●											●	●							●	●	●					●		
	DNMG150408	0.8	●	●	▲	●	●											●	●					●		●	●	●					●		C010 C011 E013 E036 –040 H009 –011
	DNMG150412	1.2	●	●	▲	●	●											●	●					●		●									
	DNMG150416	1.6		●																															
	DNMG150604	0.4	●	●	▲													●	●							●		●							
	DNMG150608	0.8	●	●	▲	●	●											●	●					●		●		●							
	DNMG150612	1.2	●	●	▲	●	●											●	●					●											
Medium Cutting	DNMG150616	1.6		●																															
* MW	DNMX150408-MW	0.8	●	●												●	●	●	●																C010 E013 E036 E038 E039 H009 H011
	DNMX150412-MW	1.2	●	●												●	●	●	●																
	DNMX150608-MW	0.8	●	●								▲				●	●	●	●																
Medium Cutting (Wiper)	DNMX150612-MW	1.2	●	●												●	●																		

* Please refer to A028 before using the MW breaker (wiper insert).

CHIP BREAKERS ➤ A042
GRADES ➤ A030
IDENTIFICATION ➤ A002

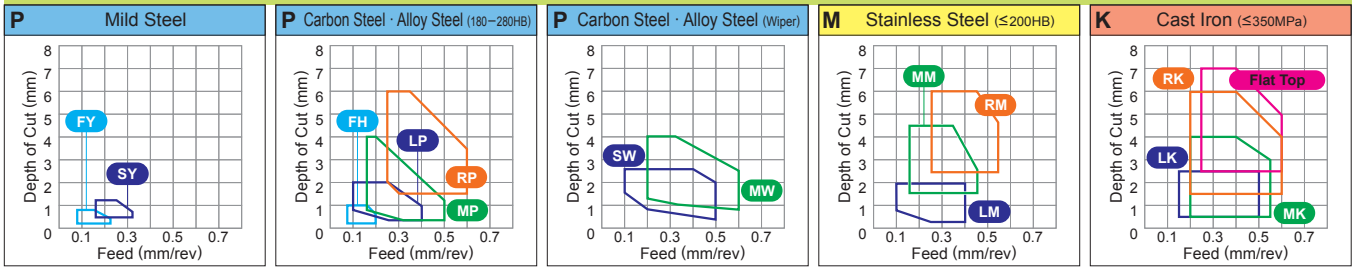
TURNING INSERTS [NEGATIVE]

55° DN TYPE INSERTS WITH HOLE

DNMG 11 04 08- MS
Size Thickness Corner Radius Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting····· Light Cutting····· Medium Cutting····· Rough Cutting····· Heavy Cutting·····



Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020 (NEW)	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	Carbide: UTi20T	HTi05T	HTi10	RT9010 (NEW)	MT9015 (NEW)	Applicable Holder Page
* MS	DNMG110408-MS	0.8	●										●																							C010 C011 E013 E036 −040 H009 −011
	DNMG150404-MS	0.4	●	▲								▲	●	●						●	●	●	●	●											●	
	DNMG150408-MS	0.8	●									▲	●	●						●	●	●	●	●	●									●	●	
	DNMG150412-MS	1.2	●										●	●						●	●	●	●												●	
	DNMG150604-MS	0.4	●									▲	●	●						●	●	●	●		●										●	
	DNMG150608-MS	0.8	●									▲	●	●						●	●	●	●												●	
Medium Cutting	DNMG150612-MS	1.2	●										●							●	●	●	●												●	
R/L	DNGG150404R	0.4																								●	●				●		●			C010 C011 E013 E036 −040 H009 −011
	DNGG150404L	0.4																								●	●				●		●			
	DNGG150408R	0.8																								●	●				●					
	DNGG150408L	0.8																								●	●									
	DNGG150604R	0.4																									●				●					
	DNGG150604L	0.4																									●									
	DNGG150608R	0.8																									●									
Medium Cutting	DNGG150608L	0.8																									●									
RP	DNMG150408-RP	0.8	●	●		●	●																													C010 C011 E013 E036 −040 H009 −011
	DNMG150412-RP	1.2	●	●		●	●																													
	DNMG150416-RP	1.6	●	●		●	●																													
	DNMG150608-RP	0.8	●	●		●	●																													
	DNMG150612-RP	1.2	●	●		●	●																													
Rough Cutting	DNMG150616-RP	1.6	●	●		●	●																													
RM	DNMG150408-RM	0.8								●	●	●																								C010 C011 E013 E036 −040 H009 −011
	DNMG150412-RM	1.2								●	●	●																								
	DNMG150416-RM	1.6								●	●	●																								
	DNMG150608-RM	0.8								●	●	●																								
	DNMG150612-RM	1.2								●	●	●																								
Rough Cutting	DNMG150616-RM	1.6								●	●	●																								
NEW RK	DNMG150408-RK	0.8														●	●																			C010 C011 E013 E036 −040 H009 −011
	DNMG150412-RK	1.2														●	●																			
	DNMG150608-RK	0.8														●	●																			
Rough Cutting	DNMG150612-RK	1.2														●	●																			

* Newly designed breakers : MP9005, MP9015, MT9015

■ = MIRACLE SIGMA

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
	P	Steel
	M	Stainless Steel
	K	Cast Iron
	N	Non-ferrous Metal
	S	Heat-resistant Alloy, Titanium Alloy

Shape	Order Number	RE (mm)	Coated																		Cermet		Coated Cermet			Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015 (NEW)	
NEW RS	DNMG150408-RS	0.8																			●													●	C010 C011 E013 E036 −040 H009 −011
	DNMG150412-RS	1.2																			●													●	
	DNMG150416-RS	1.6																			●													●	
	DNMG150608-RS	0.8																			●													●	
	DNMG150612-RS	1.2																			●													●	
Rough Cutting	DNMG150616-RS	1.6																			●													●	
GH	DNMG150408-GH	0.8	●	●	▲									●				●	●																
	DNMG150412-GH	1.2	●	●	▲								▲	●				●	●																
	DNMG150608-GH	0.8	●	●	▲									●				●	●																
	DNMG150612-GH	1.2	●	●	▲									●				●	●																
Rough Cutting																																			C010 C011 E013 E036 −040 H009 −011
GJ	DNMG150408-GJ	0.8												●									●	●									●		
	DNMG150412-GJ	1.2												●									●	●									●		
	DNMG150416-GJ	1.6												●									●	●									●		
	DNMG150608-GJ	0.8												●									●												
	DNMG150612-GJ	1.2												●									●												
Rough Cutting	DNMG150616-GJ	1.6												●									●												C010 C011 E013 E036 −040 H009 −011
HZ	DNMM150408-HZ	0.8		●	▲																														
	DNMM150412-HZ	1.2		●	▲																														
	DNMM150608-HZ	0.8		●	▲																														
	DNMM150612-HZ	1.2		●	▲																														
Heavy Cutting																																			C010 C011 E013 E036 −040 H009 −011
Flat Top	DNMA150404	0.4														●	●	●	●														●		
	DNMA150408	0.8														●	●	●	●							●						●	●		
	DNMA150412	1.2														●	●	●	●																
	DNMA150604	0.4														●	●																		
	DNMA150608	0.8														●	●	●	●																
	DNMA150612	1.2														●	●	●	●																
Flat Top	DNGA150404	0.4																															●		
	DNGA150408	0.8																														●	●		
																																			C010 C011 E013 E036 −040 H009 −011

■ = MIRACLE SIGMA

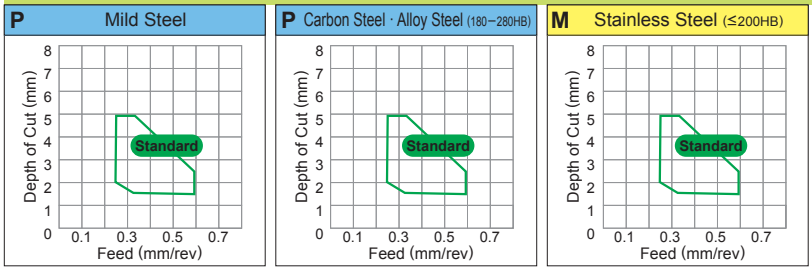
CHIP BREAKERS ➤ A042
GRADES ➤ A030
IDENTIFICATION ➤ A002

RN TYPE INSERTS WITH HOLE

RNMG 12 04 00
Size Thickness Corner Radius
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Medium Cutting·····



Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material			Coated																				Cermet		Coated Cermet			Carbide					Applicable Holder Page
			UE6105	UE6110	UE6020 NEW	MC6015 NEW	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 NEW	MC5015 NEW	UC5105	MP9005 NEW	MP9015 NEW	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010 NEW	MT9015 NEW	
P	Steel		●	◕	✣	◕	✣	✣	✣	○	◕	✣	○	✣	●	◕	✣	●	◕	●	◕	✣	✣	✣	●	◕	◕	●	●	✣					
M	Stainless Steel									○	◕	✣	○	✣							◕	✣	✣	○				○	○	✣					
K	Cast Iron															◕	✣	●	◕		◕	✣		●			●	●	✣	●	◕				
N	Non-ferrous Metal																														◕			
S	Heat-resistant Alloy, Titanium Alloy													●					●	◕	●	◕	✣									◕	◕	◕	
Shape	Order Number	RE (mm)																																
Standard	RNMG120400	–		●	▲																													–
Medium Cutting																																		

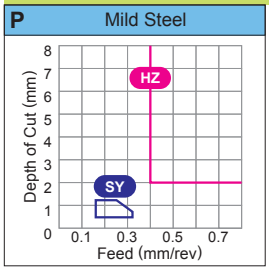
● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

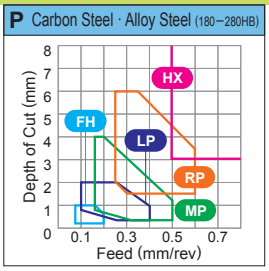
90° SN TYPE INSERTS WITH HOLE

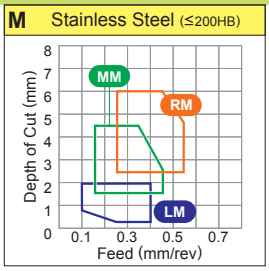
SNMG 09 03 04- FH
Size Thickness Corner Radius Chip Breaker
* Please refer to page A002.

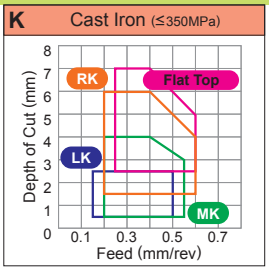
CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Light Cutting ····· Medium Cutting ····· Rough Cutting ····· Heavy Cutting ·····









Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material	
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-ferrous Metal
S	Heat-resistant Alloy, Titanium Alloy

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020 (NEW)	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	Carbide: UTi20T	HTi05T	HTi10	RT9010	MT9015 (NEW)	Applicable Holder Page
FH	**SNMG090304-FH**	0.4																								●										C012 –015 E014 E035
	SNMG**090308-FH**	0.8																								●										
Finish Cutting	SNMG**120404-FH**	0.4		●																						●		●								
	SNMG**120408-FH**	0.8		●																								●								
FS	**SNMG120408-FS**	0.8																								●										C012 –015 E014 E035
Finish Cutting																																				
LP	**SNMG120404-LP**	0.4	●	●		●	●																					●								C012 –015 E014 E035
	SNMG**120408-LP**	0.8	●	●		●	●																					●								
Light Cutting	SNMG**120412-LP**	1.2	●	●		●	●																													
LM	**SNMG120404-LM**	0.4								●	●	●																								C012 –015 E014 E035
	SNMG**120408-LM**	0.8								●	●	●																								
Light Cutting																																				
NEW **LK**	**SNMG120408-LK**	0.8														●	●																			C012 –015 E014 E035
	SNMG**120412-LK**	1.2														●	●																			
Light Cutting																																				
SH	**SNMG120404-SH**	0.4		●															●																	C012 –015 E014 E035
	SNMG**120408-SH**	0.8	●	●	▲														●							●									
Light Cutting	SNMG**120412-SH**	1.2		●	▲														●																	
SA	**SNMG120404-SA**	0.4		●																							●									C012 –015 E014 E035
	SNMG**120408-SA**	0.8	●	●	▲																						●									
Light Cutting	SNMG**120412-SA**	1.2		●	▲																						●									

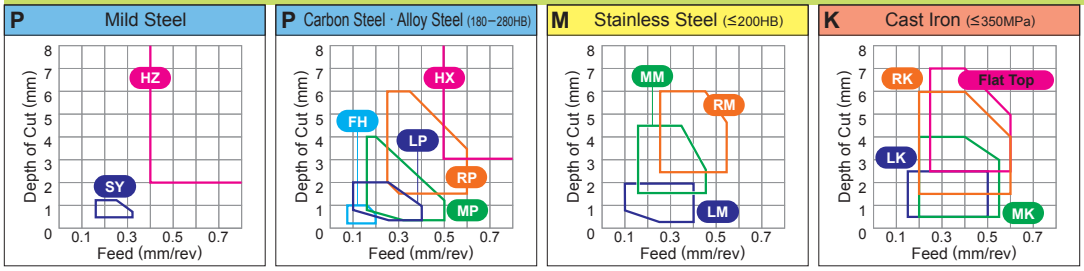
CHIP BREAKERS ➤ A042
GRADES ➤ A030
IDENTIFICATION ➤ A002

90° SN TYPE INSERTS WITH HOLE

SNMG 12 04 08- SY
Size Thickness Corner Radius Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting····· Light Cutting····· Medium Cutting····· Rough Cutting····· Heavy Cutting·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020 (NEW)	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	Carbide: UTi20T	HTi05T	HTi10	RT9010	MT9015 (NEW)	Applicable Holder Page
SY	**SNMG120408-SY**	0.8			▲																							●								C012 –015 E014 E035
Light Cutting																																				
C	**SNMG090304-C**	0.4																								▲										
	SNMG**090308-C**	0.8																								▲										C012 –015 E014 E035
	SNMG**120408-C**	0.8																								▲	▲									
	SNMG**120416-C**	1.6																								▲										
Light Cutting																																				
R/L-1G	**SNMG120404R-1G**	0.4																								●										
	SNMG**120404L-1G**	0.4																								●										C012 –015 E014 E035
	SNMG**120408R-1G**	0.8																								●										
Light Cutting																																				
MP	**SNMG120404-MP**	0.4	●	●	▲	●	●												●									●								
	SNMG**120408-MP**	0.8	●	●	▲	●	●												●									●								C012 –015 E014 E035
	SNMG**120412-MP**	1.2	●	●	▲	●	●												●									●								
Medium Cutting																																				
MM	**SNMG120408-MM**	0.8								●	●	●																								
	SNMG**120412-MM**	1.2								●	●	●																								C012 –015 E014 E035
	SNMG**120416-MM**	1.6								●	●	●																								
	SNMG**150608-MM**	0.8								●	●	●																								
	SNMG**150612-MM**	1.2								●	●	●																								
	SNMG**150616-MM**	1.6								●	●	●																								
	SNMG**190612-MM**	1.2								●	●	●																								
Medium Cutting	SNMG**190616-MM**	1.6								●	●	●																								
(NEW) **MK**	**SNMG120408-MK**	0.8														●	●																			
	SNMG**120412-MK**	1.2														●	●																			C012 –015 E014 E035
	SNMG**120416-MK**	1.6														●	●																			
	SNMG**190612-MK**	1.2														●	●																			
Medium Cutting	SNMG**190616-MK**	1.6														●	●																			

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material		
	P	Steel
	M	Stainless Steel
	K	Cast Iron
	N	Non-ferrous Metal
	S	Heat-resistant Alloy, Titanium Alloy

Shape	Order Number	RE (mm)	Coated																		Cermet		Coated Cermet			Carbide					Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015 (NEW)	
(NEW) GK	SNMG120404-GK	0.4														●	●																		
	SNMG120408-GK	0.8														●	●																		C012 –015 E014 E035
	SNMG120412-GK	1.2														●	●																		
Medium Cutting																																			
GM	SNMG120404-GM	0.4								●	●	●																							
	SNMG120408-GM	0.8								●	●	●																							C012 –015 E014 E035
	SNMG120412-GM	1.2								●	●	●																							
Medium Cutting																																			
MA	SNMG120404-MA	0.4	●	●	▲	●	●				●	●		●		●	●		●					●			●								
	SNMG120408-MA	0.8	●	●	▲	●	●	●			●	●	▲	●		●	●	●	●					●			●								
	SNMG120412-MA	1.2	●	●	▲	●	●				●	●	▲	●		●	●	●	●					●			●								
	SNMG120416-MA	1.6																	●																C012 –015 E014 E035
	SNMG150608-MA	0.8	●	●	▲			●						●																				
	SNMG150612-MA	1.2	●	●	▲			●						●					●																
	SNMG150616-MA	1.6		●																															
	SNMG190612-MA	1.2	●	●	▲														●																
Medium Cutting	SNMG190616-MA	1.6	●	●	▲			●						●																				
MH	SNMG120408-MH	0.8	●	●	▲	●	●						▲						●																
	SNMG120412-MH	1.2	●	●	▲	●	●						▲						●																C012 –015 E014 E035
	SNMG190612-MH	1.2	●	●	▲														●																
	SNMG190616-MH	1.6	●	●	▲																														
Medium Cutting																																			
Standard	SNMG090304	0.4	●	●	▲	●	●																			●	●	●			●				
	SNMG090308	0.8	●	●	▲	●	●																			●	●	●			●	●	●		
	SNMG120404	0.4	●	●	▲	●	●																			●		●			●		●		
	SNMG120408	0.8	●	●	▲	●	●	●											●	●				●		●	●	●			●	●	●		C012 –015 E014 E035
	SNMG120412	1.2	●	●	▲	●	●												●	●						●					●	●			
	SNMG120416	1.6		●	▲	●	●												●	●						●					●				
	SNMG120420	2.0			▲	●	●																												
	SNMG150612	1.2	●	●	▲		●	●											●	●															
	SNMG190612	1.2	●	●	▲		●	●											●	●											●				
Medium Cutting	SNMG190616	1.6	●	●	▲		●	●												●											●				
* MS	SNMG090304-MS	0.4												●																					
	SNMG090308-MS	0.8												●																					
	SNMG120404-MS	0.4		●									▲	●						●	●														●
	SNMG120408-MS	0.8		●	▲								▲	●	●					●	●	●	●	●	●						●			●	●
	SNMG120412-MS	1.2		●									▲	●	●					●	●	●	●	●											●
	SNMG120416-MS	1.6												●																					
(NEW)	SNMG150612-MS	1.2																		●	●														●
(NEW)	SNMG150616-MS	1.6																		●	●														●
Medium Cutting	SNMG190616-MS	1.6												●																					

* Newly designed breakers : MP9005, MP9015, MT9015

■ = MIRACLE SIGMA

CHIP BREAKERS ➤ A042
GRADES ➤ A030
IDENTIFICATION ➤ A002

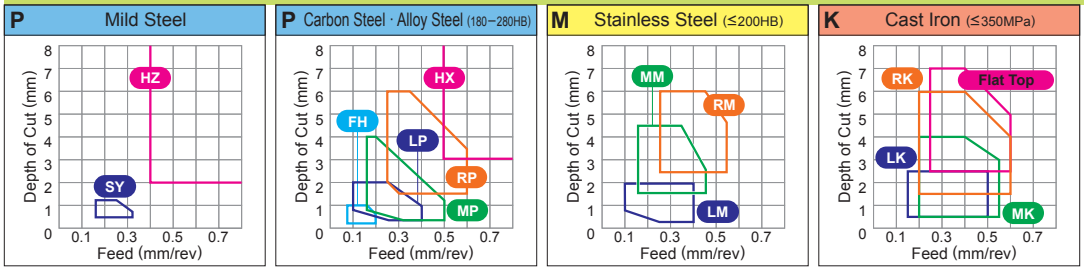
TURNING INSERTS [NEGATIVE]

90° SN TYPE INSERTS WITH HOLE

SNMG 12 04 08- RP
Size / Thickness / Corner Radius / Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Light Cutting ····· Medium Cutting ····· Rough Cutting ····· Heavy Cutting ·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020 (NEW)	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	Carbide: UTi20T	HTi05T	HTi10	RT9010	MT9015 (NEW)	Applicable Holder Page
R/L	SNGG090304R	0.4																								●	●				●		●			
	SNGG090304L	0.4																								●	●				●					
	SNGG090308R	0.8																								●	●									C012 –015 E014 E035
	SNGG090308L	0.8																								●	●									
	SNGG120404R	0.4																								●	●	●			●					
	SNGG120404L	0.4																								●	●	●			●					
	SNGG120408R	0.8																								●	●	●								
Medium Cutting	SNGG120408L	0.8																								●	●	●			●		●			
RP	SNMG120408-RP	0.8	●	●		●	●																													C012 –015 E014 E035
	SNMG120412-RP	1.2	●	●		●	●																													
	SNMG120416-RP	1.6	●	●		●	●																													
	SNMG150612-RP	1.2	●	●		●	●																													
	SNMG150616-RP	1.6	●	●		●	●																													
	SNMG190612-RP	1.2	●	●		●	●																													
Rough Cutting	SNMG190616-RP	1.6	●	●		●	●																													
RM	SNMG120408-RM	0.8								●	●	●																								C012 –015 E014 E035
	SNMG120412-RM	1.2								●	●	●																								
	SNMG120416-RM	1.6								●	●	●																								
	SNMG150612-RM	1.2								●	●	●																								
	SNMG150616-RM	1.6								●	●	●																								
	SNMG190612-RM	1.2								●	●	●																								
Rough Cutting	SNMG190616-RM	1.6								●	●	●																								
NEW RK	SNMG120408-RK	0.8														●	●																			C012 –015 E014 E035
	SNMG120412-RK	1.2														●	●																			
	SNMG120416-RK	1.6														●	●																			
	SNMG190612-RK	1.2														●	●																			
Rough Cutting	SNMG190616-RK	1.6														●	●																			
NEW RS	SNMG120408-RS	0.8																			●														●	C012 –015 E014 E035
	SNMG120412-RS	1.2																			●														●	
	SNMG120416-RS	1.6																			●														●	
	SNMG150616-RS	1.6																			●														●	
Rough Cutting	SNMG190616-RS	1.6																			●														●	

■ = MIRACLE SIGMA

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
	P	Steel
	M	Stainless Steel
	K	Cast Iron
	N	Non-ferrous Metal
	S	Heat-resistant Alloy, Titanium Alloy

Shape	Order Number	RE (mm)	Coated																			Cermet		Coated Cermet			Carbide					Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015 (NEW)	
GH	**SNMG120408-GH**	0.8	●	●	▲								▲	●				●	●																
	SNMG120412-GH	1.2	●	●	▲								▲	●				●	●																
	SNMG120416-GH	1.6	●	●										●																					C012 –015 E014 E035
	SNMG150612-GH	1.2	●	●																															
	SNMG150616-GH	1.6		●																															
	SNMG190612-GH	1.2	●	●										●																					
Rough Cutting	SNMG190616-GH	1.6	●	●									▲	●																					
HZ	**SNMM120408-HZ**	0.8		●	▲																														
	SNMM120412-HZ	1.2		●	▲																														
	SNMM150612-HZ	1.2		●	▲																														
	SNMM190612-HZ	1.2		●	▲				●																										
Heavy Cutting	SNMM190616-HZ	1.6		●	▲				●																										
HX	**SNMM190612-HX**	1.2		●	▲				●																										
	SNMM190616-HX	1.6		●	▲				●																										
	SNMM190624-HX	2.4		●	▲				●																										
	SNMM250724-HX	2.4		●	▲				●																										
Heavy Cutting	SNMM250924-HX	2.4		●	▲				●																										
HV	**SNMM190616-HV**	1.6		●	▲				●																										
	SNMM190624-HV	2.4		●	▲				●																										
	SNMM250724-HV	2.4		●	▲				●																										
	SNMM250924-HV	2.4		●	▲				●																										
Heavy Cutting																																			
Flat Top	**SNMA090304**	0.4																														●			
	SNMA090308	0.8														●	●	●	●														●		
	SNMA120408	0.8														●	●	●	●												●	●	●			C012 –015 E014 E035
	SNMA120412	1.2														●	●	●	●														●		
	SNMA120416	1.6														●	●	●	●																
	SNMA190612	1.2														●	●	●	●																
	SNMA190616	1.6														●	●	●	●																
Flat Top	**SNGA090304**	0.4																								●									
	SNGA120404	0.4																															●		
	SNGA120408	0.8																								●						●	●		C012 –015 E014 E035

CHIP BREAKERS ➤ A042
GRADES ➤ A030
IDENTIFICATION ➤ A002

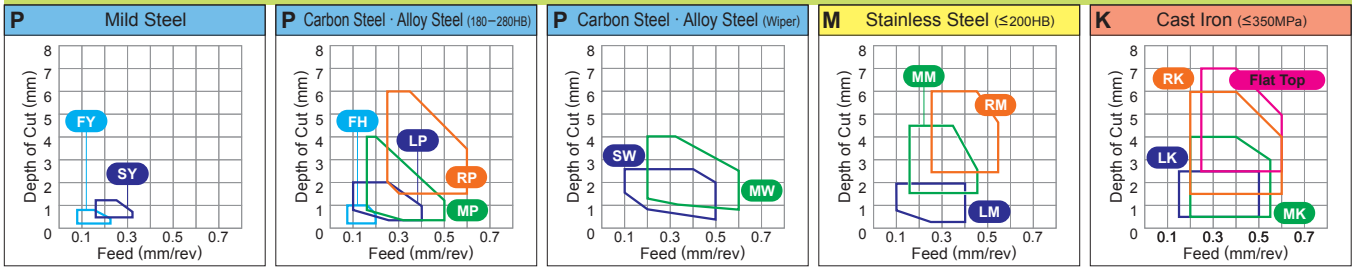
TURNING INSERTS [NEGATIVE]

60° TN TYPE INSERTS WITH HOLE

TNMG 11 03 04- FH
Size / Thickness / Corner Radius / Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Light Cutting ····· Medium Cutting ····· Rough Cutting ····· Heavy Cutting ·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	● ◔ ✣ ◔ ✣ ✣ ✣ ○ ◔ ✣ ○ ○ ◔ ✣ ✣ ● ● ◔ ◔ ● ● ✣ ● ● ✣ ✣ ◔ ● ● ● ✣
M	Stainless Steel	○ ◔ ✣ ○ ○ ◔ ✣ ✣ ○ ○ ✣
K	Cast Iron	◔ ✣ ● ◔ ◔ ✣ ● ● ✣ ● ◔
N	Non-ferrous Metal	◔
S	Heat-resistant Alloy, Titanium Alloy	● ◔ ● ◔ ● ◔ ◔ ◔ ◔

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020 (NEW)	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	Carbide: UTi20T	HTi05T	HTi10	RT9010	MT9015 (NEW)	Applicable Holder Page
FH	**TNMG110304-FH**	0.4																								●										C016 C017 E014 E035 E039
	TNMG160402-FH	0.2		●	▲																					●	●	●								
	TNMG160404-FH	0.4		●																						●	●	●	●							
	TNMG160408-FH	0.8		●	▲																					●	●	●	●							
Finish Cutting																																				
FS	**TNMG160404-FS**	0.4			▲																					●										C016 C017 E014 E035 E039
	TNMG160408-FS	0.8			▲																					●										
Finish Cutting																																				
FY	**TNMG160404-FY**	0.4			▲																						●	●		●						C016 C017 E014 E035 E039
	TNMG160408-FY	0.8			▲																							●		●						
Finish Cutting																																				
PK	**TNGG160404-PK**	0.4																								●										C016 C017 E014 E035 E039
	TNGG160408-PK	0.8																								●										
Finish Cutting																																				
R/L-FS	**TNGG160402R-FS**	0.2																								●										C016 C017 E014 E035 E039
	TNGG160402L-FS	0.2																								●										
	TNGG160404R-FS	0.4																								●										
	TNGG160404L-FS	0.4																								●										
Finish Cutting																																				
R/L-F	**TNGG160402R-F**	0.2																						●		●	●	●								C016 C017 E014 E035 E039
	TNGG160402L-F	0.2																						●		●	●	●								
	TNGG160404R-F	0.4																						●		●	●	●								
	TNGG160404L-F	0.4																						●		●	●	●								
	TNGG160408R-F	0.8																						●		●	●	●								
Finish Cutting	TNGG160408L-F	0.8																						●		●	●	●								
LP	**TNMG160404-LP**	0.4	●	●		●	●																					●								C016 C017 E014 E035 E039
	TNMG160408-LP	0.8	●	●		●	●																					●								
	TNMG160412-LP	1.2	●	●		●	●																					●								
	TNMG220408-LP	0.8	●	●		●	●																					●								
Light Cutting	TNMG220412-LP	1.2	●	●		●	●																													

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	● ◕ ✣ ● ✣ ✣ ✣ ○ ◔ ✣ ○ ✣ ◕ ✣ ✣ ◕ ✣ ✣ ● ◕ ✣ ● ◕ ✣ ● ◕ ✣ ✣ ● ◕ ● ◕ ✣
M	Stainless Steel	◔ ✣ ✣ ◕ ✣ ✣ ◕ ✣ ✣ ◕ ✣ ✣ ◕ ✣ ✣ ◕ ✣ ✣ ◕ ✣ ✣ ◕ ✣ ✣ ◕ ✣ ✣ ◕ ✣ ✣ ◕ ✣
K	Cast Iron	● ●
N	Non-ferrous Metal	● ●
S	Heat-resistant Alloy, Titanium Alloy	● ●

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	Carbide: UTi20T	HTi05T	HTi10	RT9010	MT9015 (NEW)	Applicable Holder Page
LM	**TNMG160404-LM**	0.4								●	●	●																								C016
	TNMG**160408-LM**	0.8								●	●	●																								C017
	TNMG**160412-LM**	1.2								●	●	●																								C014
Light Cutting																																				C035 C039
LK (NEW)	**TNMG160404-LK**	0.4														●	●																			C016
	TNMG**160408-LK**	0.8														●	●																			C017
	TNMG**160412-LK**	1.2														●	●																			C014
Light Cutting																																				C035 C039
LS (NEW)	**TNMG160404-LS**	0.4																		●	●														●	C016
	TNMG**160408-LS**	0.8																		●	●														●	C017
Light Cutting																																				C014 C035 C039
SH	**TNMG160404-SH**	0.4	●	●	▲	●	●							●					●							●	●		●							C016
	TNMG**160408-SH**	0.8	●	●	▲	●	●							●					●							●	●		●							C017
	TNMG**220408-SH**	0.8	●	●										●																							C014
Light Cutting																																				C035 C039
SA	**TNMG160404-SA**	0.4	●	●	▲	●	●																			●										C016
	TNMG**160408-SA**	0.8	●	●	▲	●	●																			●										C017
	TNMG**160412-SA**	1.2	●	●	▲																					●										C014
Light Cutting	TNMG**220408-SA**	0.8	●	●	▲																															C035
	TNMG**220412-SA**	1.2		●																																C039
* **SW**	**TNMX160404-SW**	0.4	●	●									▲													●	●	●								C017
	TNMX**160408-SW**	0.8	●	●									▲													●	●	●								
Light Cutting (Wiper)																																				
SY	**TNMG160404-SY**	0.4			▲																					●		●		●						C016
	TNMG**160408-SY**	0.8			▲																							●		●						C017
Light Cutting																																				C014 C035 C039
C	**TNMG160404-C**	0.4																								▲	▲									C016
	TNMG**160408-C**	0.8																								▲	▲									C017
	TNMG**220404-C**	0.4																								▲	▲									C014
Light Cutting	TNMG**220408-C**	0.8																									▲									C035 C039
R/L-1G	**TNMG160404R-1G**	0.4																								●										C016
	TNMG**160404L-1G**	0.4																								●										C017
	TNMG**220404R-1G**	0.4																								●										C014
Light Cutting	TNMG**220404L-1G**	0.4																								●										C035 C039

* Please refer to A028 before using the SW breaker (wiper insert).

■ = MIRACLE SIGMA

CHIP BREAKERS ➤ A042
GRADES ➤ A030
IDENTIFICATION ➤ A002

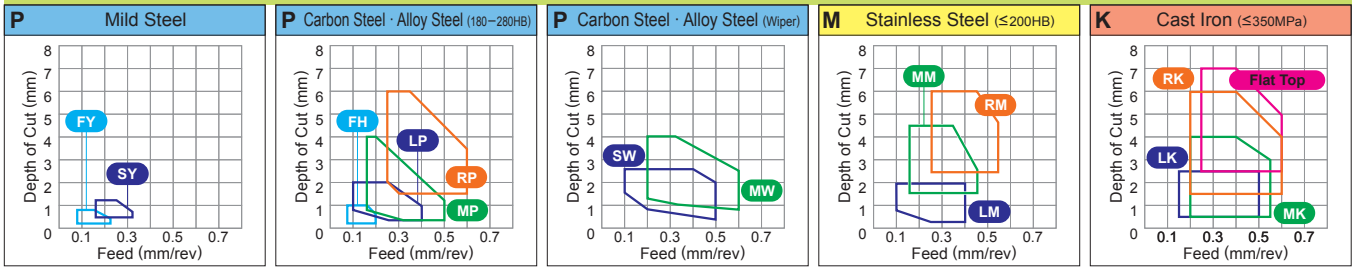
TURNING INSERTS [NEGATIVE]

60° TN TYPE INSERTS WITH HOLE

TNMG 16 04 04 MJ
Size · Thickness · Corner Radius · Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Light Cutting ····· Medium Cutting ····· Rough Cutting ····· Heavy Cutting ·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material	
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-ferrous Metal
S	Heat-resistant Alloy, Titanium Alloy

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	Carbide: UTi20T	HTi05T	HTi10	RT9010 (NEW)	MT9015 (NEW)	Applicable Holder Page
R/L-K	TNGG160402R-K	0.2																								●	●	●							
	TNGG160402L-K	0.2																								●	●	●							C016
	TNGG160404R-K	0.4																								●	●	●							C017
	TNGG160404L-K	0.4																									●	●							E014
	TNGG160408R-K	0.8																										●							E035
Light Cutting	TNGG160408L-K	0.8																										●							E039
MJ	TNMG160404-MJ	0.4													●							●	●											●	
	TNMG160408-MJ	0.8													●							●	●											●	C016
	TNMG160412-MJ	1.2													●							●	●												C017
Light Cutting																																			E014 E035 E039
MP	TNMG160404-MP	0.4	●	●	▲	●	●											●										●							
	TNMG160408-MP	0.8	●	●	▲	●	●											●										●							C016
	TNMG160412-MP	1.2	●	●	▲	●	●											●										●							C017
	TNMG220408-MP	0.8	●	●	▲	●	●											●																	E014
Medium Cutting	TNMG220412-MP	1.2	●	●	▲	●	●											●																	E035 E039
MM	TNMG160408-MM	0.8								●	●	●																							
	TNMG160412-MM	1.2								●	●	●																							C016
	TNMG220408-MM	0.8								●	●	●																							C017
	TNMG220412-MM	1.2								●	●	●																							E014
Medium Cutting	TNMG220416-MM	1.6								●	●	●																							E035 E039
NEW MK	TNMG160404-MK	0.4														●	●																		
	TNMG160408-MK	0.8														●	●																		C016
	TNMG160412-MK	1.2														●	●																		C017
	TNMG220408-MK	0.8														●	●																		E014
	TNMG220412-MK	1.2														●	●																		E035
Medium Cutting	TNMG220416-MK	1.6														●	●																		E039
NEW GK	TNMG160404-GK	0.4														●	●																		
	TNMG160408-GK	0.8														●	●																		C016
	TNMG160412-GK	1.2														●	●																		C017
	TNMG220408-GK	0.8														●	●																		E014
Medium Cutting	TNMG220412-GK	1.2														●	●																		E035 E039
GM	TNMG160404-GM	0.4								●	●	●																							
	TNMG160408-GM	0.8								●	●	●																							C016
	TNMG160412-GM	1.2								●	●	●																							C017
	TNMG220408-GM	0.8								●	●	●																							E014
Medium Cutting	TNMG220412-GM	1.2								●	●	●																							E035 E039

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																		Cermet		Coated Cermet			Carbide					Applicable Holder Page
			UE6105	UE6110	UE6020 (NEW)	MC6015	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015 (NEW)	
MA	**TNMG160404-MA**	0.4	●	●	▲	●	●			●	●	▲	●			●	●	●	●					●		●										
	TNMG160408-MA	0.8	●	●	▲	●	●	●		●	●	▲	●			●	●	●	●					●		●										
	TNMG160412-MA	1.2	●	●	▲	●	●			●	●	▲	●			●	●		●					●		●										
	TNMG160416-MA	1.6																	●																	C016 C017 E014 E035 E039
	TNMG220408-MA	0.8	●	●	▲	●	●	●		●	●	▲	●			●	●	●	●					●												
	TNMG220412-MA	1.2	●	●	▲	●	●	●		●	●	▲	●			●	●		●					●												
	TNMG220416-MA	1.6																	●																	
	TNMG270608-MA	0.8	●	●	▲			●																												
Medium Cutting	TNMG270612-MA	1.2	●	●	▲									●																						
MH	**TNMG160404-MH**	0.4	●	●	▲								▲						●																	C016 C017 E014 E035 E039
	TNMG160408-MH	0.8	●	●	▲	●	●	●					▲						●																	
	TNMG160412-MH	1.2	●	●	▲	●	●	●											●																	
	TNMG220408-MH	0.8	●	●	▲			●					▲						●																	
Medium Cutting	TNMG220412-MH	1.2	●	●	▲			●											●																	
Flat Top	**TNMG110304**	0.4		●	▲	●	●																			●					●		●			C016 C017 E014 E035 E039
	TNMG110308	0.8		●	▲	●	●																													
	TNMG160304	0.4		●																						●					●					
	TNMG160308	0.8		●	▲	●	●																			●					●					
	TNMG160404	0.4	●	●	▲	●	●											●	●					●		●	●	●			●	●	●			
	TNMG160408	0.8	●	●	▲	●	●	●										●	●					●		●	●	●			●	●	●			
	TNMG160412	1.2	●	●	▲	●	●											●	●							●										
	TNMG160416	1.6		●															●							●										
	TNMG220404	0.4	●	●	▲	●	●																				●				●					
	TNMG220408	0.8	●	●	▲	●	●	●											●							●	●				●					
	TNMG220412	1.2	●	●	▲	●	●												●																	
	TNMG220416	1.6		●	▲	●	●																													
	TNMG270608	0.8		●																																
	TNMG270612	1.2		●	▲																										●					
	TNMG270616	1.6		●	▲																															
Medium Cutting	TNMG330924	2.4																													●					
*1 **MW**	**TNMX160408-MW**	0.8	●	●									▲			●	●		●																	C017
	TNMX160412-MW	1.2	●	●									▲			●	●	●	●																	
Medium Cutting (Wiper)																																				
*2 **MS**	**TNMG160404-MS**	0.4		●									▲	●	●					●	●	●	●	●							●				●	C016 C017 E014 E035 E039
	TNMG160408-MS	0.8		●	▲								▲	●	●					●	●	●	●	●	●		●							●	●	
	TNMG160412-MS	1.2		●										●	●					●	●	●	●												●	
	TNMG220408-MS	0.8		●									▲	●	●					●	●	●	●	●	●										●	
Medium Cutting	TNMG220412-MS	1.2												●						●	●														●	
R/L-ES	**TNMG160404R-ES**	0.4											▲	●																						
	TNMG160404L-ES	0.4											▲	●																						
	TNMG160408R-ES	0.8											▲	●																						
	TNMG160408L-ES	0.8											▲	●																						
	TNMG220408R-ES	0.8												●																						
Medium Cutting	TNMG220408L-ES	0.8												●																						

*1 Please refer to A028 before using the MW breaker (wiper insert).
*2 Newly designed breakers : MP9005, MP9015, MT9015

■ = MIRACLE SIGMA

CHIP BREAKERS ➤ A042
GRADES ➤ A030
IDENTIFICATION ➤ A002

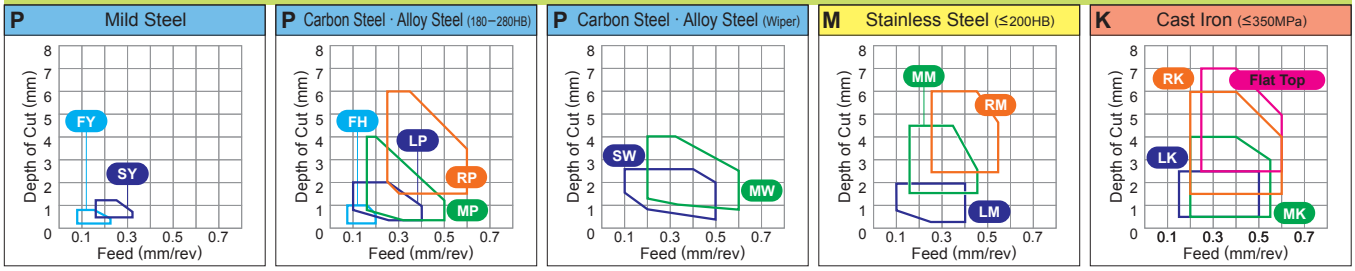
TURNING INSERTS [NEGATIVE]

60° TN TYPE INSERTS WITH HOLE

TNMG 16 04 08 RP
Size · Thickness · Corner Radius · Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Light Cutting ····· Medium Cutting ····· Rough Cutting ····· Heavy Cutting ·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material	
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-ferrous Metal
S	Heat-resistant Alloy, Titanium Alloy

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020 (NEW)	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	Carbide: UTi20T	HTi05T	HTi10	RT9010	MT9015 (NEW)	Applicable Holder Page
R/L-2G	TNMG160404R-2G	0.4																								●										C016
	TNMG160404L-2G	0.4																								●										C017
	TNMG160408R-2G	0.8																								●										E014
	TNMG160408L-2G	0.8																								●										E035
Medium Cutting																																				E039
R/L	TNGG110302R	0.2																									●									
	TNGG110302L	0.2																								●	●									
	TNGG110304R	0.4																								●	●									
	TNGG110304L	0.4																								●	●									
	TNGG110308R	0.8																									●									
	TNGG110308L	0.8																								●	●									
	TNGG160304R	0.4																								●	●				●					
	TNGG160304L	0.4																								●	●									C016
	TNGG160402R	0.2																								●	●	●			●		●			C017
	TNGG160402L	0.2																								●	●	●								E014
	TNGG160404R	0.4																								●	●	●			●	●	●			E035
	TNGG160404L	0.4																								●	●	●			●		●			E039
	TNGG160408R	0.8																								●	●	●			●	●	●			
	TNGG160408L	0.8																								●	●	●			●	●	●			
	TNGG220404R	0.4																								●	●				●					
	TNGG220404L	0.4																								●	●				●					
	TNGG220408R	0.8																								●	●				●					
Medium Cutting	TNGG220408L	0.8																								●	●				●					
RP	TNMG160408-RP	0.8	●	●		●	●																													
	TNMG160412-RP	1.2	●	●		●	●																													
	TNMG220408-RP	0.8	●	●		●	●																													C016
	TNMG220412-RP	1.2	●	●		●	●																													C017
	TNMG220416-RP	1.6	●	●		●	●																													E014
	TNMG270612-RP	1.2	●	●		●	●																													E035
Rough Cutting	TNMG270616-RP	1.6	●	●		●	●																													E039
RM	TNMG160408-RM	0.8								●	●	●																								
	TNMG160412-RM	1.2								●	●	●																								C016
	TNMG220408-RM	0.8								●	●	●																								C017
	TNMG220412-RM	1.2								●	●	●																								E014
Rough Cutting	TNMG220416-RM	1.6								●	●	●																								E035
																																				E039

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material		
	P	Steel
	M	Stainless Steel
	K	Cast Iron
	N	Non-ferrous Metal
	S	Heat-resistant Alloy, Titanium Alloy

Shape	Order Number	RE (mm)	Coated																		Cermet		Coated Cermet			Carbide					Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005	MC5015	UC5105	UC5115	MP9005	MP9015	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015	
NEW RK	TNMG160408-RK	0.8														●	●																		
	TNMG160412-RK	1.2														●	●																		C016 C017 E014 E035 E039
	TNMG160416-RK	1.6														●	●																		
	TNMG220408-RK	0.8														●	●																		
	TNMG220412-RK	1.2														●	●																		
Rough Cutting	TNMG220416-RK	1.6														●	●																		
NEW RS	TNMG160408-RS	0.8																			●													●	
	TNMG160412-RS	1.2																			●													●	C016 C017 E014 E035 E039
	TNMG220408-RS	0.8																			●													●	
Rough Cutting	TNMG220412-RS	1.2																			●													●	
GH	TNMG160408-GH	0.8	●	●	▲								▲	●				●	●																
	TNMG160412-GH	1.2	●	●															●																C016 C017 E014 E035 E039
	TNMG220408-GH	0.8	●	●	▲									●					●															
	TNMG220412-GH	1.2	●	●	▲									●				●	●																
	TNMG220416-GH	1.6	●	●																															
	TNMG270612-GH	1.2	●	●	▲									●																					
Rough Cutting	TNMG270616-GH	1.6	●	●																															
HZ	TNMM160408-HZ	0.8		●	▲																														
	TNMM220408-HZ	0.8		●	▲																														C016 C017 E014 E035 E039
	TNMM220412-HZ	1.2		●	▲																														
	TNMM220416-HZ	1.6		●	▲																														
Heavy Cutting																																			
Standard	TNMA160404	0.4														●	●	●	●													●	●		
	TNMA160408	0.8														●	●	●	●												●	●	●		
	TNMA160412	1.2														●	●	●	●																C016 C017 E014 E035 E039
	TNMA160416	1.6														●	●		●																
	TNMA160420	2.0														●	●																		
	TNMA220404	0.4																															●		
	TNMA220408	0.8														●	●	●	●							●					●		●		
	TNMA220412	1.2														●	●	●	●																
	TNMA220416	1.6														●	●	●	●												●				
Standard	TNGA110304	0.4																															●		
	TNGA110308	0.8																								●							●		
	TNGA160402	0.2																								●							●		C016 C017 E014 E035 E039
	TNGA160404	0.4																													●	●	●		
	TNGA160408	0.8																														●	●		
	TNGA220404	0.4																													●				
	TNGA220408	0.8																														●			

= MIRACLE SIGMA

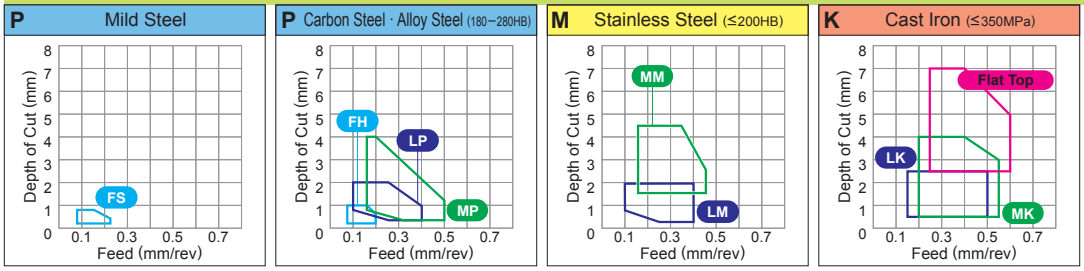
CHIP BREAKERS ➤ A042
GRADES ➤ A030
IDENTIFICATION ➤ A002

35° VN TYPE INSERTS WITH HOLE

VNMG 16 04 02- FH
Size Thickness Corner Radius Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Light Cutting ····· Medium Cutting ····· Rough Cutting ····· Heavy Cutting ·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020 (NEW)	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	Carbide: UTi20T	HTi05T	HTi10	RT9010 (NEW)	MT9015 (NEW)	Applicable Holder Page
FH	**VNMG160402-FH**	0.2		●	▲																					●	●	●							●	C018 –020 E015 E041
	VNMG160404-FH	0.4		●	▲																					●		●	●							
Finish Cutting	VNMG160408-FH	0.8		●	▲																					●	●	●	●							
FS	**VNMG160404-FS**	0.4			▲																					●										C018 –020 E015 E041
	VNMG160408-FS	0.8			▲																					●										
Finish Cutting																																				
FJ	**VNGG1604V5-FJ**	0.05																					●												●	C018 –020 E015 E041
	VNGG160401-FJ	0.1																					●												●	
Finish Cutting	VNGG160402-FJ	0.2																					●												●	
R/L-F	**VNGG160402R-F**	0.2																						●		●	●	●								C018 –020 E015 E041
	VNGG160402L-F	0.2																						●		●	●	●								
	VNGG160404R-F	0.4																						●		●	●	●								
Finish Cutting	VNGG160404L-F	0.4																						●		●	●	●								
LP	**VNMG160404-LP**	0.4		●	●		●	●																				●								C018 –020 E015 E041
	VNMG160408-LP	0.8		●	●		●	●																				●								
Light Cutting																																				
LM	**VNMG160404-LM**	0.4								●	●	●																								C018 –020 E015 E041
	VNMG160408-LM	0.8								●	●	●																								
Light Cutting																																				
NEW **LK**	**VNMG160404-LK**	0.4														●	●																			C018 –020 E015 E041
	VNMG160408-LK	0.8														●	●																			
Light Cutting																																				

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																		Cermet		Coated Cermet			Carbide					Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015 (NEW)	
NEW LS	VNMG160404-LS	0.4																		●	●													●	C018 –020 E015 E041
Light Cutting	VNMG160408-LS	0.8																		●	●													●	
SH	VNMG160404-SH	0.4	●	●	▲	●	●																			●	●		●						C018 –020 E015 E041
Light Cutting	VNMG160408-SH	0.8	●	●	▲	●	●																			●	●		●						
MJ	VNMG160404-MJ	0.4													●								●	●										●	C018 –020 E015 E041
Light Cutting	VNMG160408-MJ	0.8													●								●	●										●	
	VNMG160412-MJ	1.2													●								●	●											
MJ	VNGM160404-MJ	0.4																					●											●	C018 –020 E015 E041
Light Cutting	VNGM160408-MJ	0.8																					●											●	
MP	VNMG160404-MP	0.4	●	●	▲	●	●												●									●								C018 –020 E015 E041
Medium Cutting	VNMG160408-MP	0.8	●	●	▲	●	●												●									●								
	VNMG160412-MP	1.2	●	●	▲	●	●												●																	
MM	VNMG160408-MM	0.8								●	●	●																								C018 –020 E015 E041
Medium Cutting																																				
NEW MK	VNMG160404-MK	0.4														●	●																			C018 –020 E015 E041
Medium Cutting	VNMG160408-MK	0.8														●	●																			
	VNMG160412-MK	1.2														●	●																			
NEW GK	VNMG160404-GK	0.4														●	●																			C018 –020 E015 E041
Medium Cutting	VNMG160408-GK	0.8														●	●																			
GM	VNMG160404-GM	0.4								●	●	●																								C018 –020 E015 E041
Medium Cutting	VNMG160408-GM	0.8								●	●	●																								

■ = MIRACLE SIGMA

CHIP BREAKERS ➤ A042
GRADES ➤ A030
IDENTIFICATION ➤ A002

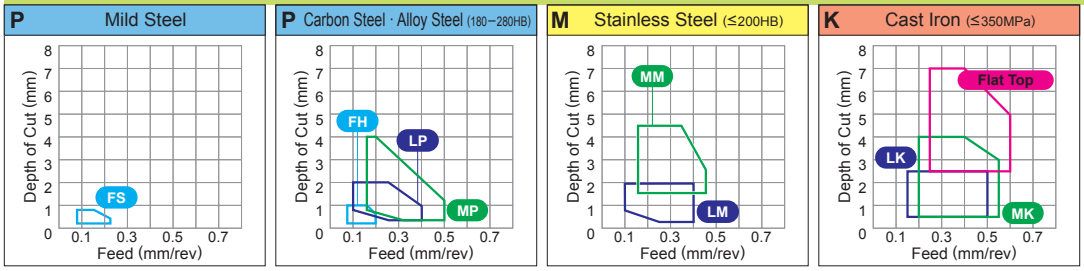
TURNING INSERTS [NEGATIVE]

35° VN TYPE INSERTS WITH HOLE

VNMG 16 04 04- MA
Size Thickness Corner Radius Chip Breaker
* Please refer to page A002.

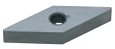
CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting····· Light Cutting····· Medium Cutting····· Rough Cutting····· Heavy Cutting·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020 (NEW)	MC6015	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	Carbide: UTi20T	HTi05T	HTi10	RT9010	MT9015 (NEW)	Applicable Holder Page
MA	**VNMG160404-MA**	0.4	●	●	▲	●	●			●	●	●	▲	●		●	●	●	●					●											C018 –020 E015 E041
	VNMG160408-MA	0.8	●	●	▲	●	●	●		●	●	●	▲	●		●	●	●	●					●											
 Medium Cutting																																			
MH	**VNMG160404-MH**	0.4	●	●	▲													●																	C018 –020 E015 E041
	VNMG160408-MH	0.8	●	●	▲	●	●						▲					●																	
 Medium Cutting																																			
Standard	**VNMG160404**	0.4	●	●	▲	●	●											●	●				●		●		●			●		●			C018 –020 E015 E041
	VNMG160408	0.8	●	●	▲	●	●											●	●				●		●		●			●		●			
	VNMG160412	1.2	●	●														●	●						●										
 Medium Cutting																																			
*** MS**	**VNMG160404-MS**	0.4		●									▲	●	●				●	●	●	●		●										●	C018 –020 E015 E041
	VNMG160408-MS	0.8		●									▲	●	●				●	●	●	●			●								●	●	
 Medium Cutting																																			
R/L	**VNGG160404R**	0.4																							●	●				●		●			C018 –020 E015 E041
	VNGG160404L	0.4																							●	●				●					
 Medium Cutting																																			
Flat Top	**VNGA160404**	0.4																														●	●		C018 –020 E015 E041
	VNGA160408	0.8																														●	●		
																																			

* Newly designed breakers : MP9005, MP9015, MT9015

■ = MIRACLE SIGMA

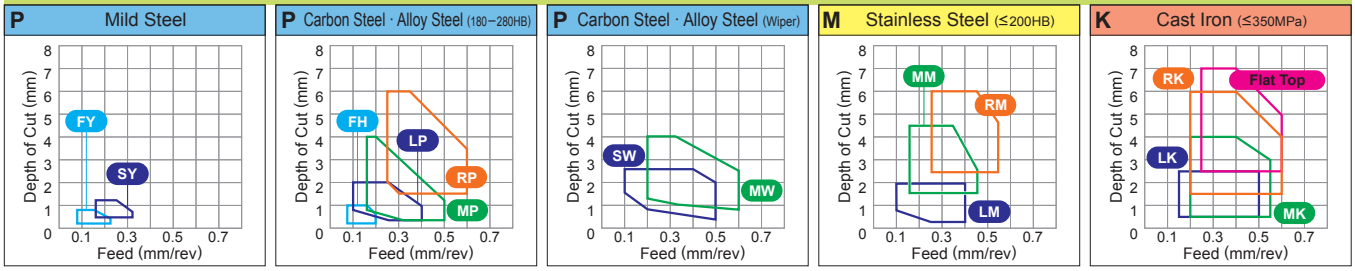
● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

80° WN TYPE INSERTS WITH HOLE

WNMG 08 04 04- FH
Size Thickness Corner Radius Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Light Cutting ····· Medium Cutting ····· Rough Cutting ····· Heavy Cutting ·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material	
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-ferrous Metal
S	Heat-resistant Alloy, Titanium Alloy

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020 (NEW)	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	Carbide: UTi20T	HTi05T	HTi10	RT9010	MT9015 (NEW)	Applicable Holder Page
FH	**WNMG080404-FH**	0.4		●																						●		●								C021 E015
	WNMG**080408-FH**	0.8		●																						●		●	●							
Finish Cutting																																				
FS	**WNMG080404-FS**	0.4			▲																					●										C021 E015
	WNMG**080408-FS**	0.8			▲																					●										
Finish Cutting																																				
FY	**WNMG080404-FY**	0.4																										●								C021 E015
	WNMG**080408-FY**	0.8			▲																							●	●							
Finish Cutting																																				
LP	**WNMG060404-LP**	0.4	●	●		●	●																					●								C021 E015 E037
	WNMG**060408-LP**	0.8	●	●		●	●																					●								
	WNMG**06T304-LP**	0.4	●	●		●	●																					●								
	WNMG**06T308-LP**	0.8	●	●		●	●																					●								
	WNMG**080404-LP**	0.4	●	●		●	●																					●								
	WNMG**080408-LP**	0.8	●	●		●	●																					●								
Light Cutting	WNMG**080412-LP**	1.2	●	●		●	●																													
LM	**WNMG060404-LM**	0.4								●	●	●																								C021 E015
	WNMG**060408-LM**	0.8								●	●	●																								
	WNMG**080404-LM**	0.4								●	●	●																								
	WNMG**080408-LM**	0.8								●	●	●																								
Light Cutting																																				
NEW **LK**	**WNMG080404-LK**	0.4														●	●																			C021 E015
	WNMG**080408-LK**	0.8														●	●																			
	WNMG**080412-LK**	1.2														●	●																			
Light Cutting																																				
NEW **LS**	**WNMG080404-LS**	0.4																		●	●														●	C021 E015
	WNMG**080408-LS**	0.8																		●	●														●	
Light Cutting																																				

■ = MIRACLE SIGMA

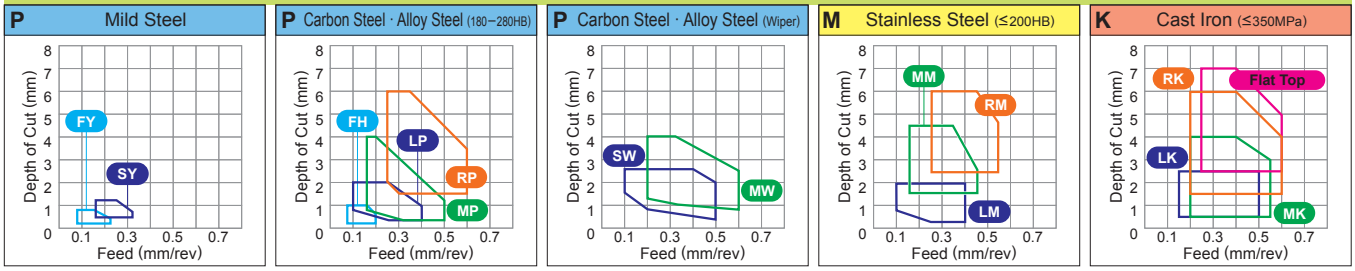
CHIP BREAKERS ➤ A042 GRADES ➤ A030 IDENTIFICATION ➤ A002

80° WN TYPE INSERTS WITH HOLE

WNMG 06 T3 04- SH
Size Thickness Corner Radius Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Light Cutting ····· Medium Cutting ····· Rough Cutting ····· Heavy Cutting ·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material	
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-ferrous Metal
S	Heat-resistant Alloy, Titanium Alloy

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020 (NEW)	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	Carbide: UTi20T	HTi05T	HTi10	RT9010 (NEW)	MT9015 (NEW)	Applicable Holder Page
SH	**WNMG06T304-SH**	0.4	●	●										●																						
	**WNMG06T308-SH**	0.8	●	●										●																						
	WNMG060404-SH	0.4	●	●										●																						C021 E015 E037
	WNMG060408-SH	0.8	●	●										●																						
	WNMG080404-SH	0.4	●	●		●	●							●				●								●										
	WNMG080408-SH	0.8	●	●	▲	●	●							●				●								●										
Light Cutting	**WNMG080412-SH**	1.2	●	●	▲	●	●							●				●																		
SA	**WNMG080404-SA**	0.4	●	●	▲	●	●																				●									C021 E015
	**WNMG080408-SA**	0.8	●	●	▲	●	●																				●									
Light Cutting	**WNMG080412-SA**	1.2	●	●	▲	●	●																				●									
* **SW**	**WNMG060404-SW**	0.4	●	●		●							▲													●		●								C021 E015
	**WNMG060408-SW**	0.8	●	●		●							▲													●		●								
	WNMG080404-SW	0.4	●	●		●							▲			●	●		●							●	●	●								
	WNMG080408-SW	0.8	●	●		●							▲			●	●		●							●	●	●								
Light Cutting (Wiper)	**WNMG080412-SW**	1.2	●	●		●							▲													●	●	●								
SY	**WNMG080404-SY**	0.4																										●								C021 E015
	**WNMG080408-SY**	0.8			▲																					●	●		●						
Light Cutting																																				
C	**WNMG080404-C**	0.4																								▲	▲									C021 E015
	**WNMG080408-C**	0.8																									▲									
Light Cutting																																				
MJ	**WNMG080408-MJ**	0.8												●								●	●													C021 E015
	**WNMG080412-MJ**	1.2												●								●	●												
Light Cutting	**WNMG080416-MJ**	1.6												●								●	●												

* Please refer to A028 before using the SW breaker (wiper insert).

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																			Cermet		Coated Cermet			Carbide					Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015 (NEW)	
MP	**WNMG06T304-MP**	0.4	●	●	▲	●	●											●																C021 E015 E037
	WNMG06T308-MP	0.8	●	●	▲	●	●											●																
	WNMG06T312-MP	1.2	●	●	▲	●	●											●																
	WNMG060404-MP	0.4	●	●	▲	●	●											●																
	WNMG060408-MP	0.8	●	●	▲	●	●											●																
	WNMG060412-MP	1.2	●	●	▲	●	●											●																
	WNMG080404-MP	0.4	●	●	▲	●	●											●										●						
	WNMG080408-MP	0.8	●	●	▲	●	●											●										●						
	WNMG080412-MP	1.2	●	●	▲	●	●											●										●						
Medium Cutting	WNMG080416-MP	1.6	●	●	▲	●	●											●																
MM	**WNMG060408-MM**	0.8								●	●	●																						
	WNMG060412-MM	1.2								●	●	●																						C021 E015
	WNMG080408-MM	0.8								●	●	●																						
	WNMG080412-MM	1.2								●	●	●																						
Medium Cutting																																		
NEW **MK**	**WNMG080404-MK**	0.4														●	●																	
	WNMG080408-MK	0.8														●	●																	C021 E015
	WNMG080412-MK	1.2														●	●																	
Medium Cutting	WNMG080416-MK	1.6														●	●																	
NEW **GK**	**WNMG060404-GK**	0.4														●	●																	
	WNMG060408-GK	0.8														●	●																	C021 E015
	WNMG080404-GK	0.4														●	●																	
	WNMG080408-GK	0.8														●	●																	
Medium Cutting	WNMG080412-GK	1.2														●	●																	
GM	**WNMG060404-GM**	0.4								●	●	●																						
	WNMG060408-GM	0.8								●	●	●																						C021 E015
	WNMG080404-GM	0.4								●	●	●																						
	WNMG080408-GM	0.8								●	●	●																						
Medium Cutting	WNMG080412-GM	1.2								●	●	●																						
MA	**WNMG06T304-MA**	0.4	●	●										●																				
	WNMG06T308-MA	0.8	●	●										●																				
	WNMG06T312-MA	1.2	●	●										●																				
	WNMG060404-MA	0.4	●	●										●																				
	WNMG060408-MA	0.8	●	●			●	●			●	●		●		●	●							●										C021 E015 E037
	WNMG060412-MA	1.2	●	●			●	●			●	●		●		●	●							●										
	WNMG080404-MA	0.4	●	●	▲		●	●			●	●	▲	●		●	●		●					●			●							
	WNMG080408-MA	0.8	●	●	▲		●	●	●		●	●	▲	●		●	●	●	●					●			●							
	WNMG080412-MA	1.2	●	●	▲		●	●	●		●	●	▲	●		●	●	●	●					●			●							
	WNMG080416-MA	1.6	●	●															●															
Medium Cutting	WNMG100612-MA	1.2			▲			●																										
MH	**WNMG080404-MH**	0.4	●	●	▲																													
	WNMG080408-MH	0.8	●	●	▲		●	●	●				▲						●															C021 E015
	WNMG080412-MH	1.2	●	●	▲		●	●	●										●															
Medium Cutting																																		

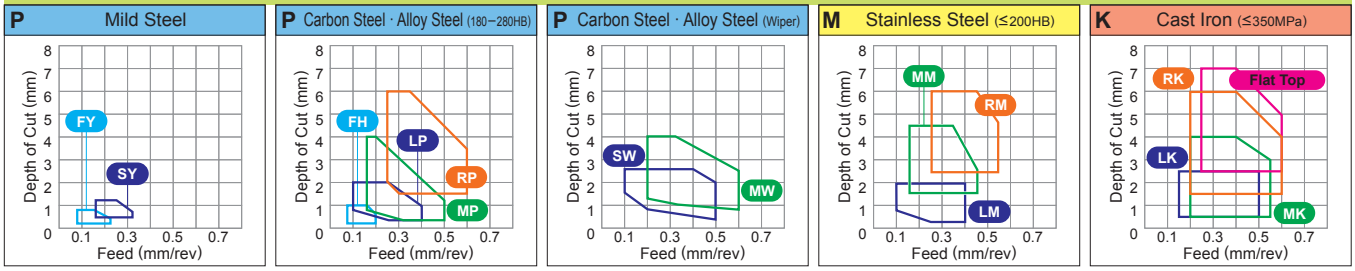
CHIP BREAKERS ➤ A042
GRADES ➤ A030
IDENTIFICATION ➤ A002

80° WN TYPE INSERTS WITH HOLE

WNMG 08 04 04
Size Thickness Corner Radius
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Light Cutting ····· Medium Cutting ····· Rough Cutting ····· Heavy Cutting ·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020 (NEW)	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	Carbide: UTi20T	HTi05T	HTi10	RT9010 (NEW)	MT9015 (NEW)	Applicable Holder Page
Standard	**WNMG080404**	0.4	●	●	▲	●	●											●	●							●		●								
	WNMG080408	0.8	●	●	▲	●	●											●	●					●		●		●			●					C021 E015
	WNMG080412	1.2	●	●	▲	●	●											●	●					●							●					
	WNMG080416	1.6																	●																	
Medium Cutting																																				
***1 MW**	**WNMG060408-MW**	0.8	●	●	▲	●	●									●	●	●	●																	
	WNMG060412-MW	1.2	●	●		●	●									●	●	●	●																	C021 E015
	WNMG080408-MW	0.8	●	●	▲	●	●						▲			●	●	●	●																	
	WNMG080412-MW	1.2	●	●		●	●						▲			●	●	●	●																	
Medium Cutting (Wiper)																																				
***2 MS**	**WNMG06T304-MS**	0.4		●									▲	●																						
	WNMG06T308-MS	0.8		●									▲	●																						
	WNMG060404-MS	0.4		●									▲	●																						C021 E015 E037
	WNMG060408-MS	0.8		●									▲	●																						
	WNMG080404-MS	0.4		●	▲								▲	●						●	●														●	
	WNMG080408-MS	0.8		●	▲								▲	●	●					●	●	●	●	●										●	●	
Medium Cutting	WNMG080412-MS	1.2		●										●	●					●	●	●	●												●	
RP	**WNMG080408-RP**	0.8	●	●		●	●																													
	WNMG080412-RP	1.2	●	●		●	●																													C021 E015
Rough Cutting																																				
RM	**WNMG060408-RM**	0.8								●	●	●																								
	WNMG060412-RM	1.2								●	●	●																								C021 E015
	WNMG080408-RM	0.8								●	●	●																								
	WNMG080412-RM	1.2								●	●	●																								
Rough Cutting																																				
NEW **RK**	**WNMG080408-RK**	0.8														●	●																			
	WNMG080412-RK	1.2														●	●																			C021 E015
	WNMG080416-RK	1.6														●	●																			
Rough Cutting																																				

*1 Please refer to A028 before using the MW breaker (wiper insert).
*2 Newly designed breakers : MP9005, MP9015, MT9015

■ = MIRACLE SIGMA

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
	P	Steel
	M	Stainless Steel
	K	Cast Iron
	N	Non-ferrous Metal
	S	Heat-resistant Alloy, Titanium Alloy

Shape	Order Number	RE (mm)	Coated																	Cermet		Coated Cermet			Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	UTi20T	HTi05T	HTi10	RT9010	MT9015 (NEW)	
NEW RS	WNMG080408-RS	0.8																			●													●	
	WNMG080412-RS	1.2																			●													●	C021 E015
	WNMG080416-RS	1.6																			●													●	
Rough Cutting	WNMG100612-RS	1.2																			●													●	
GH	WNMG080408-GH	0.8	●	●	▲								▲	●				●	●																
	WNMG080412-GH	1.2	●	●	▲									●				●	●																C021 E015
Rough Cutting																																			
GJ	WNMG080408-GJ	0.8												●									●											●	
	WNMG080412-GJ	1.2												●									●											●	C021 E015
	WNMG080416-GJ	1.6												●									●											●	
Rough Cutting	WNMG100612-GJ	1.2																					●											●	
Flat Top	WNMA080404	0.4														●	●	●	●													●			
	WNMA080408	0.8														●	●	●	●													●			C021 E015
	WNMA080412	1.2														●	●	●	●																
	WNMA080416	1.6														●	●		●																

■ = MIRACLE SIGMA

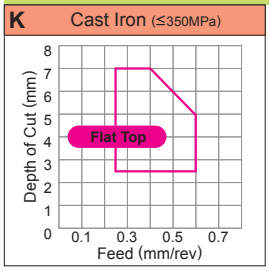
CHIP BREAKERS ➤ A042
GRADES ➤ A030
IDENTIFICATION ➤ A002

90° SN TYPE INSERTS WITHOUT HOLE

SNMN 12 04 08
Size Thickness Corner Radius
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Heavy Cutting·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	Carbide: UTi20T	HTi05T	HTi10	RT9010	MT9015 (NEW)	Applicable Holder Page
Flat Top	SNMN120408	0.8														●	●	●	●						●					●		●			–
	SNMN120412	1.2														●	●	●	●						●					●					
	SNMN120416	1.6														●	●	●	●																
	SNMN190412	1.2																												●					
Flat Top	SNGN090308	0.8																														●			–
	SNGN120404	0.4																												●		●			
	SNGN120408	0.8																												●					

● : Inventory maintained in Japan.
(10 inserts in one case)

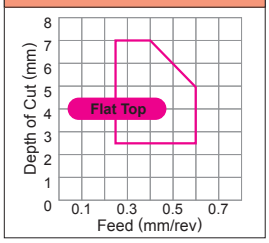
60° TN TYPE INSERTS WITHOUT HOLE

TNMN 16 03 08
Size Thickness Corner Radius
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Heavy Cutting·····

K Cast Iron (≤350MPa)



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UE6035	UH6400	MC7015	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	MP9005 (NEW)	MP9015 (NEW)	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	Carbide: UTi20T	HTi05T	HTi10	RT9010	MT9015 (NEW)	Applicable Holder Page
Flat Top	TNMN160308	0.8																							●										–
	TNMN160408	0.8														●	●	●	●						●											
	TNMN160412	1.2														●	●	●	●																	
	TNMN160416	1.6														●	●	●	●																	
	TNMN160420	2.0																	●																	
	TNMN220408	0.8																							●											
	TNMN220412	1.2																													●					
Flat Top	TNGN110304	0.4																														●			–
	TNGN110308	0.8																														●				
	TNGN160404	0.4																														●				
	TNGN160408	0.8																														●				

CHIP BREAKERS ➤ A068
GRADES ➤ A030
IDENTIFICATION ➤ A002

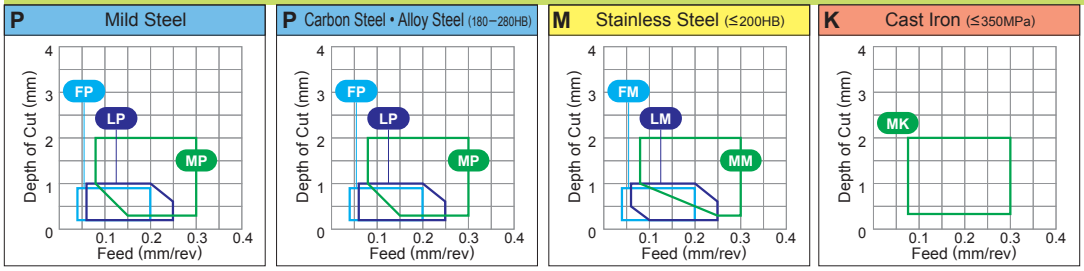
TURNING INSERTS [POSITIVE]

80° CC TYPE INSERTS WITH HOLE

CCMT 06 02 02- FP
Size · Thickness · Corner Radius · Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Light Cutting ····· Medium Cutting ·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																	Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 NEW	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 NEW	MC5015 NEW	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
FP	**CCMT060202-FP**	0.2		●		●	●															●		●							
	CCMT060204-FP	0.4		●		●	●															●		●							C022 D008
	CCMT09T302-FP	0.2		●		●	●															●		●							E006
	CCMT09T304-FP	0.4		●		●	●															●		●							E030
Finish Cutting	CCMT09T308-FP	0.8		●		●	●															●		●							E034
FM	**CCMT060202-FM**	0.2																		●											
	CCMT060204-FM	0.4																		●											C022 D008
	CCMT09T302-FM	0.2																		●											E006
	CCMT09T304-FM	0.4																		●											E030
Finish Cutting	CCMT09T308-FM	0.8																		●											E034
FV	**CCMT060202-FV**	0.2			▲															●		● ●			●	●					
	CCMT060204-FV	0.4			▲															●		● ●			●	●					C022 D008
	CCMT09T302-FV	0.2			▲																	● ●				●					E006
	CCMT09T304-FV	0.4			▲																	● ●			●	●					E030
Finish Cutting	CCMT09T308-FV	0.8			▲																	● ●			●	●					E034
FJ	**CCGT0602V5-FJ**	0.05																	●												
	CCGT060201-FJ	0.1																	●												C022 D008
	CCGT060202-FJ	0.2																	●												E006
	CCGT09T3V5-FJ	0.05																	●												E030
	CCGT09T301-FJ	0.1																	●											●	E034
	CCGT09T302-FJ	0.2																	●											●	
Finish Cutting	CCGT09T304-FJ	0.4																	●											●	
AZ	**CCGT060202-AZ**	0.2																											●		
	CCGT060204-AZ	0.4																											●		C022 D008
	CCGT09T302-AZ	0.2																											●		E006
	CCGT09T304-AZ	0.4																											●		E030
	CCGT09T308-AZ	0.8																											●		E034
	CCGT120402-AZ	0.2																											●		
Medium Cutting – Finish Cutting	CCGT120404-AZ	0.4																											●		
	CCGT120408-AZ	0.8																											●		

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	● ◕ ✣ ◕ ✣ ✣ ◔ ✣ ○ ✣ ● ◕ ✣ ✣ ◕ ✣ ● ◕ ✣ ● ◕ ◕ ◕ ◕ ✣ ◕ ◕
M	Stainless Steel	◔ ✣ ○ ✣ ◕ ✣ ✣ ○ ○ ✣ ◕ ◕
K	Cast Iron	● ✣ ● ● ◕ ✣ ● ● ✣ ● ◕
N	Non-ferrous Metal	◕
S	Heat-resistant Alloy, Titanium Alloy	● ◕ ✣ ◕ ◕

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	VP45N	Carbide: UTi20T	HTi05T	HTi10	RT9010	Applicable Holder Page
L-F	*1CCGT03S1V3L-F	0.03																		●		●										
	*1CCGT03S101L-F	0.1																		●		●										
	*1CCGT03S102L-F	0.2																		●		●		●								
	*1CCGT03S104L-F	0.4																		●		●		●								
	*1CCGT04T0V3L-F	0.03																		●		●										E016
	*1CCGT04T001L-F	0.1																		●		●										
	*1CCGT04T002L-F	0.2																		●		●		●								
Finish Cutting	*1CCGT04T004L-F	0.4																		●		●		●								
R/L-F	CCGH060202R-F	0.2																		●		●			●					●		C022
	CCGH060202L-F	0.2																		●		●			●					●		D008
	CCGH060204R-F	0.4																		●		●			●					●		E006
	CCGH060204L-F	0.4																		●		●			●					●		E030
Finish Cutting																																E034
LP	CCMT060204-LP	0.4		●		●	●															●		●								C022
	CCMT060208-LP	0.8		●		●	●															●		●								D008
	CCMT09T304-LP	0.4		●		●	●															●		●								E006
	CCMT09T308-LP	0.8		●		●	●															●		●								E030
Light Cutting																																E034
LM	CCMT060204-LM	0.4							●	●										●												C022
	CCMT060208-LM	0.8							●	●										●												D008
	CCMT09T304-LM	0.4							●	●										●												E006
	CCMT09T308-LM	0.8							●	●										●												E030
Light Cutting																																E034
SV	CCMH060202-SV	0.2			▲						▲	●								●		●	●	●			●					C022
	CCMH060204-SV	0.4			▲						▲	●								●		●	●	●			●					D008
Light Cutting																																E006 E030 E034
*2 **SW**	CCMT060202-SW	0.2		●	▲						▲											●		●		●						C022
	CCMT060204-SW	0.4		●	▲						▲					●						●		●		●						D008
	CCMT09T302-SW	0.2		●	▲						▲					●						●		●		●						E006
	CCMT09T304-SW	0.4		●	▲						▲					●						●		●		●						E030
Light Cutting (Wiper)																																E034
R/L-SS	CCGT0602V3R-SS	0.03																		●												
	CCGT0602V3L-SS	0.03																		●												
	CCGT060201R-SS	0.1																		●												
	CCGT060201L-SS	0.1																		●												
	CCGT060202R-SS	0.2																		●												C022
	CCGT060202L-SS	0.2																		●												D008
	CCGT09T3V3R-SS	0.03																		●												E006
	CCGT09T3V3L-SS	0.03																		●												E030
	CCGT09T301R-SS	0.1																		●												E034
	CCGT09T301L-SS	0.1																		●												
	CCGT09T302R-SS	0.2																		●												
Light Cutting	CCGT09T302L-SS	0.2																		●												

*1 Diameter of inscribed circle is special. (For SCLC type)

*2 Please refer to A028 before using the SW breaker (wiper insert).

CHIP BREAKERS ➤ A054
GRADES ➤ A030
IDENTIFICATION ➤ A002

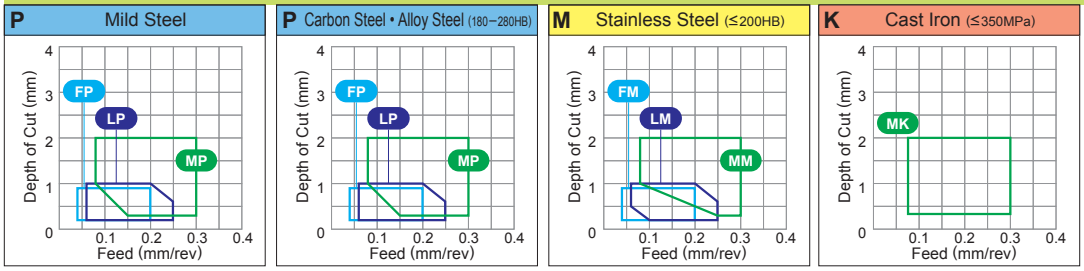
TURNING INSERTS [POSITIVE]

80° CC TYPE INSERTS WITH HOLE

CCMT 06 02 04- MK
Size / Thickness / Corner Radius / Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Light Cutting ····· Medium Cutting ·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	VP45N	Carbide: UTi20T	HTi05T	HTi10	RT9010	Applicable Holder Page
(NEW) MK	CCMT060204-MK	0.4												●	●																	
	CCMT060208-MK	0.8												●	●																	C022 D008 E006 E030 E034
	CCMT09T304-MK	0.4												●	●																	
	CCMT09T308-MK	0.8												●	●																	
	CCMT120404-MK	0.4												●	●																	
Medium Cutting	CCMT120408-MK	0.8												●	●																	
MP	CCMT060204-MP	0.4		●		●	●															●		●								
	CCMT060208-MP	0.8		●		●	●															●		●								C022 D008 E006 E030 E034
	CCMT09T304-MP	0.4		●		●	●															●		●								
	CCMT09T308-MP	0.8		●		●	●															●		●								
	CCMT120404-MP	0.4		●		●	●															●		●								
	CCMT120408-MP	0.8		●		●	●															●		●								
Medium Cutting	CCMT120412-MP	1.2		●		●	●															●		●								
MM	CCMT060204-MM	0.4							●	●											●											
	CCMT060208-MM	0.8							●	●											●											C022 D008 E006 E030 E034
	CCMT09T304-MM	0.4							●	●											●											
	CCMT09T308-MM	0.8							●	●											●											
	CCMT120404-MM	0.4							●	●											●											
	CCMT120408-MM	0.8							●	●											●											
Medium Cutting	CCMT120412-MM	1.2							●	●											●											
Standard	CCMT060202	0.2		●	▲							●										●	●	●	●			●				
	CCMT060204	0.4	●	●	▲							●				●				●		●	●	●	●			●				
	CCMT060208	0.8		●	▲							●				●				●		●						●				
	CCMT080302	0.2		●																												
	CCMT080304	0.4		●								●										●	●	●	●			●				C022 D008 E006 E030 E034
	CCMT080308	0.8		●								●																●				
	CCMT09T302	0.2		●	▲							●										●	●	●	●							
	CCMT09T304	0.4	●	●	▲							●				●				●		●	●	●	●			●				
	CCMT09T308	0.8	●	●	▲							●				●				●		●	●	●	●			●				
	CCMT120404	0.4	●	●	▲							●				●				●		●	●	●	●			●				
	CCMT120408	0.8	●	●	▲							●				●				●		●	●	●				●				
Medium Cutting	CCMT120412	1.2		●	▲							●				●							●									
MV	CCMH060202-MV	0.2			▲		●				▲	●									●	●	●	●	●		●					
	CCMH060204-MV	0.4			▲		●				▲	●									●	●	●	●	●		●					C022 D008 E006 E030 E034
Medium Cutting																																

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material		
	P	Steel
	M	Stainless Steel
	K	Cast Iron
	N	Non-ferrous Metal
	S	Heat-resistant Alloy, Titanium Alloy

Shape	Order Number	RE (mm)	Coated																Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
* MW	CCMT060204-MW	0.4			▲						▲											●		●		●						
	CCMT060208-MW	0.8		● ▲							▲											●		●		●						C022
	CCMT09T304-MW	0.4		● ▲							▲											●		●		●						D008
	CCMT09T308-MW	0.8		● ▲							▲											●		●		●						E006
	CCMT120404-MW	0.4		● ▲							▲						●					●				●						E030
Medium Cutting (Wiper)	CCMT120408-MW	0.8		● ▲							▲						●					●				●						E034
R/L-SR	CCET0602V3R-SR	0.03																		●		●								●		
	CCET0602V3L-SR	0.03																		●		●								●		
	CCET060201R-SR	0.1																		●		●								●		
	CCET060201L-SR	0.1																		●		●								●		
	CCET060202R-SR	0.2																		●		●								●		
	CCET060202L-SR	0.2																		●		●								●		
	CCET060204R-SR	0.4																		●		●								●		C022
	CCET060204L-SR	0.4																		●		●								●		D008
	CCET09T3V3R-SR	0.03																		●		●								●		E006
	CCET09T3V3L-SR	0.03																		●		●								●		E030
	CCET09T301R-SR	0.1																		●		●								●		E034
	CCET09T301L-SR	0.1																		●		●								●		
	CCET09T302R-SR	0.2																		●		●								●		
	CCET09T302L-SR	0.2																		●		●								●		
	CCET09T304R-SR	0.4																		●		●								●		
Medium Cutting	CCET09T304L-SR	0.4																		●		●								●		
R/L-SN	CCET060200R-SN	0																		●		●								●		
	CCET060200L-SN	0																		●		●								●		
	CCET0602V3R-SN	0.03																		●		●								●		
	CCET0602V3L-SN	0.03																		●		●								●		
	CCET060201R-SN	0.1																		●		●								●		
	CCET060201L-SN	0.1																		●		●								●		
	CCET060202R-SN	0.2																		●		●								●		
	CCET060202L-SN	0.2																		●		●								●		
	CCET060204R-SN	0.4																		●		●								●		C022
	CCET060204L-SN	0.4																		●		●								●		D008
	CCET09T300R-SN	0																		●		●								●		E006
	CCET09T300L-SN	0																		●		●								●		E030
	CCET09T3V3R-SN	0.03																		●		●								●		E034
	CCET09T3V3L-SN	0.03																		●		●								●		
	CCET09T301R-SN	0.1																		●		●								●		
	CCET09T301L-SN	0.1																		●		●								●		
	CCET09T302R-SN	0.2																		●		●								●		
	CCET09T302L-SN	0.2																		●		●								●		
	CCET09T304R-SN	0.4																		●		●								●		
Medium Cutting	CCET09T304L-SN	0.4																		●		●								●		

* Please refer to A028 before using the MW breaker (wiper insert).

CHIP BREAKERS ➤ A054
GRADES ➤ A030
IDENTIFICATION ➤ A002

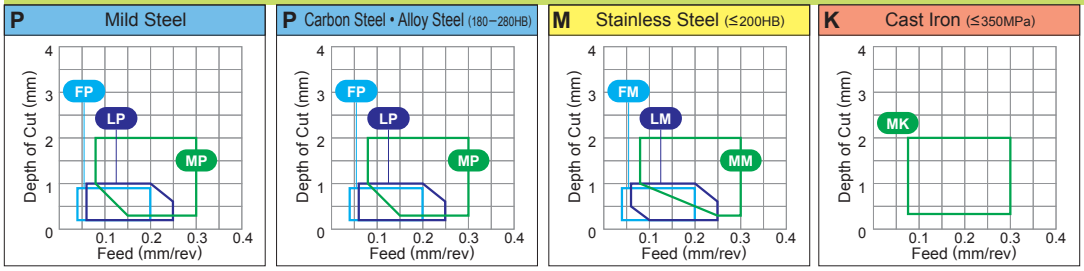
TURNING INSERTS [POSITIVE]

80° CC TYPE INSERTS WITH HOLE

CCGT 06 02 02 SMG
Size Thickness Corner Radius Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting····· Light Cutting····· Medium Cutting·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
R/L-SN	CCGT0602V3R-SN	0.03																		●											
	CCGT060201R-SN	0.1																		●											
	CCGT060201L-SN	0.1																		●											
	CCGT060202R-SN	0.2																		●											
	CCGT060202L-SN	0.2																		●											
	CCGT09T3V3R-SN	0.03																		●											
	CCGT09T3V3L-SN	0.03																		●											
	CCGT09T301R-SN	0.1																		●											
	CCGT09T301L-SN	0.1																		●											
	CCGT09T302R-SN	0.2																		●											
	CCGT09T302L-SN	0.2																		●											
	CCGT09T304R-SN	0.4																		●											
Medium Cutting	CCGT09T304L-SN	0.4																		●											
R/LW-SN *	CCET0602V3RW-SN	0.03																		●											
	CCET0602V3LW-SN	0.03																		●											
	CCET09T3V3RW-SN	0.03																		●											
Medium Cutting (Wiper)	CCET09T3V3LW-SN	0.03																		●											
SMG	CCGT060202M-SMG	0.2																		●											
	CCGT060204M-SMG	0.4																		●											
Medium Cutting																															
Flat Top	CCMW060202	0.2																											●		
	CCMW060204	0.4												●	●	●	●											●		●	
NEW	CCMW060208	0.8												●	●																
	CCMW09T304	0.4												●	●	●	●													●	
	CCMW09T308	0.8												●	●	●	●											●		●	
NEW	CCMW09T312	1.2												●	●																
	CCMW120404	0.4												●	●	●	●													●	
	CCMW120408	0.8												●	●	●	●													●	
	CCMW120412	1.2												●	●		●														
Flat Top	CCGW060200	0																				●									
	CCGW0602V5	0.05																				●									
	CCGW09T300	0																				●									
	CCGW09T3V5	0.05																				●									

C022 D008 E006 E030 E034

* Please refer to A028 before using the R/LW-SN breaker (wiper insert).

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products. (10 inserts in one case)

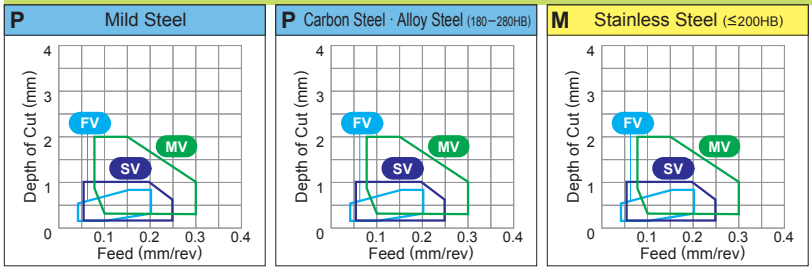
CHIP BREAKERS ➤ A054

80° CP TYPE INSERTS WITH HOLE

CPMH 08 02 02- FV
Size Thickness Corner Radius Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Light Cutting ····· Medium Cutting ·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	● ◔ ✣ ◔ ✣ ✣ ◔ ✣ ○ ✣ ● ◔ ✣ ✣ ◔ ✣ ✣ ○ ○ ○ ○ ✣ ● ◔ ◔ ✣ ● ◔
M	Stainless Steel	◔ ✣ ○ ✣ ◔ ✣ ✣ ✣ ○ ○ ○ ✣ ● ◔ ◔ ✣
K	Cast Iron	◔ ✣ ● ◔ ● ◔ ✣ ✣ ● ◔ ◔ ✣ ● ● ●
N	Non-ferrous Metal	● ◔ ● ● ◔
S	Heat-resistant Alloy, Titanium Alloy	● ◔ ✣ ● ◔ ✣ ● ◔

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	VP45N	Carbide: UTi20T	HTi05T	HTi10	RT9010	Applicable Holder Page
FV	**CPMH080202-FV**	0.2			▲															●		●	●	●								
	CPMH**080204-FV**	0.4			▲															●		●	●	●								
	CPMH**090302-FV**	0.2			▲															●		●	●	●								E006
	CPMH**090304-FV**	0.4			▲															●		●	●	●								
Finish Cutting	CPMH**090308-FV**	0.8			▲															●		●	●	●								
R/L-F	**CPMH080204R-F**	0.4																		●		●								●		
	CPMH**080204L-F**	0.4																		●		●								●		
	CPMH**090304R-F**	0.4																		●		●								●		E006
Finish Cutting	CPMH**090304L-F**	0.4																		●		●			●					●		
R/L-F	**CPGT080204R-F**	0.4																				●										
	CPGT**080204L-F**	0.4																				●										
	CPGT**090302R-F**	0.2																				●										—
	CPGT**090302L-F**	0.2																				●										
	CPGT**090304R-F**	0.4																				●										
Finish Cutting	CPGT**090304L-F**	0.4																				●										
Standard	**CPGT080202**	0.2																												●		
	CPGT**080204**	0.4																												●		
	CPGT**090302**	0.2																												●		—
	CPGT**090304**	0.4																												●		
Finish Cutting																																
SV	**CPMH080202-SV**	0.2			▲		●				▲	●								●		●	●	●			●						
	CPMH**080204-SV**	0.4			▲		●				▲	●								●		●	●	●			●						
	CPMH**090302-SV**	0.2			▲		●				▲	●								●		●	●	●			●						E006
	CPMH**090304-SV**	0.4			▲		●				▲	●								●		●	●	●			●						
Light Cutting	CPMH**090308-SV**	0.8			▲		●				▲	●								●		●	●	●			●						
Standard	**CPMX080204**	0.4		●																	●											
	CPMX**080208**	0.8		●																	●											
	CPMX**090304**	0.4		●																	●	●						●				—
Medium Cutting	CPMX**090308**	0.8		●	▲																●							●				
MV	**CPMH080204-MV**	0.4			▲		●				▲	●								●		●	●	●	●		●					
	CPMH**080208-MV**	0.8			▲		●				▲	●								●		●	●	●	●		●					
	CPMH**090304-MV**	0.4			▲		●				▲	●								●		●	●	●	●		●					E006
Medium Cutting	CPMH**090308-MV**	0.8			▲		●				▲	●								●		●	●	●	●		●					

CHIP BREAKERS ➤ A062
GRADES ➤ A030
IDENTIFICATION ➤ A002

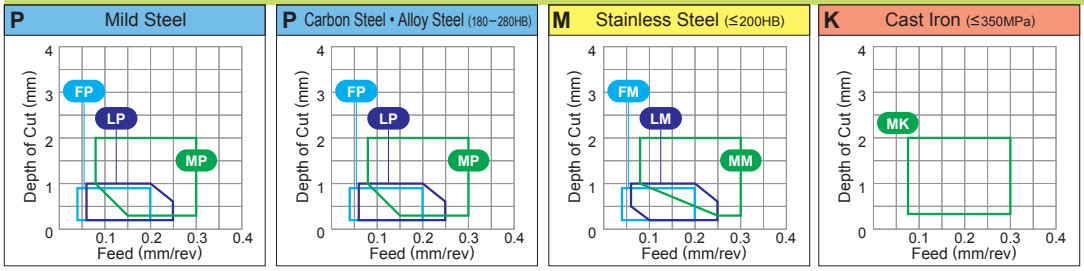
TURNING INSERTS [POSITIVE]

55° DC TYPE INSERTS WITH HOLE

DCMT 07 02 02- FP
Size Thickness Corner Radius
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Light Cutting ····· Medium Cutting ·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

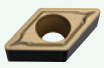
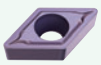
Work Material		
P	Steel	● ◔ ✣ ◔ ✣ ✣ ◔ ✣ ○ ✣ ● ◔ ✣ ✣ ● ◔ ○ ◔ ● ● ◔ ✣ ● ● ◔ ✣ ● ◔
M	Stainless Steel	◔ ✣ ○ ✣ ◔ ✣ ✣ ○ ○ ✣ ○ ○ ✣ ● ◔
K	Cast Iron	◔ ✣ ● ◔ ◔ ✣ ● ◔
N	Non-ferrous Metal	●
S	Heat-resistant Alloy, Titanium Alloy	● ◔ ✣ ◔ ◔

Shape	Order Number	RE (mm)	Coated																	Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 NEW	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 NEW	MC5015 NEW	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
FP	**DCMT070202-FP**	0.2		●		●	●															●		●							
	DCMT**070204-FP**	0.4		●		●	●															●		●							
	DCMT**11T302-FP**	0.2		●		●	●															●		●							
	DCMT**11T304-FP**	0.4		●		●	●															●		●							
Finish Cutting	DCMT**11T308-FP**	0.8		●		●	●															●		●							
FM	**DCMT070202-FM**	0.2																		●											
	DCMT**070204-FM**	0.4																		●											
	DCMT**11T302-FM**	0.2																		●											
	DCMT**11T304-FM**	0.4																		●											
Finish Cutting	DCMT**11T308-FM**	0.8																		●											
FV	**DCMT070202-FV**	0.2		●	▲															●		●		●							
	DCMT**070204-FV**	0.4		●	▲															●		●		●							
	DCMT**070208-FV**	0.8			▲															●		●									
	DCMT**11T302-FV**	0.2			▲															●		●									
	DCMT**11T304-FV**	0.4		●	▲															●		●		●							
Finish Cutting	DCMT**11T308-FV**	0.8		●	▲															●		●		●							
AZ	**DCGT070202-AZ**	0.2																											●		
	DCGT**070204-AZ**	0.4																											●		
	DCGT**11T302-AZ**	0.2																											●		
	DCGT**11T304-AZ**	0.4																											●		
Medium Cutting – Finish Cutting	DCGT**11T308-AZ**	0.8																											●		
R/L-F	**DCGT070202R-F**	0.2																		●		●							●		
	DCGT**070202L-F**	0.2																		●		●		●					●		
	DCGT**070204R-F**	0.4																		●		●							●		
	DCGT**070204L-F**	0.4																		●		●		●					●		
	DCGT**11T302R-F**	0.2																		●		●							●		
	DCGT**11T302L-F**	0.2																		●		●		●					●		
	DCGT**11T304R-F**	0.4																		●		●							●		
Finish Cutting	DCGT**11T304L-F**	0.4																		●		●		●					●		
LP	**DCMT070204-LP**	0.4		●		●	●															●		●							
	DCMT**070208-LP**	0.8		●		●	●															●		●							
	DCMT**11T304-LP**	0.4		●		●	●															●		●							
Light Cutting	DCMT**11T308-LP**	0.8		●		●	●															●		●							

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	● ◕ ✣ ◕ ✣ ✣ ◕ ✣ ○ ✣ ◕ ✣ ✣ ✣ ● ● ✣ ✣ ● ◕ ○ ◕ ○ ○ ✣ ● ◕ ✣ ● ◕ ◕
M	Stainless Steel	◕ ✣ ○ ✣ ◕ ✣ ✣ ✣ ✣ ✣ ○ ○ ✣
K	Cast Iron	◕ ✣ ● ◕ ◕ ✣ ● ● ○ ● ● ✣
N	Non-ferrous Metal	◕
S	Heat-resistant Alloy, Titanium Alloy	● ◕ ✣ ◕ ◕

Shape	Order Number	RE (mm)	Coated																Cermet		Coated Cermet				Carbide					Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
LM	**DCMT070204-LM**	0.4							●	●										●											C023 D009 D026 E008 E009 E029 E031
	DCMT**070208-LM**	0.8							●	●										●											
	DCMT**11T304-LM**	0.4							●	●										●											
	DCMT**11T308-LM**	0.8							●	●										●											
Light Cutting																															
SV	**DCMT070202-SV**	0.2			▲						▲	●								●		●	●				●					C023 D009 D026 E008 E009 E029 E031
	DCMT**070204-SV**	0.4		●	▲						▲	●								●		●	●				●					
	DCMT**070208-SV**	0.8		●	▲						▲	●								●		●	●				●					
	DCMT**11T302-SV**	0.2		●	▲						▲	●								●		●	●				●					
	DCMT**11T304-SV**	0.4		●	▲						▲	●								●		●	●				●					
Light Cutting	DCMT**11T308-SV**	0.8		●	▲						▲	●								●		●	●				●					
R/L-SS	**DCGT0702V3R-SS**	0.03																		●											C023 D009 D026 E008 E009 E029 E031
	DCGT**0702V3L-SS**	0.03																		●											
	DCGT**070201R-SS**	0.1																		●											
	DCGT**070201L-SS**	0.1																		●											
	DCGT**070202R-SS**	0.2																		●											
	DCGT**070202L-SS**	0.2																		●											
	DCGT**11T3V3R-SS**	0.03																		●											
	DCGT**11T301R-SS**	0.1																		●											
Light Cutting	DCGT**11T302R-SS**	0.2																		●											
NEW **MK**	**DCMT070204-MK**	0.4												●	●																C023 D009 D026 E008 E009 E029 E031
	DCMT**11T304-MK**	0.4												●	●																
	DCMT**11T308-MK**	0.8												●	●																
	DCMT**150404-MK**	0.4												●	●																
Medium Cutting	DCMT**150408-MK**	0.8												●	●																
MP	**DCMT070204-MP**	0.4		●		●	●															●		●							C023 D009 D026 E008 E009 E029 E031
	DCMT**070208-MP**	0.8		●		●	●															●		●							
	DCMT**11T304-MP**	0.4		●		●	●															●		●							
	DCMT**11T308-MP**	0.8		●		●	●															●		●							
	DCMT**150404-MP**	0.4		●		●	●															●		●							
Medium Cutting	DCMT**150408-MP**	0.8		●		●	●															●		●							
MM	**DCMT070204-MM**	0.4							●	●										●											C023 D009 D026 E008 E009 E029 E031
	DCMT**070208-MM**	0.8							●	●										●											
	DCMT**11T304-MM**	0.4							●	●										●											
	DCMT**11T308-MM**	0.8							●	●										●											
	DCMT**150404-MM**	0.4							●	●										●											
Medium Cutting	DCMT**150408-MM**	0.8							●	●										●											
Standard	**DCMT070202**	0.2		●	▲							●										●	●	●	●			●				C023 D009 D026 E008 E009 E029 E031
	DCMT**070204**	0.4	●	●	▲							●				●				●		●	●	●	●			●				
	DCMT**070208**	0.8		●								●				●						●	●	●	●							
	DCMT**11T302**	0.2		●	▲							●										●	●	●	●			●				
	DCMT**11T304**	0.4	●	●	▲							●				●				●		●	●	●	●			●				
	DCMT**11T308**	0.8	●	●	▲							●				●				●		●	●	●	●			●				
	DCMT**11T312**	1.2		●																											
	DCMT**150404**	0.4		●	▲							●				●						●	●	●	●			●				
	DCMT**150408**	0.8		●	▲							●				●						●	●	●				●				
Medium Cutting	DCMT**150412**	1.2		●																											

CHIP BREAKERS ➤ A054
GRADES ➤ A030
IDENTIFICATION ➤ A002

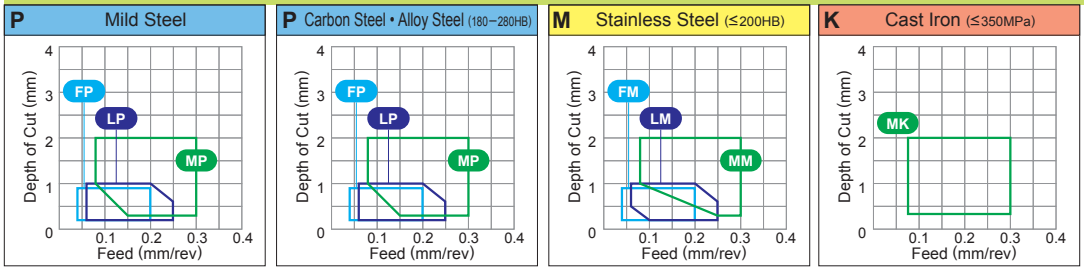
TURNING INSERTS [POSITIVE]

55° DC TYPE INSERTS WITH HOLE

DCMT 07 02 02- MV
Size Thickness Corner Radius Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting····· Light Cutting····· Medium Cutting·····



Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																		Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTI20T	HTi05T	HTi10	RT9010	
MV	**DCMT070202-MV**	0.2		●	▲		●				▲	●								●		●	●	●	●		●					C023 D009 D026 E008 E009 E029 E031
	DCMT**070204-MV**	0.4		●	▲		●				▲	●								●		●	●	●	●		●					
	DCMT**070208-MV**	0.8		●	▲		●				▲	●								●		●	●	●	●		●					
	DCMT**11T302-MV**	0.2		●	▲		●				▲	●								●		●	●	●	●		●					
	DCMT**11T304-MV**	0.4		●	▲		●				▲	●								●		●	●	●	●		●					
Medium Cutting	DCMT**11T308-MV**	0.8		●	▲		●				▲	●								●		●	●	●	●		●					
R/L-SR	**DCET0702V3R-SR**	0.03																		●		●								●		C023 D009 D026 E008 E009 E029 E031
	DCET**0702V3L-SR**	0.03																		●		●								●		
	DCET**070201R-SR**	0.1																		●		●								●		
	DCET**070201L-SR**	0.1																		●		●								●		
	DCET**070202R-SR**	0.2																		●		●								●		
	DCET**070202L-SR**	0.2																		●		●								●		
	DCET**070204R-SR**	0.4																		●		●								●		
	DCET**070204L-SR**	0.4																		●		●								●		
	DCET**11T3V3R-SR**	0.03																		●		●								●		
	DCET**11T3V3L-SR**	0.03																		●		●								●		
	DCET**11T301R-SR**	0.1																		●		●								●		
	DCET**11T301L-SR**	0.1																		●		●								●		
	DCET**11T302R-SR**	0.2																		●		●								●		
	DCET**11T302L-SR**	0.2																		●		●								●		
	DCET**11T304R-SR**	0.4																		●		●								●		
Medium Cutting	DCET**11T304L-SR**	0.4																		●		●								●		
R/L-SN	**DCET070200R-SN**	0																		●		●								●		C023 D009 D026 E008 E009 E029 E031
	DCET**070200L-SN**	0																		●		●								●		
	DCET**0702V3R-SN**	0.03																		●		●								●		
	DCET**0702V3L-SN**	0.03																		●		●								●		
	DCET**070201R-SN**	0.1																		●		●								●		
	DCET**070201L-SN**	0.1																		●		●								●		
	DCET**070202R-SN**	0.2																		●		●								●		
	DCET**070202L-SN**	0.2																		●		●								●		
	DCET**070204R-SN**	0.4																		●		●								●		
	DCET**070204L-SN**	0.4																		●		●								●		
	DCET**11T300R-SN**	0																		●		●								●		
	DCET**11T300L-SN**	0																		●		●								●		
	DCET**11T3V3R-SN**	0.03																		●		●								●		
Medium Cutting	DCET**11T3V3L-SN**	0.03																		●		●								●		

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	● ◕ ✣ ◕ ✣ ✣ ◕ ✣ ○ ✣ ✣ ◕ ✣ ✣ ● ◕ ✣ ✣ ● ◕ ◕ ◕ ● ◕ ✣ ✣ ● ◕ ◕
M	Stainless Steel	◕ ✣ ○ ✣ ○ ✣ ✣ ◕ ✣ ○ ○ ✣ ● ● ◕
K	Cast Iron	◕ ✣ ● ● ◕ ● ✣ ● ● ● ● ✣ ● ◕
N	Non-ferrous Metal	◕
S	Heat-resistant Alloy, Titanium Alloy	● ◕ ✣ ◕ ◕

Shape	Order Number	RE (mm)	Coated																Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 NEW	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 NEW	MC5015 NEW	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
R/L-SN	**DCET11T301R-SN**	0.1																	●		●							●		C023 D009 D026 E008 E009 E029 E031
	DCET**11T301L-SN**	0.1																	●		●							●		
	DCET**11T302R-SN**	0.2																	●		●							●		
	DCET**11T302L-SN**	0.2																	●		●							●		
	DCET**11T304R-SN**	0.4																	●		●							●		
Medium Cutting	DCET**11T304L-SN**	0.4																	●		●							●		
R/L-SN	**DCGT0702V3R-SN**	0.03																	●											C023 D009 D026 E008 E009 E029 E031
	DCGT**070201R-SN**	0.1																	●											
	DCGT**070202R-SN**	0.2																	●											
	DCGT**070202L-SN**	0.2																	●											
	DCGT**11T3V3R-SN**	0.03																	●											
	DCGT**11T3V3L-SN**	0.03																	●											
	DCGT**11T301R-SN**	0.1																	●											
	DCGT**11T301L-SN**	0.1																	●											
	DCGT**11T302R-SN**	0.2																	●											
	DCGT**11T302L-SN**	0.2																	●											
	DCGT**11T304R-SN**	0.4																	●											
Medium Cutting	DCGT**11T304L-SN**	0.4																	●											
R/LW-SN *	**DCET0702V3RW-SN**	0.03																	●											C023 D009 D026 E008 E009 E029 E031
	DCET**0702V3LW-SN**	0.03																	●											
	DCET**11T3V3RW-SN**	0.03																	●											
Medium Cutting (Wiper)	DCET**11T3V3LW-SN**	0.03																	●											
SMG	**DCGT070202M-SMG**	0.2																	●											C023 D009 D026 E008 E009 E029 E031
	DCGT**070204M-SMG**	0.4																	●											
	DCGT**11T302M-SMG**	0.2																	●											
	DCGT**11T304M-SMG**	0.4																	●											
Medium Cutting																														
Flat Top	**DCMW070204**	0.4												●	●	●	●													●	C023 D009 D026 E008 E009 E029 E031
	DCMW**11T304**	0.4												●	●	●	●											●		●	
	DCMW**11T308**	0.8												●	●	●	●													●	
	DCMW**150404**	0.4																												●	
	DCMW**150408**	0.8																												●	
Flat Top	**DCGW070200**	0																			●										C023 D009 D026 E008 E009 E029 E031
	DCGW**0702V5**	0.05																			●										
	DCGW**11T300**	0																			●										
	DCGW**11T3V5**	0.05																			●										

* Please refer to A028 before using the R/LW-SN breaker (wiper insert).

CHIP BREAKERS ➤ A054
GRADES ➤ A030
IDENTIFICATION ➤ A002

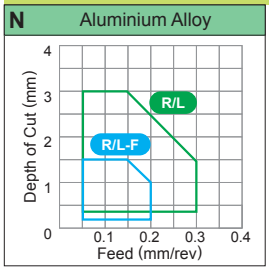
55° DE TYPE INSERTS WITH HOLE

DEGX 15 04 02 R
Size Thickness Corner Radius R/L
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Medium Cutting ·····

N Aluminium Alloy



Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	VP45N	Carbide: UTi20T	HTi05T	HTi10	RT9010	Applicable Holder Page
R/L-F	DEGX150402R-F	0.2																												●		C032
Finish Cutting (For Aluminium Alloy)	DEGX150402L-F	0.2																												●		
	DEGX150404R-F	0.4																												●		
	DEGX150404L-F	0.4																												●		
R/L	DEGX150402R	0.2																												●		C032
Medium Cutting (For Aluminium Alloy)	DEGX150402L	0.2																												●		
	DEGX150404R	0.4																												●		
	DEGX150404L	0.4																												●		

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

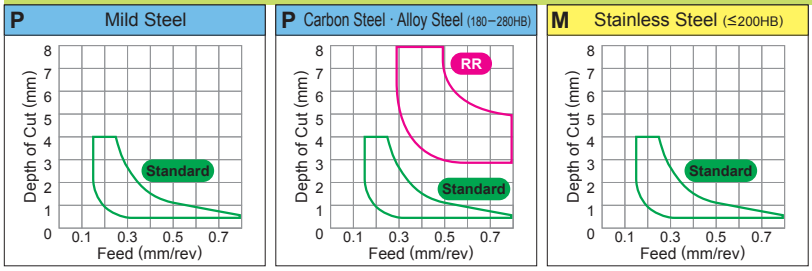
CHIP BREAKERS ➤ A066

RC TYPE INSERTS WITH HOLE

RCGT 08 03 M0- AZ
Size · Thickness · Corner Radius · Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Medium Cutting ····· Heavy Cutting ·····



Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																		Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 NEW	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 NEW	MC5015 NEW	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
AZ  Medium Cutting – Finish Cutting	**RCGT0803M0-AZ**	–																											●		C025
	RCGT**10T3M0-AZ**	–																											●		
Standard  Medium Cutting	**RCMT0602M0**	–		●																		●	●	●				●				C025
	RCMT**0803M0**	–		●								●										●	●	●				●				
Standard  Medium Cutting	**RCMX1003M0**	–		●	▲							●						●				●	●	●								C024 H012
	RCMX**1204M0**	–	●	●	▲							●	●		●		●	●	●			●	●	●								
	RCMX**1606M0**	–	●	●	▲			●				●	●					●	●													
	RCMX**2006M0**	–	●	●	▲			●				●																				
	RCMX**2507M0**	–	●	●	▲																											
	RCMX**3209M0**	–	●	●	▲																											
RR  Heavy Cutting	**RCMX1606M0-RR**	–		●	▲			●				●																				–
	RCMX**2006M0-RR**	–		●	▲			●				●																				
	RCMX**2507M0-RR**	–		●	▲			●				●																				
	RCMX**3209M0-RR**	–		●	▲																											

CHIP BREAKERS ➤ A054
GRADES ➤ A030
IDENTIFICATION ➤ A002

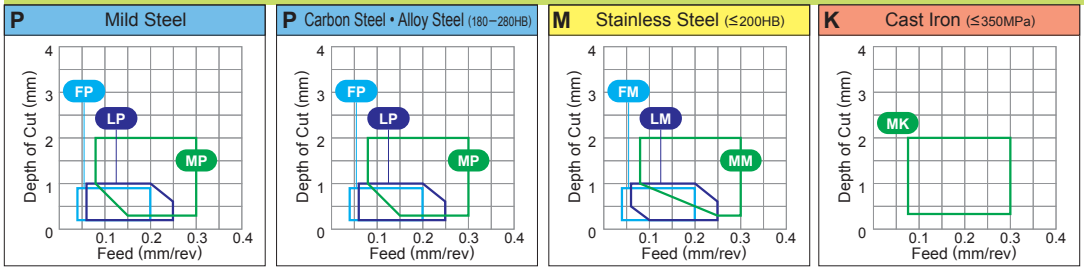
TURNING INSERTS [POSITIVE]

90° SC TYPE INSERTS WITH HOLE

SCMT 09 T3 04- FP
Size / Thickness / Corner Radius / Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Light Cutting ····· Medium Cutting ·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	VP45N	Carbide: UTi20T	HTi05T	HTi10	RT9010	Applicable Holder Page
FP  Finish Cutting	**SCMT09T304-FP**	0.4	●		●	●																●		●								C026 E033
	SCMT09T308-FP	0.8	●		●	●																●		●								
FM  Finish Cutting	**SCMT09T304-FM**	0.4																		●												C026 E033
	SCMT09T308-FM	0.8																		●												
FV  Finish Cutting	**SCMT09T304-FV**	0.4			▲																	●	●		●		●					C026 E033
LP  Light Cutting	**SCMT09T304-LP**	0.4	●		●	●																●		●								C026 E033
	SCMT09T308-LP	0.8	●		●	●																●		●								
LM  Light Cutting	**SCMT09T304-LM**	0.4							●	●										●												C026 E033
	SCMT09T308-LM	0.8							●	●										●												
NEW **MK**  Medium Cutting	**SCMT09T304-MK**	0.4												●	●																	C026 E033
	SCMT09T308-MK	0.8												●	●																	
	SCMT120408-MK	0.8												●	●																	
MP  Medium Cutting	**SCMT09T304-MP**	0.4	●		●	●																●		●								C026 E033
	SCMT09T308-MP	0.8	●		●	●																●		●								
	SCMT120404-MP	0.4	●		●	●																●		●								
	SCMT120408-MP	0.8	●		●	●																●		●								

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
MM	**SCMT09T304-MM**	0.4							●	●										●											C026 E033
	SCMT**09T308-MM**	0.8							●	●										●											
	SCMT**120404-MM**	0.4							●	●										●											
	SCMT**120408-MM**	0.8							●	●										●											
Medium Cutting																															
Standard	**SCMT09T304**	0.4	●	●	▲							●				●						●	●	●	●		●				C026 E033
	SCMT**09T308**	0.8	●	●	▲							●				●						●	●	●	●		●				
	SCMT**120404**	0.4	●	●	▲							●				●						●	●	●							
	SCMT**120408**	0.8	●	●	▲							●				●						●	●	●	●		●				
Medium Cutting	SCMT**120412**	1.2		●																											
Flat Top	**SCMW09T304**	0.4												●	●		●											●		●		C026 E033
	SCMW**09T308**	0.8												●	●	●	●															
	SCMW**120408**	0.8												●	●	●	●															

CHIP BREAKERS ➤ A054
GRADES ➤ A030
IDENTIFICATION ➤ A002

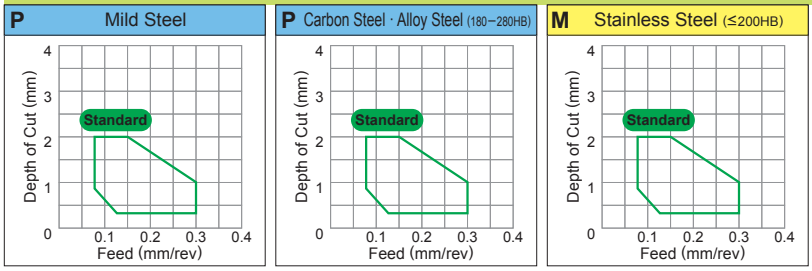
TURNING INSERTS [POSITIVE]

90° SP TYPE INSERTS WITH HOLE

SPMT 09 03 04
Size Thickness Corner Radius
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Medium Cutting·····



Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	VP45N	Carbide: UTi20T	HTi05T	HTi10	RT9010	Applicable Holder Page
Standard	**SPMT090304**	0.4																				●										
	SPMT**090308**	0.8																				●										
	SPMT**120308**	0.8																				●						●				M006
Medium Cutting																																
Flat Top	**SPMW090304**	0.4																		●	●	●						●		●		
	SPMW**090308**	0.8																		●	●	●						●		●		
	SPMW**120304**	0.4																		●	●	●						●		●		L113
	SPMW**120308**	0.8																		●	●	●						●		●		
Flat Top	**SPGX090304**	0.4																				●								●		
	SPGX**090308**	0.8																												●		
	SPGX**120304**	0.4																												●		M006
	SPGX**120308**	0.8																												●		

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

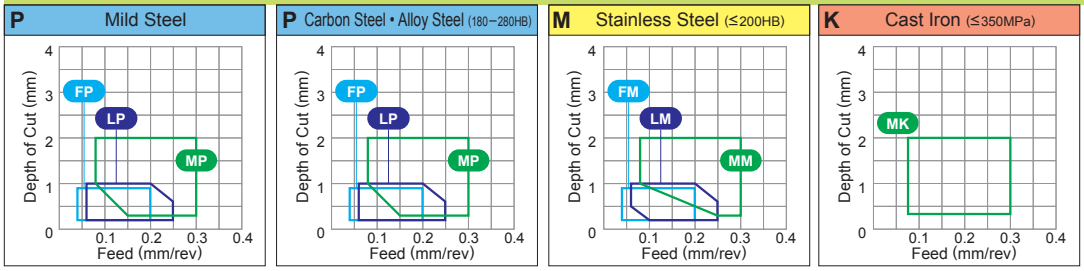
CHIP BREAKERS ➤ A062

60° TC TYPE INSERTS WITH HOLE

TCMT 09 02 02- FP
Size Thickness Corner Radius Chip Breaker
* Please refer to page A002.

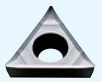
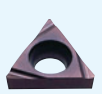
CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Light Cutting ····· Medium Cutting ·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	● ◔ ✣ ◔ ✣ ✣ ◔ ✣ ✣ ● ◔ ◔ ● ◔ ✣ ✣
M	Stainless Steel	◔ ✣ ○ ✣ ◔ ✣ ✣ ○ ○ ○ ✣ ● ●
K	Cast Iron	◔ ● ● ✣ ● ◔ ✣ ● ● ✣ ● ◔
N	Non-ferrous Metal	◔
S	Heat-resistant Alloy, Titanium Alloy	● ◔ ✣ ●

Shape	Order Number	RE (mm)	Coated																	Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 NEW	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 NEW	MC5015 NEW	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
FP	**TCMT090202-FP**	0.2		●		●	●															●		●							
	TCMT**090204-FP**	0.4		●		●	●															●		●							C027 E028
	TCMT**110202-FP**	0.2		●		●	●															●		●							
	TCMT**110204-FP**	0.4		●		●	●															●		●							
Finish Cutting	TCMT**16T304-FP**	0.4		●		●	●															●		●							
FM	**TCMT090202-FM**	0.2																		●											
	TCMT**090204-FM**	0.4																		●											C027 E028
	TCMT**110202-FM**	0.2																		●											
	TCMT**110204-FM**	0.4																		●											
Finish Cutting	TCMT**16T304-FM**	0.4																		●											
FV	**TCMT110204-FV**	0.4			▲																	●	●		●		●				
	TCMT**16T304-FV**	0.4			▲																	●	●		●						C027 E028
Finish Cutting																															
AZ	**TCGT110202-AZ**	0.2																												●	
	TCGT**110204-AZ**	0.4																												●	
	TCGT**110208-AZ**	0.8																												●	C027 E028
	TCGT**16T302-AZ**	0.2																												●	
Medium Cutting – Finish Cutting	TCGT**16T304-AZ**	0.4																												●	
	TCGT**16T308-AZ**	0.8																												●	
R/L-F	**TCGT0601V3L-F**	0.03																				●									
	TCGT**060101L-F**	0.1																		●		●									
	TCGT**060102R-F**	0.2																		●		●								●	E017
	TCGT**060102L-F**	0.2																		●		●								●	
	TCGT**060104R-F**	0.4																				●								●	
Finish Cutting	TCGT**060104L-F**	0.4																		●		●								●	
LP	**TCMT090204-LP**	0.4		●		●	●															●		●							
	TCMT**090208-LP**	0.8		●		●	●															●		●							
	TCMT**110204-LP**	0.4		●		●	●															●		●							C027 E028
	TCMT**110208-LP**	0.8		●		●	●															●		●							
	TCMT**16T304-LP**	0.4		●		●	●															●		●							
Light Cutting	TCMT**16T308-LP**	0.8		●		●	●															●		●							

CHIP BREAKERS ➤ A054
GRADES ➤ A030
IDENTIFICATION ➤ A002

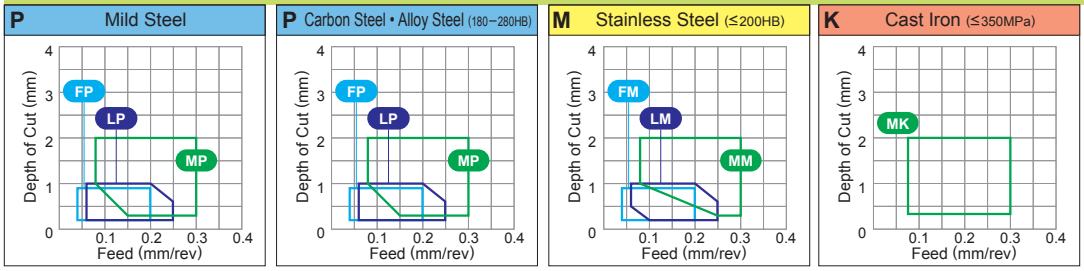
TURNING INSERTS [POSITIVE]

60° TC TYPE INSERTS WITH HOLE

TCMT 09 02 04- LM
Size Thickness Corner Radius Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting····· Light Cutting····· Medium Cutting·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																Cermet		Coated Cermet				Carbide					Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 NEW	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 NEW	MC5015 NEW	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
LM	**TCMT090204-LM**	0.4							●	●										●											
	TCMT090208-LM	0.8							●	●										●											
	TCMT110204-LM	0.4							●	●										●											C027 E028
	TCMT110208-LM	0.8							●	●										●											
	TCMT16T304-LM	0.4							●	●										●											
Light Cutting	TCMT16T308-LM	0.8							●	●										●											
NEW **MK**	**TCMT110204-MK**	0.4												●	●																
	TCMT16T304-MK	0.4												●	●																C027 E028
	TCMT16T308-MK	0.8												●	●																
	TCMT16T312-MK	1.2												●	●																
Medium Cutting																															
MP	**TCMT090204-MP**	0.4		●		●	●															●		●							
	TCMT090208-MP	0.8		●		●	●															●		●							
	TCMT110204-MP	0.4		●		●	●															●		●							
	TCMT110208-MP	0.8		●		●	●															●		●							C027 E028
	TCMT130304-MP	0.4		●		●	●															●		●							
	TCMT16T304-MP	0.4		●		●	●															●		●							
	TCMT16T308-MP	0.8		●		●	●															●		●							
Medium Cutting	TCMT16T312-MP	1.2		●		●	●															●		●							
MM	**TCMT090204-MM**	0.4							●	●										●											
	TCMT090208-MM	0.8							●	●										●											
	TCMT110204-MM	0.4							●	●										●											
	TCMT110208-MM	0.8							●	●										●											C027 E028
	TCMT130304-MM	0.4							●	●										●											
	TCMT16T304-MM	0.4							●	●										●											
	TCMT16T308-MM	0.8							●	●										●											
Medium Cutting	TCMT16T312-MM	1.2							●	●										●											
Standard	**TCMT080204**	0.4																				●		●				●			
	TCMT090204	0.4		●	▲							●										●	●	●	●			●			
	TCMT110202	0.2		●	▲							●								●		●	●	●	●						C027 E028
	TCMT110204	0.4	●	●	▲							●					●			●		●	●	●	●			●			
Medium Cutting	TCMT110208	0.8	●	●																●				●							

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	● ◕ ✣ ◕ ✣ ✣ ◕ ✣ ● ✣ ✣ ◕ ✣ ✣ ✣ ◕ ✣ ✣ ◕ ◕ ◕ ◕ ✣ ◕ ◕ ✣ ◕
M	Stainless Steel	◕ ✣ ● ✣ ✣ ✣ ◕ ✣ ✣ ✣ ◕ ◕ ◕ ✣ ◕ ◕
K	Cast Iron	◕ ✣ ● ● ◕ ✣ ● ● ● ◕ ✣ ● ● ✣ ● ◕
N	Non-ferrous Metal	◕
S	Heat-resistant Alloy, Titanium Alloy	● ◕ ● ◕ ✣ ◕ ◕

Shape	Order Number	RE (mm)	Coated																Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
Standard	**TCMT130302**	0.2																				●		●	●						
	TCMT**130304**	0.4		●								●										●		●							
	TCMT**16T304**	0.4	●	●	▲							●				●				●		●	●	●	●			●				C027 E028
	TCMT**16T308**	0.8	●	●	▲							●				●				●		●	●	●	●			●			
Medium Cutting	TCMT**16T312**	1.2		●																											
Flat Top	**TCMW110204**	0.4												●	●	●	●													●		
	TCMW**130304**	0.4																												●		
	TCMW**16T304**	0.4												●	●	●	●													●		C027 E028
	TCMW**16T308**	0.8												●	●	●	●													●		
	NEW TCMW**16T312**	1.2												●	●																	

CHIP BREAKERS ➤ A054
GRADES ➤ A030
IDENTIFICATION ➤ A002

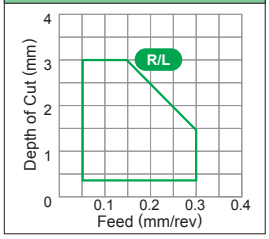
60° TE TYPE INSERTS WITH HOLE

TEGX 16 03 02 R
Size Thickness Corner Radius R/L
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Medium Cutting·····

N Aluminium Alloy



Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material			Shape	Order Number	RE (mm)	Coated																		Cermet		Coated Cermet				Carbide				Applicable Holder Page
						UE6105	UE6110	UE6020	MC6015 NEW	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 NEW	MC5015 NEW	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
	P	Steel				●	◕	✣	◕	✣	✣	◕	✣	●	✣		◕	✣	●	◕		◕	✣	✣	●	◕	◕	●	●	◕	✣		◕		
	M	Stainless Steel										◕	✣	●	✣						◕	✣	✣	●			●	●		✣					
	K	Cast Iron															◕	✣	●	◕		◕	✣		●		●	●		✣	●	◕			
	N	Non-ferrous Metal																														◕			
	S	Heat-resistant Alloy, Titanium Alloy													●						●	◕	✣									◕	◕		
R/L				**TEGX160302R**	0.2																											●			
				TEGX160302L	0.2																											●			C033 E042
				TEGX160304R	0.4																											●			
			Medium Cutting (For Aluminium Alloy)	**TEGX160304L**	0.4																											●			

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

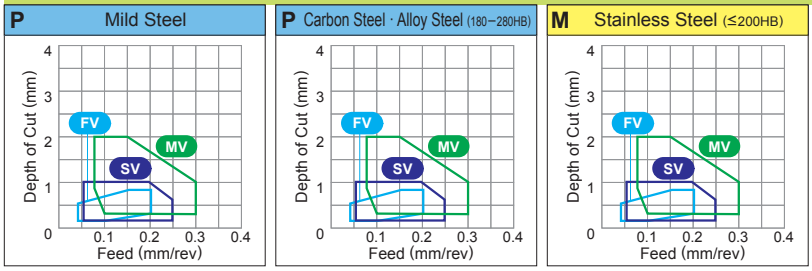
CHIP BREAKERS ➤ A066

60° TP TYPE INSERTS WITH HOLE

TPMH 08 02 02- FV
Size Thickness Corner Radius Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting····· Light Cutting····· Medium Cutting·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 NEW	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 NEW	MC5015 NEW	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
FV	**TPMH080202-FV**	0.2			▲															●		●	●						●		E007
	TPMH080204-FV	0.4			▲															●		●	●						●		
	TPMH090202-FV	0.2			▲															●		●	●						●		
	TPMH090204-FV	0.4			▲															●		●	●						●		
	TPMH110302-FV	0.2			▲															●		●	●						●		
	TPMH110304-FV	0.4			▲															●		●	●						●		
	TPMH110308-FV	0.8			▲															●		●	●						●		
	TPMH160302-FV	0.2			▲															●		●	●						●		
	TPMH160304-FV	0.4			▲															●		●	●						●		
Finish Cutting	TPMH160308-FV	0.8			▲															●		●	●						●		
R/L-FS	**TPGH080202R-FS**	0.2																		●		●								●	E007
	TPGH080202L-FS	0.2																		●		●		●	●					●	
	TPGH080204R-FS	0.4																		●		●								●	
	TPGH080204L-FS	0.4																		●		●		●	●					●	
	TPGH090202R-FS	0.2																		●		●								●	
	TPGH090202L-FS	0.2																		●		●		●	●					●	
	TPGH090204R-FS	0.4																		●		●								●	
	TPGH090204L-FS	0.4																		●		●		●	●					●	
	TPGH110302R-FS	0.2																		●		●								●	
	TPGH110302L-FS	0.2																		●		●		●	●					●	
	TPGH110304R-FS	0.4																		●		●								●	
	TPGH110304L-FS	0.4																		●		●		●	●					●	
	TPGH160304R-FS	0.4																		●		●								●	
	TPGH160304L-FS	0.4																		●		●		●						●	
	TPGH160308R-FS	0.8																		●		●								●	
Finish Cutting	TPGH160308L-FS	0.8																		●		●		●						●	

CHIP BREAKERS ➤ A062
GRADES ➤ A030
IDENTIFICATION ➤ A002

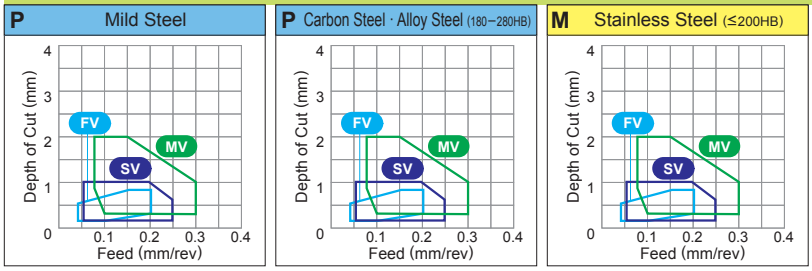
TURNING INSERTS [POSITIVE]

60° TP TYPE INSERTS WITH HOLE

TPGX 08 02 02 R
Size Thickness Corner Radius R/L
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Light Cutting ····· Medium Cutting ·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																	Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 NEW	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 NEW	MC5015 NEW	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
R/L	TPGX080202R	0.2																			●										
	TPGX080202L	0.2																			●						●		●		
	TPGX080204R	0.4																			●								●		
	TPGX080204L	0.4																		●	●						●		●		
	TPGX090202R	0.2																			●										
	TPGX090202L	0.2																			●						●		●		
	TPGX090204R	0.4																			●								●		
	TPGX090204L	0.4																		●	●						●		●		E025
	TPGX090208R	0.8																											●		
	TPGX090208L	0.8																			●								●		
	TPGX110302L	0.2																			●						●		●		
	TPGX110304R	0.4																		●	●								●		
	TPGX110304L	0.4																		●	●						●		●		
	TPGX110308R	0.8																			●								●		
Finish Cutting	TPGX110308L	0.8																		●	●						●	●	●		
L	TPMX090204L	0.4																			●										
	TPMX110304L	0.4																			●										
Finish Cutting																															E025
SV	TPMH080202-SV	0.2			▲		●				▲	●								●		●	●	●							
	TPMH080204-SV	0.4			▲		●				▲	●								●		●	●	●		●					
	TPMH090202-SV	0.2			▲		●				▲	●								●		●	●	●							
	TPMH090204-SV	0.4			▲		●				▲	●								●		●	●	●		●					
	TPMH110302-SV	0.2			▲		●				▲	●								●		●	●	●		●					
	TPMH110304-SV	0.4			▲		●				▲	●								●		●	●	●		●					
	TPMH110308-SV	0.8			▲		●				▲	●								●		●	●	●		●					
	TPMH160302-SV	0.2			▲		●				▲	●								●		●	●	●		●					
	TPMH160304-SV	0.4			▲		●				▲	●								●		●	●	●		●					
Light Cutting	TPMH160308-SV	0.8			▲		●				▲	●								●		●	●	●		●					E007
Standard	TPMX110304	0.4																			●	●		●							
	TPMX110308	0.8																			●	●		●							
Medium Cutting																															E025

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	● ◕ ✣ ◕ ✣ ✣ ◕ ✣ ○ ✣ ✣ ✣ ◕ ✣ ✣ ✣ ● ◕ ◕ ◕ ● ◕ ● ◕ ✣ ● ◕ ✣
M	Stainless Steel	○ ✣ ○ ✣ ○ ○ ✣ ○ ○ ✣
K	Cast Iron	◕ ✣ ● ● ◕ ✣ ● ◕ ✣ ● ● ✣ ● ◕
N	Non-ferrous Metal	◕
S	Heat-resistant Alloy, Titanium Alloy	● ◕ ✣ ◕ ◕

Shape	Order Number	RE (mm)	Coated																Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 NEW	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 NEW	MC5015 NEW	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
MV	**TPMH080202-MV**	0.2			▲		●				▲	●								●		● ●									
	TPMH**080204-MV**	0.4			▲		●				▲	●								●		● ●		● ●		●					
	TPMH**090202-MV**	0.2			▲		●				▲	●								●		● ●		●							
	TPMH**090204-MV**	0.4			▲		●				▲	●								●		● ●		● ●		●					
	TPMH**090208-MV**	0.8			▲		●													●		●	●	●							
	TPMH**110302-MV**	0.2			▲		●				▲	●								●		● ●		● ●		●					
	TPMH**110304-MV**	0.4			▲		●				▲	●								●		● ●		● ●		●					
	TPMH**110308-MV**	0.8			▲		●				▲	●								●		● ●		● ●		●					
	TPMH**160304-MV**	0.4			▲		●				▲	●								●		● ●		● ●		●					
Medium Cutting	TPMH**160308-MV**	0.8			▲		●				▲	●								●		● ●		● ●		●					E007
Flat Top	**TPGX080202**	0.2																											●		
	TPGX**080204**	0.4																		●	●	●						●		●	
	TPGX**080208**	0.8																				●						●		●	
	TPGX**090202**	0.2																												●	
	TPGX**090204**	0.4																			●	●						●		●	
	TPGX**090208**	0.8																			●	●						●		●	
	TPGX**110302**	0.2																												●	
	TPGX**110304**	0.4																		●	●	●						●	●	●	
	TPGX**110308**	0.8																			●	●						●	●	●	
	TPGX**160304**	0.4																				●						●		●	M006
	TPGX**160308**	0.8																										●		●	

CHIP BREAKERS ➤ A062
GRADES ➤ A030
IDENTIFICATION ➤ A002

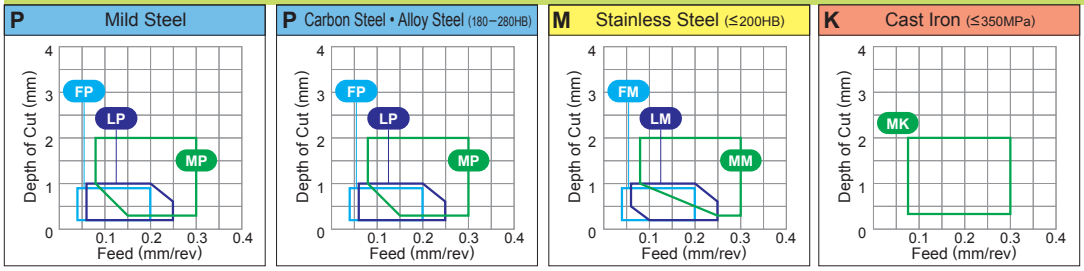
TURNING INSERTS [POSITIVE]

35° VB TYPE INSERTS WITH HOLE

VBMT 11 03 02- FP
Size Thickness Corner Radius Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting····· Light Cutting····· Medium Cutting·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 NEW	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 NEW	MC5015 NEW	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
FP	VBMT110302-FP	0.2		●		●	●															●		●							D010
	VBMT110304-FP	0.4		●		●	●															●		●							D011
	VBMT110308-FP	0.8		●		●	●															●		●							E011
	VBMT160404-FP	0.4		●		●	●															●		●							E012
Finish Cutting	VBMT160408-FP	0.8		●		●	●															●		●							H013
FM	VBMT110302-FM	0.2																		●											D010
	VBMT110304-FM	0.4																		●											D011
	VBMT110308-FM	0.8																		●											E011
	VBMT160404-FM	0.4																		●											E012
Finish Cutting	VBMT160408-FM	0.8																		●											H013
FV	VBMT110304-FV	0.4			▲															●		●	●								D010
	VBMT110308-FV	0.8			▲															●		●	●								D011
	VBMT160404-FV	0.4			▲															●		●	●								E011
	VBMT160408-FV	0.8			▲															●		●	●								E012
Finish Cutting																															H013
R/L-F	VBGT110302R-F	0.2																		●		●		●	●					●	
	VBGT110302L-F	0.2																		●		●		●	●					●	
	VBGT110304R-F	0.4																		●		●			●					●	D010
	VBGT110304L-F	0.4																		●		●			●					●	D011
	VBGT160402R-F	0.2																		●		●			●					●	E011
	VBGT160402L-F	0.2																		●		●			●					●	E012
	VBGT160404R-F	0.4																		●		●			●					●	H013
Finish Cutting	VBGT160404L-F	0.4																		●		●			●					●	
LP	VBMT110304-LP	0.4		●		●	●															●		●							D010
	VBMT110308-LP	0.8		●		●	●															●		●							D011
	VBMT160404-LP	0.4		●		●	●															●		●							E011
	VBMT160408-LP	0.8		●		●	●															●		●							E012
Light Cutting																															H013
LM	VBMT110304-LM	0.4							●	●										●											D010
	VBMT110308-LM	0.8							●	●										●											D011
	VBMT160404-LM	0.4							●	●										●											E011
	VBMT160408-LM	0.8							●	●										●											E012
Light Cutting																															H013

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	● ◕ ✣ ◕ ✣ ✣ ◕ ✣ ○ ✣ ○ ✣ ◕ ✣ ✣ ● ◕ ◕ ✣ ✣ ✣ ● ◕ ◕ ✣ ● ◕ ✣ ✣ ✣ ✣ ✣ ◕
M	Stainless Steel	○ ✣ ○ ✣ ○ ✣ ○ ✣ ○ ○ ✣
K	Cast Iron	◕ ✣ ● ◕ ✣ ● ◕ ● ◕ ● ◕ ✣ ● ● ◕
N	Non-ferrous Metal	◕
S	Heat-resistant Alloy, Titanium Alloy	● ◕ ✣ ● ◕ ✣ ◕

Shape	Order Number	RE (mm)	Coated																Cermet		Coated Cermet				Carbide					Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
SV	**VBMT110304-SV**	0.4			▲															●		●									D010
	VBMT**110308-SV**	0.8			▲															●		●									D011
	VBMT**160404-SV**	0.4			▲															●		●									E011
	VBMT**160408-SV**	0.8			▲															●		●									E012
Light Cutting																															H013
NEW **MK**	**VBMT160404-MK**	0.4												●	●																
	VBMT**160408-MK**	0.8												●	●																E011
Medium Cutting																															H013
MP	**VBMT160404-MP**	0.4		●		●	●															●		●							
	VBMT**160408-MP**	0.8		●		●	●															●		●							E011
Medium Cutting																															H013
MM	**VBMT160404-MM**	0.4							●	●										●											
	VBMT**160408-MM**	0.8							●	●										●											E011
Medium Cutting																															H013
Standard	**VBMT160404**	0.4		●																											
	VBMT**160408**	0.8		●																											E011
Medium Cutting																															H013
MV	**VBMT110304-MV**	0.4			▲		●				▲	●								●		●	●	●		●					
	VBMT**110308-MV**	0.8			▲		●				▲	●								●		●	●	●		●					D010
	VBMT**160404-MV**	0.4			▲		●				▲	●								●		●	●	●		●					D011
	VBMT**160408-MV**	0.8			▲		●				▲	●								●		●	●	●		●					E011
Medium Cutting																															E012
																															H013

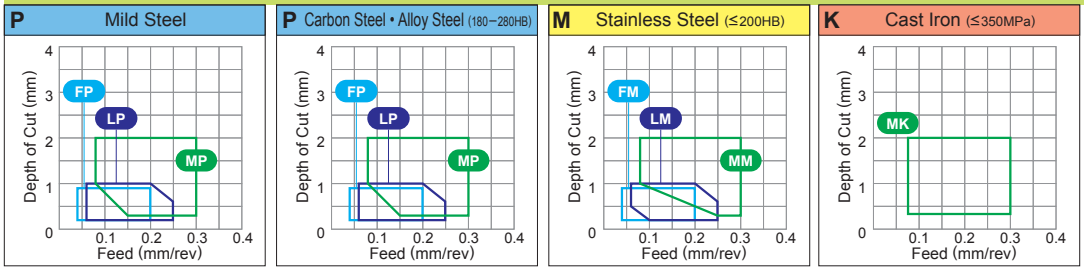
CHIP BREAKERS ➤ A052
GRADES ➤ A030
IDENTIFICATION ➤ A002

35° VB TYPE INSERTS WITH HOLE

VBMW 16 04 08
Size Thickness Corner Radius
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting····· Light Cutting····· Medium Cutting·····



Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																		Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 NEW	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 NEW	MC5015 NEW	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
R/L-SR	VBET1103V3R-SR	0.03																		●		●							●		
	VBET1103V3L-SR	0.03																		●		●							●		
	VBET110301R-SR	0.1																		●		●							●		D010 D011 E011 E012
	VBET110301L-SR	0.1																		●		●							●		
	VBET110302R-SR	0.2																		●		●							●		
	VBET110302L-SR	0.2																		●		●							●		
	VBET110304R-SR	0.4																		●		●							●		
Medium Cutting	VBET110304L-SR	0.4																		●		●							●		
R/L-SN	VBET110300R-SN	0																		●		●							●		
	VBET110300L-SN	0																		●		●							●		
	VBET1103V3R-SN	0.03																		●		●							●		
	VBET1103V3L-SN	0.03																		●		●							●		
	VBET110301R-SN	0.1																		●		●							●		D010 D011 E011 E012
	VBET110301L-SN	0.1																		●		●							●		
	VBET110302R-SN	0.2																		●		●							●		
	VBET110302L-SN	0.2																		●		●							●		
	VBET110304R-SN	0.4																		●		●							●		
Medium Cutting	VBET110304L-SN	0.4																		●		●							●		
R/LW-SN *	VBET1103V3RW-SN	0.03																		●											D010 D011 E011 E012
	VBET1103V3LW-SN	0.03																		●											
Medium Cutting (Wiper)																															
NEW Flat Top	VBMW160408	0.8												●	●																E011 E012

* Please refer to A028 before using the R/LW-SN breaker (wiper insert).

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

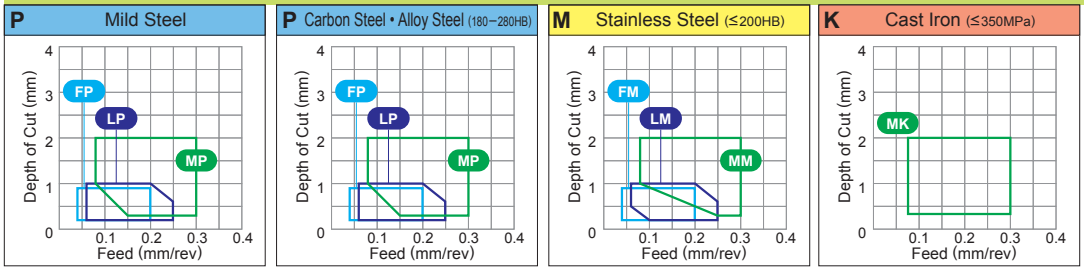
CHIP BREAKERS ➤ A052

35° VC TYPE INSERTS WITH HOLE

VCMT 11 03 02- FP
Size Thickness Corner Radius Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Light Cutting ····· Medium Cutting ·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	VP45N	Carbide: UTi20T	HTi05T	HTi10	RT9010	Applicable Holder Page
FP	**VCMT110302-FP**	0.2	●		●	●																●		●								
	VCMT110304-FP	0.4	●		●	●																●		●								C028 C029 E032 E033
	VCMT160404-FP	0.4	●		●	●																●		●								
	VCMT160408-FP	0.8	●		●	●																●		●								
Finish Cutting																																
FM	**VCMT110302-FM**	0.2																		●												
	VCMT110304-FM	0.4																		●												C028 C029 E032 E033
	VCMT160404-FM	0.4																		●												
	VCMT160408-FM	0.8																		●												
Finish Cutting																																
FV	**VCMT080202-FV**	0.2			▲															●		● ●		●								
	VCMT080204-FV	0.4			▲															●		● ●		●								C028 C029 E011 E012 E032 E033
	VCMT160404-FV	0.4	●	▲																		● ●			●							
	VCMT160408-FV	0.8	●	▲																		● ●			●							
Finish Cutting																																
AZ	**VCGT160404-AZ**	0.4																												●		
	VCGT160408-AZ	0.8																												●		C028 C029 E032 E033
	VCGT160412-AZ	1.2																												●		
Finish Cutting																																
R/L-F	**VCGT080202R-F**	0.2																		●		●			●					●		
	VCGT080202L-F	0.2																		●		●			●					●		E011 E012
	VCGT080204R-F	0.4																		●		●			●					●		
	VCGT080204L-F	0.4																		●		●			●					●		
Finish Cutting																																
LP	**VCMT110304-LP**	0.4	●		●	●																●		●								
	VCMT110308-LP	0.8	●		●	●																●		●								C028 C029 E032 E033
	VCMT160404-LP	0.4	●		●	●																●		●								
	VCMT160408-LP	0.8	●		●	●																●		●								
Light Cutting																																
LM	**VCMT110304-LM**	0.4							●	●										●												
	VCMT110308-LM	0.8							●	●										●												C028 C029 E032 E033
	VCMT160404-LM	0.4							●	●										●												
	VCMT160408-LM	0.8							●	●										●												
Light Cutting																																

CHIP BREAKERS ➤ A054
GRADES ➤ A030
IDENTIFICATION ➤ A002

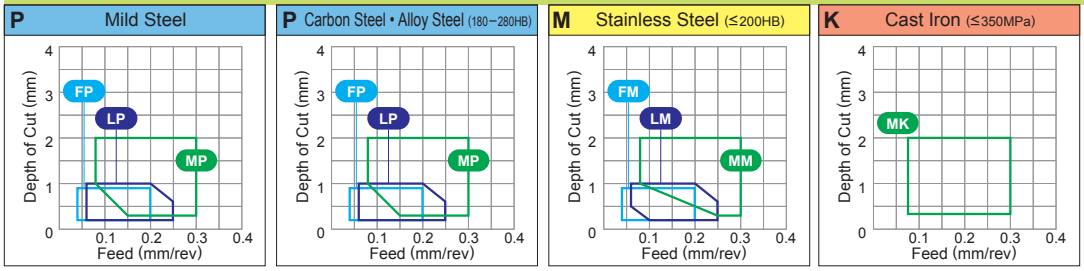
TURNING INSERTS [POSITIVE]

35° VC TYPE INSERTS WITH HOLE

VCMT 08 02 02- SV
Size Thickness Corner Radius Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting····· Light Cutting····· Medium Cutting·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated: UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	Cermet: NX2525	NX3035	Coated Cermet: MP3025	AP25N	VP25N	VP45N	Carbide: UTi20T	HTi05T	HTi10	RT9010	Applicable Holder Page
SV	**VCMT080202-SV**	0.2			▲															●			●	●									E011 E012
Light Cutting	VCMT**080204-SV**	0.4			▲															●			●	●									
MK NEW	**VCMT160404-MK**	0.4												●	●																		C028 C029 E032 E033
Medium Cutting	VCMT**160408-MK**	0.8												●	●																		
MP	**VCMT160404-MP**	0.4		●		●	●															●		●									C028 C029 E032 E033
Medium Cutting	VCMT**160408-MP**	0.8		●		●	●															●		●									
	VCMT**160412-MP**	1.2		●		●	●															●		●									
MM	**VCMT160404-MM**	0.4							●	●										●													C028 C029 E032 E033
Medium Cutting	VCMT**160408-MM**	0.8							●	●										●													
	VCMT**160412-MM**	1.2							●	●										●													
Standard	**VCMT110304**	0.4		●	▲							●								●		●	●	●	●			●		●			C028 C029 E032 E033
Medium Cutting	VCMT**160404**	0.4	●	●	▲							●				●				●		●	●	●	●			●		●			
	VCMT**160408**	0.8	●	●	▲							●				●				●		●	●	●	●			●					
	VCMT**160412**	1.2		●	▲							●										●	●										
MV	**VCMT080202-MV**	0.2			▲		●				▲	●								●		●	●	●	●		●						C028 C029 E032 E033
Medium Cutting	VCMT**080204-MV**	0.4			▲		●				▲	●								●		●	●	●	●		●						
Flat Top	**VCMW110304**	0.4																												●			C028 C029 E032 E033
	VCMW**160404**	0.4												●	●	●	●													●			
	VCMW**160408**	0.8												●	●	●	●													●			

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

CHIP BREAKERS ➤ A054

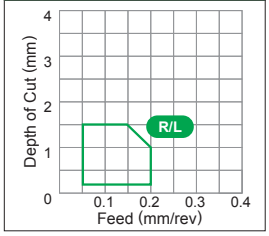
35° VD TYPE INSERTS WITH HOLE

VDGX 16 03 02 R
Size Thickness Corner Radius R/L
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Medium Cutting·····

N Aluminium Alloy



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	● ◔ ✣ ◔ ✣ ✣ ◔ ✣ ● ◔ ● ◔ ✣ ✣ ● ◔ ◔ ◔ ● ◔ ✣ ● ◔
M	Stainless Steel	◔ ✣ ● ✣ ◔ ✣ ✣ ✣ ◔ ✣ ◔ ✣ ✣ ● ◔ ✣ ● ● ✣ ● ◔
K	Cast Iron	● ◔ ✣ ● ◔ ✣ ● ◔ ◔ ✣ ● ◔ ✣ ● ● ✣ ● ◔
N	Non-ferrous Metal	● ◔
S	Heat-resistant Alloy, Titanium Alloy	● ◔ ✣ ● ◔ ✣ ● ◔ ◔ ◔

Shape	Order Number	RE (mm)	Coated																	Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 NEW	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 NEW	MC5015 NEW	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
R/L	VDGX160302R	0.2																											●		
	VDGX160302L	0.2																											●		
	VDGX160304R	0.4																											●		C034
Medium Cutting (For Aluminium)	VDGX160304L	0.4																											●		

CHIP BREAKERS ➤ A066
GRADES ➤ A030
IDENTIFICATION ➤ A002

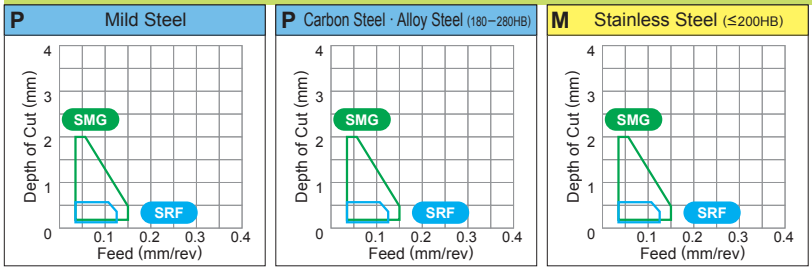
TURNING INSERTS [POSITIVE]

35° VP TYPE INSERTS WITH HOLE

VPGT 08 02 01 SMG
Size Thickness Corner Radius Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting····· Medium Cutting·····



Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																	Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 NEW	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 NEW	MC5015 NEW	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
R/L-SRF	VPET080201R-SRF	0.1																		●											
	VPET080201L-SRF	0.1																		●											
	VPET080202R-SRF	0.2																		●											
	VPET080202L-SRF	0.2																		●											
	VPET1103V3R-SRF	0.03																		●											D010 D011
	VPET1103V3L-SRF	0.03																		●											
	VPET110301R-SRF	0.1																		●											
	VPET110301L-SRF	0.1																		●											
	VPET110302R-SRF	0.2																		●											
Finish Cutting	VPET110302L-SRF	0.2																		●											
SMG	VPGT080201M-SMG	0.1																		●											
	VPGT080202M-SMG	0.2																		●											D010 D011
	VPGT110301M-SMG	0.1																		●											
	VPGT110302M-SMG	0.2																		●											
Medium Cutting																															

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

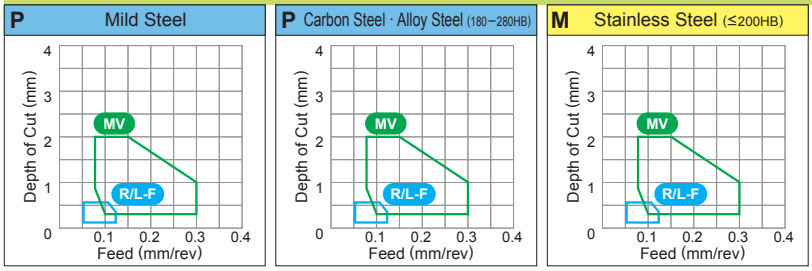
CHIP BREAKERS ➤ A062

80° WB TYPE INSERTS WITH HOLE

WBGT 02 01 V3 L F
Size · Thickness · Corner Radius · R/L · Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Medium Cutting ·····



Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																	Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
R/L-F	WBGT0201V3L-F	0.03																		●		●										
	WBGT020101L-F	0.1																		●		●										
	WBGT020102L-F	0.2																		●		●		●								
	WBGT020104L-F	0.4																		●		●		●								
	WBGTL302V3L-F	0.03																		●		●										E010 E016
	WBGTL30201L-F	0.1																		●		●										
	WBGTL30202R-F	0.2																		●		●										
	WBGTL30202L-F	0.2																		●		●		●								
	WBGTL30204R-F	0.4																		●		●										
Finish Cutting	WBGTL30204L-F	0.4																		●		●		●								
R/L-MV	WBMTL30202R-MV	0.2			▲		●			▲										●		●	●	●			●					E010 E016
	WBMTL30202L-MV	0.2			▲		●			▲										●		●	●	●			●					
	WBMTL30204R-MV	0.4			▲		●			▲										●		●	●	●			●					
	WBMTL30204L-MV	0.4			▲		●			▲										●		●	●	●			●					
Medium Cutting																																

CHIP BREAKERS ➤ A052
GRADES ➤ A030
IDENTIFICATION ➤ A002

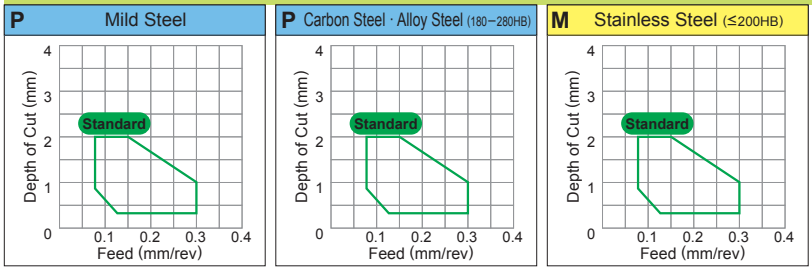
TURNING INSERTS [POSITIVE]

80° WC TYPE INSERTS WITH HOLE

WCGT 02 01 02 R
Size Thickness Corner Radius R/L
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Medium Cutting·····



Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 NEW	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 NEW	MC5015 NEW	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
R/L	WCGT020102R	0.2																			●										
	WCGT020102L	0.2																			●								●		
	WCGT020104R	0.4																			●										E027
	WCGT020104L	0.4																			●								●		
	WCGTL30202L	0.2																			●										
Finish Cutting	WCGTL30204L	0.4																			●										
Standard	WCMT020102	0.2		●	▲							●									●	●	●	●			●				
	WCMT020104	0.4		●	▲							●									●	●	●	●			●				
	WCMTL30202	0.2		●								●									●	●	●	●			●				
	WCMTL30204	0.4		●								●									●	●	●	●			●				
	WCMT040202	0.2		●	▲							●									●	●	●	●			●				E027
	WCMT040204	0.4		●	▲							●									●	●	●	●			●				
	WCMT040208	0.8			▲																										
	WCMT06T304	0.4		●	▲							●									●	●	●	●			●				
Medium Cutting	WCMT06T308	0.8		●	▲							●									●	●	●	●			●				

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

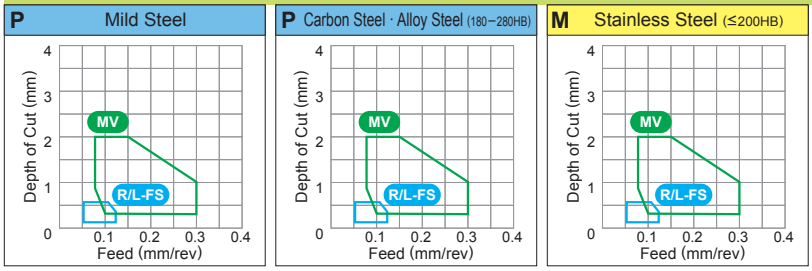
CHIP BREAKERS ➤ A054

80° WP TYPE INSERTS WITH HOLE

WPMT 04 02 02 MV
Size / Thickness / Corner Radius / Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Medium Cutting ·····



Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																	Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
R/L-FS	WPGT040204R-FS	0.4																		●		●										
	WPGT040204L-FS	0.4																		●		●										
	WPGT060304R-FS	0.4																		●		●										E010
	WPGT060304L-FS	0.4																		●		●										
Finish Cutting																																
MV	WPMT040202-MV	0.2			▲		●				▲	●								●		●	●	●								
	WPMT040204-MV	0.4			▲		●				▲	●								●		●	●	●		●						
	WPMT060304-MV	0.4			▲		●				▲	●								●		●	●	●								E010
	WPMT060308-MV	0.8			▲		●				▲	●								●		●	●	●		●						
Medium Cutting																																

CHIP BREAKERS ➤ A062
GRADES ➤ A030
IDENTIFICATION ➤ A002

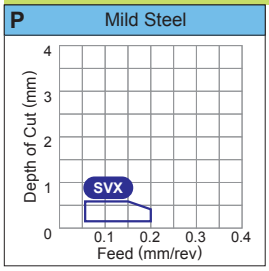
TURNING INSERTS [POSITIVE]

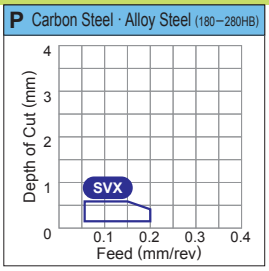
25° XC TYPE INSERTS WITH HOLE

XCMT 15 03 02- SVX
Size Thickness Corner Radius Chip Breaker
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Light Cutting·····





Cutting Conditions (Guide) : ● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																		Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 NEW	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 NEW	MC5015 NEW	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
SVX	XCMT150302-SVX	0.2																		●											
	XCMT150304-SVX	0.4			▲															●											
	XCMT150308-SVX	0.8			▲															●											C030
Light Cutting																															

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

CHIP BREAKERS ➤ A054

RTG TYPE INSERTS WITHOUT HOLE

Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
 For Special Use (For TL Holder)	**RTG05A**	—																									●		●		C035
	RTG**06A**	—																									●		●		
	RTG**07A**	—																									●				
	RTG**08A**	—																									●		●		
	RTG**10A**	—																									●		●		

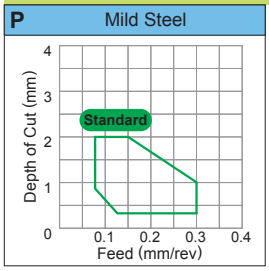
TURNING INSERTS [POSITIVE]

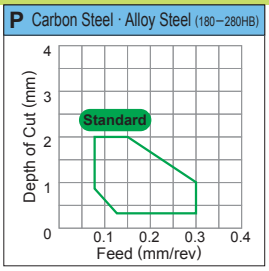
90° SP TYPE INSERTS WITHOUT HOLE

SPGR 09 03 04 R
Size Thickness Corner Radius R/L
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Medium Cutting·····





Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																	Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 NEW	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 NEW	MC5015 NEW	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
R	**SPGR090304R**	0.4																									●				
Finish Cutting																															–
Standard	**SPMR090304**	0.4		●	▲																	●	●	●							
	SPMR090308	0.8		●	▲																	●	●	●							
	SPMR120304	0.4		●	▲																	●	●	●							–
	SPMR120308	0.8		●	▲																	●	●	●							
Light to Medium Cutting																															
Flat Top	**SPMN090304**	0.4																				●						●		●	
	SPMN090308	0.8		●																		●						●		●	
	SPMN120304	0.4		●																●								●		●	
	SPMN120308	0.8		●																●	●							●		●	
	SPMN120312	1.2		●	▲															●								●		●	
	SPMN120408	0.8																										●		●	
	SPMN120412	1.2																										●			–
	SPMN150408	0.8																										●			
	SPMN150412	1.2																										●			
	SPMN190404	0.4																										●			
	SPMN190408	0.8																										●			
	SPMN190412	1.2																										●			
Flat Top	**SPGN090304**	0.4																				●						●		●	
	SPGN090308	0.8																												●	
	SPGN120304	0.4																				●						●		●	
	SPGN120308	0.8																			●	●						●		●	
	SPGN120312	1.2																												●	–
	SPGN120404	0.4																												●	
	SPGN120408	0.8																										●		●	
	SPGN150404	0.4																										●			
	SPGN150408	0.8																												●	

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

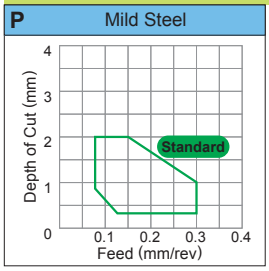
CHIP BREAKERS ➤ A068

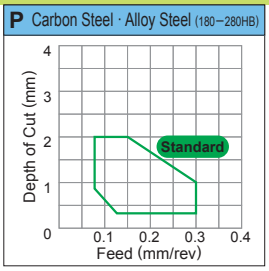
60° TC TYPE INSERTS WITHOUT HOLE

TCGN 06 01 04
Size Thickness Corner Radius
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Medium Cutting·····





Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	● ◔ ✣ ◔ ✣ ✣ ◔ ✣ ✣ ✣ ● ◔ ● ◔ ✣ ✣ ✣ ● ◔ ◔ ◔ ● ● ◔ ✣ ✣ ✣ ● ◔ ● ◔ ✣ ● ● ◔ ● ◔ ● ◔
M	Stainless Steel	◔ ✣ ● ✣ ✣ ◔ ✣ ✣ ✣ ◔ ✣ ✣ ✣ ● ◔ ● ● ✣ ● ◔
K	Cast Iron	◔ ✣ ● ◔ ✣ ✣ ● ◔ ✣ ✣ ● ● ● ✣ ● ◔
N	Non-ferrous Metal	✣ ● ◔
S	Heat-resistant Alloy, Titanium Alloy	● ◔ ✣ ● ◔ ✣ ● ◔

Shape	Order Number	RE (mm)	Coated																		Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 (NEW)	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 (NEW)	MC5015 (NEW)	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
Flat Top	TCGN060104	0.4																											●		–
	TCGN090204	0.4																											●		

CHIP BREAKERS ➤ A068
GRADES ➤ A030
IDENTIFICATION ➤ A002

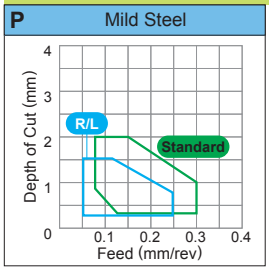
TURNING INSERTS [POSITIVE]

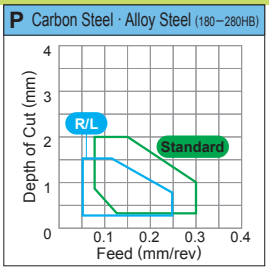
60° TP TYPE INSERTS WITHOUT HOLE

TPGR 11 03 04 R
Size · Thickness · Corner Radius · R/L
* Please refer to page A002.

CHIP CONTROL RANGE FOR WORK MATERIALS

Finish Cutting ····· Medium Cutting ·····





Cutting Conditions (Guide) : ● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	

Shape	Order Number	RE (mm)	Coated																Cermet		Coated Cermet				Carbide				Applicable Holder Page
			UE6105	UE6110	UE6020	MC6015 NEW	MC6025	UH6400	MC7025	MP7035	US7020	US735	US905	MC5005 NEW	MC5015 NEW	UC5105	UC5115	VP05RT	VP10RT	VP15TF	UP20M	NX2525	NX3035	MP3025	AP25N	VP25N	VP45N	UTi20T	HTi05T	HTi10	RT9010	
R/L	**TPGR110304R**	0.4																			●								●		
	TPGR110304L	0.4																			●						●		●		
	TPGR160304R	0.4																			●						●		●		
	TPGR160304L	0.4																			●						●		●		E026
	TPGR160308R	0.8																			●										
Finish Cutting	TPGR160308L	0.8																			●						●		●		
Standard	**TPMR090202**	0.2																				●	●								
	TPMR090204	0.4																			●	●	●								
	TPMR090208	0.8																					●								
	TPMR110302	0.2																			●	●	●								
	TPMR110304	0.4		●	●																●	●	●								E026
	TPMR110308	0.8		●	●																●	●	●								
	TPMR160304	0.4		●	●																●	●	●								
	TPMR160308	0.8		●	●																●	●	●								
Light to Medium Cutting	TPMR160312	1.2		●																		●	●								
Flat Top	**TPMN110304**	0.4		●										●	●	●	●				●	●						●		●		
	TPMN110308	0.8		●										●	●	●	●					●						●		●		
	TPMN160304	0.4		●										●	●	●	●			●	●	●						●		●		
	TPMN160308	0.8		●										●	●	●	●			●	●	●						●	●	●		
	TPMN160312	1.2		●										●	●	●	●				●									●		E026
	TPMN160320	2.0																										●				
	TPMN220404	0.4		●																								●				
	TPMN220408	0.8		●	●															●	●							●		●		
	TPMN220412	1.2		●																●								●		●		
Flat Top	**TPGN110302**	0.2																												●		
	TPGN110304	0.4																			●						●	●	●		
	TPGN110308	0.8																		●									●		
	TPGN160302	0.2																											●		
	TPGN160304	0.4																		●	●						●	●	●		
	TPGN160308	0.8																		●	●						●	●	●		E026
	TPGN160312	1.2																											●		
	TPGN160316	1.6																											●		
	TPGN160408	0.8																									●				
	TPGN220404	0.4																		●									●		
	TPGN220408	0.8																		●									●		

● : Inventory maintained in Japan.
(10 inserts in one case)

CHIP BREAKERS ➤ A068
GRADES ➤ A030
IDENTIFICATION ➤ A002

Memo

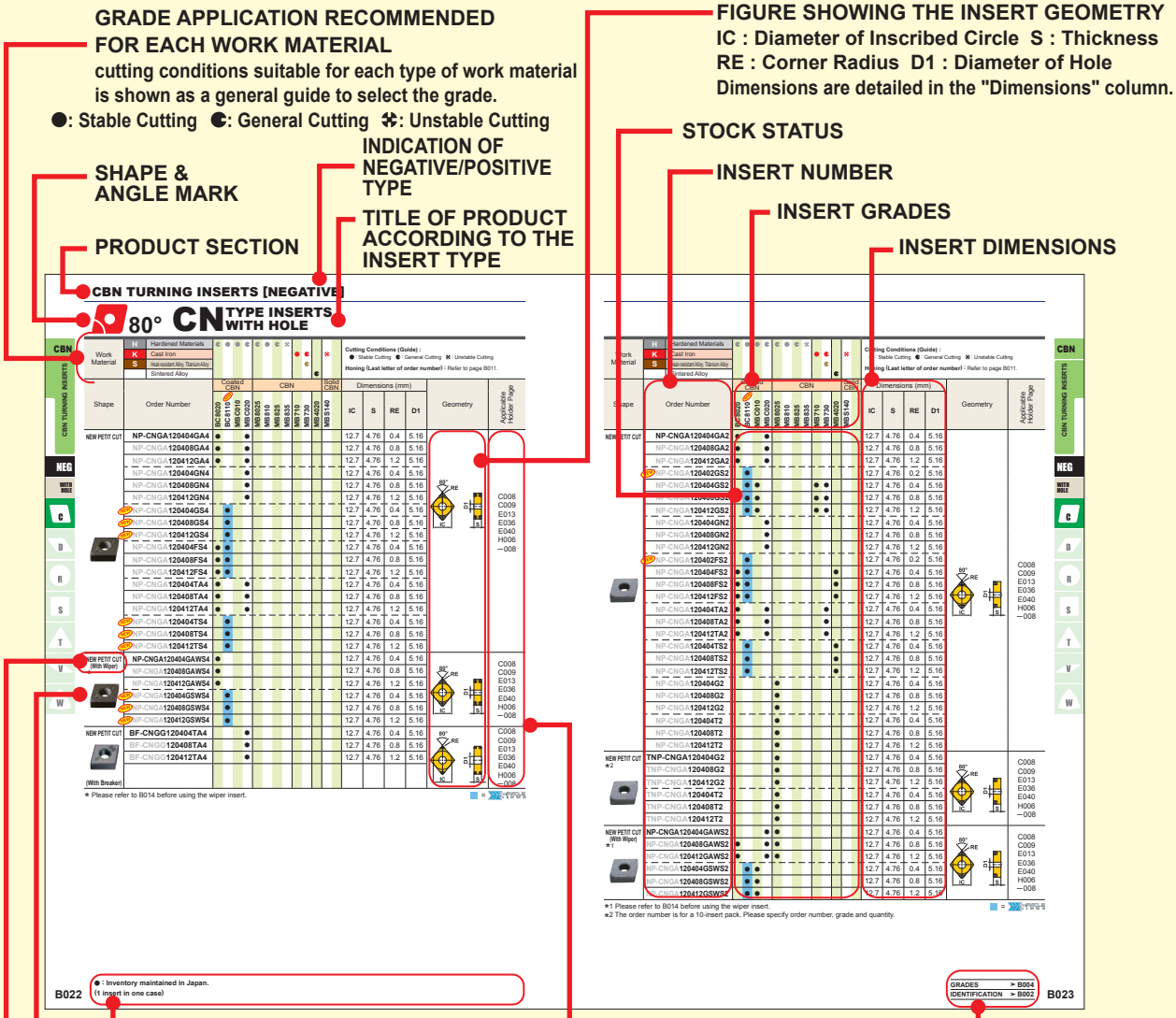
HOW TO READ THE STANDARD OF CBN&PCD TURNING INSERTS

●How this section page is organized

①Organized according to turning insert shape.
(Refer to the index on the next page.)

②Inserts are arranged in order of :

- Negative inserts (with hole→without hole)
- Positive inserts (with hole→without hole)



●To Order : Please specify
①insert number and ②grade.

TURNING TOOLS

CBN & PCD INSERT STANDARDS
CBN & PCD INSERT GRADES

INDENTIFICATION ····· B002
CBN (CUBIC BORON NITRIDE) ····· B004
PCD (SINTERED DIAMOND) ····· B015
CLASSIFICATION OF CBN & PCD INSERTS ····· B016

STANDARD OF CBN TURNING INSERTS

NEGATIVE INSERTS WITH HOLE

CN○○TYPE···RHOMBIC 80° ····· B022
DN○○TYPE···RHOMBIC 55° ····· B025
SN○○TYPE···SQUARE 90° ····· B028
TN○○TYPE···TRIANGULAR 60° ····· B030
VN○○TYPE···RHOMBIC 35° ····· B032
WN○○TYPE···TRIGON 80° ····· B034

NEGATIVE INSERTS WITHOUT HOLE

CN○○TYPE···RHOMBIC 80° ····· B035
DN○○TYPE···RHOMBIC 55° ····· B035
RN○○TYPE···ROUND ····· B036
SN○○TYPE···SQUARE 90° ····· B037
TN○○TYPE···TRIANGULAR 60° ····· B038

POSITIVE INSERTS WITH HOLE

CC○○TYPE···RHOMBIC 80° ····· B039
CP○○TYPE···RHOMBIC 80° ····· B042
DC○○TYPE···RHOMBIC 55° ····· B043
TC○○TYPE···TRIANGULAR 60° ····· B045
TP○○TYPE···TRIANGULAR 60° ····· B046
VB○○TYPE···RHOMBIC 35° ····· B048
VC○○TYPE···RHOMBIC 35° ····· B049
WC○○TYPE···TRIGON 80° ····· B049

POSITIVE INSERTS WITHOUT HOLE

SP○○TYPE···SQUARE 90° ····· B051
TB○○TYPE···TRIANGULAR 60° ····· B052
TP○○TYPE···TRIANGULAR 60° ····· B052
RTGTYPE ····· B050
GYTYPE ····· B053
MGTRTYPE ····· B054

STANDARD OF PCD TURNING INSERTS

NEGATIVE INSERTS WITH HOLE

CN○○TYPE···RHOMBIC 80° ····· B055
DN○○TYPE···RHOMBIC 55° ····· B055
SN○○TYPE···SQUARE 90° ····· B056
TN○○TYPE···TRIANGULAR 60° ····· B056
VN○○TYPE···RHOMBIC 35° ····· B057

NEGATIVE INSERTS WITHOUT HOLE

SN○○TYPE···SQUARE 90° ····· B058

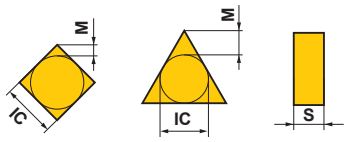
POSITIVE INSERTS WITH HOLE

CC○○TYPE···RHOMBIC 80° ····· B059
CP○○TYPE···RHOMBIC 80° ····· B059
DC○○TYPE···RHOMBIC 55° ····· B060
SP○○TYPE···SQUARE 90° ····· B060
TC○○TYPE···TRIANGULAR 60° ····· B061
TP○○TYPE···TRIANGULAR 60° ····· B062
VB○○TYPE···RHOMBIC 35° ····· B064
VC○○TYPE···RHOMBIC 35° ····· B064
WC○○TYPE···TRIGON 80° ····· B065
WP○○TYPE···TRIGON 80° ····· B065
DE○○TYPE···RHOMBIC 55° ····· B066
TE○○TYPE···TRIANGULAR 60° ····· B066
VD○○TYPE···RHOMBIC 35° ····· B067

POSITIVE INSERTS WITHOUT HOLE

SP○○TYPE···SQUARE 90° ····· B068
TP○○TYPE···TRIANGULAR 60° ····· B068

IDENTIFICATION



Symbol	Tolerance of Nose Height **M** (mm)	Tolerance of Inscribed Circle **IC** (mm)	Tolerance of Thickness **S** (mm)
G	±0.025	±0.025	±0.13
M*	±0.08–±0.18	±0.05–±0.15	±0.13

The surface of insert with * mark is sintered.

Detail of M Class Insert Tolerance

● Tolerance of Nose Height **M** (mm)

D.I.C.	Triangular	Square	Rhombic 80°	Rhombic 55°	Rhombic 35°	Round
6.35	±0.08	±0.08	±0.08	±0.11	±0.16	–
9.525	±0.08	±0.08	±0.08	±0.11	±0.16	–
12.70	±0.13	±0.13	±0.13	±0.15	–	–

● Tolerance of Inscribed Circle **IC** (mm)

D.I.C.	Triangular	Square	Rhombic 80°	Rhombic 55°	Rhombic 35°	Round
6.35	±0.05	±0.05	±0.05	±0.05	±0.05	–
9.525	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05
12.70	±0.08	±0.08	±0.08	±0.08	–	±0.08

⑤ Tolerance Class

BM	With Breaker
BF	With Breaker
NP	New Petit Cut
No mark	Standard Type

② Insert Geometry

T	10-inserts Package
No mark	1-insert Package

① Insert Case

①	②		③	④	⑤	⑥
T	**NP**	-	**C**	**N**	**G**	**A**

③ Insert Shape

Symbol	Insert Shape
S	Square
T	Triangular
C	Rhombic 80°
D	Rhombic 55°
V	Rhombic 35°
W	Trigon
R	Round

④ Normal Clearance

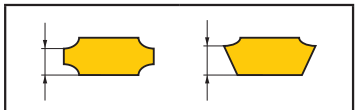
Symbol	Normal Clearance
B	5°
C	7°
D	15°
E	20°
N	0°
P	11°

⑥ Fixing and/or for Chip Breaker

Metric				
Symbol	Hole	Hole Configuration	Chip Breaker	Figure
W	With Hole	Cylindrical Hole + One Countersink (40–60°)	No	
T	With Hole		One Sided	
B	With Hole	Cylindrical Hole + One Countersink (70–90°)	No	
H	With Hole		One Sided	
A	With Hole	Cylindrical Hole	No	
M	With Hole	Cylindrical Hole	One Sided	
N	Without Hole	–	No	
X	–	–	–	Special Design

Diameter of Inscribed Circle (mm)	Symbol						
	R	W	V	D	C	S	T
3.97		02		04	03	03	06
4.76		L3	08	05	04	04	08
5.56		03	09	06	05	05	09
6.35		04	11	07	06	06	11
7.94		05	13	09	08	07	13
9.525	09	06	16	11	09	09	16
12.70	12	08	22	15	12	12	22

⑦ Insert Size



*Thickness is from the bottom of the insert to the top of the cutting edge.

Symbol	Thickness (mm)
S1	1.39
01	1.59
T0	1.79
02	2.38
T2	2.78
03	3.18
T3	3.97
04	4.76

⑧ Insert Thickness

Symbol	Corner Radius (mm)
02	0.2
04	0.4
08	0.8
12	1.2
16	1.6

⑨ Insert Corner Configuration

⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭
12	04	04	G	WS	2	J	R

⑩ Application (Honing)

Symbol	Honing
GA GS GN G	General Cutting
FA FS FN F	Continuous Cutting
TA TS TN T	Interrupted Cutting

Please refer to page B011 for further information.

⑪ Wiper

WS	With Wiper
No mark	Without Wiper

⑫ Number of Teeth

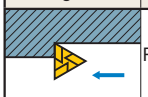
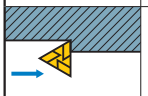
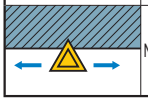
2	2
3	3
4	4
6	6
No mark	1

⑬ Cutting Edge Angle

F	91°
J	93°
No mark	Non Restriction

Please pay special attention when using an indexable insert.
Please refer to page B014 for further information.

⑭ Cutting Direction

Figure	Hand	Symbol
	Right	R
	Left	L
	Neutral	N

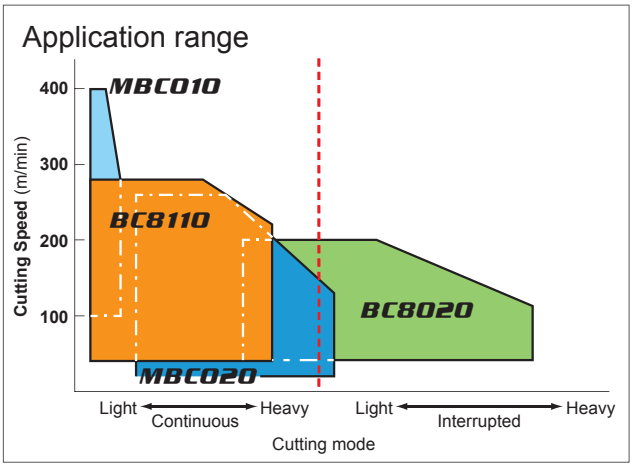
COATED CBN SERIES

NEW BC8110 | BC8020 | MBC010 | MBC020

FEATURES

With the expansion of BC8110, Mitsubishi can offer 4 coated CBN grades for machining of hardened steels. These 4 coated CBN grades cover a wide range of applications.

To achieve longer tool life, Mitsubishi uses a unique "Particle-activated Sintering Method", combined with increased cutting edge strength. With high crater wear resistance CBN grades and a wear resistant ceramic coatings, longer tool life and improved machine efficiency are obtained.



NEW BC8110

MIRACLE SIGMA

Newly developed special ceramic coating



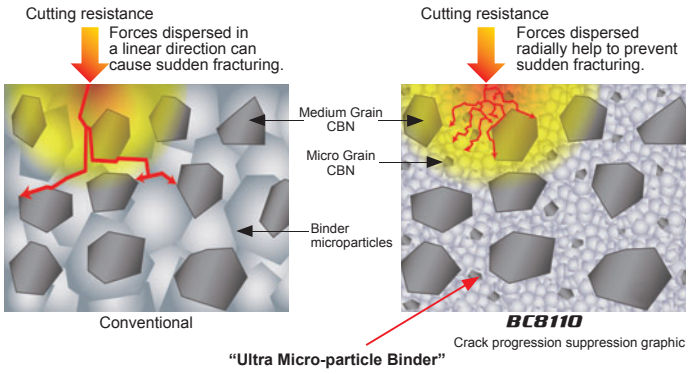
Prevention of welding
Peeling of the coating is prevented by improving welding resistance.

NEW TiAlSiN Coating
Improved wear and chipping resistance.

TiAlN Coating
Improved adhesion to the CBN surface provides increased peeling resistance.

The newly developed Ultra Micro-particle Binder prevents sudden fracture

Dispersal of the newly developed Ultra Micro-particle Binder for sintered CBN and Micro Grain CBN suppresses cracking to prevent sudden fracturing.



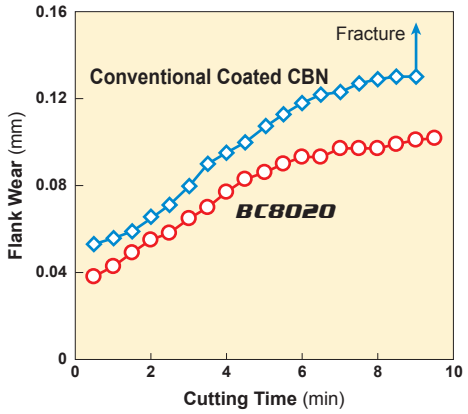
BC8110 is constantly stable without any cutting edge chipping and abnormal damage of the coating.

Grade	Grade Features and Application	Main Component	Coating Layer
NEW BC8110	**Coated CBN for continuous cutting** Newly developed Ultra Micro-particle Binder is consistent with wear resistance and cutting edge strength. Ultra Micro-particle Binder provides protection by means of dual-layer ceramic coating film based on special CBN and TiAlSiN + TiAlN. As a result, it exhibits excellent wear resistance, high coating adhesive strength and performs long-term stable cutting.	CBN (Medium Grain) TiN Al_2O_3	TiAlSiN TiAlN Dual-layer
BC8020	**High efficiency coated CBN** Increased cutting edge strength and high crater wear resistant CBN grade in combination with a highly wear resistant TiAlN coating, results in longer tool life and improved machining efficiency under heavy duty or interrupting cutting.	CBN (Medium Grain) TiN Al_2O_3	TiAlN
MBC010	**Coated CBN for High Speed Continuous Cutting** MBC010 makes the best use of special ceramic binder structure, actualizing high wear resistance. High wear resistance enables continuous machining at high speed of over 300m/min.	CBN (Micro Grain) TiN Al_2O_3	TiN
MBC020	**Coated CBN for general cutting** Uses a CBN substrate that has high cutting edge toughness. The TiAlN based coating delivers superb wear resistance. It covers a wide range of applications from continuous to light interrupted cutting.	CBN (Micro Grain) TiN Al_2O_3	TiAlN

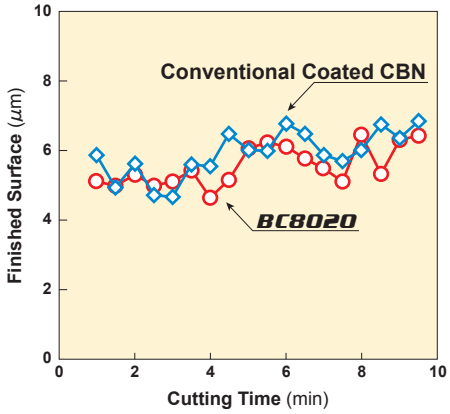
BC8020

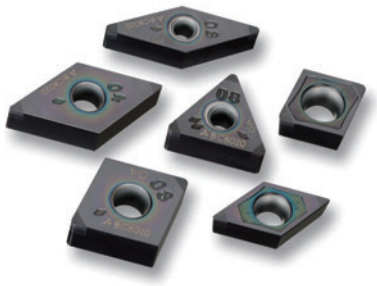
CONTINUOUS CUTTING

WEAR RESISTANCE



FINISHED SURFACE

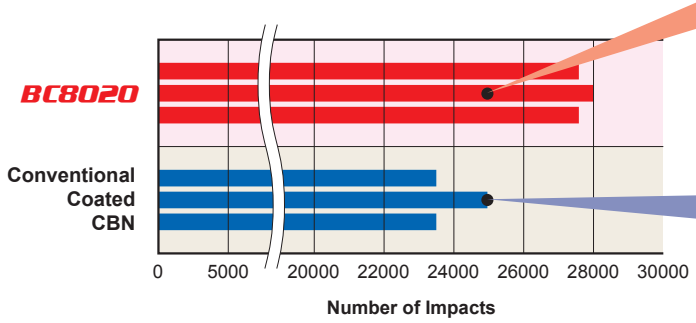


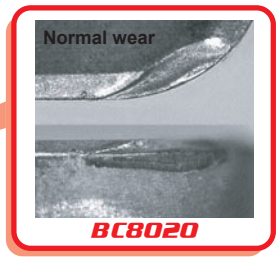


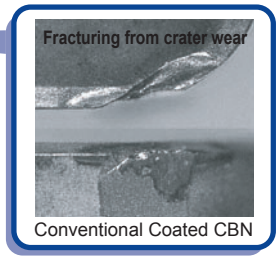
<Cutting Conditions>
Workpiece : JIS SCr420 (60HRC) Insert : NP-CNGA120408GA
Cutting Speed : 150m/min Feed : 0.15mm/rev Depth of Cut : 0.5mm
Wet Continuous Cutting

INTERRUPTED CUTTING (CRATER WEAR)

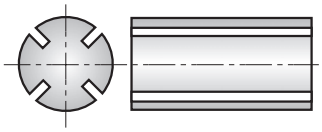
FRACTURE RESISTANCE





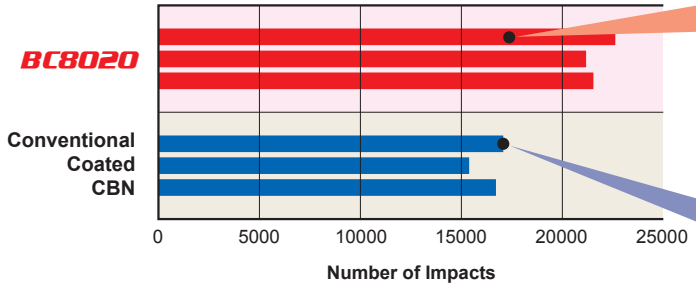


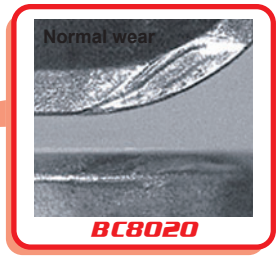
<Cutting Conditions>
Workpiece : JIS SCM415 (60HRC)
Medium Interrupted Cutting
Insert : NP-CNGA120408GA
Cutting Speed : 150m/min
Feed : 0.15mm/rev
Depth of Cut : 0.15mm
Dry Interrupted Cutting

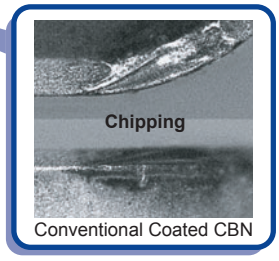


INTERRUPTED CUTTING (CHIPPING)

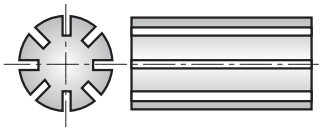
FRACTURE RESISTANCE







<Cutting Conditions>
Workpiece : JIS SCM415 (60HRC)
Heavy Interrupted Cutting
Insert : NP-CNGA120408GA
Cutting Speed : 150m/min
Feed : 0.2mm/rev
Depth of Cut : 0.2mm
Dry Interrupted Cutting

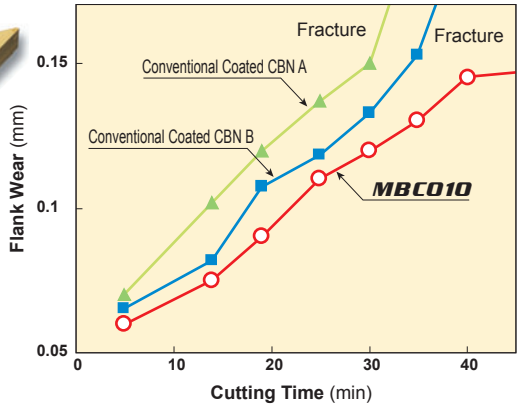


BC8020 exhibits excellent cutting performance for severe or interrupted machining.

MBC010

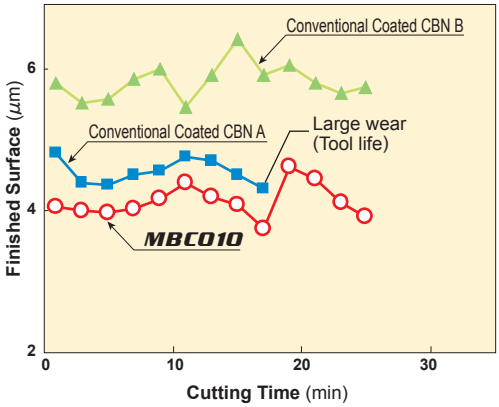


WEAR RESISTANCE



<Cutting Conditions>
Workpiece : JIS SCM415 (60HRC)
Insert : NP-CNGA120408GS2
Cutting Speed : 300m/min
Feed : 0.05mm/rev
Depth of Cut : 0.1mm
Dry Continuous Cutting

FINISHED SURFACE



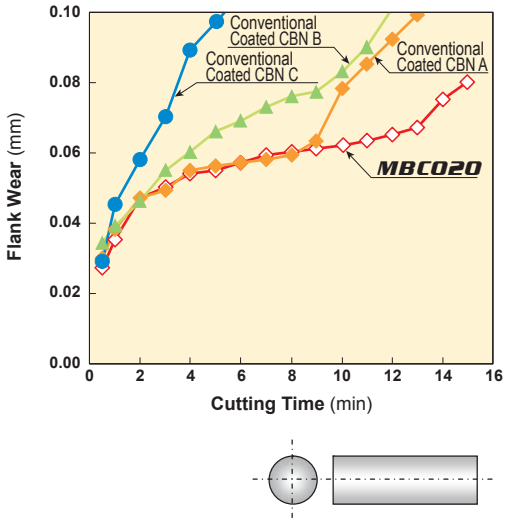
<Cutting Conditions>
Workpiece : JIS SCM415 (60HRC)
Insert : NP-CNGA120408GS2
Cutting Speed : 150m/min
Feed : 0.15mm/rev
Depth of Cut : 0.2mm
Dry Continuous Cutting

MBC010 employs TiN based coating for superior, consistent surface finishes.

MBC020

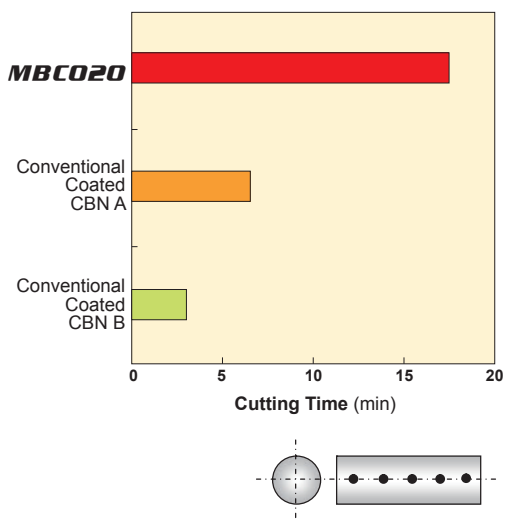


WEAR RESISTANCE



<Cutting Conditions>
Workpiece : JIS SCr420 (60HRC)
Round bar
Insert : NP-CNGA120408GA4
Cutting Speed : 220m/min
Feed : 0.1mm/rev
Depth of Cut : 0.1mm
Dry Continuous Cutting

TOUGHNESS



<Cutting Conditions>
Workpiece : JIS SCr420 (60HRC)
Insert : NP-CNGA120408GA4
Cutting Speed : 120m/min
Feed : 0.15mm/rev
Depth of Cut : 0.15mm
Dry Interrupted Cutting

MBC020 exhibits excellent cutting performance for a wide range of applications from continuous through interrupted machining.

NON-COATED CBN SERIES

FEATURES

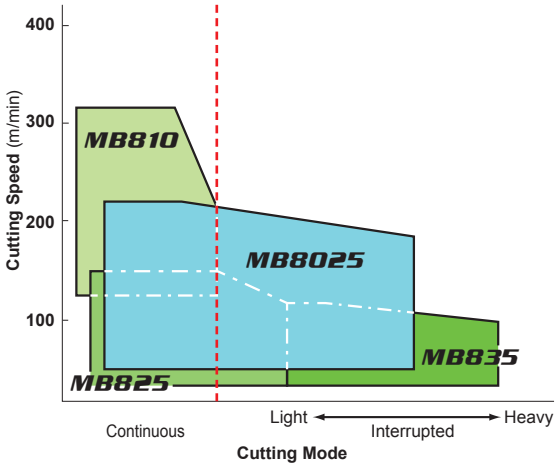
• CBN tool material is produced by mixing the main component CBN (cubic boron nitride), which has a hardness second only to diamond, with a special ceramic or metal binder. It is then sintered at a pressure of over 5GPa and at a temperature of 1200°C or higher.

• CBN has lower affinity to iron than diamond. The low affinity and high hardness properties means that sintered CBN delivers a superior cutting performance especially during high speed machining of materials such hardened steel, cast iron and sintered alloys etc.



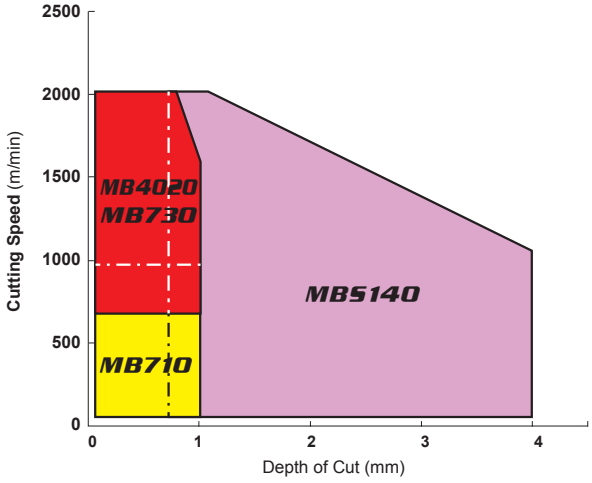
HARDENED STEEL MACHINING

Grade	Grade Features and Application	Main Component
MB8025	**For General Purpose Turning** By employing a "Particle-activated Sintering Method", the new sintered CBN technology is recommended for continuous cutting from medium to high speeds.	CBN (Coarse grain) TiN Al_2O_3
MB810	**For High Speed Continuous Cutting** It features improved wear resistance due to impregnation with larger CBN particles.	CBN (Micro Grain) TiN Al_2O_3
MB825	**For Continuous to Medium Interrupted Cutting** Excellent balance of wear resistance and fracture resistance due to introduction of micro-grain CBN particles.	CBN (Micro Grain) TiN Al_2O_3
MB835	**For Heavy Interrupted Cutting** Improved grade employing micro-grain CBN particles. Excellent fracture resistance for use in heavy interrupted cutting.	CBN (Micro Grain) TiN Al_2O_3



CAST IRON MACHINING

Grade	Grade Features and Application	Main Component
MB710	**For General Cutting** General purpose grade with well balanced wear and fracture resistance.	CBN TiC Al_2O_3
MB730	**For Continuous to Interrupted Cutting** Has the larger CBN content and therefore displays good thermal conductivity. It is suitable for the high temperatures that are generated in high speed cutting.	CBN Co Base Alloy
MB4020	**For High Speed Cutting** Has the larger CBN content and therefore displays good thermal conductivity. From high-speed cutting to interrupted cutting are possible.	CBN (High Content) Co Base Alloy
MB5140	**For High Speed Cutting and Roughing of Cast Iron** Highest CBN content, high thermal conductivity. Enables deep depth of cut.	CBN AlN (Solid)
MB5015	MB5015 is exclusive grade for boring of Centrifugal casting Cylinder liners in semi finishing or finishing applications with high with high wear resistance.	



MB5015

For Cylinder liner
✱Poduced to order only.

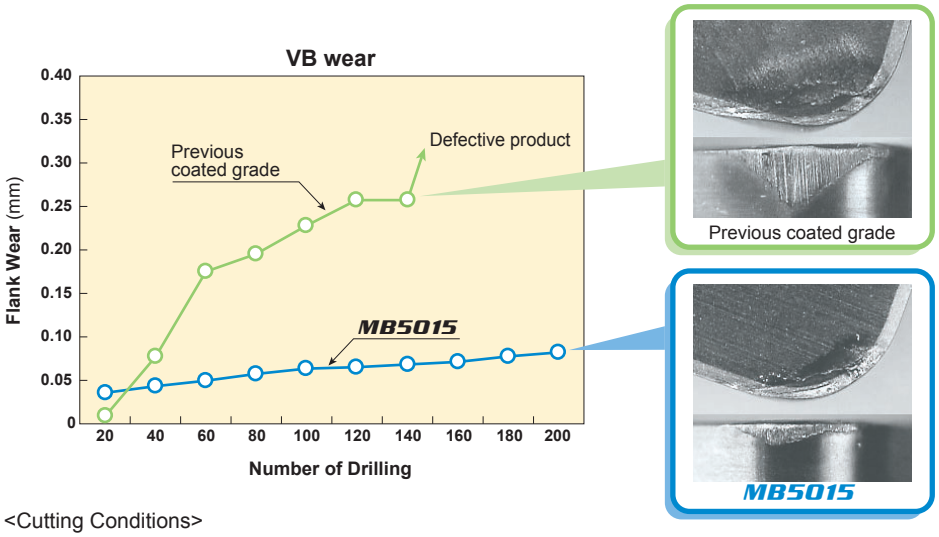
FEATURES

●**MB5015** is exclusive grade for boring of Centrifugal casting Cylinder liners in semi finishing or finishing applications with high with high wear resistance.

RECOMMENDED CUTTING CONDITIONS

Work Material		Cutting Mode	Cutting Speed (m/min) 100 500 1000 1500	Feed (mm/rev)	Depth of Cut (mm)	Coolant
Centrifugal casting	Cast Iron	Continuous cutting		–0.3(Finishing) –0.8(Semi-finishing)	–0.05(Finishing) –0.2(Semi-finishing)	Wet

CUTTING PERFORMANCE



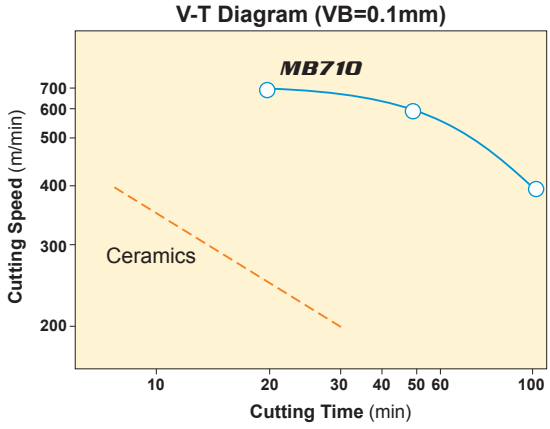
<Cutting Conditions>
Workpiece : FC200 (Centrifugal casting) ϕ63.0
Cutting Speed : 800m/min Feed : 0.35mm/rev Depth of Cut : 0.03mm
Work : Centrifugal casting Cylinder liner Hole Depth : 100mm

CAST IRON MACHINING

Grade	Grade Features and Application	Main Component
MB710	**For General Cutting** General purpose grade with well balanced wear and fracture resistance.	CBN TiC Al_2O_3
MB730	**For Continuous to Interrupted Cutting** Has the larger CBN content and therefore displays good thermal conductivity. It is suitable for the high temperatures that are generated in high speed cutting.	CBN Co Base Alloy
MB4020	**For High Speed Cutting** Has the larger CBN content and therefore displays good thermal conductivity. From high-speed cutting to interrupted cutting are possible.	CBN (High Content) Co Base Alloy
MB5140	**For High Speed Cutting and Roughing of Cast Iron** Highest CBN content, high thermal conductivity. Enables deep depth of cut.	CBN AlN (Solid)

CUTTING PERFORMANCE

Continuous Cutting



<Cutting Condition of **MB710**>
Workpiece : JIS FC250
Insert : TNGA160408
Feed : 0.1mm/rev
Depth of Cut : 0.15mm
Wet Cutting

<Cutting Condition of Ceramics>
Workpiece : JIS FC250
Insert : TNGA160408
Feed : 0.1mm/rev
Depth of Cut : 0.1mm
Dry Cutting

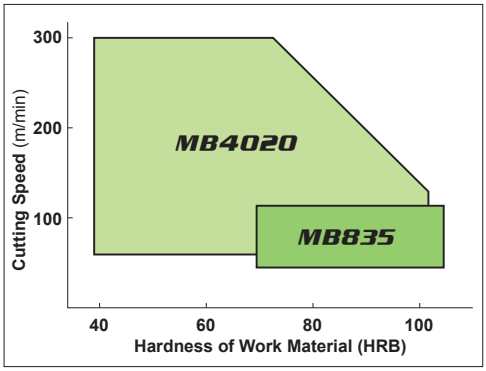
MB4020 SINTERED ALLOY MACHINING



FEATURES

High cutting edge strength

Newly developed special binder provides high cutting edge strength. Burrs and plasticity characteristics must be suppressed in interrupted cutting of sintered alloy machining. Extremely superior work accuracy is realized because MB4020 allows selection of a sharper cutting shape to perform its high cutting edge strength.



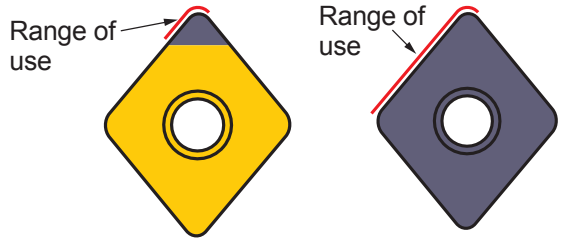
Exeellent welding resistance

There is almost not welding to the tool cutting edge because the stable CBN contents is high. Work cutting dimensional accuracy is stable.

NEW

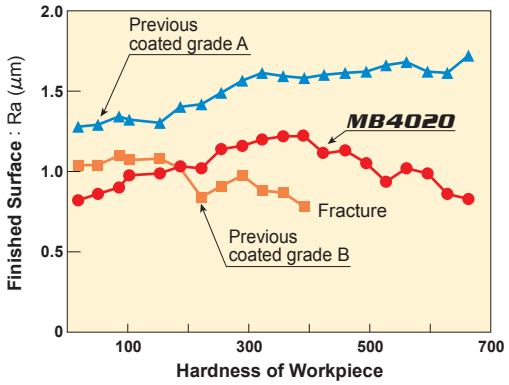
Full face CBN

Full face CBN insert can be used for chamfering that use higher depth of cut



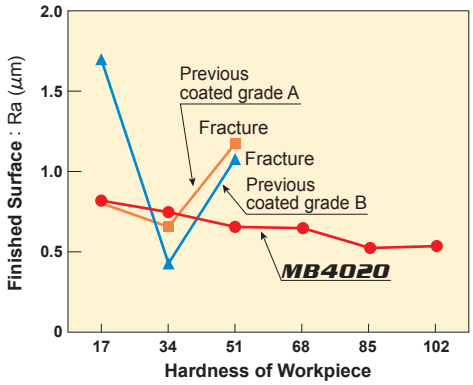
CUTTING PERFORMANCE

Continuous cutting of high density sintered alloy



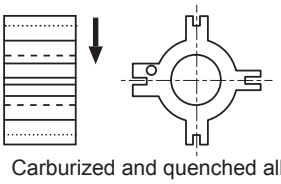
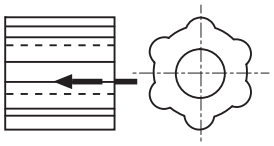
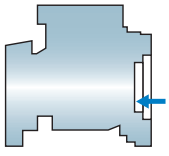
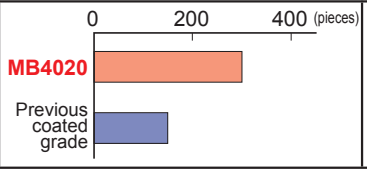
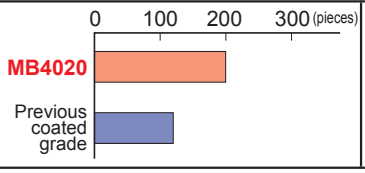
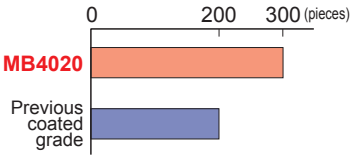
<Cutting Conditions>
Workpiece : High density sintered alloy Insert : NP-CNGA120408
Cutting Speed : 190m/min Feed : 0.15mm/rev
Depth of Cut : 0.1mm
Wet Cutting

Continuous cutting of sintered alloy



<Cutting Conditions>
Workpiece : Sintered alloy Insert : NP-CNGA120408
Cutting Speed : 100m/min Feed : 0.15mm/rev
Depth of Cut : 0.1mm
Wet Cutting

APPLICATION EXAMPLE

Insert	NP-TNGA160404FS3	NP-TPGX080204FS3	CCGW060204FS
Workpiece	 Carburized and quenched alloy	 Carburized and quenched alloy	 FC250
Component	Variable valve parts	Oil pump parts	Crankcase
Cutting Conditions: Cutting Speed (m/min)	250	100	400→450
Cutting Conditions: Feed (mm/rev)	0.1	0.03	0.03→0.37
Cutting Conditions: Depth of Cut (mm)	0.2	0.05	0.13
Result			

CBN

- Suitable for high speed finishing of heat treated steel, sintered ferrous alloy and cast iron.
- Low affinity to iron, thus good surface finishes are possible.
- Grinding can be replaced by machining.



●Heat Treated Steel

Work Material		Type	Cutting Mode	Recommended Grade	Recommended Cutting Conditions		
					Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
Structural Steel Esp. Carburized Steel (SC, SCM, SCr) High Alloy Steel (SKD, SKH)	HRC 35—65	Coated	High speed finishing cutting	**MBC010**	250 (150—400)	—0.2	—0.2
			Continuous cutting for general purpose	**MBC020**	200 (80—250)	—0.2	—0.3
			Continuous cutting	**BC8110**	200 (100—300)	—0.2	—0.3
			Heavy interrupted cutting for general purpose	**BC8020**	200 (80—250)	—0.3	—0.8
			Interrupted cutting for general purpose		150 (60—200)	—0.2	—0.3
		Non-coated	Continuous cutting for general purpose	**MB8025**	180 (80—250)	—0.3	—0.5
			Interrupted cutting for general purpose		120 (60—150)	—0.2	—0.3
			High speed finishing cutting	**MB810**	200 (150—300)	—0.15	—0.15
			Continuous to light interrupted cutting	**MB825**	120 (70—150)	—0.3	—0.5
			Interrupted cutting	**MB835**	100 (50—120)	—0.3	—0.5

●Cast Iron

Work Material		Workpiece Structure	Cutting Speed (m/min) 250 500 750 1000 1250	Feed (mm/rev)	Depth of Cut (mm)	Coolant
Gray Cast Iron	JIS FC250	Ferritic + Pearlitic	MBS140, MB730, MB710, MB4020	—0.5	—1.0 MBS140 —5.0	Dry,Wet
	JIS FC300	Pearlitic				
Alloy Cast Iron		Pearlitic		—0.4	—0.5	Dry,Wet
Ductile Cast Iron	JIS FCD400	Ferritic	MB710, MB730	—0.4	—0.5	Dry,Wet
	JIS FCD700	Ferritic + Pearlitic Pearlitic				

●Sintered Alloy

Work Material	Recommended Grade	Recommended Cutting Conditions		
		Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
General Sintered Alloy	**MB4020**	250 (80—300)	—0.2	—0.3
High Density Sintered Alloy	**MB4020**	150 (80—250)	—0.2	—0.3
Sintered Alloy	**MB4020, MB835**	100 (80—150)	—0.2	—0.3

●Valve Seat

Amount of Hard Particles	None or Small ← → Large			
Hardness of Workpiece (HV)	150	250	300	350
Plunge Cut	MB4020	MB825	MB835	
Traverse Cut	MB4020	MB710	MB825	

●Roll

Work Material	Grade	Recommended Cutting Conditions		
		Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
Cast Steel Adamite Cast Steel	**MB825, MB8025**	80 (30—130)	0.3 (0.1—0.5)	0.2—3.0
Ductile Cast Iron Granular Cast Iron Chilled Cast Iron	**MB710**	80 (30—130)	0.3 (0.1—0.5)	0.2—3.0
High Chromium Steel High Alloy Steel	**MB825, MB8025**	80 (30—130)	0.3 (0.1—0.5)	0.2—3.0
High Speed Steel	**MB730**	50 (20—70)	0.25 (0.1—0.4)	0.1—3.0
Cemented Carbide	**MB730, MBS140**	20 (10—30)	—0.2	—0.2

●Heat Resistant Alloy

Work Material	Grade	Recommended Cutting Conditions		
		Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
Ni Base Heat Resistant Alloy (e.g. Inconel)	**MB730**	120 (100—150)	—0.2	—0.5
Co Base Heat Resistant Alloy (e.g. Stellite)	**MB730**	70 (50—100)	—0.2	—0.5

HONING

NEW HONING TYPES

For the CBN ***BC8020***, ***MBC010*** and ***MBC020*** coated grades, ***MB4020*** and ***MB710/MB730*** a wide range of edge honing styles are available to cover a large range of applications and to represent Mitsubishi Materials' unique cutting tool technology.



General cutting

GA honing is the first recommendation.
GS honing if the depth of cut is 0.1mm or less.
GN honing if the crater wear is large.

Continuous cutting, stable cutting

FS honing is the first recommendation.
FA honing to improve the initial machining performance.
FN honing if the crater wear is large.

Medium and heavy interrupted cutting, unstable cutting

TA honing is the first recommendation.
TS honing if the depth of cut is 0.1mm or less.
TN honing if the crater wear is large.

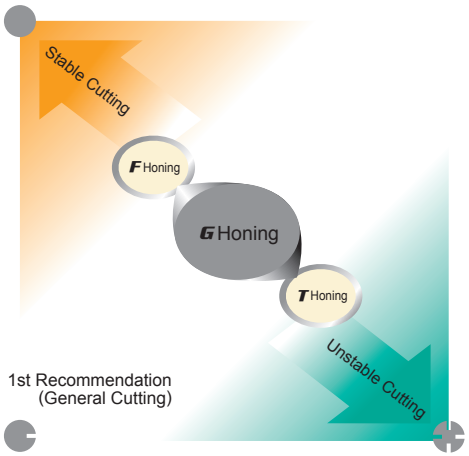
NP-CNGA120408-GA2

Main Application — Edge Honing Type

MAIN APPLICATION \ EDGE HONING TYPE	A For General Purpose Machining	S For Anti Chatter (Sharp anti-burr type)	N For Small Depth of Cut (Crater wear resistant)
F Continuous cutting	FA Honing: 0.1, 15°, R0	FS Honing: 0.1, 15°, R0.015	FN Honing: 0.05, 15°, R0.015
G Light interrupted cutting	GA Honing: 0.13, 25°, R0.03	GS Honing: 0.13, 25°, R0.015	GN Honing: 0.05, 25°, R0.015
T Interrupted cutting	TA Honing: 0.13, 35°, R0.03	TS Honing: 0.13, 35°, R0.015	TN Honing: 0.05, 35°, R0.015

CONVENTIONAL HONING TYPES

For CBN grades except new honing types, three conventional honing types, namely F, G and T types are available for different applications.



NP-CNGA120408-G2

Main Application

F Honing — Continuous cutting	0.1, 15°, R0
G Honing — Light interrupted cutting	0.13, 25°, R0.03
T Honing — Interrupted cutting	0.13, 35°, R0.03

CBN GROOVING SERIES
(GY/MG)



FEATURES

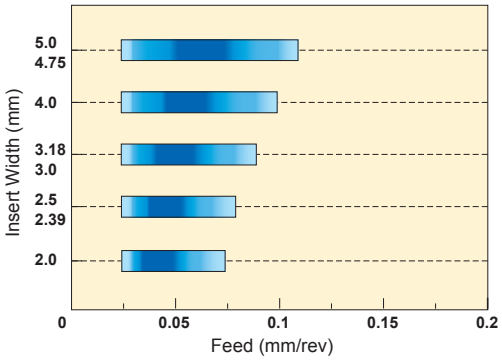
A combination with a high rigidity holder ensures high accuracy and long tool life.

Holder rigidity is essential when grooving hardened steel. The GY series Tri Lock system offers high rigidity equivalent to a 1-piece type despite being a 2-piece type. MG has a wide insert location face for high gripping force. A combination with these holders allows it to deliver excellent performance when grooving hardened steel.

Product line-up for different holder properties

MG for narrow grooves and GY for general grooves are both lined up to allow selection of the most suitable tool.

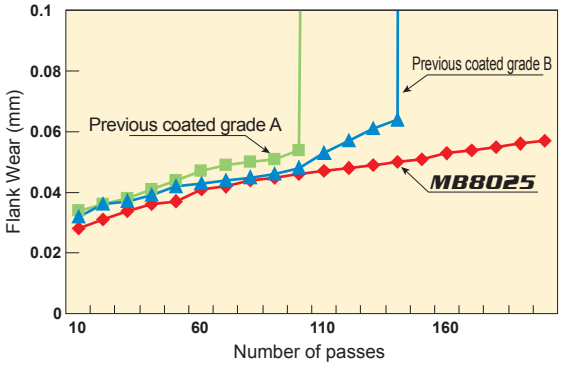
RECOMMENDED CUTTING CONDITIONS



Work Material		Hardness	Grade	Cutting Speed (m/min)	Coolant
H	Hardened Steel	35—65HRC	**MB8025**	100 (60—120)	Dry,Wet

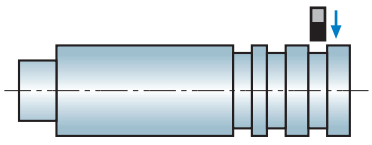
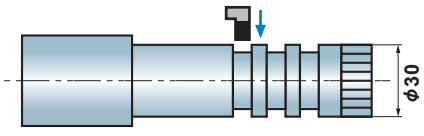
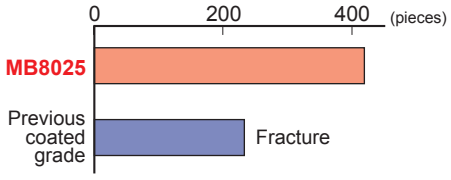
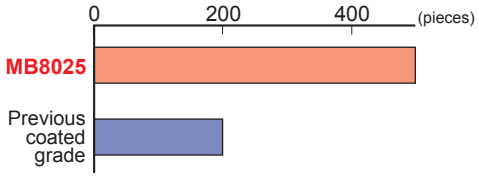
CUTTING PERFORMANCE

Tool life evaluation for the GY holder



<Cutting Conditions>
Workpiece : JIS SCM415 (HRC60) Depth of Cut : 0.35mm
Cutting Speed : 120m/min Dry Cutting
Feed : 0.1mm/rev

APPLICATION EXAMPLE

Insert	**GY1G0300F020N-GFGS** (Grade : **MB8025**)	**MGTR43200** (Grade : **MB8025**)
Workpiece	 SNCM230H (HRC58—62)	 SCr420H (HRC61—65)
Component	Transmission shaft	Transmission shaft
Cutting Conditions — Cutting Speed (m/min)	129	100
Cutting Conditions — Feed (mm/rev)	0.1	0.05
Result	 GY achieves longer tool life without fracturing.	 2.5 times longer tool life than the conventional insert.

CBN BREAKER INSERT

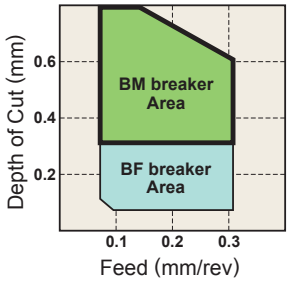
(*BM/BF* Breaker)

FEATURES

Chip Breaker Geometry Designed for Excellent Chip Control
Radial chip breaker ensures optimization of the cutting point and the chip breaker position. Enables effective chip discharge even when copy machining and prevents the chips from wrapping around the holder under finish cutting conditions.

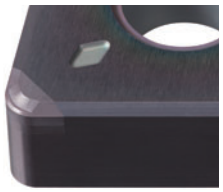
Long Life Coated CBN Grade
Combination of Coating grade & Breaker, high efficiency and long tool life in wide variety of applications.

APPLICATION AREA



DEEP CUTTING DEPTH

BM Breaker (Deep shoulder Milling)

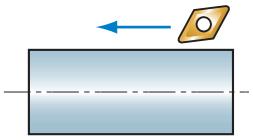


Good for deep depth cutting of carburized layer.

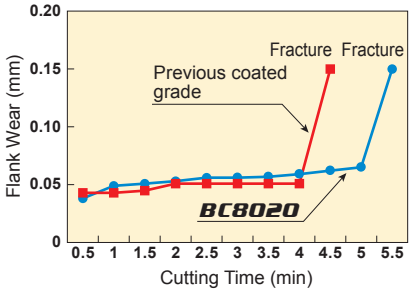
Recommend and under ap=0.6mm

Available in BC8020 grade.

CUTTING PERFORMANCE



<Cutting Conditions>
Workpiece : JIS SCM415 (60HRC)
Insert : BM-CNGM120408TA
Cutting Speed : 180m/min
Feed : 0.2mm/rev
Depth of Cut : 0.5mm
Dry Cutting



LIGHT CUTTING DEPTH

BF Breaker

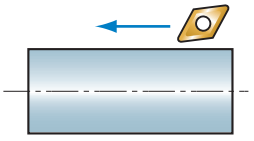


Good for chip removal under light depth and feed cutting.

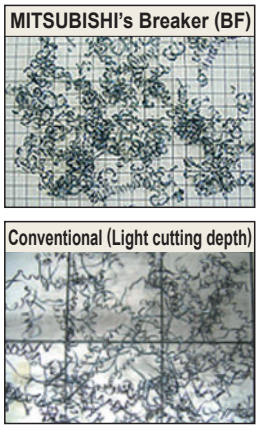
Recommend and under ap=0.3mm

Available in BC8110,MBC020 grade.

CUTTING PERFORMANCE



<Cutting Conditions>
Workpiece : SCr420H (55HRC)
Insert : BF-CNGG120408TA4
Cutting Speed : 100m/min
Feed : 0.2mm/rev
Depth of Cut : 0.1mm
Dry Cutting



MULTI-CORNER TYPE INSERTS

A single sided, multi-corner type insert has no cutting edges on the underside.

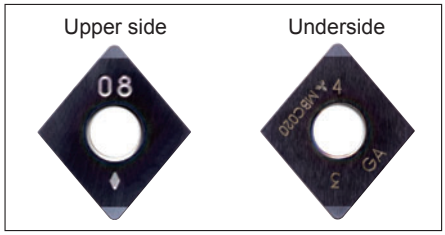
Double Sided, multi-corner type insert, ex.

NP-CNGA120408GA4
No. of Cutting Edge Corners

Single Sided, multi-corner type insert, ex.

NP-CNGA120408GA2
No. of Cutting Edge Corners

Double sided, multi-corner type insert

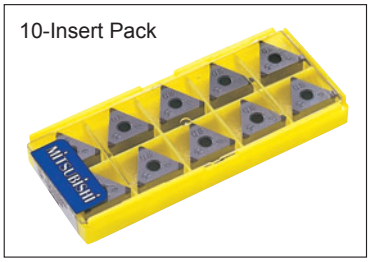


10-INSERTS PACKS

Two types of packs for ***MB8025*** Multi-corner type inserts, are available, a single insert pack and a ten insert pack. For easy storage.

TNP-CNGA120404G2
10-Insert Pack Symbol

10-Insert Pack



WIPER INSERT

●Improving Surface Finish

Under the same machining conditions as conventional breakers, but with the feed rate increased, the surface finish of the workpiece can be improved.

●Improving Efficiency

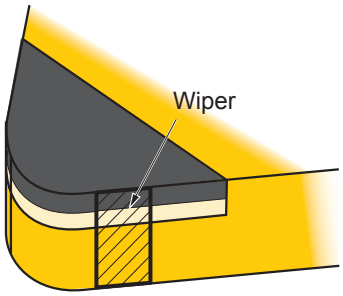
High feed rates not only shorten machining times but also make it possible to combine roughing and finishing operations.

●Increased Tool Life

When a change to high feed conditions, the time required to cut one component is decreased, thus more parts can be machined with each insert. In addition, the high feed rate prevents rubbing, therefore, delaying the progression of wear and increasing the tool life of the insert.

●Improving Chip Control

Under high feed conditions, the chips generated become thicker and are more easily broken, thus, chip control is improved.



Insert example

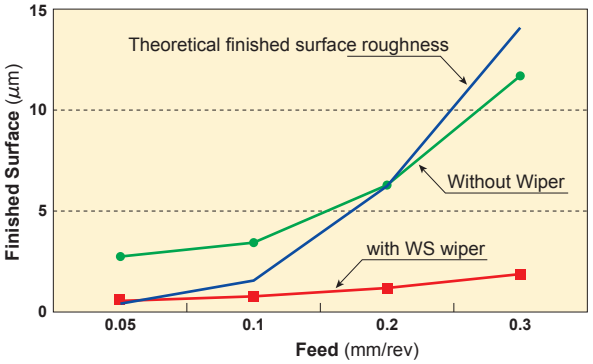
Wiper insert for low rigidity workpieces

NP-CNGA120408GAWS2

New wiper edge code

CUTTING PERFORMANCE

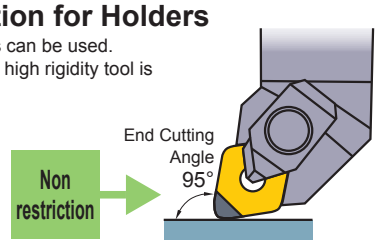
<Cutting Conditions> Workpiece : Hardened Material (HRC60) Depth of Cut : 0.1mm
Insert : NP-CNGA120408GAWS2 Dry Cutting
Cutting Speed : 120m/min



NOTES FOR USE

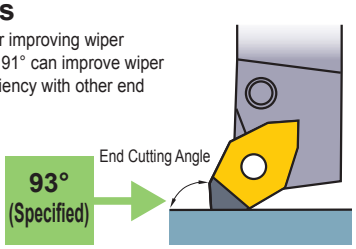
No Restriction for Holders

A standard holders can be used.
(*A double clamp, high rigidity tool is recommended.)

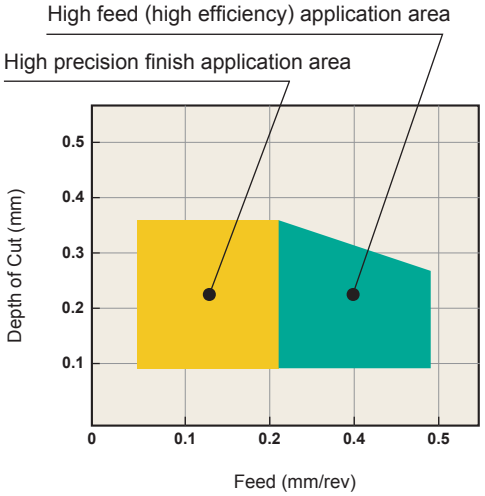


Restriction for Holders

Use a holder with end cutting angle 93° for improving wiper efficiency. A holder with end cutting angle 91° can improve wiper efficiency, however, there is no wiper efficiency with other end cutting angles (60°, 90°,107°etc.).

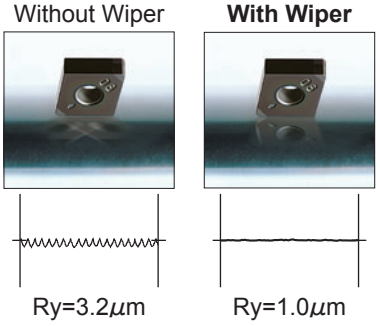


RECOMMENDED CUTTING CONDITIONS AND PERFORMANCE



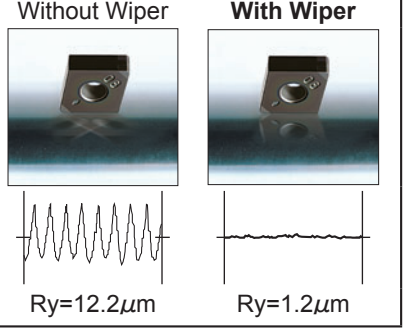
High precision finishing

Cutting Speed: 100m/min Feed: 0.1mm/rev
Depth of Cut: 0.1mm Dry Cutting

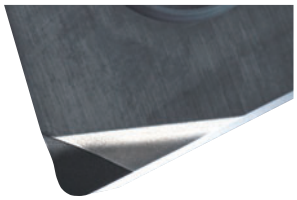


High feed, high efficiency machining

Cutting Speed: 100m/min Feed: 0.3mm/rev
Depth of Cut: 0.1mm Dry Cutting

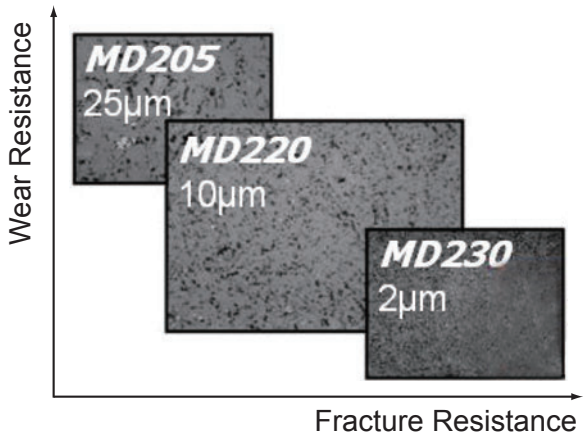


PCD (SINTERED DIAMOND)



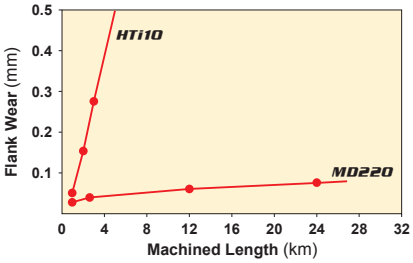
- Suitable for materials such as aluminium alloy, non-ferrous metals, and fibre strengthened plastic.
- Suitable for extremely high speed finishing.

FEATURES



Grade	Features
MD205	**Materials focused on wear resistance** Coarse grain diamond particles are sintered and wear resistance is excellent. Use when wear resistance with MD220 is insufficient.
MD220	**Materials for general machining** Sintered medium grain diamond particles. Wear resistance and fracture resistance are superbly balanced. Applicable to general finishing of non-ferrous metals, non-metal cutting, and similar machining.
MD230	**Materials focused on fracture resistance** Fine grain diamond particles are used. Fracture resistance and cutting edge sharpness are excellent. Use when fracture and a high quality finished surface is demanded with MD220.

CUTTING PERFORMANCE



Sintered diamond tool wear for high Si aluminium alloy cutting

<Cutting Conditions>

Workpiece	: High Si Aluminium Alloy
Tool	: P11R,SPGN120308
Cutting Speed	: 200m/min
Depth of Cut	: 1.5mm
Feed	: 0.15mm/rev
Coolant	: W.S.O

APPLICATION

Grade		
MD205	**MD220**	**MD230**
Please use when there is insufficient resistance to wear with the MD220.	Apply for general finishing of non-ferrous metals and non-metal cutting.	Please use when a fracture has occured with the MD220 and you desire a high-quality finished surface.

SELECTION STANDARD

TURNING

Work Material	Recommended Grade			Recommended Cutting Conditions		
	MD205	MD220	MD230	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
Aluminium		◎	○	1000 (200—1500)	—0.2	—1.0
Aluminium Alloy (Si ≤ 16%)		◎	○	800 (200—1200)	—0.2	—1.0
Aluminium Alloy (Si > 16%)		○		600 (200—1000)	—0.2	—1.0
Copper Alloy		◎	○	700 (200—1200)	—0.2	—1.0
Strengthened Plastic		◎		600 (100—1000)	—0.4	—1.0
Glass Fibre Reinforced Plastic		◎		500 (100—800)	—0.25	—1.0
Carbon	○	◎		400 (100—600)	—0.3	—1.0
Ceramics		○		50 (30—80)	—0.1	—1.0
Hard Rubber		◎		600 (300—800)	—0.15	—1.0
Wood Inorganic Board		◎		1300 (300—4000)	—0.4	—
Cemented Carbide		○		15 (5—20)	—0.2	—0.5

(Note1) ◎ : 1st recommendation. ○ : 2nd recommendation
(Note2) Not suitable for steel.

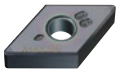
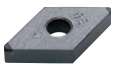
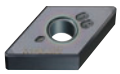
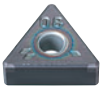
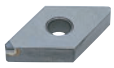
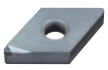
NEW PETIT CUT INSERT SERIES

FEATURES

- **Economical** The small PCD delivers long tool life. Eliminates the need for regrinding, making tool management easier and economical.
- **With Breaker** Chip breaker formed directly on the PCD portion delivers superior chip control.
- Corner R0.05mm inserts are available, making it suitable for the machining of small work corner radii.

CLASSIFICATION

NEGATIVE INSERTS WITH HOLE

Product Name	Type	Tolerance	Breaker Name and Cross Section	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°
NEW PETIT CUT	Multi-corner Type Double Sided	G	Flat Top	NP-CNGA_○4  B022	NP-DNGA_○4  B025	NP-SNGA_○4  B028	NP-TNGA_○6  B030	NP-VNGA_○4  B032	NP-WNGA_○6  B034
	Multi-corner Type Double Sided With Wiper		Flat Top	NP-CNGA_○4  B022					
	Multi-corner Type Double Sided With Breaker		BF	BF-CNGG_○4  B022	BF-DNGG_○4  B025				
	Multi-corner Type Double Sided With Breaker		Flat Top	NP-CNGA_○2 *  B023	NP-DNGA_○2 *  B026	NP-SNGA_○2 *  B028	NP-TNGA_○3 *  B030, B031	NP-VNGA_○2 *  B032	NP-WNGA_○3  B034
	Multi-corner Type Single Sided With Wiper		Flat Top	NP-CNGA_○WS2 *  B023	NP-DNGA_○WS2J_R/L  B027				NP-WNGA_○WS3  B034
	Multi-corner Type Single Sided With Breaker		BF	BF-CNGM_○2  B024	BF-DNGM_○2  B027				
	Multi-corner Type Single Sided With Breaker		BM	BM-CNGM_○2  B024	BM-DNGM_○2  B027		BM-TNGM_○3  B031		
	One-corner Type Single Sided	M	Flat Top	NP-CNMA_○  B024	NP-DNMA_○  B027	NP-SNMA_○  B028	NP-TNMA_○  B031	NP-VNMA_○  B033	
	One-corner Type Single Sided With Breaker		R/L-F	NP-CNMM_R/L-F  B055	NP-DNMM_R/L-F  B055	NP-SNMM_R/L-F  B056	NP-TNMM_R/L-F  B056	NP-VNMM_R/L-F  B057	

(Note) Two types of packs for * type inserts, pack of single insert and pack of ten inserts, are available. (The single pack is standard.)
Please refer to the "Standard of inserts".

NEGATIVE INSERTS WITH HOLE

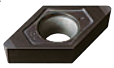
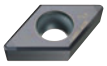
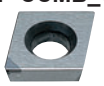
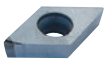
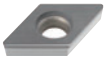
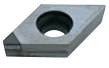
Product Name	Type	Tolerance	Breaker Name and Cross Section	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°
STANDARD	NEW Multi-corner Type Double Sided (Solid CBN)	G	Flat Top	CNGA  B024		SNGA  B029	TNGA  B031		
	One-corner Type Single Sided	M	Flat Top	CNMA  B024, B055					
	One-corner Type Single Sided	G	Flat Top		DNGA  B027, B055	SNGA  B028, B056	TNGA  B031, B056	VNGA  B033, B057	

5° POSITIVE INSERTS WITH HOLE

Product Name	Type	Tolerance	Breaker Name and Cross Section	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°
NEW PETIT CUT	Multi-corner Type Single Sided	G	Flat Top					NP-VBGW_○2  B048	
	One-corner Type Single Sided		Flat Top					NP-VBGW_○  B048	
	One-corner Type Single Sided With Breaker		R-F					NP-VBGT_R-F  B064	

CLASSIFICATION

7° POSITIVE INSERTS WITH HOLE

Product Name	Type	Tolerance	Breaker Name and Cross Section	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°
NEW PETIT CUT	Multi-corner Type Single Sided	G	Flat Top	NP-CCGW/B_○2 *  B039	NP-DCGW_○2 *  B043		NP-TCGW_○3  B045	NP-VCGW_○2  B049	
	Multi-corner Type Single Sided With Wiper	G	Flat Top	NP-CCGW_○WS2  B040					
	Multi-corner Type Single Sided With Breaker	G	BF	BF-CCGT_○2  B040	BF-DCGT_○2  B044				
	One-corner Type Single Sided	M	Flat Top	NP-CCMB_○  B040					
	One-corner Type Single Sided With Breaker	M	Standard	NP-CCMH  B059					
	One-corner Type Single Sided	G	Flat Top	NP-CCGW_○  B040	NP-DCGW_○  B044				
	One-corner Type Single Sided	M	Flat Top	NP-CCMW_○  B041	NP-DCMW_○  B044				NP-WCMW_○  B049
	One-corner Type Single Sided	M	Flat Top	NP-CCMW  B059					
	One-corner Type Single Sided With Breaker	M	R/L-F		NP-DCMT_R/L-F  B060				
	One-corner Type Single Sided With Breaker	G	R-F					NP-VCGT_R-F  B064	
STANDARD	NEW Multi-corner Type Single Sided	G	Flat Top	CCGW  B041	DCGW  B044		TCGW  B045		
	One-corner Type Single Sided	M G	Flat Top	CCMW  B041, B059	DCMW  B044, B060		TCMW TCGW  B045, B061		WCMW  B065

(Note) Two types of packs for ⋆ type inserts, pack of single insert and pack of ten inserts, are available. (The single pack is standard.)
Please refer to the "Standard of inserts".

11° POSITIVE INSERTS WITH HOLE

Product Name	Type	Tolerance	Breaker Name and Cross Section	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Rhombic 35°	Trigon 80°
NEW PETIT CUT	Multi-corner Type Single Sided	G	Flat Top	NP-CPGB_○2  B042			NP-TPGB_○3  B046		
	Multi-corner Type Single Sided		Flat Top				NP-TPGX_○3  B046		
	One-corner Type Single Sided	M	Flat Top	NP-CPMB_○  B042			NP-TPMB_○  B046		
	One-corner Type Single Sided With Breaker		Standard	NP-CPMH  B059					
	One-corner Type Single Sided	G	Flat Top				NP-TPGX_○  B047		
	One-corner Type Single Sided With Breaker	M	R/L-F				NP-TPMX_R/L-F  B062		
	One-corner Type Single Sided With Breaker		R/L-F				NP-TPMH_R/L-F  B062		
STANDARD	One-corner Type Single Sided With Breaker	G	Standard	CPGT  B059					WPGT  B065
	One-corner Type Single Sided		Flat Top			SPGX  B060	TPGX  B047, B063		
	One-corner Type Single Sided With Breaker		R/L-F				TPGT/V_R/L-F  B062, B063		

CLASSIFICATION

15° POSITIVE INSERTS WITH HOLE

Type	Tolerance	Breaker Name and Cross Section	Rhombic 35° 	
One-corner Type Single Sided (For Aluminium With Breaker)	G	R/L 	VDGX_R/L-F  B067	

20° POSITIVE INSERTS WITH HOLE

Type	Tolerance	Breaker Name and Cross Section	Rhombic 55° 	Triangular 60° 
One-corner Type Single Sided (For Aluminium With Breaker)	G	R/L 		TEGX_R/L  B066
One-corner Type Single Sided (For Aluminium With Breaker)		R/L-F 	DEGX_R/L-F  B066	
One-corner Type Single Sided (For Aluminium)		Flat Top 		TEGX  B066

NEGATIVE INSERTS WITHOUT HOLE

Type	Tolerance	Breaker Name and Cross Section	Rhombic 80°	Rhombic 55°	Square 90°	Triangular 60°	Round
One-corner Type Single Sided	G	Flat Top			SNGN  B037, B058	TNGN  B038	
Multi-corner Type Double Sided (Solid CBN)	G	Flat Top	CNGN  B035	DNGN  B035	SNGN  B037	TNGN  B038	RNGN  B036

5° POSITIVE INSERTS WITHOUT HOLE

Type	Tolerance	Breaker Name and Cross Section	Triangular 60°	
Multi-corner Type Single Sided	G	Flat Top	TBGN  B052	

11° POSITIVE INSERTS WITHOUT HOLE

Type	Tolerance	Breaker Name and Cross Section	Square 90°	Triangular 60°
One-corner Type Single Sided	G	Flat Top	SPGN  B051, B068	TPGN  B052, B068

SPECIAL PURPOSE INSERTS

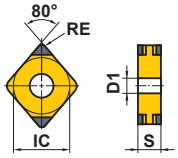
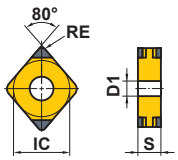
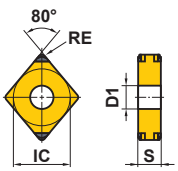
Tool Holder Type	Tolerance	Inserts
GY Type	G	GY_GFGS  B053
MG Type	G	MGTR  B054
TL Type	G	RTG-A  B050

80° CN TYPE INSERTS WITH HOLE

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

Shape	Order Number	Coated CBN				CBN							Solid CBN	Dimensions (mm)				Geometry	Applicable Holder Page
		BC8020	BC8110 NEW	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	D1		
NEW PETIT CUT	NP-CNGA120404GA4	●			●									12.7	4.76	0.4	5.16		C008 C009 E013 E036 E040 H006 —008
	NP-CNGA120408GA4	●			●									12.7	4.76	0.8	5.16		
	NP-CNGA120412GA4	●			●									12.7	4.76	1.2	5.16		
	NP-CNGA120404GN4				●									12.7	4.76	0.4	5.16		
	NP-CNGA120408GN4				●									12.7	4.76	0.8	5.16		
	NP-CNGA120412GN4				●									12.7	4.76	1.2	5.16		
	NEW NP-CNGA120404GS4		●											12.7	4.76	0.4	5.16		
	NEW NP-CNGA120408GS4		●											12.7	4.76	0.8	5.16		
	NEW NP-CNGA120412GS4		●											12.7	4.76	1.2	5.16		
	NP-CNGA120404FS4	●	●											12.7	4.76	0.4	5.16		
	NP-CNGA120408FS4	●	●											12.7	4.76	0.8	5.16		
	NP-CNGA120412FS4	●	●											12.7	4.76	1.2	5.16		
	NP-CNGA120404TA4	●			●									12.7	4.76	0.4	5.16		
	NP-CNGA120408TA4	●			●									12.7	4.76	0.8	5.16		
	NP-CNGA120412TA4	●			●									12.7	4.76	1.2	5.16		
	NEW NP-CNGA120404TS4		●											12.7	4.76	0.4	5.16		
	NEW NP-CNGA120408TS4		●											12.7	4.76	0.8	5.16		
	NEW NP-CNGA120412TS4		●											12.7	4.76	1.2	5.16		
NEW PETIT CUT (With Wiper) *	NP-CNGA120404GAWS4	●												12.7	4.76	0.4	5.16		C008 C009 E013 E036 E040 H006 —008
	NP-CNGA120408GAWS4	●												12.7	4.76	0.8	5.16		
	NP-CNGA120412GAWS4	●												12.7	4.76	1.2	5.16		
	NEW NP-CNGA120404GSWS4		●											12.7	4.76	0.4	5.16		
	NEW NP-CNGA120408GSWS4		●											12.7	4.76	0.8	5.16		
	NEW NP-CNGA120412GSWS4		●											12.7	4.76	1.2	5.16		
NEW PETIT CUT	BF-CNGG120404TA4				●									12.7	4.76	0.4	5.16		C008 C009 E013 E036 E040 H006 —008
 (With Breaker)	BF-CNGG120408TA4				●									12.7	4.76	0.8	5.16		
	BF-CNGG120412TA4				●									12.7	4.76	1.2	5.16		

* Please refer to B014 before using the wiper insert.

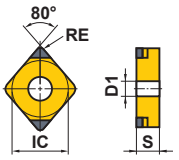
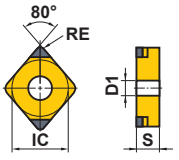
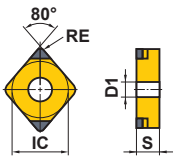
■ = MIRACLE SIGMA

● : Inventory maintained in Japan. (1 insert in one case)

Work Material		
H	Hardened Materials	
K	Cast Iron	
S	Heat-resistant Alloy, Titanium Alloy	
	Sintered Alloy	

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

Shape	Order Number	Coated CBN				CBN							Solid CBN	Dimensions (mm)				Geometry	Applicable Holder Page
		BC8020	BC8110 NEW	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	D1		
NEW PETIT CUT	NP-CNGA120404GA2	●			●									12.7	4.76	0.4	5.16		C008 C009 E013 E036 E040 H006 −008
	NP-CNGA120408GA2	●			●									12.7	4.76	0.8	5.16		
	NP-CNGA120412GA2	●			●									12.7	4.76	1.2	5.16		
	NEW NP-CNGA120402GS2		●											12.7	4.76	0.2	5.16		
	NP-CNGA120404GS2		●	●						●	●			12.7	4.76	0.4	5.16		
	NP-CNGA120408GS2		●	●						●	●			12.7	4.76	0.8	5.16		
	NP-CNGA120412GS2		●	●						●	●			12.7	4.76	1.2	5.16		
	NP-CNGA120404GN2				●									12.7	4.76	0.4	5.16		
	NP-CNGA120408GN2				●									12.7	4.76	0.8	5.16		
	NP-CNGA120412GN2				●									12.7	4.76	1.2	5.16		
	NEW NP-CNGA120402FS2		●											12.7	4.76	0.2	5.16		
	NP-CNGA120404FS2	●	●									●		12.7	4.76	0.4	5.16		
	NP-CNGA120408FS2	●	●									●		12.7	4.76	0.8	5.16		
	NP-CNGA120412FS2	●	●									●		12.7	4.76	1.2	5.16		
	NP-CNGA120404TA2	●			●						●			12.7	4.76	0.4	5.16		
	NP-CNGA120408TA2	●			●						●			12.7	4.76	0.8	5.16		
	NP-CNGA120412TA2	●			●						●			12.7	4.76	1.2	5.16		
	NP-CNGA120404TS2		●									●		12.7	4.76	0.4	5.16		
	NP-CNGA120408TS2		●									●		12.7	4.76	0.8	5.16		
	NP-CNGA120412TS2		●									●		12.7	4.76	1.2	5.16		
	NP-CNGA120404G2					●								12.7	4.76	0.4	5.16		
	NP-CNGA120408G2					●								12.7	4.76	0.8	5.16		
	NP-CNGA120412G2					●								12.7	4.76	1.2	5.16		
	NP-CNGA120404T2					●								12.7	4.76	0.4	5.16		
	NP-CNGA120408T2					●								12.7	4.76	0.8	5.16		
	NP-CNGA120412T2					●								12.7	4.76	1.2	5.16		
NEW PETIT CUT ✱2	TNP-CNGA120404G2					●								12.7	4.76	0.4	5.16		C008 C009 E013 E036 E040 H006 −008
	TNP-CNGA120408G2					●								12.7	4.76	0.8	5.16		
	TNP-CNGA120412G2					●								12.7	4.76	1.2	5.16		
	TNP-CNGA120404T2					●								12.7	4.76	0.4	5.16		
	TNP-CNGA120408T2					●								12.7	4.76	0.8	5.16		
	TNP-CNGA120412T2					●								12.7	4.76	1.2	5.16		
NEW PETIT CUT (With Wiper) ✱1	NP-CNGA120404GAWS2				●	●								12.7	4.76	0.4	5.16		C008 C009 E013 E036 E040 H006 −008
	NP-CNGA120408GAWS2	●			●	●								12.7	4.76	0.8	5.16		
	NP-CNGA120412GAWS2	●			●	●								12.7	4.76	1.2	5.16		
	NP-CNGA120404GSWS2		●	●										12.7	4.76	0.4	5.16		
	NP-CNGA120408GSWS2		●	●										12.7	4.76	0.8	5.16		
	NP-CNGA120412GSWS2		●	●										12.7	4.76	1.2	5.16		

✱1 Please refer to B014 before using the wiper insert.
✱2 The order number is for a 10-insert pack. Please specify order number, grade and quantity.

■ = MIRACLE SIGMA

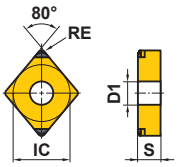
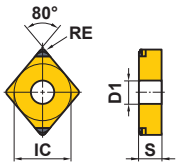
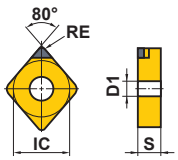
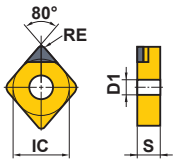
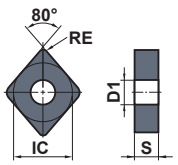
GRADES ➤ B004
IDENTIFICATION ➤ B002

80° CN TYPE INSERTS WITH HOLE

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

Shape	Order Number	Coated CBN				CBN							Solid CBN	Dimensions (mm)				Geometry	Applicable Holder Page
		BC8020	BC8110 NEW	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	D1		
NEW PETIT CUT	BF-CNGM120404TA2				●									12.7	4.76	0.4	5.16		C008 C009 E013 E036 E040 H006 –008
	BF-CNGM120408TA2				●									12.7	4.76	0.8	5.16		
	BF-CNGM120412TA2				●									12.7	4.76	1.2	5.16		
	NEW BF-CNGM120404TS2		●											12.7	4.76	0.4	5.16		
	NEW BF-CNGM120408TS2		●											12.7	4.76	0.8	5.16		
(With Breaker)	NEW BF-CNGM120412TS2		●											12.7	4.76	1.2	5.16		
NEW PETIT CUT	BM-CNGM120408TA2	●												12.7	4.76	0.8	5.16		C008 C009 E013 E036 E040 H006 –008
	BM-CNGM120412TA2	●												12.7	4.76	1.2	5.16		
(With Breaker)																			
NEW PETIT CUT	NP-CNMA120404GS									●	●			12.7	4.76	0.4	5.16		C008 C009 E013 E036 E040 H006 –008
	NP-CNMA120408GS									●	●			12.7	4.76	0.8	5.16		
	NP-CNMA120412GS									●	●			12.7	4.76	1.2	5.16		
	NP-CNMA120404G					●		●						12.7	4.76	0.4	5.16		
	NP-CNMA120408G					●		●						12.7	4.76	0.8	5.16		
	NP-CNMA120412G					●		●						12.7	4.76	1.2	5.16		
	NP-CNMA120404F					□	●			●				12.7	4.76	0.4	5.16		
	NP-CNMA120408F					□	●			●				12.7	4.76	0.8	5.16		
	NP-CNMA120412F					□	●			●				12.7	4.76	1.2	5.16		
	NP-CNMA120404T					□		●	●		●			12.7	4.76	0.4	5.16		
	NP-CNMA120408T					□		●	●		●			12.7	4.76	0.8	5.16		
	NP-CNMA120412T					□		●	●		●			12.7	4.76	1.2	5.16		
	CNMA120404						●			●	●			12.7	4.76	0.4	5.16		C008 C009 E013 E036 E040 H006 –008
	CNMA120408						●			●	●			12.7	4.76	0.8	5.16		
	CNMA120412									●	●			12.7	4.76	1.2	5.16		
	NEW CNGA120408												●	12.7	4.76	0.8	5.16		C008 C009 E013 E036 E040 H006 –008
	NEW CNGA120412												●	12.7	4.76	1.2	5.16		

■ = MIRACLE SIGMA

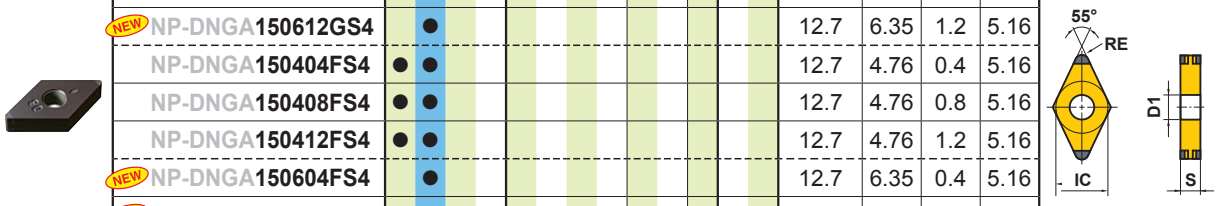
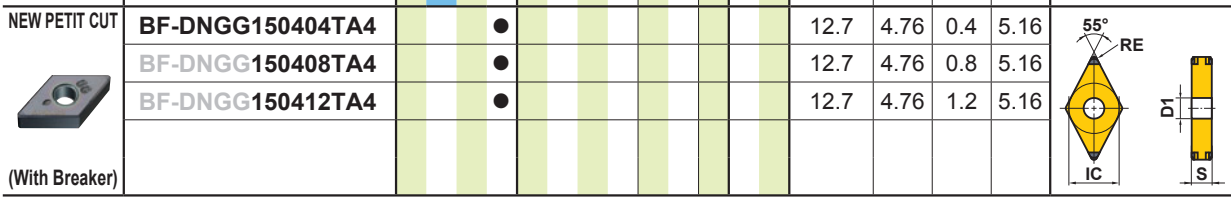
● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

55° DN TYPE INSERTS WITH HOLE

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

Shape	Order Number	Coated CBN				CBN							Solid CBN	Dimensions (mm)				Geometry	Applicable Holder Page
		BC8020	BC8110 (NEW)	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	D1		
NEW PETIT CUT	NP-DNGA150404GA4	●			●									12.7	4.76	0.4	5.16		C010 C011 E013 E036 —040 H009 —011
	NP-DNGA150408GA4	●			●									12.7	4.76	0.8	5.16		
	NP-DNGA150412GA4	●			●									12.7	4.76	1.2	5.16		
	NP-DNGA150404GN4				●									12.7	4.76	0.4	5.16		
	NP-DNGA150408GN4				●									12.7	4.76	0.8	5.16		
	NP-DNGA150412GN4				●									12.7	4.76	1.2	5.16		
	NEW NP-DNGA150404GS4		●											12.7	4.76	0.4	5.16		
	NEW NP-DNGA150408GS4		●											12.7	4.76	0.8	5.16		
	NEW NP-DNGA150412GS4		●											12.7	4.76	1.2	5.16		
	NEW NP-DNGA150604GS4		●											12.7	6.35	0.4	5.16		
	NEW NP-DNGA150608GS4		●											12.7	6.35	0.8	5.16		
	NEW NP-DNGA150612GS4		●											12.7	6.35	1.2	5.16		
	NP-DNGA150404FS4	●	●											12.7	4.76	0.4	5.16		
	NP-DNGA150408FS4	●	●											12.7	4.76	0.8	5.16		
	NP-DNGA150412FS4	●	●											12.7	4.76	1.2	5.16		
	NEW NP-DNGA150604FS4		●											12.7	6.35	0.4	5.16		
	NEW NP-DNGA150608FS4		●											12.7	6.35	0.8	5.16		
	NEW NP-DNGA150612FS4		●											12.7	6.35	1.2	5.16		
	NP-DNGA150404TA4	●			●									12.7	4.76	0.4	5.16		
	NP-DNGA150408TA4	●			●									12.7	4.76	0.8	5.16		
	NP-DNGA150412TA4	●			●									12.7	4.76	1.2	5.16		
	NEW NP-DNGA150404TS4		●											12.7	4.76	0.4	5.16		
	NEW NP-DNGA150408TS4		●											12.7	4.76	0.8	5.16		
	NEW NP-DNGA150412TS4		●											12.7	4.76	1.2	5.16		
	NEW NP-DNGA150604TS4		●											12.7	6.35	0.4	5.16		
	NEW NP-DNGA150608TS4		●											12.7	6.35	0.8	5.16		
	NEW NP-DNGA150612TS4		●											12.7	6.35	1.2	5.16		
NEW PETIT CUT	BF-DNGG150404TA4				●									12.7	4.76	0.4	5.16		C010 C011 E013 E036 —040 H009 —011
	BF-DNGG150408TA4				●									12.7	4.76	0.8	5.16		
	BF-DNGG150412TA4				●									12.7	4.76	1.2	5.16		
(With Breaker)																			

■ = MIRACLE SIGMA

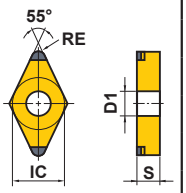
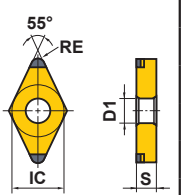
GRADES ➤ B004
IDENTIFICATION ➤ B002

55° DN TYPE INSERTS WITH HOLE

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

Shape	Order Number	Coated CBN				CBN							Solid CBN	Dimensions (mm)				Geometry	Applicable Holder Page
		BC8020	BC8110 (NEW)	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	D1		
NEW PETIT CUT	NP-DNGA110408GA2	●												9.525	4.76	0.8	3.81		C010 C011 E013 E036 —040 H009 —011
	NP-DNGA150404GA2	●			●									12.7	4.76	0.4	5.16		
	NP-DNGA150408GA2	●			●									12.7	4.76	0.8	5.16		
	NP-DNGA150412GA2	●			●									12.7	4.76	1.2	5.16		
	NEW NP-DNGA150402GS2		●											12.7	4.76	0.2	5.16		
	NP-DNGA150404GS2		●	●						●	●			12.7	4.76	0.4	5.16		
	NP-DNGA150408GS2		●	●						●	●			12.7	4.76	0.8	5.16		
	NP-DNGA150412GS2		●	●						●	●			12.7	4.76	1.2	5.16		
	NEW NP-DNGA150604GS2		●											12.7	6.35	0.4	5.16		
	NEW NP-DNGA150608GS2		●											12.7	6.35	0.8	5.16		
	NEW NP-DNGA150612GS2		●											12.7	6.35	1.2	5.16		
	NP-DNGA150404GN2				●									12.7	4.76	0.4	5.16		
	NP-DNGA150408GN2				●									12.7	4.76	0.8	5.16		
	NP-DNGA150412GN2				●									12.7	4.76	1.2	5.16		
	NEW NP-DNGA150402FS2		●											12.7	4.76	0.2	5.16		
	NP-DNGA150404FS2	●	●									●		12.7	4.76	0.4	5.16		
	NP-DNGA150408FS2	●	●									●		12.7	4.76	0.8	5.16		
	NP-DNGA150412FS2	●	●									●		12.7	4.76	1.2	5.16		
	NEW NP-DNGA150604FS2		●											12.7	6.35	0.4	5.16		
	NEW NP-DNGA150608FS2		●											12.7	6.35	0.8	5.16		
	NEW NP-DNGA150612FS2		●											12.7	6.35	1.2	5.16		
	NP-DNGA150404TA2	●			●									12.7	4.76	0.4	5.16		
	NP-DNGA150408TA2	●			●									12.7	4.76	0.8	5.16		
	NP-DNGA150412TA2	●			●									12.7	4.76	1.2	5.16		
	NP-DNGA150404TS2		●									●		12.7	4.76	0.4	5.16		
	NP-DNGA150408TS2		●									●		12.7	4.76	0.8	5.16		
	NP-DNGA150412TS2		●									●		12.7	4.76	1.2	5.16		
	NEW NP-DNGA150604TS2		●											12.7	6.35	0.4	5.16		
	NEW NP-DNGA150608TS2		●											12.7	6.35	0.8	5.16		
	NEW NP-DNGA150612TS2		●											12.7	6.35	1.2	5.16		
	NP-DNGA150404G2					●								12.7	4.76	0.4	5.16		
	NP-DNGA150408G2					●								12.7	4.76	0.8	5.16		
	NP-DNGA150412G2					●								12.7	4.76	1.2	5.16		
	NP-DNGA150404T2					●								12.7	4.76	0.4	5.16		
	NP-DNGA150408T2					●								12.7	4.76	0.8	5.16		
	NP-DNGA150412T2					●								12.7	4.76	1.2	5.16		
NEW PETIT CUT *	TNP-DNGA150404G2					●								12.7	4.76	0.4	5.16		C010 C011 E013 E036 —040 H009 —011
	TNP-DNGA150408G2					●								12.7	4.76	0.8	5.16		
	TNP-DNGA150412G2					●								12.7	4.76	1.2	5.16		
	TNP-DNGA150404T2					●								12.7	4.76	0.4	5.16		
	TNP-DNGA150408T2					●								12.7	4.76	0.8	5.16		
	TNP-DNGA150412T2					●								12.7	4.76	1.2	5.16		

* The order number is for a 10-insert pack. Please specify order number, grade and quantity.

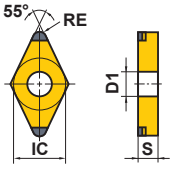
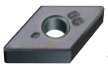
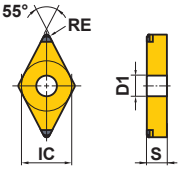
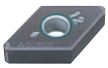
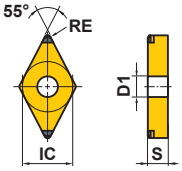
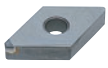
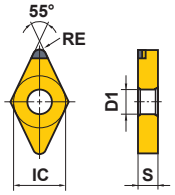
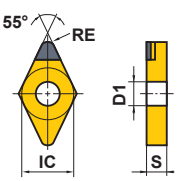
■ = MIRACLE SIGMA

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

Shape	Order Number	Coated CBN				CBN							Solid CBN	Dimensions (mm)				Geometry	Applicable Holder Page
		BC8020	BC8110 (NEW)	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	D1		
NEW PETIT CUT (With Wiper) * 	NP-DNGA150404GAWS2JR				●	●								12.7	4.76	0.4	5.16	 Right hand insert shown.	C010 C011 E013 E036 −040 H009 −011
	NP-DNGA150404GAWS2JL				●	●								12.7	4.76	0.4	5.16		
	NP-DNGA150408GAWS2JR				●	●								12.7	4.76	0.8	5.16		
	NP-DNGA150408GAWS2JL				●	●								12.7	4.76	0.8	5.16		
	NP-DNGA150404GSWS2JR			●										12.7	4.76	0.4	5.16		
	NP-DNGA150404GSWS2JL			●										12.7	4.76	0.4	5.16		
	NP-DNGA150408GSWS2JR			●										12.7	4.76	0.8	5.16		
	NP-DNGA150408GSWS2JL			●										12.7	4.76	0.8	5.16		
NEW PETIT CUT 	BF-DNGM150404TA2				●									12.7	4.76	0.4	5.16		C010 C011 E013 E036 −040 H009 −011
	BF-DNGM150408TA2				●									12.7	4.76	0.8	5.16		
	BF-DNGM150412TA2				●									12.7	4.76	1.2	5.16		
	NEW BF-DNGM150404TS2		●											12.7	4.76	0.4	5.16		
	NEW BF-DNGM150408TS2		●											12.7	4.76	0.8	5.16		
(With Breaker)	NEW BF-DNGM150412TS2		●											12.7	4.76	1.2	5.16		
NEW PETIT CUT 	BM-DNGM150408TA2	●												12.7	4.76	0.8	5.16		C010 C011 E013 E036 −040 H009 −011
(With Breaker)	BM-DNGM150412TA2	●												12.7	4.76	1.2	5.16		
NEW PETIT CUT 	NP-DNMA150404GS									●	●			12.7	4.76	0.4	5.16		C010 C011 E013 E036 −040 H009 −011
	NP-DNMA150408GS									●	●			12.7	4.76	0.8	5.16		
	NP-DNMA150404G					●		●						12.7	4.76	0.4	5.16		
	NP-DNMA150408G					●		●						12.7	4.76	0.8	5.16		
	NP-DNMA150412G					●								12.7	4.76	1.2	5.16		
	NP-DNMA150404F					□	●			●				12.7	4.76	0.4	5.16		
	NP-DNMA150408F					□	●			●				12.7	4.76	0.8	5.16		
	NP-DNMA150412F					□								12.7	4.76	1.2	5.16		
	NP-DNMA150404T					□		●	●		●			12.7	4.76	0.4	5.16		
	NP-DNMA150408T					□		●	●		●			12.7	4.76	0.8	5.16		
	NP-DNMA150412T					□								12.7	4.76	1.2	5.16		
	DNGA150404									□	□			12.7	4.76	0.4	5.16		C010 C011 E013 E036 −040 H009 −011
	DNGA150408									□	□			12.7	4.76	0.8	5.16		
	DNGA150412									□	□			12.7	4.76	1.2	5.16		

✱ Please refer to B014 before using the wiper insert.

■ = MIRACLE SIGMA

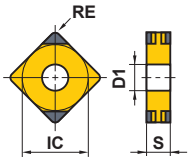
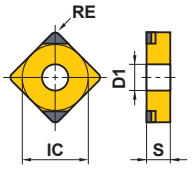
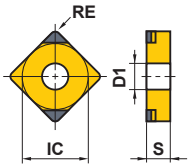
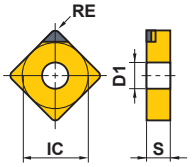
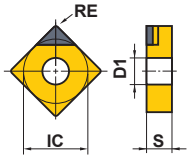
GRADES ➤ B004
IDENTIFICATION ➤ B002

90° SN TYPE INSERTS WITH HOLE

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

Shape	Order Number	Coated CBN				CBN							Solid CBN	Dimensions (mm)				Geometry	Applicable Holder Page
		BC8020	BC8110 (NEW)	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	D1		
NEW PETIT CUT	**NP-SNGA120404GA4**				●									12.7	4.76	0.4	5.16		C012 −015 E014 E035
	NP-SNGA120408GA4				●									12.7	4.76	0.8	5.16		
	NP-SNGA120412GA4				●									12.7	4.76	1.2	5.16		
NEW PETIT CUT	**NP-SNGA120404GS2**			●										12.7	4.76	0.4	5.16		C012 −015 E014 E035
	NP-SNGA120408GS2			●						●	●			12.7	4.76	0.8	5.16		
	NP-SNGA120412GS2			●						●	●			12.7	4.76	1.2	5.16		
	NP-SNGA120404FS2											●		12.7	4.76	0.4	5.16		
	NP-SNGA120408FS2											●		12.7	4.76	0.8	5.16		
	NP-SNGA120412FS2											●		12.7	4.76	1.2	5.16		
	NP-SNGA120404TS2											●		12.7	4.76	0.4	5.16		
	NP-SNGA120408TS2											●		12.7	4.76	0.8	5.16		
	NP-SNGA120412TS2											●		12.7	4.76	1.2	5.16		
	NP-SNGA120404G2					●								12.7	4.76	0.4	5.16		
	NP-SNGA120408G2					●								12.7	4.76	0.8	5.16		
	NP-SNGA120412G2					●								12.7	4.76	1.2	5.16		
	NP-SNGA120404T2					●								12.7	4.76	0.4	5.16		
	NP-SNGA120408T2					●								12.7	4.76	0.8	5.16		
	NP-SNGA120412T2					●								12.7	4.76	1.2	5.16		
NEW PETIT CUT *	**TNP-SNGA120404G2**					●								12.7	4.76	0.4	5.16		C012 −015 E014 E035
	TNP-SNGA120408G2					●								12.7	4.76	0.8	5.16		
	TNP-SNGA120412G2					●								12.7	4.76	1.2	5.16		
	TNP-SNGA120404T2					●								12.7	4.76	0.4	5.16		
	TNP-SNGA120408T2					●								12.7	4.76	0.8	5.16		
	TNP-SNGA120412T2					●								12.7	4.76	1.2	5.16		
NEW PETIT CUT	**NP-SNMA120404GS**									●	●			12.7	4.76	0.4	5.16		C012 −015 E014 E035
	NP-SNMA120408GS									●	●			12.7	4.76	0.8	5.16		
	NP-SNMA120404G					●		●						12.7	4.76	0.4	5.16		
	NP-SNMA120408G					●		●						12.7	4.76	0.8	5.16		
	NP-SNMA120412G					●								12.7	4.76	1.2	5.16		
	NP-SNMA120404F					□	●			●				12.7	4.76	0.4	5.16		
	NP-SNMA120408F					□	●			●				12.7	4.76	0.8	5.16		
	NP-SNMA120412F					□	●			●				12.7	4.76	1.2	5.16		
	NP-SNMA120404T					□		●	●		●			12.7	4.76	0.4	5.16		
	NP-SNMA120408T					□		●	●		●			12.7	4.76	0.8	5.16		
	NP-SNMA120412T					□		●	●		●			12.7	4.76	1.2	5.16		
	SNGA120404									□	□			12.7	4.76	0.4	5.16		C012 −015 E014 E035
	SNGA120408									●	●			12.7	4.76	0.8	5.16		
	SNGA120412									●	●			12.7	4.76	1.2	5.16		

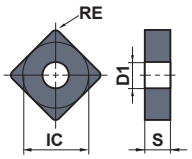
* The order number is for a 10-insert pack. Please specify order number, grade and quantity.

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

Work Material			Coated CBN				CBN							Solid CBN	Dimensions (mm)				Geometry	Applicable Holder Page
			BC8020	BC8110 NEW	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	D1		
	H	Hardened Materials	◐	●	●	◐	◐	●	◐	✱	●	◐	◐	✱						
	K	Cast Iron																		
	S	Heat-resistant Alloy, Titanium Alloy																		
		Sintered Alloy																		

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

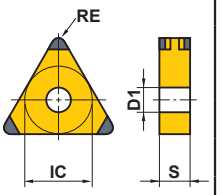
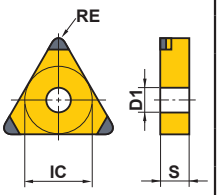
Shape	Order Number	BC8020	BC8110 NEW	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	D1	Geometry	Applicable Holder Page
NEW 	**SNGA120408**												●	12.7	4.76	0.8	5.16		C012 −015 E014 E035
	SNGA**120412**												●	12.7	4.76	1.2	5.16		

60° TN TYPE INSERTS WITH HOLE

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

Shape	Order Number	Coated CBN				CBN							Solid CBN	Dimensions (mm)				Geometry	Applicable Holder Page
		BC8020	BC8110 NEW	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	D1		
NEW PETIT CUT	NP-TNGA160404GA6	●			●									9.525	4.76	0.4	3.81		C016 C017 E014 E035 E039
	NP-TNGA160408GA6	●			●									9.525	4.76	0.8	3.81		
	NP-TNGA160412GA6	●			●									9.525	4.76	1.2	3.81		
	NP-TNGA160404GN6				●									9.525	4.76	0.4	3.81		
	NP-TNGA160408GN6				●									9.525	4.76	0.8	3.81		
	NP-TNGA160412GN6				●									9.525	4.76	1.2	3.81		
	NEW NP-TNGA160404GS6		●											9.525	4.76	0.4	3.81		
	NEW NP-TNGA160408GS6		●											9.525	4.76	0.8	3.81		
	NEW NP-TNGA160412GS6		●											9.525	4.76	1.2	3.81		
	NP-TNGA160404FS6	●	●											9.525	4.76	0.4	3.81		
	NP-TNGA160408FS6	●	●											9.525	4.76	0.8	3.81		
	NP-TNGA160412FS6	●	●											9.525	4.76	1.2	3.81		
	NP-TNGA160404TA6	●			●									9.525	4.76	0.4	3.81		
	NP-TNGA160408TA6	●			●									9.525	4.76	0.8	3.81		
	NP-TNGA160412TA6	●			●									9.525	4.76	1.2	3.81		
	NEW NP-TNGA160404TS6		●											9.525	4.76	0.4	3.81		
	NEW NP-TNGA160408TS6		●											9.525	4.76	0.8	3.81		
	NEW NP-TNGA160412TS6		●											9.525	4.76	1.2	3.81		
NEW PETIT CUT	NP-TNGA160402GA3				●									9.525	4.76	0.2	3.81		C016 C017 E014 E035 E039
	NP-TNGA160404GA3	●			●									9.525	4.76	0.4	3.81		
	NP-TNGA160408GA3	●			●									9.525	4.76	0.8	3.81		
	NP-TNGA160412GA3	●			●									9.525	4.76	1.2	3.81		
	NEW NP-TNGA160402GS3		●											9.525	4.76	0.2	3.81		
	NP-TNGA160404GS3		●	●										9.525	4.76	0.4	3.81		
	NP-TNGA160408GS3		●	●						●	●			9.525	4.76	0.8	3.81		
	NP-TNGA160412GS3		●	●						●	●			9.525	4.76	1.2	3.81		
	NP-TNGA160402GN3				●									9.525	4.76	0.2	3.81		
	NP-TNGA160404GN3				●									9.525	4.76	0.4	3.81		
	NP-TNGA160408GN3				●									9.525	4.76	0.8	3.81		
	NP-TNGA160412GN3				●									9.525	4.76	1.2	3.81		
	NEW NP-TNGA160402FS3		●											9.525	4.76	0.2	3.81		
	NP-TNGA160404FS3	●	●									●		9.525	4.76	0.4	3.81		
	NP-TNGA160408FS3	●	●									●		9.525	4.76	0.8	3.81		
	NP-TNGA160412FS3	●	●									●		9.525	4.76	1.2	3.81		
	NP-TNGA160404TA3	●			●									9.525	4.76	0.4	3.81		
	NP-TNGA160408TA3	●			●									9.525	4.76	0.8	3.81		
	NP-TNGA160412TA3	●			●									9.525	4.76	1.2	3.81		
	NP-TNGA160404TS3		●									●		9.525	4.76	0.4	3.81		
	NP-TNGA160408TS3		●									●		9.525	4.76	0.8	3.81		
	NP-TNGA160412TS3		●									●		9.525	4.76	1.2	3.81		

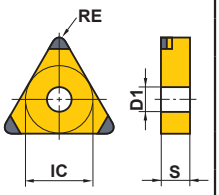
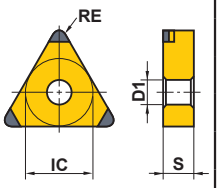
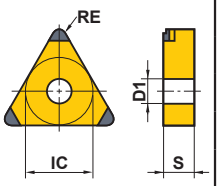
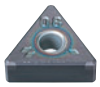
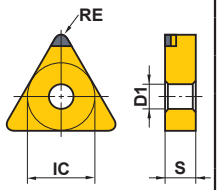
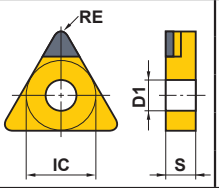
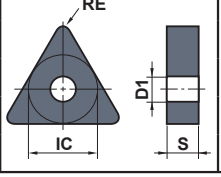
■ = MIRACLE SIGMA

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

Shape	Order Number	Coated CBN				CBN							Solid CBN	Dimensions (mm)				Geometry	Applicable Holder Page
		BC8020	BC8110 NEW	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	D1		
NEW PETIT CUT	NP-TNGA160404G3					●								9.525	4.76	0.4	3.81		C016 C017 E014 E035 E039
	NP-TNGA160408G3					●								9.525	4.76	0.8	3.81		
	NP-TNGA160412G3					●								9.525	4.76	1.2	3.81		
	NP-TNGA160404T3					●								9.525	4.76	0.4	3.81		
	NP-TNGA160408T3					●								9.525	4.76	0.8	3.81		
	NP-TNGA160412T3					●								9.525	4.76	1.2	3.81		
NEW PETIT CUT *	TNP-TNGA160404G3					●								9.525	4.76	0.4	3.81		C016 C017 E014 E035 E039
	TNP-TNGA160408G3					●								9.525	4.76	0.8	3.81		
	TNP-TNGA160412G3					●								9.525	4.76	1.2	3.81		
	TNP-TNGA160404T3					●								9.525	4.76	0.4	3.81		
	TNP-TNGA160408T3					●								9.525	4.76	0.8	3.81		
	TNP-TNGA160412T3					●								9.525	4.76	1.2	3.81		
NEW PETIT CUT	BM-TNGM160408TA3	●												9.525	4.76	0.8	3.81		C016 C017 E014 E035 E039
 (With Breaker)	BM-TNGM160412TA3	●												9.525	4.76	1.2	3.81		
NEW PETIT CUT	NP-TNMA160404GS									●	●			9.525	4.76	0.4	3.81		C016 C017 E014 E035 E039
	NP-TNMA160408GS									●	●			9.525	4.76	0.8	3.81		
	NP-TNMA160412GS									●	●			9.525	4.76	1.2	3.81		
	NP-TNMA160404G					●		●						9.525	4.76	0.4	3.81		
	NP-TNMA160408G					●		●						9.525	4.76	0.8	3.81		
	NP-TNMA160412G					●		●						9.525	4.76	1.2	3.81		
	NP-TNMA160404F					□	●			●				9.525	4.76	0.4	3.81		
	NP-TNMA160408F					□	●			●				9.525	4.76	0.8	3.81		
	NP-TNMA160412F					□	●			□				9.525	4.76	1.2	3.81		
	NP-TNMA160404T					□		●	●		●			9.525	4.76	0.4	3.81		
	NP-TNMA160408T					□		●	●		●			9.525	4.76	0.8	3.81		
	NP-TNMA160412T					□		●	●		□			9.525	4.76	1.2	3.81		
	TNGA160404						●			●	●			9.525	4.76	0.4	3.81		C016 C017 E014 E035 E039
	TNGA160408						●			●	●			9.525	4.76	0.8	3.81		
	TNGA220404									●	□			12.7	4.76	0.4	5.16		
	TNGA220408									●	□			12.7	4.76	0.8	5.16		
	TNGA220412									●	□			12.7	4.76	1.2	5.16		
	NEW TNGA160408												●	9.525	4.76	0.8	3.81		C016 C017 E014 E035 E039
	NEW TNGA160412												●	9.525	4.76	1.2	3.81		

* The order number is for a 10-insert pack. Please specify order number, grade and quantity.

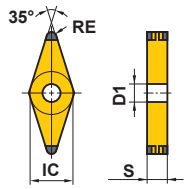
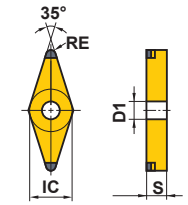
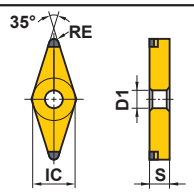
GRADES ➤ B004
IDENTIFICATION ➤ B002

35° VN TYPE INSERTS WITH HOLE

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

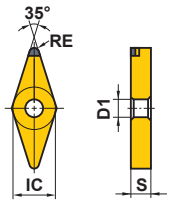
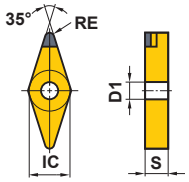
Honing (Last letter of order number) : Refer to page B011.

Shape	Order Number	Coated CBN				CBN							Solid CBN	Dimensions (mm)				Geometry	Applicable Holder Page
		BC8020	BC8110 (NEW)	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	D1		
NEW PETIT CUT	NP-VNGA160404GA4	●			●									9.525	4.76	0.4	3.81		C018 −020 E015 E041
	NP-VNGA160408GA4	●			●									9.525	4.76	0.8	3.81		
	NP-VNGA160412GA4	●												9.525	4.76	1.2	3.81		
	NEW NP-VNGA160404GS4		●											9.525	4.76	0.4	3.81		
	NEW NP-VNGA160408GS4		●											9.525	4.76	0.8	3.81		
	NEW NP-VNGA160412GS4		●											9.525	4.76	1.2	3.81		
	NP-VNGA160404FS4	●	●											9.525	4.76	0.4	3.81		
	NP-VNGA160408FS4	●	●											9.525	4.76	0.8	3.81		
	NP-VNGA160412FS4	●												9.525	4.76	1.2	3.81		
	NP-VNGA160404TA4	●												9.525	4.76	0.4	3.81		
	NP-VNGA160408TA4	●												9.525	4.76	0.8	3.81		
	NP-VNGA160412TA4	●												9.525	4.76	1.2	3.81		
	NEW NP-VNGA160404TS4		●											9.525	4.76	0.4	3.81		
	NEW NP-VNGA160408TS4		●											9.525	4.76	0.8	3.81		
NEW PETIT CUT	NP-VNGA160402GA2				●									9.525	4.76	0.2	3.81		C018 −020 E015 E041
	NP-VNGA160404GA2	●			●									9.525	4.76	0.4	3.81		
	NP-VNGA160408GA2	●			●									9.525	4.76	0.8	3.81		
	NEW NP-VNGA160402GS2		●											9.525	4.76	0.2	3.81		
	NP-VNGA160404GS2		●	●										9.525	4.76	0.4	3.81		
	NP-VNGA160408GS2		●	●										9.525	4.76	0.8	3.81		
	NEW NP-VNGA160412GS2		●											9.525	4.76	1.2	3.81		
	NP-VNGA160402GN2				●									9.525	4.76	0.2	3.81		
	NEW NP-VNGA160402FS2		●											9.525	4.76	0.2	3.81		
	NP-VNGA160404FS2	●	●									●		9.525	4.76	0.4	3.81		
	NP-VNGA160408FS2	●	●									●		9.525	4.76	0.8	3.81		
	NP-VNGA160404TA2	●												9.525	4.76	0.4	3.81		
	NP-VNGA160408TA2	●												9.525	4.76	0.8	3.81		
	NP-VNGA160404TS2		●									●		9.525	4.76	0.4	3.81		
	NP-VNGA160408TS2		●									●		9.525	4.76	0.8	3.81		
	NP-VNGA160404G2					●								9.525	4.76	0.4	3.81		
	NP-VNGA160408G2					●								9.525	4.76	0.8	3.81		
	NP-VNGA160404T2					●								9.525	4.76	0.4	3.81		
	NP-VNGA160408T2					●								9.525	4.76	0.8	3.81		
NEW PETIT CUT *	TNP-VNGA160404G2					●								9.525	4.76	0.4	3.81		C018 −020 E015 E041
	TNP-VNGA160408G2					●								9.525	4.76	0.8	3.81		
	TNP-VNGA160404T2					●								9.525	4.76	0.4	3.81		
	TNP-VNGA160408T2					●								9.525	4.76	0.8	3.81		

* The order number is for a 10-insert pack. Please specify order number, grade and quantity.

■ = MIRACLE SIGMA

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

Work Material			Coated CBN				CBN							Solid CBN	Dimensions (mm)				Geometry	Applicable Holder Page
			BC8020	BC8110 NEW	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	D1		
Shape	Order Number																			
	H	Hardened Materials	◐	●	●	◐	◐	●	◐	✲	●	◐	◐	✲						
	K	Cast Iron										◐								
	S	Heat-resistant Alloy, Titanium Alloy											◐							
		Sintered Alloy																		
NEW PETIT CUT	NP-VNMA160404GS										●	●			9.525	4.76	0.4	3.81		C018 −020 E015 E041
	NP-VNMA160408GS										●	●			9.525	4.76	0.8	3.81		
	NP-VNMA160404G						●		●						9.525	4.76	0.4	3.81		
	NP-VNMA160408G						●		●						9.525	4.76	0.8	3.81		
	NP-VNMA160404F						□	●			●				9.525	4.76	0.4	3.81		
	NP-VNMA160408F						□	●			●				9.525	4.76	0.8	3.81		
	NP-VNMA160404T						□		●	●		●			9.525	4.76	0.4	3.81		
	NP-VNMA160408T						□		●	●		●			9.525	4.76	0.8	3.81		
	VNGA160404										□	□			9.525	4.76	0.4	3.81		C018 −020 E015 E041
	VNGA160408										□	□			9.525	4.76	0.8	3.81		

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

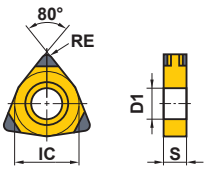
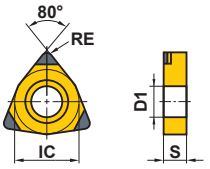
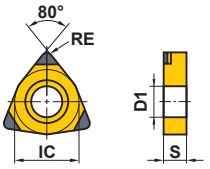
Honing (Last letter of order number) : Refer to page B011.

80° WN TYPE INSERTS WITH HOLE

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✻ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

Shape	Order Number	Coated CBN				CBN							Solid CBN	Dimensions (mm)				Geometry	Applicable Holder Page
		BC8020	BC8110 NEW	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE	D1		
NEW PETIT CUT	NP-WNGA080408GA6	●			●									12.7	4.76	0.8	5.16		C021 E015
	NEW NP-WNGA080408GS6		●											12.7	4.76	0.8	5.16		
	NEW NP-WNGA080408FS6		●											12.7	4.76	0.8	5.16		
	NEW NP-WNGA080408TS6		●											12.7	4.76	0.8	5.16		
NEW PETIT CUT	NP-WNGA080408GA3	●			●									12.7	4.76	0.8	5.16		C021 E015
	NEW NP-WNGA080408GS3		●											12.7	4.76	0.8	5.16		
	NP-WNGA080408FS3		●									●		12.7	4.76	0.8	5.16		
	NP-WNGA080408TS3		●									●		12.7	4.76	0.8	5.16		
NEW PETIT CUT (With Wiper) *	NP-WNGA080408GAWS3				●	●								12.7	4.76	0.8	5.16		C021 E015
	NP-WNGA080408GSWS3		●	●										12.7	4.76	0.8	5.16		

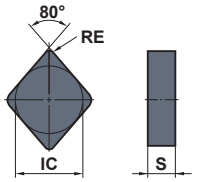
* Please refer to B014 before using the wiper insert.

■ = MIRACLE SIGMA

● : Inventory maintained in Japan. (1 insert in one case)

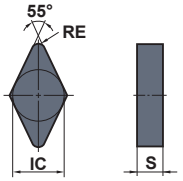
80° CN TYPE INSERTS WITHOUT HOLE

Work Material			Coated CBN			CBN							Solid CBN	Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting
	H	Hardened Materials	◐	●	◐	◐	●	◐	✱	●	◐	◐	✱	
	K	Cast Iron									◐			
	S	Heat-resistant Alloy, Titanium Alloy										◐		
		Sintered Alloy												

Shape	Order Number	BC8020	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	Dimensions (mm) IC	S	RE	Geometry	Applicable Holder Page
	**CNGN120404**											●	12.7	4.76	0.4		–
	CNGN**120408**											●	12.7	4.76	0.8		
	CNGN**120412**											●	12.7	4.76	1.2		

55° DN TYPE INSERTS WITHOUT HOLE

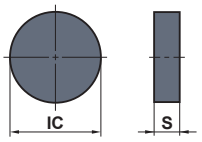
Work Material			Coated CBN			CBN							Solid CBN	Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting
	H	Hardened Materials	◐	●	◐	◐	●	◐	✱	●	◐	◐	✱	
	K	Cast Iron									◐			
	S	Heat-resistant Alloy, Titanium Alloy										◐		
		Sintered Alloy												

Shape	Order Number	BC8020	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	Dimensions (mm) IC	S	RE	Geometry	Applicable Holder Page
	**DNGN110308**											●	9.525	3.18	0.8		–
	DNGN**110312**											●	9.525	3.18	1.2		

GRADES ➤ B004
IDENTIFICATION ➤ B002

RN TYPE INSERTS WITHOUT HOLE

Work Material			Coated CBN			CBN						Solid CBN	Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting
	H	Hardened Materials	◐	●	◐	◐	●	◐	✠	●	◐	◐	✠	
	K	Cast Iron									◐			
	S	Heat-resistant Alloy, Titanium Alloy												
		Sintered Alloy												

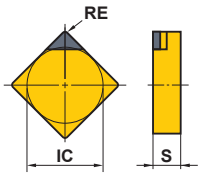
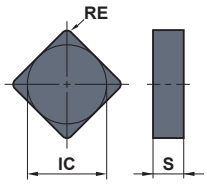
Shape	Order Number	BC8020	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	Dimensions (mm) IC	S		Geometry	Applicable Holder Page
	**RNGN090300**											●	9.525	3.18			—
	RNGN**120300**											●	12.7	3.18			
	RNGN**120400**											●	12.7	4.76			

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

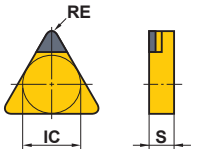
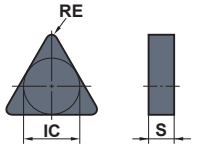
90° SN TYPE INSERTS WITHOUT HOLE

Work Material		
H	Hardened Materials	
K	Cast Iron	
S	Heat-resistant Alloy, Titanium Alloy	
	Sintered Alloy	

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

Shape	Order Number	Coated CBN			CBN							Solid CBN	Dimensions (mm)			Geometry	Applicable Holder Page
		BC8020	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE		
	SNGN090304								□	□			9.525	3.18	0.4		—
	SNGN090308								□	□			9.525	3.18	0.8		
	SNGN120404								□	□			12.7	4.76	0.4		
	SNGN120408								●	□			12.7	4.76	0.8		
	SNGN120412								●	□			12.7	4.76	1.2		
	SNGN090308											●	9.525	3.18	0.8		—
	SNGN090312											●	9.525	3.18	1.2		
	SNGN090316											●	9.525	3.18	1.6		
	SNGN090408											●	9.525	4.76	0.8		
	SNGN090412											●	9.525	4.76	1.2		
	SNGN120408											●	12.7	4.76	0.8		
	SNGN120412											●	12.7	4.76	1.2		
	SNGN120416											●	12.7	4.76	1.6		

60° TN TYPE INSERTS WITHOUT HOLE

Work Material			Coated CBN			CBN						Solid CBN	Dimensions (mm)			Geometry	Applicable Holder Page
			BC8020	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	MBS140	IC	S	RE		
	H	Hardened Materials	◐	●	◐	◐	●	◐	✱				✱					
	K	Cast Iron								●	◐							
	S	Heat-resistant Alloy, Titanium Alloy									◐							
		Sintered Alloy										◐						
		**TNGN160404**								●	□			9.525	4.76	0.4		–
		TNGN**160408**								●	□			9.525	4.76	0.8		
		**TNGN160408**											●	9.525	4.76	0.8		–
		TNGN**160412**											●	9.525	4.76	1.2		
		TNGN**160416**											●	9.525	4.76	1.6		

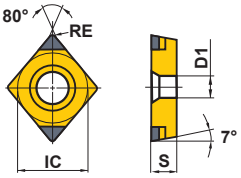
● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

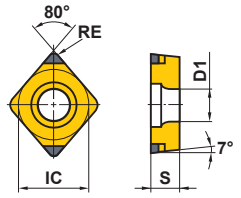
80° CC TYPE INSERTS WITH HOLE

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✿ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

Shape	Order Number	Coated CBN				CBN							Dimensions (mm)				Geometry	Applicable Holder Page
		BC8020	BC8110 (NEW)	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	D1		
NEW PETIT CUT	NP-CCGB060204GA2				●								6.35	2.38	0.4	2.8		C022 D008 E006 E030 E034
NEW PETIT CUT	NP-CCGW060202GA2	●			●								6.35	2.38	0.2	2.8		
	NP-CCGW060204GA2	●			●								6.35	2.38	0.4	2.8		
	NP-CCGW060208GA2	●			●								6.35	2.38	0.8	2.8		
	NP-CCGW09T302GA2	●			●								9.525	3.97	0.2	4.4		
	NP-CCGW09T304GA2	●			●								9.525	3.97	0.4	4.4		
	NP-CCGW09T308GA2	●			●								9.525	3.97	0.8	4.4		
	NP-CCGW060202GS2		●							●	●		6.35	2.38	0.2	2.8		
	NP-CCGW060204GS2		●	●						●	●		6.35	2.38	0.4	2.8		
	NP-CCGW060208GS2		●							●	●		6.35	2.38	0.8	2.8		
NEW	NP-CCGW09T302GS2		●										9.525	3.97	0.2	4.4		
	NP-CCGW09T304GS2		●	●						●	●		9.525	3.97	0.4	4.4		
	NP-CCGW09T308GS2		●	●						●	●		9.525	3.97	0.8	4.4		
	NP-CCGW09T302GN2				●								9.525	3.97	0.2	4.4		
	NP-CCGW09T304GN2				●								9.525	3.97	0.4	4.4		
	NP-CCGW09T308GN2				●								9.525	3.97	0.8	4.4		
	NP-CCGW060202FA2									●	●		6.35	2.38	0.2	2.8		
	NP-CCGW060204FA2									●	●		6.35	2.38	0.4	2.8		
	NP-CCGW060208FA2									●	●		6.35	2.38	0.8	2.8		
	NP-CCGW09T304FA2									●	●		9.525	3.97	0.4	4.4		
	NP-CCGW09T308FA2									●	●		9.525	3.97	0.8	4.4		
	NP-CCGW060202FS2	●	●									●	6.35	2.38	0.2	2.8		
	NP-CCGW060204FS2	●	●									●	6.35	2.38	0.4	2.8		
	NP-CCGW060208FS2		●									●	6.35	2.38	0.8	2.8		
	NP-CCGW09T302FS2	●	●									●	9.525	3.97	0.2	4.4		
	NP-CCGW09T304FS2	●	●									●	9.525	3.97	0.4	4.4		
	NP-CCGW09T308FS2	●	●									●	9.525	3.97	0.8	4.4		
	NP-CCGW060202TS2											●	6.35	2.38	0.2	2.8		
	NP-CCGW060204TS2											●	6.35	2.38	0.4	2.8		
	NP-CCGW060208TS2											●	6.35	2.38	0.8	2.8		
	NP-CCGW09T302TS2											●	9.525	3.97	0.2	4.4		
	NP-CCGW09T304TS2											●	9.525	3.97	0.4	4.4		
	NP-CCGW09T308TS2											●	9.525	3.97	0.8	4.4		
	NP-CCGW09T304G2					●							9.525	3.97	0.4	4.4		
	NP-CCGW09T308G2					●							9.525	3.97	0.8	4.4		



C022 D008 E006 E030 E034

■ = MIRACLE SIGMA

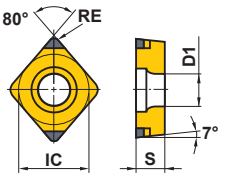
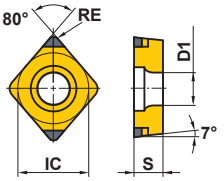
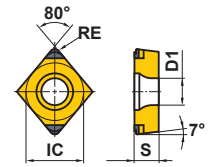
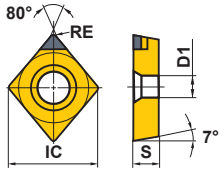
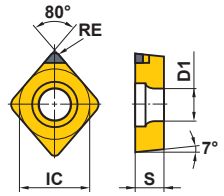
GRADES ➤ B004
IDENTIFICATION ➤ B002

80° CC TYPE INSERTS WITH HOLE

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

Shape	Order Number	Coated CBN				CBN							Dimensions (mm)				Geometry	Applicable Holder Page
		BC8020	BC8110 (NEW)	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	D1		
NEW PETIT CUT ✱2	TNP-CCGW09T304G2					●							9.525	3.97	0.4	4.4		C022 D008 E030 E034
	TNP-CCGW09T308G2					●							9.525	3.97	0.8	4.4		
NEW PETIT CUT (With Wiper) ✱1	NP-CCGW09T308GAWS2				●	●							9.525	3.97	0.8	4.4		C022 D008 E030 E034
	NEW NP-CCGW09T304GSWS2		●										9.525	3.97	0.4	4.4		
	NP-CCGW09T308GSWS2		●	●									9.525	3.97	0.8	4.4		
NEW PETIT CUT	BF-CCGT09T304TA2				●								9.525	3.97	0.4	4.4		C022 D008 E030 E034
	BF-CCGT09T308TA2				●								9.525	3.97	0.8	4.4		
	NEW BF-CCGT09T304TS2		●										9.525	3.97	0.4	4.4		
(With Breaker)	NEW BF-CCGT09T308TS2		●										9.525	3.97	0.8	4.4		
NEW PETIT CUT	NP-CCMB060204G							●					6.35	2.38	0.4	2.8		C022 D008 E006 E030 E034
																		
NEW PETIT CUT	NP-CCGW09T302GS									●	●		9.525	3.97	0.2	4.4		C022 D008 E006 E030 E034
	NP-CCGW09T304GS									●	●		9.525	3.97	0.4	4.4		
	NP-CCGW060202G					●		●					6.35	2.38	0.2	2.8		
	NP-CCGW060204G					●		●					6.35	2.38	0.4	2.8		
	NP-CCGW060208G					●							6.35	2.38	0.8	2.8		
	NP-CCGW09T302G					●		●					9.525	3.97	0.2	4.4		
	NP-CCGW09T304G					●		●					9.525	3.97	0.4	4.4		
	NP-CCGW09T308G					●							9.525	3.97	0.8	4.4		
	NP-CCGW060202F						●						6.35	2.38	0.2	2.8		
	NP-CCGW060204F						●						6.35	2.38	0.4	2.8		
	NP-CCGW09T302F						●						9.525	3.97	0.2	4.4		
	NP-CCGW09T304F					□	●						9.525	3.97	0.4	4.4		
	NP-CCGW09T308F					□							9.525	3.97	0.8	4.4		
	NP-CCGW060202T								●				6.35	2.38	0.2	2.8		
	NP-CCGW060204T								●				6.35	2.38	0.4	2.8		
	NP-CCGW09T302T								●				9.525	3.97	0.2	4.4		
	NP-CCGW09T304T					□			●				9.525	3.97	0.4	4.4		
	NP-CCGW09T308T					□							9.525	3.97	0.8	4.4		
	NEW ✱3 NP-CCGW03S102FS		●										3.57	1.39	0.2	2.0		
	NEW ✱3 NP-CCGW03S104FS		●										3.57	1.39	0.4	2.0		
	NEW ✱3 NP-CCGW04T002FS		●										4.37	1.79	0.2	2.4		
	NEW ✱3 NP-CCGW04T004FS		●										4.37	1.79	0.4	2.4		

✱1 Please refer to B014 before using the wiper insert.
✱2 The order number is for a 10-insert pack. Please specify order number, grade and quantity.
✱3 Diameter of inscribed circle is special. (For SCLC type)

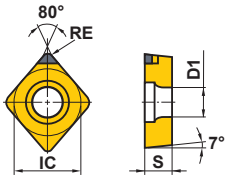
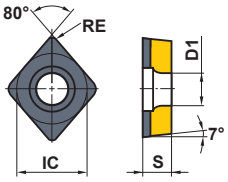
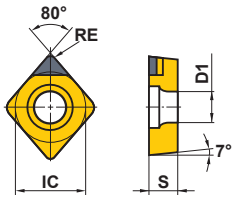
■ = MIRACLE SIGMA

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

Work Material			BC8020	BC8110 NEW	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020
	H	Hardened Materials	◐	●	●	◐	◐	●	◐	✱	●	●	◐
	K	Cast Iron										◐	
	S	Heat-resistant Alloy, Titanium Alloy											◐
		Sintered Alloy											

Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

Shape	Order Number	Coated CBN				CBN							Dimensions (mm)				Geometry	Applicable Holder Page
		BC8020	BC8110 NEW	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	D1		
NEW PETIT CUT 	* NP-CCMW03S102F						●						3.57	1.39	0.2	2.0		E016
	* NP-CCMW03S104F						●						3.57	1.39	0.4	2.0		
	* NP-CCMW04T002F						●						4.37	1.79	0.2	2.4		
	* NP-CCMW04T004F						●						4.37	1.79	0.4	2.4		
NEW 	CCGW060202FS											●	6.35	2.38	0.2	2.8		C022 D008 E006 E030 E034
	CCGW060204FS											●	6.35	2.38	0.4	2.8		
	CCGW060208FS											●	6.35	2.38	0.8	2.8		
	CCGW09T304FS											●	9.525	3.97	0.4	4.4		
	CCGW09T308FS											●	9.525	3.97	0.8	4.4		
	CCMW060202									□	□		6.35	2.38	0.2	2.8		C022 D008 E006 E030 E034
	CCMW060204									□	□		6.35	2.38	0.4	2.8		
	CCMW09T302									□	□		9.525	3.97	0.2	4.4		
	CCMW09T304									□	□		9.525	3.97	0.4	4.4		
	CCMW09T308									□	□		9.525	3.97	0.8	4.4		
	CCMW120404									□	□		12.7	4.76	0.4	5.5		
	CCMW120408									□	□		12.7	4.76	0.8	5.5		
	CCMW120412									□	□		12.7	4.76	1.2	5.5		

* Diameter of inscribed circle is special. (For SCLC type)

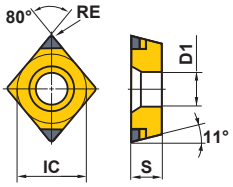
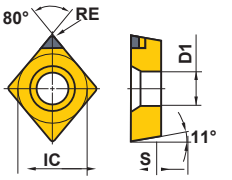
GRADES ➤ B004
IDENTIFICATION ➤ B002

80° CP TYPE INSERTS WITH HOLE

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

Shape	Order Number	Coated CBN				CBN							Dimensions (mm)				Geometry	Applicable Holder Page
		BC8020	BC8110 NEW	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	D1		
NEW PETIT CUT	NP-CPGB080204GA2	●			●								7.94	2.38	0.4	3.5		E006
	NP-CPGB080208GA2	●			●								7.94	2.38	0.8	3.5		
	NP-CPGB090304GA2				●								9.525	3.18	0.4	4.5		
	NP-CPGB090308GA2				●								9.525	3.18	0.8	4.5		
NEW	NP-CPGB080204GS2		●										7.94	2.38	0.4	3.5		
NEW	NP-CPGB080208GS2		●										7.94	2.38	0.8	3.5		
NEW	NP-CPGB090302GS2		●										9.525	3.18	0.2	4.5		
NEW	NP-CPGB090304GS2		●										9.525	3.18	0.4	4.5		
NEW	NP-CPGB090308GS2		●										9.525	3.18	0.8	4.5		
	NP-CPGB080202FS2											●	7.94	2.38	0.2	3.5		
	NP-CPGB080204FS2	●	●									●	7.94	2.38	0.4	3.5		
	NP-CPGB080208FS2	●	●										7.94	2.38	0.8	3.5		
	NP-CPGB090302FS2		●									●	9.525	3.18	0.2	4.5		
	NP-CPGB090304FS2											●	9.525	3.18	0.4	4.5		
	NP-CPGB090308FS2											●	9.525	3.18	0.8	4.5		
NEW PETIT CUT	NP-CPMB080204G							●					7.94	2.38	0.4	3.5		E006
	NP-CPMB090304G							●					9.525	3.18	0.4	4.5		

■ = MIRACLE SIGMA

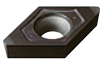
● : Inventory maintained in Japan. (1 insert in one case)

55° DC TYPE INSERTS WITH HOLE

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

Shape	Order Number	Coated CBN				CBN							Dimensions (mm)				Geometry	Applicable Holder Page
		BC8020	BC8110 (NEW)	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	D1		
NEW PETIT CUT	NP-DCGW070202GA2	●			●								6.35	2.38	0.2	2.8		
	NP-DCGW070204GA2	●			●								6.35	2.38	0.4	2.8		
	NP-DCGW070208GA2				●								6.35	2.38	0.8	2.8		
	NP-DCGW11T302GA2	●			●								9.525	3.97	0.2	4.4		
	NP-DCGW11T304GA2	●			●								9.525	3.97	0.4	4.4		
	NP-DCGW11T308GA2	●			●								9.525	3.97	0.8	4.4		
	NEW NP-DCGW070202GS2		●										6.35	2.38	0.2	2.8		
	NP-DCGW070204GS2		●	●									6.35	2.38	0.4	2.8		
	NEW NP-DCGW070208GS2		●										6.35	2.38	0.8	2.8		
	NP-DCGW11T302GS2		●	●									9.525	3.97	0.2	4.4		
	NP-DCGW11T304GS2		●	●						●	●		9.525	3.97	0.4	4.4		
	NP-DCGW11T308GS2		●	●						●	●		9.525	3.97	0.8	4.4		
	NP-DCGW070202GN2				●								6.35	2.38	0.2	2.8		
	NP-DCGW070204GN2				●								6.35	2.38	0.4	2.8		
	NP-DCGW070208GN2				●								6.35	2.38	0.8	2.8		
	NP-DCGW11T302GN2				●								9.525	3.97	0.2	4.4		
	NP-DCGW11T304GN2				●								9.525	3.97	0.4	4.4		
	NP-DCGW11T308GN2				●								9.525	3.97	0.8	4.4		
	NP-DCGW11T304FA2									●	●		9.525	3.97	0.4	4.4		
	NP-DCGW11T308FA2									●	●		9.525	3.97	0.8	4.4		
	NP-DCGW070202FS2	●	●										6.35	2.38	0.2	2.8		
	NP-DCGW070204FS2	●	●									●	6.35	2.38	0.4	2.8		
	NP-DCGW070208FS2		●									●	6.35	2.38	0.8	2.8		
	NP-DCGW11T302FS2	●	●									●	9.525	3.97	0.2	4.4		
	NP-DCGW11T304FS2	●	●									●	9.525	3.97	0.4	4.4		
	NP-DCGW11T308FS2	●	●									●	9.525	3.97	0.8	4.4		
	NP-DCGW070204TS2											●	6.35	2.38	0.4	2.8		
	NP-DCGW070208TS2											●	6.35	2.38	0.8	2.8		
	NP-DCGW11T302TS2											●	9.525	3.97	0.2	4.4		
	NP-DCGW11T304TS2											●	9.525	3.97	0.4	4.4		
	NP-DCGW11T308TS2											●	9.525	3.97	0.8	4.4		
	NP-DCGW11T304G2					●							9.525	3.97	0.4	4.4		
	NP-DCGW11T308G2					●							9.525	3.97	0.8	4.4		
																	55° RE IC S D1 7°	C023 D009 D026 E008 E009 E029 E031
NEW PETIT CUT *	TNP-DCGW11T304G2					●							9.525	3.97	0.4	4.4		
	TNP-DCGW11T308G2					●							9.525	3.97	0.8	4.4		
																	55° RE IC S D1 7°	C023 D009 D026 E008 E009 E029 E031

* The order number is for a 10-insert pack. Please specify order number, grade and quantity.

■ = MIRACLE SIGMA

CBN
CBN TURNING INSERTS
POSI 7°
WITH HOLE
C
D
R
S
T
V
W

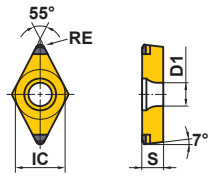
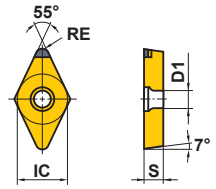
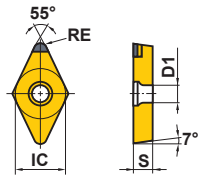
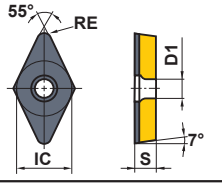
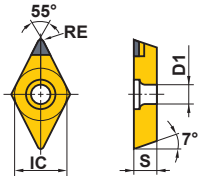
GRADES ➤ B004
IDENTIFICATION ➤ B002

55° DC TYPE INSERTS WITH HOLE

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

Shape	Order Number	Coated CBN				CBN							Dimensions (mm)				Geometry	Applicable Holder Page
		BC8020	BC8110 NEW	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	D1		
NEW PETIT CUT	BF-DCGT11T304TA2				●								9.525	3.97	0.4	4.4		C023 D009 D026 E008 E009 E029 E031
	BF-DCGT11T308TA2				●								9.525	3.97	0.8	4.4		
	NEW BF-DCGT11T304TS2		●										9.525	3.97	0.4	4.4		
	NEW BF-DCGT11T308TS2		●										9.525	3.97	0.8	4.4		
(With Breaker)																		
NEW PETIT CUT	NP-DCGW11T302GS									●	●		9.525	3.97	0.2	4.4		C023 D009 D026 E008 E009 E029 E031
	NP-DCGW11T304GS									●	●		9.525	3.97	0.4	4.4		
	NP-DCGW070202G					●							6.35	2.38	0.2	2.8		
	NP-DCGW070204G					●							6.35	2.38	0.4	2.8		
	NP-DCGW070208G					●							6.35	2.38	0.8	2.8		
	NP-DCGW11T302G					●		●					9.525	3.97	0.2	4.4		
	NP-DCGW11T304G					●		●					9.525	3.97	0.4	4.4		
	NP-DCGW11T308G					●							9.525	3.97	0.8	4.4		
	NP-DCGW070202F						●						6.35	2.38	0.2	2.8		
	NP-DCGW070204F						●						6.35	2.38	0.4	2.8		
	NP-DCGW11T302F						●						9.525	3.97	0.2	4.4		
	NP-DCGW11T304F					□	●						9.525	3.97	0.4	4.4		
	NP-DCGW11T308F					□							9.525	3.97	0.8	4.4		
	NP-DCGW070202T								●				6.35	2.38	0.2	2.8		
	NP-DCGW070204T								●				6.35	2.38	0.4	2.8		
	NP-DCGW11T302T								●				9.525	3.97	0.2	4.4		
	NP-DCGW11T304T					□			●				9.525	3.97	0.4	4.4		
	NP-DCGW11T308T					□			□				9.525	3.97	0.8	4.4		
NEW PETIT CUT	NP-DCMW070204G							●					6.35	2.38	0.4	2.8		C023 D009 D026 E008 E009 E029 E031
	NP-DCMW11T304G							●					9.525	3.97	0.4	4.4		
	NEW DCGW070204FS											●	6.35	2.38	0.4	2.8		C023 D009 D026 E008 E009 E029 E031
	NEW DCGW070208FS											●	6.35	2.38	0.8	2.8		
	DCMW070202									□	□		6.35	2.38	0.2	2.8		C023 D009 D026 E008 E009 E029 E031
	DCMW070204									□	□		6.35	2.38	0.4	2.8		
	DCMW11T302									□	□		9.525	3.97	0.2	4.4		
	DCMW11T304									□	□		9.525	3.97	0.4	4.4		

■ = MIRACLE SIGMA

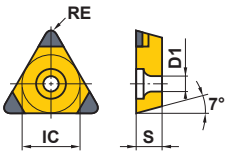
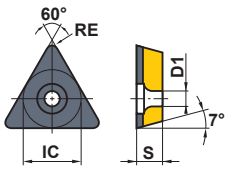
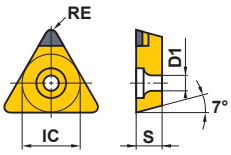
● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

60° TC TYPE INSERTS WITH HOLE

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

Shape	Order Number	Coated CBN				CBN							Dimensions (mm)				Geometry	Applicable Holder Page
		BC8020	BC8110 (NEW)	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	D1		
NEW PETIT CUT	NP-TCGW090202GA3				●								5.56	2.38	0.2	2.5		
	NP-TCGW090204GA3				●								5.56	2.38	0.4	2.5		
	NP-TCGW090208GA3				●								5.56	2.38	0.8	2.5		
	NP-TCGW110202GA3				●								6.35	2.38	0.2	2.8		
	NP-TCGW110204GA3				●								6.35	2.38	0.4	2.8		
	NP-TCGW110208GA3				●								6.35	2.38	0.8	2.8		
	NP-TCGW130304GA3				●								7.94	3.18	0.4	3.4		
	NP-TCGW130308GA3				●								7.94	3.18	0.8	3.4		
	NP-TCGW16T304GA3				●								9.525	3.97	0.4	4.4		
	NP-TCGW16T308GA3				●								9.525	3.97	0.8	4.4		
	NEW NP-TCGW090204GS3		●										5.56	2.38	0.4	2.5		C027 E028
	NEW NP-TCGW090208GS3		●										5.56	2.38	0.8	2.5		
	NEW NP-TCGW110202GS3		●										6.35	2.38	0.2	2.8		
	NEW NP-TCGW110204GS3		●										6.35	2.38	0.4	2.8		
	NEW NP-TCGW110208GS3		●										6.35	2.38	0.8	2.8		
	NEW NP-TCGW130304GS3		●										7.94	3.18	0.4	3.4		
	NEW NP-TCGW130308GS3		●										7.94	3.18	0.8	3.4		
	NEW NP-TCGW16T304GS3		●										9.525	3.97	0.4	4.4		
	NEW NP-TCGW16T308GS3		●										9.525	3.97	0.8	4.4		
	NP-TCGW110204FA3									●	●		6.35	2.38	0.4	2.8		
	NP-TCGW110208FA3									●	●		6.35	2.38	0.8	2.8		
	NP-TCGW110204FS3											●	6.35	2.38	0.4	2.8		
	NP-TCGW110208FS3											●	6.35	2.38	0.8	2.8		
	NP-TCGW110204TS3											●	6.35	2.38	0.4	2.8		
	NP-TCGW110208TS3											●	6.35	2.38	0.8	2.8		
	NEW TCGW090204FS											●	5.56	2.38	0.4	2.5		C027 E028
	NEW TCGW090208FS											●	5.56	2.38	0.8	2.5		
	NEW TCGW110204FS											●	6.35	2.38	0.4	2.8		
	NEW TCGW110208FS											●	6.35	2.38	0.8	2.8		
	TCMW110202									□	□		6.35	2.38	0.2	2.8		C027 E028
	TCMW110204									□	□		6.35	2.38	0.4	2.8		

= MIRACLE SIGMA

GRADES ➤ B004
IDENTIFICATION ➤ B002

60° TP TYPE INSERTS WITH HOLE

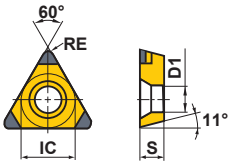
Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

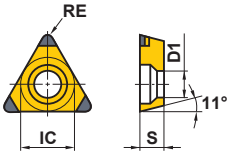
Shape	Order Number	Coated CBN				CBN							Dimensions (mm)				Geometry	Applicable Holder Page
		BC8020	BC8110 (NEW)	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	D1		
NEW PETIT CUT	NP-TPGB080204GA3				●								4.76	2.38	0.4	2.4		
	NP-TPGB080208GA3				●								4.76	2.38	0.8	2.4		
	NP-TPGB090204GA3				●								5.56	2.38	0.4	2.9		
	NP-TPGB090208GA3				●								5.56	2.38	0.8	2.9		
	NP-TPGB110304GA3	●			●								6.35	3.18	0.4	3.4		
	NP-TPGB110308GA3	●			●								6.35	3.18	0.8	3.4		
	NP-TPGB160304GA3	●			●								9.525	3.18	0.4	4.4		
	NP-TPGB160308GA3	●			●								9.525	3.18	0.8	4.4		
	NEW NP-TPGB080204GS3		●										4.76	2.38	0.4	2.4		
	NEW NP-TPGB080208GS3		●										4.76	2.38	0.8	2.4		
	NEW NP-TPGB090204GS3		●										5.56	2.38	0.4	2.9		
	NEW NP-TPGB090208GS3		●										5.56	2.38	0.8	2.9		
	NEW NP-TPGB110302GS3		●										6.35	3.18	0.2	3.4		
	NEW NP-TPGB110304GS3		●										6.35	3.18	0.4	3.4		
	NEW NP-TPGB110308GS3		●										6.35	3.18	0.8	3.4		
	NEW NP-TPGB160304GS3		●										9.525	3.18	0.4	4.4		
	NEW NP-TPGB160308GS3		●										9.525	3.18	0.8	4.4		
	NP-TPGB090202FS3											●	5.56	2.38	0.2	2.9		
	NP-TPGB090204FS3											●	5.56	2.38	0.4	2.9		
	NP-TPGB110302FS3		●									●	6.35	3.18	0.2	3.4		
	NP-TPGB110304FS3	●	●									●	6.35	3.18	0.4	3.4		
	NP-TPGB110308FS3	●	●									●	6.35	3.18	0.8	3.4		
	NP-TPGB160304FS3	●											9.525	3.18	0.4	4.4		
	NP-TPGB160308FS3	●											9.525	3.18	0.8	4.4		
NEW PETIT CUT	NP-TPGX080202GA3				□								4.76	2.38	0.2	2.5		
	NP-TPGX080204GA3				□								4.76	2.38	0.4	2.5		
	NP-TPGX080208GA3				□								4.76	2.38	0.8	2.5		
	NP-TPGX090204GA3				□								5.56	2.38	0.4	3		
	NP-TPGX090208GA3				□								5.56	2.38	0.8	3		
	NP-TPGX110304GA3				□								6.35	3.18	0.4	3.5		
	NP-TPGX110308GA3				□								6.35	3.18	0.8	3.5		
	NP-TPGX080202GS3			●									4.76	2.38	0.2	2.5		
	NP-TPGX080204GS3			●									4.76	2.38	0.4	2.5		
	NP-TPGX090202GS3			●									5.56	2.38	0.2	3		
	NP-TPGX090204GS3			●									5.56	2.38	0.4	3		
	NP-TPGX110304GS3			●									6.35	3.18	0.4	3.5		
	NP-TPGX110308GS3			●									6.35	3.18	0.8	3.5		
NEW PETIT CUT	NP-TPMB080204G							●					4.76	2.38	0.4	2.4		
	NP-TPMB090204G							●					5.56	2.38	0.4	2.9		
	NP-TPMB110304G							●					6.35	3.18	0.4	3.4		
	NP-TPMB160304G							●					9.525	3.18	0.4	4.4		





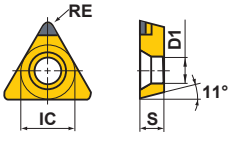
E007





E025





E007

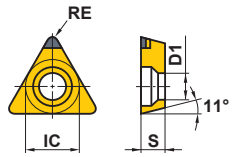
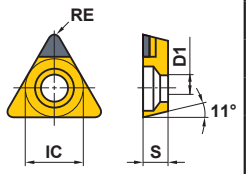
■ = MIRACLE SIGMA

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

Shape	Order Number	Coated CBN				CBN							Dimensions (mm)				Geometry	Applicable Holder Page
		BC8020	BC8110 NEW	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	D1		
NEW PETIT CUT	NP-TPGX090204G					●							5.56	2.38	0.4	3		E025
	NP-TPGX090208G					●							5.56	2.38	0.8	3		
	NP-TPGX110304G					●							6.35	3.18	0.4	3.5		
	NP-TPGX110308G					●							6.35	3.18	0.8	3.5		
	NP-TPGX080202F						●						4.76	2.38	0.2	2.5		
	NP-TPGX080204F						●						4.76	2.38	0.4	2.5		
	NP-TPGX090202F						●						5.56	2.38	0.2	3		
	NP-TPGX090204F						●						5.56	2.38	0.4	3		
	NP-TPGX110304F						●			●			6.35	3.18	0.4	3.5		
	NP-TPGX110308F						●			●			6.35	3.18	0.8	3.5		
	NP-TPGX080202T								●				4.76	2.38	0.2	2.5		
	NP-TPGX080204T								●				4.76	2.38	0.4	2.5		
	NP-TPGX090202T								●				5.56	2.38	0.2	3		
	NP-TPGX090204T								●				5.56	2.38	0.4	3		
	NP-TPGX110304T							●	●		●		6.35	3.18	0.4	3.5		
	NP-TPGX110308T							●	●		●		6.35	3.18	0.8	3.5		
	TPGX080202									●	●		4.76	2.38	0.2	2.5		E025
	TPGX080204						●			●	●		4.76	2.38	0.4	2.5		
	TPGX080208									□	□		4.76	2.38	0.8	2.5		
	TPGX090202									●	●		5.56	2.38	0.2	3		
	TPGX090204						●			●	●		5.56	2.38	0.4	3		
	TPGX090208									□	□		5.56	2.38	0.8	3		
	TPGX110302									□	□		6.35	3.18	0.2	3.5		
	TPGX110304						●			●	●		6.35	3.18	0.4	3.5		
	TPGX110308						●			●	●		6.35	3.18	0.8	3.5		
	TPGX160304									●	□		9.525	3.18	0.4	4.8		
	TPGX160308									●	□		9.525	3.18	0.8	4.8		
	TPGX160404									□	□		9.525	4.76	0.4	4.8		
	TPGX160408									□	□		9.525	4.76	0.8	4.8		

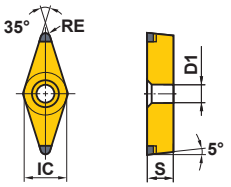
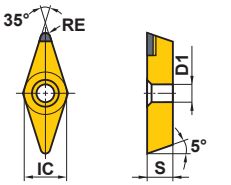
GRADES ➤ B004
IDENTIFICATION ➤ B002

35° VB TYPE INSERTS WITH HOLE

Work Material		
H	Hardened Materials	
K	Cast Iron	
S	Heat-resistant Alloy, Titanium Alloy	
	Sintered Alloy	

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

Shape	Order Number	Coated CBN				CBN							Dimensions (mm)				Geometry	Applicable Holder Page
		BC8020	BC8110 NEW	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	D1		
NEW PETIT CUT	NP-VBGW160404GA2	●			●								9.525	4.76	0.4	4.43		D010 D011 E011 E012 H013
	NP-VBGW160408GA2	●			●								9.525	4.76	0.8	4.43		
NEW	NP-VBGW110302GS2		●										6.35	3.18	0.2	2.85		
	NP-VBGW110304GS2		●								●		6.35	3.18	0.4	2.85		
	NP-VBGW110308GS2		●								●		6.35	3.18	0.8	2.85		
NEW	NP-VBGW160402GS2		●										9.525	4.76	0.2	4.43		
	NP-VBGW160404GS2		●							●	●		9.525	4.76	0.4	4.43		
	NP-VBGW160408GS2		●							●	●		9.525	4.76	0.8	4.43		
NEW	NP-VBGW110302FS2		●										6.35	3.18	0.2	2.85		
	NP-VBGW110304FS2		●									●	6.35	3.18	0.4	2.85		
	NP-VBGW110308FS2		●									●	6.35	3.18	0.8	2.85		
NEW	NP-VBGW160402FS2		●										9.525	4.76	0.2	4.43		
	NP-VBGW160404FS2	●										●	9.525	4.76	0.4	4.43		
	NP-VBGW160408FS2	●										●	9.525	4.76	0.8	4.43		
	NP-VBGW110304TS2											●	6.35	3.18	0.4	2.85		
	NP-VBGW110308TS2											●	6.35	3.18	0.8	2.85		
	NP-VBGW160404TS2											●	9.525	4.76	0.4	4.43		
	NP-VBGW160408TS2											●	9.525	4.76	0.8	4.43		
NEW PETIT CUT	NP-VBGW160404G					●							9.525	4.76	0.4	4.43		E011 H013
	NP-VBGW160408G					●							9.525	4.76	0.8	4.43		

■ = MIRACLE SIGMA

● : Inventory maintained in Japan. (1 insert in one case)

35° VC TYPE INSERTS WITH HOLE

Work Material			Coated CBN				CBN							Dimensions (mm)				Geometry	Applicable Holder Page
			BC8020	BC8110 (NEW)	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	D1		
	H	Hardened Materials	◐	●	●	◐	◐	●	◐	✣									
	K	Cast Iron									●	◐							
	S	Heat-resistant Alloy, Titanium Alloy										◐							
		Sintered Alloy											◐						
NEW PETIT CUT		NP-VCGW160404GA2	●			●								9.525	4.76	0.4	4.4	35° RE IC D1 7° S	C028 C029 E032 E033
		NP-VCGW160408GA2	●			●								9.525	4.76	0.8	4.4		
	NEW	NP-VCGW160404GS2		●										9.525	4.76	0.4	4.4		
	NEW	NP-VCGW160408GS2		●										9.525	4.76	0.8	4.4		
		NP-VCGW160404FS2	●	●										9.525	4.76	0.4	4.4		
		NP-VCGW160408FS2	●	●										9.525	4.76	0.8	4.4		
	NEW	NP-VCGW160404TS2		●										9.525	4.76	0.4	4.4		
	NEW	NP-VCGW160408TS2		●										9.525	4.76	0.8	4.4		

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

■ = MIRACLE SIGMA

80° WC TYPE INSERTS WITH HOLE

Work Material			Coated CBN				CBN							Dimensions (mm)				Geometry	Applicable Holder Page
			BC8020	BC8110 (NEW)	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	D1		
	H	Hardened Materials	◐	●	●	◐	◐	●	◐	✣									
	K	Cast Iron									●	◐							
	S	Heat-resistant Alloy, Titanium Alloy										◐							
		Sintered Alloy											◐						
		NP-WCMWL30204FA										●		4.76	2.38	0.4	2.3	RE 80° IC D1 7° S	E027
		NP-WCMWL30208FA										●		4.76	2.38	0.8	2.3		

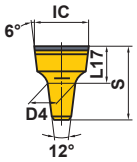
Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting

Honing (Last letter of order number) : Refer to page B011.

RTG TYPE INSERTS WITHOUT HOLE

Work Material			BC8020	BC8110 (NEW)	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020
	H	Hardened Materials	◐	●	●	◐	◐	●	◐	✣	●	◐	◐
	K	Cast Iron											
	S	Heat-resistant Alloy, Titanium Alloy									●	◐	
		Sintered Alloy											◐

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting

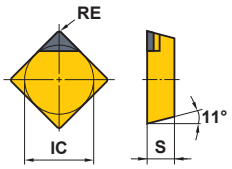
Shape	Order Number	IC	L17	S	D4	Geometry	Applicable Holder Page
	RTG05A	5	3.5	7.5	2.5		C035
	RTG06A	6	3.5	7.5	3.5		
	RTG07A	7	5	11	3.5		
	RTG08A	8	5	11	4.5		
	RTG10A	10	6.5	14	5.5		

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

90° SP TYPE INSERTS WITHOUT HOLE

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

Shape	Order Number	Coated CBN				CBN							Dimensions (mm)			Geometry	Applicable Holder Page
		BC8020	BC8110 NEW	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE		
	SPGN090302									□	□		9.525	3.18	0.2		–
	SPGN090304									●	□		9.525	3.18	0.4		
	SPGN090308									●	□		9.525	3.18	0.8		
	SPGN090312									□	□		9.525	3.18	1.2		
	SPGN120304									●	●		12.7	3.18	0.4		
	SPGN120308									●	●		12.7	3.18	0.8		
	SPGN120312									□	□		12.7	3.18	1.2		
	SPGN120408									□	□		12.7	4.76	0.8		
	SPGN120412									□	□		12.7	4.76	1.2		

60° TB TYPE INSERTS WITHOUT HOLE

Work Material			Coated CBN				CBN							Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting
	H	Hardened Materials	◐	●	●	◐	◐	●	◐	✣	●	◐	◐	
	K	Cast Iron												
	S	Heat-resistant Alloy, Titanium Alloy												
		Sintered Alloy											◐	

Shape	Order Number	BC8020	BC8110 (NEW)	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	Geometry	Applicable Holder Page
	TBGN060104						●			●	□		3.97	1.59	0.4	RE, IC, S, 5°	—
	TBGN**060108**						●			●	□		3.97	1.59	0.8		

60° TP TYPE INSERTS WITHOUT HOLE

Work Material			Coated CBN				CBN							Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting
	H	Hardened Materials	◐	●	●	◐	◐	●	◐	✣	●	◐	◐	
	K	Cast Iron												
	S	Heat-resistant Alloy, Titanium Alloy												
		Sintered Alloy											◐	

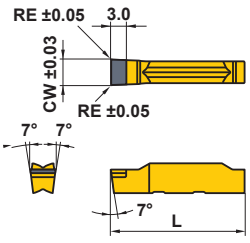
Shape	Order Number	BC8020	BC8110 (NEW)	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	MB4020	IC	S	RE	Geometry	Applicable Holder Page
	TPGN090204									□	□		5.56	2.38	0.4	RE, IC, S, 11°	E026
	TPGN**110302**									□	□		6.35	3.18	0.2		
	TPGN**110304**									●	●		6.35	3.18	0.4		
	TPGN**110308**									□	□		6.35	3.18	0.8		
	TPGN**160304**									●	●		9.525	3.18	0.4		
	TPGN**160308**									●	●		9.525	3.18	0.8		
	TPGN**160312**									□	□		9.525	3.18	1.2		
	TPGN**160408**									□	□		9.525	4.76	0.8		
	TPGN**220408**									□	□		12.7	4.76	0.8		

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

GY TYPE INSERTS WITHOUT HOLE

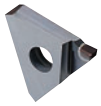
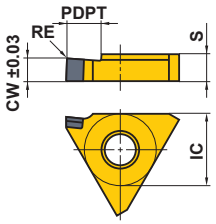
Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

Shape	Order Number	Coated CBN				CBN						Dimensions (mm)			Geometry	Applicable Holder Page
		BC8020	BC8110 (NEW)	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	CW	RE	L		
	GY1G0200D020N-GFGS					●						2.00	0.2	20.70		F028
	GY1G0239E020N-GFGS					●						2.39	0.2	20.70		—039
	GY1G0250E020N-GFGS					●						2.50	0.2	20.70		F044
	GY1G0300F020N-GFGS					●						3.00	0.2	20.70		—049
	GY1G0318F020N-GFGS					●						3.18	0.2	20.70		F052
	GY1G0400G020N-GFGS					●						4.00	0.2	25.65		—079
	GY1G0475H020N-GFGS					●						4.75	0.2	25.65		F084
	GY1G0500H020N-GFGS					●						5.00	0.2	25.65		—091
																F094
																—101

GRADES ➤ B004
IDENTIFICATION ➤ B002

MGTR TYPE INSERTS WITH HOLE

Work Material			Coated CBN				CBN						Dimensions (mm)					Geometry	Applicable Holder Page
			BC8020	BC8110 NEW	MBC010	MBC020	MB8025	MB810	MB825	MB835	MB710	MB730	CW	PDPT	IC	S	RE		
	H	Hardened Materials																	
	K	Cast Iron																	
	S	Heat-resistant Alloy, Titanium Alloy																	
		Sintered Alloy																	
	**MGTR43125**						●						1.25	2.0	12.7	4.76	0.2	 Right hand tool holder only.	H014
	MGTR**43150**						●						1.50	3.5	12.7	4.76	0.2		
	MGTR**43200**						●						2.00	3.5	12.7	4.76	0.2		
	MGTR**43250**						●						2.50	4.0	12.7	4.76	0.2		
	MGTR**43300**						●						3.00	4.0	12.7	4.76	0.2		
	MGTR**43350**						●						3.50	5.0	12.7	4.76	0.2		
	MGTR**43400**						●						4.00	5.0	12.7	4.76	0.2		

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

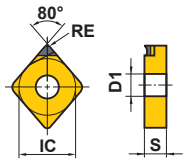
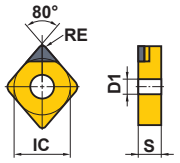
● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

GRADES ➤ B004

80° CN TYPE INSERTS WITH HOLE

Work Material	N	Non-ferrous Metal	●

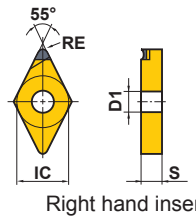
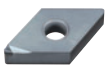
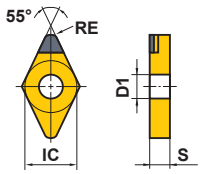
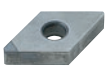
Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

Shape	Order Number	PCD MD220	Dimensions (mm) IC	S	RE	D1	Geometry	Applicable Holder Page
NEW PETIT CUT	**NP-CNMM120402R-F**	●	12.7	4.76	0.2	5.16		C008 C009 E036 E040 H006 −008
	NP-CNMM**120402L-F**	□	12.7	4.76	0.2	5.16		
	NP-CNMM**120404R-F**	●	12.7	4.76	0.4	5.16		
	NP-CNMM**120404L-F**	□	12.7	4.76	0.4	5.16		
	NP-CNMM**120408R-F**	●	12.7	4.76	0.8	5.16		
(With Breaker)	NP-CNMM**120408L-F**	□	12.7	4.76	0.8	5.16	Right hand insert shown.	
	CNMA120404	●	12.7	4.76	0.4	5.16		C008 C009 E036 E040 H006 −008
	CNMA**120408**	●	12.7	4.76	0.8	5.16		

55° DN TYPE INSERTS WITH HOLE

Work Material	N	Non-ferrous Metal	●

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

Shape	Order Number	PCD MD220	Dimensions (mm) IC	S	RE	D1	Geometry	Applicable Holder Page
NEW PETIT CUT	**NP-DNMM150402R-F**	●	12.7	4.76	0.2	5.16		C010 C011 E013 E036 −040 H009 −011
	NP-DNMM**150402L-F**	□	12.7	4.76	0.2	5.16		
	NP-DNMM**150404R-F**	●	12.7	4.76	0.4	5.16		
	NP-DNMM**150404L-F**	□	12.7	4.76	0.4	5.16		
	NP-DNMM**150408R-F**	●	12.7	4.76	0.8	5.16		
(With Breaker)	NP-DNMM**150408L-F**	□	12.7	4.76	0.8	5.16	Right hand insert shown.	
	DNGA150404	●	12.7	4.76	0.4	5.16		C010 C011 E013 E036 −040 H009 −011
	DNGA**150408**	●	12.7	4.76	0.8	5.16		

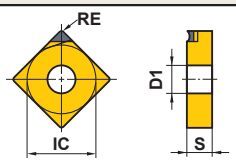
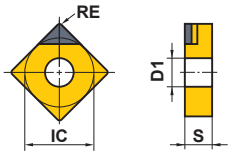
GRADES ➤ B015
IDENTIFICATION ➤ B002

PCD TURNING INSERTS [NEGATIVE]

90° SN TYPE INSERTS WITH HOLE

Work Material	N	Non-ferrous Metal	●

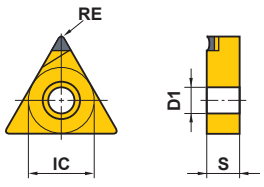
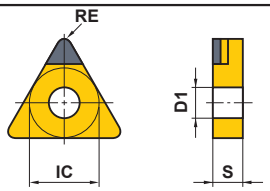
Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

Shape	Order Number	PCD MD220	Dimensions (mm) IC	S	RE	D1	Geometry	Applicable Holder Page
NEW PETIT CUT  (With Breaker)	**NP-SNMM120404R-F**	●	12.7	4.76	0.4	5.16	 Right hand insert shown.	C012 —015 E014 E035
	NP-SNMM**120404L-F**	□	12.7	4.76	0.4	5.16		
	NP-SNMM**120408R-F**	●	12.7	4.76	0.8	5.16		
	NP-SNMM**120408L-F**	□	12.7	4.76	0.8	5.16		
	**SNGA120404**	□	12.7	4.76	0.4	5.16		C012 —015 E014 E035
	SNGA**120408**	●	12.7	4.76	0.8	5.16		

60° TN TYPE INSERTS WITH HOLE

Work Material	N	Non-ferrous Metal	●

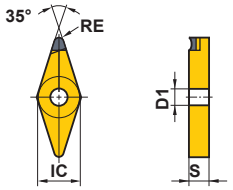
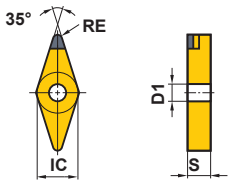
Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

Shape	Order Number	PCD MD220	Dimensions (mm) IC	S	RE	D1	Geometry	Applicable Holder Page
NEW PETIT CUT  (With Breaker)	**NP-TNMM160402R-F**	●	9.525	4.76	0.2	3.81	 Right hand insert shown.	C016 C017 E014 E035 E039
	NP-TNMM**160402L-F**	□	9.525	4.76	0.2	3.81		
	NP-TNMM**160404R-F**	●	9.525	4.76	0.4	3.81		
	NP-TNMM**160404L-F**	□	9.525	4.76	0.4	3.81		
	NP-TNMM**160408R-F**	●	9.525	4.76	0.8	3.81		
	NP-TNMM**160408L-F**	□	9.525	4.76	0.8	3.81		
	**TNGA160402**	●	9.525	4.76	0.2	3.81		C016 C017 E014 E035 E039
	TNGA**160404**	●	9.525	4.76	0.4	3.81		
	TNGA**160408**	●	9.525	4.76	0.8	3.81		

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

35° VN TYPE INSERTS WITH HOLE

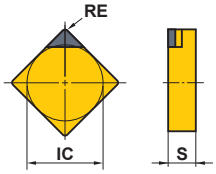
Work Material				Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting
	N	Non-ferrous Metal	●	

Shape	Order Number	PCD MD220	Dimensions (mm) IC	S	RE	D1	Geometry	Applicable Holder Page
NEW PETIT CUT  (With Breaker)	**NP-VNMM160402R-F**	●	9.525	4.76	0.2	3.81	 Right hand insert shown.	C018 —020 E015 E041
	NP-VNMM**160402L-F**	□	9.525	4.76	0.2	3.81		
	NP-VNMM**160404R-F**	●	9.525	4.76	0.4	3.81		
	NP-VNMM**160404L-F**	□	9.525	4.76	0.4	3.81		
	NP-VNMM**160408R-F**	●	9.525	4.76	0.8	3.81		
	NP-VNMM**160408L-F**	□	9.525	4.76	0.8	3.81		
	**VNGA160404**	●	9.525	4.76	0.4	3.81		C018 —020 E015 E041
	VNGA**160408**	●	9.525	4.76	0.8	3.81		

GRADES ➤ B015
IDENTIFICATION ➤ B002

90° SN TYPE INSERTS WITHOUT HOLE

Work Material	N	Non-ferrous Metal	●	Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

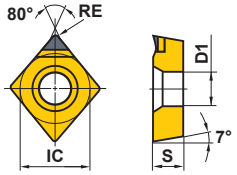
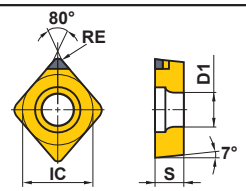
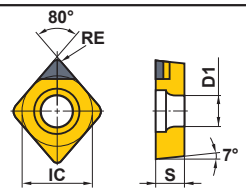
Shape	Order Number	PCD MD220	Dimensions (mm) IC	S	RE	Geometry	Applicable Holder Page
	SNGN120404	□	12.7	4.76	0.4		–
	SNGN120408	●	12.7	4.76	0.8		

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

80° CC TYPE INSERTS WITH HOLE

Work Material	N	Non-ferrous Metal	●

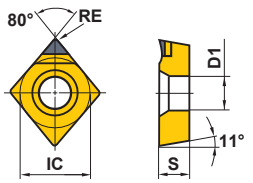
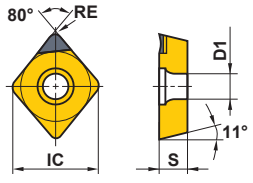
Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Shape	Order Number	PCD MD220	Dimensions (mm) IC	S	RE	D1	Geometry	Applicable Holder Page
NEW PETIT CUT  (With Breaker)	**NP-CCMH060202**	●	6.35	2.38	0.2	2.8		C022 D008 E006 E016 E030 E034
	NP-CCMH**060204**	●	6.35	2.38	0.4	2.8		
NEW PETIT CUT 	**NP-CCMW03S102**	●	3.57	1.39	0.2	2.0		–
	NP-CCMW**03S104**	●	3.57	1.39	0.4	2.0		
	NP-CCMW**04T002**	●	4.37	1.79	0.2	2.4		
	NP-CCMW**04T004**	●	4.37	1.79	0.4	2.4		
	**CCMW060202**	●	6.35	2.38	0.2	2.8		C022 D008 E006 E016 E030 E034
	CCMW**060204**	●	6.35	2.38	0.4	2.8		
	CCMW**09T302**	●	9.525	3.97	0.2	4.4		
	CCMW**09T304**	●	9.525	3.97	0.4	4.4		

80° CP TYPE INSERTS WITH HOLE

Work Material	N	Non-ferrous Metal	●

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

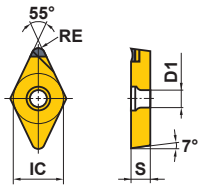
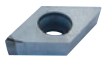
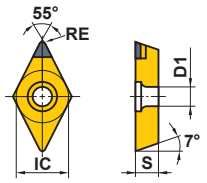
Shape	Order Number	PCD MD220	Dimensions (mm) IC	S	RE	D1	Geometry	Applicable Holder Page
NEW PETIT CUT  (With Breaker)	**NP-CPMH080202**	●	7.94	2.38	0.2	3.5		E006
	NP-CPMH**080204**	●	7.94	2.38	0.4	3.5		
	NP-CPMH**090302**	●	9.525	3.18	0.2	4.5		
	NP-CPMH**090304**	●	9.525	3.18	0.4	4.5		
	**CPGT080202**	●	7.94	2.38	0.2	3.4		–
	CPGT**080204**	●	7.94	2.38	0.4	3.4		
	CPGT**090302**	●	9.525	3.18	0.2	4.4		
	CPGT**090304**	●	9.525	3.18	0.4	4.4		

GRADES ➤ B015
IDENTIFICATION ➤ B002

55° DC TYPE INSERTS WITH HOLE

Work Material	N	Non-ferrous Metal	●

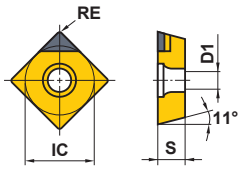
Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✥ : Unstable Cutting

Shape	Order Number	PCD MD220	Dimensions (mm) IC	S	RE	D1	Geometry	Applicable Holder Page
NEW PETIT CUT	**NP-DCMT070202R-F**	●	6.35	2.38	0.2	2.8		C023 D009 D026 E008 E009 E029 E031
	NP-DCMT**070202L-F**	●	6.35	2.38	0.2	2.8		
	NP-DCMT**070204R-F**	●	6.35	2.38	0.4	2.8		
	NP-DCMT**070204L-F**	●	6.35	2.38	0.4	2.8		
	NP-DCMT**11T302R-F**	●	9.525	3.97	0.2	4.4		
	NP-DCMT**11T302L-F**	●	9.525	3.97	0.2	4.4		
	NP-DCMT**11T304R-F**	●	9.525	3.97	0.4	4.4		
(With Breaker)	NP-DCMT**11T304L-F**	●	9.525	3.97	0.4	4.4	Left hand insert shown.	
	**DCMW070202**	●	6.35	2.38	0.2	2.8		C023 D009 D026 E008 E009 E029 E031
	DCMW**070204**	●	6.35	2.38	0.4	2.8		
	DCMW**11T302**	●	9.525	3.97	0.2	4.4		
	DCMW**11T304**	●	9.525	3.97	0.4	4.4		

90° SP TYPE INSERTS WITH HOLE

Work Material	N	Non-ferrous Metal	●

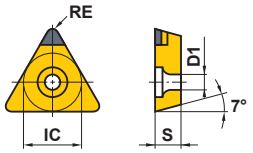
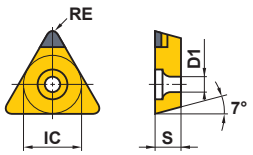
Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✥ : Unstable Cutting

Shape	Order Number	PCD MD220	Dimensions (mm) IC	S	RE	D1	Geometry	Applicable Holder Page
	**SPGX090304**	●	9.525	3.18	0.4	4.8		—
	SPGX**090308**	●	9.525	3.18	0.8	4.8		

● : Inventory maintained in Japan. (1 insert in one case)

60° TC TYPE INSERTS WITH HOLE

Work Material				Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting
	N	Non-ferrous Metal	●	

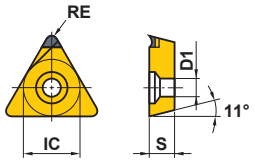
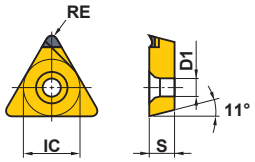
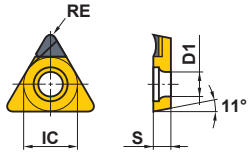
Shape	Order Number	PCD MD220	Dimensions (mm) IC	S	RE	D1	Geometry	Applicable Holder Page
	**TCMW110202**	●	6.35	2.38	0.2	2.8		C027 E028
	TCMW**110204**	●	6.35	2.38	0.4	2.8		
	**TCGW060102**	●	3.97	1.59	0.2	2.3		–
	TCGW**060104**	●	3.97	1.59	0.4	2.3		
	TCGW**060108**	●	3.97	1.59	0.8	2.3		

GRADES ➤ B015
IDENTIFICATION ➤ B002

60° TP TYPE INSERTS WITH HOLE

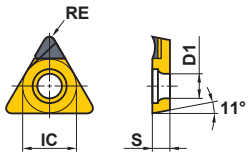
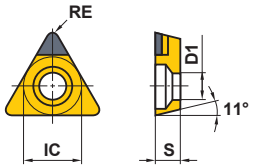
Work Material	N	Non-ferrous Metal	●

Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Shape	Order Number	PCD	Dimensions (mm)				Geometry	Applicable Holder Page
		MD220	IC	S	RE	D1		
NEW PETIT CUT	NP-TPMX090202R-F	●	5.56	2.38	0.2	3		E025
	NP-TPMX090202L-F	●	5.56	2.38	0.2	3		
	NP-TPMX090204R-F	□	5.56	2.38	0.4	3		
	NP-TPMX090204L-F	●	5.56	2.38	0.4	3		
	NP-TPMX090208R-F	□	5.56	2.38	0.8	3		
	NP-TPMX090208L-F	●	5.56	2.38	0.8	3		
	NP-TPMX110302R-F	□	6.35	3.18	0.2	3.5		
	NP-TPMX110302L-F	●	6.35	3.18	0.2	3.5		
	NP-TPMX110304R-F	□	6.35	3.18	0.4	3.5		
	NP-TPMX110304L-F	●	6.35	3.18	0.4	3.5		
	NP-TPMX110308R-F	□	6.35	3.18	0.8	3.5		
	NP-TPMX110308L-F	●	6.35	3.18	0.8	3.5		
	NP-TPMX160302R-F	□	9.525	3.18	0.2	4.8		
	NP-TPMX160302L-F	●	9.525	3.18	0.2	4.8		
	NP-TPMX160304R-F	□	9.525	3.18	0.4	4.8		
	NP-TPMX160304L-F	●	9.525	3.18	0.4	4.8		
	NP-TPMX160308R-F	□	9.525	3.18	0.8	4.8		
(With Breaker)	NP-TPMX160308L-F	●	9.525	3.18	0.8	4.8	Right hand insert shown.	
NEW PETIT CUT	NP-TPMH080202R-F	●	4.76	2.38	0.2	2.5		E007
	NP-TPMH080202L-F	●	4.76	2.38	0.2	2.5		
	NP-TPMH080204R-F	●	4.76	2.38	0.4	2.5		
	NP-TPMH080204L-F	●	4.76	2.38	0.4	2.5		
	NP-TPMH090202R-F	●	5.56	2.38	0.2	2.9		
	NP-TPMH090202L-F	●	5.56	2.38	0.2	2.9		
	NP-TPMH090204R-F	●	5.56	2.38	0.4	2.9		
	NP-TPMH090204L-F	●	5.56	2.38	0.4	2.9		
	NP-TPMH110302R-F	●	6.35	3.18	0.2	3.4		
	NP-TPMH110302L-F	●	6.35	3.18	0.2	3.4		
	NP-TPMH110304R-F	●	6.35	3.18	0.4	3.4		
	NP-TPMH110304L-F	●	6.35	3.18	0.4	3.4		
	NP-TPMH160302R-F	●	9.525	3.18	0.2	4.4		
	NP-TPMH160302L-F	●	9.525	3.18	0.2	4.4		
	NP-TPMH160304R-F	●	9.525	3.18	0.4	4.4		
(With Breaker)	NP-TPMH160304L-F	●	9.525	3.18	0.4	4.4	Left hand insert shown.	
	TPGT160302R-F	●	9.525	3.18	0.2	4.4		–
	TPGT160302L-F	●	9.525	3.18	0.2	4.4		
	TPGT160304R-F	●	9.525	3.18	0.4	4.4		
	TPGT160304L-F	●	9.525	3.18	0.4	4.4		
(With Breaker)							Right hand insert shown.	

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

Work Material	N	Non-ferrous Metal	●	Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

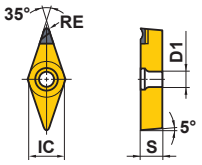
Shape	Order Number	PCD MD220	Dimensions (mm) IC	S	RE	D1	Geometry	Applicable Holder Page
 (With Breaker)	TPGV090202R-F	●	5.56	2.38	0.2	2.8	 Right hand insert shown.	–
	TPGV090202L-F	●	5.56	2.38	0.2	2.8		
	TPGV090204R-F	●	5.56	2.38	0.4	2.8		
	TPGV090204L-F	●	5.56	2.38	0.4	2.8		
	TPGV110302R-F	●	6.35	3.18	0.2	3.4		
	TPGV110302L-F	●	6.35	3.18	0.2	3.4		
	TPGV110304R-F	●	6.35	3.18	0.4	3.4		
	TPGV110304L-F	●	6.35	3.18	0.4	3.4		
	TPGX080202	●	4.76	2.38	0.2	2.5		E025
	TPGX080204	●	4.76	2.38	0.4	2.5		
	TPGX080208	●	4.76	2.38	0.8	2.5		
	TPGX090202	●	5.56	2.38	0.2	3		
	TPGX090204	●	5.56	2.38	0.4	3		
	TPGX090208	●	5.56	2.38	0.8	3		
	TPGX110302	●	6.35	3.18	0.2	3.5		
	TPGX110304	●	6.35	3.18	0.4	3.5		
	TPGX110308	●	6.35	3.18	0.8	3.5		
	TPGX160304	●	9.525	3.18	0.4	4.8		
	TPGX160308	●	9.525	3.18	0.8	4.8		

GRADES ➤ B015
IDENTIFICATION ➤ B002

35° VB TYPE INSERTS WITH HOLE

Work Material	N	Non-ferrous Metal	●

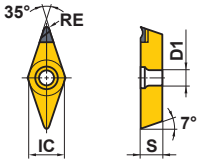
Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting

Shape	Order Number	PCD MD220	Dimensions (mm) IC	S	RE	D1	Geometry	Applicable Holder Page
 (With Breaker)	NP-VBGT1103V5R-F	●	6.35	3.18	0.05	2.85		D010 D011 E011 E012
	NP-VBGT110301R-F	●	6.35	3.18	0.1	2.85		
	NP-VBGT110302R-F	●	6.35	3.18	0.2	2.85		
	NP-VBGT110304R-F	●	6.35	3.18	0.4	2.85		

35° VC TYPE INSERTS WITH HOLE

Work Material	N	Non-ferrous Metal	●

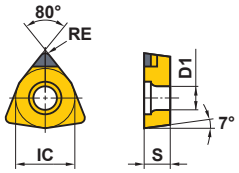
Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting

Shape	Order Number	PCD MD220	Dimensions (mm) IC	S	RE	D1	Geometry	Applicable Holder Page
 (With Breaker)	NP-VCGT0802V5R-F	●	4.76	2.38	0.05	2.4		C028 E011 E012 E032
	NP-VCGT080201R-F	●	4.76	2.38	0.1	2.4		
	NP-VCGT080202R-F	●	4.76	2.38	0.2	2.4		
	NP-VCGT080204R-F	●	4.76	2.38	0.4	2.4		
	NP-VCGT1103V5R-F	●	6.35	3.18	0.05	2.8		
	NP-VCGT110301R-F	●	6.35	3.18	0.1	2.8		
	NP-VCGT110302R-F	●	6.35	3.18	0.2	2.8		
	NP-VCGT110304R-F	●	6.35	3.18	0.4	2.8		

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

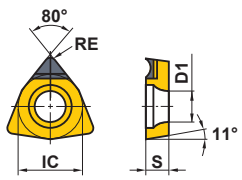
80° WC TYPE INSERTS WITH HOLE

Work Material				Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting
	N	Non-ferrous Metal	●	

Shape	Order Number	PCD MD220	Dimensions (mm) IC	S	RE	D1	Geometry	Applicable Holder Page
	**WCMWL30202**	●	4.76	2.38	0.2	2.3		E027
	WCMW**L30204**	□	4.76	2.38	0.4	2.3		
	WCMW**040202**	●	6.35	2.38	0.2	2.8		
	WCMW**040204**	□	6.35	2.38	0.4	2.8		
	WCMW**06T304**	●	9.525	3.97	0.4	4.4		
	WCMW**06T308**	□	9.525	3.97	0.8	4.4		

80° WP TYPE INSERTS WITH HOLE

Work Material				Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting
	N	Non-ferrous Metal	●	

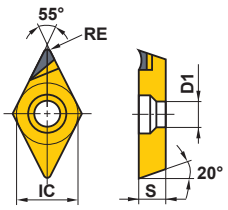
Shape	Order Number	PCD MD220	Dimensions (mm) IC	S	RE	D1	Geometry	Applicable Holder Page
 (With Breaker)	**WPGT040202**	●	6.35	2.38	0.2	2.8		E010
	WPGT**040204**	●	6.35	2.38	0.4	2.8		
	WPGT**060302**	●	9.525	3.18	0.2	4.4		
	WPGT**060304**	●	9.525	3.18	0.4	4.4		

GRADES ➤ B015
IDENTIFICATION ➤ B002

55° DE TYPE INSERTS WITH HOLE

Work Material	N	Non-ferrous Metal	●

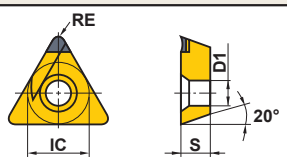
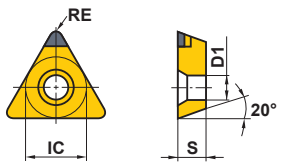
Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

Shape	Order Number	PCD MD220	Dimensions (mm) IC	S	RE	D1	Geometry	Applicable Holder Page
 (With Breaker)	**DEGX150402R-F**	●	12.7	4.76	0.2	5.1	 Right hand insert shown.	C032
	DEGX**150402L-F**	●	12.7	4.76	0.2	5.1		
	DEGX**150404R-F**	●	12.7	4.76	0.4	5.1		
	DEGX**150404L-F**	●	12.7	4.76	0.4	5.1		

60° TE TYPE INSERTS WITH HOLE

Work Material	N	Non-ferrous Metal	●

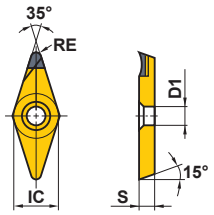
Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

Shape	Order Number	PCD MD220	Dimensions (mm) IC	S	RE	D1	Geometry	Applicable Holder Page
 (With Breaker)	**TEGX160302R**	●	9.525	3.18	0.2	4.3	 Right hand insert shown.	C033 E042
	TEGX**160302L**	●	9.525	3.18	0.2	4.3		
	TEGX**160304R**	●	9.525	3.18	0.4	4.3		
	TEGX**160304L**	●	9.525	3.18	0.4	4.3		
	**TEGX160302**	●	9.525	3.18	0.2	4.3		C033 E042
	TEGX**160304**	●	9.525	3.18	0.4	4.3		

● : Inventory maintained in Japan. (1 insert in one case)

35° VD TYPE INSERTS WITH HOLE

Work Material				Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting
	N	Non-ferrous Metal	●	

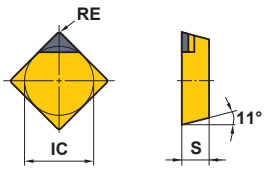
Shape	Order Number	PCD MD220	Dimensions (mm) IC	S	RE	D1	Geometry	Applicable Holder Page
 (With Breaker)	VDGX160302R-F	●	9.525	3.18	0.2	4.5	 Right hand insert shown.	C034
	VDGX160302L-F	●	9.525	3.18	0.2	4.5		
	VDGX160304R-F	●	9.525	3.18	0.4	4.5		
	VDGX160304L-F	●	9.525	3.18	0.4	4.5		

GRADES ➤ B015
IDENTIFICATION ➤ B002

90° SP TYPE INSERTS WITHOUT HOLE

Work Material	N	Non-ferrous Metal	●

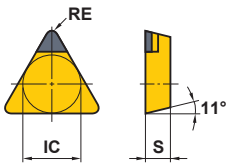
Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

Shape	Order Number	PCD MD220	Dimensions (mm) IC	S	RE	Geometry	Applicable Holder Page
	SPGN090302	●	9.525	3.18	0.2		–
	SPGN090304	●	9.525	3.18	0.4		
	SPGN090308	●	9.525	3.18	0.8		
	SPGN090312	□	9.525	3.18	1.2		
	SPGN120304	●	12.7	3.18	0.4		
	SPGN120308	●	12.7	3.18	0.8		
	SPGN120312	●	12.7	3.18	1.2		

60° TP TYPE INSERTS WITHOUT HOLE

Work Material	N	Non-ferrous Metal	●

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

Shape	Order Number	PCD MD220	Dimensions (mm) IC	S	RE	Geometry	Applicable Holder Page
	TPGN110302	●	6.35	3.18	0.2		E026
	TPGN110304	●	6.35	3.18	0.4		
	TPGN110308	●	6.35	3.18	0.8		
	TPGN160302	●	9.525	3.18	0.2		
	TPGN160304	●	9.525	3.18	0.4		
	TPGN160308	●	9.525	3.18	0.8		
	TPGN160312	□	9.525	3.18	1.2		

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

GRADES ➤ B015
IDENTIFICATION ➤ B002

Memo

HOW TO READ THE STANDARD OF EXTERNAL TURNING TOOLS

●How this section page is organized

①Organized according to turning insert shape.
(Refer to the index on the next page.)

TYPE OF TOOL HOLDER
indicates the first four letters of the order number, as well as cutting applications.

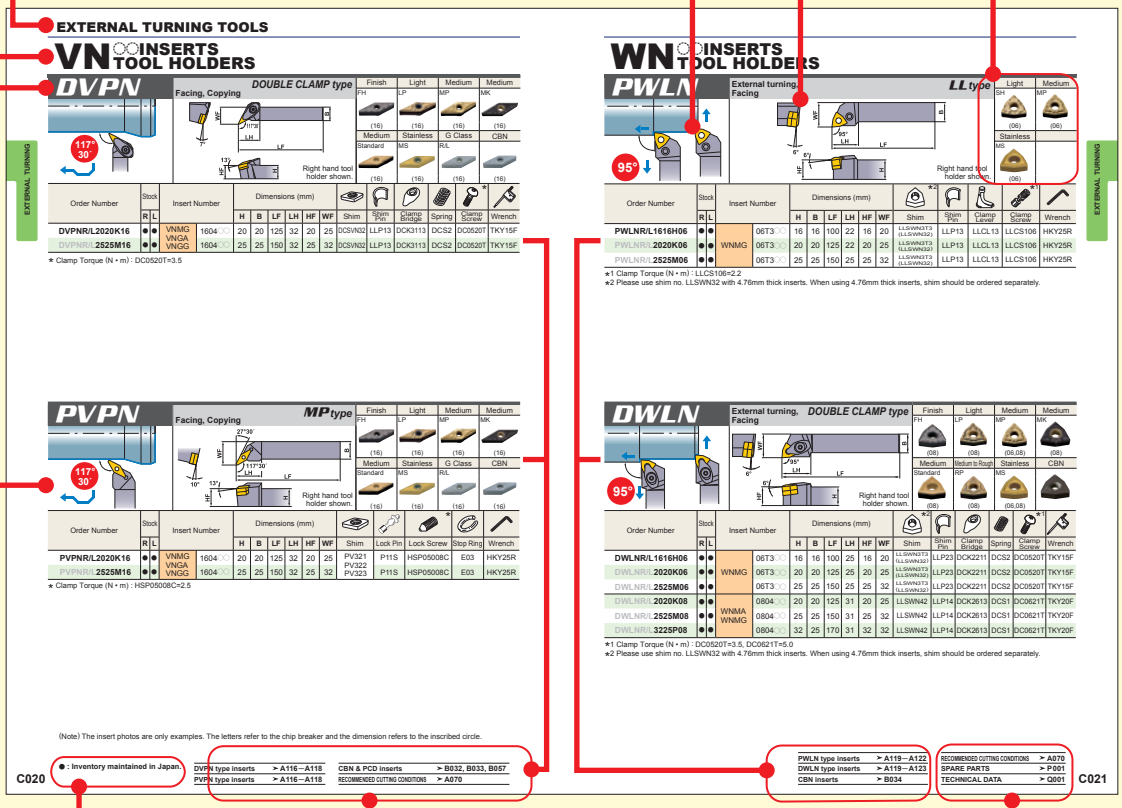
TITLE OF PRODUCT BY INSERT TYPE

PRODUCT SECTION

FIGURE SHOWING THE TOOLING APPLICATION
uses illustrations and arrows to depict the available machining applications such as external turning, copying, facing, and chamfering together with cutting edge lead angles.

GEOMETRY

CHIP BREAKER BY CUTTING APPLICATION



LEGEND FOR STOCK STATUS MARK
is shown on the left hand page of each double-page spread.

REFERENCE PAGE FOR APPLICABLE INSERTS
indicates reference pages giving details of inserts that are applicable to the product.

PAGE REFERENCE
·SPARE PARTS
·TECHNICAL DATA
indicates reference pages, including the above, on the right hand page of each double-page spread.

PRODUCT STANDARDS
indicates order numbers, stock status (per right/left hand), applicable inserts, dimensions, and spare parts.

●To Order : Please specify
①order number and hand of tool (right/left).

TURNING TOOLS

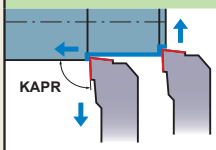
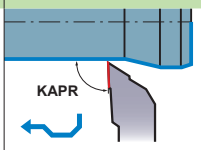
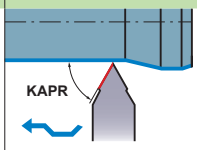
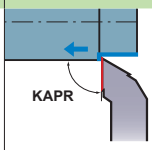
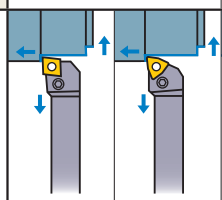
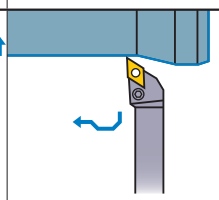
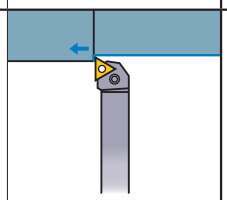
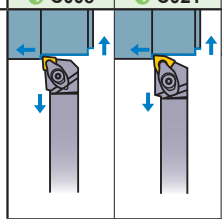
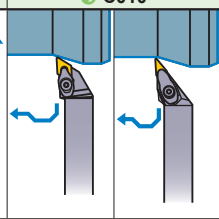
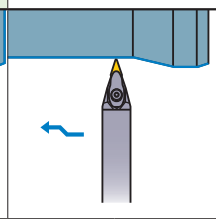
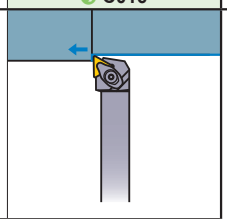
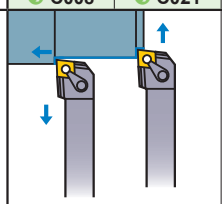
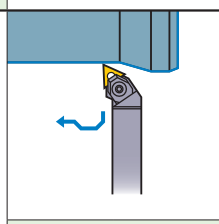
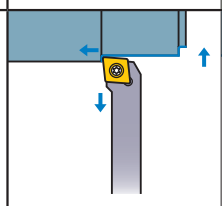
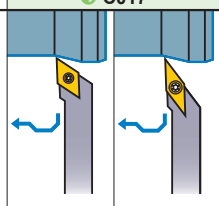
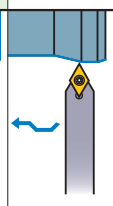
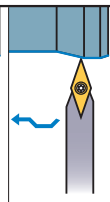
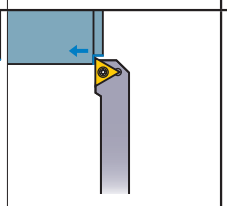
EXTERNAL TURNING TOOLS

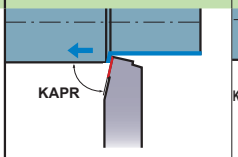
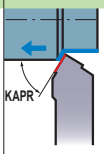
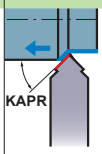
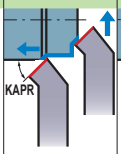
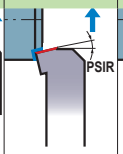
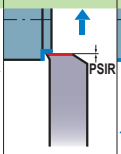
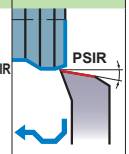
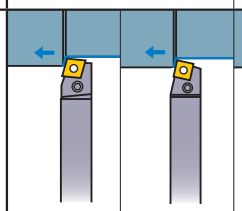
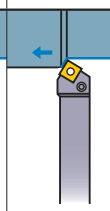
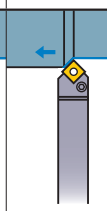
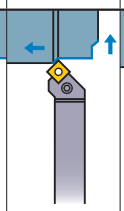
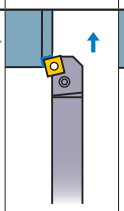
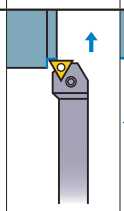
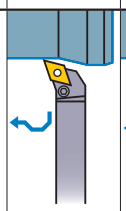
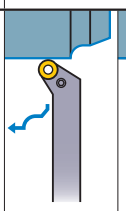
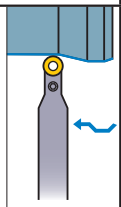
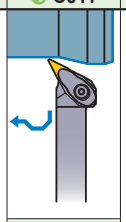
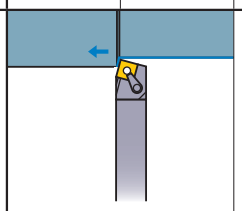
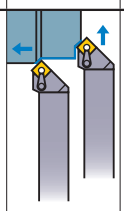
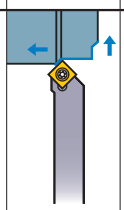
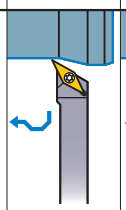
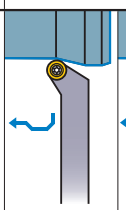
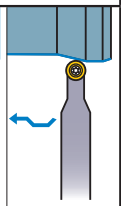
CLASSIFICATION ····· C002
IDENTIFICATION ····· C006
METHOD OF HOLDING ····· C007
STANDARD HOLDERS
CN○○ INSERTS TOOL HOLDERS ····· C008
DN○○ INSERTS TOOL HOLDERS ····· C010
SN○○ INSERTS TOOL HOLDERS ····· C012
TN○○ INSERTS TOOL HOLDERS ····· C016
VN○○ INSERTS TOOL HOLDERS ····· C018
WN○○ INSERTS TOOL HOLDERS ····· C021
CC○○ INSERTS TOOL HOLDERS ····· C022
DC○○ INSERTS TOOL HOLDERS ····· C023
RC○○ INSERTS TOOL HOLDERS ····· C024
SC○○ INSERTS TOOL HOLDERS ····· C026
TC○○ INSERTS TOOL HOLDERS ····· C027
VC○○ INSERTS TOOL HOLDERS ····· C028
XC○○ INSERTS TOOL HOLDERS ····· C030
TL HOLDER ····· C035
●AL HOLDER
DE○○ INSERTS TOOL HOLDERS ····· C032
TE○○ INSERTS TOOL HOLDERS ····· C033
VD○○ INSERTS TOOL HOLDERS ····· C034

*Arranged by Alphabetical order

C008 **DCLN**
C010 **DDJN**
C016 **DTGN**
C018 **DVJN**
C020 **DVPN**
C019 **DVVN**
C021 **DWLN**
C009 **MCLN**
C012 **MSBN**
C014 **MSSN**
C017 **MTJN**
C009 **PCBN**
C008 **PCLN**
C011 **PDHN**
C010 **PDJN**
C024 **PRDC**
C024 **PRGC**
C012 **PSBN**
C014 **PSDN**
C015 **PSKN**
C013 **PSSN**
C013 **PSTN**
C017 **PTFN**
C016 **PTGN**
C018 **PVJN**
C020 **PVPN**
C019 **PVVN**
C021 **PWLN**
C022 **SCLC**
C023 **SDJC**
C032 **SDJE**
C023 **SDNC**
C032 **SDNE**
C025 **SRDC**
C025 **SRGC**
C026 **SSSC**
C033 **STFE**
C027 **STGC**
C033 **STGE**
C028 **SVJC**
C034 **SVJD**
C029 **SVPC**
C028 **SVVC**
C030 **SXZC**
C035 **TLHR**

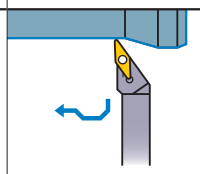
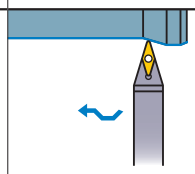
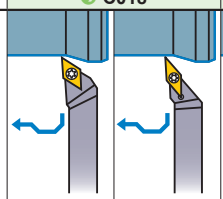
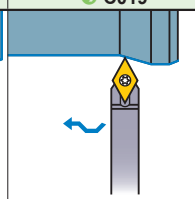
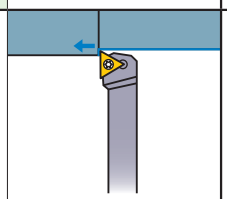
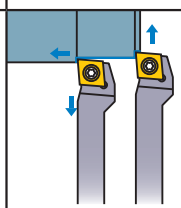
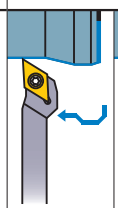
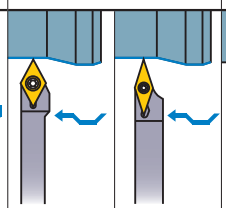
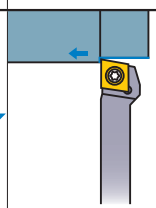
CLASSIFICATION

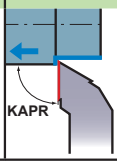
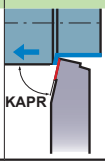
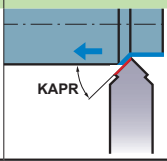
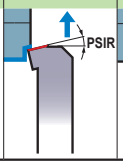
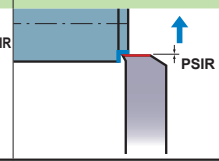
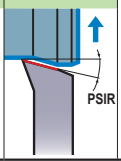
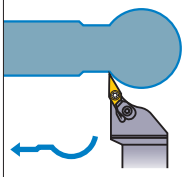
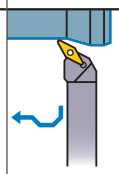
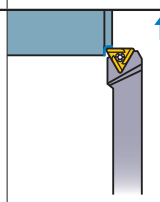
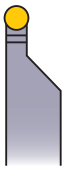
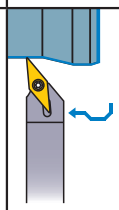
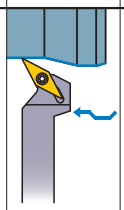
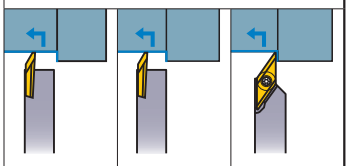
Tool Holder	Features Shank Size (H x W x L)	External Turning Facing KAPR=95°	External Turning Copying KAPR=93°	External Turning Copying KAPR=63°30' 72°30'	External Turning KAPR=90°
					
LL Holder 	● Lever lock type. ● ISO standard. ● Various holder shapes. ● Suitable for light to heavy cutting. ● Economical negative insert. 10 x 10 x 70 25 x 25 x 150 12 x 12 x 80 32 x 25 x 170 16 x 16 x 100 32 x 32 x 170 20 x 20 x 125	 **PCLN** ➲ C008	 **PWLN** ➲ C021	 **PDJN** ➲ C010	 **PTGN** ➲ C016
DOUBLE CLAMP Holder 	● New double clamp type. ● Holds inserts securely. ● Excellent cutting edge tolerance. ● Economical negative insert. ● Small insert series. 16 x 16 x 100 25 x 25 x 150 20 x 20 x 125 32 x 25 x 170	 **DCLN** ➲ C008	 **DWLN** ➲ C021	 **DDJN** ➲ C010	 **DVJN** ➲ C018
		 **DVVN** ➲ C019	 **DTGN** ➲ C016		
DOUBLE CLAMP Holder (For heavy cutting) 	● Double clamp holder type. ● Holds inserts securely. ● Suitable for heavy cutting. ● Negative insert. 32 x 32 x 170 40 x 40 x 200	 **MCLN** ➲ C009			
WP Holder 	● Double clamp holder type. ● Simple insert exchange. ● Economical negative insert. 20 x 20 x 125 25 x 25 x 150		 **MTJN** ➲ C017		
SP Holder 	● Screw-on type. ● Miniature holder with 7°positive insert. 8 x 8 x 60 10 x 10 x 70 12 x 12 x 80 16 x 16 x 100 20 x 20 x 125 25 x 25 x 150	 **SCLC** ➲ C022	 **SDJC** ➲ C023	 **SVJC** ➲ C028	 **SDNC** ➲ C023
		 **SVVC** ➲ C028	 **STGC** ➲ C027		

	External Turning		External Turning, Chamfering		External Turning, Facing, Chamfering	Facing		Facing, Copying	External Turning, Copying		Selection Standard				
	KAPR=75°		KAPR=60°	KAPR=45°	KAPR=45°	PSIR=15°	PSIR=0° –-1°	PSIR=10° –	Special Design		Economical	Low Cutting Resistance (Sharpness)	Clamp Rigidity	Operation Efficiency	Specialised
															
											◎		○	◎	
	PCBN ➲ C009	PSBN ➲ C012	PSTN ➲ C013	PSDN ➲ C014	PSSN ➲ C013	PSKN ➲ C015	PTFN ➲ C017	PDHN ➲ C011	PRGC ➲ C024	PRDC ➲ C024					
											◎		◎	◎	
								DVPN ➲ C020							
													◎		
	MSBN ➲ C012				MSSN ➲ C014										
											◎		◎	◎	
												○			
					SSSC ➲ C026			SVPC ➲ C029	SRGC ➲ C025	SRDC ➲ C025					

(Note) ◎ : 1st recommendation. ○ : 2nd recommendation.

CLASSIFICATION

Tool Holder	Features Shank Size (H x W x L)	External Turning, Facing KAPR=99°—95°	External Turning, Copying KAPR=93°	External Turning, Copying KAPR=62°30' 72°30'	External Turning KAPR=90°
Profile Holder 	● Screw-on type. ● 25° rhombic shape insert. ● Possible to machine a face relief with up to 60° inclination. 16 x 16 x 100 20 x 20 x 125 25 x 25 x 150				
MP Holder 	● Pin lock type. ● 35°rhombic shape insert. ● Suitable for recessing. 20 x 20 x 125 25 x 25 x 150		 **PVJN** C018	 **PVVN** C019	
AL Holder 	● Screw-on type. ● 20°positive insert. (35°rhombic shape insert is 15°) ● High rake and good sharpness. 16 x 16 x 100 20 x 20 x 125 25 x 25 x 150		 **SDJE** C032 **SVJD** C034	 **SDNE** C032	 **STGE** C033
TL Holder 	● Taper lock type ● Excellent finished surface with round shape insert. 20 x 20 x 125 25 x 25 x 150 32 x 25 x 170				
SMALL TOOLS (Tools for front turning) 	● Screw-on type. ● Tools to be equipped on gang type tool posts. ● Miniature holder with 7°positive insert. 8 x 8 x 125 10 x 10 x 125 12 x 12 x 150 16 x 16 x 150	 **SCLC-SM** D008	 **SDJC-SM** D009 **SVJB-SM** D010	 **SDNC-SM** D009 **SVVB-SM** D011	 **SCAC-SM** D008
SMALL TOOLS (Tools for back turning) 	● Screw-on type. ● Tools to be equipped on gang type tool posts. ● High rigidity due to designing of vertical insert. (BTA/CTB type) Back machining. ● (BTA/CTB type) 8 x 10 x 120 10 x 10 x 120 12 x 12 x 120 16 x 16 x 120				

External Turning		External Turning, Chamfering	Facing		Facing, Copying	External Turning, Copying	Selection Standard				
KAPR=95°	KAPR=75°	KAPR=45°	PSIR=27°30'	PSIR=0° —-1°	PSIR=10° –	Special Design	Economical	Low Cutting Resistance (Sharpness)	Clamp Rigidity	Operation Efficiency	Specialised
											
						 SXZC ➲ C030		◎	◎		
					 PVPN ➲ C020		◎			◎	
				 STFE ➲ C033				◎			◎
						 TLHR ➲ C035		○			◎
 SVLP-SM ➲ D010			 SVPP-SM ➲ D011					○			
					Special Design  BTAH ➲ D012 / CTBH ➲ D013 / BTVH ➲ D014			○			

(Note) ◎ : 1st recommendation. ○ : 2nd recommendation.

IDENTIFICATION

LL Type, Double Clamp Type, SP Type, Profile Holder, AL Type

P	C	L	N	R	25	25	M	12
①	②	③	④	⑤	⑥	⑥	⑦	⑧

①Clamp Structure	
D	Double Clamp Type
M	Wedge Lock Type Multiple Clamp Type
P	Lever Lock Type
S	Screw-on Type

②Insert Shape	
C	Rhombic 80°
D	Rhombic 55°
R	Round
S	Square
T	Triangular
V	Rhombic 35°
W	Trigon
X	Special Design

③Cutting Angle	
A	90°Without Offset
B	75°
D	45°Neutral
E	60°
F	90°
G	90°With Offset
H	107°30′
J	93°
K	75°
L	95°
N	62°30′
P	117°30′
Q	105°
S	45°
T	60°
V	72°30′
Z	Special

④Insert Clearance	
C	7°Positive
N	Negative
E	20°Positive

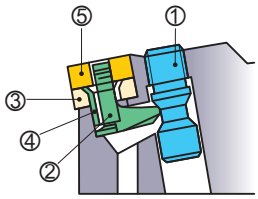
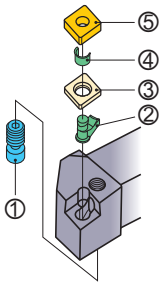
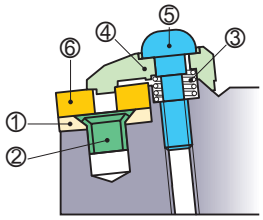
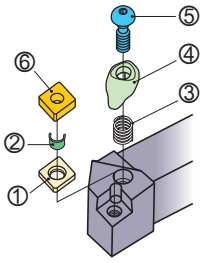
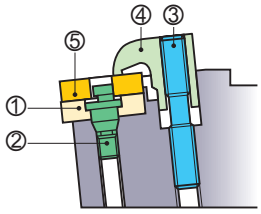
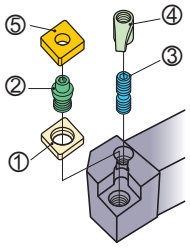
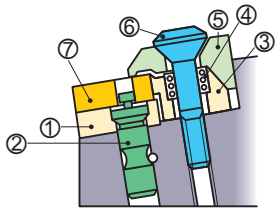
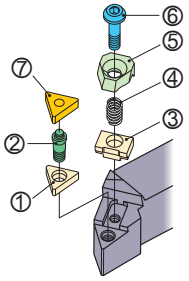
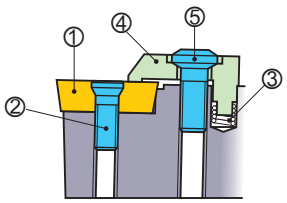
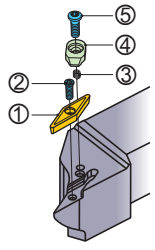
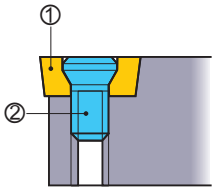
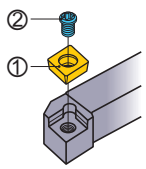
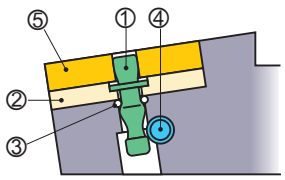
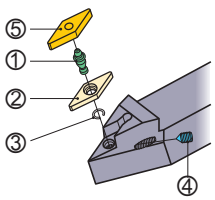
⑤Hand of Tool	
R	Right Hand
L	Left Hand
N	Neutral

⑥Tool Size (mm) (Height and Width)	
8	08
10	10
12	12
16	16
20	20
25	25
32	32

⑦Tool Length (mm)	
D	60
E	70
F	80
H	100
K	125
M	150
P	170
Q	180
R	200

⑧Cutting Edge Length (mm)						
Inscribed Circle	Insert Shape					
	Square	Triangular	Round	Rhombic 80°	Rhombic 55°	Rhombic 35°
6.00	–	–	06	–	–	–
6.35	–	11	–	06	07	11
7.94	–	13	–	–	–	–
8.00	–	–	08	–	–	–
9.525	09	16	–	09	11	16
10.00	–	–	10	–	–	–
12.00	–	–	12	–	–	–
12.70	12	22	–	12	15	–
15.875	15	27	–	16	–	–
16.00	–	–	16	–	–	–
19.05	19	–	–	19	–	–
20.00	–	–	20	–	–	–
25.00	–	–	25	–	–	–
25.40	25	–	–	–	–	–
32.00	–	–	32	–	–	–

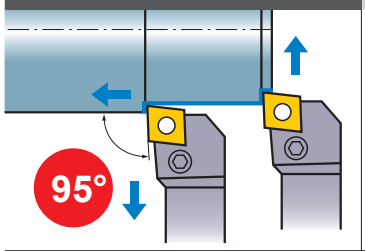
METHOD OF HOLDING

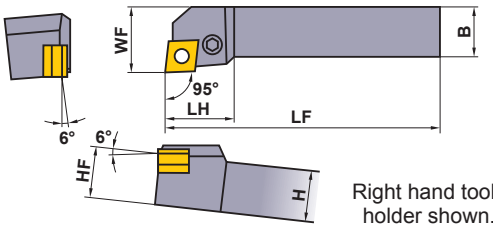
Type (Holder)	Structure	
Lever Lock (LL HOLDER)		①Clamp Screw ②Lever ③Shim ④Shim Pin ⑤Insert 
Double Clamp (DOUBLE CLAMP HOLDER)		①Shim ②Shim Pin ③Spring ④Clamp Bridge ⑤Clamp Screw ⑥Insert 
Multiple Clamp (DOUBLE CLAMP HOLDER) (For heavy cutting)		①Shim ②Shim Pin ③Clamp Screw ④Clamp Bridge ⑤Insert 
Wedge Lock (WP HOLDER)		①Shim ②Shim Pin ③Plate ④Spring ⑤Clamp Bridge ⑥Clamp Screw ⑦Insert 
Two action double clamp (PROFILE HOLDER)		①Insert ②Clamp Screw (1) ③Spring ④Clamp Bridge ⑤Clamp Screw (2) 
Screw-on (SP HOLDER AL HOLDER)		①Insert ②Clamp Screw 
Pin lock (MP HOLDER)		①Lock Pin ②Shim ③Stop Ring ④Lock Screw ⑤Insert 

CN◇◇ INSERTS TOOL HOLDERS

PCLN

External turning, Facing — ***LL type***





Right hand tool holder shown.

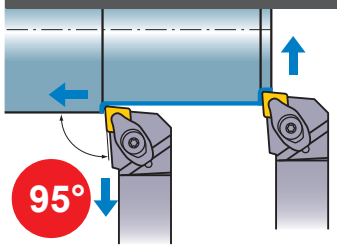
Finish	Light	Medium	Medium
FH	LP	MP	MK
			
(12)	(12)	(12,16,19)	(12,16,19)
Medium	**Medium to Rough**	**Stainless**	**CBN**
Standard	RP	MS	
			
(09,12,16,19)	(12)	(12,16,19)	(12)

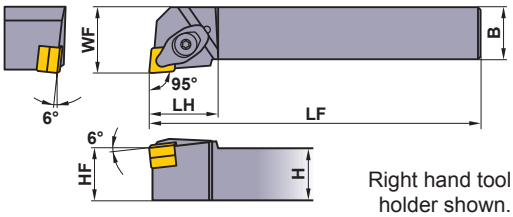
Order Number	Stock		Insert Number		Dimensions (mm)									 *	
	R	L			H	B	LF	LH	HF	WF	Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
PCLNR/L1616H09	●	●	CNMG	09T3◇◇	16	16	100	22	16	20	LLSCN3T3	LLP13	LLCL13	LLCS106	HKY25R
PCLNR/L**2020K09**	●	●		09T3◇◇	20	20	125	22	20	25	LLSCN3T3	LLP13	LLCL13	LLCS106	HKY25R
PCLNR/L**2525M09**	●	●		09T3◇◇	25	25	150	22	25	32	LLSCN3T3	LLP13	LLCL13	LLCS106	HKY25R
PCLNR/L**2020K12**	●	●	CNMA CNMG CNMM CNGG	1204◇◇	20	20	125	28	20	25	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R
PCLNR/L**2525M12**	●	●		1204◇◇	25	25	150	28	25	32	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R
PCLNR/L**3225P12**	●	●		1204◇◇	32	25	170	28	32	32	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R
PCLNR/L**3232P16**	●	●		1606◇◇	32	32	170	32	32	40	LLSCN53	LLP15	LLCL25	LLCS508	HKY30R
PCLNR/L**3232P19**	●	●		1906◇◇	32	32	170	40	32	40	LLSCN63	LLP16	LLCL16	LLCS310	HKY40R

* Clamp Torque (N • m) : LLCS106=2.2, LLCS108=3.3, LLCS508=3.3, LLCS310=7.0

DCLN

External turning, Facing — ***DOUBLE CLAMP type***





Right hand tool holder shown.

Finish	Light	Medium	Medium
FH	LP	MP	MK
			
(12)	(12)	(12)	(12)
Medium	**Medium to Rough**	**Stainless**	**CBN**
Standard	RP	MS	
			
(09,12)	(12)	(12)	(12)

Order Number	Stock		Insert Number		Dimensions (mm)						 *2				 *1	
	R	L			H	B	LF	LH	HF	WF	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
DCLNR/L1616H09	●	●	CNMG	09T3◇◇	16	16	100	25	16	20	LLSCN3T3 (LLSCN33)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DCLNR/L**2020K09**	●	●		09T3◇◇	20	20	125	25	20	25	LLSCN3T3 (LLSCN33)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DCLNR/L**2525M09**	●	●		09T3◇◇	25	25	150	25	25	32	LLSCN3T3 (LLSCN33)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DCLNR/L**2020K12**	●	●	CNMA CNMG CNMM CNGG	1204◇◇	20	20	125	29	20	25	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
DCLNR/L**2525M12**	●	●		1204◇◇	25	25	150	29	25	32	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
DCLNR/L**3225P12**	●	●		1204◇◇	32	25	170	29	32	32	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F

*1 Clamp Torque (N • m) : DC0520T=3.5, DC0621T=5.0

*2 Please use shim no. LLSCN33 with 3.18mm thick inserts. When using 3.18mm thick inserts, shim should be ordered separately.

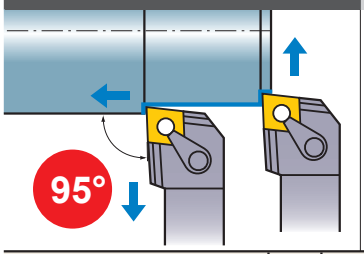
(Note) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

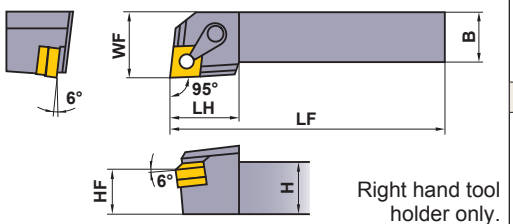
● : Inventory maintained in Japan.

PCLN type inserts	➤ A092—A097	CBN & PCD inserts	➤ B022—B024, B055
DCLN type inserts	➤ A092—A097	RECOMMENDED CUTTING CONDITIONS	➤ A070

MCLN

External turning, Facing — ***DOUBLE CLAMP type*** For heavy cutting





Right hand tool holder only.

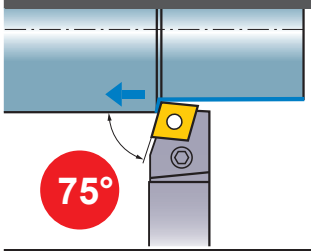
Medium	Medium	Medium	Medium to Rough
MH	Standard	MS	RP
			
(19)	(19)	(19)	(19)
Heavy	**Heavy**	**Heavy**	**M Class**
HZ	HX	HV	
			
(19)	(19)	(19)	(19)

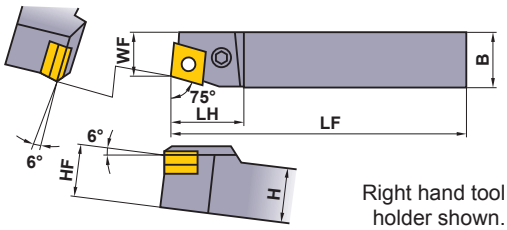
Order Number	Stock	Insert Number		Dimensions (mm)						Shim	Shim Pin	Clamp Bridge	Clamp Screw *	Wrench
	R			H	B	LF	LH	HF	WF					
MCLNR3232P19	●	CNMG CNMM CNMA	1906○○	32	32	170	36	32	40	MSCN63	MP6	CKW6	LS25	HKY40R
MCLNR**4040R19**	●		1906○○	40	40	200	36	40	50	MSCN63	MP6	CKW6	LS25	HKY40R

∗ Clamp Torque (N • m) : LS25=8.2

PCBN

External turning — ***LL type***





Right hand tool holder shown.

Finish	Light	Medium	Medium
FH	LP	MP	MK
			
(12)	(12)	(12)	(12)
Medium	**Medium to Rough**	**Stainless**	
Standard	RP	MS	
			
(12)	(12)	(12)	

Order Number	Stock		Insert Number		Dimensions (mm)						Shim	Shim Pin	Clamp Lever	Clamp Screw *	Wrench
	R	L			H	B	LF	LH	HF	WF					
PCBNR/L2020K12	●	●	CNMA CNMG CNMM CNGG	1204○○	20	20	125	28	20	17	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R
PCBNR/L**2525M12**	●	●		1204○○	25	25	150	25	25	22	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R

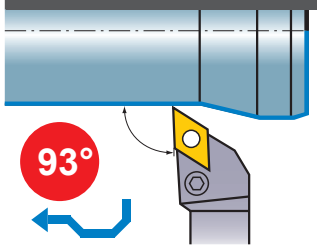
∗ Clamp Torque (N • m) : LLCS108=3.3

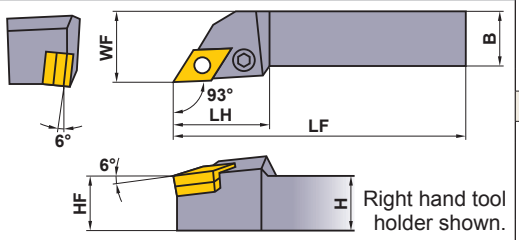
MCLN type inserts	➤ A094—A097	RECOMMENDED CUTTING CONDITIONS	➤ A070
PCBN type inserts	➤ A094—A097	SPARE PARTS	➤ P001
CBN & PCD inserts	➤ B022—B024, B055	TECHNICAL DATA	➤ Q001

DN INSERTS TOOL HOLDERS

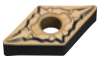
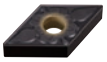
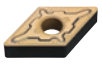
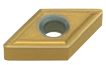
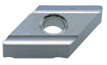
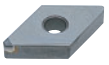
PDJN

External turning, Copying — ***LL type***





Right hand tool holder shown.

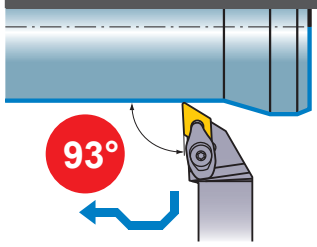
Finish	Light	Medium	Medium
FH	LP	MP	MK
			
(15)	(15)	(15)	(15)
Medium to Rough	**Stainless**	**G Class**	**CBN**
RP	MS	R/L	
			
(15)	(15)	(15)	(15)

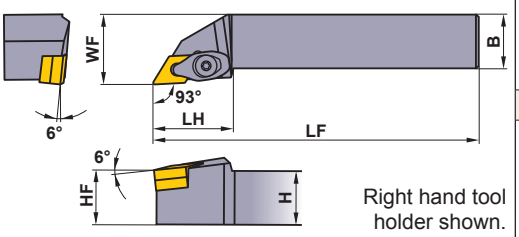
Order Number	Stock		Insert Number		Dimensions (mm)						*2			*1	
	R	L			H	B	LF	LH	HF	WF	Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
PDJNR/L2020K15	●	●	DNMA DNMG DNMM DNMX DNGA DNGG	1504◌◌	20	20	125	35	20	25	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HKY30R
PDJNR/L**2525M15**	●	●		1504◌◌	25	25	150	35	25	32	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HKY30R
PDJNR/L**3225P15**	●	●		1504◌◌	32	25	170	35	32	32	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HKY30R

∗1 Clamp Torque (N • m) : LLCS108=3.3
∗2 Please use shim no. LLSDN42 with 6.35mm thick inserts. When using 6.35mm thick inserts, shim should be ordered separately.

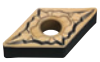
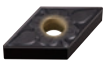
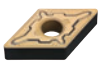
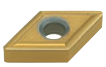
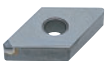
DDJN

External turning, Copying — ***DOUBLE CLAMP type***





Right hand tool holder shown.

Finish	Light	Medium	Medium
FH	LP	MP	MK
			
(15)	(15)	(15)	(15)
Medium to Rough	**Stainless**	**G Class**	**CBN**
RP	MS	R/L	
			
(15)	(15)	(15)	(15)

Order Number	Stock		Insert Number		Dimensions (mm)						*2				*1	
	R	L			H	B	LF	LH	HF	WF	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
DDJNR/L1616H11	●	●	DNMG DNMX	1104◌◌	16	16	100	28	16	20	LLSDN32	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DDJNR/L**2020K11**	●	●		1104◌◌	20	20	125	28	20	25	LLSDN32	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DDJNR/L**2525M11**	●	●		1104◌◌	25	25	150	28	25	32	LLSDN32	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DDJNR/L**3225P11**	●	●		1104◌◌	32	25	170	28	32	32	LLSDN32	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DDJNR/L**2020K15**	●	●	DNMA DNMG DNMM DNMX DNGA DNGG	1504◌◌	20	20	125	37	20	25	LLSDN43 (LLSDN42)	LLP24	DCK2613	DCS1	DC0621T	TKY20F
DDJNR/L**2525M15**	●	●		1504◌◌	25	25	150	37	25	32	LLSDN43 (LLSDN42)	LLP24	DCK2613	DCS1	DC0621T	TKY20F
DDJNR/L**3225P15**	●	●		1504◌◌	32	25	170	37	32	32	LLSDN43 (LLSDN42)	LLP24	DCK2613	DCS1	DC0621T	TKY20F

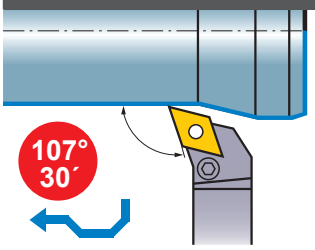
∗1 Clamp Torque (N • m) : DC0520T=3.5, DC0621T=5.0
∗2 Please use shim no. LLSDN42 with 6.35mm thick inserts. When using 6.35mm thick inserts, shim should be ordered separately.

(Note) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

● : Inventory maintained in Japan.

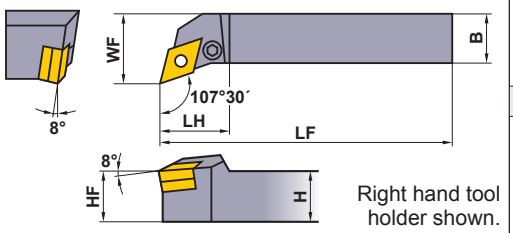
PDJN type inserts ➤ A098—A103
DDJN type inserts ➤ A098—A103
CBN & PCD inserts ➤ B025—B027, B055
RECOMMENDED CUTTING CONDITIONS ➤ A070

PDHN

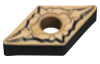
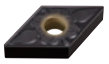
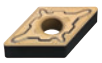
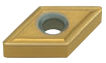
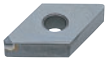


Facing, Copying

LL type



Right hand tool holder shown.

Finish	Light	Medium	Medium
FH	LP	MP	MK
			
(15)	(15)	(15)	(15)
Medium to Rough	**Stainless**	**G Class**	**CBN**
RP	MS	R/L	
			
(15)	(15)	(15)	(15)

Order Number	Stock		Insert Number		Dimensions (mm)						✶2			✶1	
	R	L			H	B	LF	LH	HF	WF	Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
PDHNR/L2020K15	●	●	DNMA DNMG DNMM DNGA DNGG	1504○○	20	20	125	34	20	25	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HKY30R
PDHNR/L**2525M15**	●	●		1504○○	25	25	150	34	25	32	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HKY30R
PDHNR/L**3225P15**	●	●		1504○○	32	25	170	34	32	32	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HKY30R

✶1 Clamp Torque (N • m) : LLCS108=3.3

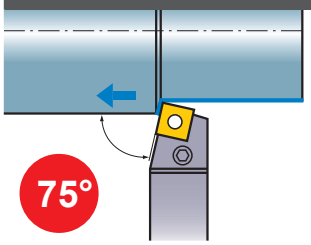
✶2 Please use shim no. LLSDN42 with 6.35mm thick inserts. When using 6.35mm thick inserts, shim should be ordered separately.

PDHN type inserts	➤ A098—A103
CBN & PCD inserts	➤ B025—B027, B055
RECOMMENDED CUTTING CONDITIONS	➤ A070

SPARE PARTS	➤ P001
TECHNICAL DATA	➤ Q001

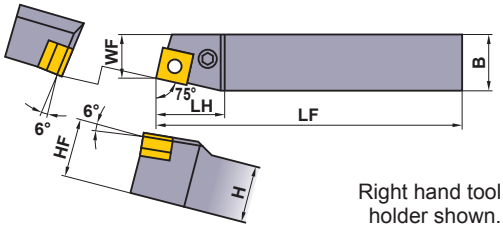
SN INSERTS TOOL HOLDERS

PSBN



External turning

LL type



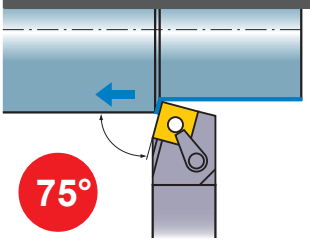
Right hand tool holder shown.

Finish	Light	Medium	Medium
FH	LP	MP	MK
			
(09,12)	(12)	(12,15,19)	(12)
Medium to Rough	**Stainless**	**G Class**	**CBN**
RP	MS	R/L	
			
(12)	(12,15,19)	(09,12)	(12)

Order Number	Stock		Insert Number		Dimensions (mm)						Shim	Shim Pin	Lever Spring	Clamp Lever	Clamp Screw *	Wrench
	R	L			H	B	LF	LH	HF	WF						
PSBNR/L1212F09	●	●	SNMA SNMG SNMM SNGA SNGG	0903○○	12	12	80	20	12	13	—	—	HLS2	LLCL13S	LLCS105	HKY20R
PSBNR/L**1616H09**	●	●		0903○○	16	16	100	22	16	13	LLSSN33	LLP23	—	LLCL13	LLCS106	HKY25R
PSBNR/L**2020K12**	●	●		1204○○	20	20	125	28	20	17	LLSSN42	LLP14	—	LLCL14	LLCS108	HKY30R
PSBNR/L**2525M12**	●	●		1204○○	25	25	150	25	25	22	LLSSN42	LLP14	—	LLCL14	LLCS108	HKY30R
PSBNR/L**2525M15**	●	●		1506○○	25	25	150	33	25	22	LLSSN53	LLP15	—	LLCL25	LLCS508	HKY30R
PSBNR/L**3232P19**	●	●		1906○○	32	32	170	40	32	27	LLSSN63	LLP16	—	LLCL16	LLCS310	HKY40R

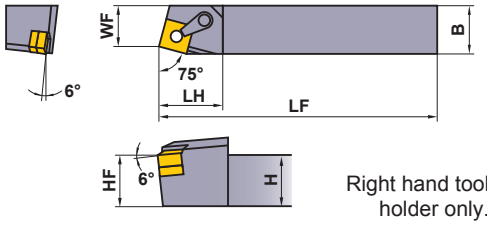
* Clamp Torque (N • m) : LLCS105=1.5, LLCS106=2.2, LLCS108=3.3, LLCS508=3.3, LLCS310=7.0

MSBN



External turning

DOUBLE CLAMP type
For heavy cutting



Right hand tool holder only.

Medium	Medium	Medium	Medium to Rough
MH	Standard	MS	RP
			
(19)	(19)	(19)	(19)
Heavy	**Heavy**	**Heavy**	**M Class**
HZ	HX	HV	
			
(19)	(19)	(19)	(19)

Order Number	Stock	Insert Number		Dimensions (mm)						Shim	Shim Pin	Clamp Bridge	Clamp Screw *	Wrench
	R			H	B	LF	LH	HF	WF					
MSBNR3232P19	●	SNMG SNMM SNMA	1906○○	32	32	170	41	32	27	MSSN63	MP6	CKW6	LS25	HKY40R
MSBNR**4040R19**	●		1906○○	40	40	200	41	40	35	MSSN63	MP6	CKW6	LS25	HKY40R

* Clamp Torque (N • m) : LS25=8.2

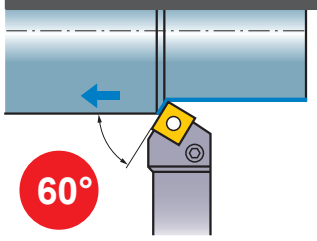
(Note) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

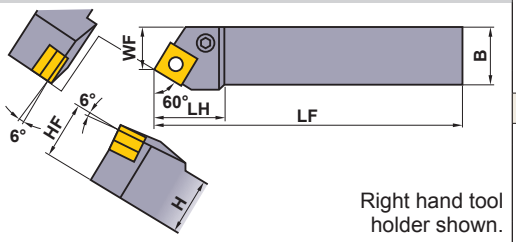
● : Inventory maintained in Japan.

PSBN type inserts	➤ A105—A109	CBN & PCD inserts	➤ B028, B056
MSBN type inserts	➤ A106—A109	RECOMMENDED CUTTING CONDITIONS	➤ A070

PSTN

External turning, Chamfering — ***LL type***





Right hand tool holder shown.

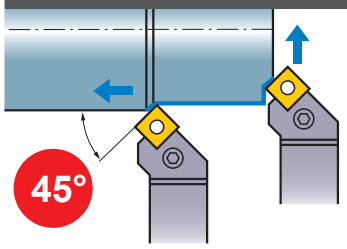
Finish	Light	Medium	Medium
FH	LP	MP	MK
			
(09,12)	(12)	(12)	(12)
Medium to Rough	Stainless	G Class	CBN
RP	MS	R/L	
			
(12)	(12)	(09,12)	(12)

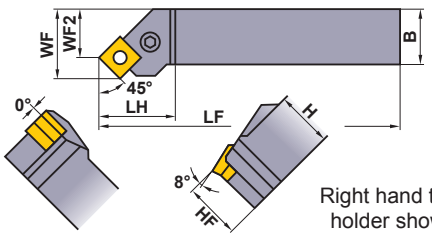
Order Number	Stock		Insert Number		Dimensions (mm)						Shim	Shim Pin	Clamp Lever	Clamp Screw *	Wrench
	R	L			H	B	LF	LH	HF	WF					
PSTNR/L1616H09	●	●	SNMA SNMG SNMM SNGA SNGG	0903○○	16	16	100	20	16	13	LLSSN33	LLP23	LLCL13	LLCS106	HKY25R
PSTNR/L**2020K12**	●	●		1204○○	20	20	125	25	20	17	LLSSN42	LLP14	LLCL14	LLCS108	HKY30R
PSTNR/L**2525M12**	●	●		1204○○	25	25	150	25	25	22	LLSSN42	LLP14	LLCL14	LLCS108	HKY30R

∗ Clamp Torque (N • m) : LLCS106=2.2, LLCS108=3.3

PSSN

External turning, Facing, Chamfering — ***LL type***





Right hand tool holder shown.

Finish	Light	Medium	Medium
FH	LP	MP	MK
			
(09,12)	(12)	(12,15,19)	(12)
Medium to Rough	Stainless	G Class	CBN
RP	MS	R/L	
			
(12)	(12,15,19)	(09,12)	(12)

Order Number	Stock		Insert Number		Dimensions (mm)							Shim	Shim Pin	Clamp Lever	Clamp Screw *	Wrench
	R	L			H	B	LF	LH	HF	WF	WF2					
PSSNR/L1616H09	●	●	SNMA SNMG SNMM SNGA SNGG	0903○○	16	16	100	22	16	20	(14)	LLSSN33	LLP23	LLCL13	LLCS106	HKY25R
PSSNR/L**2020K12**	●	●		1204○○	20	20	125	31	20	25	(17)	LLSSN42	LLP14	LLCL14	LLCS108	HKY30R
PSSNR/L**2525M12**	●	●		1204○○	25	25	150	31	25	32	(24)	LLSSN42	LLP14	LLCL14	LLCS108	HKY30R
PSSNR/L**3232P15**	●	●		1506○○	32	32	170	34	32	40	(29)	LLSSN53	LLP15	LLCL25	LLCS508	HKY30R
PSSNR/L**3232P19**	●	●		1906○○	32	32	170	40	32	40	(27)	LLSSN63	LLP16	LLCL16	LLCS310	HKY40R

(Note) When facing or chamfering only and using insert with right or left hand breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

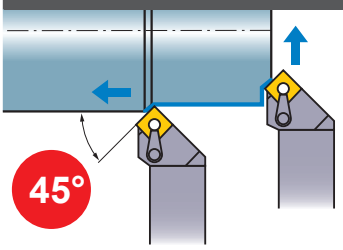
∗ Clamp Torque (N • m) : LLCS106=2.2, LLCS108=3.3, LLCS508=3.3, LLCS310=7.0

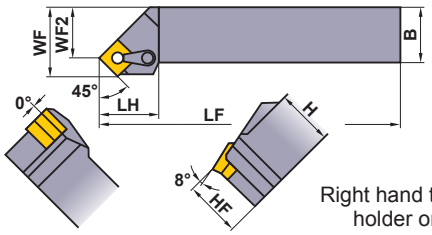
PSTN type inserts	➤ A105—A109	RECOMMENDED CUTTING CONDITIONS	➤ A070
PSSN type inserts	➤ A105—A109	SPARE PARTS	➤ P001
CBN & PCD inserts	➤ B028, B056	TECHNICAL DATA	➤ Q001

SN INSERTS TOOL HOLDERS

MSSN

External turning, Facing, Chamfering — ***DOUBLE CLAMP type*** For heavy cutting





Right hand tool holder only.

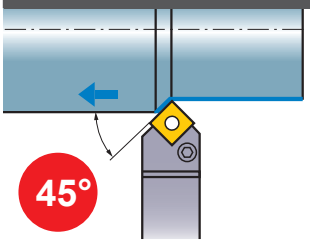
Medium	Medium	Medium	Rough
MH	Standard	MS	RP
			
(19)	(19)	(19)	(19)
Heavy	**Heavy**	**Heavy**	**M Class**
HZ	HX	HV	
			
(19)	(19)	(19)	(19)

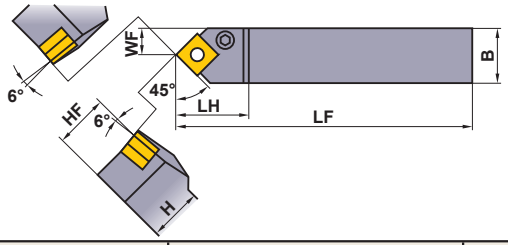
Order Number	Stock	Insert Number		Dimensions (mm)										 *	
	R			H	B	LF	LH	HF	WF	WF2	Shim	Shim Pin	Clamp Bridge	Clamp Screw	Wrench
MSSNR3232P19	●	SNMG SNMM SNMA	1906◌◌	32	32	170	44	32	40	27	MSSN63	MP6	CKW6	LS25	HKY40R
MSSNR**4040R19**	●		1906◌◌	40	40	200	44	40	50	37	MSSN63	MP6	CKW6	LS25	HKY40R

∗ Clamp Torque (N • m) : LS25=8.2

PSDN

External turning, Chamfering — ***LL type***





Finish	Light	Medium	Medium
FH	LP	MP	MK
			
(09,12)	(12)	(12)	(12)
Medium to Rough	**Stainless**	**G Class**	**CBN**
RP	MS	R/L	
			
(12)	(12)	(09,12)	(12)

Order Number	Stock	Insert Number		Dimensions (mm)										 *	
				H	B	LF	LH	HF	WF	Shim	Shim Pin	Lever Spring	Clamp Lever	Clamp Screw	Wrench
PSDNN1212F09	●	SNMA SNMG SNMM SNGA SNGG	0903◌◌	12	12	80	20	12	6.0	—	—	HLS2	LLCL13S	LLCS105	HKY20R
PSDNN**1616H09**	●		0903◌◌	16	16	100	22	16	8.0	LLSSN33	LLP23	—	LLCL13	LLCS106	HKY25R
PSDNN**2020K12**	●		1204◌◌	20	20	125	28	20	10.0	LLSSN42	LLP14	—	LLCL14	LLCS108	HKY30R
PSDNN**2525M12**	●		1204◌◌	25	25	150	28	25	12.5	LLSSN42	LLP14	—	LLCL14	LLCS108	HKY30R
PSDNN**3225P12**	●		1204◌◌	32	25	170	28	32	12.5	LLSSN42	LLP14	—	LLCL14	LLCS108	HKY30R

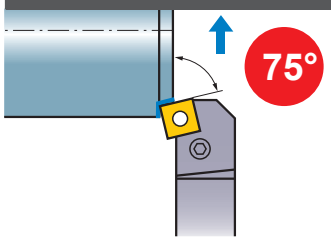
∗ Clamp Torque (N • m) : LLCS105=1.5, LLCS106=2.2, LLCS108=3.3

(Note) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

● : **Inventory maintained in Japan.**

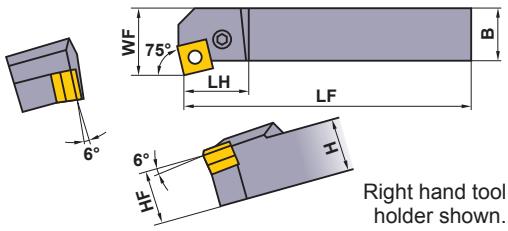
MSSN type inserts	**➤ A106—A109**	**CBN & PCD inserts**	**➤ B028, B056**
PSDN type inserts	**➤ A105—A109**	**RECOMMENDED CUTTING CONDITIONS**	**➤ A070**

PSKN



Facing

LL type



Right hand tool holder shown.

Finish	Light	Medium	Medium
FH	LP	MP	MK
			
(09,12)	(12)	(12)	(12)
Medium to Rough	**Stainless**	**G Class**	**CBN**
RP	MS	R/L	
			
(12)	(12)	(09,12)	(12)

Order Number	Stock		Insert Number		Dimensions (mm)									 *	
	R	L			H	B	LF	LH	HF	WF	Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
PSKNR/L1616H09	●	●	SNMA SNMG SNMM SNGA SNGG	0903○○	16	16	100	20	16	20	LLSSN33	LLP23	LLCL13	LLCS106	HKY25R
PSKNR/L2020K12	●	●		1204○○	20	20	125	25	20	25	LLSSN42	LLP14	LLCL14	LLCS108	HKY30R
PSKNR/L2525M12	●	●		1204○○	25	25	150	25	25	32	LLSSN42	LLP14	LLCL14	LLCS108	HKY30R

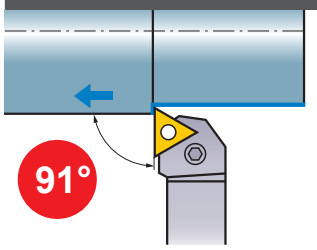
(Note) When using insert with right or left hand breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

* Clamp Torque (N • m) : LLCS106=2.2, LLCS108=3.3

PSKN type inserts	➤ A105—A109
CBN & PCD inserts	➤ B028, B056
RECOMMENDED CUTTING CONDITIONS	➤ A070
SPARE PARTS	➤ P001
TECHNICAL DATA	➤ Q001

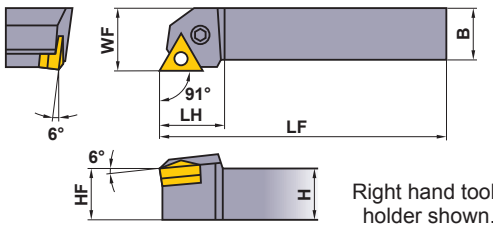
TN INSERTS TOOL HOLDERS

PTGN



External turning

LL type



Right hand tool holder shown.

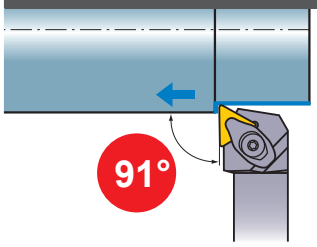
Finish	Light	Medium	Medium
FH	LP	MP	MK
			
(11,16)	(16)	(16,22,27)	(16,22)
Medium to Rough	Stainless	G Class	CBN
RP	MS	R/L	
			
(16)	(16,22)	(11,16,22)	(16)

Order Number	Stock		Insert Number		Dimensions (mm)						✶2	✶2			✶1	
	R	L			H	B	LF	LH	HF	WF	Shim	Shim Pin	Lever Spring	Clamp Lever	Clamp Screw	Wrench
PTGNR/L1010E11	●	●	TNMA TNMG TNMM TNGA TNGG	1103○○	10	10	70	17	10	12	—	—	HLS1	LLCL12S	LLCS105	HKY20F
PTGNR/L**1212F11**	●	●		1103○○	12	12	80	17	12	16	—	—	HLS1	LLCL12S	LLCS105	HKY20F
PTGNR/L**1616H16**	●	●		1604○○	16	16	100	22	16	20	LLSTN32 (LLSTN33)	LLP13 (LLP23)	—	LLCL13	LLCS106	HKY25R
PTGNR/L**2020K16**	●	●		1604○○	20	20	125	22	20	25	LLSTN32 (LLSTN33)	LLP13 (LLP23)	—	LLCL13	LLCS106	HKY25R
PTGNR/L**2525M16**	●	●		1604○○	25	25	150	22	25	32	LLSTN32 (LLSTN33)	LLP13 (LLP23)	—	LLCL13	LLCS206	HKY25R
PTGNR/L**2525M22**	●	●		2204○○	25	25	150	28	25	32	LLSTN42	LLP14	—	LLCL14	LLCS108	HKY30R
PTGNR/L**3225P22**	●	●		2204○○	32	25	170	28	32	32	LLSTN42	LLP14	—	LLCL14	LLCS108	HKY30R
PTGNR/L**3232P27**	●	●		2706○○	32	32	170	35	32	40	LLSTN53	LLP15	—	LLCL25	LLCS508	HKY30R

✶1 Clamp Torque (N • m) : LLCS105=1.5, LLCS106=2.2, LLCS206=2.2, LLCS108=3.3, LLCS508=3.3
PTGNR/L1010E11 • PTGNR/L1212F11 Clamp Torque (N • m) : LLCS105=1.0

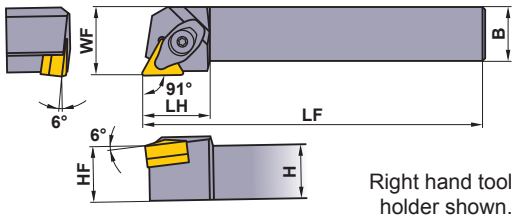
✶2 Please use shim no. LLSTN33 and shim pin no. LLP23 with 3.18mm thick inserts. When using 3.18mm thick inserts, shim and shim pin should be ordered separately.

DTGN



External turning

DOUBLE CLAMP type



Right hand tool holder shown.

Finish	Light	Medium	Medium
FH	LP	MP	MK
			
(16)	(16)	(16)	(16)
Medium to Rough	Stainless	G Class	CBN
RP	MS	R/L	
			
(16)	(16)	(16)	(16)

Order Number	Stock		Insert Number		Dimensions (mm)						✶2	✶2			✶1	
	R	L			H	B	LF	LH	HF	WF	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
DTGNR/L1616H16	●	●	TNMA TNMG TNMM TNGA TNGG	1604○○	16	16	100	25	16	20	LLSTN32 (LLSTN33)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DTGNR/L**2020K16**	●	●		1604○○	20	20	125	25	20	25	LLSTN32 (LLSTN33)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DTGNR/L**2525M16**	●	●		1604○○	25	25	150	25	25	32	LLSTN32 (LLSTN33)	LLP23	DCK2211	DCS2	DC0520T	TKY15F

✶1 Clamp Torque (N • m) : DC0520T=3.5

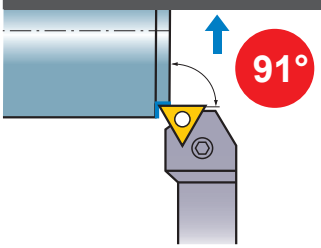
✶2 Please use shim no. LLSTN33 with 3.18mm thick inserts. When using 3.18mm thick inserts, shim should be ordered separately.

(Note) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

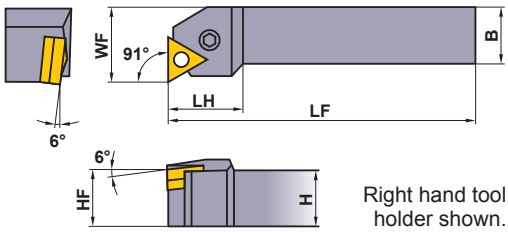
● : Inventory maintained in Japan.

PTGN type inserts ➤ A110—A115
DTGN type inserts ➤ A110—A115
CBN & PCD inserts ➤ B030, B031, B056
RECOMMENDED CUTTING CONDITIONS ➤ A070

PTFN



Facing — ***LL type***



Right hand tool holder shown.

Finish	Light	Medium	Medium
FH	LP	MP	MK
			
(16)	(16)	(16,22)	(16,22)
Medium to Rough	**Stainless**	**G Class**	**CBN**
RP	MS	R/L	
			
(16)	(16,22)	(16,22)	(16)

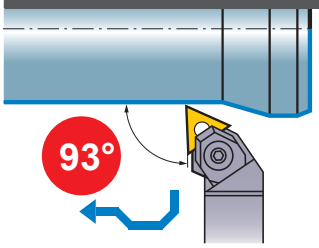
Order Number	Stock		Insert Number		Dimensions (mm)						*2	*2		*1	
	R	L			H	B	LF	LH	HF	WF	Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
PTFNR/L1616H16	●	●	TNMA TNMG TNMM TNGA TNGG	1604○○	16	16	100	22	16	20	LLSTN32 (LLSTN33)	LLP13 (LLP23)	LLCL13	LLCS106	HKY25R
PTFNR/L**2020K16**	●	●		1604○○	20	20	125	22	20	25	LLSTN32 (LLSTN33)	LLP13 (LLP23)	LLCL13	LLCS106	HKY25R
PTFNR/L**2525M16**	●	●		1604○○	25	25	150	22	25	32	LLSTN32 (LLSTN33)	LLP13 (LLP23)	LLCL13	LLCS206	HKY25R
PTFNR/L**2525M22**	●	●		2204○○	25	25	150	28	25	32	LLSTN42	LLP14	LLCL14	LLCS108	HKY30R

(Note) When using insert with right or left hand breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

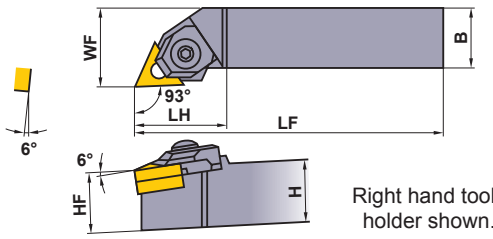
∗1 Clamp Torque (N • m) : LLCS106=2.2, LLCS206=2.2, LLCS108=3.3

∗2 Please use shim no. LLSTN33 and shim pin no. LLP23 with 3.18mm thick inserts. When using 3.18mm thick inserts, shim should be ordered separately.

MTJN



External turning, Copying — ***WP type***



Right hand tool holder shown.

Finish	Light	Medium	Medium
FH	LP	MP	MK
			
(16)	(16)	(16,22)	(16,22)
Medium to Rough	**Stainless**	**G Class**	**CBN**
RP	MS	R/L	
			
(16)	(16,22)	(16,22)	(16)

Order Number	Stock		Insert Number		Dimensions (mm)											*	
	R	L			H	B	LF	LH	HF	WF	Shim	Shim Pin	Clamp Bridge	Side Lock Plate	Spring	Clamp Screw	Wrench
MTJNR/L2020K16N	●	●	TNMA TNMG TNMM TNGA TNGG	1604○○	20	20	125	31	20	25	WPSTN33	CCP33	CCK13	CPT13	MES2	SLCS105	HKY25R HKY40R
MTJNR/L**2525M16N**	●	●		1604○○	25	25	150	31	25	32	WPSTN33	CCP33	CCK13	CPT13	MES2	SLCS105	HKY25R HKY40R
MTJNR/L**2525M22N**	●	●		2204○○	25	25	150	38	25	32	WPSTN43	CCP34	CCK14	CPT14	MES3	SLCS106	HKY30R HKY40R

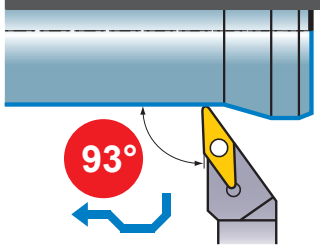
∗ Clamp Torque (N • m) : SLCS105=7.0, SLCS106=7.0

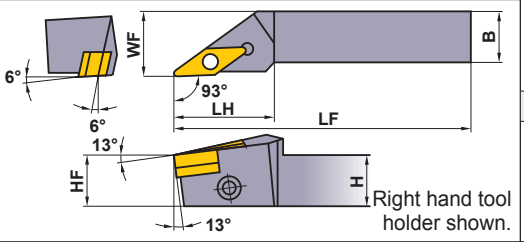
MTJN type inserts	➤ A110—A115
PTFN type inserts	➤ A110—A115
CBN & PCD inserts	➤ B030, B031, B056
RECOMMENDED CUTTING CONDITIONS	➤ A070
SPARE PARTS	➤ P001
TECHNICAL DATA	➤ Q001

VN INSERTS TOOL HOLDERS

PVJN

External turning, Copying — ***MP type***





Right hand tool holder shown.

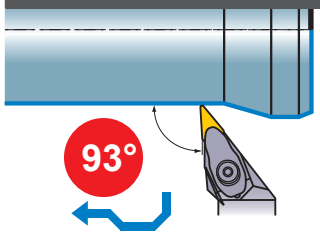
Finish	Light	Medium	Medium
FH	LP	MP	MK
			
(16)	(16)	(16)	(16)
Medium	**Stainless**	**G Class**	**CBN**
Standard	MS	R/L	
			
(16)	(16)	(16)	(16)

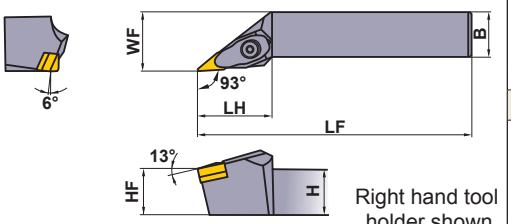
Order Number	Stock		Insert Number		Dimensions (mm)								 *		
	R	L			H	B	LF	LH	HF	WF	Shim	Lock Pin	Lock Screw	Stop Ring	Wrench
PVJNR/L2020K16	●	●	VNMG VNGA VNGG	1604◌◌	20	20	125	32	20	25	PV321 PV322 PV323	P11S	HSP05008C	E03	HKY25R
PVJNR/L**2525M16**	●	●		1604◌◌	25	25	150	38	25	32		P11S	HSP05008C	E03	HKY25R

∗ Clamp Torque (N • m) : HSP05008C=2.5

DVJN

External turning, Copying — ***DOUBLE CLAMP type***





Right hand tool holder shown.

Finish	Light	Medium	Medium
FH	LP	MP	MK
			
(16)	(16)	(16)	(16)
Medium	**Stainless**	**G Class**	**CBN**
Standard	MS	R/L	
			
(16)	(16)	(16)	(16)

Order Number	Stock		Insert Number		Dimensions (mm)										 *	
	R	L			H	B	LF	LH	HF	WF	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
DVJNR/L2020K16	●	●	VNMG VNGA VNGG	1604◌◌	20	20	125	41	20	25	DCSVN32	LLP13	DCK3113	DCS2	DC0520T	TKY15F
DVJNR/L**2525M16**	●	●		1604◌◌	25	25	150	41	25	32	DCSVN32	LLP13	DCK3113	DCS2	DC0520T	TKY15F

∗ Clamp Torque (N • m) : DC0520T=3.5

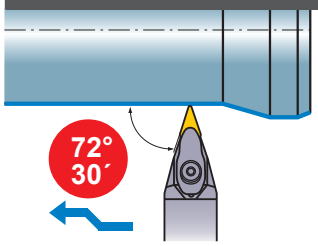
(Note) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

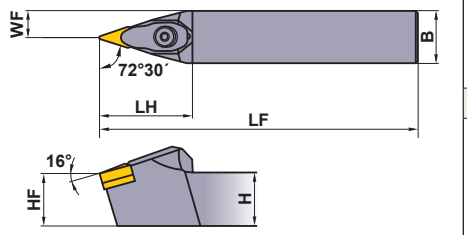
● : Inventory maintained in Japan.

PVJN type inserts	➤ A116—A118	CBN & PCD inserts	➤ B032, B033, B057
DVJN type inserts	➤ A116—A118	RECOMMENDED CUTTING CONDITIONS	➤ A070

DVVN

External turning, Copying — ***DOUBLE CLAMP type***





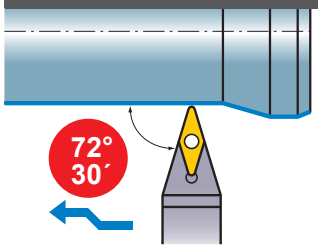
Finish	Light	Medium	Medium
FH	LP	MP	MK
(16)	(16)	(16)	(16)
Medium	**Stainless**	**G Class**	**CBN**
Standard	MS	R/L	
(16)	(16)	(16)	(16)

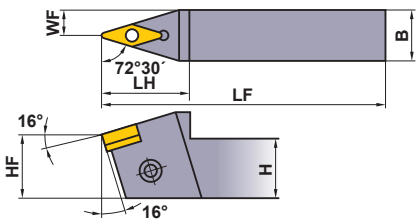
Order Number	Stock	Insert Number		Dimensions (mm)						Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw *	Wrench
				H	B	LF	LH	HF	WF						
DVVNN2020K16	●	VNMA VNMG VNGA VNGG	1604◌◌	20	20	125	44	20	10	DCSVN32	LLP13	DCK3113	DCS2	DC0520T	TKY15F
DVVNN**2525M16**	●		1604◌◌	25	25	150	44	25	12.5	DCSVN32	LLP13	DCK3113	DCS2	DC0520T	TKY15F

∗ Clamp Torque (N • m) : DC0520T=3.5

PVVN

External turning, Copying — ***MP type***





Finish	Light	Medium	Medium
FH	LP	MP	MK
(16)	(16)	(16)	(16)
Medium	**Stainless**	**G Class**	**CBN**
Standard	MS	R/L	
(16)	(16)	(16)	(16)

Order Number	Stock	Insert Number		Dimensions (mm)						Shim	Lock Pin	Lock Screw *	Stop Ring	Wrench
				H	B	LF	LH	HF	WF					
PVVNN2020K16	●	VNMA VNMG VNGA VNGG	1604◌◌	20	20	125	38	20	10	PV321 PV322 PV323	P11S	HSP05008C	E03	HKY25R
PVVNN**2525M16**	●		1604◌◌	25	25	150	38	25	12.5		P11S	HSP05008C	E03	HKY25R

∗ Clamp Torque (N • m) : HSP05008C=2.5

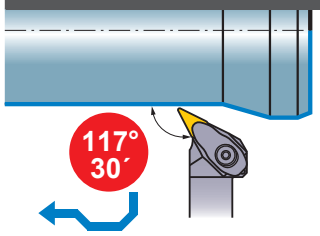
DVVN type inserts	➤ A116—A118	RECOMMENDED CUTTING CONDITIONS	➤ A070
PVVN type inserts	➤ A116—A118	SPARE PARTS	➤ P001
CBN & PCD inserts	➤ B032, B033, B057	TECHNICAL DATA	➤ Q001

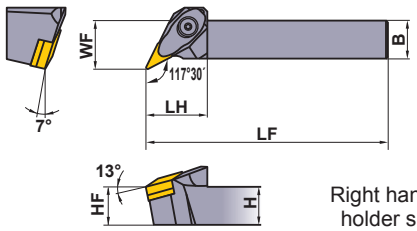
VN INSERTS TOOL HOLDERS

DVPN

DOUBLE CLAMP type

Facing, Copying





Right hand tool holder shown.

Finish	Light	Medium	Medium
FH	LP	MP	MK
			
(16)	(16)	(16)	(16)
Medium	**Stainless**	**G Class**	**CBN**
Standard	MS	R/L	
			
(16)	(16)	(16)	(16)

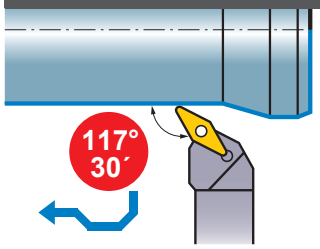
Order Number	Stock		Insert Number		Dimensions (mm)										 *	
	R	L			H	B	LF	LH	HF	WF	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
DVPNR/L2020K16	●	●	VNMG VNGA VNGG	1604◌◌	20	20	125	32	20	25	DCSVN32	LLP13	DCK3113	DCS2	DC0520T	TKY15F
DVPNR/L**2525M16**	●	●		1604◌◌	25	25	150	32	25	32	DCSVN32	LLP13	DCK3113	DCS2	DC0520T	TKY15F

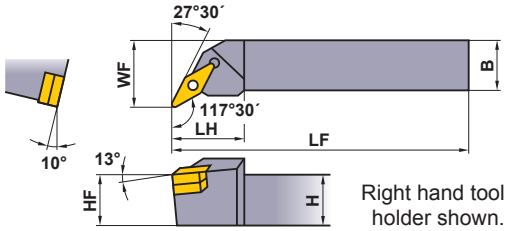
∗ Clamp Torque (N • m) : DC0520T=3.5

PVPN

MP type

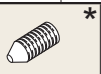
Facing, Copying





Right hand tool holder shown.

Finish	Light	Medium	Medium
FH	LP	MP	MK
			
(16)	(16)	(16)	(16)
Medium	**Stainless**	**G Class**	**CBN**
Standard	MS	R/L	
			
(16)	(16)	(16)	(16)

Order Number	Stock		Insert Number		Dimensions (mm)								 *		
	R	L			H	B	LF	LH	HF	WF	Shim	Lock Pin	Lock Screw	Stop Ring	Wrench
PVPNR/L2020K16	●	●	VNMG VNGA VNGG	1604◌◌	20	20	125	32	20	25	PV321 PV322 PV323	P11S	HSP05008C	E03	HKY25R
PVPNR/L**2525M16**	●	●		1604◌◌	25	25	150	32	25	32		P11S	HSP05008C	E03	HKY25R

∗ Clamp Torque (N • m) : HSP05008C=2.5

(Note) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

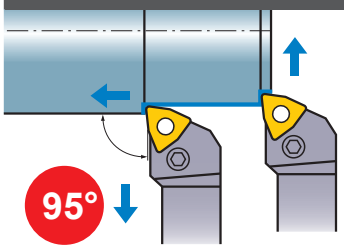
● : Inventory maintained in Japan.

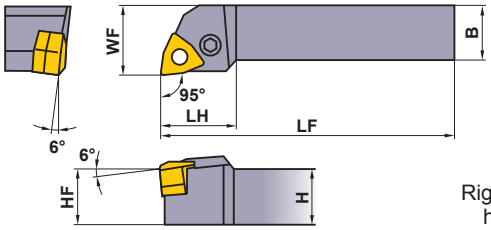
DVPN type inserts	➤ A116—A118	CBN & PCD inserts	➤ B032, B033, B057
PVPN type inserts	➤ A116—A118	RECOMMENDED CUTTING CONDITIONS	➤ A070

WN□□ INSERTS TOOL HOLDERS

PWLN

External turning, Facing — ***LL type***





Right hand tool holder shown.

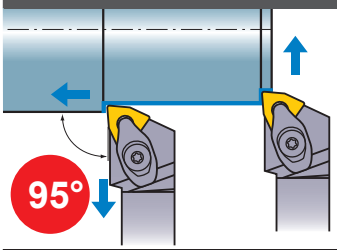
Light	Medium
SH (06)	MP (06)
Stainless	
MS (06)	

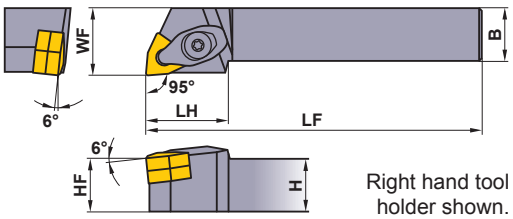
Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) H	B	LF	LH	HF	WF	∗2 Shim	Shim Pin	Clamp Lever	∗1 Clamp Screw	Wrench
PWLNR/L1616H06	●	●	WNMG	06T3□□	16	16	100	22	16	20	LLSWN3T3 (LLSWN32)	LLP13	LLCL13	LLCS106	HKY25R
PWLNR/L**2020K06**	●	●		06T3□□	20	20	125	22	20	25	LLSWN3T3 (LLSWN32)	LLP13	LLCL13	LLCS106	HKY25R
PWLNR/L**2525M06**	●	●		06T3□□	25	25	150	25	25	32	LLSWN3T3 (LLSWN32)	LLP13	LLCL13	LLCS106	HKY25R

∗1 Clamp Torque (N • m) : LLCS106=2.2
∗2 Please use shim no. LLSWN32 with 4.76mm thick inserts. When using 4.76mm thick inserts, shim should be ordered separately.

DWLN

External turning, Facing — ***DOUBLE CLAMP type***





Right hand tool holder shown.

Finish	Light	Medium	Medium
FH (08)	LP (08)	MP (06,08)	MK (08)
Medium	**Medium to Rough**	**Stainless**	**CBN**
Standard (08)	RP (08)	MS (06,08)	

Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) H	B	LF	LH	HF	WF	∗2 Shim	Shim Pin	Clamp Bridge	Spring	∗1 Clamp Screw	Wrench
DWLNR/L1616H06	●	●	WNMG	06T3□□	16	16	100	25	16	20	LLSWN3T3 (LLSWN32)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DWLNR/L**2020K06**	●	●		06T3□□	20	20	125	25	20	25	LLSWN3T3 (LLSWN32)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DWLNR/L**2525M06**	●	●		06T3□□	25	25	150	25	25	32	LLSWN3T3 (LLSWN32)	LLP23	DCK2211	DCS2	DC0520T	TKY15F
DWLNR/L**2020K08**	●	●	WNMA WNMG	0804□□	20	20	125	31	20	25	LLSWN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
DWLNR/L**2525M08**	●	●		0804□□	25	25	150	31	25	32	LLSWN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
DWLNR/L**3225P08**	●	●		0804□□	32	25	170	31	32	32	LLSWN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F

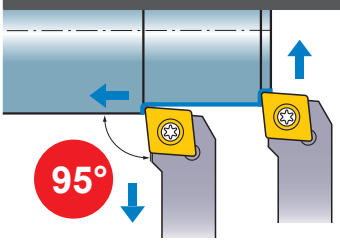
∗1 Clamp Torque (N • m) : DC0520T=3.5, DC0621T=5.0
∗2 Please use shim no. LLSWN32 with 4.76mm thick inserts. When using 4.76mm thick inserts, shim should be ordered separately.

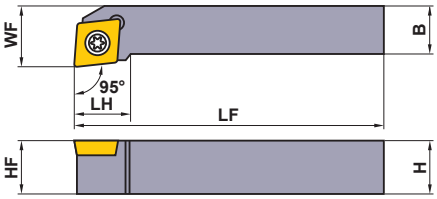
PWLN type inserts	➤ A119—A122	RECOMMENDED CUTTING CONDITIONS	➤ A070
DWLN type inserts	➤ A119—A123	SPARE PARTS	➤ P001
CBN inserts	➤ B034	TECHNICAL DATA	➤ Q001

CC INSERTS TOOL HOLDERS

SCLC

External turning, Facing — **SP type**





Right hand tool holder shown.

Finish	Finish	Light	Light
FP	FM	LP	LM
			
(06,09)	(06,09)	(06,09)	(06,09)
Medium	**Medium**	**Flat top**	**PCD/CBN**
MP	MM		
			
(06,09,12)	(06,09,12)	(06,09,12)	(06,09,12)

Order Number	Stock		Insert Number		Dimensions (mm)						*	
	R	L			H	B	LF	LH	HF	WF	Clamp Screw	Wrench
SCLCR/L0808D06	●	●	CCET CCGT CCMW CCMT CCGW	0602○○	8	8	60	8.9	8	10	TS25	TKY08F
SCLCR/L**1010E06**	●	●		0602○○	10	10	70	8.9	10	12	TS25	TKY08F
SCLCR/L**1212F09**	●	●		09T3○○	12	12	80	13.6	12	16	TS43	TKY15F
SCLCR/L**1616H12**	●	●		1204○○	16	16	100	16.7	16	20	TS5	TKY25F

∗ Clamp Torque (N • m) : TS25=1.0, TS43=3.5, TS5=7.5

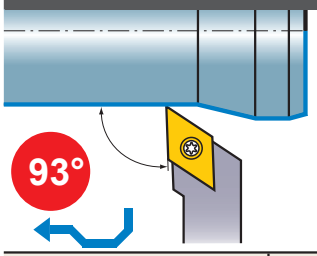
(Note) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

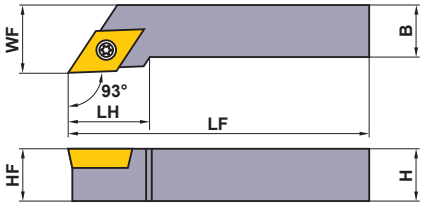
● : Inventory maintained in Japan.

SCLC type inserts	➤ A126—A130
CBN & PCD inserts	➤ B039—B041, B059
RECOMMENDED CUTTING CONDITIONS	➤ A070

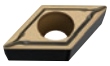
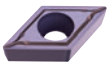
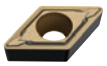
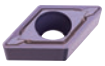
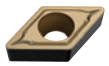
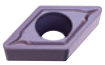
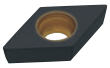
SDJC

External turning, Copying — SP type





Right hand tool holder shown.

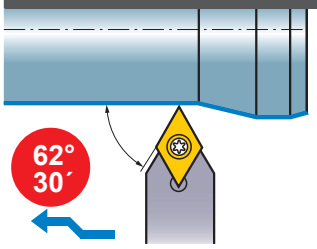
Finish	Finish	Light	Light
FP	FM	LP	LM
			
(07,11)	(07,11)	(07,11)	(07,11)
Medium	Medium	Flat top	PCD/CBN
MP	MM		
			
(07,11)	(07,11)	(07,11)	(07,11)

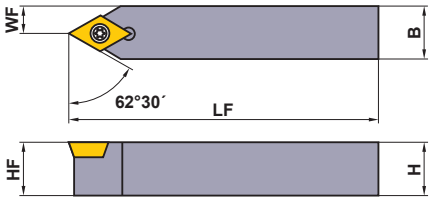
Order Number	Stock		Insert Number		Dimensions (mm)						*	
	R	L			H	B	LF	LH	HF	WF	Clamp Screw	Wrench
SDJCR/L1010E07	●	●	DCET DCGT DCMW DCMT DCGW	0702◌◌	10	10	70	12	10	12	TS25	TKY08F
SDJCR/L**1212F11**	●	●		11T3◌◌	12	12	80	18	12	16	TS43	TKY15F
SDJCR/L**1616H11**	●	●		11T3◌◌	16	16	100	18	16	20	TS43	TKY15F

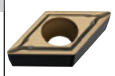
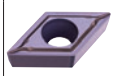
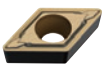
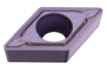
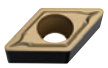
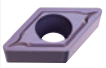
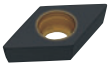
∗ Clamp Torque (N • m) : TS25=1.0, TS43=3.5

SDNC

External turning, Copying — SP type





Finish	Finish	Light	Light
FP	FM	LP	LM
			
(07,11)	(07,11)	(07,11)	(07,11)
Medium	Medium	Flat top	PCD/CBN
MP	MM		
			
(07,11)	(07,11)	(07,11)	(07,11)

Order Number	Stock	Insert Number		Dimensions (mm)					*	
				H	B	LF	HF	WF	Clamp Screw	Wrench
SDNCN0808D07	●	DCET DCGT DCMW DCMT DCGW	0702◌◌	8	8	60	8	4	TS25	TKY08F
SDNCN**1010E07**	●		0702◌◌	10	10	70	10	5	TS25	TKY08F
SDNCN**1212F11**	●		11T3◌◌	12	12	80	12	6	TS43	TKY15F
SDNCN**1616H11**	●		11T3◌◌	16	16	100	16	8	TS43	TKY15F

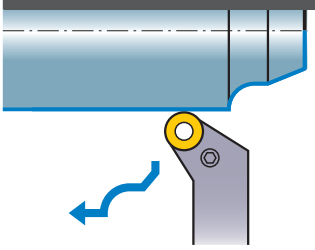
∗ Clamp Torque (N • m) : TS25=1.0, TS43=3.5

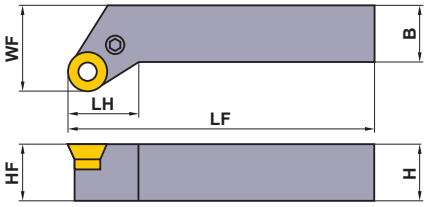
SDJC type inserts	➤ A132—A135	RECOMMENDED CUTTING CONDITIONS	➤ A070
SDNC type inserts	➤ A132—A135	SPARE PARTS	➤ P001
CBN & PCD inserts	➤ B043, B044, B060	TECHNICAL DATA	➤ Q001

RC INSERTS TOOL HOLDERS

PRGC

External turning, Facing, Copying — ***LL type*** — Medium





(10,12,16,20)

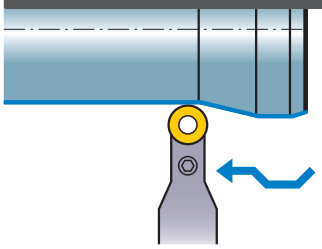
Right hand tool holder shown.

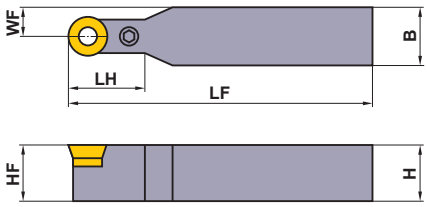
Order Number	Stock		Insert Number		Dimensions (mm)						Shim	Shim Pin	Clamp Lever	Clamp Screw *	Wrench
	R	L			H	B	LF	LH	HF	WF					
PRGCR/L2525M10	●	●	RCMX	1003M0	25	25	150	16.7	25	32	LLSRN103	LLP13	LLCL110	LLCS205	HKY20R
PRGCR/L**2525M12**	●	●		1204M0	25	25	150	17.5	25	32	LLSRN123	LLP13	LLCL112	LLCS106	HKY25R
PRGCR/L**2525M16**	●	●		1606M0	25	25	150	19.9	25	32	LLSRN164	LLP24	LLCL116	LLCS306	HKY25R
PRGCR/L**3232P20**	●	●		2006M0	32	32	170	23.8	32	40	LLSRN204	LLP15	LLCL120	LLCS508	HKY30R

∗ Clamp Torque (N • m) : LLCS205=1.5, LLCS106=2.2, LLCS306=2.2, LLCS508=3.3

PRDC

External turning, Copying — ***LL type*** — Medium





(10,12,16,20)

Order Number	Stock	Insert Number		Dimensions (mm)						Shim	Shim Pin	Clamp Lever	Clamp Screw *	Wrench
				H	B	LF	LH	HF	WF					
PRDCN2020K10	●	RCMX	1003M0	20	20	125	23	20	10.0	LLSRN103	LLP13	LLCL110	LLCS205	HKY20R
PRDCN**2525M12**	●		1204M0	25	25	150	24	25	12.5	LLSRN123	LLP13	LLCL112	LLCS106	HKY25R
PRDCN**3225P12**	●		1204M0	32	25	170	24	32	12.5	LLSRN123	LLP13	LLCL112	LLCS106	HKY25R
PRDCN**3225P16**	●		1606M0	32	25	170	28	32	12.5	LLSRN164	LLP24	LLCL116	LLCS306	HKY25R
PRDCN**3232P20**	●		2006M0	32	32	170	33	32	16.0	LLSRN204	LLP15	LLCL120	LLCS508	HKY30R

∗ Clamp Torque (N • m) : LLCS205=1.5, LLCS106=2.2, LLCS306=2.2, LLCS508=3.3

(Note) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

● : **Inventory maintained in Japan.**

PRGC type inserts	**➢ A137**
PRDC type inserts	**➢ A137**
RECOMMENDED CUTTING CONDITIONS	**➢ A070**

SRGC

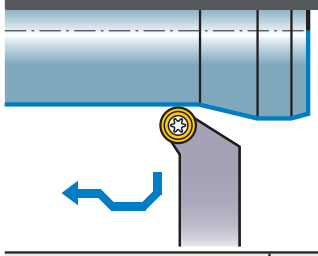
External turning, Facing, Copying

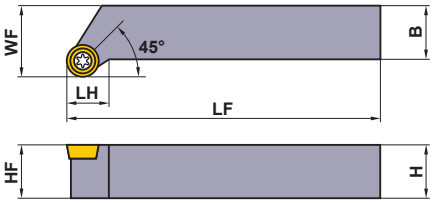
SP type

Medium
Standard



(06,08)





Right hand tool holder shown.

Order Number	Stock		Insert Number		Dimensions (mm)						*	
	R	L			H	B	LF	LH	HF	WF	Clamp Screw	Wrench
SRGCR/L1616H06	●	●	RCMT RCGT	0602○○ 0803○○	16	16	100	10	16	20	TS25	TKY08F
SRGCR/L**1616H08**	●	●			16	16	100	14.5	16	22	TS3	TKY08F

∗ Clamp Torque (N • m) : TS25=1.0, TS3=1.0

SRDC

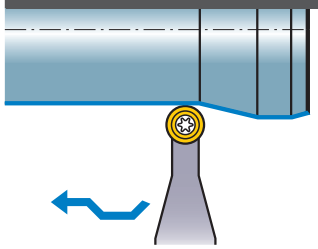
External turning, Copying

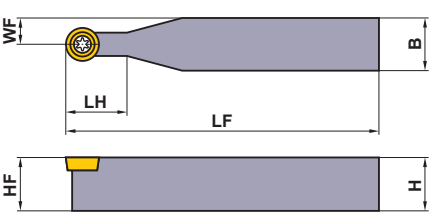
SP type

Medium
Standard



(06,08)





Order Number	Stock	Insert Number		Dimensions (mm)						*	
				H	B	LF	LH	HF	WF	Clamp Screw	Wrench
SRDCN1616H06	●	RCMT RCGT	0602○○ 0803○○	16	16	100	12	16	8	TS25	TKY08F
SRDCN**1616H08**	●			16	16	100	16	16	8	TS3	TKY08F

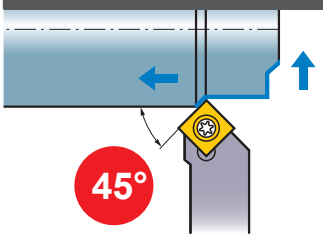
∗ Clamp Torque (N • m) : TS25=1.0, TS3=1.0

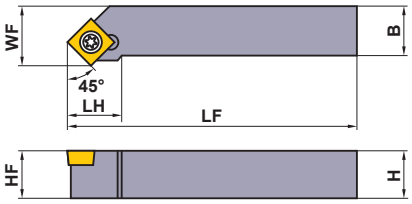
SRGC type inserts	➤ A137
SRDC type inserts	➤ A137
RECOMMENDED CUTTING CONDITIONS	➤ A070
SPARE PARTS	➤ P001
TECHNICAL DATA	➤ Q001

SC INSERTS TOOL HOLDERS

SSSC

External turning, Facing, Chamfering — **SP type**





Right hand tool holder shown.

Finish	Finish	Light	Light
FP	FM	LP	LM
			
(09)	(09)	(09)	(09)
Medium	**Medium**	**Medium**	**Flat top**
MP	MM	Standard	
			
(09)	(09)	(09)	(09)

Order Number	Stock		Insert Number		Dimensions (mm)						*	
	R	L			H	B	LF	LH	HF	WF	Clamp Screw	Wrench
SSSCR/L1212F09	●	●	SCMW SCMT	09T3○○	12	12	80	15.2	12	13	TS43	TKY15F
SSSCR/L**1616H09**	●	●		09T3○○	16	16	100	15.2	16	17	TS43	TKY15F

* Clamp Torque (N • m) : TS43=3.5

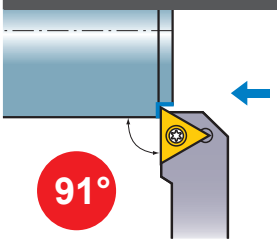
(Note) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

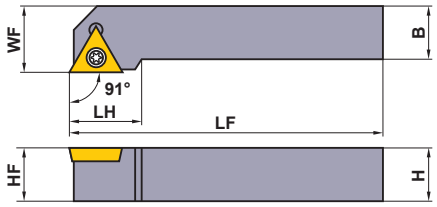
● : Inventory maintained in Japan.
▲ : Inventory maintained in Japan. To be replaced by new products.

SSSC type inserts ➤ A138, A139
RECOMMENDED CUTTING CONDITIONS ➤ A070

STGC

External turning **SP type**





Right hand tool holder shown.

Finish	Finish	Light	Light
FP	FM	LP	LM
			
(11,16)	(11,16)	(11,16)	(11,16)
Medium	**Medium**	**Flat top**	**PCD/CBN**
MP	MM		
			
(11,16)	(11,16)	(11,16)	(11,13)

Order Number	Stock		Insert Number		Dimensions (mm)						*	
	R	L			H	B	LF	LH	HF	WF	Clamp Screw	Wrench
STGCR/L1010E11	●	●	TCGT TCMW TCMT	1102○○	10	10	70	13.5	10	12	TS25	TKY08F
STGCR/L**1212F13**	●	●		1303○○	12	12	80	17.6	12	16	TS3	TKY08F
STGCR/L**1616H16**	●	●		16T3○○	16	16	100	20.7	16	20	TS43	TKY15F

* Clamp Torque (N • m) : TS25=1.0, TS3=1.0, TS43=3.5

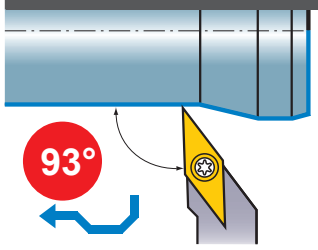
STGC type inserts ➤ A141—A143
CBN & PCD inserts ➤ B045, B061

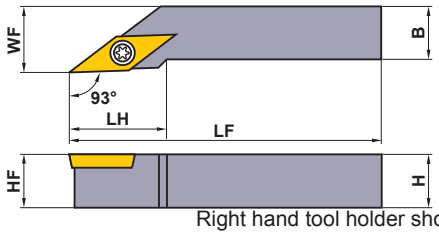
RECOMMENDED CUTTING CONDITIONS ➤ A070
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

VC INSERTS TOOL HOLDERS

SVJC

External turning, Copying — **SP type**





Right hand tool holder shown.

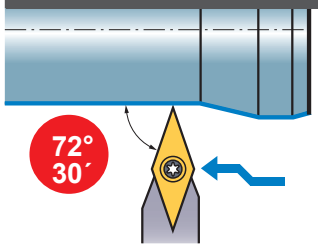
Finish	Finish	Light	Light
FP	FM	LP	LM
			
(11,16)	(11,16)	(11,16)	(11,16)
Medium	**Medium**	**Medium**	**Flat top**
MP	MM	Standard	
			
(16)	(16)	(11,16)	(11,16)

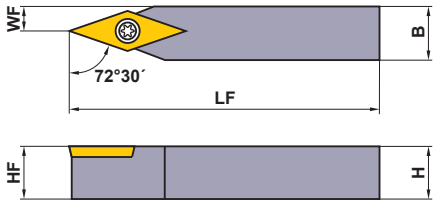
Order Number	Stock		Insert Number		Dimensions (mm)								 *	
	R	L			H	B	LF	LH	HF	WF	Shim	Shim Pin	Clamp Screw	Wrench
SVJCR/L1010E11	●	●	VCMT VCMW	1103○○	10	10	70	17	10	12	–	–	TS25	①TKY08F
SVJCR/L**1616H16**	●	●		1604○○	16	16	100	25	16	20	–	–	TS43	①TKY15F
SVJCR/L**2020K16**	●	●		1604○○	20	20	125	40	20	25	SPSVN32	BCP141	TS44	②TKY15R
SVJCR/L**2525M16**	●	●		1604○○	25	25	150	40	25	32	SPSVN32	BCP141	TS44	②TKY15R

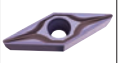
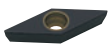
* Clamp Torque (N • m) : TS25=1.0, TS43=3.5, TS44=3.5

SVVC

External turning, Copying — **SP type**





Finish	Finish	Light	Light
FP	FM	LP	LM
			
(16)	(16)	(16)	(16)
Medium	**Medium**	**Medium**	**Flat top**
MP	MM	Standard	
			
(16)	(16)	(16)	(16)

Order Number	Stock	Insert Number		Dimensions (mm)							 *	
				H	B	LF	HF	WF	Shim	Shim Pin	Clamp Screw	Wrench
SVVCN1616H16	●	VCMT VCMW	1604○○	16	16	100	16	8	–	–	TS43	①TKY15F
SVVCN**2020K16**	●		1604○○	20	20	125	20	10	SPSVN32	BCP141	TS44	②TKY15R
SVVCN**2525M16**	●		1604○○	25	25	150	25	12.5	SPSVN32	BCP141	TS44	②TKY15R

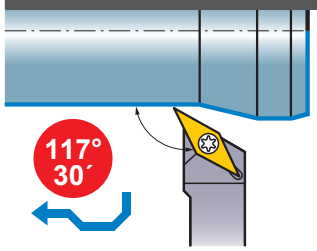
* Clamp Torque (N • m) : TS43=3.5, TS44=3.5

(Note) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

● : Inventory maintained in Japan.

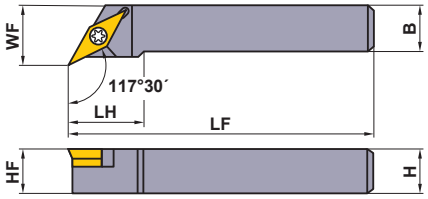
SVJC type inserts	➤ A151, A152	CBN & PCD inserts	➤ B049, B064
SVVC type inserts	➤ A151, A152	RECOMMENDED CUTTING CONDITIONS	➤ A070

SVPC

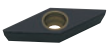


Facing, Copying

SP type



Right hand tool holder shown.

Finish	Finish	Light	Light
FP	FM	LP	LM
			
(16)	(16)	(16)	(16)
Medium	**Medium**	**Medium**	**Flat top**
MP	MM	Standard	
			
(16)	(16)	(16)	(16)

Order Number	Stock		Insert Number		Dimensions (mm)								 *	
	R	L			H	B	LF	LH	HF	WF	Shim	Shim Pin	Clamp Screw	Wrench
SVPCR/L2020K16	●	●	VCGT VCMT VCMW	1604○○	20	20	125	30	20	25	SPSVN32	BCP141	TS44	TKY15R
SVPCR/L **2525M16**	●	●		1604○○	25	25	150	30	25	32	SPSVN32	BCP141	TS44	TKY15R

* Clamp Torque (N • m) : TS44=3.5

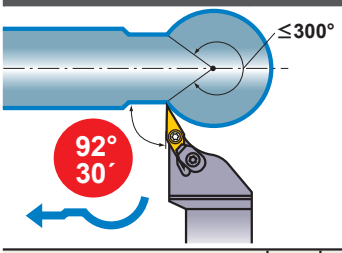
SVPC type inserts	➤ A151, A152
CBN inserts	➤ B049
RECOMMENDED CUTTING CONDITIONS	➤ A070
SPARE PARTS	➤ P001
TECHNICAL DATA	➤ Q001

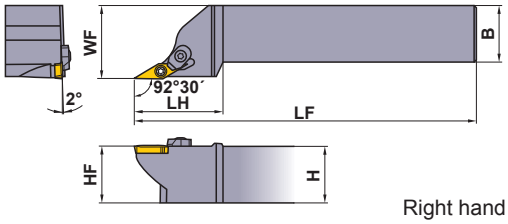
XC INSERTS TOOL HOLDERS

SXZC

External turning, Copying — ***Profile Holder***

Finish: SVX





Right hand tool holder shown.

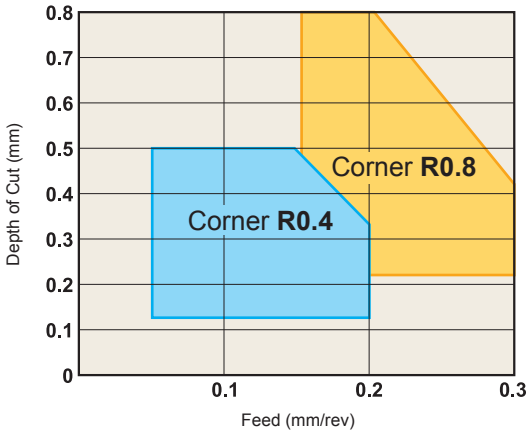


(15)

Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) H	B	LF	LH	HF	WF	Clamp Screw *	Clamp Bridge	Clamp Bridge Screw *	Spring	Insert Wrench	Wrench for clamp bridge
SXZCR/L1616H15	●	●	XCMT	1503○○-SVX	16	16	100	35	16	20	TS255	AMS3	AJS3010T10	ASS2	TKY08F	TKY10F
SXZCR/L2020K15	●	●	XCMT	1503○○-SVX	20	20	125	35	20	25	TS255	AMS3	AJS3010T10	ASS2	TKY08F	TKY10F
SXZCR/L2525M15	●	●	XCMT	1503○○-SVX	25	25	150	40	25	32	TS255	AMS3	AJS3010T10	ASS2	TKF08F	TKF10F

∗ Clamp Torque (N • m) : TS255=1.0, AJS3010T10=2.5

Applicable range



RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	**UE6020**	150−350
	Carbon Steel, Alloy Steel	150HB−250HB	**UE6020**	100−250

(Note) The above cutting conditions are general guidelines.
Adjustments maybe necessary depending on machine rigidity, workpiece geometry and clamping.

(Note) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

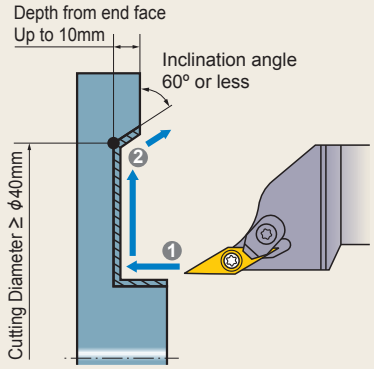
● : **Inventory maintained in Japan.**

SXZC type inserts ➤ A158

NOTE

Notes when end face copying

Pay special attention to the following when face copying.



●Machining of an outer diameter (Step ①)

- To prevent burr formation, the depth of cut should be below half the nose radius.

●Machining of an inclination (Step ②)

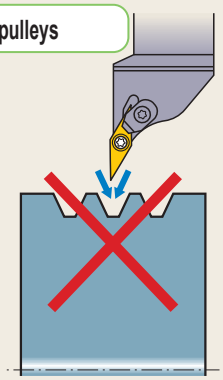
- To reduce the contact length of chips, the depth of cut should be below half the nose radius.
- To prevent interference between the tool and the workpiece, the cutting diameter should be 40mm or larger, inclination angle 60° or less and depth from the end face up to 10mm.

●When changing inserts

- When indexing the inserts, it is recommended to preset the cutting edge position to maintain machining accuracy.

Not possible

Machining of V-pulleys

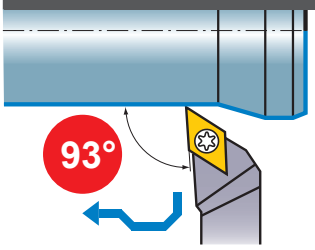


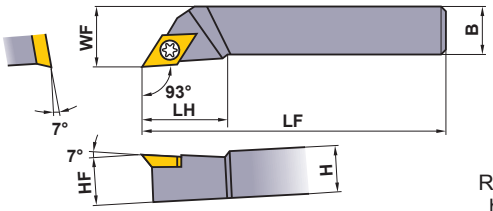
When machining V-pulleys, use a VNMG insert.

DE□□ INSERTS TOOL HOLDERS

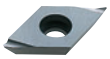
SDJE

External turning, Copying — ***AL type***





Right hand tool holder shown.

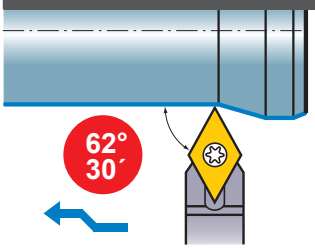
Finish	Medium
R/L-F	R/L
 (15)	 (15)
PCD	
R/L-F	
 (15)	

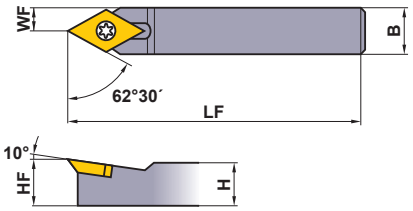
Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) H	B	LF	LH	HF	WF	* Clamp Screw	Wrench
SDJER/L1616H15	●	●	DEGX	1504□□	16	16	100	27	16	20	CS451190T	TKY20F
SDJER/L**2020K15**	●	●	DEGX	1504□□	20	20	125	35	20	25	CS451190T	TKY20F
SDJER/L**2525M15**	●	●	DEGX	1504□□	25	25	150	35	25	32	CS451190T	TKY20F

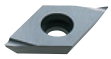
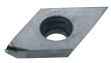
∗ Clamp Torque (N • m) : CS451190T=5.0

SDNE

External turning, Copying — ***AL type***





Finish	Medium
R/L-F	R/L
 (15)	 (15)
PCD	
R/L-F	
 (15)	

Order Number	Stock	Insert Number		Dimensions (mm) H	B	LF	HF	WF	* Clamp Screw	Wrench
SDNEN1616H15	●	DEGX	1504□□	16	16	100	16	8	CS451190T	TKY20F
SDNEN**2020K15**	●	DEGX	1504□□	20	20	125	20	10	CS451190T	TKY20F
SDNEN**2525M15**	●	DEGX	1504□□	25	25	150	25	12.5	CS451190T	TKY20F

∗ Clamp Torque (N • m) : CS451190T=5.0

RECOMMENDED CUTTING CONDITIONS

	Work Material	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
N	Aluminium Alloy	**HTi10**	400	0.05—0.3	0.2—3.0
		MD220	800	0.05—0.3	0.2—0.5

(Note) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

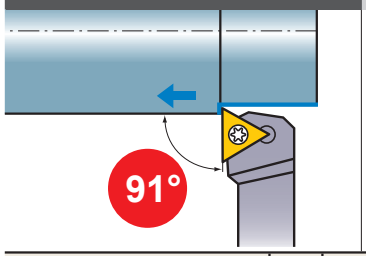
● : **Inventory maintained in Japan.**

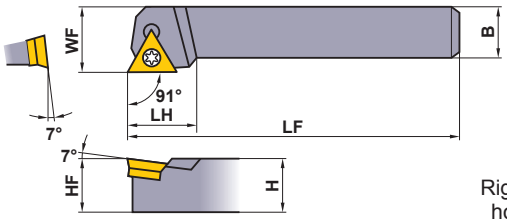
SDJE type inserts ➤ **A136**
SDNE type inserts ➤ **A136**
PCD inserts ➤ **B066**

STGE

External turning

AL type





Right hand tool holder shown.

Medium	PCD
R/L	R/L
 (16)	 (16)
PCD	
 (16)	

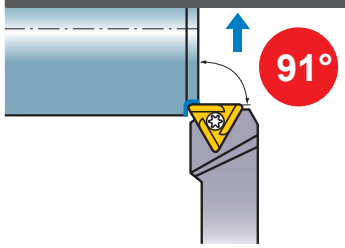
Order Number	Stock		Insert Number		Dimensions (mm)						*	
	R	L			H	B	LF	LH	HF	WF	Clamp Screw	Wrench
STGER/L1616H16	●	●	TEGX	1603○○	16	16	100	22	16	20	FC400890T	TKY10F
STGER/L**2020K16**	●	●		1603○○	20	20	125	22	20	25	FC400890T	TKY10F
STGER/L**2525M16**	●	●		1603○○	25	25	150	22	25	32	FC400890T	TKY10F

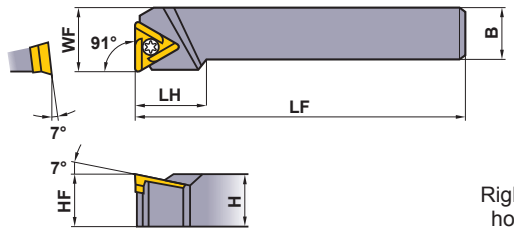
* Clamp Torque (N • m) : FC400890T=2.5

STFE

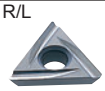
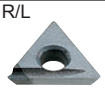
Facing

AL type





Right hand tool holder shown.

Medium	PCD
R/L	R/L
 (16)	 (16)
PCD	
 (16)	

Order Number	Stock		Insert Number		Dimensions (mm)						*	
	R	L			H	B	LF	LH	HF	WF	Clamp Screw	Wrench
STFER/L1616H16	●	●	TEGX	1603○○	16	16	100	22	16	20	FC400890T	TKY10F
STFER/L**2020K16**	●	●		1603○○	20	20	125	22	20	25	FC400890T	TKY10F
STFER/L**2525M16**	●	●		1603○○	25	25	150	22	25	32	FC400890T	TKY10F

(Note) When using insert with right or left hand breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

* Clamp Torque (N • m) : FC400890T=2.5

RECOMMENDED CUTTING CONDITIONS

Work Material		Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
N	Aluminium Alloy	**HTi10**	400	0.05—0.3	0.2—3.0
		MD220	800	0.05—0.3	0.2—0.5

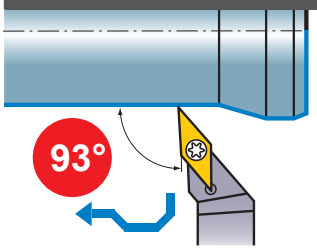
STGE type inserts ➤ **A144**
STFE type inserts ➤ **A144**
PCD inserts ➤ **B066**
SPARE PARTS ➤ **P001**
TECHNICAL DATA ➤ **Q001**

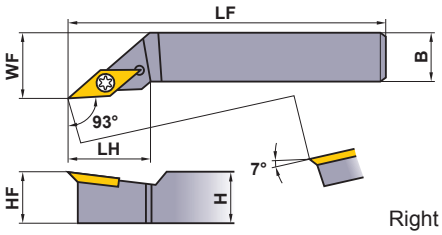
VD○○ INSERTS TOOL HOLDERS

SVJD

External turning, Copying

AL type





Right hand tool holder shown.

Finish

R/L



(16)

PCD

R/L-F



(16)

Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) H	B	LF	LH	HF	WF	* Clamp Screw	Wrench
SVJDR/L1616H16	●	●	VDGX	1603○○	16	16	100	30	16	20	FC400890T	TKY10F
SVJDR/L**2020K16**	●	●	VDGX	1603○○	20	20	125	30	20	25	FC400890T	TKY10F
SVJDR/L**2525M16**	●	●	VDGX	1603○○	25	25	150	30	25	32	FC400890T	TKY10F

∗ Clamp Torque (N • m) : FC400890T=2.5

RECOMMENDED CUTTING CONDITIONS

	Work Material	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
N	Aluminium Alloy	**HTi10**	400	0.05—0.3	0.2—3.0
		MD220	800	0.05—0.3	0.2—0.5

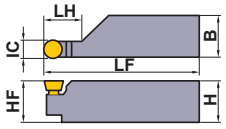
(Note) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

● : **Inventory maintained in Japan.**

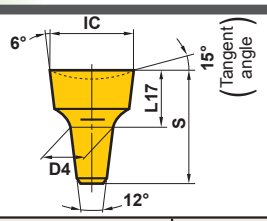
SVJD type inserts ➤ **A153**
PCD inserts ➤ **B067**

TL HOLDER

HOLDER

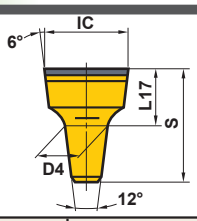
Geometry	Revised order number	Conventional order number	Stock	Insert Number	Dimensions (mm)					
					IC	H	B	HF	LF	LH
TLHR (External turning, Copying) 	**TLHR2020K5**	TLHR2020K5	●	RTG05A	5	20	20	20	125	16
	TLHR2020K6	TLHR2020K6	●	RTG06A	6	20	20	20	125	16
	TLHR2525M7	TLHR2525M7	●	RTG07A	7	25	25	25	150	20
	TLHR3225P10	TLHR54P10	●	RTG10A	10	32	25	32	170	25

INSERTS



Order Number	Stock Carbide		Dimensions (mm)			
	UTi20T	HTi10	IC	S	D4	L17
RTG05A	●	●	5	7.5	2.5	3.5
RTG06A	●	●	6	7.5	3.5	3.5
RTG07A	●		7	11	3.5	5
RTG08A	●	●	8	11	4.5	5
RTG10A	●	●	10	14	5.5	6.5

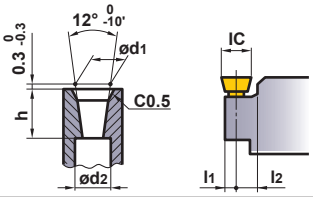
INSERTS (CBN)



Order Number	Stock CBN	Dimensions (mm)			
	MB825	IC	S	D4	L17
RTG05A	●	5	7.5	2.5	3.5
RTG06A	●	6	7.5	3.5	3.5
RTG07A	●	7	11	3.5	5
RTG08A	●	8	11	4.5	5
RTG10A	●	10	14	5.5	6.5

INSERT SEAT LOCATION

When manufacturing a special tool holder, please machine insert seat in accordance to the drawing.

Insert Seat Dimensions	Insert Diameter **IC**	Dimensions (mm)					Taper Diameter
		h	d_1	d_2	l_1	l_2	
	5	4	2.5	1.9	1.85	3.2	1.5
	6	4	3.5	2.9	2.35	3.7	2.5
	7	6	3.5	2.5	2.75	4.3	2.1
	8	6	4.5	3.5	3.25	4.8	3.1
	10	7.5	5.5	4.2	4.15	5.9	3.8
	12	7.5	7.5	6.2	5.15	6.9	5.8

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

HOW TO READ THE STANDARD OF SMALL TOOLS

●How this section page is organized

①Organized according to the cutting mode of small tools.
(Refer to the inside title on the next page.)
②Shown as Turning → External Grooving → External Cutting Off → Threading → Boring.

TYPE OF TOOL HOLDER
indicates the first four letters of the order number, as well as cutting applications.

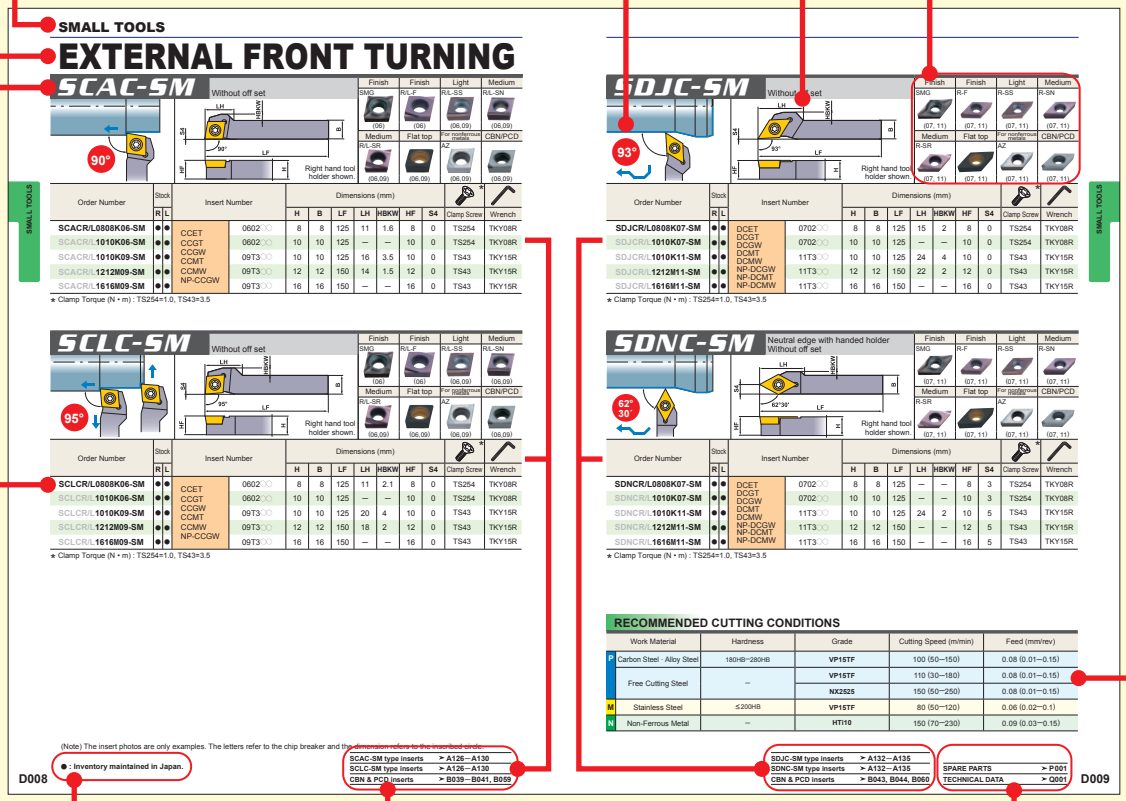
APPLICATION

PRODUCT SECTION

FIGURE SHOWING THE TOOLING APPLICATION
uses illustrations and arrows to depict the available machining applications such as external turning, copying, facing, chamfering, threading, and grooving together with cutting edge lead angles.

GEOMETRY

CHIP BREAKER BY CUTTING APPLICATION



LEGEND FOR STOCK STATUS MARK
is shown on the left hand page of each double-page spread.

REFERENCE PAGE FOR APPLICABLE INSERTS
indicates reference pages giving details of inserts that are applicable to the product.

PAGE REFERENCE
·SPARE PARTS
·TECHNICAL DATA
indicates reference pages, including the above, on the right hand page of each double-page spread.

PRODUCT STANDARDS
indicates order numbers, stock status (per right/left hand), applicable inserts, dimensions, and spare parts.

RECOMMENDED CUTTING CONDITIONS
for each work material classification, indicates recommended cutting conditions according to the ISO categories for cutting grades, P, M and N.

●To Order : Please specify
①order number and hand of tool (right/left).

TURNING TOOLS

SMALL TOOLS

OUTLINE OF SMALL TOOLS ····· D002
CLASSIFICATION ····· D004

STANDARD FOR GANG TYPE TOOL POSTS

EXTERNAL FRONT TURNING
SCAC-SM ····· D008
SCLC-SM ····· D008
SDJC-SM ····· D009
SDNC-SM ····· D009
SVLP-SM ····· D010
SVJB-SM ····· D010
SVVB-SM ····· D011
SVPP-SM ····· D011

EXTERNAL BACK TURNING
BTAH ····· D012
CTBH ····· D013
BTVH ····· D014

EXTERNAL GROOVING
GTAH ····· D016
GTBH ····· D016
GTCH ····· D016

EXTERNAL CUTTING OFF
CTAH ····· D018
CTAH-S ····· D018
CTBH ····· D020
CTCH ····· D021
CTDH ····· D022
CTEH ····· D023

EXTERNAL THREADING
TTAH ····· D024

EXTERNAL FRONT TURNING, COPYING, FACING
SH ····· D026

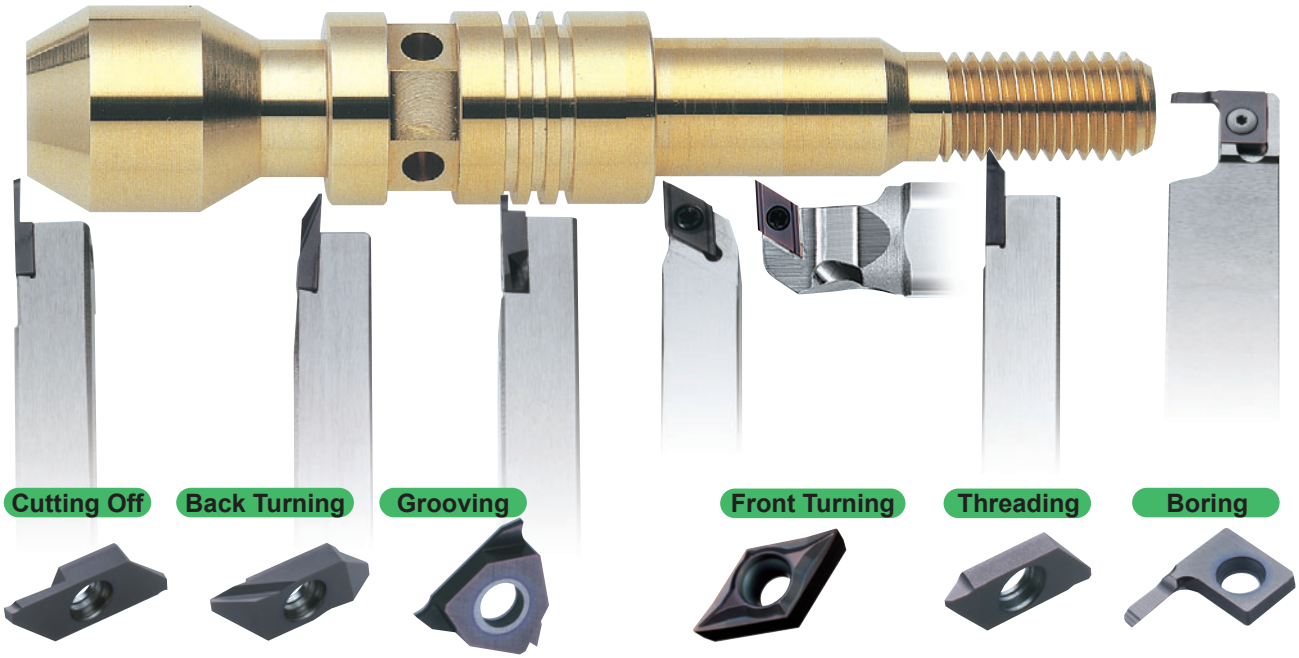
CAM TYPE TOOL POSTS
CSVH ····· D027

BORING
SBAH ····· D030

*Arranged by Alphabetical order
D012 BTAH
D012 BTAT INSERTS
D013 BTBT INSERTS
D014 BTVH
D014 BTVT INSERTS
D027 CSVH
D028 CSVTBXL INSERTS
D028 CSVTB INSERTS
D028 CSVTC INSERTS
D027 CSVTF INSERTS
D027 CSVTFXL INSERTS
D029 CSVTG INSERTS
D029 CSVTT INSERTS
D018 CTAH
D018 CTAH-S
D019 CTAT INSERTS
D013 CTBH
D020 CTBH
D020 CTBT INSERTS
D021 CTCH
D021 CTCT INSERTS
D022 CTDH
D022 CTDT INSERTS
D023 CTEH
D023 CTET INSERTS
D016 GTAH
D016 GTAT INSERTS
D016 GTBH
D016 GTBT INSERTS
D016 GTCH
D016 GTCT INSERTS
D030 SBAH
D030 SBAT INSERTS
D008 SCAC-SM
D008 SCLC-SM
D009 SDJC-SM
D009 SDNC-SM
D026 SH
D010 SVJB-SM
D010 SVLP-SM
D011 SVPP-SM
D011 SVVB-SM
D024 TTAH
D024 TTAT INSERTS

OUTLINE OF SMALL TOOLS

TOOLS FOR GANG TYPE AUTOMATIC LATHES (FOR EXTERNAL TURNING AND BORING)



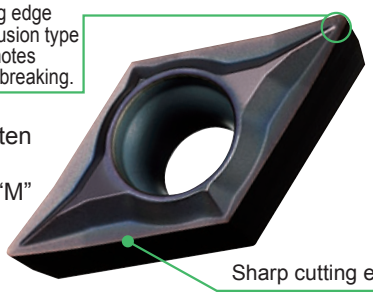
Cutting Off | Back Turning | Grooving | Front Turning | Threading | Boring

SMG Breaker Insert

Nose radii designed with minus tolerance

- Suitable for small parts applications that often require minus tolerance dimensions.
- The order number is shown with the letter "M" that indicates minus tolerance.
- The radius value is printed on the side of the insert label for easy recognition.

A combination of a curved cutting edge and the protrusion type breaker promotes efficient chip breaking.

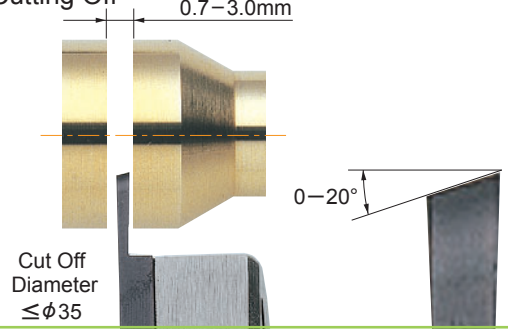


Tolerance Corner R

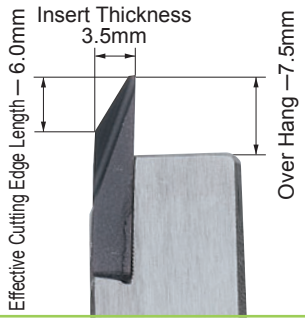


SMG Breaker Insert	E class
RE $^{0}_{-0.05}$ mm	RE $^{0}_{-0.02}$ mm
(Conventional G-class insert RE ±0.10 mm)	

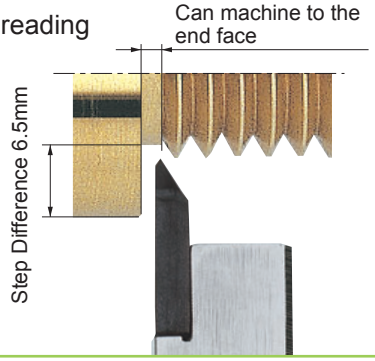
Cutting Off



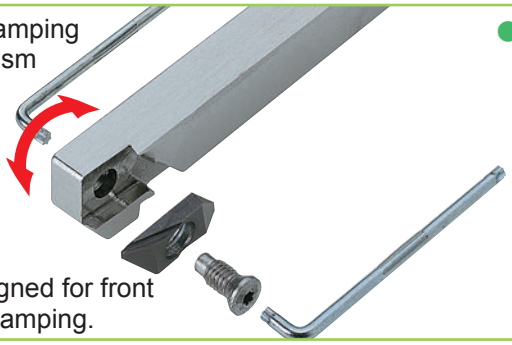
Back Turning



Threading



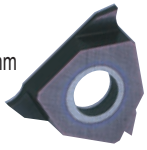
Back Clamping Mechanism

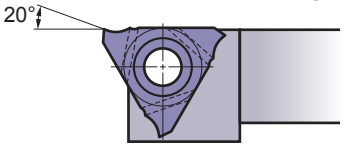


Screw designed for front and back clamping.

Grooving

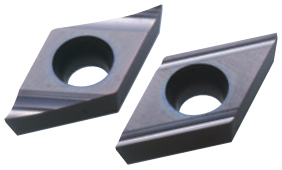
- 3-cornered
- Groove width 0.3−3.0mm
- Traversing possible





Front Turning

- ISO E class accuracy inserts
- A wide variety of small corner R inserts
- Rake angle 30°



Tools for a very wide range of small parts machining

External Turning	Tools for front turning, back turning, grooving, threading, and cutting off
Internal Turning	Tools for boring, internal grooving and internal threading
Drilling	Drills
End Milling	End Mills

Tools for CNC automatic and small lathes

Types of Tool Posts	Gang type, turret type, cam type (radial pattern type)
Tool Sizes	Square shank: 8–16 mm Round shank : less than ϕ25.4

Indexable inserts developed under the concept of "high quality, high efficiency and long tool life."

High Quality	E class tolerance, sharp cutting edge, high accuracy small corner R, smooth surface finish
Long Tool Life	Miracle Coating (VP15TF), cermet (NX2525), cemented carbide (HTi10)
High Efficiency	Regrinding not necessary due to the employment of indexable inserts. A wide variety of top cutting edge geometries

TOOLS FOR CAM TYPE AUTOMATIC LATHES

- The most suitable for the use with cam type automatic lathes (radial pattern tool posts)
- The most suitable for machining of small parts with work diameter 5mm or smaller
- Single holder for front turning, back turning, grooving, threading and cutting off operations





Front Turning | Back Turning | Grooving | Threading | Cutting Off

INTERNAL TURNING TOOLS

Solid type ***MICRO-MINI TWIN Boring Bars***

Minimum cutting diameter ϕ2.2–

Boring
Grooving
Threading

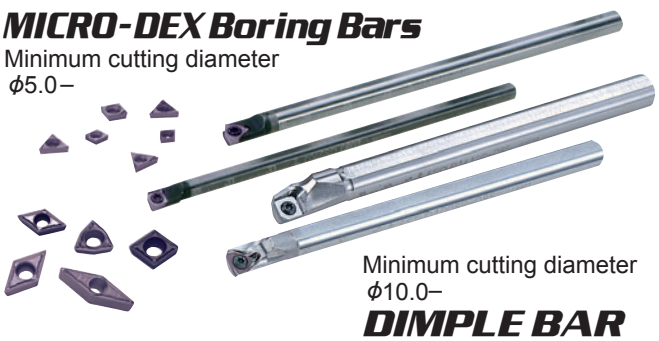


Round Shank

Square Shank

MICRO-DEX Boring Bars

Minimum cutting diameter ϕ5.0–

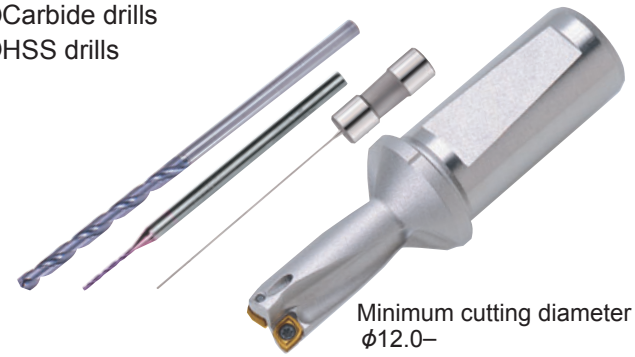


Minimum cutting diameter ϕ10.0–

DIMPLE BAR

DRILLING TOOLS

- Carbide drills
- HSS drills

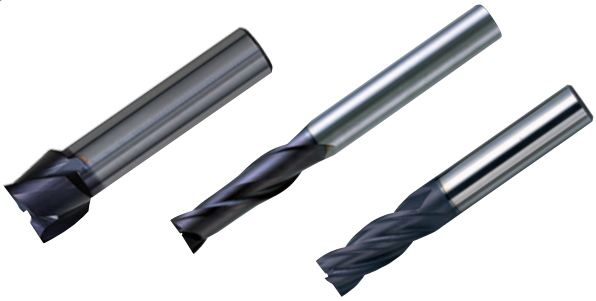


Minimum cutting diameter ϕ12.0–

TAF Drill

END MILLING TOOLS

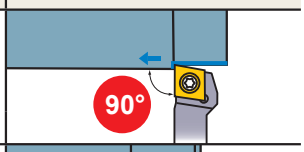
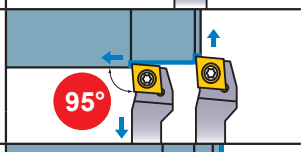
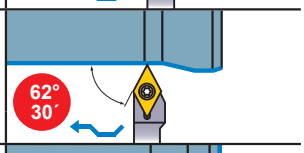
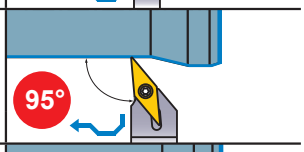
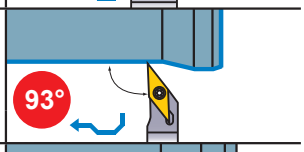
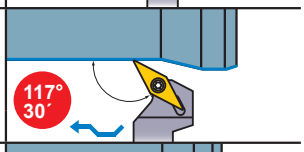
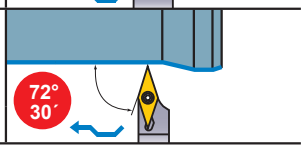
- Carbide end mills
- HSS end mills



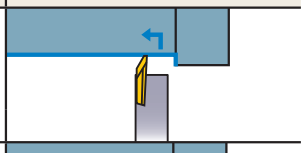
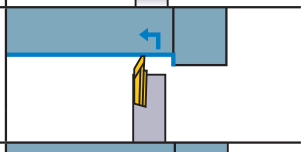
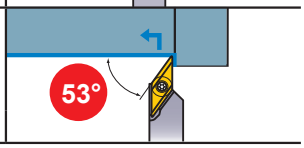
CLASSIFICATION OF EXTERNAL TURNING TOOLS

GANG TYPE TOOL POSTS

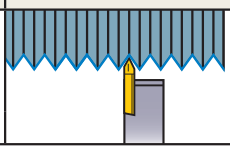
FRONT TURNING

Name of Tool Holder	Shank Size (mm) (H x W x L)	Geometry
SCAC-SM → D008	8 x 8 x 125 10 x 10 x 125 12 x 12 x 150 16 x 16 x 150	
SCLC-SM → D008	8 x 8 x 125 10 x 10 x 125 12 x 12 x 150 16 x 16 x 150	
SDJC-SM → D009	8 x 8 x 125 10 x 10 x 125 12 x 12 x 150 16 x 16 x 150	
SDNC-SM → D009	8 x 8 x 125 10 x 10 x 125 12 x 12 x 150 16 x 16 x 150	
SVLP-SM → D010	10 x 10 x 125 12 x 12 x 150 16 x 16 x 150	
SVJB-SM → D010	10 x 10 x 125 12 x 12 x 150 16 x 16 x 150	
SVPP-SM → D011	10 x 10 x 125 12 x 12 x 150 16 x 16 x 150	
SVVB-SM → D011	10 x 10 x 125 12 x 12 x 150 16 x 16 x 150	

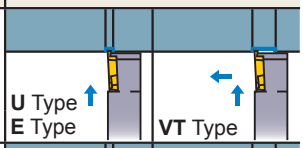
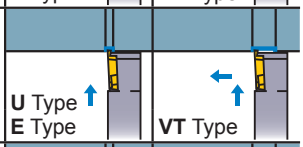
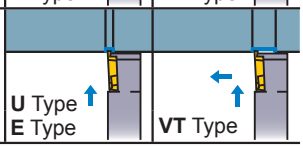
BACK TURNING

Name of Tool Holder	Shank Size (mm) (H x W x L)	Geometry
BTAH (Insert Size 2.8, 3.5, 5.0mm) → D012	8 x 10 x 120 10 x 10 x 120 12 x 12 x 120 16 x 16 x 120	
CTBH (Insert Size 4.5, 6.0mm) → D013	10 x 10 x 120 12 x 12 x 120 16 x 16 x 120	
BTVH (Insert Size 7.5mm) → D014	10 x 10 x 120 12 x 12 x 120 16 x 16 x 120	

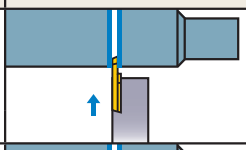
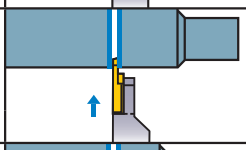
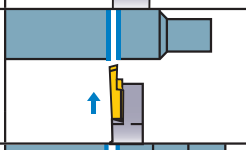
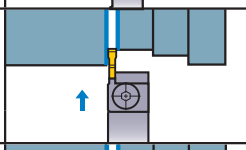
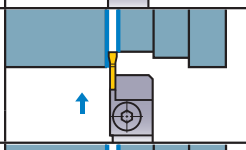
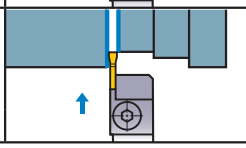
THREADING

Name of Tool Holder	Shank Size (mm) (H x W x L)	Geometry
TTAH → D024	8 x 10 x 120 10 x 10 x 120 12 x 12 x 120 16 x 16 x 120	

GROOVING

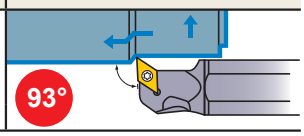
Name of Tool Holder	Shank Size (mm) (H x W x L)	Geometry
GTAH (Groove Width 0.3—3.0mm) → D016	8 x 8 x 80 8 x 8 x 120 10 x 10 x 80 10 x 10 x 120 12 x 12 x 80 12 x 12 x 120 16 x 16 x 120	
GTBH (Groove Width 1.45—3.0mm) → D016	10 x 10 x 80 10 x 10 x 120 12 x 12 x 120 16 x 16 x 120	
GTCH (Groove Width 2.5—3.0mm) → D016	10 x 10 x 80 10 x 10 x 120	

CUTTING OFF

Name of Tool Holder	Shank Size (mm) (H x W x L)	Geometry
CTAH (Max. Cut Off Diameter 12mm) → D018	8 x 10 x 120 10 x 10 x 120 12 x 12 x 120 16 x 16 x 120	
CTAH-S (Max. Cut Off Diameter 12mm) → D018	10 x 10 x 80	
CTBH (Max. Cut Off Diameter 16mm) → D020	10 x 10 x 120 12 x 12 x 120 16 x 16 x 120	
CTCH (Max. Cut Off Diameter 20mm) → D021	10 x 10 x 120 12 x 12 x 120	
CTDH (Max. Cut Off Diameter 23—35mm) → D022	16 x 16 x 120 16 x 16 x 125	
CTEH (Max. Cut Off Diameter 23—35mm) → D023	16 x 16 x 120 16 x 16 x 125	

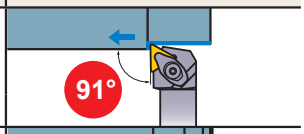
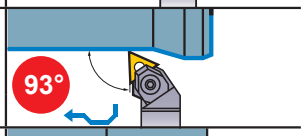
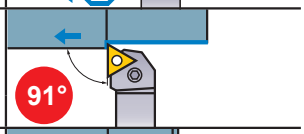
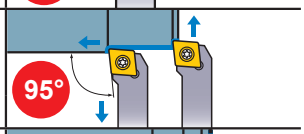
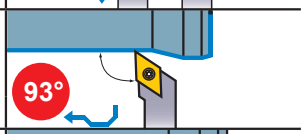
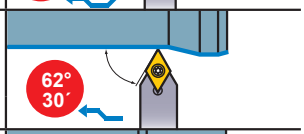
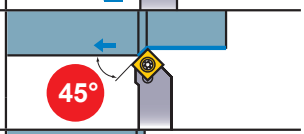
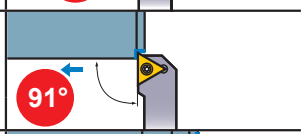
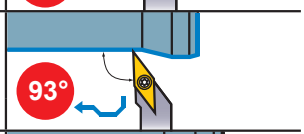
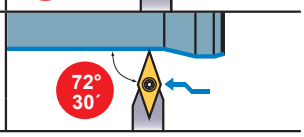
OPPOSITE TOOL POSTS

DIMPLE SLEEVE HOLDER

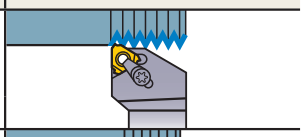
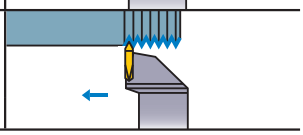
Name of Tool Holder	Shank Size (mm) (Shank Dia. x L)	Geometry
SH (Front Turning, Copying, Facing) → D026	ϕ15.875 x 100 ϕ19.05 x 125 ϕ20 x 125 ϕ22 x 125 ϕ25.4 x 150	

TURRET TYPE TOOL POSTS

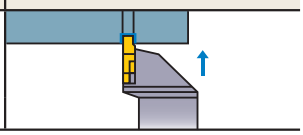
FRONT TURNING

Name of Tool Holder	Shank Size (mm) (H x W x L)	Geometry
DTGN → C016	16 x 16 x 100 20 x 20 x 125 25 x 25 x 150	
MTJN → C017	20 x 20 x 125 25 x 25 x 150	
PTGN → C016	10 x 10 x 70 12 x 12 x 80 16 x 16 x 100 20 x 20 x 125 25 x 25 x 150	
SCLC → C022	8 x 8 x 60 10 x 10 x 70 12 x 12 x 80 16 x 16 x 100	
SDJC → C023	10 x 10 x 70 12 x 12 x 80 16 x 16 x 100	
SDNC → C023	8 x 8 x 60 10 x 10 x 70 12 x 12 x 80 16 x 16 x 100	
SSSC → C026	12 x 12 x 80 16 x 16 x 100	
STGC → C027	10 x 10 x 70 12 x 12 x 80 16 x 16 x 100	
SVJC → C028	10 x 10 x 70 16 x 16 x 100	
SVVC → C028	16 x 16 x 100	

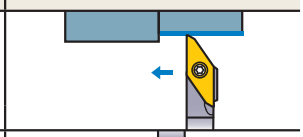
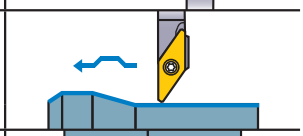
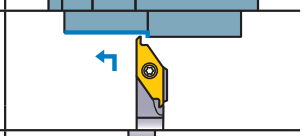
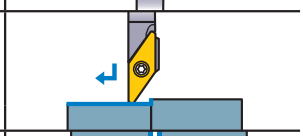
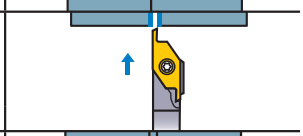
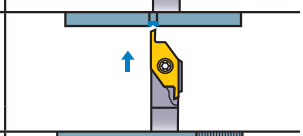
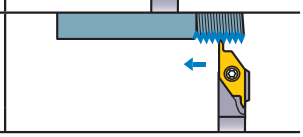
THREADING

Name of Tool Holder	Shank Size (mm) (H x W x L)	Geometry
MMT → G012	12 x 12 x 100 16 x 16 x 100 20 x 20 x 125 25 x 25 x 150 32 x 32 x 170	
SMGH → G024	10 x 10 x 70 12 x 12 x 80 16 x 16 x 100	

GROOVING

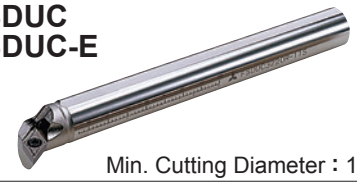
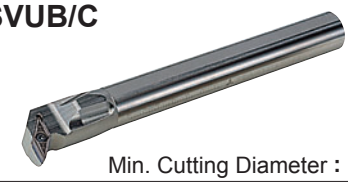
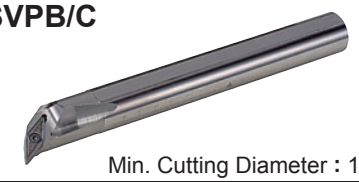
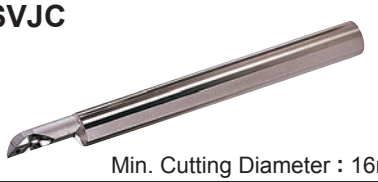
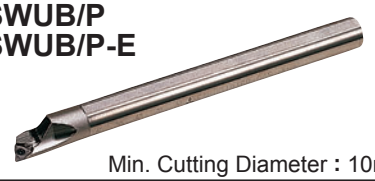
Name of Tool Holder	Shank Size (mm) (H x W x L)	Geometry
SMGH → F124	10 x 10 x 70 12 x 12 x 80 16 x 16 x 100	

CAM TYPE TOOL POSTS

Name of Tool Holder	Shank Size (mm) (H x W x L)	Geometry
CSVH (Front Turning) → D027	7 x 7 x 140 8 x 8 x 140 9.5 x 9.5 x 140 10 x10 x 140 12 x12 x 140	
CSVH (Front Turning Copying) → D027	7 x 7 x 140 8 x 8 x 140 9.5 x 9.5 x 140 10 x10 x 140 12 x12 x 140	
CSVH (Back Turning) → D027	7 x 7 x 140 8 x 8 x 140 9.5 x 9.5 x 140 10 x10 x 140 12 x12 x 140	
CSVH (Back Turning Copying) → D027	7 x 7 x 140 8 x 8 x 140 9.5 x 9.5 x 140 10 x10 x 140 12 x12 x 140	
CSVH (Cutting Off) → D027	7 x 7 x 140 8 x 8 x 140 9.5 x 9.5 x 140 10 x10 x 140 12 x12 x 140	
CSVH (Grooving) → D027	7 x 7 x 140 8 x 8 x 140 9.5 x 9.5 x 140 10 x10 x 140 12 x12 x 140	
CSVH (Threading) → D027	7 x 7 x 140 8 x 8 x 140 9.5 x 9.5 x 140 10 x10 x 140 12 x12 x 140	

CLASSIFICATION OF INTERNAL TURNING TOOLS (FOR GENERAL USE)

Product Name	Holder
For Gang Type Tool Posts D030	**SBAH**  Min. Cutting Diameter : 3mm
MICRO-MINI TWIN Boring Bars (Solid Carbide) E019	**CB CR**  Min. Cutting Diameter : 2.2mm
MICRO-MINI Boring Bars (Solid Carbide) E022	**C○○FR-BLS**  Min. Cutting Diameter : 3.2mm
MICRO-DEX Boring Bars (Carbide Shank) E016	**SCLC**  Min. Cutting Diameter : 5mm
MICRO-DEX Boring Bars (Carbide Shank) E017	**STUC**  Min. Cutting Diameter : 8mm
MICRO-DEX Boring Bars (Carbide Shank) E016	**SWUB**  Min. Cutting Diameter : 6mm
F type Bars (Steel Shank) E027	**FSWL1**  Min. Cutting Diameter : 5.8mm
F type Bars (Carbide Shank) E027	**FSWL2**  Min. Cutting Diameter : 5.8mm
DIMPLE BAR (Steel Shank Carbide Shank) E006	**FSCLC/P FSCLC/P-E**  Min. Cutting Diameter : 10mm

Product Name	Holder
DIMPLE BAR (Steel Shank Carbide Shank) E008	**FSDUC FSDUC-E**  Min. Cutting Diameter : 14mm
DIMPLE BAR (Steel Shank Carbide Shank) E009	**FSDQC FSDQC-E**  Min. Cutting Diameter : 13mm
DIMPLE BAR (Steel Shank Carbide Shank) E007	**FSTUP FSTUP-E**  Min. Cutting Diameter : 10mm
DIMPLE BAR (Steel Shank) E011	**FSVUB/C**  Min. Cutting Diameter : 16mm
DIMPLE BAR (Steel Shank) E011	**FSVPB/C**  Min. Cutting Diameter : 16mm
DIMPLE BAR (Steel Shank) E012	**FSVJC**  Min. Cutting Diameter : 16mm
DIMPLE BAR (Steel Shank Carbide Shank) E010	**FSWUB/P FSWUB/P-E**  Min. Cutting Diameter : 10mm

CLASSIFICATION OF INTERNAL TURNING TOOLS (GROOVING/THREADING END MILLING/DRILLING)

FOR GROOVING AND THREADING

Product Name	Holder
MICRO-MINI TWIN Boring Bars (Solid Type) ➲ F126	**CG TYPE(Grooving)**  Min. Cutting Diameter : 3mm
MICRO-MINI TWIN Boring Bars (Solid Type) ➲ G026	**CT TYPE(Threading)**  Min. Cutting Diameter : 3mm
F type Bars (Steel Shank / Carbide Shank) (Grooving) (Threading) ➲ F130	**FSL51** **FSL52**  Min. Cutting Diameter : 10mm

END MILLS

Solid Carbide End Mill series	➲ J024
HSS End Mill series	➲ J043

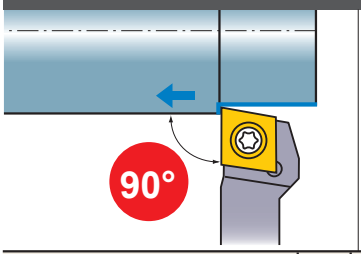
DRILLS

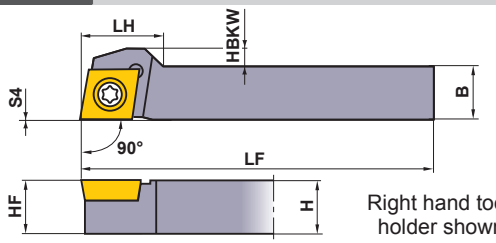
MVX/TAF Drill (Indexable type)	➲ N212
Solid Carbide Drill series	➲ N004
Solid Gun Drill series	➲ N124
HSS Drill series	➲ N010

EXTERNAL FRONT TURNING

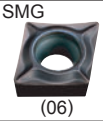
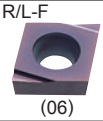
SCAC-SM

Without off set





Right hand tool holder shown.

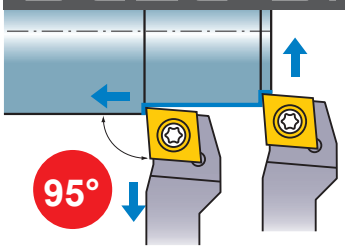
Finish	Finish	Light	Medium
SMG	R/L-F	R/L-SS	R/L-SN
			
(06)	(06)	(06,09)	(06,09)
Medium	**Flat top**	**For nonferrous metals**	**CBN/PCD**
R/L-SR		AZ	
			
(06,09)	(06,09)	(06,09)	(06,09)

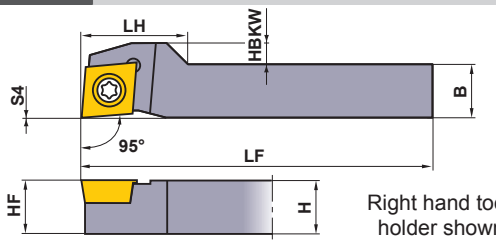
Order Number	Stock		Insert Number		Dimensions (mm)							*	
	R	L			H	B	LF	LH	HBKW	HF	S4	Clamp Screw	Wrench
SCACR/L0808K06-SM	●	●	CCET CCGT CCGW CCMT CCMW NP-CCGW	0602□□	8	8	125	11	1.6	8	0	TS254	TKY08R
SCACR/L**1010K06-SM**	●	●		0602□□	10	10	125	—	—	10	0	TS254	TKY08R
SCACR/L**1010K09-SM**	●	●		09T3□□	10	10	125	16	3.5	10	0	TS43	TKY15R
SCACR/L**1212M09-SM**	●	●		09T3□□	12	12	150	14	1.5	12	0	TS43	TKY15R
SCACR/L**1616M09-SM**	●	●		09T3□□	16	16	150	—	—	16	0	TS43	TKY15R

∗ Clamp Torque (N • m) : TS254=1.0, TS43=3.5

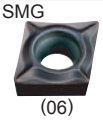
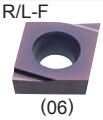
SCLC-SM

Without off set





Right hand tool holder shown.

Finish	Finish	Light	Medium
SMG	R/L-F	R/L-SS	R/L-SN
			
(06)	(06)	(06,09)	(06,09)
Medium	**Flat top**	**For nonferrous metals**	**CBN/PCD**
R/L-SR		AZ	
			
(06,09)	(06,09)	(06,09)	(06,09)

Order Number	Stock		Insert Number		Dimensions (mm)							*	
	R	L			H	B	LF	LH	HBKW	HF	S4	Clamp Screw	Wrench
SCLCR/L0808K06-SM	●	●	CCET CCGT CCGW CCMT CCMW NP-CCGW	0602□□	8	8	125	11	2.1	8	0	TS254	TKY08R
SCLCR/L**1010K06-SM**	●	●		0602□□	10	10	125	—	—	10	0	TS254	TKY08R
SCLCR/L**1010K09-SM**	●	●		09T3□□	10	10	125	20	4	10	0	TS43	TKY15R
SCLCR/L**1212M09-SM**	●	●		09T3□□	12	12	150	18	2	12	0	TS43	TKY15R
SCLCR/L**1616M09-SM**	●	●		09T3□□	16	16	150	—	—	16	0	TS43	TKY15R

∗ Clamp Torque (N • m) : TS254=1.0, TS43=3.5

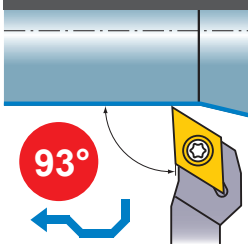
(Note) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

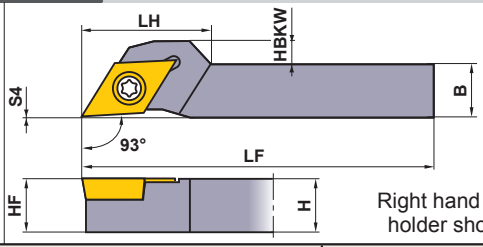
● : **Inventory maintained in Japan.**

SCAC-SM type inserts	**➤ A126—A130**
SCLC-SM type inserts	**➤ A126—A130**
CBN & PCD inserts	**➤ B039—B041, B059**

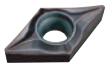
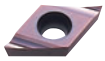
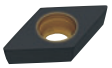
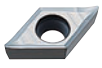
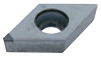
SDJC-SM

Without off set





Right hand tool holder shown.

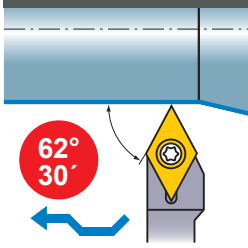
Finish	Finish	Light	Medium
SMG	R-F	R-SS	R-SN
			
(07, 11)	(07, 11)	(07, 11)	(07, 11)
Medium	**Flat top**	**For nonferrous metals**	**CBN/PCD**
R-SR		AZ	
			
(07, 11)	(07, 11)	(07, 11)	(07, 11)

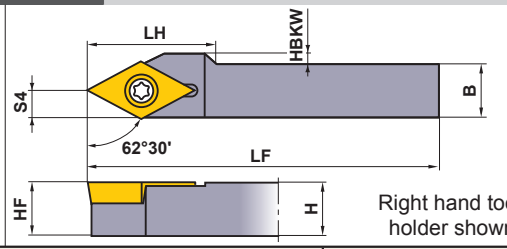
Order Number	Stock		Insert Number		Dimensions (mm)							*	
	R	L			H	B	LF	LH	HBKW	HF	S4	Clamp Screw	Wrench
SDJCR/L0808K07-SM	●	●	DCET DCGT DCGW DCMT DCMW NP-DCGW NP-DCMT NP-DCMW	0702□□	8	8	125	15	2	8	0	TS254	TKY08R
SDJCR/L**1010K07-SM**	●	●		0702□□	10	10	125	–	–	10	0	TS254	TKY08R
SDJCR/L**1010K11-SM**	●	●		11T3□□	10	10	125	24	4	10	0	TS43	TKY15R
SDJCR/L**1212M11-SM**	●	●		11T3□□	12	12	150	22	2	12	0	TS43	TKY15R
SDJCR/L**1616M11-SM**	●	●		11T3□□	16	16	150	–	–	16	0	TS43	TKY15R

∗ Clamp Torque (N • m) : TS254=1.0, TS43=3.5

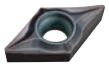
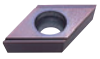
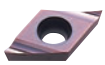
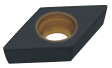
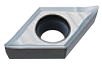
SDNC-SM

Neutral edge with handed holder
Without off set





Right hand tool holder shown.

Finish	Finish	Light	Medium
SMG	R-F	R-SS	R-SN
			
(07, 11)	(07, 11)	(07, 11)	(07, 11)
Medium	**Flat top**	**For nonferrous metals**	**CBN/PCD**
R-SR		AZ	
			
(07, 11)	(07, 11)	(07, 11)	(07, 11)

Order Number	Stock		Insert Number		Dimensions (mm)							*	
	R	L			H	B	LF	LH	HBKW	HF	S4	Clamp Screw	Wrench
SDNCR/L0808K07-SM	●	●	DCET DCGT DCGW DCMT DCMW NP-DCGW NP-DCMT NP-DCMW	0702□□	8	8	125	–	–	8	3	TS254	TKY08R
SDNCR/L**1010K07-SM**	●	●		0702□□	10	10	125	–	–	10	3	TS254	TKY08R
SDNCR/L**1010K11-SM**	●	●		11T3□□	10	10	125	24	2	10	5	TS43	TKY15R
SDNCR/L**1212M11-SM**	●	●		11T3□□	12	12	150	–	–	12	5	TS43	TKY15R
SDNCR/L**1616M11-SM**	●	●		11T3□□	16	16	150	–	–	16	5	TS43	TKY15R

∗ Clamp Torque (N • m) : TS254=1.0, TS43=3.5

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF**	100 (50–150)	0.08 (0.01–0.15)
P	Free Cutting Steel	–	**VP15TF**	110 (30–180)	0.08 (0.01–0.15)
P	Free Cutting Steel	–	**NX2525**	150 (50–250)	0.08 (0.01–0.15)
M	Stainless Steel	≤200HB	**VP15TF**	80 (50–120)	0.06 (0.02–0.1)
N	Non-Ferrous Metal	–	**HTi10**	150 (70–230)	0.09 (0.03–0.15)

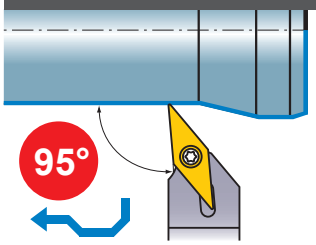
SDJC-SM type inserts	**➤ A132–A135**
SDNC-SM type inserts	**➤ A132–A135**
CBN & PCD inserts	**➤ B043, B044, B060**

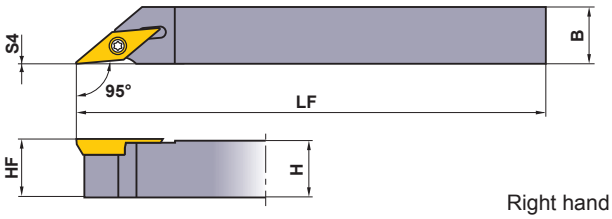
SPARE PARTS	**➤ P001**
TECHNICAL DATA	**➤ Q001**

EXTERNAL FRONT TURNING

SVLP-SM

Without off set





Right hand tool holder shown.

Finish
R/L-SRF



(08,11)

Finish
SMG



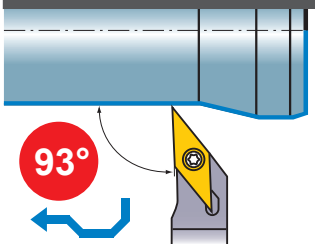
(08,11)

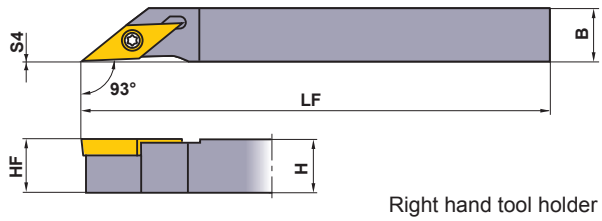
Order Number	Stock		Insert Number		Dimensions (mm)					* Clamp Screw	Wrench
	R	L			H	B	LF	HF	S4		
SVLPR/L1010K08-SM	●	●	VPET VPGT	0802○○	10	10	125	10	0	TS202	TKY06R
SVLPR/L**1212M08-SM**	●	●		0802○○	12	12	150	12	0	TS202	TKY06R
SVLPR/L**1010K11-SM**	●	●		1103○○	10	10	125	10	0	TS255	TKY08R
SVLPR/L**1212M11-SM**	●	●		1103○○	12	12	150	12	0	TS255	TKY08R
SVLPR/L**1616M11-SM**	●	●		1103○○	16	16	150	16	0	TS255	TKY08R

∗ Clamp Torque (N • m) : TS202=0.6, TS255=1.0

SVJB-SM

Without off set





Right hand tool holder shown.

Finish
R/L-F



(11)

Medium
R/L-SN



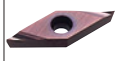
(11)

Medium
MV



(11)

Medium
R/L-SR



(11)

Order Number	Stock		Insert Number		Dimensions (mm)					* Clamp Screw	Wrench
	R	L			H	B	LF	HF	S4		
SVJBR/L1010K11-SM	●	●	VBET VBGT VBMT	1103○○	10	10	125	10	0	TS255	TKY08R
SVJBR/L**1212M11-SM**	●	●		1103○○	12	12	150	12	0	TS255	TKY08R
SVJBR/L**1616M11-SM**	●	●		1103○○	16	16	150	16	0	TS255	TKY08R

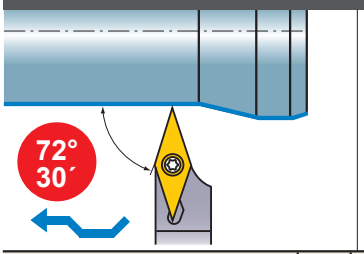
∗ Clamp Torque (N • m) : TS255=1.0

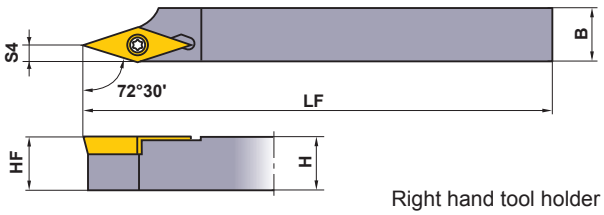
● : Inventory maintained in Japan. (10 inserts in one case)

SVLP-SM type inserts	➤ A154
SVJB-SM type inserts	➤ A148—A150
CBN & PCD inserts	➤ B048, B064

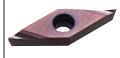
SVVB-SM

Neutral edge with handed holder





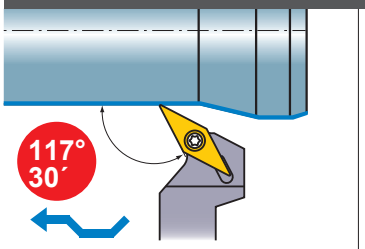
Right hand tool holder shown.

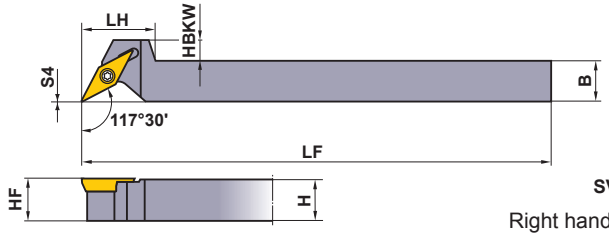
Finish	Medium
R/L-F	R/L-SN
 (11)	 (11)
Medium	Medium
MV	R/L-SR
 (11)	 (11)

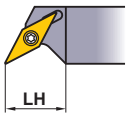
Order Number	Stock		Insert Number		Dimensions (mm)					*	
	R	L			H	B	LF	HF	S4	Clamp Screw	Wrench
SVVBR/L1010K11-SM	●	●	VBET VBGT VBMT	1103○○	10	10	125	10	3	TS255	TKY08R
SVVBR/L**1212M11-SM**	●	●		1103○○	12	12	150	12	3	TS255	TKY08R
SVVBR/L**1616M11-SM**	●	●		1103○○	16	16	150	16	3	TS255	TKY08R

∗ Clamp Torque (N • m) : TS255=1.0

SVPP-SM







SVPPR/L1616M11-SM

Right hand tool holder shown.

Finish
R/L-SRF
 (11)
Finish
SMG
 (11)

Order Number	Stock		Insert Number		Dimensions (mm)							*	
	R	L			H	B	LF	LH	HBKW	HF	S4	Clamp Screw	Wrench
SVPPR/L1010K11-SM	●	●	VPET VPGT	1103○○	10	10	125	20	8	10	0	TS255	TKY08R
SVPPR/L**1212M11-SM**	●	●		1103○○	12	12	150	20	6	12	0	TS255	TKY08R
SVPPR/L**1616M11-SM**	●	●		1103○○	16	16	150	17	—	16	0	TS255	TKY08R

∗ Clamp Torque (N • m) : TS255=1.0

RECOMMENDED CUTTING CONDITIONS

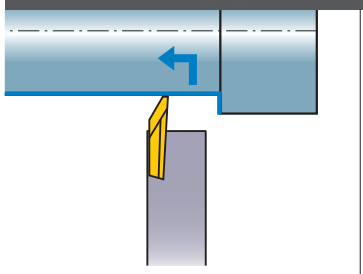
	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF**	100 (70–120)	0.06 (0.02–0.1)
	Free Cutting Steel	–	**VP15TF**	110 (30–180)	0.06 (0.02–0.1)
M	Stainless Steel	≤200HB	**VP15TF**	100 (70–120)	0.06 (0.02–0.1)

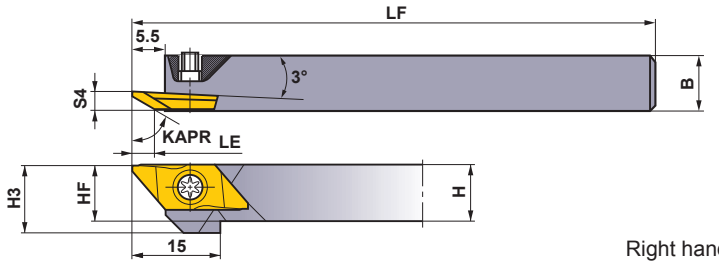
(Note) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

SVVB-SM type inserts	**➤ A148–A150**	**SPARE PARTS**	**➤ P001**
SVPP-SM type inserts	**➤ A154**	**TECHNICAL DATA**	**➤ Q001**
CBN & PCD inserts	**➤ B048, B064**		

EXTERNAL BACK TURNING

BTAH





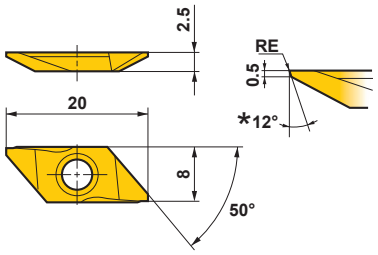
Right hand tool holder shown.

Order Number	Stock		Insert Number		Dimensions (mm)						*	
	R	L			H	B	LF	HF	H3	S4	Clamp Screw	Wrench
BTAHR/L0810-50	●	●	BTAT	5528□□R/L-B	8	10	120	8	12	3.5	NS402W	NKY15R
BTAHR/L**1010-50**	●	●		6035□□R/L-B	10	10	120	10	12	3.5	NS402W	NKY15R
BTAHR/L**1212-50**	●	●		605000RX	12	12	120	12	—	3.5	NS403W	NKY15R
BTAHR/L**1616-50**	●				16	16	120	16	—	3.5	NS403W	NKY15R

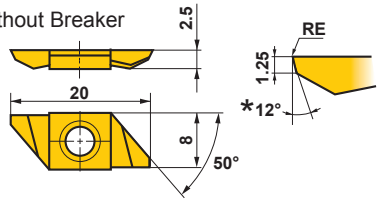
(Note 1) Please use right hand insert for right hand holder and left hand insert for left hand holder.
(Note 2) Set the maximum depth of cut at under 60% of the effective cutting edge length (LE).
∗ Clamp Torque (N • m) : NS402W=1.0, NS403W=1.0

INSERTS

Order Number	Hand	Coated	Dimensions (mm)			Geometry
		VP15TF	KAPR*	RE	LE *	
BTAT552800R-B	R	●	55°	0	2.8	With Breaker
BTAT**552800L-B**	L	●	55°	0	2.8	
BTAT**552801R-B**	R	●	55°	0.1	2.8	
BTAT**552801L-B**	L	●	55°	0.1	2.8	
BTAT**603500R-B**	R	●	60°	0	3.5	
BTAT**603500L-B**	L	●	60°	0	3.5	
BTAT**603501R-B**	R	●	60°	0.1	3.5	
BTAT**603501L-B**	L	●	60°	0.1	3.5	
BTAT605000RX	R	●	60°	0	5.0	Without Breaker



Right hand insert shown.



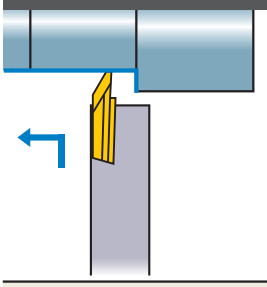
∗ Numeric value set insert on holder.

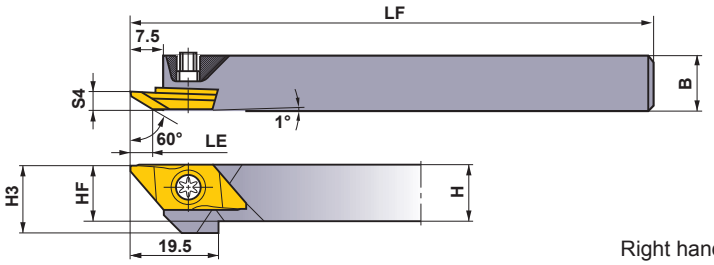
RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF**	100 (50–150)	0.08 (0.01–0.15)
P	Free Cutting Steel	–	**VP15TF**	110 (30–180)	0.08 (0.01–0.15)
M	Stainless Steel	≤200HB	**VP15TF**	80 (50–120)	0.06 (0.02–0.1)
N	Non-Ferrous Metal	–	**VP15TF**	150 (70–230)	0.09 (0.03–0.15)

● : **Inventory maintained in Japan. (5 inserts in one case)**

CTBH





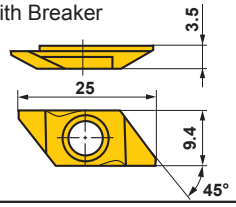
Right hand tool holder shown.

Order Number	Stock		Insert Number		Dimensions (mm)						*	
	R	L			H	B	LF	HF	H3	S4	Clamp Screw	Wrench
CTBHR/L1010-160	●	●	BTBT	60450□R/L-B 606000R/L	10	10	120	10	12	3.4	NS402W	NKY15R
CTBHR/L1212-160	●	●			12	12	120	12	—	3.4	NS403W	NKY15R
CTBHR/L1616-160	●	●			16	16	120	16	—	3.4	NS403W	NKY15R

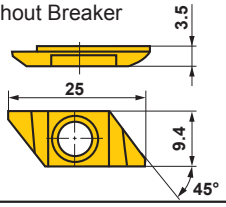
(Note 1) Please use right hand insert for right hand holder and left hand insert for left hand holder.
(Note 2) Set the maximum depth of cut at under 60% of the effective cutting edge length (LE).
∗ Clamp Torque (N • m) : NS402W=1.0, NS403W=1.0

INSERTS

Order Number	Hand	Coated	Dimensions (mm)		LE (mm) ∗	Geometry
		VP15TF	RE	CF		
BTBT604500R-B	R	●	0	0.2	4.5	With Breaker
BTBT604500L-B	L	●	0	0.2	4.5	
BTBT604501R-B	R	●	0.1	0.3	4.5	
BTBT604501L-B	L	●	0.1	0.3	4.5	
BTBT606000R	R	●	0	0.2	6.0	Without Breaker
BTBT606000L	L	●	0	0.2	6.0	



Right hand insert shown.



Right hand insert shown.

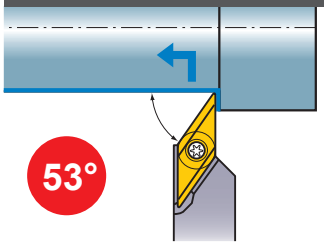
∗ Numeric value set insert on holder.

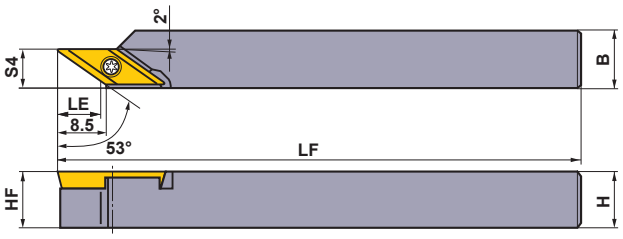
SMALL TOOLS

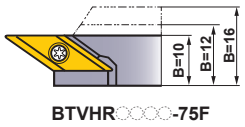
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

EXTERNAL BACK TURNING

BTVH







BTVHR□□□□-75F

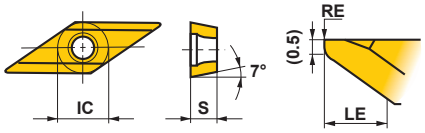
Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions (mm)					*	
	R			H	B	LF	HF	S4	Clamp Screw	Wrench
BTVHR1010-75	●	BTVT	5375□□R-B	10	10	120	10	7.5	NS251	NKY15R
BTVHR**1212-75**	●			12	12	120	12	7.5	NS251	NKY15R
BTVHR**1616-75**	●			16	16	120	16	7.5	NS251	NKY15R
BTVHR**1010-75F**	●			10	10	120	10	10.0	NS251	NKY15R
BTVHR**1212-75F**	●			12	12	120	12	10.0	NS251	NKY15R
BTVHR**1616-75F**	●			16	16	120	16	10.0	NS251	NKY15R

(Note 1) Set the maximum depth of cut at under 30% of the effective cutting edge length (LE).
(Note 2) For high load machining, F type is recommended.
* Clamp Torque (N • m) : NS251=1.0

INSERTS

Order Number	Hand	Coated	Dimensions (mm)			LE (mm) *	Geometry
		VP15TF	IC	S	RE		
BTVT5375V5R-B	R	●	6.35	3.18	0.05	7.5	With Breaker
BTVT**537501R-B**	R	●	6.35	3.18	0.1	7.5	



* Numeric value set insert on holder.

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF**	100 (50–150)	0.08 (0.01–0.15)
	Free Cutting Steel	–	**VP15TF**	110 (30–180)	0.08 (0.01–0.15)
M	Stainless Steel	≤200HB	**VP15TF**	80 (50–120)	0.06 (0.02–0.1)
N	Non-Ferrous Metal	–	**VP15TF**	150 (70–230)	0.09 (0.03–0.15)

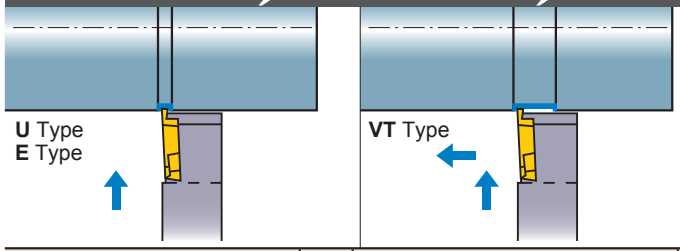
● : **Inventory maintained in Japan. (5 inserts in one case)**

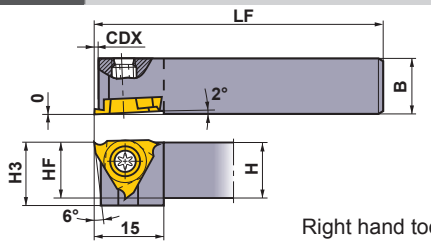
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

Memo

EXTERNAL GROOVING

GTAH, GTBH, GTCH





Right hand tool holder shown.

	Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) H	B	HF	LF	CDX*1	H3	Cutting Width (mm)	*2 Clamp Screw	Wrench
Standard Shank	GTAHR/L0808-20S	●	●	GTAT GTBT *1 GTCT *1	○○○○	8	8	8	80	2	13	0.3—3.0	NS404W	NKY15R
	GTAHR/L1010-20S	●	●		○○○○	10	10	10	80	2	13	0.3—3.0	NS404W	NKY15R
	GTAHR/L1212-20S	●	●		○○○○	12	12	12	80	2	13	0.3—3.0	NS404W	NKY15R
	GTBHR/L1010-30S	●	●	GTBT. GTCT	○○○○	10	10	10	80	3	13	1.45—3.0	NS404W	NKY15R
	GTCHR/L1010-30S	●	●	GTCT	○○○○	10	10	10	80	3	13	2.5—3.0	NS404W	NKY15R
Long Shank	GTAHR/L0808-20	●	●	GTAT GTBT *1 GTCT *1	○○○○	8	8	8	120	2	13	0.3—3.0	NS404W	NKY15R
	GTAHR/L1010-20	●	●		○○○○	10	10	10	120	2	13	0.3—3.0	NS404W	NKY15R
	GTAHR/L1212-20	●	●		○○○○	12	12	12	120	2	13	0.3—3.0	NS404W	NKY15R
	GTAHR/L1616-20	●	●		○○○○	16	16	16	120	2	—	0.3—3.0	NS404W	NKY15R
	GTBHR/L1010-30	●	●	GTBT. GTCT	○○○○	10	10	10	120	3	13	1.45—3.0	NS404W	NKY15R
	GTBHR/L1212-30	●	●		○○○○	12	12	12	120	3	13	1.45—3.0	NS404W	NKY15R
	GTBHR/L1616-30	●	●		○○○○	16	16	16	120	3	16	1.45—3.0	NS404W	NKY15R
	GTCHR/L1010-30	●	●	GTCT	○○○○	10	10	10	120	3	13	2.5—3.0	NS404W	NKY15R

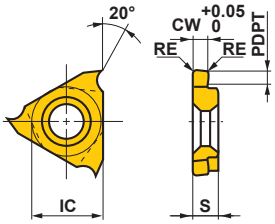
(Note) Please use right hand insert for right hand holder and left hand insert for left hand holder.

*1 Even if the insert dimension PDPT exceeds the holder dimension CDX, it is not possible to machine depths over CDX.

*2 Clamp Torque (N • m) : NS404W=1.0

INSERTS

Order Number	Hand	Coated VP15TF	Dimensions (mm) CW	PDPT*1	RE	IC	S	Geometry
GTAT 03006V3R-U	R	●	0.3	0.6	0.03	9.525	3.18	U Type Breaker (General purpose Grooving)
GTAT 03006V3L-U	L	●	0.3	0.6	0.03	9.525	3.18	
GTAT 05012V5R-U	R	●	0.5	1.2	0.05	9.525	3.18	
GTAT 05012V5L-U	L	●	0.5	1.2	0.05	9.525	3.18	
GTAT 07520V5R-U	R	●	0.75	2.0	0.05	9.525	3.18	
GTAT 07520V5L-U	L	●	0.75	2.0	0.05	9.525	3.18	
GTAT 09520V5R-U	R	●	0.95	2.0	0.05	9.525	3.18	
GTAT 09520V5L-U	L	●	0.95	2.0	0.05	9.525	3.18	
GTAT 10020V5R-U	R	●	1.0	2.0	0.05	9.525	3.18	
GTAT 10020V5L-U	L	●	1.0	2.0	0.05	9.525	3.18	
GTAT 10320V5R-U	R	●	1.03	2.0	0.05	9.525	3.18	
GTAT 12520V5R-U	R	●	1.25	2.0	0.05	9.525	3.18	
GTAT 12520V5L-U	L	●	1.25	2.0	0.05	9.525	3.18	
GTBT 14530V5R-U	R	●	1.45	3.0	0.05	9.525	3.18	
GTBT 14530V5L-U	L	●	1.45	3.0	0.05	9.525	3.18	
GTBT 15030V5R-U	R	●	1.5	3.0	0.05	9.525	3.18	
GTBT 15030V5L-U	L	●	1.5	3.0	0.05	9.525	3.18	
GTBT 17530V5R-U	R	●	1.75	3.0	0.05	9.525	3.18	
GTBT 17530V5L-U	L	●	1.75	3.0	0.05	9.525	3.18	
GTBT 20030V5R-U	R	●	2.0	3.0	0.05	9.525	3.18	
GTBT 20030V5L-U	L	●	2.0	3.0	0.05	9.525	3.18	
GTCT 25030V5R-U	R	●	2.5	3.0	0.05	9.525	3.18	
GTCT 25030V5L-U	L	●	2.5	3.0	0.05	9.525	3.18	

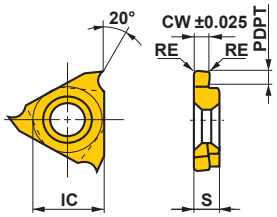


Right hand insert shown.

● : Inventory maintained in Japan. (5 inserts in one case)

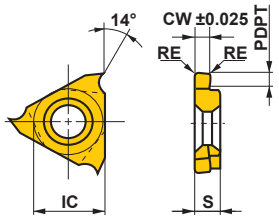
INSERTS

Order Number	Hand	Coated		Carbide	Dimensions (mm)					Geometry
		VP15TF	VP15KZ	TF15	CW	PDPT	RE	IC	S	
GTAT 03306V3R-E	R	●			0.33	0.6	0.03	9.525	3.18	**E** Type Breaker (Ring processing Grooving)
GTAT **03306V3L-E**	L	●			0.33	0.6	0.03	9.525	3.18	
GTAT **04312V3R-E**	R	●			0.43	1.2	0.03	9.525	3.18	
GTAT **04312V3L-E**	L	●			0.43	1.2	0.03	9.525	3.18	
GTAT **05312V5R-E**	R	●			0.53	1.2	0.05	9.525	3.18	
GTAT **05312V5L-E**	L	●			0.53	1.2	0.05	9.525	3.18	
GTAT **07520V5R-E**	R	●			0.75	2.0	0.05	9.525	3.18	
GTAT **07520V5L-E**	L	●			0.75	2.0	0.05	9.525	3.18	
GTAT **09520V5R-E**	R	●			0.95	2.0	0.05	9.525	3.18	
GTAT **09520V5L-E**	L	●			0.95	2.0	0.05	9.525	3.18	
GTAT **10020V5R-E**	R	●			1.0	2.0	0.05	9.525	3.18	
GTAT **10020V5L-E**	L	●			1.0	2.0	0.05	9.525	3.18	
GTAT **1002001R-E**	R	●			1.0	2.0	0.1	9.525	3.18	
GTAT **1002001L-E**	L	●			1.0	2.0	0.1	9.525	3.18	
GTAT **12020V5R-E**	R	●			1.2	2.0	0.05	9.525	3.18	
GTAT **12020V5L-E**	L	●			1.2	2.0	0.05	9.525	3.18	
GTAT **1202001R-E**	R	●			1.2	2.0	0.1	9.525	3.18	
GTAT **1202001L-E**	L	●			1.2	2.0	0.1	9.525	3.18	
GTAT **14020V5R-E**	R	●			1.4	2.0	0.05	9.525	3.18	
GTAT **14020V5L-E**	L	●			1.4	2.0	0.05	9.525	3.18	
GTBT15030V5R-E	R	●			1.5	3.0	0.05	9.525	3.18	
GTBT **15030V5L-E**	L	●			1.5	3.0	0.05	9.525	3.18	
GTBT **1503001R-E**	R	●			1.5	3.0	0.1	9.525	3.18	
GTBT **1503001L-E**	L	●			1.5	3.0	0.1	9.525	3.18	
GTBT **18030V5R-E**	R	●			1.8	3.0	0.05	9.525	3.18	
GTBT **18030V5L-E**	L	●			1.8	3.0	0.05	9.525	3.18	
GTBT **20030V5R-E**	R	●			2.0	3.0	0.05	9.525	3.18	
GTBT **20030V5L-E**	L	●			2.0	3.0	0.05	9.525	3.18	
GTBT **2003001R-E**	R	●			2.0	3.0	0.1	9.525	3.18	
GTBT **2003001L-E**	L	●			2.0	3.0	0.1	9.525	3.18	
GTBT **22530V5R-E**	R	●			2.25	3.0	0.05	9.525	3.18	
GTBT **22530V5L-E**	L	●			2.25	3.0	0.05	9.525	3.18	
GTCT25030V5R-E	R	●			2.5	3.0	0.05	9.525	3.18	
GTCT **25030V5L-E**	L	●			2.5	3.0	0.05	9.525	3.18	
GTCT **27530V5R-E**	R	●			2.75	3.0	0.05	9.525	3.18	
GTCT **27530V5L-E**	L	●			2.75	3.0	0.05	9.525	3.18	
GTCT **30030V5R-E**	R	●			3.0	3.0	0.05	9.525	3.18	
GTCT **30030V5L-E**	L	●			3.0	3.0	0.05	9.525	3.18	

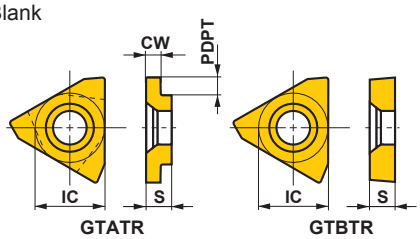


Right hand insert shown.

Order Number	Hand	Coated		Carbide	Dimensions (mm)					Max. Cutting Depth (mm)	Geometry
		VP15TF	VP15KZ	TF15	CW	PDPT	RE	IC	S		
GTAT 0330600R-VT	R		●		0.33	0.6	0	9.525	3.18	0.25	**VT** Type Breaker (Grooving, Side Turning)
GTAT **0431200R-VT**	R		●		0.43	1.2	0	9.525	3.18	0.9	
GTAT **0532000R-VT**	R		●		0.53	2.0	0	9.525	3.18	1.6	
GTAT **0652000R-VT**	R		●		0.65	2.0	0	9.525	3.18	1.6	
GTAT **0752000R-VT**	R		●		0.75	2.0	0	9.525	3.18	1.6	
GTAT **0802000R-VT**	R		●		0.8	2.0	0	9.525	3.18	1.6	
GTAT **0852000R-VT**	R		●		0.85	2.0	0	9.525	3.18	1.6	
GTAT **0952000R-VT**	R		●		0.95	2.0	0	9.525	3.18	1.6	
GTAT **1002000R-VT**	R		●		1.0	2.0	0	9.525	3.18	1.6	
GTAT **1102000R-VT**	R		●		1.1	2.0	0	9.525	3.18	1.6	
GTAT **1202000R-VT**	R		●		1.2	2.0	0	9.525	3.18	1.6	
GTAT **1302000R-VT**	R		●		1.3	2.0	0	9.525	3.18	1.6	
GTAT **1402000R-VT**	R		●		1.4	2.0	0	9.525	3.18	1.6	
GTBT1503000R-VT	R		●		1.5	3.0	0	9.525	3.18	2.7	
GTBT **2003000R-VT**	R		●		2.0	3.0	0	9.525	3.18	2.7	



Order Number	Hand	Coated		Carbide	Dimensions (mm)					Geometry
		VP15TF	VP15KZ	TF15	CW	PDPT	RE	IC	S	
GTATR	R			∗●	1.76	3.0	—	9.525	3.18	Blank
GTATL	L			∗●	1.76	3.0	—	9.525	3.18	
GTBTR	R			∗●	—	0	—	9.525	3.18	
GTBTL	L			∗●	—	0	—	9.525	3.18	



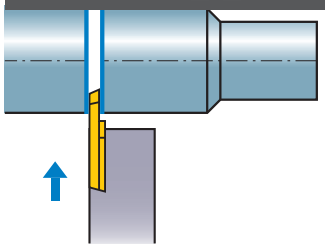
Right hand insert shown.

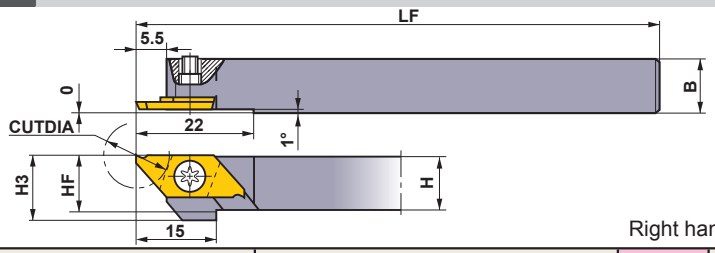
∗ 10 inserts in one case.

CUTTING CONDITIONS ➤ D018
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

EXTERNAL CUTTING OFF

CTAH



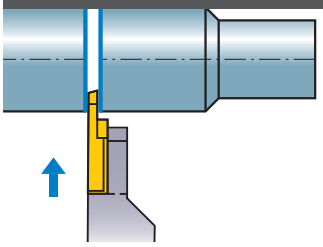


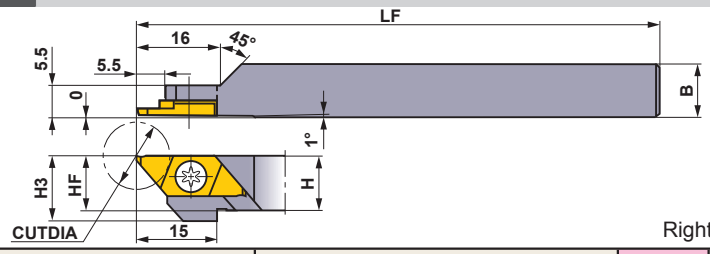
Right hand tool holder shown.

Order Number	Stock		Insert Number		Dimensions (mm)					CUTDIA (mm)	*2	
	R	L			H	B	HF	LF	H3		Clamp Screw	Wrench
CTAHR/L0810-120	●	●	CTAT	○○○○	8	10	8	120	12	12 (8) *1	NS402W	NKY15R
CTAHR/L**1010-120**	●	●		○○○○	10	10	10	120	12		NS402W	NKY15R
CTAHR/L**1212-120**	●	●		○○○○	12	12	12	120	—		NS403W	NKY15R
CTAHR/L**1616-120**	●	●		○○○○	16	16	16	120	—		NS403W	NKY15R

*1 When the width of cutting off (CW) is 0.7mm.
*2 Clamp Torque (N • m) : NS402W=1.0, NS403W=1.0

CTAH-S





Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions (mm)					CUTDIA (mm)	*2	
	R			H	B	HF	LF	H3		Clamp Screw	Wrench
CTAHR1010-120S	●	CTAT	○○○○	10	10	10	80	12	12 (8) *1	NS401	NKY25R

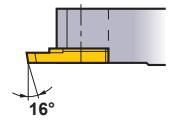
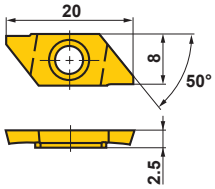
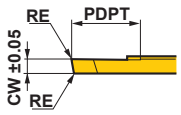
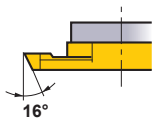
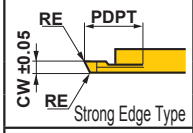
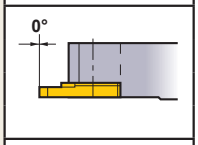
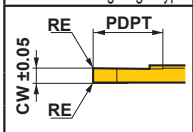
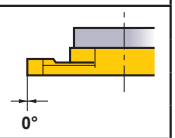
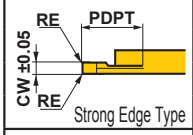
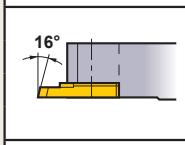
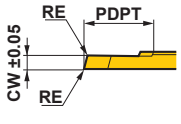
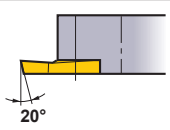
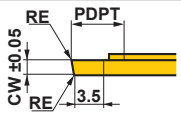
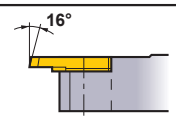
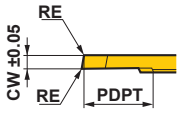
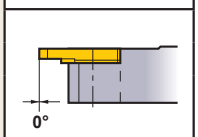
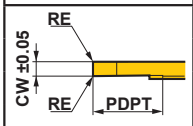
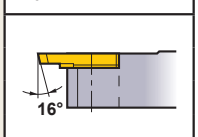
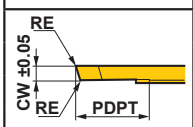
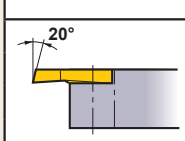
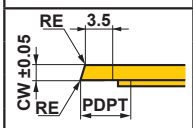
*1 When the width of cutting off (CW) is 0.7mm.
*2 Clamp Torque (N • m) : NS401=3.5

RECOMMENDED CUTTING CONDITIONS

Work Material		Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF/VP15KZ**	100 (50–150)	0.05 (0.02–0.09)
	Free Cutting Steel	–	**VP15TF/VP15KZ**	110 (30–180)	0.05 (0.01–0.09)
M	Stainless Steel	≤200HB	**VP15TF/VP15KZ**	80 (50–120)	0.03 (0.02–0.05)
N	Non-Ferrous Metal	–	**VP15TF/VP15KZ**	150 (70–230)	0.07 (0.03–0.11)

● : **Inventory maintained in Japan. (5 inserts in one case)**

INSERTS

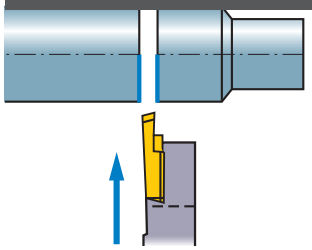
Holder	Setting Geometry	Breaker	Geometry	Insert Geometry	Order Number	Hand	Coated	Dimensions (mm)			CUTDIA *1 (mm)
							VP15TF	CW	PDPT	RE	
Right Hand (R)		With Breaker			CTAT07080V5RR-B	R	●	0.7	4.5	0.05	8
					CTAT10120V5RR-B	R	●	1.0	6.7	0.05	12
					CTAT15120V5RR-B	R	●	1.5	6.7	0.05	12
					CTAT20120V5RR-B	R	●	2.0	6.7	0.05	12
					CTAT15120V5RR-BX	R	●	1.5	6.7	0.05	12
					CTAT20120V5RR-BX	R	●	2.0	6.7	0.05	12
					CTAT10120V5RN-B	N	●	1.0	6.7	0.05	12
					CTAT15120V5RN-B	N	●	1.5	6.7	0.05	12
					CTAT20120V5RN-B	N	●	2.0	6.7	0.05	12
					CTAT15120V5RN-BX	N	●	1.5	6.7	0.05	12
					CTAT20120V5RN-BX	N	●	2.0	6.7	0.05	12
					CTAT10110V5RL-B	L	●	1.0	6.7	0.05	11
					CTAT15110V5RL-B	L	●	1.5	6.7	0.05	11
					CTAT20110V5RL-B	L	●	2.0	6.7	0.05	11
		Without Breaker			CTAT1012000RR	R	●	1.0	6.7	0	12
					CTAT1512000RR	R	●	1.5	6.7	0	12
					CTAT2012000RR	R	●	2.0	6.7	0	12
Left Hand (L)		With Breaker			CTAT07080V5LL-B	L	●	0.7	4.5	0.05	8
					CTAT10120V5LL-B	L	●	1.0	6.7	0.05	12
					CTAT15120V5LL-B	L	●	1.5	6.7	0.05	12
					CTAT20120V5LL-B	L	●	2.0	6.7	0.05	12
					CTAT10120V5LN-B	N	●	1.0	6.7	0.05	12
					CTAT15120V5LN-B	N	●	1.5	6.7	0.05	12
					CTAT20120V5LN-B	N	●	2.0	6.7	0.05	12
					CTAT10110V5LR-B	R	●	1.0	6.7	0.05	11
					CTAT15110V5LR-B	R	●	1.5	6.7	0.05	11
					CTAT20110V5LR-B	R	●	2.0	6.7	0.05	11
		Without Breaker	Right hand insert shown.		CTAT1012000LL	L	●	1.0	6.7	0	12
					CTAT1512000LL	L	●	1.5	6.7	0	12
					CTAT2012000LL	L	●	2.0	6.7	0	12

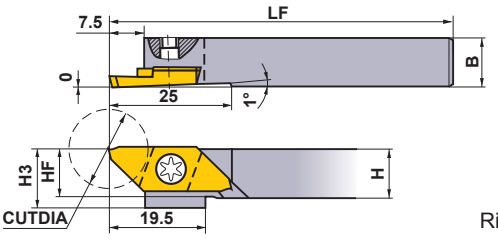
*1 CUTDIA : Max. Cut off Diameter

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

EXTERNAL CUTTING OFF

CTBH



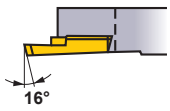
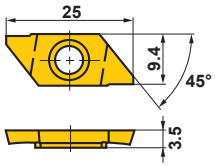
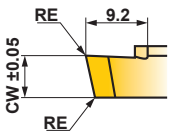
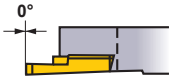
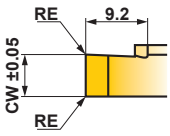
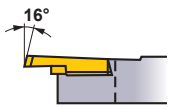
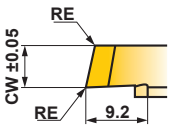
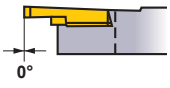
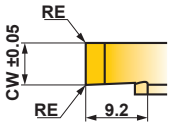
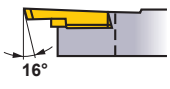
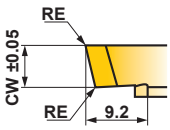


Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) H	B	HF	LF	H3	CUTDIA (mm)	* Clamp Screw	Wrench
CTBHR/L1010-160	●	●	CTBT	○○○○	10	10	10	120	12	16	NS402W	NKY15R
CTBHR/L**1212-160**	●	●		○○○○	12	12	12	120	—	16	NS403W	NKY15R
CTBHR/L**1616-160**	●	●		○○○○	16	16	16	120	—	16	NS403W	NKY15R

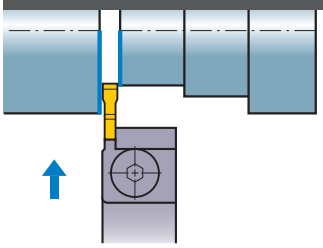
* Clamp Torque (N • m) : NS402W=1.0, NS403W=1.0

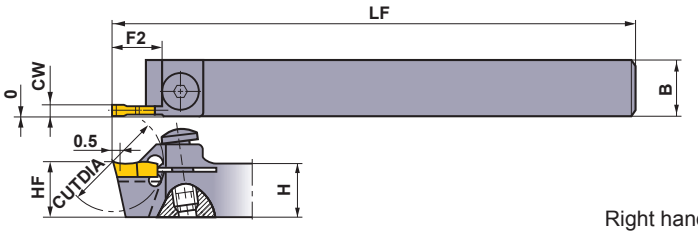
INSERTS

Holder	Setting Geometry	Breaker	Geometry	Insert Geometry	Order Number	Hand	Coated VP15TF	Dimensions (mm) CW	Dimensions (mm) RE	CUTDIA (mm)
Right Hand (R)		With Breaker	 Right hand insert shown.		**CTBT15160V5RR-B**	R	●	1.5	0.05	16
					CTBT**20160V5RR-B**	R	●	2.0	0.05	16
					**CTBT20160V5RN-B**	N	●	2.0	0.05	16
Left Hand (L)					**CTBT20160V5LL-B**	L	●	2.0	0.05	16
					**CTBT20160V5LN-B**	N	●	2.0	0.05	16
					**CTBT20145V5LR-B**	R	●	2.0	0.05	14.5

● : Inventory maintained in Japan. (5 inserts in one case)

CTCH





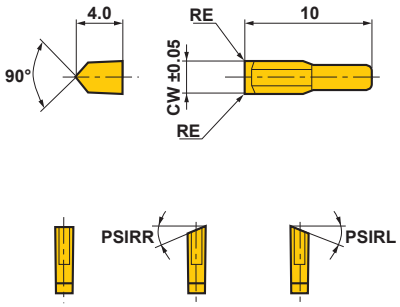
Right hand tool holder shown.

Order Number	Stock		Insert Number		Dimensions (mm)					CUTDIA (mm)	* Clamp Screw	Wrench
	R	L			H	B	HF	LF	F2			
CTCHR/L1010-200	●	●	CTCT	2○○○	10	10	10	120	11	20	NS501W	HKY25RS
CTCHR/L1212-200	●	●	CTCT	2○○○	12	12	12	120	11	20	NS501W	HKY25RS

* Clamp Torque (N • m) : NS501W=2.2

INSERTS

Breaker	Order Number	Hand	Coated	Dimensions (mm)			CUTDIA (mm)	Geometry
			VP15TF	CW	PSIRR/L	RE		
With Breaker	**CTCT22200V5N-B**	N	*●	2.2	0°	0.05	20	
	CTCT**2220001N-B**	N	*●	2.2	0°	0.1	20	
	CTCT**25200V5N-B**	N	*●	2.5	0°	0.05	20	
	CTCT**2520001N-B**	N	*●	2.5	0°	0.1	20	
	CTCT**22200V5R-B**	R	*●	2.2	17°	0.05	20	
	CTCT**2220001R-B**	R	*●	2.2	17°	0.1	20	
	CTCT**25200V5R-B**	R	*●	2.5	17°	0.05	20	
	CTCT**2520001R-B**	R	*●	2.5	17°	0.1	20	
	CTCT**22200V5L-B**	L	*●	2.2	17°	0.05	20	
	CTCT**2220001L-B**	L	*●	2.2	17°	0.1	20	
	CTCT**25200V5L-B**	L	*●	2.5	17°	0.05	20	
	CTCT**2520001L-B**	L	*●	2.5	17°	0.1	20	



* 10 inserts in one case.

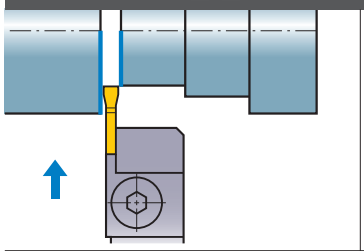
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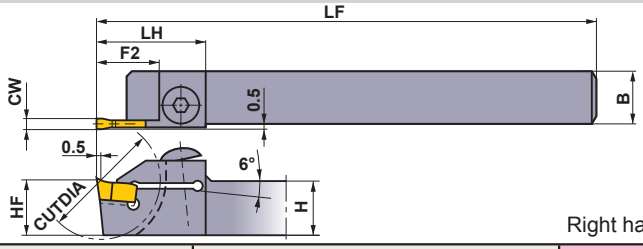
	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF**	100 (50–150)	0.05 (0.02–0.09)
P	Free Cutting Steel	–	**VP15TF**	110 (30–180)	0.05 (0.01–0.09)
M	Stainless Steel	≤200HB	**VP15TF**	80 (50–120)	0.03 (0.02–0.05)
N	Non-Ferrous Metal	–	**VP15TF**	150 (70–230)	0.07 (0.03–0.11)

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

EXTERNAL CUTTING OFF

CTDH





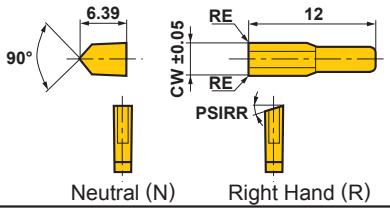
Right hand tool holder shown.

Order Number	Stock		Insert Number		Dimensions (mm)						CUTDIA (mm)	* Clamp Screw	Wrench
	R	L			H	B	HF	LF	LH	F2			
CTDHR/L1616-230	●		CTDT	2535○○	16	16	16	125	24	12.2	23	HBH06020	HKY40R
CTDHR/L1616-280	●			2535○○	16	16	16	120	25	15	28	NS502W	HKY25R
CTDHR/L1616-350	●	●		2535○○	16	16	16	125	32	18.5	35	HBH06020	HKY40R

∗ Clamp Torque (N • m) : HBH06020=7.0, NS502W=2.2

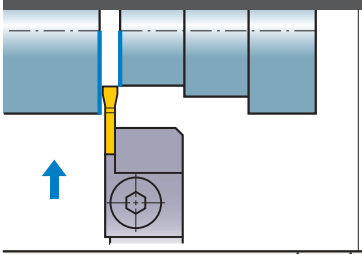
INSERTS

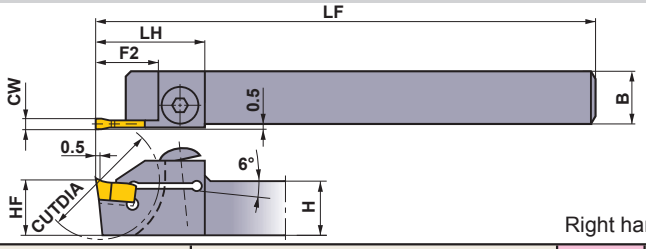
Breaker	Order Number	Hand	Coated	Dimensions (mm)			CUTDIA (mm)	Geometry
			VP15TF	CW	PSIRR	RE		
With Breaker	**CTDT2535002N-B**	N	●	2.5	0°	0.2	23–35	
	CTDT25350V5R-B	R	●	2.5	8°	≤0.05	23–35	
	CTDT25350V5R-BS	R	●	2.5	17°	≤0.05	23–35	
	CTDT2535002R-B	R	●	2.5	8°	0.2	23–35	



● : Inventory maintained in Japan. (10 inserts in one case)

CTEH





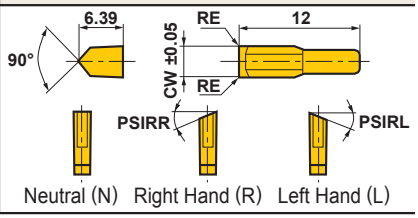
Right hand tool holder shown.

Order Number	Stock		Insert Number		Dimensions (mm)						CUTDIA (mm)	* Clamp Screw	Wrench
	R	L			H	B	HF	LF	LH	F2			
CTEHR/L1616-230	●		CTET	3035□□	16	16	16	125	24	12.2	23	HBH06020	HKY40R
CTEHR/L1616-280	●			3035□□	16	16	16	120	25	15	28	NS502W	HKY25R
CTEHR/L1616-350	●	●		3035□□	16	16	16	125	32	18.5	35	HBH06020	HKY40R

* Clamp Torque (N • m) : HBH06020=7.0, NS502W=2.2

INSERTS

Breaker	Order Number	Hand	Coated	Dimensions (mm)			CUTDIA (mm)	Geometry
			VP15TF	CW	PSIRR/L	RE		
With Breaker	**CTET30350V5R-B**	R	●	3	8°	≤0.05	23–35	
	CTET30350V5R-BS	R	●	3	17°	≤0.05	23–35	
	CTET3035002N-B	N	●	3	0°	0.2	23–35	
	CTET3035002R-B	R	●	3	8°	0.2	23–35	
	CTET3035002L-B	L	●	3	8°	0.2	23–35	



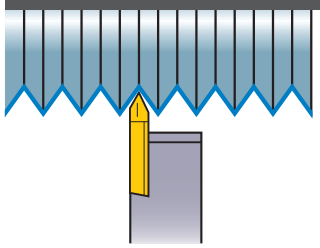
RECOMMENDED CUTTING CONDITIONS

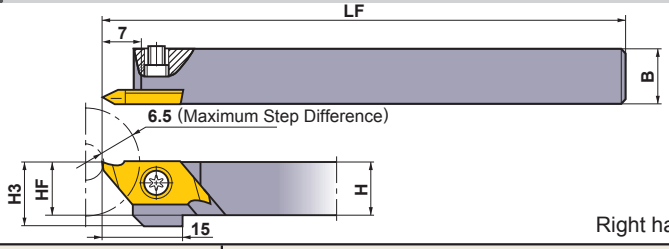
	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF**	100 (50–150)	0.05 (0.02–0.09)
	Free Cutting Steel	–	**VP15TF**	110 (30–180)	0.05 (0.01–0.09)
M	Stainless Steel	≤200HB	**VP15TF**	80 (50–120)	0.03 (0.02–0.05)
N	Non-Ferrous Metal	–	**VP15TF**	150 (70–230)	0.07 (0.03–0.11)

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

EXTERNAL THREADING

TTAH



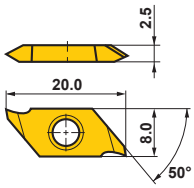
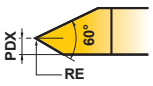
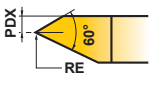
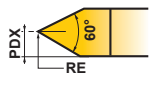
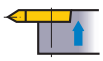
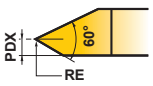
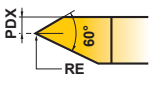
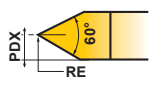
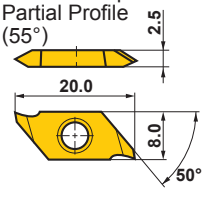
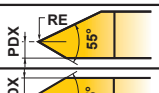
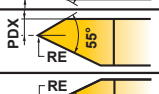
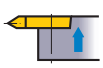
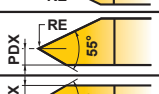
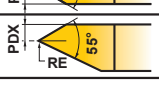


Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) H	B	HF	LF	H3	* Clamp Screw	Wrench
TTAHR/L0810	●	●	TTAT	○○○○	8	10	8	120	12	NS402W	NKY15R
TTAHR/L**1010**	●	●		○○○○	10	10	10	120	12	NS402W	NKY15R
TTAHR/L**1212**	●	●		○○○○	12	12	12	120	–	NS403W	NKY15R
TTAHR/L**1616**	●	●		○○○○	16	16	16	120	–	NS403W	NKY15R

* Clamp Torque (N • m) : NS402W=1.0, NS403W=1.0

INSERTS

Holder	Setting Geometry	Breaker	Geometry	Insert Geometry	Order Number	Hand	Coated VP15TF	Dimensions (mm) PDX	Dimensions (mm) RE	Pitch of Screw (mm) (thread/inch)
Right Hand (R)		With Breaker	General Purpose Partial Profile (60°)  Right hand insert shown.		**TTAT60075F5RR-B**	R	●	0.4	0.05 Flat	0.2—0.75 (80—36)
					TTAT**60125V5RR-B**	R	●	0.8	0.05	0.5—1.25 (40—16)
					TTAT**60075F5RL-B**	L	●	0.4	0.05 Flat	0.2—0.75 (80—36)
					TTAT**60125V5RL-B**	L	●	0.8	0.05	0.5—1.25 (40—16)
					TTAT**6015001RN-B**	N	●	1.25	0.1	1.0—1.5 (24—18)
Left Hand (L)					TTAT**60075F5LR-B**	R	●	0.4	0.05 Flat	0.2—0.75 (80—36)
					TTAT**60125V5LR-B**	R	●	0.8	0.05	0.5—1.25 (40—16)
					TTAT**60075F5LL-B**	L	●	0.4	0.05 Flat	0.2—0.75 (80—36)
					TTAT**60125V5LL-B**	L	●	0.8	0.05	0.5—1.25 (40—16)
					TTAT**6015001LN-B**	N	●	1.25	0.1	1.0—1.5 (24—18)
Right Hand (R)			General Purpose Partial Profile (55°)  Right hand insert shown.		TTAT**55158V5RR-B**	R	●	0.8	0.05	(40—16)
					TTAT**55158V5RL-B**	L	●	0.8	0.05	(40—16)
Left Hand (L)					TTAT**55158V5LR-B**	R	●	0.8	0.05	(40—16)
					TTAT**55158V5LL-B**	L	●	0.8	0.05	(40—16)

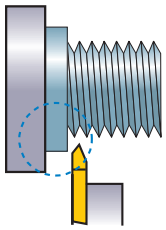
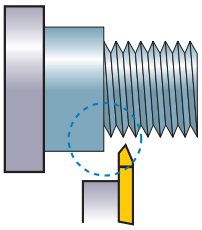
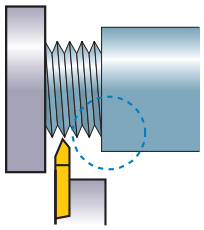
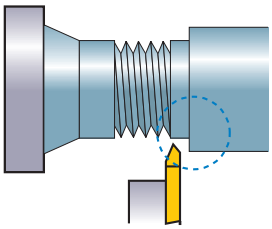
RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Cutting Speed (m/min)
P	Carbon Steel · Alloy Steel	180HB—280HB	100 (50—150)
	Free Cutting Steel	–	110 (30—180)

	Work Material	Hardness	Cutting Speed (m/min)
M	Stainless Steel	≤200HB	80 (50—120)
N	Non-Ferrous Metal	–	150 (70—230)

● : Inventory maintained in Japan. (5 inserts in one case)

HOLDER APPLICATION

	Right Hand Holder	Left Hand Holder
Right Hand Insert		
Left Hand Insert		

*The above combinations enable to machine the side of ◌.

THREAD RANGE

Application range

Pitch (mm)	Pitch Diameter of Thread (mm)										Number of Passes
	≥ϕ1.0	≥ϕ1.2	≥ϕ1.6	≥ϕ2.0	≥ϕ2.5	≥ϕ3.0	≥ϕ4.0	≥ϕ5.0	≥ϕ6.0	≥ϕ7.0	
0.2											2－4
0.25											
0.3											3－5
0.35											
0.4											4－6
0.45											
0.5											5－7
0.6											
0.7											
0.75											
0.8		Threading impossible									
1											
1.25											6－8
1.5											

*Metric Thread (60°)

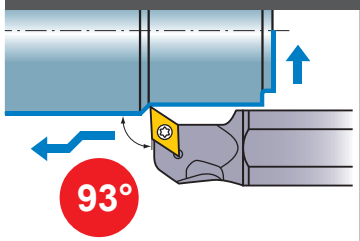
Pitch(thread/inch)	Pitch Diameter of Thread									Number of Passes
Inch	≥ϕ0.060	≥ϕ0.073	≥ϕ0.086	≥ϕ0.099	≥ϕ0.112	≥ϕ0.164	≥ϕ0.190	≥ϕ0.250	≥ϕ0.313	
mm	≥ϕ1.524	≥ϕ1.854	≥ϕ2.184	≥ϕ2.515	≥ϕ2.845	≥ϕ4.166	≥ϕ4.826	≥ϕ6.350	≥ϕ7.938	
80										3－5
72										
64										4－6
56										
48										5－7
44										
40										
32										
28										
26										
24		Threading impossible								
20										6－8
18										
16										

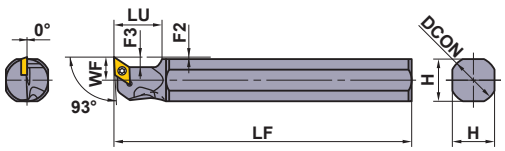
*American UN, Whitworth

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

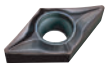
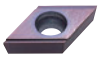
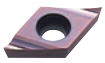
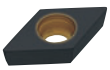
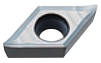
EXTERNAL FRONT TURNING, COPYING, FACING (FOR OPPOSITE TOOL POSTS)

SH





Left hand tool holder shown.

Finish	Finish	Light	Medium
SMG	R-F	R-SS	R-SN
			
(07, 11)	(07, 11)	(07, 11)	(07, 11)
Medium	**Flat top**	**For nonferrous metals**	**CBN/PCD**
R-SR		AZ	
			
(07, 11)	(07, 11)	(07, 11)	(07, 11)

Order Number	Stock	Insert Number		Dimensions (mm)							*	
	L			DCON	LF	LU	H	WF	F2	F3	Clamp Screw	Wrench
SH16H-FSDUCL07	●	DCET DCGT DCGW DCMT DCMW NP-DCGW NP-DCMT NP-DCMW	0702○○	15.875	100	20	14	7.75	0.75	4.2	TS254	TKY08R
SH19K-FSDUCL07	●			19.05	125	20	17	9.25	0.75	4.2	TS254	TKY08R
SH20K-FSDUCL07	●			20	125	20	18	9.75	0.75	4.2	TS254	TKY08R
SH22K-FSDUCL07	●			22	125	20	20	10.75	0.75	4.2	TS254	TKY08R
SH25M-FSDUCL07	●			25.4	150	20	23	12.25	0.75	4.2	TS254	TKY08R
SH16H-FSDUCL11	●	DCET DCGT DCGW DCMT DCMW NP-DCGW NP-DCMT NP-DCMW	11T3○○	15.875	100	20	15	7.75	0.75	6.4	TS43	TKY15R
SH19K-FSDUCL11	●			19.05	125	20	17	9.25	0.75	6.4	TS43	TKY15R
SH20K-FSDUCL11	●			20	125	20	18	9.75	0.75	6.4	TS43	TKY15R
SH22K-FSDUCL11	●			22	125	20	20	10.75	0.75	6.4	TS43	TKY15R
SH25M-FSDUCL11	●			25.4	150	20	23	12.25	0.75	6.4	TS43	TKY15R

(Note 1) When using insert with right and left hand chip breaker, please use right hand insert.
(Note 2) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.
∗ Clamp Torque (N • m) : TS254=1.0, TS43=3.5

RECOMMENDED CUTTING CONDITIONS

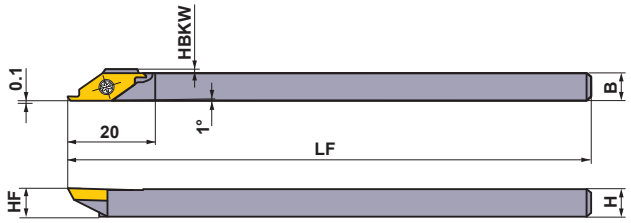
	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel · Alloy Steel	180HB–280HB	**VP15TF**	100 (50–150)	0.08 (0.01–0.15)
P	Free Cutting Steel	–	**VP15TF**	110 (30–180)	0.08 (0.01–0.15)
P	Free Cutting Steel	–	**NX2525**	150 (50–250)	0.08 (0.01–0.15)
M	Stainless Steel	≤200HB	**VP15TF**	80 (50–120)	0.06 (0.02–0.1)
N	Non-Ferrous Metal	–	**HTi10**	150 (70–230)	0.09 (0.03–0.15)

● : **Inventory maintained in Japan. (5 inserts in one case)**

SH○○○ type inserts ➤ **A132–A135**
CBN & PCD inserts ➤ **B043, B044, B060**

CAM TOOL POSTS

CSVH



Right hand tool holder shown.

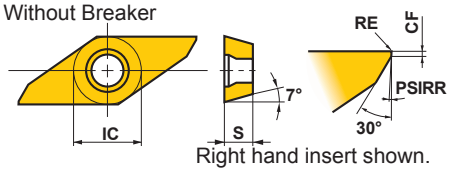
Order Number	Stock		Insert Number		Dimensions (mm)					✱1 APMX (mm)	✱2 Clamp Screw	Wrench
	R	L			H	B	HF	LF	HBKW			
CSVHR/L0707	●	●	CSVT	○○○○	7	7	7	140	0.5	3.0	NS251	NKY15R
CSVHR/L**0808**	●	●		○○○○	8	8	8	140	0	3.0	NS251	NKY15R
CSVHR/L**0909**	●			○○○○	9.5	9.5	9.5	140	0	3.0	NS251	NKY15R
CSVHR/L**1010**	●	●		○○○○	10	10	10	140	0	3.0	NS251	NKY15R
CSVHR/L**1212**	●			○○○○	12	12	12	140	0	3.0	NS251	NKY15R

(Note 1) Please use right hand insert for right hand holder and left hand insert for left hand holder.
(Note 2) Max. Cutting Depth (APMX) varies depending on the type of insert used.
✱1 APMX : Max. Cutting Depth
✱2 Clamp Torque (N • m) : NS251=1.0

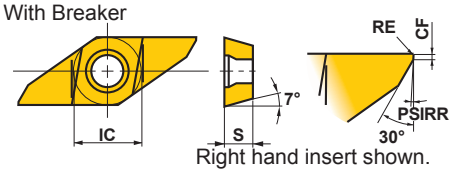
INSERTS

CSVTF — Front turning

Order Number	Hand	Coated	Dimensions (mm)					✱ APMX (mm)	Geometry
		VP15KZ	IC	S	RE	CF	PSIRR/L		
CSVTF30AR	R	●	6.35	2.38	0	0.3	5°	3.0	Without Breaker
CSVTF**30AL**	L	●	6.35	2.38	0	0.3	5°	3.0	
CSVTF**30BR**	R	●	6.35	2.38	0	0.3	2°	3.0	
CSVTF**30CR**	R	●	6.35	2.38	0	0.15	2°	3.0	
CSVTF**30DR**	R	●	6.35	2.38	0	0.15	5°	3.0	
CSVTF30AR-B	R	●	6.35	2.38	0	0.3	5°	3.0	With Breaker
CSVTF**30AL-B**	L	●	6.35	2.38	0	0.3	5°	3.0	
CSVTF**30BR-B**	R	●	6.35	2.38	0	0.3	2°	3.0	
CSVTF**30CR-B**	R	●	6.35	2.38	0	0.15	2°	3.0	
CSVTF**30DR-B**	R	●	6.35	2.38	0	0.15	5°	3.0	



Right hand insert shown.

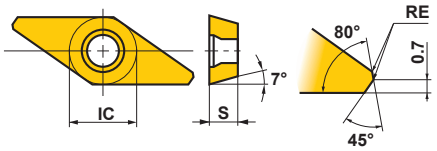


Right hand insert shown.

✱ APMX : Max. Cutting Depth

CSVTFXL — Front turning, Copying

Order Number	Hand	Coated	Dimensions (mm)			✱ APMX (mm)	Geometry
		VP15KZ	IC	S	RE		
CSVTFXL	L	●	6.35	2.38	0	3.0	Without Breaker



✱ APMX : Max. Cutting Depth

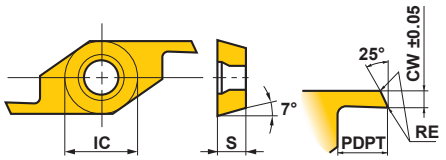
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

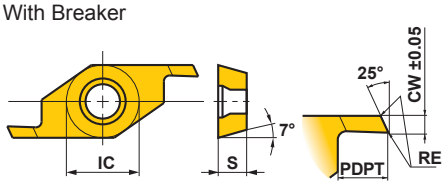
CAM TOOL POSTS

INSERTS

CSVTC — Cutting off

Order Number	Hand	Coated	Dimensions (mm)					APMX* (mm)	Geometry
		VP15KZ	IC	S	RE	PDPT	CW		
CSVTC0640R	R	●	6.35	2.38	0	2.0	0.6	1.5	Without Breaker
CSVTC**0750R**	R	●	6.35	2.38	0	2.5	0.7	2.0	
CSVTC**0750L**	L	●	6.35	2.38	0	2.5	0.7	2.0	
CSVTC**0850R**	R	●	6.35	2.38	0	2.5	0.8	2.0	
CSVTC**0850L**	L	●	6.35	2.38	0	2.5	0.8	2.0	
CSVTC**0950R**	R	●	6.35	2.38	0	2.5	0.9	2.0	
CSVTC**1060R**	R	●	6.35	2.38	0	3.0	1.0	2.5	
CSVTC**1060L**	L	●	6.35	2.38	0	3.0	1.0	2.5	
CSVTC**1360R**	R	●	6.35	2.38	0	3.0	1.3	2.5	
CSVTC**1360L**	L	●	6.35	2.38	0	3.0	1.3	2.5	
CSVTC**1560R**	R	●	6.35	2.38	0	3.0	1.5	2.5	
CSVTC**1560L**	L	●	6.35	2.38	0	3.0	1.5	2.5	Right hand insert shown.
CSVTC0640R-B	R	●	6.35	2.38	0	2.0	0.6	1.5	With Breaker
CSVTC**0750R-B**	R	●	6.35	2.38	0	2.5	0.7	2.0	
CSVTC**0850R-B**	R	●	6.35	2.38	0	2.5	0.8	2.0	
CSVTC**0950R-B**	R	●	6.35	2.38	0	2.5	0.9	2.0	
CSVTC**1060R-B**	R	●	6.35	2.38	0	3.0	1.0	2.5	
CSVTC**1360R-B**	R	●	6.35	2.38	0	3.0	1.3	2.5	
CSVTC**1560R-B**	R	●	6.35	2.38	0	3.0	1.5	2.5	Right hand insert shown.

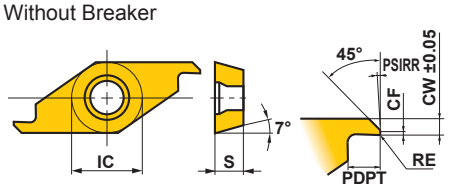


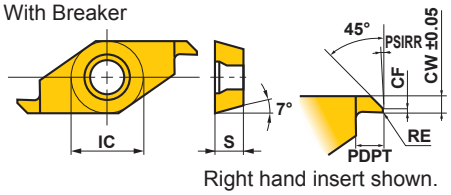


* APMX : Max. Cutting Depth

CSVTB — Back turning

Order Number	Hand	Coated	Dimensions (mm)							APMX* (mm)	Geometry
		VP15KZ	IC	S	RE	PDPT	CW	CF	PSIRR/L		
CSVTB10AR	R	●	6.35	2.38	0	2.5	1	0.3	5°	2.0	Without Breaker
CSVTB**10AL**	L	●	6.35	2.38	0	2.5	1	0.3	5°	2.0	
CSVTB**10BR**	R	●	6.35	2.38	0	2.5	1	0.3	2°	2.0	
CSVTB**10CR**	R	●	6.35	2.38	0	2.5	1	0.15	2°	2.0	
CSVTB**10DR**	R	●	6.35	2.38	0	2.5	1	0.15	5°	2.0	
CSVTB**12AR**	R	●	6.35	2.38	0	2.5	1.2	0.3	5°	2.0	
CSVTB**14AR**	R	●	6.35	2.38	0	2.5	1.4	0.3	5°	2.0	Right hand insert shown.
CSVTB10AR-B	R	●	6.35	2.38	0	2.5	1	0.3	5°	2.0	With Breaker
CSVTB**10BR-B**	R	●	6.35	2.38	0	2.5	1	0.3	2°	2.0	
CSVTB**10CR-B**	R	●	6.35	2.38	0	2.5	1	0.15	2°	2.0	
CSVTB**10DR-B**	R	●	6.35	2.38	0	2.5	1	0.15	5°	2.0	
CSVTB**12AR-B**	R	●	6.35	2.38	0	2.5	1.2	0.3	5°	2.0	
CSVTB**14AR-B**	R	●	6.35	2.38	0	2.5	1.4	0.3	5°	2.0	Right hand insert shown.

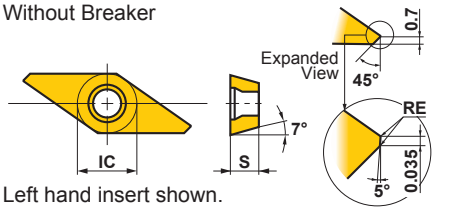




* APMX : Max. Cutting Depth

CSVTBXL — Back turning, Copying

Order Number	Hand	Coated	Dimensions (mm)			APMX* (mm)	Geometry
		VP15KZ	IC	S	RE		
CSVTBXL	L	●	6.35	2.38	0	3.0	Without Breaker
							Left hand insert shown.

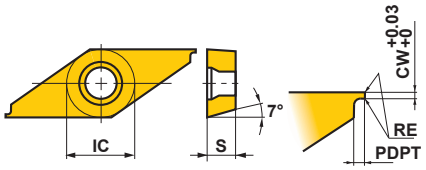


* APMX : Max. Cutting Depth

● : **Inventory maintained in Japan. (5 inserts in one case)**

CSVTG Grooving

Order Number	Hand	Coated	Dimensions (mm)					APMX* (mm)	Geometry
		VP15KZ	IC	S	RE	PDPT	CW		
CSVTG02505R	R	●	6.35	2.38	0	0.5	0.25	0.15	Without Breaker
CSVTG**03005R**	R	●	6.35	2.38	0	0.5	0.3	0.15	
CSVTG**03505R**	R	●	6.35	2.38	0	0.5	0.35	0.15	
CSVTG**04005R**	R	●	6.35	2.38	0	0.5	0.4	0.15	
CSVTG**04510R**	R	●	6.35	2.38	0	1.0	0.45	0.45	
CSVTG**05010R**	R	●	6.35	2.38	0	1.0	0.5	0.45	
CSVTG**05510R**	R	●	6.35	2.38	0	1.0	0.55	0.45	
CSVTG**06010R**	R	●	6.35	2.38	0	1.0	0.6	0.45	
CSVTG**06510R**	R	●	6.35	2.38	0	1.0	0.65	0.45	
CSVTG**07010R**	R	●	6.35	2.38	0	1.0	0.7	0.45	
CSVTG**07520R**	R	●	6.35	2.38	0	2.0	0.75	1.4	
CSVTG**07520L**	L	●	6.35	2.38	0	2.0	0.75	1.4	
CSVTG**08020R**	R	●	6.35	2.38	0	2.0	0.8	1.4	
CSVTG**08520R**	R	●	6.35	2.38	0	2.0	0.85	1.4	
CSVTG**09020R**	R	●	6.35	2.38	0	2.0	0.9	1.4	
CSVTG**09520R**	R	●	6.35	2.38	0	2.0	0.95	1.4	
CSVTG**09520L**	L	●	6.35	2.38	0	2.0	0.95	1.4	
CSVTG**10020R**	R	●	6.35	2.38	0	2.0	1.0	1.4	
CSVTG**11030R**	R	●	6.35	2.38	0	3.0	1.1	2.6	
CSVTG**12030R**	R	●	6.35	2.38	0	3.0	1.2	2.6	
CSVTG**12030L**	L	●	6.35	2.38	0	3.0	1.2	2.6	
CSVTG**13030R**	R	●	6.35	2.38	0	3.0	1.3	2.6	
CSVTG**14030R**	R	●	6.35	2.38	0	3.0	1.4	2.6	
CSVTG**15030R**	R	●	6.35	2.38	0	3.0	1.5	2.6	

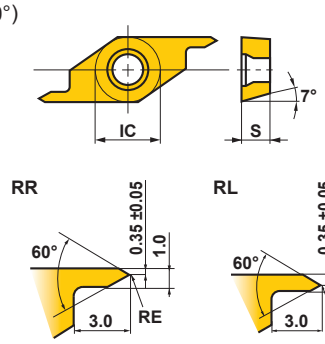


Right hand insert shown.

* APMX : Max. Cutting Depth

CSVTT Threading

Order Number	Hand	Coated	Pitch (mm)	Dimensions (mm)			Geometry
		VP15KZ		IC	S	RE	
CSVTT60050RR	R	●	0.2–0.5	6.35	2.38	0.03	Without Breaker General Purpose Partial Profile (60°)
CSVTT**60050RL**	R	●	0.2–0.5	6.35	2.38	0.03	



Right hand insert shown.

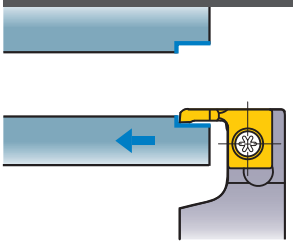
SMALL TOOLS

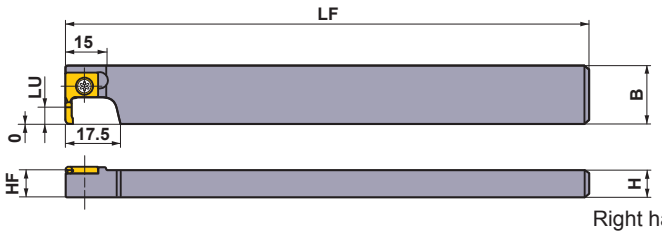
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

BORING

SBAH

Without off set





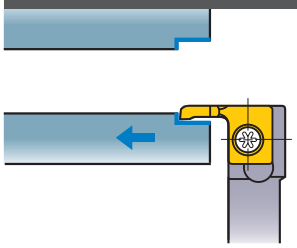
Right hand tool holder only.

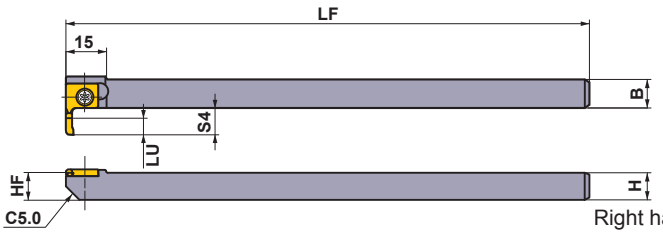
Order Number	Stock	Insert Number		Dimensions (mm)				LU (mm)	∗1 DMIN (mm)	∗2 Clamp Screw	Wrench
	R			H	B	LF	HF				
SBAHR1022	●	SBAT	3080□□L/L-B	10	21.5	120	10	8	3	NS402W	NKY15R
SBAHR**1222**	●	SBAT	3080□□L/L-B	12	21.5	120	12	8	3	NS403W	NKY15R

∗1 DMIN : Min. Cutting Diameter
∗2 Clamp Torque (N • m) : NS402W=1.0, NS403W=1.0

SBAH

With off set



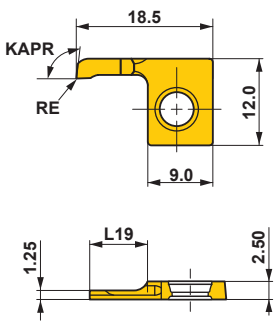


Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions (mm)					LU (mm)	∗1 DMIN (mm)	∗2 Clamp Screw	Wrench
	R			H	B	LF	HF	S4				
SBAHR1010	●	SBAT	3080□□L/L-B	10	10	120	10	10	8	3	NS402W	NKY15R

∗1 DMIN : Min. Cutting Diameter
∗2 Clamp Torque (N • m) : NS402W=1.0

INSERTS

Breaker	Order Number	Coated	Dimensions (mm)			DMIN ∗ (mm)	Geometry
		VP15KZ	KAPR	RE	L19		
Without Breaker	**SBAT308000L**	●	95°	0	8.0	3	
	SBAT**3080V5L**	●	95°	0.05	8.0	3	
With Breaker	**SBAT308000L-B**	●	95°	0	8.0	3	
	SBAT**3080V5L-B**	●	95°	0.05	8.0	3	

∗ DMIN : Min. Cutting Diameter

● : Inventory maintained in Japan. (5 inserts in one case)

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

Memo

HOW TO READ THE STANDARD OF BORING BARS

●How this section page is organized

①Organized by product series.
(Refer to the index on the next page.)

TYPE OF BORING BAR
indicates the initial letters for the order number, as well as applicable insert types.

TITLE OF PRODUCT SERIES

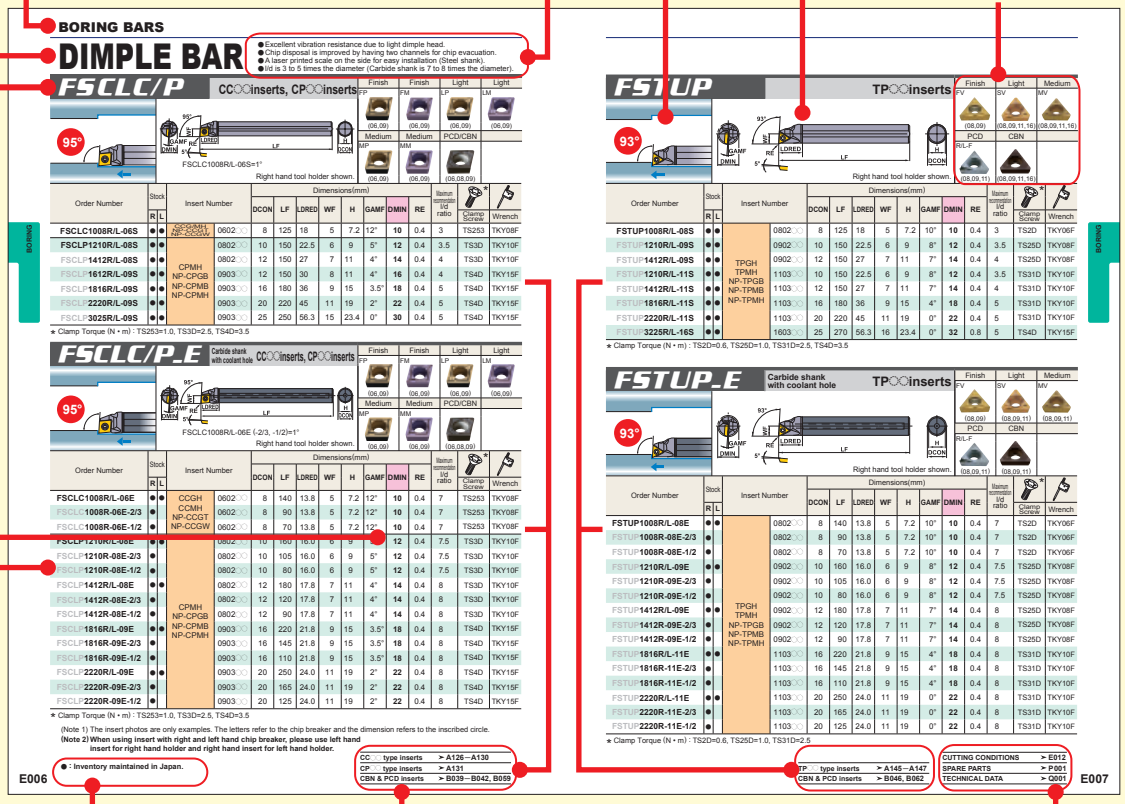
PRODUCT SECTION

PRODUCT FEATURES

FIGURE SHOWING THE TOOLING APPLICATION
uses illustrations and arrows to depict available machining applications along with cutting edge lead angles.

GEOMETRY

CHIP BREAKER BY CUTTING APPLICATION



LEGEND FOR STOCK STATUS MARK
is shown on the left hand page of each double-page spread.

PRODUCT STANDARDS
indicates order numbers, stock status (per right/left hand), applicable inserts, dimensions, minimum cutting diameters, standard corner radius, recommended l/d ratios, and spare parts.

MIN. CUTTING DIAMETER
is colour-coded to let you find, at a glance, the maximum / minimum cutting diameters for internal machining.

REFERENCE PAGE FOR APPLICABLE INSERTS
indicates reference pages for details of inserts that are applicable to the title product.

PAGE REFERENCE
·SPARE PARTS
·TECHNICAL DATA
indicates reference pages, including the above, on the right hand page of each double-page spread.

●To Order : Please specify

①order number and hand of tool (right/left).

TURNING TOOLS

BORING BARS

CLASSIFICATION OF BORING TOOLS ····· E002
IDENTIFICATION ····· E004

STANDARD BORING BARS
- FEATURES OF DIMPLE BAR ····· E005
- DIMPLE BAR ····· E006
- DOUBLE CLAMP DIMPLE BAR ····· E013
- MICRO-DEX BORING BARS ····· E016
- MICRO-MINI TWIN BORING BARS ····· E019
- MICRO-MINI BORING BARS ····· E022
- F TYPE BORING BARS ····· E025
- S TYPE BORING BARS ····· E028
- P TYPE BORING BARS ····· E035
- D TYPE BORING HEAD ····· E039
- AL TYPE BORING BARS ····· E042

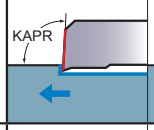
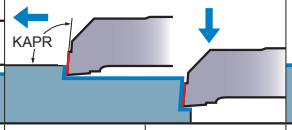
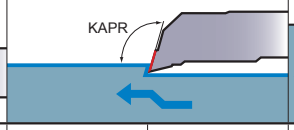
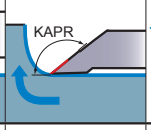
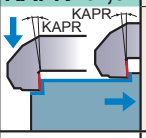
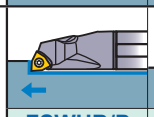
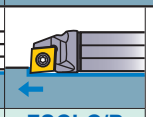
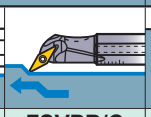
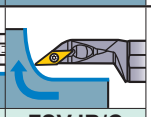
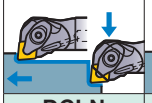
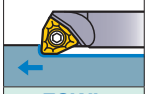
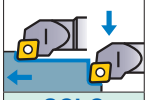
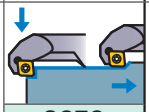
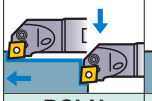
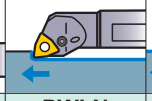
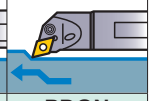
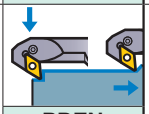
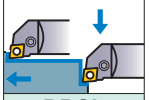
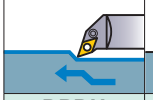
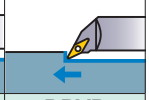
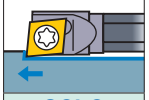
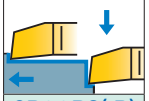
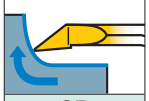
*Arranged by Alphabetical order

E013 **A□□□-DCLN**
E013 **A□□□-DDUN**
E014 **A□□□-DSKN**
E014 **A□□□-DTFN**
E015 **A□□□-DVUN**
E015 **A□□□-DWLN**
E036 **A□□□PCLN**
E037 **A□□□PDQN**
E036 **A□□□PDUN**
E038 **A□□□PDZN**
E035 **A□□□PSKN**
E035 **A□□□PTFN**
E037 **A□□□PWLN**
E022 **C□□□□-BLS**
E016 **C□□□SCLC**
E030 **C□□□SCLC**
E031 **C□□□SDQC**
E029 **C□□□SDUC**
E028 **C□□□STFC**
E017 **C□□□STUC**
E032 **C□□□SVQC**
E016 **C□□□SWUB**
E019 **CB**
E020 **CR**
E040 **DPCL**
E040 **DPDH**
E039 **DPDU**
E039 **DPTF**
E041 **DPVP**
E026 **FCTU1**
E026 **FCTU2**
E006 **FSCLC/P**
E009 **FSDQC**
E008 **FSDUC**
E025 **FSTU1**
E025 **FSTU2**
E007 **FSTUP**
E012 **FSVJB/C**
E011 **FSVPB/C**
E011 **FSVUB/C**
E027 **FSWL1**
E027 **FSWL2**
E010 **FSWUB/P**
E018 **RBH**
E023 **RBH**
E030 **S□□□SCLC**
E034 **S□□□SCZC**
E031 **S□□□SDQC**
E029 **S□□□SDUC**
E033 **S□□□SSKC**
E028 **S□□□STFC**
E042 **S□□□STFE**
E032 **S□□□SVQC**
E033 **S□□□SVUC**
E024 **SBH**

CLASSIFICATION

Name of Tool Holder	Features	KAPR=75°	KAPR=91°	KAPR=93°		
		KAPR	KAPR	KAPR		
DIMPLE BAR 	● The minimum cutting diameter is from ϕ10. ● 5°, 7°, 11° positive insert. ● Excellent vibration resistance due to a light dimple head. ● l/d is 3 to 5 times the diameter (Carbide shank is 7 to 8 times the diameter).			FSTUP ➲ E007	FSDUC ➲ E008	FSVUB/C ➲ E011
DOUBLE CLAMP DIMPLE BAR 	● The minimum cutting diameter is from ϕ32. ● Economical negative insert. ● Single action type. ● Excellent vibration resistance due to a light dimple head. (With coolant hole.) ● l/d is 3 to 4 times the diameter.	DSKN ➲ E014	DTFN ➲ E014	DDUN ➲ E013	DVUN ➲ E015	
F Type Boring Bars 	● The minimum cutting diameter is from ϕ5.8. ● 11°positive insert. ● Screw-on type and Clamp-on type. ● l/d is 3 to 5 times the diameter. ● FSWL type is 7°positive insert.			FSTU ➲ E025	FCTU ➲ E026	
S Type Boring Bars 	● The minimum cutting diameter is from ϕ11. ● ISO standard. ● 7°positive insert. ● Screw-on type. ● l/d is 3 to 5 times the diameter (Carbide shank is 7 times the diameter).	SSKC ➲ E033	STFC ➲ E028	SDUC ➲ E029	SVUC ➲ E033	
P Type Boring Bars 	● The minimum cutting diameter is from ϕ25. ● ISO standard. ● Economical negative insert. ● Lever lock type, and pin lock type. ● l/d is 3 times the diameter.	PSKN ➲ E035	PTFN ➲ E035	PDUN ➲ E036		
D Type Boring Head 	● The minimum cutting diameter is from ϕ40. ● Economical negative insert. ● Lever lock type. ● Exchangeable head type.		DPTF ➲ E039	DPDU ➲ E039		
AL Type Boring Bars 	● The minimum cutting diameter is from ϕ20. ● Suitable for non-ferrous metal. ● 20°positive insert. ● Screw-on type. ● l/d is 6 times the diameter. ● Excellent vibration resistance.		STFE ➲ E042			
MICRO-DEX Boring Bars (Carbide Shank) 	● The minimum cutting diameter is from ϕ5. ● 7°positive insert. ● Carbide shank type. ● Easy-to-use tool geometries. ● Suitable for small workpieces. ● l/d is 5 times the diameter.			SWUB ➲ E016	STUC ➲ E017	
MICRO-MINI TWIN Boring Bars 	● The minimum cutting diameter is from ϕ2.2. ● Solid carbide type with two cutting edges. ● Continuous cutting from boring to facing. ● With or without a chip breaker.					
MICRO-MINI Boring Bars 	● The minimum cutting diameter is from ϕ3.2. ● Solid carbide type (Single cutting edges). ● l/d is 5 times the diameter. ● Cutting edge can be shaped according to the application. Thus, it covers a wide cutting range (threading,grooving,copying, etc.).	 C○○FR-BLS ➲ E022				

(Note 1) Holders with blue colour symbol have an anti-vibration carbide shank. (For Micro-dex boring bars, carbide shank only.)

	KAPR=93°	KAPR=95°		KAPR=107°30´—117°30´		KAPR=142°	KAPR=3°,5°	Selection Standard							
								Economical	Low Cutting Resistance (Sharpness)	Clamp Rigidity	Vibration Resisiance	Operation Efficiency	Coolant Hole	Specialized	Small Diameter Cutting
	 FSWUB/P E010	 FSCLC/P E006		 FSDQC E009	 FSVPB/C E011	 FSVJB/C E012			◎		◎*	◎	◎*		
		 DCLN E013	 DWLN E015											
		 FSWL E027							○		○*				○*
		 SCLC E030		 SDQC E031	 SVQC E032		 SCZC E034		○		○*				
		 PCLN E036	 PWLN E037	 PDQN E037			 PDZN E038	◎		○		◎	◎		
		 DPCL E040		 DPDH E040	 DPVP E041			◎		○		◎			
									◎		○			◎	
		 SCLC E016									◎				◎
		 CB○○RS(-B) E019				 CR E020			◎		◎				◎
									◎						◎

(Note 2) ◎ : 1st recommendation. ○: 2nd recommendation.
(Note 3) ＊Indicates that the shank material is carbide.

IDENTIFICATION

DIMPLE BAR

①Function	
F	Fixed type

②Clamp Structure	
S	Screw-on

③Insert Shape	
C	RHOMBIC 80°
D	RHOMBIC 55°
T	TRIANGULAR 60°
V	RHOMBIC 35°
W	TRIGON

④Cutting Angle	
U	93°
L	95°
Q	107°30´
P	117°30´
J	142°

⑤Insert Clearance	
B	5°
C	7°
P	11°

⑥Min.Cutting Diameter (mm)			
10	10	22	22
12	12	25	25
13	13	30	30
14	14	32	32
16	16	34	34
18	18	40	40
20	20		

⑦Shank Diameter (mm)	
08	8
10	10
12	12
16	16
20	20
25	25
32	32

F	S	C	L	C	10	08	R	-	06	E	-	2/3
①	②	③	④	⑤	⑥	⑦	⑧		⑨	⑩		⑪

⑧Hand of Tool	
R	Right Hand
L	Left Hand

⑨Cutting Edge Length (mm)					
Inscribed circle of insert	4.76	5.56	6.35	7.94	9.525
RHOMBIC 80°	–	–	**06**	**0.8**	**09**
RHOMBIC 55°	–	–	**07**	–	**11**
TRIANGULAR 60°	**08**	**09**	**11**	–	**16**
RHOMBIC 35°	**08**	–	**11**	–	**16**
TRIGON	**L3**	–	**04**	–	**06**

⑩Shank Material	
E	Carbide Shank
S	Steel Shank

⑪Tool Length (Carbide shank only) (mm)					
Shank Dia.	8	10	12	16	20
No symbol	140	160	180	220	250
2/3	90	105	120	145	165
1/2	70	80	90	110	125

ISO TYPE Boring tools
[For Aluminium Alloy, P-type and S-type]

S	16	M	S	C	L	C	R	09
①	②	③	④	⑤	⑥	⑦	⑧	⑨

①Shank Material	
A	Steel Shank with Coolant Hole
C	Carbide Shank
E	Carbide Shank with Coolant Hole
S	Steel Shank

②Shank Diameter (mm)	
08	8
10	10
12	12
16	16
20	20
25	25
32	32
40	40

③Tool Length (mm)	
F	80
H	100
K	125
M	150
Q	180
R	200
S	250
T	300
U	350
V	400

④Clamp Structure	
P	Lever Lock
S	Screw-on

⑤Insert Shape	
C	RHOMBIC 80°
D	RHOMBIC 55°
S	SQUARE 90°
T	TRIANGULAR 60°
V	RHOMBIC 35°
W	TRIGON

⑥Cutting Angle	
F	91°
K	75°
L	95°
Q	107°30´
U	93°

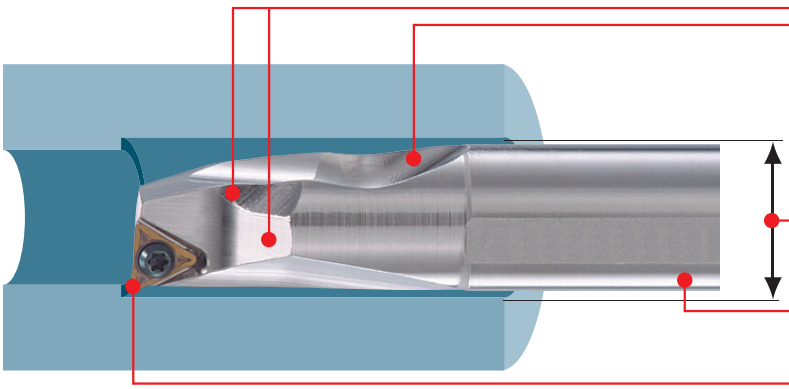
⑦Insert Clearance	
C	7°Positive
E	20°Positive
N	0°
P	11°Positive

⑧Hand of Tool	
R	Right Hand
L	Left Hand

⑨Cutting Edge Length (mm)					
Inscribed circle of insert	6.35	7.94	9.525	12.70	19.05
RHOMBIC 80°	**06**	**08**	**09**	**12**	**19**
RHOMBIC 55°	**07**	–	**11**	**15**	–
SQUARE 90°	–	–	**09**	**12**	**19**
TRIANGULAR 60°	**11**	–	**16**	**22**	–
RHOMBIC 35°	**11**	–	**16**	–	–

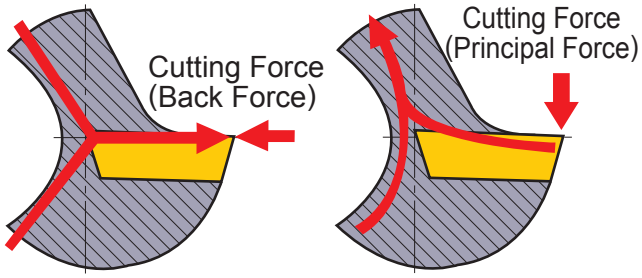
FEATURES OF DIMPLE BAR

Highly rigid steel shank and a lightweight head configuration designed by computer simulation analysis reduces chatter and improves the vibration damping properties.



- Chip disposal is improved by having two channels for chip evacuation.
- The lightweight head with its large dimple reduces chatter.
- Available in sizes smaller than the ISO standard. Therefore the boring of small diameter holes is possible.
- The boring bar has a laser printed scale on the shank to facilitate easy installation.
- "F and FS" breakers improves the quality of the surface finish, "MV" breaker offers excellent chip disposal. High wear resistant CBN inserts are also available for the machining of hardened materials.

DEFLECTION RESISTANCE



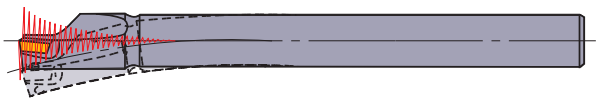
The unique cross sectional shape engineered into the dimple effectively balances the cutting forces (principal and back force), and reduces deflection by up to 17 %.

Boring Bar	Deflection
DIMPLE BAR	28.3μm
Conventional Bar	34μm

VIBRATION RESISTANCE

●DIMPLE BAR

Weight of the Head	Damping Time
49.7g	15.8ms



By reducing the weight of the head, the damping properties are increased.

●Conventional Product

Weight of the Head	Damping Time
70.1g	20ms



* The simulation data stated above was conducted with a FSCLP1816R-09S holder, under the following conditions; l/d=5, depth of cut=0.5mm, and feed=0.05mm/rev.

Direction for the use of CCG/MT • CPG/MT • CPMX • TPG/MX type inserts

By changing the clamp screw, it is possible to use the inserts listed in the table below.

Holder : FSCLC/P • FSCLC/P...E

Insert Number	Clamp Screw
CCG/MT0602○○ (ϕ6.35)	Can be used as it is.
CPG/MT0802○○ (ϕ7.94)	Change to **TS3**
CPG/MT0903○○ (ϕ9.525)	Change to **TS4**
CPMX0802○○ (ϕ7.94)	Can be used as it is.
CPMX0903○○ (ϕ9.525)	Can be used as it is.

Holder : FSTUP • FSTUP...E

Insert Number	Clamp Screw
TPG/MX0802○○ (ϕ4.76)	Change to **CS200T**
TPG/MX0902○○ (ϕ5.56)	Change to **CS250T**
TPG/MX1103○○ (ϕ9.525)	Change to **CS300890T**

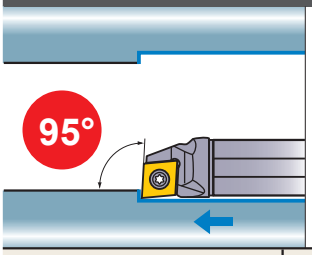
* If the screw is too long the please shorten as necessary.

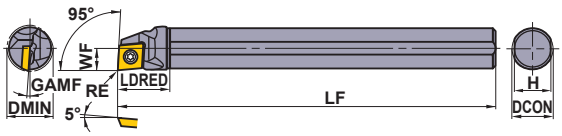
(Note) TPMT/W09, W11 types cannot be used due to a different clamp screw size.

DIMPLE BAR

- Excellent vibration resistance due to light dimple head.
- Chip disposal is improved by having two channels for chip evacuation.
- A laser printed scale on the side for easy installation (Steel shank).
- l/d is 3 to 5 times the diameter (Carbide shank is 7 to 8 times the diameter).

FSCLC/P — CC○○inserts, CP○○inserts





FSCLC1008R/L-06S=1°

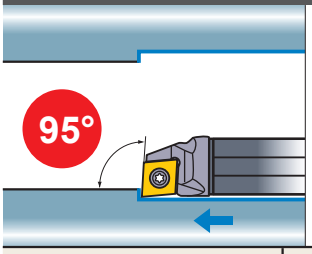
Right hand tool holder shown.

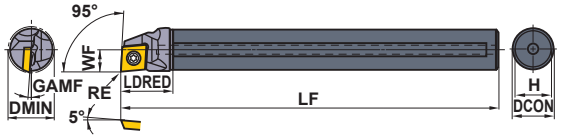
Finish	Finish	Light	Light
FP	FM	LP	LM
			
(06,09)	(06,09)	(06,09)	(06,09)
Medium	**Medium**	**PCD/CBN**	
MP	MM		
			
(06,09)	(06,09)	(06,08,09)	

Order Number	Stock		Insert Number		Dimensions(mm)								Maximum recommendation l/d ratio	* Clamp Screw	Wrench
	R	L			DCON	LF	LDRED	WF	H	GAMF	DMIN	RE			
FSCLC1008R/L-06S	●	●	CCG/MH NP-CCGT NP-CCGW	0602○○	8	125	18	5	7.2	12°	**10**	0.4	3	TS253	TKY08F
FSCLP1210R/L-08S	●	●	CPMH NP-CPGB NP-CPMB NP-CPMH	0802○○	10	150	22.5	6	9	5°	**12**	0.4	3.5	TS3D	TKY10F
FSCLP**1412R/L-08S**	●	●		0802○○	12	150	27	7	11	4°	**14**	0.4	4	TS3D	TKY10F
FSCLP**1612R/L-09S**	●	●		0903○○	12	150	30	8	11	4°	**16**	0.4	4	TS4D	TKY15F
FSCLP**1816R/L-09S**	●	●		0903○○	16	180	36	9	15	3.5°	**18**	0.4	5	TS4D	TKY15F
FSCLP**2220R/L-09S**	●	●		0903○○	20	220	45	11	19	2°	**22**	0.4	5	TS4D	TKY15F
FSCLP**3025R/L-09S**	●	●		0903○○	25	250	56.3	15	23.4	0°	**30**	0.4	5	TS4D	TKY15F

* Clamp Torque (N • m) : TS253=1.0, TS3D=2.5, TS4D=3.5

FSCLC/P_E — Carbide shank with coolant hole — CC○○inserts, CP○○inserts





FSCLC1008R/L-06E (-2/3, -1/2)=1°

Right hand tool holder shown.

Finish	Finish	Light	Light
FP	FM	LP	LM
			
(06,09)	(06,09)	(06,09)	(06,09)
Medium	**Medium**	**PCD/CBN**	
MP	MM		
			
(06,09)	(06,09)	(06,08,09)	

Order Number	Stock		Insert Number		Dimensions(mm)								Maximum recommendation l/d ratio	* Clamp Screw	Wrench
	R	L			DCON	LF	LDRED	WF	H	GAMF	DMIN	RE			
FSCLC1008R/L-06E	●	●	CCGH CCMH NP-CCGT NP-CCGW	0602○○	8	140	13.8	5	7.2	12°	**10**	0.4	7	TS253	TKY08F
FSCLC**1008R-06E-2/3**	●			0602○○	8	90	13.8	5	7.2	12°	**10**	0.4	7	TS253	TKY08F
FSCLC**1008R-06E-1/2**	●			0602○○	8	70	13.8	5	7.2	12°	**10**	0.4	7	TS253	TKY08F
FSCLP1210R/L-08E	●	●	CPMH NP-CPGB NP-CPMB NP-CPMH	0802○○	10	160	16.0	6	9	5°	**12**	0.4	7.5	TS3D	TKY10F
FSCLP**1210R-08E-2/3**	●			0802○○	10	105	16.0	6	9	5°	**12**	0.4	7.5	TS3D	TKY10F
FSCLP**1210R-08E-1/2**	●			0802○○	10	80	16.0	6	9	5°	**12**	0.4	7.5	TS3D	TKY10F
FSCLP**1412R/L-08E**	●	●		0802○○	12	180	17.8	7	11	4°	**14**	0.4	8	TS3D	TKY10F
FSCLP**1412R-08E-2/3**	●			0802○○	12	120	17.8	7	11	4°	**14**	0.4	8	TS3D	TKY10F
FSCLP**1412R-08E-1/2**	●			0802○○	12	90	17.8	7	11	4°	**14**	0.4	8	TS3D	TKY10F
FSCLP**1816R/L-09E**	●	●		0903○○	16	220	21.8	9	15	3.5°	**18**	0.4	8	TS4D	TKY15F
FSCLP**1816R-09E-2/3**	●			0903○○	16	145	21.8	9	15	3.5°	**18**	0.4	8	TS4D	TKY15F
FSCLP**1816R-09E-1/2**	●			0903○○	16	110	21.8	9	15	3.5°	**18**	0.4	8	TS4D	TKY15F
FSCLP**2220R/L-09E**	●	●		0903○○	20	250	24.0	11	19	2°	**22**	0.4	8	TS4D	TKY15F
FSCLP**2220R-09E-2/3**	●			0903○○	20	165	24.0	11	19	2°	**22**	0.4	8	TS4D	TKY15F
FSCLP**2220R-09E-1/2**	●			0903○○	20	125	24.0	11	19	2°	**22**	0.4	8	TS4D	TKY15F

* Clamp Torque (N • m) : TS253=1.0, TS3D=2.5, TS4D=3.5

(Note 1) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

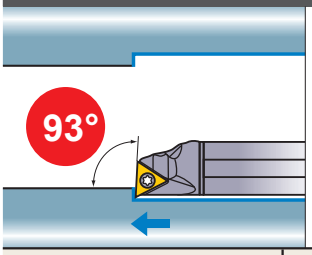
(Note 2) When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

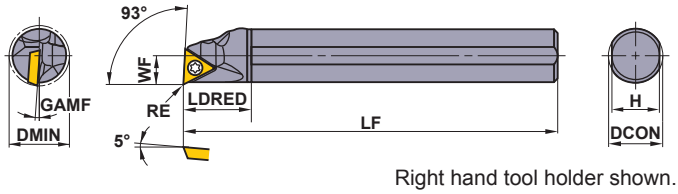
● : Inventory maintained in Japan.

CC○○ type inserts	**➤ A126—A130**
CP○○ type inserts	**➤ A131**
CBN & PCD inserts	**➤ B039—B042, B059**

FSTUP

TP○○inserts





Right hand tool holder shown.

Finish	Light	Medium
FV	SV	MV
		
(08,09)	(08,09,11,16)	(08,09,11,16)
PCD	**CBN**	
R/L-F		
		
(08,09,11)	(08,09,11,16)	

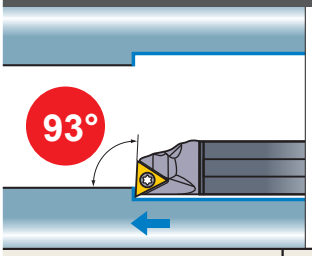
Order Number	Stock		Insert Number		Dimensions(mm)								Maximum recommendation l/d ratio	* Clamp Screw	Wrench
	R	L			DCON	LF	LDRED	WF	H	GAMF	DMIN	RE			
FSTUP1008R/L-08S	●	●	TPGH TPMH NP-TPGB NP-TPMB NP-TPMH	0802○○	8	125	18	5	7.2	10°	**10**	0.4	3	TS2D	TKY06F
FSTUP**1210R/L-09S**	●	●		0902○○	10	150	22.5	6	9	8°	**12**	0.4	3.5	TS25D	TKY08F
FSTUP**1412R/L-09S**	●	●		0902○○	12	150	27	7	11	7°	**14**	0.4	4	TS25D	TKY08F
FSTUP**1210R/L-11S**	●	●		1103○○	10	150	22.5	6	9	8°	**12**	0.4	3.5	TS31D	TKY10F
FSTUP**1412R/L-11S**	●	●		1103○○	12	150	27	7	11	7°	**14**	0.4	4	TS31D	TKY10F
FSTUP**1816R/L-11S**	●	●		1103○○	16	180	36	9	15	4°	**18**	0.4	5	TS31D	TKY10F
FSTUP**2220R/L-11S**	●	●		1103○○	20	220	45	11	19	0°	**22**	0.4	5	TS31D	TKY10F
FSTUP**3225R/L-16S**	●	●		1603○○	25	270	56.3	16	23.4	0°	**32**	0.8	5	TS4D	TKY15F

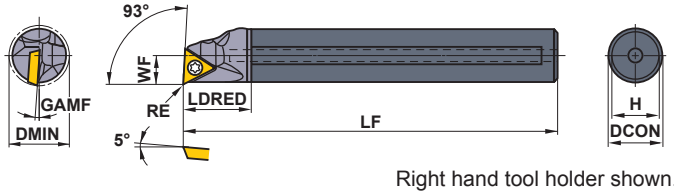
* Clamp Torque (N • m) : TS2D=0.6, TS25D=1.0, TS31D=2.5, TS4D=3.5

FSTUP_E

Carbide shank with coolant hole

TP○○inserts





Right hand tool holder shown.

Finish	Light	Medium
FV	SV	MV
		
(08,09)	(08,09,11)	(08,09,11)
PCD	**CBN**	
R/L-F		
		
(08,09,11)	(08,09,11)	

Order Number	Stock		Insert Number		Dimensions(mm)								Maximum recommendation l/d ratio	* Clamp Screw	Wrench
	R	L			DCON	LF	LDRED	WF	H	GAMF	DMIN	RE			
FSTUP1008R/L-08E	●	●	TPGH TPMH NP-TPGB NP-TPMB NP-TPMH	0802○○	8	140	13.8	5	7.2	10°	**10**	0.4	7	TS2D	TKY06F
FSTUP**1008R-08E-2/3**	●			0802○○	8	90	13.8	5	7.2	10°	**10**	0.4	7	TS2D	TKY06F
FSTUP**1008R-08E-1/2**	●			0802○○	8	70	13.8	5	7.2	10°	**10**	0.4	7	TS2D	TKY06F
FSTUP**1210R/L-09E**	●	●		0902○○	10	160	16.0	6	9	8°	**12**	0.4	7.5	TS25D	TKY08F
FSTUP**1210R-09E-2/3**	●			0902○○	10	105	16.0	6	9	8°	**12**	0.4	7.5	TS25D	TKY08F
FSTUP**1210R-09E-1/2**	●			0902○○	10	80	16.0	6	9	8°	**12**	0.4	7.5	TS25D	TKY08F
FSTUP**1412R/L-09E**	●	●		0902○○	12	180	17.8	7	11	7°	**14**	0.4	8	TS25D	TKY08F
FSTUP**1412R-09E-2/3**	●			0902○○	12	120	17.8	7	11	7°	**14**	0.4	8	TS25D	TKY08F
FSTUP**1412R-09E-1/2**	●			0902○○	12	90	17.8	7	11	7°	**14**	0.4	8	TS25D	TKY08F
FSTUP**1816R/L-11E**	●	●		1103○○	16	220	21.8	9	15	4°	**18**	0.4	8	TS31D	TKY10F
FSTUP**1816R-11E-2/3**	●			1103○○	16	145	21.8	9	15	4°	**18**	0.4	8	TS31D	TKY10F
FSTUP**1816R-11E-1/2**	●			1103○○	16	110	21.8	9	15	4°	**18**	0.4	8	TS31D	TKY10F
FSTUP**2220R/L-11E**	●	●		1103○○	20	250	24.0	11	19	0°	**22**	0.4	8	TS31D	TKY10F
FSTUP**2220R-11E-2/3**	●			1103○○	20	165	24.0	11	19	0°	**22**	0.4	8	TS31D	TKY10F
FSTUP**2220R-11E-1/2**	●			1103○○	20	125	24.0	11	19	0°	**22**	0.4	8	TS31D	TKY10F

* Clamp Torque (N • m) : TS2D=0.6, TS25D=1.0, TS31D=2.5

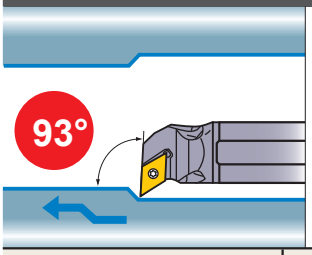
TP○○ type inserts	➤ A145—A147
CBN & PCD inserts	➤ B046, B062

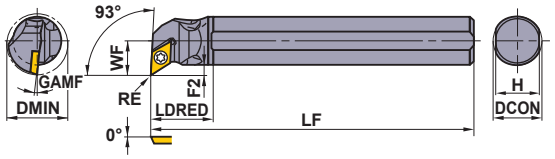
CUTTING CONDITIONS	➤ E012
SPARE PARTS	➤ P001
TECHNICAL DATA	➤ Q001

DIMPLE BAR

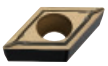
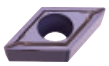
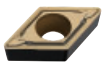
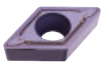
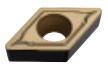
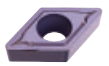
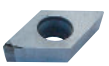
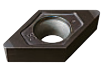
- Excellent vibration resistance due to light dimple head.
- Chip disposal is improved by having two channels for chip evacuation.
- A laser printed scale on the side for easy installation (Steel shank).
- l/d is 3 to 5 times the diameter (Carbide shank is 7 to 8 times the diameter).

FSDUC — DC○○inserts





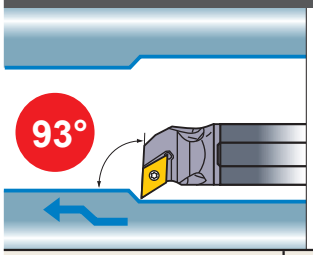
Right hand tool holder shown.

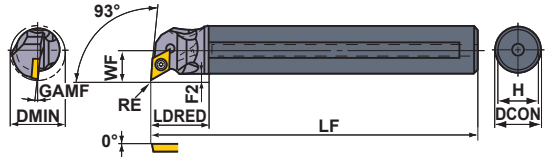
Finish	Finish	Light	Light
FP	FM	LP	LM
			
(07,11)	(07,11)	(07,11)	(07,11)
Medium	Medium	PCD	CBN
MP	MM	R/L-F	
			
(07,11)	(07,11)	(07,11)	(07,11)

Order Number	Stock R	Stock L	Insert Number		Dimensions(mm) DCON	LF	LDRED	WF	F2	H	GAMF	DMIN	RE	Maximum recommendation l/d ratio	* Clamp Screw	Wrench
FSDUC1410R/L-07S	●	●	DCMT DCET DCGT NP-DCMT NP-DCMW	0702○○	10	150	18	8.3	3.3	9	7.5°	**14**	0.4	3.5	TS25	TKY08F
FSDUC1612R/L-07S	●	●		0702○○	12	150	20	9.3	3.3	11	6°	**16**	0.4	4	TS25	TKY08F
FSDUC2016R/L-07S	●	●		0702○○	16	180	20	11.3	3.3	15	5°	**20**	0.4	5	TS25	TKY08F
FSDUC3220R/L-11S	●	●		11T3○○	20	180	22.5	16.1	6.1	19	5°	**32**	0.8	5	TS43	TKY15F

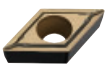
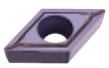
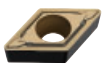
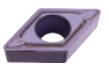
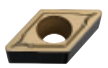
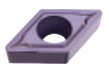
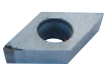
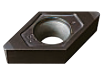
∗ Clamp Torque (N • m) : TS25=1.0, TS43=3.5

FSDUC_E — Carbide shank with coolant hole — DC○○inserts





Right hand tool holder shown.

Finish	Finish	Light	Light
FP	FM	LP	LM
			
(07,11)	(07,11)	(07,11)	(07,11)
Medium	Medium	PCD	CBN
MP	MM	R/L-F	
			
(07,11)	(07,11)	(07,11)	(07,11)

Order Number	Stock R	Stock L	Insert Number		Dimensions(mm) DCON	LF	LDRED	WF	F2	H	GAMF	DMIN	RE	Maximum recommendation l/d ratio	* Clamp Screw	Wrench
FSDUC1410R/L-07E	●	●	DCMT DCET DCGT NP-DCMT NP-DCMW	0702○○	10	160	16.0	8.3	3.3	9	7.5°	**14**	0.4	7.5	TS25	TKY08F
FSDUC1612R/L-07E	●	●		0702○○	12	180	17.8	9.3	3.3	11	6.0°	**16**	0.4	8	TS25	TKY08F
FSDUC2016R/L-07E	●	●		0702○○	16	220	21.8	11.3	3.3	15	5.0°	**20**	0.4	8	TS25	TKY08F
FSDUC3220R/L-11E	●	●		11T3○○	20	250	24.0	16.1	6.1	19	5.0°	**32**	0.8	8	TS43	TKY15F

∗ Clamp Torque (N • m) : TS25=1.0, TS43=3.5

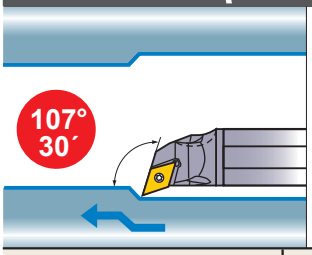
(Note 1) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.
(Note 2) When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

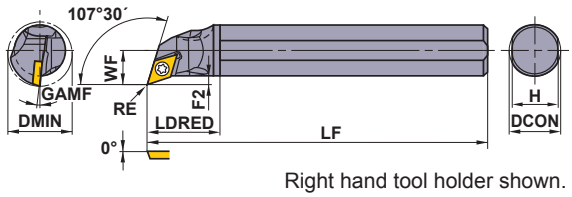
● : Inventory maintained in Japan.

DC○○ type inserts	**➤ A132—A135**
CBN & PCD inserts	**➤ B043, B044, B060**

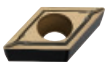
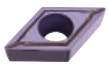
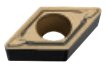
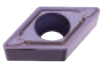
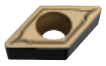
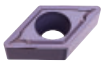
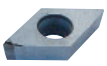
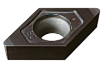
FSDQC

DC○○inserts





Right hand tool holder shown.

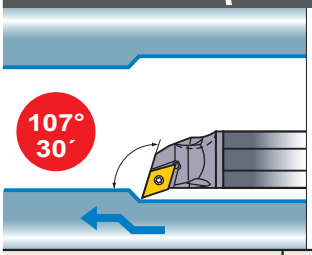
Finish	Finish	Light	Light
FP	FM	LP	LM
			
(07,11)	(07,11)	(07,11)	(07,11)
Medium	**Medium**	**PCD**	**CBN**
MP	MM	R/L-F	
			
(07,11)	(07,11)	(07,11)	(07,11)

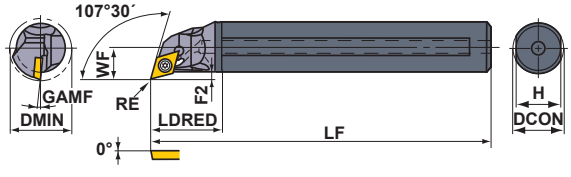
Order Number	Stock		Insert Number		Dimensions(mm)									Maximum recommendation l/d ratio	* Clamp Screw	Wrench
	R	L			DCON	LF	LDRED	WF	F2	H	GAMF	DMIN	RE			
FSDQC1310R/L-07S	●	●	DCMT DCET DCGT NP-DCMT NP-DCMW	0702○○	10	150	20.5	7.6	2.6	9	8°	**13**	0.4	3.5	TS25	TKY08F
FSDQC1612R/L-07S	●	●		0702○○	12	150	22.5	8.6	2.6	11	6°	**16**	0.4	4	TS25	TKY08F
FSDQC2016R/L-07S	●	●		0702○○	16	180	22.5	10.6	2.6	15	5°	**20**	0.4	5	TS25	TKY08F
FSDQC2520R/L-11S	●	●		11T3○○	20	180	26	13.7	3.7	19	7°	**25**	0.8	5	TS43	TKY15F

∗ Clamp Torque (N • m) : TS25=1.0, TS43=3.5

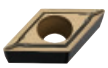
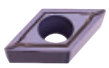
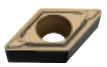
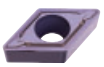
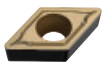
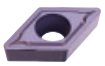
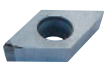
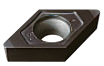
FSDQC_E

Carbide shank with coolant hole DC○○inserts





Right hand tool holder shown.

Finish	Finish	Light	Light
FP	FM	LP	LM
			
(07,11)	(07,11)	(07,11)	(07,11)
Medium	**Medium**	**PCD**	**CBN**
MP	MM	R/L-F	
			
(07,11)	(07,11)	(07,11)	(07,11)

Order Number	Stock		Insert Number		Dimensions(mm)									Maximum recommendation l/d ratio	* Clamp Screw	Wrench
	R	L			DCON	LF	LDRED	WF	F2	H	GAMF	DMIN	RE			
FSDQC1310R/L-07E	●	●	DCMT DCET DCGT NP-DCMT NP-DCMW	0702○○	10	162	18.4	7.6	2.6	9	8°	**13**	0.4	7.5	TS25	TKY08F
FSDQC1612R/L-07E	●	●		0702○○	12	182	20.2	8.6	2.6	11	6°	**16**	0.4	8	TS25	TKY08F
FSDQC2016R/L-07E	●	●		0702○○	16	222	24.2	10.6	2.6	15	5°	**20**	0.4	8	TS25	TKY08F
FSDQC2520R/L-11E	●	●		11T3○○	20	254	28.0	13.7	3.7	19	7°	**25**	0.8	8	TS43	TKY15F

∗ Clamp Torque (N • m) : TS25=1.0, TS43=3.5

DC○○ type inserts	➤ A132—A135
CBN & PCD inserts	➤ B043, B044, B060

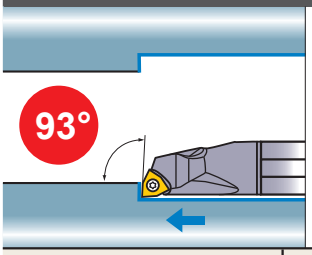
CUTTING CONDITIONS	➤ E012
SPARE PARTS	➤ P001
TECHNICAL DATA	➤ Q001

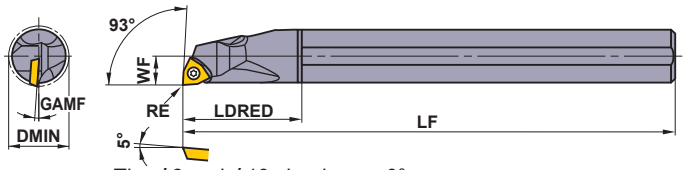
DIMPLE BAR

- Excellent vibration resistance due to light dimple head.
- Chip disposal is improved by having two channels for chip evacuation.
- A laser printed scale on the side for easy installation (Steel shank).
- l/d is 3 to 5 times the diameter (Carbide shank is 7 to 8 times the diameter).

FSWUB/P

WB○○inserts, WP○○inserts





The ϕ8 and ϕ10 shanks are 0°

Right hand tool holder shown.

Finish
R/L-F·FS



(L3,04,06)

Medium
MV



(L3,04,06)

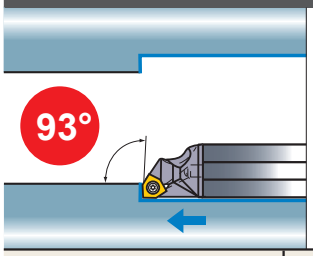
Order Number	Stock R	Stock L	Insert Number		Dimensions(mm) DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Maximum recommendation l/d ratio	* Clamp Screw	Wrench
FSWUB1008R/L-L3S	●	●	WBMT WBGT	L302○○	8	125	18	5	7.2	14°	**10**	0.2	3	TS2	TKY06F
FSWUB1210R/L-L3S	●	●		L302○○	10	150	22.5	6	9	11°	**12**	0.2	3.5	TS2	TKY06F
FSWUP1412R/L-04S	●	●	WPMT WPGT	0402○○	12	150	27	7	11	4°	**14**	0.4	4	TS253	TKY08F
FSWUP1816R/L-04S	●	●		0402○○	16	180	36	9	15	1°	**18**	0.4	5	TS253	TKY08F
FSWUP2220R/L-06S	●	●		0603○○	20	220	45	11	19	2°	**22**	0.8	5	TS4	TKY15F
FSWUP3025R/L-06S	●	●		0603○○	25	250	56.3	15	23.4	0°	**30**	0.8	5	TS4	TKY15F

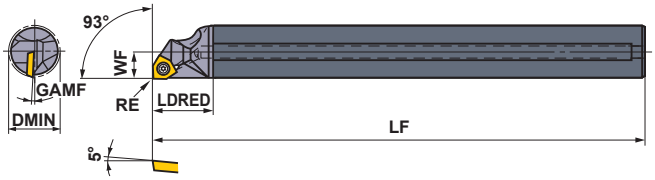
* Clamp Torque (N • m) : TS2=0.6, TS253=1.0, TS4=3.5

FSWUB/P_E

Carbide shank with coolant hole

WB○○inserts, WP○○inserts





The ϕ8 and ϕ10 shanks are 0°

Right hand tool holder shown.

Finish
R/L-F·FS



(L3,04,06)

Medium
MV



(L3,04,06)

Order Number	Stock R	Stock L	Insert Number		Dimensions(mm) DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Maximum recommendation l/d ratio	* Clamp Screw	Wrench
FSWUB1008R/L-L3E	●	●	WBMT WBGT	L302○○	8	140	13.8	5	7.2	14°	**10**	0.2	7	TS2	TKY06F
FSWUB1008R-L3E-2/3	●			L302○○	8	90	13.8	5	7.2	14°	**10**	0.2	7	TS2	TKY06F
FSWUB1008R-L3E-1/2	●			L302○○	8	70	13.8	5	7.2	14°	**10**	0.2	7	TS2	TKY06F
FSWUB1210R/L-L3E	●	●		L302○○	10	160	16.0	6	9	11°	**12**	0.2	7.5	TS2	TKY06F
FSWUB1210R-L3E-2/3	●			L302○○	10	105	16.0	6	9	11°	**12**	0.2	7.5	TS2	TKY06F
FSWUB1210R-L3E-1/2	●			L302○○	10	80	16.0	6	9	11°	**12**	0.2	7.5	TS2	TKY06F
FSWUP1412R/L-04E	●	●	WPMT WPGT	0402○○	12	180	17.8	7	11	4°	**14**	0.4	8	TS253	TKY08F
FSWUP1412R-04E-2/3	●			0402○○	12	120	17.8	7	11	4°	**14**	0.4	8	TS253	TKY08F
FSWUP1412R-04E-1/2	●			0402○○	12	90	17.8	7	11	4°	**14**	0.4	8	TS253	TKY08F
FSWUP1816R/L-04E	●	●		0402○○	16	220	21.8	9	15	1°	**18**	0.4	8	TS253	TKY08F
FSWUP1816R-04E-2/3	●			0402○○	16	145	21.8	9	15	1°	**18**	0.4	8	TS253	TKY08F
FSWUP1816R-04E-1/2	●			0402○○	16	110	21.8	9	15	1°	**18**	0.4	8	TS253	TKY08F
FSWUP2220R/L-06E	●	●		0603○○	20	250	24.0	11	19	2°	**22**	0.8	8	TS4	TKY15F
FSWUP2220R-06E-2/3	●			0603○○	20	165	24.0	11	19	2°	**22**	0.8	8	TS4	TKY15F
FSWUP2220R-06E-1/2	●			0603○○	20	125	24.0	11	19	2°	**22**	0.8	8	TS4	TKY15F

* Clamp Torque (N • m) : TS2=0.6, TS253=1.0, TS4=3.5

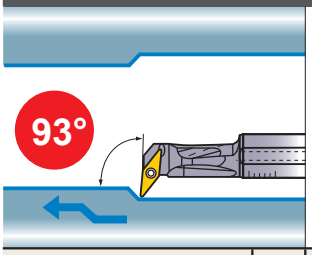
(Note 1) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.
(Note 2) When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

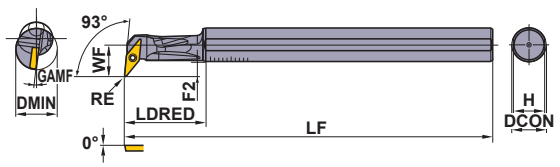
● : **Inventory maintained in Japan.**

WB○○ type inserts ➤ A155
WP○○ type inserts ➤ A157
PCD inserts ➤ B065

FSVUB/C

VC○○inserts, VB○○inserts





Right hand tool holder shown.

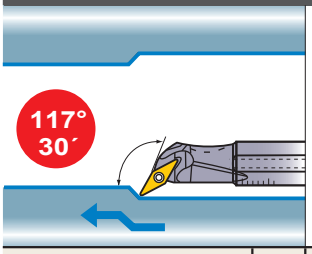
Finish	Finish	Light	Light
FP	FM	LP	LM
			
(11,16)	(11,16)	(11,16)	(11,16)
Medium	**Medium**	**Medium**	**CBN**
MP	MM	Standard	
			
(16)	(16)	(16)	(16)

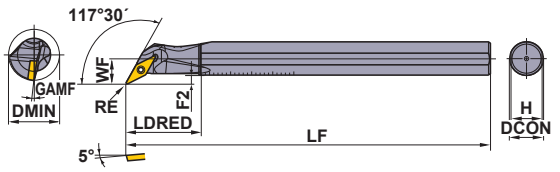
Order Number	Stock		Insert Number		Dimensions(mm)									Maximum recommendation l/d ratio	Shim	Shim Pin	Clamp Screw *	Wrench
	R	L			DCON	LF	LDRED	WF	F2	H	GAMF	DMIN	RE					
FSVUC1612R/L-08S	●	●	VCGT VCMT	0802○○	12	150	25	11	5.5	11	8°	**16**	0.4	4	—	—	TS202	TKY06F
FSVUB2016R/L-11S	●	●	VBET VBGT VBMT NP-VBGW	1103○○	16	180	32.5	15.5	8	15	8°	**20**	0.4	5	—	—	TS255	TKY08F
FSVUB2520R/L-11S	●	●		1103○○	20	200	40.5	17.5	8	19	7°	**25**	0.4	5	—	—	TS255	TKY08F
FSVUB3425R/L-16S	●	●		1604○○	25	220	50	20.5	8.5	23.4	13°	**34**	0.8	5	SPSVN32	BCP141	TS35D	TKY15F
FSVUB4032R/L-16S	●	●		1604○○	32	250	84.0	27.5	12	30.4	9°	**40**	0.8	5	SPSVN32	BCP141	TS35D	TKY15F

* Clamp Torque (N • m) : TS202=0.6, TS255=1.0, TS35D=3.5

FSVPB/C

VC○○inserts, VB○○inserts





Right hand tool holder shown.

Finish	Finish	Light	Light
FP	FM	LP	LM
			
(11,16)	(11,16)	(11,16)	(11,16)
Medium	**Medium**	**Medium**	**CBN**
MP	MM	Standard	
			
(16)	(16)	(16)	(16)

Order Number	Stock		Insert Number		Dimensions(mm)									Maximum recommendation l/d ratio	Shim	Shim Pin	Clamp Screw *	Wrench
	R	L			DCON	LF	LDRED	WF	F2	H	GAMF	DMIN	RE					
FSVPC1610R/L-08S	●	●	VCGT VCMT	0802○○	10	150	25	8	3	9	8°	**16**	0.4	3.5	—	—	TS202	TKY06F
FSVPB2012R/L-11S	●	●	VBET VBGT VBMT NP-VBGW	1103○○	12	150	28	10	4.5	11	8°	**20**	0.4	4	—	—	TS255	TKY08F
FSVPB2516R/L-11S	●	●		1103○○	16	180	35	12.5	5	15	5°	**25**	0.4	5	—	—	TS255	TKY08F
FSVPB3020R/L-11S	●	●		1103○○	20	200	40	15	5	19	5°	**30**	0.4	5	—	—	TS255	TKY08F
FSVPB3425R/L-16S	●	●		1604○○	25	220	50	17	5	23.4	13°	**34**	0.8	5	SPSVN32	BCP141	TS35D	TKY15F
FSVPB4032R/L-16S	●	●		1604○○	32	250	55	22	6.5	30.4	9°	**40**	0.8	5	SPSVN32	BCP141	TS35D	TKY15F

* Clamp Torque (N • m) : TS202=0.6, TS255=1.0, TS35D=3.5

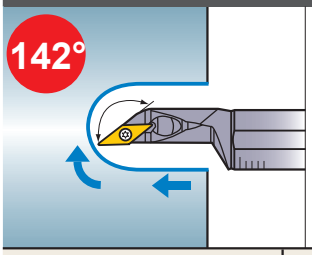
VB○○ type inserts	➤ A148—A150	CUTTING CONDITIONS	➤ E012
VC○○ type inserts	➤ A151, A152	SPARE PARTS	➤ P001
CBN & PCD inserts	➤ B048, B064	TECHNICAL DATA	➤ Q001

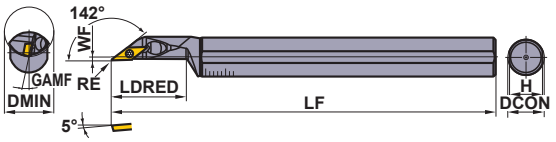
DIMPLE BAR

- Excellent vibration resistance due to light dimple head.
- Chip disposal is improved by having two channels for chip evacuation.
- A laser printed scale on the side for easy installation (Steel shank).
- l/d is 3 to 5 times the diameter.

FSVJB/C

VC○○inserts, VB○○inserts





Right hand tool holder shown.

Finish	Finish	Light	Light
FP	FM	LP	LM
			
(11)	(11)	(11)	(11)
Finish	Medium		
FV	MV		
			
(08,11)	(08,11)		

Order Number	Stock R	Stock L	Insert Number		Dimensions(mm) DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Maximum recommendation l/d ratio	* Clamp Screw	Wrench
FSVJC1612R/L-08S	●	●	VCGT VCMT	0802○○	12	150	26	2	11	5°	**16**	0.4	4	TS202	TKY06F
FSVJC**2016R/L-08S**	●	●	VCGT VCMT	0802○○	16	180	36	2	15	5°	**20**	0.4	5	TS202	TKY06F
FSVJB2520R/L-11S	●	●	VBET VBGT VBMT	1103○○	20	200	37.5	2	19	5°	**25**	0.4	5	TS255	TKY08F
FSVJB**3025R/L-11S**	●	●	VBET VBGT VBMT	1103○○	25	250	45	3.5	23.4	5°	**30**	0.4	5	TS255	TKY08F

* Clamp Torque (N • m) : TS202=0.6, TS255=1.0

RECOMMENDED CUTTING CONDITIONS

Work Material		Cutting Mode	Breaker	Recom-mendation	Grade	Cutting Speed (m/min)	l/d ≤ 3 (Steel shank) l/d ≤ 6 (Carbide shank) Feed (mm/rev)	Depth of Cut (mm)	l/d = 4–5 (Steel shank) l/d = 7–8 (Carbide shank) Feed (mm/rev)	Depth of Cut (mm)
P	Mild Steel ≤180HB	Finish	FV	①	NX2525	170 (120–220)	0.10 (0.05–0.15)	–0.5	0.10 (0.05–0.15)	–0.5
		Light	SV	①	NX3035	150 (100–200)	0.20 (0.10–0.25)	–1.0	0.15 (0.05–0.20)	–1.0
				②	NX2525	160 (110–210)	0.20 (0.10–0.25)	–1.0	0.15 (0.05–0.20)	–1.0
		Medium	MV	①	NX3035	140 (90–190)	0.25 (0.15–0.35)	–2.0	0.20 (0.15–0.25)	–1.5
				②	NX2525	150 (100–200)	0.25 (0.15–0.35)	–2.0	0.20 (0.15–0.25)	–1.5
	Carbon Steel Alloy Steel 180–350HB	Finish	FV	①	VP15TF	140 (90–190)	0.10 (0.05–0.15)	–0.5	0.10 (0.05–0.15)	–0.5
				②	NX2525	130 (80–180)	0.10 (0.05–0.15)	–0.5	0.10 (0.05–0.15)	–0.5
		Light	SV	①	UE6020	140 (90–190)	0.20 (0.10–0.25)	–1.0	0.15 (0.05–0.20)	–1.0
				②	NX3035	110 (60–160)	0.20 (0.10–0.25)	–1.0	0.15 (0.05–0.20)	–1.0
		Medium	MV	①	UE6020	130 (80–180)	0.25 (0.15–0.35)	–2.0	0.20 (0.15–0.25)	–1.5
				②	NX3035	100 (60–150)	0.25 (0.15–0.35)	–2.0	0.20 (0.15–0.25)	–1.5
M	Stainless Steel ≤200HB	Finish	FV	①	VP15TF	150 (110–190)	0.10 (0.05–0.15)	–0.5	0.10 (0.05–0.15)	–0.5
		Light	SV	①	US735	125 (85–165)	0.20 (0.10–0.25)	–1.0	0.15 (0.05–0.20)	–1.0
				②	VP15TF	130 (90–170)	0.20 (0.10–0.25)	–1.0	0.15 (0.05–0.20)	–1.0
		Medium	MV	①	US735	105 (70–135)	0.20 (0.15–0.25)	–2.0	0.20 (0.15–0.25)	–1.0
				②	VP15TF	120 (80–160)	0.20 (0.15–0.25)	–2.0	0.20 (0.15–0.25)	–1.0
K	Gray Cast Iron Tensile Strength ≤350MPa	Finish	F, FS	①	HTi10	130 (90–160)	0.15 (0.10–0.20)	–0.5	0.15 (0.10–0.20)	–0.5
		Medium	MV	①	VP15TF	90 (60–120)	0.20 (0.15–0.25)	–2.0	0.20 (0.15–0.25)	–1.5
N	Aluminium Alloy	Finish	F, FS	①	HTi10	300 (200–400)	0.10 (0.05–0.15)	–0.5	0.10 (0.05–0.15)	–0.5
			Flat Top	①	MD220	200 (150–250)	0.10 (0.05–0.15)	–2.0	0.10 (0.05–0.15)	–1.0
H	Heat Treated Steel 35–65HRC	Finish	Flat Top	①	MB825	100 (80–200)	0.10 (0.05–0.15)	–0.15	0.10 (0.05–0.15)	–0.1

(Note 1) When vibrations occur, reduce cutting speed by 30%.
(Note 2) The depth of cut needs to be less than the corner diameter when using the FSVJ type.

(Note 1) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.
(Note 2) When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

● : **Inventory maintained in Japan.**

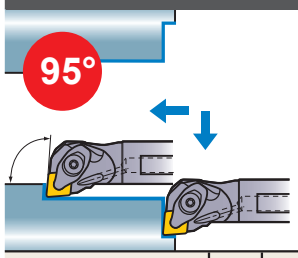
VB○○ type inserts	**➤ A148–A150**
VC○○ type inserts	**➤ A151, A152**
CBN & PCD inserts	**➤ B048, B064**

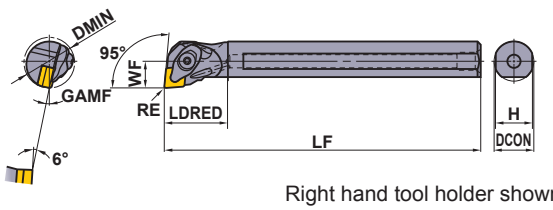
DOUBLE CLAMP DIMPLE BAR

- Economical negative insert.
- Single action type.
- Excellent vibration resistance due to a light dimple head. (With coolant hole.)
- l/d is 3 to 4 times the diameter.

DCLN

With coolant hole **CN○○inserts**





Right hand tool holder shown.

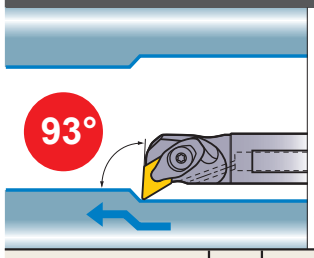
Finish	Light	Light	Medium
FH	SA	LP	MP
(12)	(12)	(12)	(12)
Medium	**Medium**	**Stainless**	**CBN**
MH	Standard	MM	
(12)	(12)	(12)	(12)

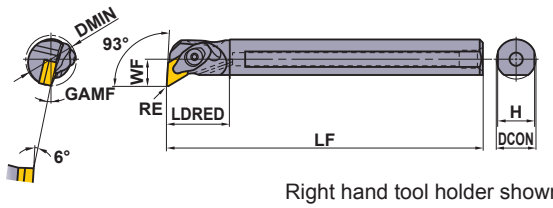
Order Number	Stock R	Stock L	Insert Number		Dimensions(mm) DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw *	Wrench
A25R-DCLNR/L12	●	●	CNMA CNMG CNMM CNGG	1204○○	25	200	40	17	23	11°	32	0.8	LLSCP42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A32S-DCLNR/L12	●	●		1204○○	32	250	50	22	30	13°	40	0.8	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A40T-DCLNR/L12	●	●		1204○○	40	300	63	27	37	10°	50	0.8	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F

∗ Clamp Torque (N • m) : DC0621T=5.0

DDUN

With coolant hole **DN○○inserts**





Right hand tool holder shown.

Finish	Light	Medium	Medium
FH	LP	MP	MH
(15)	(15)	(15)	(15)
Medium	**Stainless**	**G class**	**CBN**
Standard	MM	R/L	
(15)	(15)	(15)	(15)

Order Number	Stock R	Stock L	Insert Number		Dimensions(mm) DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw *	Wrench
A25R-DDUNR/L15	●	●	DNMA DNMG DNMX DNGA DNGG	1504○○	25	200	40	17	23	13°	35	0.8	LLSDP42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A32S-DDUNR/L15	●	●		1504○○	32	250	50	22	30	13°	40	0.8	LLSDN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A40T-DDUNR/L15	●	●		1504○○	40	300	63	27	37	10°	50	0.8	LLSDN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F

∗ Clamp Torque (N • m) : DC0621T=5.0

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Cutting Mode	l/d≤3 Cutting Speed (m/min)	l/d≤3 Feed (mm/rev)	l/d≤3 Depth of Cut (mm)	l/d=3—4 Cutting Speed (m/min)	l/d=3—4 Feed (mm/rev)	l/d=3—4 Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180—350HB	Medium	110 (80—140)	0.25 (0.1—0.4)	—5.0	110 (80—140)	0.2 (0.1—0.3)	—4.0
M	Stainless Steel	≤200HB	Medium	80 (60—100)	0.2 (0.1—0.3)	—4.0	70 (50—100)	0.15 (0.1—0.25)	—3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium	80 (60—100)	0.25 (0.1—0.4)	—5.0	80 (60—100)	0.2 (0.1—0.3)	—4.0

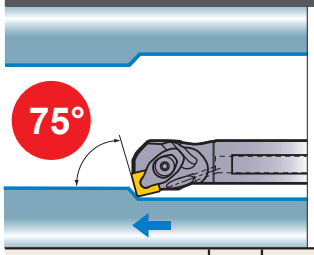
CN○○ type inserts ➤ A092—A097
DN○○ type inserts ➤ A098—A103
CBN & PCD inserts ➤ B022—B027, B055
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

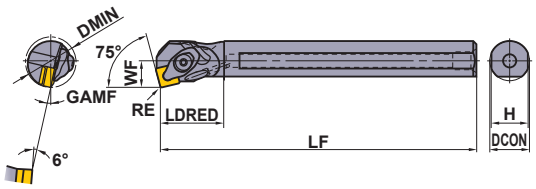
DOUBLE CLAMP DIMPLE BAR

- Economical negative insert.
- Single action type.
- Excellent vibration resistance due to a light dimple head. (With coolant hole.)
- l/d is 3 to 4 times the diameter.

DSKN

With coolant hole **SN○○inserts**





Right hand tool holder shown.

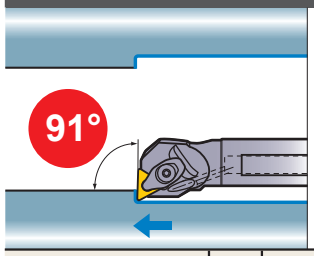
Finish	Light	Medium	Medium
FH	LP	MP	MH
			
(12)	(12)	(12)	(12)
Medium	**Stainless**	**G class**	**CBN**
Standard	MM	R/L	
			
(12)	(12)	(12)	(12)

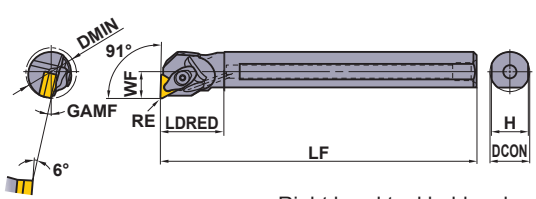
Order Number	Stock		Insert Number		Dimensions(mm)								Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw *	Wrench
	R	L			DCON	LF	LDRED	WF	H	GAMF	DMIN	RE						
A25R-DSKNR/L12	●	●	SNMA SNMG SNMM SNGA SNGG	1204○○	25	200	40	17	23	13°	32	0.8	LLSSP42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A32S-DSKNR/L12	●	●		1204○○	32	250	50	22	30	13°	40	0.8	LLSSN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F

∗ Clamp Torque (N • m) : DC0621T=5.0

DTFN

With coolant hole **TN○○inserts**





Right hand tool holder shown.

Finish	Light	Medium	Medium
FH	LP	MP	MH
			
(16)	(16)	(16)	(16)
Medium	**Stainless**	**G class**	**CBN**
Standard	MM	R/L	
			
(16)	(16)	(16)	(16)

Order Number	Stock		Insert Number		Dimensions(mm)								Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw *	Wrench
	R	L			DCON	LF	LDRED	WF	H	GAMF	DMIN	RE						
A25R-DTFNR/L16	●	●	TNMA TNMG TNMM TNGA TNGG	1604○○	25	200	40	17	23	13°	32	0.8	LLSTP32	LLP23	DCK2211	DCS2	DC0520T	TKY15F
A32S-DTFNR/L16	●	●		1604○○	32	250	50	22	30	13°	40	0.8	LLSTN32	LLP23	DCK2211	DCS2	DC0520T	TKY15F

∗ Clamp Torque (N • m) : DC0520T=3.5

(Note 1) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.
(Note 2) When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

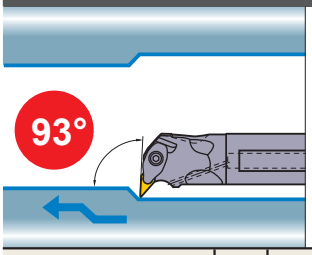
● : Inventory maintained in Japan.

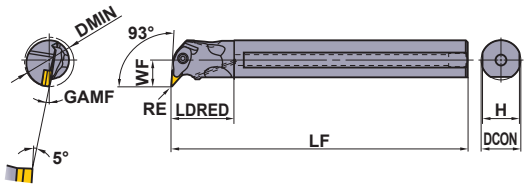
SN○○ type inserts	**➤ A105—A109**
TN○○ type inserts	**➤ A110—A115**
CBN & PCD inserts	**➤ B028—B031, B056**

DVUN

With coolant hole

VN○○inserts





Right hand tool holder shown.

Finish	Light	Medium	Medium
FH	LP	MP	MH
			
(16)	(16)	(16)	(16)
Medium	**Stainless**	**G class**	**CBN**
Standard	MM	R/L	
			
(16)	(16)	(16)	(16)

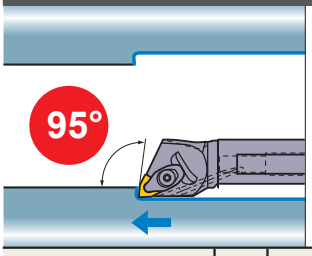
Order Number	Stock R	Stock L	Insert Number	DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw *	Wrench
A40T-DVUNR/L16	●	●	VNMA VNGA 1604○○	40	300	63	27	37	9°	50	0.8	DCSVN32	LLP13	DCK3113	DCS2	DC0520T	TKY15F

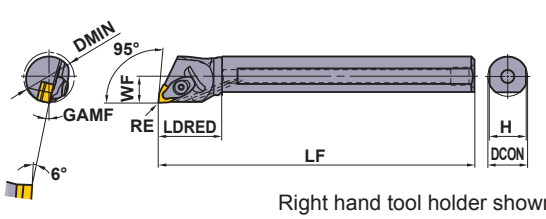
∗ Clamp Torque (N • m) : DC0520T=3.5

DWLN

With coolant hole

WN○○inserts





Right hand tool holder shown.

Finish	Light	Medium	Medium
FH	LP	MP	MH
			
(08)	(08)	(06,08)	(08)
Medium	**Medium – Rough**	**Stainless**	
Standard	RP	MM	
			
(08)	(08)	(06,08)	

Order Number	Stock R	Stock L	Insert Number	DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw *	Wrench
A25R-DWLNR/L06	●	●	WNMG 0604○○	25	200	40	17	23	13°	35	0.8	LLSWP32	LLP23	DCK2211	DCS2	DC0520T	TKY15F
A25R-DWLNR/L08	●	●	WNMA WNMG 0804○○	25	200	40	17	23	13°	35	0.8	LLSWP42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A32S-DWLNR/L08	●	●		32	250	50	22	30	13°	40	0.8	LLSWN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
A40T-DWLNR/L08	●	●		40	300	63	27	37	10°	50	0.8	LLSWN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F

∗ Clamp Torque (N • m) : DC0520T=3.5, DC0621T=5.0

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Cutting Mode	l/d≤3 Cutting Speed (m/min)	l/d≤3 Feed (mm/rev)	l/d≤3 Depth of Cut (mm)	l/d=3–4 Cutting Speed (m/min)	l/d=3–4 Feed (mm/rev)	l/d=3–4 Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Medium	110 (80–140)	0.25 (0.1–0.4)	–5.0	110 (80–140)	0.2 (0.1–0.3)	–4.0
M	Stainless Steel	≤200HB	Medium	80 (60–100)	0.2 (0.1–0.3)	–4.0	70 (50–100)	0.15 (0.1–0.25)	–3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium	80 (60–100)	0.25 (0.1–0.4)	–5.0	80 (60–100)	0.2 (0.1–0.3)	–4.0

VN○○ type inserts ➤ A116–A118
WN○○ type inserts ➤ A119–A123
CBN & PCD inserts ➤ B032–B034, B057
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

MICRO-DEX BORING BARS

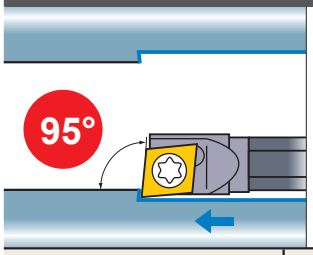
- The minimum cutting diameter is from ϕ5.
- 7° positive insert, carbide shank type.
- Easy-to-use tool geometries.
- Suitable for small workpieces.
- l/d is 5 times the diameter.

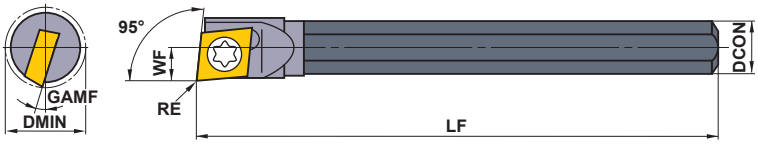
SCLC

Carbide shank

CC○○inserts

Finish: L-F (03,04) / PCD/CBN (03,04)





Right hand tool holder only.

Order Number	Stock R	Insert Number		Dimensions(mm) DCON	LF	WF	H	GAMF	DMIN	RE	*2 Clamp Screw	Wrench
C04GSCLCR03	●	*1 CCGT NP-CCMW	03S1○○	4	90	2.5	3.7	15°	5	0.2	TS16	TKY06F
C05HSCLCR03	●		03S1○○	5	100	3.0	4.7	13°	6	0.2	TS16	TKY06F
C06JSCLCR04	●		04T0○○	6	110	3.5	5.7	13°	7	0.2	TS21	TKY06F
C07KSCLCR04	●		04T0○○	7	125	4.0	6.7	11°	8	0.2	TS21	TKY06F

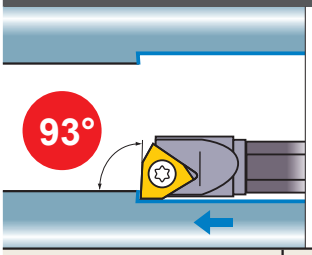
*1 Diameter of inscribed circle is special. (For SCLC type)
*2 Clamp Torque (N • m) : TS16=0.6, TS21=0.6

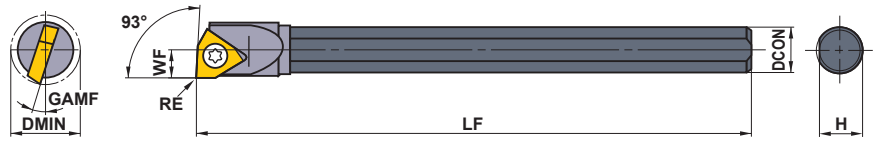
SWUB

Carbide shank

WBGT inserts

Finish: L-F (02,L3)





Right hand tool holder only.

Order Number	Stock R	Insert Number		Dimensions(mm) DCON	LF	WF	H	GAMF	DMIN	RE	* Clamp Screw	Wrench
C05HSWUBR02	●	WBGT	0201○○L-F	5	100	3.0	4.7	15°	6	0.2	TS21	TKY06F
C06JSWUBR02	●		0201○○L-F	6	110	3.5	5.7	13°	7	0.2	TS2C	TKY06F
C07KSWUBRL3	●		L302○○L-F	7	125	4.0	6.7	15°	8	0.2	TS2	TKY06F

* Clamp Torque (N • m) : TS21=0.6, TS2C=0.6, TS2=0.6

(Note) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

● : Inventory maintained in Japan.

CCGT type inserts ➤ A127
WBGT type inserts ➤ A155
CBN inserts ➤ B040, B041, B059

STUC

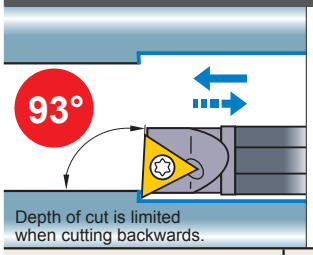
Carbide shank

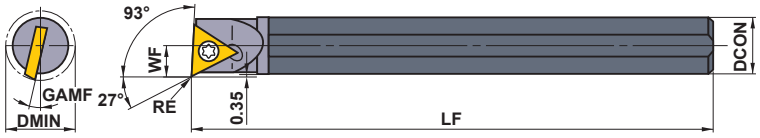
TCGT inserts

Finish
L-F



(06)





Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions(mm)							*	
	R			DCON	LF	WF	H	GAMF	DMIN	RE	Clamp Screw	Wrench
C07KSTUCR06	●	TCGT	0601○○	7	125	4.0	6.7	12°	**8**	0.2	TS2C	TKY06F

∗ Clamp Torque (N • m) : TS2C=0.6

BORING

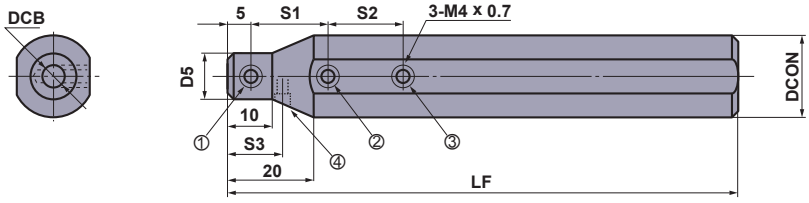
RECOMMENDED CUTTING CONDITIONS

	Work Material	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	l/d
P	Carbon Steel, Alloy Steel 180–350HB	**NX2525**	80 (40–120)	0.03 (0.01–0.05)	0.2 (0.1–0.3)	3–5
M	Stainless Steel ≤200HB	**VP15TF**	80 (40–120)	0.03 (0.01–0.05)	0.2 (0.1–0.3)	3–5
K	Gray Cast Iron ≤350MPa	**VP15TF**	80 (40–120)	0.03 (0.01–0.05)	0.2 (0.1–0.3)	3–5
N	Non-Ferrous Meterial	**VP15TF**	120 (80–160)	0.05 (0.01–0.08)	0.4 (0.1–0.6)	3–5
		MD220	120 (80–160)	0.05 (0.01–0.08)	0.4 (0.1–0.6)	3–5
H	Heat Treated Steel 35–65HRC	**MB810**	80 (40–120)	0.03 (0.01–0.05)	0.1 (0.03–0.2)	3–5

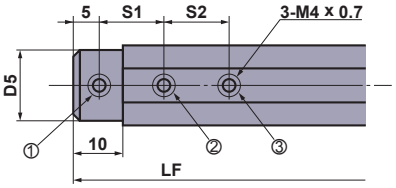
TCGT type inserts ➤ A141
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

MICRO-DEX BORING BARS

STANDARD HOLDER



RBH22□□N has a temporary set screw for different machine specifications.
(Represented by number 4)



RBH158□□N, RBH16□□N,
RBH190□□N

Order Number	Stock	Dimensions(mm)							MICRO-DEX	∗Clamp Screw				Wrench	Torque (N • m)
		DCON	DCB	D5	LF	S1	S2	S3		①	②	③	④		
RBH15840N	●	15.875	4	15	100	15	15	—	C04GS□□□R□□	A	A	A	—	HKY20F	2.0
RBH15850N	●	15.875	5	15	100	15	15	—	C05HS□□□R□□	A	A	A	—	HKY20F	2.0
RBH15860N	●	15.875	6	15	100	15	15	—	C06JS□□□R□□	A	A	A	—	HKY20F	2.0
RBH15870N	●	15.875	7	15	100	20	20	—	C07KS□□□R□□	A	A	A	—	HKY20F	2.0
RBH1640N	●	16	4	15	100	15	15	—	C04GS□□□R□□	A	A	A	—	HKY20F	2.0
RBH1650N	●	16	5	15	100	15	15	—	C05HS□□□R□□	A	A	A	—	HKY20F	2.0
RBH1660N	●	16	6	15	100	15	15	—	C06JS□□□R□□	A	A	A	—	HKY20F	2.0
RBH1670N	●	16	7	15	100	20	20	—	C07KS□□□R□□	A	A	A	—	HKY20F	2.0
∗2 **RBH19040N**	●	19.05	4	18	125	15	15	—	C04GS□□□R□□	B	B	B	—	HKY20F	2.0
∗2 **RBH19050N**	●	19.05	5	18	125	15	15	—	C05HS□□□R□□	B	B	B	—	HKY20F	2.0
∗2 **RBH19060N**	●	19.05	6	18	125	15	15	—	C06JS□□□R□□	B	B	B	—	HKY20F	2.0
∗2 **RBH19070N**	●	19.05	7	18	125	20	20	—	C07KS□□□R□□	B	B	B	—	HKY20F	2.0
RBH2040N	●	20	4	13	125	15	15	—	C04GS□□□R□□	A	B	B	—	HKY20F	2.0
RBH2050N	●	20	5	14	125	15	15	—	C05HS□□□R□□	A	B	B	—	HKY20F	2.0
RBH2060N	●	20	6	15	125	15	15	—	C06JS□□□R□□	A	B	B	—	HKY20F	2.0
RBH2070N	●	20	7	16	125	20	20	—	C07KS□□□R□□	A	B	B	—	HKY20F	2.0
RBH2240N	●	22	4	13	125	15	15	12.5	C04GS□□□R□□	A	B	B	A	HKY20F	2.0
RBH2250N	●	22	5	14	125	15	15	12.5	C05HS□□□R□□	A	B	B	A	HKY20F	2.0
RBH2260N	●	22	6	15	125	15	15	15	C06JS□□□R□□	A	B	B	A	HKY20F	2.0
RBH2270N	●	22	7	16	125	20	20	15	C07KS□□□R□□	A	B	B	A	HKY20F	2.0
RBH2540N	●	25	4	13	150	15	15	—	C04GS□□□R□□	A	C	C	—	HKY20F	2.0
RBH2550N	●	25	5	14	150	15	15	—	C05HS□□□R□□	A	C	C	—	HKY20F	2.0
RBH2560N	●	25	6	15	150	15	15	—	C06JS□□□R□□	A	C	C	—	HKY20F	2.0
RBH2570N	●	25	7	16	150	20	20	—	C07KS□□□R□□	A	C	C	—	HKY20F	2.0
RBH25440N	●	25.4	4	13	150	15	15	—	C04GS□□□R□□	A	C	C	—	HKY20F	2.0
RBH25450N	●	25.4	5	14	150	15	15	—	C05HS□□□R□□	A	C	C	—	HKY20F	2.0
RBH25460N	●	25.4	6	15	150	15	15	—	C06JS□□□R□□	A	C	C	—	HKY20F	2.0
RBH25470N	●	25.4	7	16	150	20	20	—	C07KS□□□R□□	A	C	C	—	HKY20F	2.0

∗1 Order number of clamp screw A=HSS04004, B=HSS04006, C=HSS04008
∗2 Revised order number.

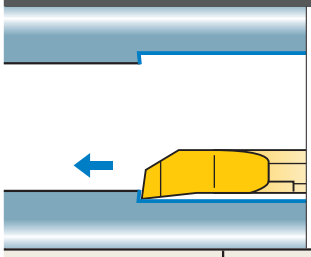
Conventional Order Number	Revised Order Number
RBH1940N	**RBH19040N**
RBH1950N	**RBH19050N**
RBH1960N	**RBH19060N**
RBH1970N	**RBH19070N**

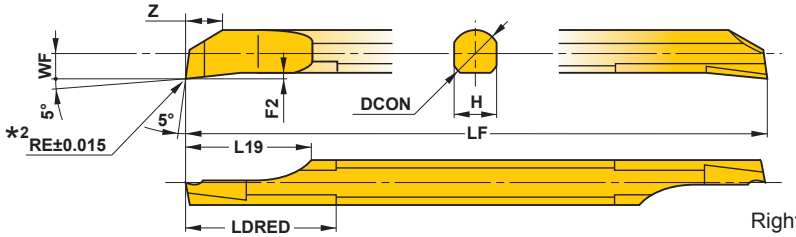
● : Inventory maintained in Japan. (MICRO-MINI TWIN is available in 1 piece in one pack.)

MICRO-MINI TWIN

CB

For internal machining





Right hand tool only.

Order Number	Stock		Breaker	Dimensions(mm)									
	Micro Grain	Coated		DMIN*1		RE	DCON	LF	L19	LDRED	WF	F2	H	Z
	TF15	VP15TF		l/d ≤ 3	l/d>3									
CB02RS	●	●	without	**2.2**	**3.6**	0.05	2	50	5	6	1	0.25	1.8	1.4
CB02RS-B	●	●	with	**2.2**	**3.9**	0.05	2	50	5	6	1	0.25	1.8	1.4
CB02RS-01	●	●	without	**2.2**	**3.6**	0.1	2	50	5	6	1	0.25	1.8	1.4
CB02RS-01B	●	●	with	**2.2**	**4.2**	0.1	2	50	5	6	1	0.25	1.8	1.4
CB02RS-02	●	●	without	**2.2**	**3.6**	0.2	2	50	5	6	1	0.25	1.8	1.4
CB02RS-02B	●	●	with	**2.2**	**4.9**	0.2	2	50	5	6	1	0.25	1.8	1.4
CB03RS	●	●	without	**3.2**	**4.2**	0.05	3	50	7.5	9	1.5	0.35	2.7	2.3
CB03RS-B	●	●	with	**3.2**	**4.4**	0.05	3	50	7.5	9	1.5	0.35	2.7	2.3
CB03RS-01	●	●	without	**3.2**	**4.2**	0.1	3	50	7.5	9	1.5	0.35	2.7	2.3
CB03RS-01B	●	●	with	**3.2**	**4.5**	0.1	3	50	7.5	9	1.5	0.35	2.7	2.3
CB03RS-02	●	●	without	**3.2**	**4.2**	0.2	3	50	7.5	9	1.5	0.35	2.7	2.3
CB03RS-02B	●	●	with	**3.2**	**4.8**	0.2	3	50	7.5	9	1.5	0.35	2.7	2.3
CB04RS	●	●	without	**4.2**	**5.1**	0.05	4	60	10	12	2	0.45	3.6	3.1
CB04RS-B	●	●	with	**4.2**	**5.2**	0.05	4	60	10	12	2	0.45	3.6	3.1
CB04RS-01	●	●	without	**4.2**	**5.1**	0.1	4	60	10	12	2	0.45	3.6	3.1
CB04RS-01B	●	●	with	**4.2**	**5.3**	0.1	4	60	10	12	2	0.45	3.6	3.1
CB04RS-02	●	●	without	**4.2**	**5.1**	0.2	4	60	10	12	2	0.45	3.6	3.1
CB04RS-02B	●	●	with	**4.2**	**5.5**	0.2	4	60	10	12	2	0.45	3.6	3.1
CB05RS	●	●	without	**5.2**	**6.0**	0.05	5	70	12.5	15	2.5	0.55	4.5	3.9
CB05RS-B	●	●	with	**5.2**	**6.1**	0.05	5	70	12.5	15	2.5	0.55	4.5	3.9
CB05RS-02	●	●	without	**5.2**	**6.0**	0.2	5	70	12.5	15	2.5	0.55	4.5	3.9
CB05RS-02B	●	●	with	**5.2**	**6.4**	0.2	5	70	12.5	15	2.5	0.55	4.5	3.9
CB06RS	●	●	without	**6.2**	**7.2**	0.05	6	75	12.5	18	3	0.65	5.4	4.7
CB06RS-B	●	●	with	**6.2**	**7.3**	0.05	6	75	12.5	18	3	0.65	5.4	4.7
CB06RS-02	●	●	without	**6.2**	**7.2**	0.2	6	75	12.5	18	3	0.65	5.4	4.7
CB06RS-02B	●	●	with	**6.2**	**7.8**	0.2	6	75	12.5	18	3	0.65	5.4	4.7
CB07RS	●	●	without	**7.2**	**8.6**	0.05	7	85	12.5	21	3.5	0.75	6.3	5.5
CB07RS-B	●	●	with	**7.2**	**8.8**	0.05	7	85	12.5	21	3.5	0.75	6.3	5.5
CB07RS-02	●	●	without	**7.2**	**8.6**	0.2	7	85	12.5	21	3.5	0.75	6.3	5.5
CB07RS-02B	●	●	with	**7.2**	**9.2**	0.2	7	85	12.5	21	3.5	0.75	6.3	5.5
CB08RS	●	●	without	**8.2**	**9.5**	0.05	8	95	15	24	4	0.85	7.2	6.3
CB08RS-B	●	●	with	**8.2**	**9.6**	0.05	8	95	15	24	4	0.85	7.2	6.3
CB08RS-02	●	●	without	**8.2**	**9.5**	0.2	8	95	15	24	4	0.85	7.2	6.3
CB08RS-02B	●	●	with	**8.2**	**9.8**	0.2	8	95	15	24	4	0.85	7.2	6.3

*1 DMIN : Min. Cutting Diameter
*2 The RE dimension represents the size before grinding a chip breaker.

RECOMMENDED CUTTING CONDITIONS

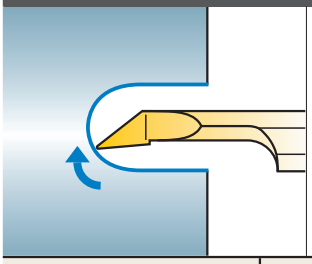
Work Material		Micro-Mini Twin **CB**				Micro-Mini Twin **CR**		
		Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	l/d	Cutting Speed (m/min)	Feed(mm/rev)	
							03RS/04RS	05RS
P	Carbon Steel Alloy Steel 180–350HB	80 (40–120)	0.03 (0.01–0.05)	0.2 (0.1–0.3)	3–5	80 (40–120)	0.02 (0.01–0.03)	0.03 (0.01–0.05)
M	Stainless Steel ≤200HB	80 (40–120)	0.03 (0.01–0.05)	0.2 (0.1–0.3)	3–5	80 (40–120)	0.02 (0.01–0.03)	0.03 (0.01–0.05)
K	Gray Cast Iron ≤350MPa	80 (40–120)	0.03 (0.01–0.05)	0.2 (0.1–0.3)	3–5	80 (40–120)	0.03 (0.01–0.05)	0.03 (0.01–0.05)
N	Non-Ferrous Meterial	120 (80–160)	0.05 (0.01–0.08)	0.3 (0.1–0.5)	3–5	120 (80–160)	0.03 (0.01–0.05)	0.05 (0.01–0.08)

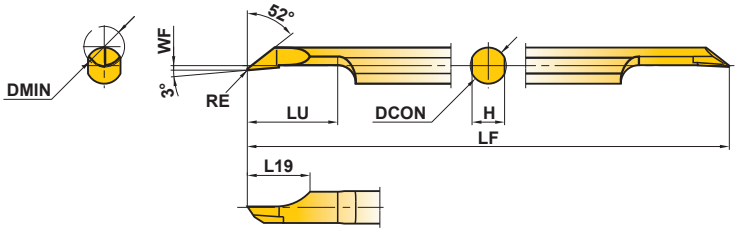
(Note) Recommend wet machining.

MICRO-MINI TWIN

CR

For internal copying





Right hand tool only.

Order Number	Stock		Breaker	Dimensions(mm)							
	Micro Grain	Coated		DMIN	RE	DCON	LF	LU	L19	WF	H
	TF15	VP15TF									
CR03RS-01	●	●	without	3.5	0.1	3	50	8	6	0.15	2.7
CR03RS-01B	●	●	with	3.5	0.1	3	50	8	6	0.15	2.7
CR04RS-01	●	●	without	4.5	0.1	4	60	10	7	0.15	3.6
CR04RS-01B	●	●	with	4.5	0.1	4	60	10	7	0.15	3.6
CR05RS-01	●	●	without	5.5	0.1	5	70	12	8	0.15	4.5
CR05RS-01B	●	●	with	5.5	0.1	5	70	12	8	0.15	4.5

RECOMMENDED CUTTING CONDITIONS

Work Material		Micro-Mini Twin **CB**				Micro-Mini Twin **CR**		
		Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	l/d	Cutting Speed (m/min)	Feed(mm/rev) 03RS/04RS	Feed(mm/rev) 05RS
P	Carbon Steel Alloy Steel 180–350HB	80 (40–120)	0.03 (0.01–0.05)	0.2 (0.1–0.3)	3–5	80 (40–120)	0.02 (0.01–0.03)	0.03 (0.01–0.05)
M	Stainless Steel ≤200HB	80 (40–120)	0.03 (0.01–0.05)	0.2 (0.1–0.3)	3–5	80 (40–120)	0.02 (0.01–0.03)	0.03 (0.01–0.05)
K	Gray Cast Iron ≤350MPa	80 (40–120)	0.03 (0.01–0.05)	0.2 (0.1–0.3)	3–5	80 (40–120)	0.03 (0.01–0.05)	0.03 (0.01–0.05)
N	Non-Ferrous Meterial	120 (80–160)	0.05 (0.01–0.08)	0.3 (0.1–0.5)	3–5	120 (80–160)	0.03 (0.01–0.05)	0.05 (0.01–0.08)

(Note 1) Recommend wet machining.
(Note 2) The recommended tool overhang of CR type is LU+2mm.

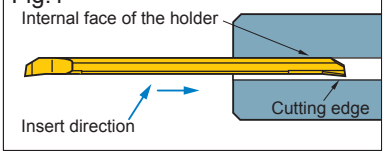
● : Inventory maintained in Japan. (MICRO-MINI TWIN is available in 1 piece in one pack.)

PRECAUTIONS WHEN USING THE MICRO-MINI TWIN

●When using a holder for general purpose / small automatic lathe:

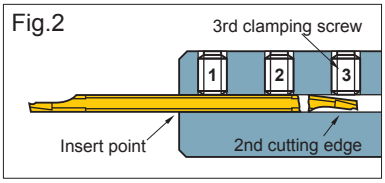
1 To avoid chipping of the 2nd cutting edge take care when inserting the boring bar into the holder. Refer to fig.1. If the 2nd edge contacts the internal face of the holder there is a possibility that it may chip.

Fig.1



2 When using this type of holder, there is a possibility that damage to the shank and the 2nd cutting edge can occur. Make sure that the clamping screws are tightened to the set torque value. Additionally make sure that there is no clamping screw near the 2nd cutting edge as this can break the boring bar.

Fig.2



◎When using Mitsubishi holders
When using holders with a tool overhang of recommended quantity, ensure that the 3rd clamping screw is removed prior to machining. (RBH1620N, RBH19020N, RBH2020N and RBH2520N do not have the 3rd screw.) The set torque value for clamping screw is 2.0 N•m.

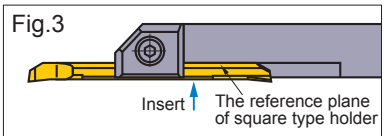
●When using a square type holder:

1 When installing the boring bar into the holder, tighten the clamp screws after ensuring the flats on the tool holder are parallel to the reference flats on the micro-mini bar. Refer to fig.3.

2 Make sure that the clamping screws are tightened to the recommended values.

3 Do not tighten the clamp screw without a bar in place, otherwise the bridge will be deformed.

Fig.3



Tighten the clamping screw ensuring making the micro-mini twin boring bars is in contact with the reference plane of square type holder.

MACHINING METHODS OF THE CR TYPE

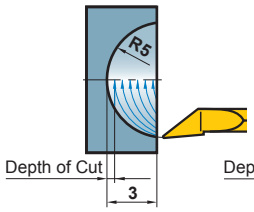
●Profile turning

By drilling a pre-prepared hole, the machining time will be shortened and chip control will be improved.

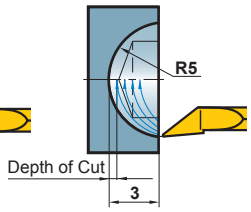
<Cutting Conditions>

Workpiece	: JIS S20C
Holder	: CR05RS-01B
Cutting Speed	: 80m/min
Feed	: 0.05mm/rev
Depth of Cut	: 0.05mm
Wet Cutting	

Machining a work piece without a pre-prepared hole



Machining a work piece with a pre-prepared hole



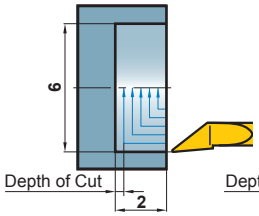
●Inner end facing

By drilling a pre-prepared hole, the machining time will be shortened and chip control will be improved.

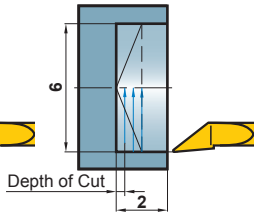
<Cutting Conditions>

Workpiece	: JIS S20C
Holder	: CR05RS-01B
Cutting Speed	: 80m/min
Feed	: 0.05mm/rev
Depth of Cut	: 0.05mm
Wet Cutting	

Machining a work piece without a pre-prepared hole

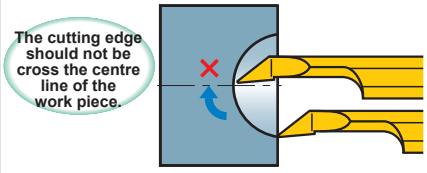


Machining a work piece with a pre-prepared hole



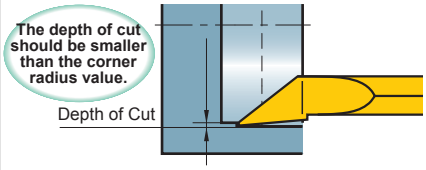
NOTES FOR USE

Profile turning, Inner end facing



If the cutting edge crosses the centre line of a work piece, the cutting edge can fracture.

Copying



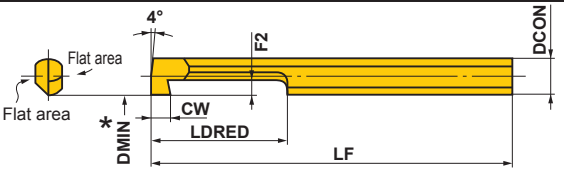
With depths of cut larger than the corner radius value, burrs will be formed.

MICRO-MINI BORING BARS

- Solid carbide type with minimum cutting diameter ϕ3.2mm.
- l/d is 5 times the diameter.
- Cutting edge can be shaped according to the application thus, it covers a wide application range (threading, grooving, copying, etc).

STANDARD MICRO-MINI BORING BARS (Solid carbide boring bar)

Order Number	Stock	Dimensions(mm)						Geometry
	TF15	CW	DCON	LF	LDRED	DMIN	F2	
C03FR-BLS	●	2.0	3	80	15	3.2	1.0	
C04FR-BLS	●	2.5	4	80	20	4.2	1.5	
C05HR-BLS	●	3.0	5	100	25	5.2	2.0	



Right hand tool only.

*DMIN : Min. Cutting Diameter

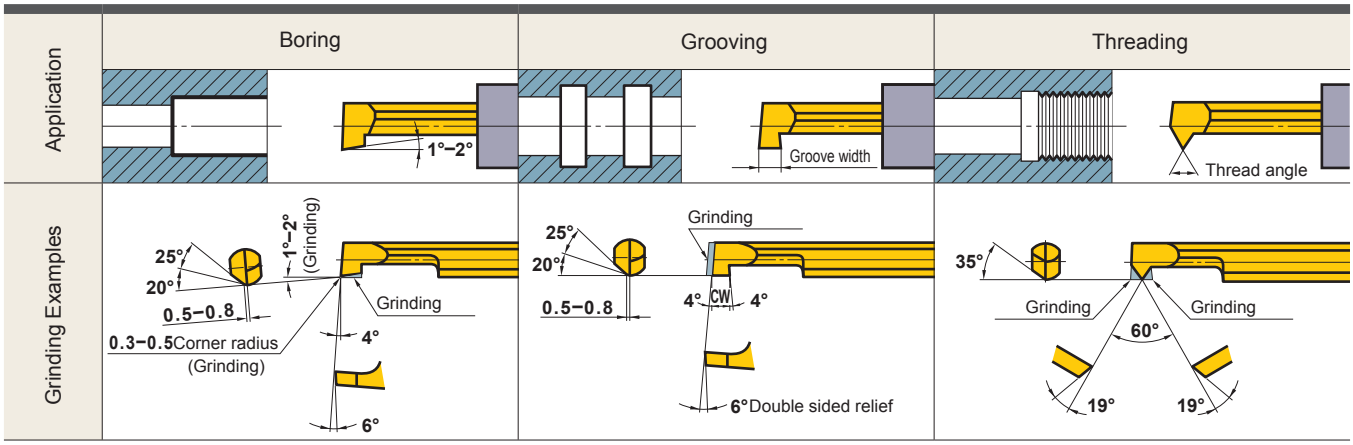
RECOMMENDED CUTTING CONDITIONS

	Work Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	l/d	Edge Condition (mm)	
						*Corner Radius or C	*Honing
P	Carbon Steel, Alloy Steel 180—350HB	40 (30—50)	0.05 (—0.1)	0.2 (0.1—0.3)	5	0.1—0.5	0.01—0.05
M	Stainless Steel ≤200HB	40 (30—50)	0.05 (—0.1)	0.2 (0.1—0.3)	5	≤0.4	≤0.03 (Honing not required)
K	Gray Cast Iron ≤350MPa	40 (30—50)	0.05 (—0.05)	0.2 (0.1—0.3)	5	0.1—0.5	0.01—0.05
N	Non-Ferrous Meterial	80 (60—100)	0.05 (—0.1)	0.3 (0.1—0.5)	5	0.1—0.5	≤0.03 (Honing not required)

*Cutting edge is not honed. Please hone according to the workpiece before machining.

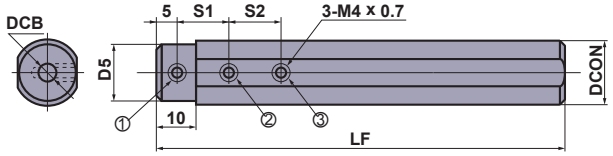
GRINDING THE CUTTING EDGE OF MICRO-MINI BORING BAR

- MICRO-MINI boring bar can be applied to boring and grooving without any modifications. It can also be reground as shown below.
- For shaping and regrinding, use a diamond whetstone approximately #250—#400. Please grind according to the application using the figure below as a reference.

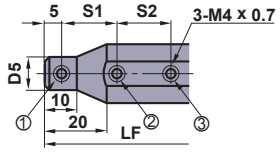


● : Inventory maintained in Japan. (MICRO MINI is available in 1 piece in one pack.)

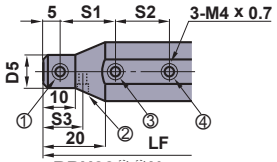
ROUND TYPE HOLDER



RBH158○○N, RBH16○○N, RBH190○○N



RBH20○○N, RBH25○○N, RBH254○○N



RBH22○○N

Order Number	Stock	Dimensions(mm)							Micro-Mini	Micro-Mini Twin		∗1 Clamp Screw				Wrench	Torque (N • m)
		DCON	DCB	D5	LF	S1	S2	S3	C	CB	CR	①	②	③	④		
RBH15820N	●	15.875	2	15	100	10	—	—	—	02RS(-B) 02RS-0○(B)	—	B	B	—	—	HKY20F	2.0
RBH**15830N**	●	15.875	3	15	100	10	10	—	03FR-BLS	03RS(-B) 03RS-0○(B)	03RS-01(B)	A	A	A	—	HKY20F	2.0
RBH**15840N**	●	15.875	4	15	100	15	15	—	04FR-BLS	04RS(-B) 04RS-0○(B)	04RS-01(B)	A	A	A	—	HKY20F	2.0
RBH**15850N**	●	15.875	5	15	100	15	15	—	05HR-BLS	05RS(-B) 05RS-0○(B)	05RS-01(B)	A	A	A	—	HKY20F	2.0
RBH**15860N**	●	15.875	6	15	100	15	15	—	—	06RS(-B) 06RS-0○(B)	—	A	A	A	—	HKY20F	2.0
RBH**15870N**	●	15.875	7	15	100	20	20	—	—	07RS(-B) 07RS-0○(B)	—	A	A	A	—	HKY20F	2.0
RBH**15880N**	●	15.875	8	15	100	20	20	—	—	08RS(-B) 08RS-0○(B)	—	D	D	D	—	HKY20F	2.0
RBH1620N	●	16	2	15	100	10	—	—	—	02RS(-B) 02RS-0○(B)	—	B	B	—	—	HKY20F	2.0
RBH**1630N**	●	16	3	15	100	10	10	—	03FR-BLS	03RS(-B) 03RS-0○(B)	03RS-01(B)	A	A	A	—	HKY20F	2.0
RBH**1640N**	●	16	4	15	100	15	15	—	04FR-BLS	04RS(-B) 04RS-0○(B)	04RS-01(B)	A	A	A	—	HKY20F	2.0
RBH**1650N**	●	16	5	15	100	15	15	—	05HR-BLS	05RS(-B) 05RS-0○(B)	05RS-01(B)	A	A	A	—	HKY20F	2.0
RBH**1660N**	●	16	6	15	100	15	15	—	—	06RS(-B) 06RS-0○(B)	—	A	A	A	—	HKY20F	2.0
RBH**1670N**	●	16	7	15	100	20	20	—	—	07RS(-B) 07RS-0○(B)	—	A	A	A	—	HKY20F	2.0
RBH**1680N**	●	16	8	15	100	20	20	—	—	08RS(-B) 08RS-0○(B)	—	D	D	D	—	HKY20F	2.0
∗2 **RBH19020N**	●	19.05	2	18	125	10	—	—	—	02RS(-B) 02RS-0○(B)	—	C	C	—	—	HKY20F	2.0
∗2 RBH**19030N**	●	19.05	3	18	125	10	10	—	03FR-BLS	03RS(-B) 03RS-0○(B)	03RS-01(B)	B	B	B	—	HKY20F	2.0
∗2 RBH**19040N**	●	19.05	4	18	125	15	15	—	04FR-BLS	04RS(-B) 04RS-0○(B)	04RS-01(B)	B	B	B	—	HKY20F	2.0
∗2 RBH**19050N**	●	19.05	5	18	125	15	15	—	05HR-BLS	05RS(-B) 05RS-0○(B)	05RS-01(B)	B	B	B	—	HKY20F	2.0
∗2 RBH**19060N**	●	19.05	6	18	125	15	15	—	—	06RS(-B) 06RS-0○(B)	—	B	B	B	—	HKY20F	2.0
∗2 RBH**19070N**	●	19.05	7	18	125	20	20	—	—	07RS(-B) 07RS-0○(B)	—	B	B	B	—	HKY20F	2.0
RBH**19080N**	●	19.05	8	18	125	20	20	—	—	08RS(-B) 08RS-0○(B)	—	A	A	A	—	HKY20F	2.0
RBH2020N	●	20	2	11	125	10	—	—	—	02RS(-B) 02RS-0○(B)	—	A	A	—	—	HKY20F	2.0
RBH**2030N**	●	20	3	12	125	10	10	—	03FR-BLS	03RS(-B) 03RS-0○(B)	03RS-01(B)	A	A	B	—	HKY20F	2.0
RBH**2040N**	●	20	4	13	125	15	15	—	04FR-BLS	04RS(-B) 04RS-0○(B)	04RS-01(B)	A	B	B	—	HKY20F	2.0
RBH**2050N**	●	20	5	14	125	15	15	—	05HR-BLS	05RS(-B) 05RS-0○(B)	05RS-01(B)	A	B	B	—	HKY20F	2.0
RBH**2060N**	●	20	6	15	125	15	15	—	—	06RS(-B) 06RS-0○(B)	—	A	B	B	—	HKY20F	2.0
RBH**2070N**	●	20	7	16	125	20	20	—	—	07RS(-B) 07RS-0○(B)	—	A	B	B	—	HKY20F	2.0
RBH**2080N**	●	20	8	17	125	20	20	—	—	08RS(-B) 08RS-0○(B)	—	A	A	A	—	HKY20F	2.0
RBH2220N	●	22	2	11	125	10	—	10	—	02RS(-B) 02RS-0○(B)	—	A	B	—	A	HKY20F	2.0
RBH**2230N**	●	22	3	12	125	10	10	10	03FR-BLS	03RS(-B) 03RS-0○(B)	03RS-01(B)	A	B	C	A	HKY20F	2.0
RBH**2240N**	●	22	4	13	125	15	15	12.5	04FR-BLS	04RS(-B) 04RS-0○(B)	04RS-01(B)	A	B	B	A	HKY20F	2.0
RBH**2250N**	●	22	5	14	125	15	15	12.5	05HR-BLS	05RS(-B) 05RS-0○(B)	05RS-01(B)	A	B	B	A	HKY20F	2.0
RBH**2260N**	●	22	6	15	125	15	15	15	—	06RS(-B) 06RS-0○(B)	—	A	B	B	A	HKY20F	2.0
RBH**2270N**	●	22	7	16	125	20	20	15	—	07RS(-B) 07RS-0○(B)	—	A	B	B	A	HKY20F	2.0
RBH**2280N**	●	22	8	17	125	20	20	15	—	08RS(-B) 08RS-0○(B)	—	A	B	B	A	HKY20F	2.0
RBH2520N	●	25	2	11	150	10	—	—	—	02RS(-B) 02RS-0○(B)	—	A	B	—	—	HKY20F	2.0
RBH**2530N**	●	25	3	12	150	10	10	—	03FR-BLS	03RS(-B) 03RS-0○(B)	03RS-01(B)	A	B	C	—	HKY20F	2.0
RBH**2540N**	●	25	4	13	150	15	15	—	04FR-BLS	04RS(-B) 04RS-0○(B)	04RS-01(B)	A	C	C	—	HKY20F	2.0
RBH**2550N**	●	25	5	14	150	15	15	—	05HR-BLS	05RS(-B) 05RS-0○(B)	05RS-01(B)	A	C	C	—	HKY20F	2.0
RBH**2560N**	●	25	6	15	150	15	15	—	—	06RS(-B) 06RS-0○(B)	—	A	C	C	—	HKY20F	2.0
RBH**2570N**	●	25	7	16	150	20	20	—	—	07RS(-B) 07RS-0○(B)	—	A	C	C	—	HKY20F	2.0
RBH**2580N**	●	25	8	17	150	20	20	—	—	08RS(-B) 08RS-0○(B)	—	A	B	B	—	HKY20F	2.0
RBH25420N	●	25.4	2	11	150	10	—	—	—	02RS(-B) 02RS-0○(B)	—	A	B	—	—	HKY20F	2.0
RBH**25430N**	●	25.4	3	12	150	10	10	—	03FR-BLS	03RS(-B) 03RS-0○(B)	03RS-01(B)	A	B	C	—	HKY20F	2.0
RBH**25440N**	●	25.4	4	13	150	15	15	—	04FR-BLS	04RS(-B) 04RS-0○(B)	04RS-01(B)	A	C	C	—	HKY20F	2.0
RBH**25450N**	●	25.4	5	14	150	15	15	—	05HR-BLS	05RS(-B) 05RS-0○(B)	05RS-01(B)	A	C	C	—	HKY20F	2.0
RBH**25460N**	●	25.4	6	15	150	15	15	—	—	06RS(-B) 06RS-0○(B)	—	A	C	C	—	HKY20F	2.0
RBH**25470N**	●	25.4	7	16	150	20	20	—	—	07RS(-B) 07RS-0○(B)	—	A	C	C	—	HKY20F	2.0
RBH**25480N**	●	25.4	8	17	150	20	20	—	—	08RS(-B) 08RS-0○(B)	—	A	B	B	—	HKY20F	2.0

∗1 Order number of clamp screw A=HSS04004, B=HSS04006, C=HSS04008, D=HSS04003 ∗2 Revised order number.

Conventional Order Number	Revised Order Number
RBH1920N	**RBH19020N**
RBH**1930N**	RBH**19030N**
RBH**1940N**	RBH**19040N**

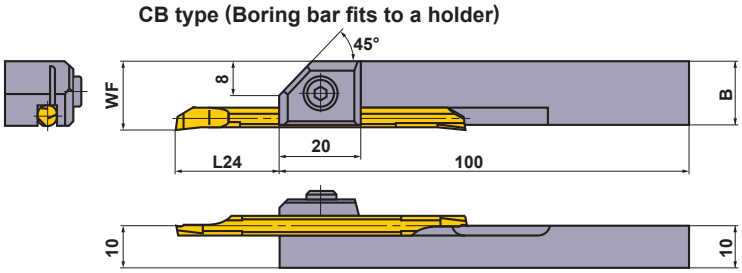
Conventional Order Number	Revised Order Number
RBH1950N	**RBH19050N**
RBH**1960N**	RBH**19060N**
RBH**1970N**	RBH**19070N**

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

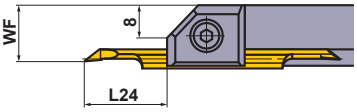
MICRO-MINI TWIN

SQUARE TYPE HOLDER

CB type (Boring bar fits to a holder)



CR type (Boring bar fits to a holder)



Order Number	Stock	Dimensions(mm) WF CB	WF CR	L24* CB	L24* CR	B CB	B CR	Micro-Mini Twin CB	Micro-Mini Twin CR	Clamp Screw	Wrench	Torque (N • m)
SBH1020R	●	13	—	6—24 (6—10)	—	12.9		02RS(-B) 02RS-0□(B)	—	HSC04010	HKY30R	4.8
SBH1030R	●	14	12.65	8.5—22 (9—15)	11—19.5 (12)	13.8		03RS(-B) 03RS-0□(B)	03RS-01(B)	HSC05012	HKY40R	9.5
SBH1040R	●	15	13.15	11—29.5 (12—20)	13—27.5 (14)	14.7		04RS(-B) 04RS-0□(B)	04RS-01(B)	HSC05012	HKY40R	9.5
SBH1050R	●	16	13.65	13.5—37 (15—25)	15—35.5 (16)	15.6		05RS(-B) 05RS-0□(B)	05RS-01(B)	HSC05012	HKY40R	9.5
SBH1060R	●	17	—	13.5—42 (18—30)	—	16.5		06RS(-B) 06RS-0□(B)	—	HSC05012	HKY40R	9.5
SBH1070R	●	18	—	13.5—52 (21—35)	—	17.4		07RS(-B) 07RS-0□(B)	—	HSC05012	HKY40R	9.5

(Note) The MICRO-DEX and the MICRO-MINI cannot be fit to square holders.
*L24 is the length of overhang for sufficient clamping, and ( ) is the recommended length for machining of carbon and alloy steel.

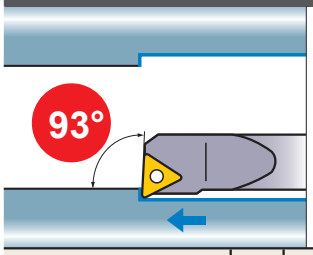
● : Inventory maintained in Japan.

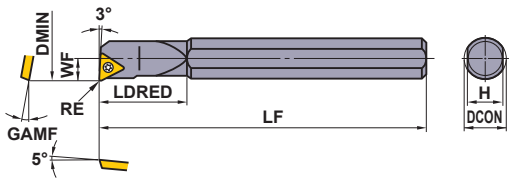
F TYPE BORING BARS

- The minimum cutting diameter is from ϕ10.
- 11°positive insert.
- Screw-on type.
- l/d is 3 to 5 times the diameter (up to 7 times with the carbide shank).

FSTU1

TP○○inserts





Right hand tool holder shown.

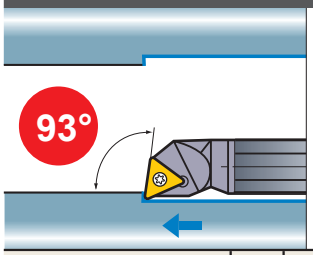
Light	Flat Top
R/L	
	
(08,09,11)	(08,09,11)
PCD	CBN/PCD
R/L-F	
	
(08,09,11)	(11)

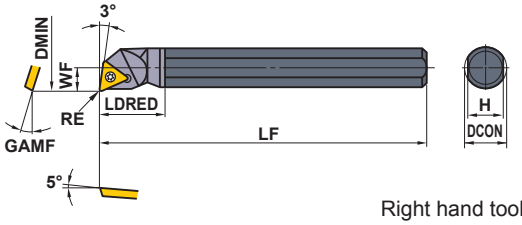
Order Number	Stock R	Stock L	Insert Number		Dimensions(mm) DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	* Clamp Screw	Wrench
FSTU108R/L	●	●	TPGX TPMX NP-TPGX NP-TPMX	0802○○	8	125	18	5	7	15°	**10**	0.4	CS200T	TKY06F
FSTU110R/L	●	●		0902○○	10	150	22	6	9	13°	**12**	0.4	CS250T	TKY08F
FSTU112R/L	●	●		0902○○	12	180	25	8	11	10°	**16**	0.4	CS250T	TKY08F
FSTU116R/L	●	●		1103○○	16	200	30	11	14	7°	**22**	0.4	CS300890T	TKY08F

∗ Clamp Torque (N • m) : CS200T=0.6, CS250T=1.0, CS300890T=1.0

FSTU2

Carbide shank **TP○○inserts**





Right hand tool holder shown.

Light	Flat Top
R/L	
	
(08,09,11)	(08,09,11)
PCD	CBN/PCD
R/L-F	
	
(08,09,11)	(11)

Order Number	Stock R	Stock L	Insert Number		Dimensions(mm) DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	* Clamp Screw	Wrench
FSTU208R/L	●	●	TPGX TPMX NP-TPGX NP-TPMX	0802○○	8	125	13	5	7	15°	**10**	0.4	CS200T	TKY06F
FSTU210R/L	●	●		0902○○	10	150	16	6	9	13°	**12**	0.4	CS250T	TKY08F
FSTU212R/L	●	●		0902○○	12	180	19	8	11	10°	**16**	0.4	CS250T	TKY08F
FSTU216R/L	●	●		1103○○	16	200	26	11	14	7°	**22**	0.4	CS300890T	TKY08F

∗ Clamp Torque (N • m) : CS200T=0.6, CS250T=1.0, CS300890T=1.0

RECOMMENDED CUTTING CONDITIONS

Steel Shank			l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
Carbide Shank			l/d≤5			l/d=6–7		
Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
		Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
		Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
		Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

(Note 1) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.
(Note 2) When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

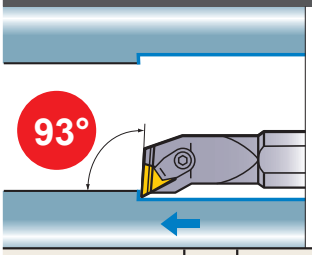
TP○○ type inserts	**➤ A146, A147**
CBN & PCD inserts	**➤ B046, B047, B062**
SPARE PARTS	**➤ P001**
TECHNICAL DATA	**➤ Q001**

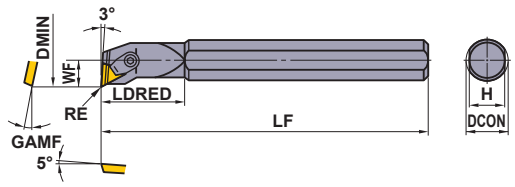
F TYPE BORING BARS

- The minimum cutting diameter is from ϕ22.
- 11°positive insert.
- Clamp-on type.
- l/d is 3 to 5 times the diameter (up to 7 times with the carbide shank).

FCTU1

TP○○inserts





Right hand tool holder shown.

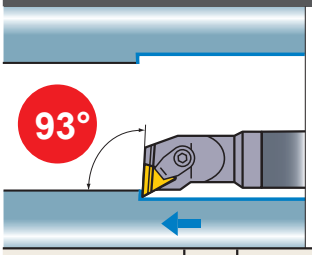
M Class	M Class	G class
		R/L 
(11,16)	(11,16)	(11,16)
G class	CBN/PCD	
		
(11,16)	(11,16)	

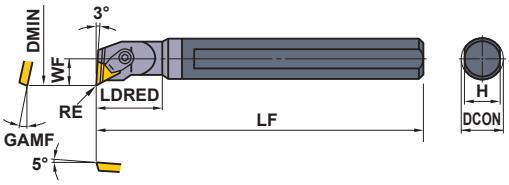
Order Number	Stock R	Stock L	Insert Number		Dimensions(mm) DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Shim	Shim Pin	Clamp Set *	Breaker Piece	Wrench
FCTU116R/L	●	●	TPMN TPMR TPGN TPGR	1103○○	16	200	30	11	14	7°	**22**	0.4	—	—	C3	CBT2N	HKY25R
FCTU120R/L	●	●		1603○○	20	200	37	13	18	5°	**26**	0.8	—	—	C4	CBT3F	HKY30R
FCTU125R/L (4 Side Flat Shank)	●	●		1603○○	25	250	40	16	22	5°	**32**	0.8	PT32	BCP202	C4	CBT3F	HKY30R
FCTU132R/L (4 Side Flat Shank)	●	●		1603○○	32	300	45	20	29	0°	**40**	0.8	PT32	BCP201	C4	CBT3F	HKY30R

∗ Clamp Torque (N • m) : C3=2.2, C4=3.3

FCTU2

Carbide shank **TP○○inserts**





Right hand tool holder only.

M Class	M Class	G class
		R/L 
(11,16)	(11,16)	(11,16)
G class	CBN/PCD	
		
(11,16)	(11,16)	

Order Number	Stock R	Insert Number		Dimensions(mm) DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Shim	Shim Pin	Clamp Set *	Breaker Piece	Wrench
FCTU216R	●	TPMN TPMR TPGN TPGR	1103○○	16	200	26	11	14	7°	**22**	0.4	—	—	C3	CBT2N	HKY25R
FCTU220R	●		1603○○	20	200	33	13	18	5°	**26**	0.8	—	—	C4	CBT3F	HKY30R
FCTU225R	●		1603○○	25	250	37	16	22	5°	**32**	0.8	PT32	BCP202	C4	CBT3F	HKY30R

∗ Clamp Torque (N • m) : C3=2.2, C4=3.3

(Note 1) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.
(Note 2) When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

● : Inventory maintained in Japan.

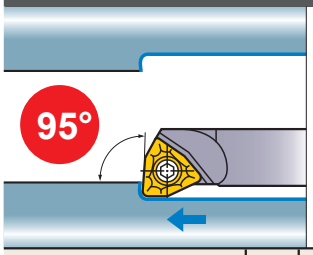
TP○○ type inserts ➤ A162
CBN & PCD inserts ➤ B052, B068

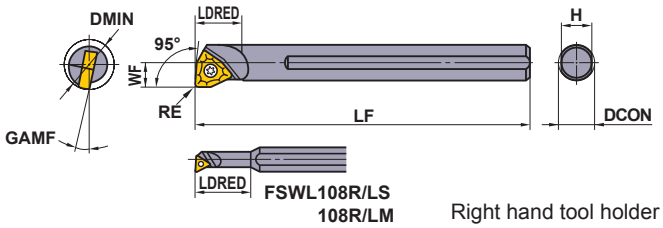
F TYPE BORING BARS

- The minimum cutting diameter is from ϕ5.8.
- 7°positive insert.
- Screw-on type.
- l/d is 3 to 5 times the diameter (up to 7 times with the carbide shank).

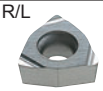
FSWL1

WC○○inserts





Right hand tool holder shown.

Light	Light
	R/L 
(02,L3,04,06)	(02,L3)
PCD	
	
(L3,04,06)	

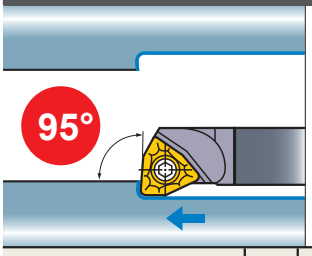
Order Number	Stock R	Stock L	Insert Number		Dimensions(mm) DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	* Clamp Screw	Wrench
FSWL108R/LS	●	●	WCMT WCGT	0201○○	8	100	19	2.9	7	17°	**5.8**	0.4	TS21	TKY06F
FSWL**108R/LM**	●	●	WCMT WCGT WCMW	L302○○	8	100	25	4	7	15°	**8**	0.4	TS2	TKY06F
FSWL**108R/L**	●	●	WCMT WCMW	0402○○	8	125	10	5	7	15°	**10**	0.4	TS25	TKY08F
FSWL**110R/L**	●	●		0402○○	10	150	12	6	9	13°	**12**	0.4	TS25	TKY08F
FSWL**112R/L**	●	●		06T3○○	12	180	15	8	11	13°	**16**	0.8	TS4	TKY15F
FSWL**116R/L**	●	●		06T3○○	16	200	20	11	14	7°	**22**	0.8	TS4	TKY15F

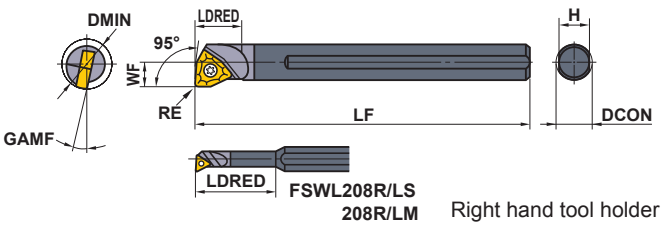
* Clamp Torque (N • m) : TS21=0.6, TS2=0.6, TS25=1.0, TS4=3.5

FSWL2

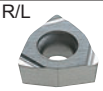
Carbide shank

WC○○inserts





Right hand tool holder shown.

Light	Light
	R/L 
(02,L3,04,06)	(02,L3)
PCD	
	
(L3,04,06)	

Order Number	Stock R	Stock L	Insert Number		Dimensions(mm) DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	* Clamp Screw	Wrench
FSWL208R/LS	●	●	WCMT WCGT	0201○○	8	122	25	2.9	7	17°	**5.8**	0.4	TS21	TKY06F
FSWL**208R/LM**	●	●	WCMT WCGT WCMW	L302○○	8	125	33	4	7	15°	**8**	0.4	TS2	TKY06F
FSWL**208R/L**	●	●	WCMT WCMW	0402○○	8	125	10	5	7	15°	**10**	0.4	TS25	TKY08F
FSWL**210R/L**	●	●		0402○○	10	150	12	6	9	13°	**12**	0.4	TS25	TKY08F
FSWL**212R/L**	●	●		06T3○○	12	180	15	8	11	13°	**16**	0.8	TS4	TKY15F
FSWL**216R/L**	●	●		06T3○○	16	200	20	11	14	7°	**22**	0.8	TS4	TKY15F

* Clamp Torque (N • m) : TS21=0.6, TS2=0.6, TS25=1.0, TS4=3.5

RECOMMENDED CUTTING CONDITIONS

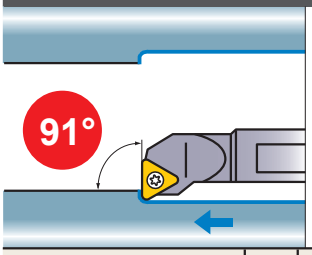
Steel Shank				l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
Carbide Shank				l/d≤5			l/d=6–7		
	Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
			Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M	Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
			Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N	Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
			Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

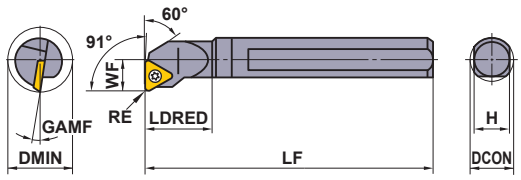
WC○○ type inserts	➤ A156
CBN & PCD inserts	➤ B049, B065
SPARE PARTS	➤ P001
TECHNICAL DATA	➤ Q001

S TYPE BORING BARS

- The minimum cutting diameter is from ϕ11.
- ISO standard.
- 7° positive insert.
- Screw-on type.
- l/d is 3 to 5 times the diameter (up to 7 times with the carbide shank).

STFC — TC○○inserts





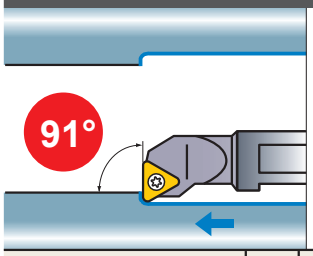
Right hand tool holder shown.

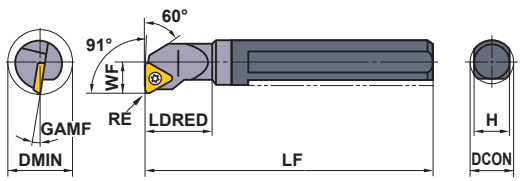
Finish	Finish	Light	Light
FP	FM	LP	LM
			
(09,11,16)	(09,11,16)	(09,11,16)	(09,11,16)
Medium	Medium	Flat top	PCD/CBN
MP	MM		
			
(09,11,16)	(09,11,16)	(11,16)	(11)

Order Number	Stock R	Stock L	Insert Number		Dimensions(mm) DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	* Clamp Screw	Wrench
S08FSTFCR/L09	●	●	TCMT	0902○○	8	80	12	6	7	15°	**11**	0.4	TS22	TKY06F
S10HSTFCR/L11	●	●	TCMW TCMT	1102○○	10	100	16	7	9	13°	**13**	0.4	TS25	TKY08F
S12KSTFCR/L11	●	●		1102○○	12	125	20	9	11	10°	**16**	0.4	TS25	TKY08F
S16MSTFCR/L11	●	●		1102○○	16	150	25	11	14	7°	**20**	0.4	TS25	TKY08F
S20QSTFCR/L16	●	●		16T3○○	20	180	32	13	18	7°	**25**	0.8	TS4	TKY15F
S25RSTFCR/L16	●	●		16T3○○	25	200	40	17	23	5°	**32**	0.8	TS4	TKY15F
S32SSTFCR/L16	●	●		16T3○○	32	250	50	22	30	5°	**40**	0.8	TS4	TKY15F

* Clamp Torque (N • m) : TS22=0.6, TS25=1.0, TS4=3.5

STFC — Carbide shank TC○○inserts





Right hand tool holder only.

Finish	Finish	Light	Light
FP	FM	LP	LM
			
(09,11,16)	(09,11,16)	(09,11,16)	(09,11,16)
Medium	Medium	Flat top	PCD/CBN
MP	MM		
			
(09,11,16)	(09,11,16)	(11,16)	(11)

Order Number	Stock R	Insert Number		Dimensions(mm) DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	* Clamp Screw	Wrench
C08HSTFCR09	●	TCMT	0902○○	8	100	12	6	7	15°	**11**	0.4	TS22	TKY06F
C10KSTFCR11	●	TCMW TCMT	1102○○	10	125	16	7	9	13°	**13**	0.4	TS25	TKY08F
C12MSTFCR11	●		1102○○	12	150	20	9	11	10°	**16**	0.4	TS25	TKY08F
C16RSTFCR11	●		1102○○	16	200	25	11	14	7°	**20**	0.4	TS25	TKY08F
C20SSTFCR16	●		16T3○○	20	250	32	13	18	7°	**25**	0.8	TS4	TKY15F
C25TSTFCR16	●		16T3○○	25	300	40	17	23	5°	**32**	0.8	TS4	TKY15F

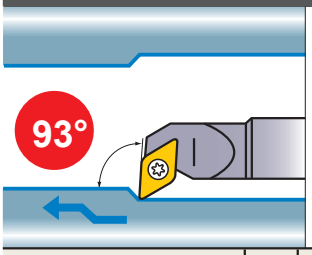
* Clamp Torque (N • m) : TS22=0.6, TS25=1.0, TS4=3.5

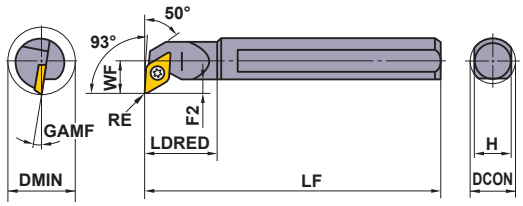
(Note 1) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.
(Note 2) When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

● : **Inventory maintained in Japan.**

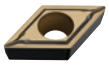
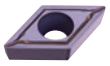
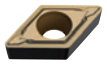
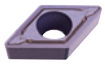
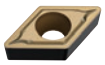
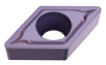
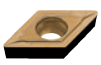
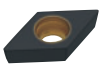
TC○○ type inserts ➤ A141—A143
CBN & PCD inserts ➤ B045, B061

SDUC — DC○○inserts





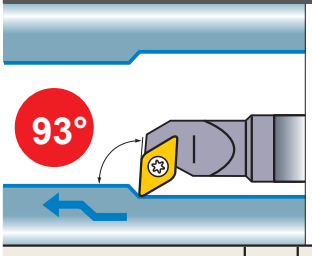
Right hand tool holder shown.

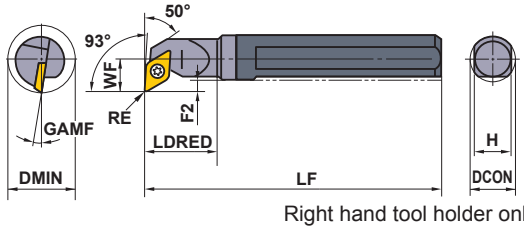
Finish	Finish	Light	Light
FP	FM	LP	LM
			
(07,11)	(07,11)	(07,11)	(07,11)
Medium	**Medium**	**Medium**	**Flat top**
MP	MM	Standard	
			
(07,11,15)	(07,11,15)	(07,11,15)	(07,11)

Order Number	Stock		Insert Number		Dimensions(mm)									*	
	R	L			DCON	LF	LDRED	WF	F2	H	GAMF	DMIN	RE	Clamp Screw	Wrench
S10HSDUCR/L07	●	●	DCMT DCET DCGT DCMW DCGW NP-DCGW NP-DCMT	0702○○	10	100	16	7	2.4	9	13°	**13**	0.4	TS25	TKY08F
S12KSDUCR/L07	●	●		0702○○	12	125	20	9	3.4	11	10°	**16**	0.4	TS25	TKY08F
S16MSDUCR/L07	●	●		0702○○	16	150	25	11	3.9	14	7°	**20**	0.4	TS25	TKY08F
S20QSDUCR/L11	●	●		11T3○○	20	180	32	13	4.4	18	7°	**25**	0.8	TS4	TKY15F
S25RSDUCR/L15	●	●		1504○○	25	200	40	17	6.9	23	5°	**32**	0.8	TS5	TKY25F
S32SSDUCR/L15	●	●		1504○○	32	250	50	22	8.4	30	5°	**40**	0.8	TS5	TKY25F
S40TSDUCR/L15	●	●		1504○○	40	300	63	27	9.4	37	5°	**50**	0.8	TS5	TKY25F

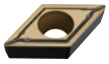
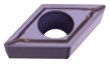
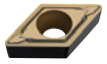
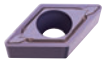
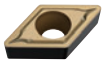
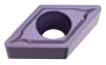
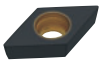
* Clamp Torque (N • m) : TS25=1.0, TS4=3.5, TS5=7.5

SDUC — Carbide shank DC○○inserts





Right hand tool holder only.

Finish	Finish	Light	Light
FP	FM	LP	LM
			
(07,11)	(07,11)	(07,11)	(07,11)
Medium	**Medium**	**Medium**	**Flat top**
MP	MM	Standard	
			
(07,11,15)	(07,11,15)	(07,11,15)	(07,11)

Order Number	Stock	Insert Number		Dimensions(mm)									*	
	R			DCON	LF	LDRED	WF	F2	H	GAMF	DMIN	RE	Clamp Screw	Wrench
C10KSDUCR07	●	DCMT DCET DCGT DCMW DCGW NP-DCGW NP-DCMT	0702○○	10	125	16	7	2.1	9	13°	**13**	0.4	TS25	TKY08F
C12MSDUCR07	●		0702○○	12	150	20	9	3.1	11	10°	**16**	0.4	TS25	TKY08F
C16RSDUCR07	●		0702○○	16	200	25	11	3.1	14	7°	**20**	0.4	TS25	TKY08F
C20SSDUCR11	●		11T3○○	20	250	32	13	3.1	18	7°	**25**	0.8	TS4	TKY15F
C25TSDUCR15	●	DCMW DCMT	1504○○	25	300	40	17	4.9	23	5°	**32**	0.8	TS5	TKY25F

* Clamp Torque (N • m) : TS25=1.0, TS4=3.5, TS5=7.5

RECOMMENDED CUTTING CONDITIONS

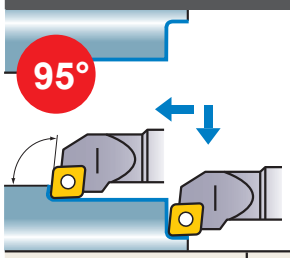
Steel Shank			l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
Carbide Shank			l/d≤5			l/d=6–7		
Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
		Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
		Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
		Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

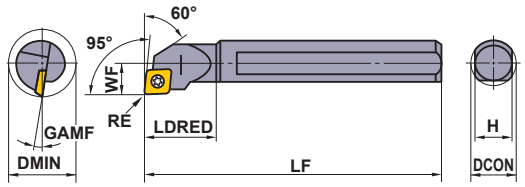
DC○○ type inserts	**➤ A132–A135**
CBN & PCD inserts	**➤ B043, B044, B060**
SPARE PARTS	**➤ P001**
TECHNICAL DATA	**➤ Q001**

S TYPE BORING BARS

- The minimum cutting diameter is from ϕ11.
- ISO standard.
- 7° positive insert.
- Screw-on type.
- l/d is 3 to 5 times the diameter (up to 7 times with the carbide shank).

SCLC — CC○○inserts





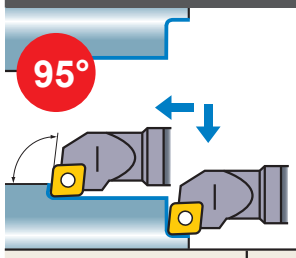
Right hand tool holder shown.

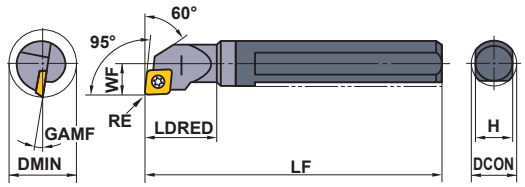
Finish	Finish	Light	Light
FP	FM	LP	LM
			
(06,09)	(06,09)	(06,09)	(06,09)
Medium	**Medium**	**Flat top**	**PCD/CBN**
MP	MM		
			
(06,09,12)	(06,09,12)	(06,09,12)	(06,09,12)

Order Number	Stock		Insert Number		Dimensions(mm)								*	
	R	L			DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Clamp Screw	Wrench
S08FSCLCR/L06	●	●	CCMH CCMT CCET CCGT CCMW CCGW NP-CCGW	0602○○	8	80	12	6	7	15°	**11**	0.4	TS25	TKY08F
S10HSCLCR/L06	●	●		0602○○	10	100	16	7	9	13°	**13**	0.4	TS25	TKY08F
S12KSCLCR/L06	●	●		0602○○	12	125	20	9	11	10°	**16**	0.4	TS25	TKY08F
S16MSCLCR/L09	●	●		09T3○○	16	150	25	11	14	7°	**20**	0.8	TS4	TKY15F
S20QSCLCR/L09	●	●		09T3○○	20	180	32	13	18	7°	**25**	0.8	TS4	TKY15F
S25RSCLCR/L12	●	●		1204○○	25	200	40	17	23	5°	**32**	0.8	TS5	TKY25F
S32SSCLCR/L12	●	●		1204○○	32	250	50	22	30	5°	**40**	0.8	TS5	TKY25F
S40TSCLCR/L12	●	●		1204○○	40	300	63	27	37	5°	**50**	0.8	TS5	TKY25F

* Clamp Torque (N • m) : TS25=1.0, TS4=3.5, TS5=7.5

SCLC — Carbide shank CC○○inserts





Right hand tool holder only.

Finish	Finish	Light	Light
FP	FM	LP	LM
			
(06,09)	(06,09)	(06,09)	(06,09)
Medium	**Medium**	**Medium**	**Flat top**
MP	MM	Standard	
			
(06,09)	(06,09)	(06,09)	(06,09)

Order Number	Stock	Insert Number		Dimensions(mm)								*	
	R			DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Clamp Screw	Wrench
C08HSCLCR06	●	CCMH CCMT CCET CCGT CCMW CCGW NP-CCGW	0602○○	8	100	12	6	7	15°	**11**	0.4	TS25	TKY08F
C10KSCLCR06	●		0602○○	10	125	16	7	9	13°	**13**	0.4	TS25	TKY08F
C12MSCLCR06	●		0602○○	12	150	20	9	11	10°	**16**	0.4	TS25	TKY08F
C16RSCLCR09	●		09T3○○	16	200	25	11	14	7°	**20**	0.8	TS4	TKY15F
C20SSCLCR09	●		09T3○○	20	250	32	13	18	7°	**25**	0.8	TS4	TKY15F

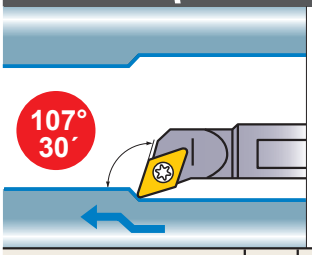
* Clamp Torque (N • m) : TS25=1.0, TS4=3.5

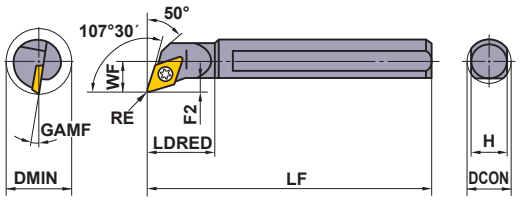
(Note 1) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.
(Note 2) When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

● : Inventory maintained in Japan.

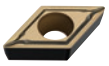
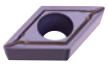
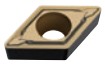
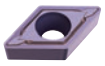
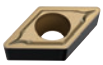
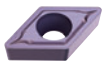
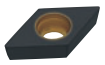
CC○○ type inserts	**➤ A126—A130**
CBN & PCD inserts	**➤ B039—B041, B059**

SDQC — DC○○inserts





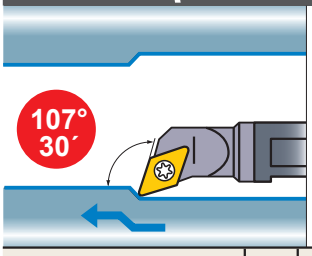
Right hand tool holder shown.

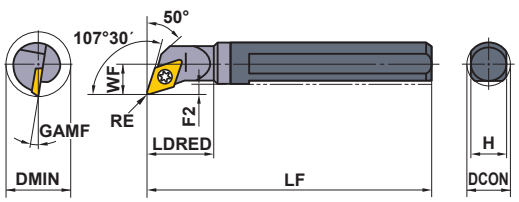
Finish	Finish	Light	Light
FP	FM	LP	LM
			
(07,11)	(07,11)	(07,11)	(07,11)
Medium	Medium	Flat top	PCD/CBN
MP	MM		
			
(07,11,15)	(07,11,15)	(07,11,15)	(07,11)

Order Number	Stock		Insert Number		Dimensions(mm)									*	
	R	L			DCON	LF	LDRED	WF	F2	H	GAMF	DMIN	RE	Clamp Screw	Wrench
S10HSDQCR/L07	●	●	DCMT DCET DCGT DCMW DCGW NP-DCMW NP-DCMT	0702○○	10	100	16	7	2.4	9	13°	**13**	0.4	TS25	TKY08F
S12KSDQCR/L07	●	●		0702○○	12	125	20	9	3.4	11	10°	**16**	0.4	TS25	TKY08F
S16MSDQCR/L07	●	●		0702○○	16	150	25	11	3.9	14	7°	**20**	0.4	TS25	TKY08F
S20QSDQCR/L11	●	●		11T3○○	20	180	32	13	4.4	18	7°	**25**	0.8	TS4	TKY15F
S25RSDQCR/L15	●	●		1504○○	25	200	40	17	6.9	23	5°	**32**	0.8	TS5	TKY25F
S32SSDQCR15	●			1504○○	32	250	50	22	8.4	30	5°	**40**	0.8	TS5	TKY25F
S40TSDQCR15	●			1504○○	40	300	63	27	9.4	37	5°	**50**	0.8	TS5	TKY25F

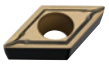
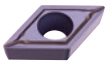
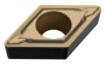
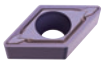
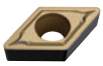
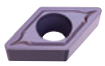
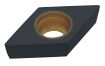
* Clamp Torque (N • m) : TS25=1.0, TS4=3.5, TS5=7.5

SDQC — Carbide shank DC○○inserts





Right hand tool holder only.

Finish	Finish	Light	Light
FP	FM	LP	LM
			
(07,11)	(07,11)	(07,11)	(07,11)
Medium	Medium	Flat top	PCD/CBN
MP	MM		
			
(07,11,15)	(07,11,15)	(07,11,15)	(07,11)

Order Number	Stock	Insert Number		Dimensions(mm)									*	
	R			DCON	LF	LDRED	WF	F2	H	GAMF	DMIN	RE	Clamp Screw	Wrench
C10KSDQCR07	●	DCMT DCET DCGT DCMW DCGW NP-DCMW NP-DCMT	0702○○	10	125	16	7	2.1	9	13°	**13**	0.4	TS25	TKY08F
C12MSDQCR07	●		0702○○	12	150	20	9	3.1	11	10°	**16**	0.4	TS25	TKY08F
C16RSDQCR07	●		0702○○	16	200	25	11	3.1	14	7°	**20**	0.4	TS25	TKY08F
C20SSDQCR11	●		11T3○○	20	250	32	13	3.1	18	7°	**25**	0.8	TS4	TKY15F
C25TSDQCR15	●	DCMW DCMT	1504○○	25	300	40	17	4.9	23	5°	**32**	0.8	TS5	TKY25F

* Clamp Torque (N • m) : TS25=1.0, TS4=3.5, TS5=7.5

RECOMMENDED CUTTING CONDITIONS

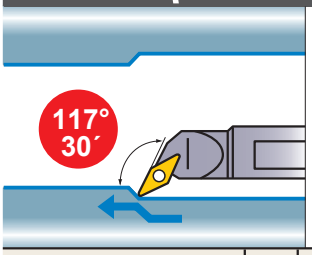
Steel Shank			l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
Carbide Shank			l/d≤5			l/d=6–7		
Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
		Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
		Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
		Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

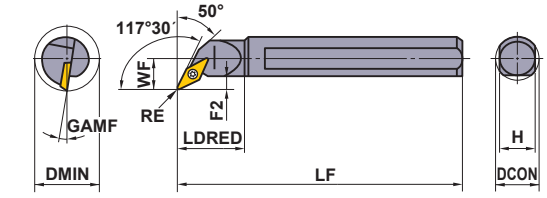
DC○○ type inserts	➤ A132–A135
CBN & PCD inserts	➤ B043, B044, B060
SPARE PARTS	➤ P001
TECHNICAL DATA	➤ Q001

S TYPE BORING BARS

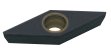
- The minimum cutting diameter is from ϕ20.
- ISO standard.
- 7° positive insert.
- Screw-on type.
- l/d is 3 to 5 times the diameter (up to 7 times with the carbide shank).

SVQC — VC○○inserts





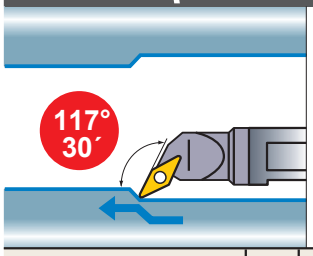
Right hand tool holder shown.

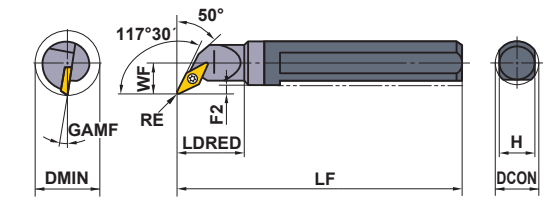
Finish	Finish	Light	Light
FP	FM	LP	LM
			
(11,16)	(11,16)	(11,16)	(11,16)
Medium	**Medium**	**Medium**	**Flat top**
MP	MM	Standard	
			
(16)	(16)	(11,16)	(11,16)

Order Number	Stock		Insert Number		Dimensions(mm)									*	
	R	L			DCON	LF	LDRED	WF	F2	H	GAMF	DMIN	RE	Clamp Screw	Wrench
S16MSVQCR/L11	●	●	VCMW VCMT	1103○○	16	150	25	11	3.9	14	7°	**20**	0.4	TS25	TKY08F
S20QSVQCR/L11	●	●		1103○○	20	180	32	13	4.4	18	7°	**25**	0.4	TS25	TKY08F
S25RSVQCR/L16	●	●		1604○○	25	200	40	17	6.9	23	5°	**32**	0.8	TS4	TKY15F
S32SSVQCR/L16	●	●		1604○○	32	250	50	22	8.4	30	5°	**40**	0.8	TS4	TKY15F
S40TSVQCR16	●			1604○○	40	300	63	27	9.4	37	5°	**50**	0.8	TS4	TKY15F

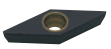
∗ Clamp Torque (N • m) : TS25=1.0, TS4=3.5

SVQC — Carbide shank VC○○inserts





Right hand tool holder only.

Finish	Finish	Light	Light
FP	FM	LP	LM
			
(11,16)	(11,16)	(11,16)	(11,16)
Medium	**Medium**	**Medium**	**Flat top**
MP	MM	Standard	
			
(16)	(16)	(11,16)	(11,16)

Order Number	Stock	Insert Number		Dimensions(mm)									*	
	R			DCON	LF	LDRED	WF	F2	H	GAMF	DMIN	RE	Clamp Screw	Wrench
C16RSVQCR11	●	VCMT VCMW	1103○○	16	200	25	11	3.1	14	7°	**20**	0.4	TS25	TKY08F
C20SSVQCR11	●		1103○○	20	250	32	13	3.1	18	7°	**25**	0.4	TS25	TKY08F
C25TSVQCR16	●		1604○○	25	300	40	17	4.9	23	5°	**32**	0.8	TS4	TKY15F

∗ Clamp Torque (N • m) : TS25=1.0, TS4=3.5

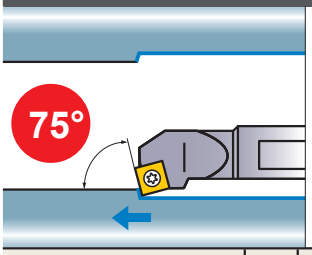
(Note 1) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.
(Note 2) When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

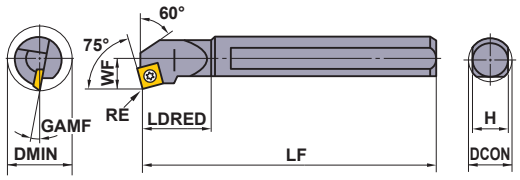
● : **Inventory maintained in Japan.**

VC○○ type inserts ➤ A151, A152
CBN & PCD inserts ➤ B049, B064

SSKC

SC○○inserts





Right hand tool holder shown.

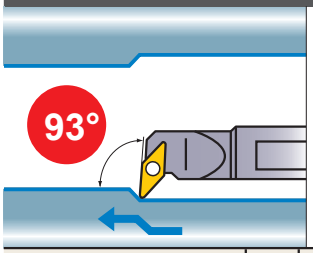
Finish	Finish	Light	Light
FP	FM	LP	LM
			
(09)	(09)	(09)	(09)
Medium	Medium	Medium	Flat top
MP	MM	Standard	
			
(09,12)	(09,12)	(09,12)	(09,12)

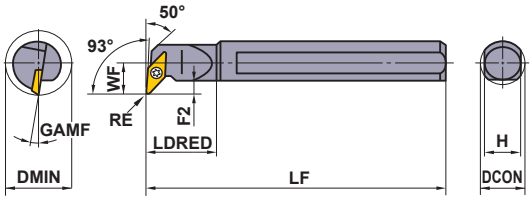
Order Number	Stock		Insert Number		Dimensions(mm)								*	
	R	L			DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Clamp Screw	Wrench
S16MSSKCR/L09	●	●	SCMW SCMT	09T3○○	16	150	25	11	14	7°	**20**	0.8	TS4	TKY15F
S20QSSKCR/L09	●	●		09T3○○	20	180	32	13	18	7°	**25**	0.8	TS4	TKY15F
S25RSSKCR/L12	●	●		1204○○	25	200	40	17	23	5°	**32**	0.8	TS5	TKY25F

∗ Clamp Torque (N • m) : TS4=3.5, TS5=7.5

SVUC

VC○○inserts





Right hand tool holder only.

Finish	Finish	Light	Light
FP	FM	LP	LM
			
(11,16)	(11,16)	(11,16)	(11,16)
Medium	Medium	Medium	Flat top
MP	MM	Standard	
			
(16)	(16)	(11,16)	(11,16)

Order Number	Stock		Insert Number		Dimensions(mm)									*	
	R	L			DCON	LF	LDRED	WF	F2	H	GAMF	DMIN	RE	Clamp Screw	Wrench
S20QSVUCR/L11	●	●	VCMW VCMT	1103○○	20	180	32	13	4.4	18	7°	**25**	0.4	TS25	TKY08F
S25RSVUCR/L16	●	●		1604○○	25	200	40	17	6.9	23	5°	**32**	0.8	TS4	TKY15F
S32SSVUCR/L16	●	●		1604○○	32	250	50	22	8.4	30	5°	**40**	0.8	TS4	TKY15F
S40TSVUCR/L16	●	●		1604○○	40	300	63	27	9.4	37	5°	**50**	0.8	TS4	TKY15F

∗ Clamp Torque (N • m) : TS25=1.0, TS4=3.5

RECOMMENDED CUTTING CONDITIONS

Steel Shank			l/d≤3			l/d=3–4 (Shank Diameter ≥ 25mm)		
Carbide Shank			l/d≤5			l/d=6–7		
Work Material	Hardness	Cutting Mode	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
		Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
		Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
		Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

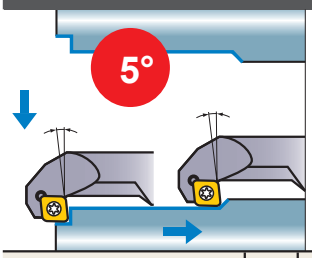
SC○○ type inserts ➤ A138, A139
VC○○ type inserts ➤ A151, A152
CBN inserts ➤ B049
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

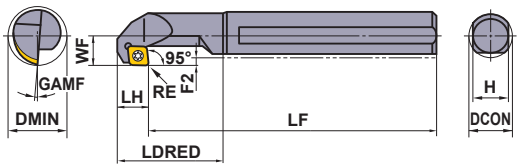
S TYPE BORING BARS

- The minimum cutting diameter is from ϕ20.
- ISO standard.
- 7° positive insert.
- Screw-on type.
- l/d is 3 to 5 times the diameter (up to 7 times with the carbide shank).

SCZC

CC○○inserts





Right hand tool holder shown.

Finish	Finish	Light	Light
FP	FM	LP	LM
			
(06,09)	(06,09)	(06,09)	(06,09)
Medium	Medium	Flat top	PCD/CBN
MP	MM		
			
(06,09)	(06,09)	(06,09)	(06,09)

Order Number	Stock R	Stock L	Insert Number		Dimensions(mm) DCON	LF	LDRED	LH	WF	F2	H	GAMF	DMIN	RE	* Clamp Screw	Wrench
S16MSCZCR/L06	●	●	CCMH CCMT CCET CCGT CCMW	0602○○	16	150	36	11	11	3	14	10°	**20**	0.4	TS25	TKY08F
S20QSCZCR/L09	●	●	CCMH CCMT CCET CCGT CCMW	09T3○○	20	180	50	18	13	3	18	7°	**25**	0.8	TS4	TKY15F

(Note 1) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.
(Note 2) When using insert with right and left hand chip breaker, please use right hand insert for right hand holder and left hand insert for left hand holder.
∗ Clamp Torque (N • m) : TS25=1.0, TS4=3.5

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Cutting Mode	l/d≤3 Cutting Speed (m/min)	l/d≤3 Feed (mm/rev)	l/d≤3 Depth of Cut (mm)	l/d=3–4 (Shank Diameter ≥ 25mm) Cutting Speed (m/min)	l/d=3–4 (Shank Diameter ≥ 25mm) Feed (mm/rev)	l/d=3–4 (Shank Diameter ≥ 25mm) Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180–350HB	Light Cutting	130 (90–160)	0.1 (0.05–0.15)	0.2	120 (80–150)	0.1 (0.05–0.15)	0.2
			Medium Cutting	90 (60–120)	0.25 (0.15–0.35)	–3.0	80 (50–110)	0.15 (0.1–0.2)	–1.5
M	Stainless Steel	≤200HB	Light Cutting	140 (100–180)	0.1 (0.05–0.15)	0.2	140 (100–180)	0.1 (0.05–0.15)	0.2
			Medium Cutting	70 (50–90)	0.2 (0.15–0.25)	–2.0	60 (40–80)	0.15 (0.1–0.2)	–1.0
N	Aluminium Alloy	–	Light Cutting	300 (200–400)	0.1 (0.05–0.15)	0.2	300 (200–400)	0.1 (0.05–0.15)	0.2
			Medium Cutting	200 (150–250)	0.1 (0.05–0.15)	–2.0	200 (150–250)	0.1 (0.05–0.15)	–1.5

● : Inventory maintained in Japan.
▲ : Inventory maintained in Japan. To be replaced by new products.

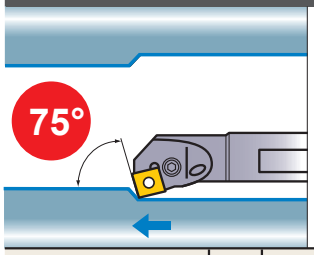
CC○○ type inserts ➤ A126–A130
CBN & PCD inserts ➤ B039–B041, B059

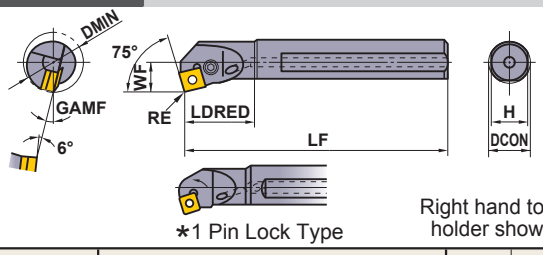
P TYPE BORING BARS

- The minimum cutting diameter is from ϕ25.
- l/d is 3 times the diameter.
- ISO standard.
- Economical negative insert.
- Lever lock type.

PSKN

With coolant hole **SN○○inserts**





∗1 Pin Lock Type

Right hand tool holder shown.

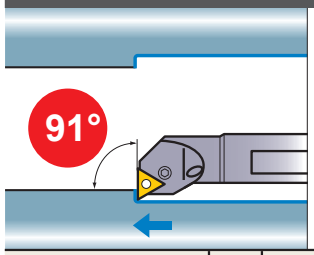
Finish	Light	Medium	Medium
FH	LP	MP	MH
			
(09,12)	(12)	(12)	(12)
Medium	**Stainless**	**G class**	**CBN**
Standard	MM	R/L	
			
(09,12)	(12)	(09,12)	(12)

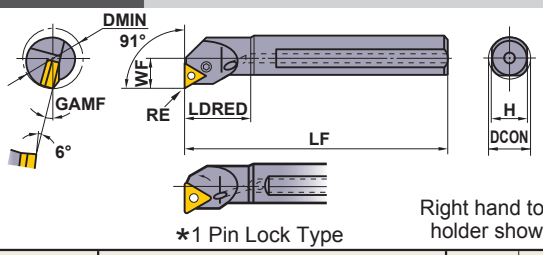
Order Number	Stock		Insert Number		Dimensions(mm)								Shim	Shim Pin	Clamp Lever	Clamp Screw ∗2	Wrench	Plug	Clamp Pin ∗2	Pin	Screw
	R	L			DCON	LF	LDRED	WF	H	GAMF	DMIN	RE									
A20QPSKNR/L09	●	●	SNMA SNMG	0903○○	20	180	32	13	18	13°	**25**	0.8	—	—	—	—	HKY15R HKY25R	HGM-PT1/8	HP3T	P208AM	HSS03005
A25RPSKNR/L12	●	●	SNMM SNGA SNGG	1204○○	25	200	40	17	23	13°	**32**	0.8	MLSP42	—	—	—	HKY15R HKY30R	HGM-PT1/4	HP43	P210AM	HSS03005
A32SPSKNR/L12	●	●		1204○○	32	250	50	22	30	13°	**44**	0.8	LLSSN42	LLP14	LLCL14	LLCS108S	HKY30R	HGM-PT3/8	—	—	—

∗1 Pin Lock Type : A20QPSKNR/L09, A25RPSKNR/L12
∗2 Clamp Torque (N • m) : LLCS108S=3.3, HP3T=2.2, HP43=3.3

PTFN

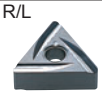
With coolant hole **TN○○inserts**





∗1 Pin Lock Type

Right hand tool holder shown.

Finish	Light	Medium	Medium
FH	LP	MP	MH
			
(16)	(16)	(16,22)	(16,22)
Medium	**Stainless**	**G class**	**CBN**
Standard	MM	R/L	
			
(16,22)	(16,22)	(16,22)	(16)

Order Number	Stock		Insert Number		Dimensions(mm)								Shim	Shim Pin	Clamp Lever	Clamp Screw ∗2	Wrench	Plug	Clamp Pin ∗2	Pin	Screw
	R	L			DCON	LF	LDRED	WF	H	GAMF	DMIN	RE									
A20QPTFNR/L16	●	●		1604○○	20	180	32	13	18	15°	**25**	0.8	—	—	—	—	HKY15R HKY25R	HGM-PT1/8	HP31	P208AM	HSS03005
A25RPTFNR/L16	●	●	TNMA TNMG	1604○○	25	200	40	17	23	13°	**32**	0.8	MLTP32	—	—	—	HKY15R HKY25R	HGM-PT1/4	HP33	P208AM	HSS03005
A32SPTFNR/L16	●	●	TNMM	1604○○	32	250	50	22	30	13°	**44**	0.8	LLSTN32	LLP13	LLCL13	LLCS106	HKY25R	HGM-PT3/8	—	—	—
A40TPTFNR/L22	●	●	TNGA TNGG	2204○○	40	300	63	27	37	10°	**54**	0.8	LLSTN42	LLP14	LLCL14	LLCS108S	HKY30R	HGM-PT3/8	—	—	—
A50UPTFNR/L22	●	●		2204○○	50	350	80	35	47	9°	**70**	0.8	LLSTN42	LLP14	LLCL14	LLCS108S	HKY30R	HGM-PT3/8	—	—	—

∗1 Pin Lock Type : A20QPTFNR/L16, A25RPTFNR/L16
∗2 Clamp Torque (N • m) : LLCS106=2.2, LLCS108S=3.3, HP31=2.2, HP33=2.2

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Cutting Mode	l/d≤3			l/d=3—4		
				Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180—350HB	Medium Cutting	110 (80—140)	0.25 (0.1—0.4)	—5.0	110 (80—140)	0.2 (0.1—0.3)	—4.0
M	Stainless Steel	≤200HB	Medium Cutting	80 (60—100)	0.2 (0.1—0.3)	—4.0	70 (50—100)	0.15 (0.1—0.25)	—3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium Cutting	80 (60—100)	0.25 (0.1—0.4)	—5.0	80 (60—100)	0.2 (0.1—0.3)	—4.0

(Note 1) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.
(Note 2) When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

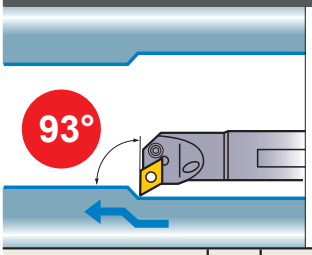
SN○○ type inserts	**➤ A105—A109**
TN○○ type inserts	**➤ A110—A115**
CBN & PCD inserts	**➤ B028—B031, B056**
SPARE PARTS	**➤ P001**
TECHNICAL DATA	**➤ Q001**

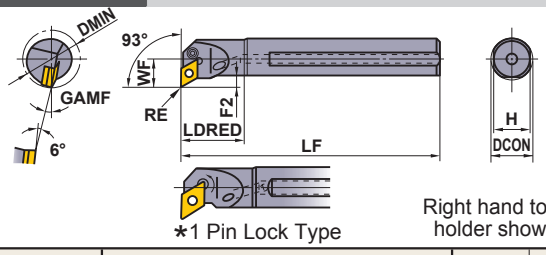
P TYPE BORING BARS

- The minimum cutting diameter is from ϕ20.
- ISO standard.
- Economical negative insert.
- Lever lock type.
- l/d is 3 times the diameter.

PDUN

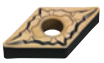
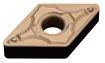
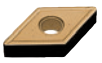
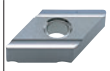
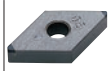
With coolant hole **DN○○inserts**





∗1 Pin Lock Type

Right hand tool holder shown.

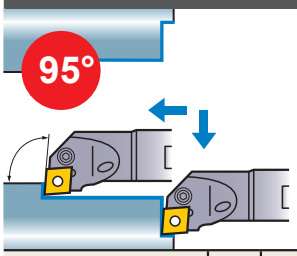
Finish	Light	Medium	Medium
FH	LP	MP	MH
			
(15)	(15)	(15)	(15)
Medium	**Stainless**	**G class**	**CBN**
Standard	MM	R/L	
			
(11,15)	(15)	(15)	(15)

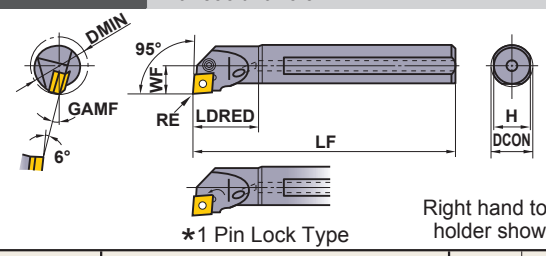
Order Number	Stock		Insert Number		Dimensions(mm)									Shim	Shim Pin	Clamp Lever	Clamp Screw *2	Wrench	Plug	Clamp Pin *2	Pin	Screw
	R	L			DCON	LF	LDRED	WF	F2	H	GAMF	DMIN	RE									
A20QPDUNR/L11	●	●	DNMA DNMG DNMX DNMM DNGA DNGG	1104○○	20	180	32	15	6.4	18	13°	**26**	0.8	—	—	LLCL23S	LLCS125	HKY20R	HGM-PT1/8	—	—	—
A25RPDUNR/L11	●	●		1104○○	25	200	40	17	6.9	23	15°	**32**	0.8	LLSDN32	LLP13	LLCL23	LLCS106	HKY25R	HGM-PT1/4	—	—	—
A25RPDUNR/L15	●	●		1504○○	25	200	40	17	6.9	23	13°	**32**	0.8	MLDP42	—	—	—	HKY15R HKY30R	HGM-PT1/4	HP43	P210AM	HSS03005
A32SPDUNR/L11	●	●		1104○○	32	250	50	22	8.4	30	13°	**44**	0.8	LLSDN32	LLP13	LLCL23	LLCS106	HKY25R	HGM-PT3/8	—	—	—
A32SPDUNR/L15	●	●		1504○○	32	250	50	22	8.4	30	13°	**44**	0.8	LLSDN42	LLP14	LLCL24	LLCS108S	HKY30R	HGM-PT3/8	—	—	—
A40TPDUNR/L15	●	●		1504○○	40	300	63	27	9.4	37	10°	**54**	0.8	LLSDN42	LLP14	LLCL24	LLCS108S	HKY30R	HGM-PT3/8	—	—	—
A50UPDUNR/L15	●	●		1504○○	50	350	80	35	12.4	47	9°	**70**	0.8	LLSDN42	LLP14	LLCL24	LLCS108S	HKY30R	HGM-PT3/8	—	—	—

∗1 Pin Lock Type : A25RPDUNR/L15
∗2 Clamp Torque (N • m) : LLCS125=1.5, LLCS106=2.2, LLCS108S=3.3, HP43=3.3

PCLN

With coolant hole **CN○○inserts**





∗1 Pin Lock Type

Right hand tool holder shown.

Finish	Light	Light	Medium
FH	SA	LP	MP
			
(12)	(12)	(12)	(12)
Medium	**Medium**	**Stainless**	**CBN**
MH	Standard	MM	
			
(12)	(09,12)	(12)	(12)

Order Number	Stock		Insert Number		Dimensions(mm)								Shim	Shim Pin	Clamp Lever	Clamp Screw *2	Wrench	Plug	Clamp Pin *2	Pin	Screw
	R	L			DCON	LF	LDRED	WF	H	GAMF	DMIN	RE									
A16MPCLNR/L09	●	●	CNMA CNMG CNMM CNGG	09T3○○	16	150	25	11	14	15°	**20**	0.8	—	—	LLCL13S	LLCS105	HKY20R	HGM-PT1/8	—	—	—
A20QPCLNR/L09	●	●		09T3○○	20	180	32	13	18	13°	**25**	0.8	—	—	—	—	HKY25R HKY15R	HGM-PT1/8	HP3T	P208AM	HSS03005
A20QPCLNR/L09N	●	●		09T3○○	20	180	32	13	18	13°	**25**	0.8	—	—	LLCL13S	LLCS105	HKY20R	HGM-PT1/8	—	—	—
A25RPCLNR/L09	●	●		09T3○○	25	200	40	17	23	13°	**32**	0.8	—	—	LLCL13S	LLCS105	HKY20R	HGM-PT1/4	—	—	—
A25RPCLNR/L12	●	●		1204○○	25	200	40	17	23	13°	**32**	0.8	MLCP42	—	—	—	HKY30R HKY15R	HGM-PT1/4	HP43	P210AM	HSS03005
A32SPCLNR/L12	●	●		1204○○	32	250	50	22	30	13°	**44**	0.8	LLSCN42	LLP14	LLCL14	LLCS108S	HKY30R	HGM-PT3/8	—	—	—
A40TPCLNR/L12	●	●		1204○○	40	300	63	27	37	10°	**54**	0.8	LLSCN42	LLP14	LLCL14	LLCS108S	HKY30R	HGM-PT3/8	—	—	—
A50UPCLNR12	●			1204○○	50	350	80	35	47	10°	**63**	0.8	LLSCP42	LLP14	LLCL14	LLCS108S	HKY30R	HGM-PT3/8	—	—	—

∗1 Pin Lock Type : A20QPCLNR/L09, A25RPCLNR/L12
∗2 Clamp Torque (N • m) : LLCS105=1.5, LLCS106=2.2, LLCS108S=3.3, HP3T=2.2, HP43=3.3

(Note 1) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.
(Note 2) When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

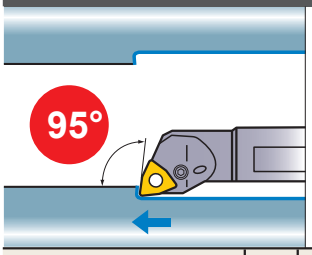
● : Inventory maintained in Japan.
▲ : Inventory maintained in Japan. To be replaced by new products.

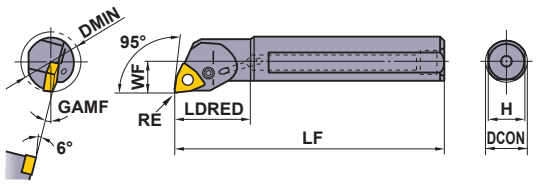
DN○○ type inserts	➤ A098—A103
CN○○ type inserts	➤ A092—A097
CBN & PCD inserts	➤ B022—B027, B055

PWLN

With coolant hole

WN○○inserts





Right hand tool holder shown.

Light	Medium
SH (06)	MP (06)
Stainless	
MM (06)	

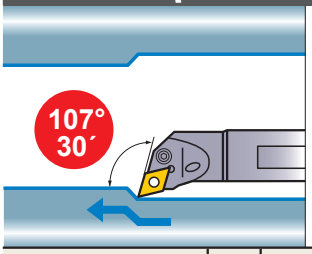
Order Number	Stock R	Stock L	Insert Number		Dimensions(mm) DCON	LF	LDRED	WF	H	GAMF	DMIN	RE	Clamp Lever	Clamp Screw *	Wrench	Plug
A16MPWLNR/L06	●	●	WNMG	06T3○○	16	150	25	11	14	15°	**20**	0.8	LLCL13S	LLCS105	HKY20R	HGM-PT1/8
A20QPWLNR/L06	●	●		06T3○○	20	180	32	13	18	13°	**25**	0.8	LLCL13S	LLCS105	HKY20R	HGM-PT1/8
A25RPWLNR/L06	●	●		06T3○○	25	200	40	17	23	13°	**32**	0.8	LLCL13S	LLCS105	HKY20R	HGM-PT1/4

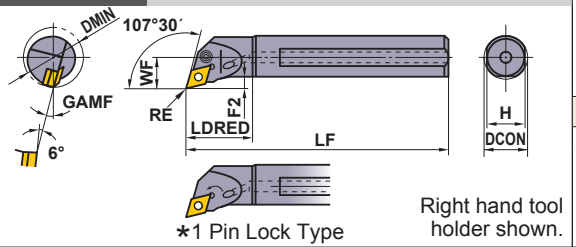
∗ Clamp Torque (N • m) : LLCS105=1.5

PDQN

With coolant hole

DN○○inserts





∗1 Pin Lock Type

Right hand tool holder shown.

Finish	Light	Medium	Medium
FH (15)	LP (15)	MP (15)	MH (15)
Medium	Stainless	G class	CBN
Standard (15)	MM (15)	R/L (15)	(15)

Order Number	Stock R	Stock L	Insert Number		Dimensions(mm) DCON	LF	LDRED	WF	F2	H	GAMF	DMIN	RE	Shim	Shim Pin	Clamp Lever	Clamp Screw *2	Wrench	Plug	Clamp Pin *2	Pin	Screw
A25RPDQNR/L15	●	●	DNMA DNMG DNMM DNGA DNGG	1504○○	25	200	40	17	6.9	23	13°	**32**	0.8	MLDP42	—	—	—	HKY15R HKY30R	HGM-PT1/4	HP43	P210AM	HSS03005
A32SPDQNR/L15	●	●		1504○○	32	250	50	22	8.4	30	13°	**44**	0.8	LLSDN42	LLP14	LLCL24	LLCS108S	HKY30R	HGM-PT3/8	—	—	—
A40TPDQNR/L15	●	●		1504○○	40	300	63	27	9.4	37	10°	**54**	0.8	LLSDN42	LLP14	LLCL24	LLCS108S	HKY30R	HGM-PT3/8	—	—	—
A50UPDQNR15	●			1504○○	50	350	80	35	12.4	47	9°	**70**	0.8	LLSDN42	LLP14	LLCL24	LLCS108S	HKY30R	HGM-PT3/8	—	—	—

∗1 Pin Lock Type : A25RPDQNR/L15
∗2 Clamp Torque (N • m) : LLCS108S=3.3, HP43=3.3

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Cutting Mode	l/d≤3 Cutting Speed (m/min)	l/d≤3 Feed (mm/rev)	l/d≤3 Depth of Cut (mm)	l/d=3—4 Cutting Speed (m/min)	l/d=3—4 Feed (mm/rev)	l/d=3—4 Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180—350HB	Medium Cutting	110 (80—140)	0.25 (0.1—0.4)	—5.0	110 (80—140)	0.2 (0.1—0.3)	—4.0
M	Stainless Steel	≤200HB	Medium Cutting	80 (60—100)	0.2 (0.1—0.3)	—4.0	70 (50—100)	0.15 (0.1—0.25)	—3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium Cutting	80 (60—100)	0.25 (0.1—0.4)	—5.0	80 (60—100)	0.2 (0.1—0.3)	—4.0

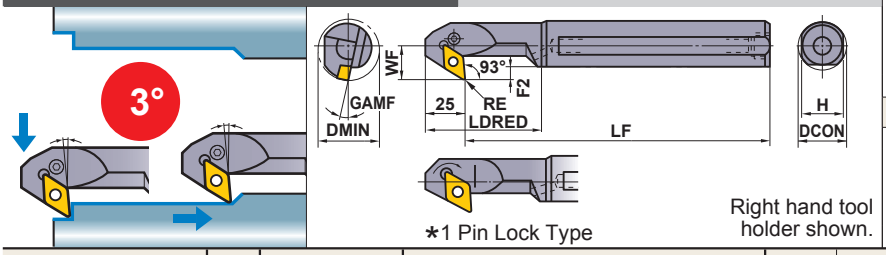
WN○○ type inserts ➤ A119—A122
DN○○ type inserts ➤ A098—A103
CBN & PCD inserts ➤ B025—B027, B055
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

P TYPE BORING BARS

- The minimum cutting diameter is from ϕ32.
- ISO standard.
- Economical negative insert.
- Lever lock type.
- l/d is 3 times the diameter.

PDZN

With coolant hole **DN○○inserts**



∗1 Pin Lock Type

Right hand tool holder shown.

Finish	Light	Medium	Medium
FH	LP	MP	MH
(15)	(15)	(15)	(15)
Medium	**Stainless**	**G class**	**CBN**
Standard	MM	R/L	
(15)	(15)	(15)	(15)

Order Number	Stock R	Stock L	Insert Number		DCON	LF	LDRED	WF	F2	H	GAMF	DMIN	RE	Shim	Shim Pin	Clamp Lever	Clamp Screw *2	Wrench	Plug	Clamp Pin *2	Pin	Screw
A25RPDZNR/L15	●	●	DNMA DNMG DNMX	1504○○	25	200	65	17	6.7	23	13°	**32**	0.8	MLDP42	—	—	—	HKY15R HKY30R	HGM-PT1/4	HP43	P210AM	HSS03005
A32SPDZNR/L15	●	●		1504○○	32	250	75	22	8.2	30	13°	**40**	0.8	LLSDN42	LLP14	LLCL24	LLCS108S	HKY30R	HGM-PT3/8	—	—	—
A40TPDZNR/L15	●	●	DNMM DNGA DNGG	1504○○	40	300	88	27	9.2	37	10°	**50**	0.8	LLSDN42	LLP14	LLCL24	LLCS108S	HKY30R	HGM-PT3/8	—	—	—
A50UPDZNR/L15	●	●		1504○○	50	350	105	35	12.2	47	9°	**63**	0.8	LLSDN42	LLP14	LLCL24	LLCS108S	HKY30R	HGM-PT3/8	—	—	—

(Note 1) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.
(Note 2) When using insert with right and left hand chip breaker, please use right hand insert for right hand holder and left hand insert for left hand holder.
∗1 Pin Lock Type : A25RPDZNR/L15
∗2 Clamp Torque (N • m) : LLCS108S=3.3, HP43=3.3

RECOMMENDED CUTTING CONDITIONS

Work Material		Hardness	Cutting Mode	l/d≤3 Cutting Speed (m/min)	l/d≤3 Feed (mm/rev)	l/d≤3 Depth of Cut (mm)	l/d=3—4 Cutting Speed (m/min)	l/d=3—4 Feed (mm/rev)	l/d=3—4 Depth of Cut (mm)
P	Carbon Steel Alloy Steel	180—350HB	Medium Cutting	110 (80—140)	0.25 (0.1—0.4)	—5.0	110 (80—140)	0.2 (0.1—0.3)	—4.0
M	Stainless Steel	≤200HB	Medium Cutting	80 (60—100)	0.2 (0.1—0.3)	—4.0	70 (50—100)	0.15 (0.1—0.25)	—3.0
K	Gray Cast Iron	Tensile Strength ≤350MPa	Medium Cutting	80 (60—100)	0.25 (0.1—0.4)	—5.0	80 (60—100)	0.2 (0.1—0.3)	—4.0

● : Inventory maintained in Japan.
▲ : Inventory maintained in Japan. To be replaced by new products.

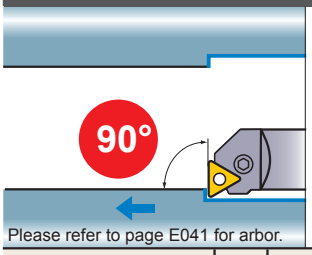
DN○○ type inserts ➤ A098—A103
CBN & PCD inserts ➤ B025—B027, B055

D TYPE BORING HEAD

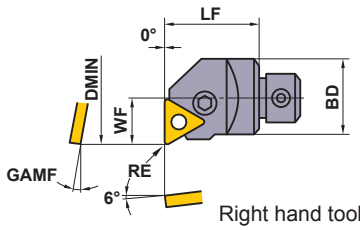
- The minimum cutting diameter is from ϕ40.
- Economical negative insert.
- Lever lock type.
- Exchangeable head type.

DPTF

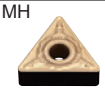
TN○○inserts



Please refer to page E041 for arbor.



Right hand tool holder only.

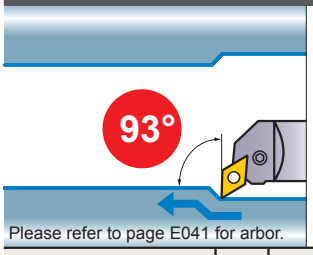
Finish	Light	Medium	Medium
FH	SH	MP	MH
			
(16)	(16,22)	(16,22)	(16,22)
Medium	**Stainless**	**G class**	**CBN**
Standard	MM	L	
			
(16,22)	(16,22)	(16,22)	(16)

Order Number	Stock	Insert Number		Dimensions(mm)						*				
	R			BD	LF	WF	GAMF	DMIN	RE	Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
DPTF132R	●	TNMA TNMG TNMM TNGA TNGG	1604○○	32	40	20	12°	**40**	0.8	LLSTN32	LLP13	LLCL13	LLCS106	HKY25R
DPTF**140R**	●		2204○○	40	50	25	10°	**50**	0.8	LLSTN42	LLP14	LLCL14	LLCS108	HKY30R

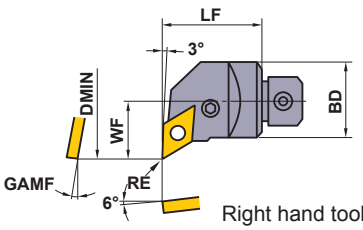
* Clamp Torque (N • m) : LLCS106=2.2, LLCS108=3.3

DPDU

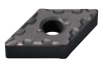
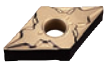
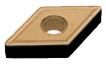
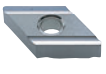
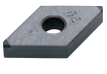
DN○○inserts



Please refer to page E041 for arbor.



Right hand tool holder only.

Finish	Light	Medium	Medium
FH	SH	MP	MH
			
(15)	(15)	(15)	(15)
Medium	**Stainless**	**G class**	**CBN**
Standard	MM	L	
			
(15)	(15)	(15)	(15)

Order Number	Stock	Insert Number		Dimensions(mm)						*				
	R			BD	LF	WF	GAMF	DMIN	RE	Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
DPDU132R	●	DNMA DNMG DNMX DNMM DNGA DNGG	1504○○	32	40	25	10°	**50**	0.8	LLSDN42	LLP14	LLCL24	LLCS108	HKY30R
DPDU**140R**	●		1504○○	40	50	30	9°	**60**	0.8	LLSDN42	LLP14	LLCL24	LLCS108	HKY30R

* Clamp Torque (N • m) : LLCS108=3.3

(Note 1) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.

(Note 2) When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

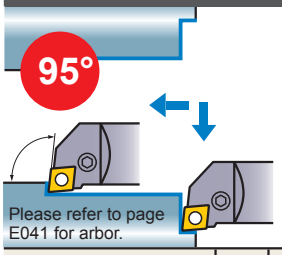
TN○○ type inserts	**➤ A110—A115**
DN○○ type inserts	**➤ A098—A103**
CBN & PCD inserts	**➤ B025—B027, B030, B031, B055, B056**
SPARE PARTS	**➤ P001**
TECHNICAL DATA	**➤ Q001**

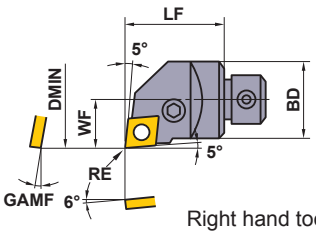
D TYPE BORING HEAD

- The minimum cutting diameter is from ϕ40.
- Economical negative insert.
- Lever lock type.
- Exchangeable head type.

DPCL

CN○○inserts





Right hand tool holder only.

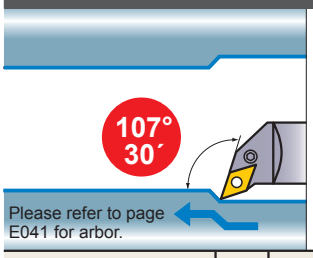
Finish	Light	Light	Medium
FH	SA	LP	MP
 (12)	 (12)	 (12)	 (12)
Medium	**Medium**	**Stainless**	**CBN**
MH	Standard	MM	
 (12)	 (12)	 (12)	 (12)

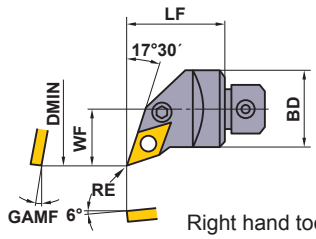
Order Number	Stock	Insert Number		Dimensions(mm)						Shim	Shim Pin	Clamp Lever	Clamp Screw *	Wrench
	R			BD	LF	WF	GAMF	DMIN	RE					
DPCL132R	●	CNMA CNMG CNMM CNGG	1204○○	32	40	20	12°	**40**	0.8	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R
DPCL**140R**	●		1204○○	40	50	25	10°	**50**	0.8	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R

∗ Clamp Torque (N • m) : LLCS108=3.3

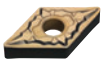
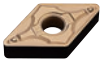
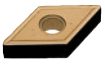
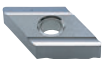
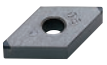
DPDH

DN○○inserts





Right hand tool holder only.

Finish	Light	Medium	Medium
FH	LP	MP	MH
 (15)	 (15)	 (15)	 (15)
Medium	**Stainless**	**G class**	**CBN**
Standard	MM	L	
 (15)	 (15)	 (15)	 (15)

Order Number	Stock	Insert Number		Dimensions(mm)						Shim	Shim Pin	Clamp Lever	Clamp Screw *	Wrench
	R			BD	LF	WF	GAMF	DMIN	RE					
DPDH132R	●	DNMA DNMG DNMM DNGA DNGG	1504○○	32	40	25	10°	**50**	0.8	LLSDN42	LLP14	LLCL24	LLCS108	HKY30R
DPDH**140R**	●		1504○○	40	50	30	9°	**60**	0.8	LLSDN42	LLP14	LLCL24	LLCS108	HKY30R

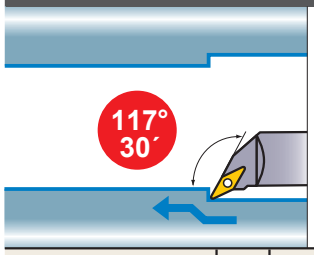
∗ Clamp Torque (N • m) : LLCS108=3.3

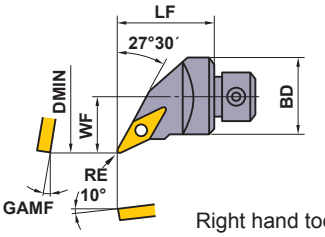
● : Inventory maintained in Japan.

CN○○ type inserts ➤ A092—A097
DN○○ type inserts ➤ A098—A103
CBN & PCD inserts ➤ B022—B027, B055

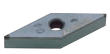
DPVP

VN○○inserts





Right hand tool holder only.

Finish	Light	Medium	Medium
FH	SH	MP	MH
			
(16)	(16)	(16)	(16)
Stainless	**G class**	**PCD**	**CBN**
MM	L	L-F	
			
(16)	(16)	(16)	(16)

Order Number	Stock	Insert Number		Dimensions(mm)								 *		
	R			BD	LF	WF	GAMF	DMIN	RE	Shim	Lock Pin	Lock Screw	Stop Ring	Wrench
DPVP132R	●	VNMG VNGA VNGG	1604○○	32	40	25	13°	**50**	0.8	PV322	P11S	HSP05008C	E03	HKY25R
DPVP**140R**	●		1604○○	40	50	30	13°	**60**	0.8	PV322	P11S	HSP05008C	E03	HKY25R

* Clamp Torque (N • m) : HSP05008C=2.5

STANDARD ARBOR FOR D TYPE BORING HEAD

① **B** ② **1** ③ **32** ④ **32**

①Designation

②Arbor Length (mm)

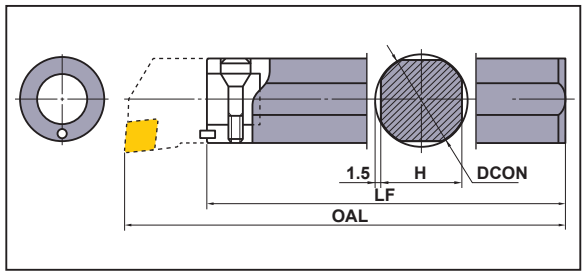
Symbol	DCON	LF	OAL
1	32	260	300
	40	310	360

③Arbor Diameter (mm)

Symbol	Diameter(DCON)
32	32
40	40

④Head Diameter (mm)

Symbol	Diameter(BD)
32	32
40	40



Order Number	Stock	Dimensions (mm)				Set Bolt	Wrench	Head Order Number
		DCON	LF	H	OAL			
B13232	●	32	260	29	300	SD32	HKY60R	DP○○132R
B14040	●	40	310	37	360	SD40	HKY60R	DP○○140R

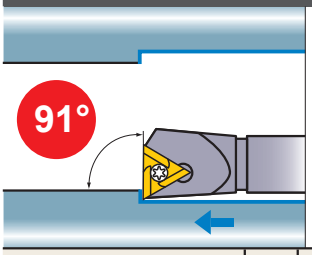
VN○○ type inserts	➤ A116—A118	SPARE PARTS	➤ P001
CBN & PCD inserts	➤ B032, B033, B057	TECHNICAL DATA	➤ Q001

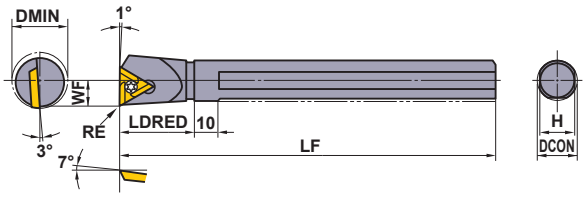
AL TYPE BORING BARS

- Suitable for non-ferrous metal.
- 20° positive insert.
- Screw-on type.
- l/d is 6 times the diameter.
- Excellent vibration resistance.
- The minimum cutting diameter is from ϕ20.

STFE

TE○○inserts





Right hand tool holder shown.

Medium	PCD
R/L	R/L
 (16)	 (16)
PCD	
 (16)	

Order Number	Stock		Insert Number		Dimensions(mm)							*	
	R	L			DCON	LF	LDRED	WF	H	DMIN	RE	Clamp Screw	Wrench
S16RSTFER/L16	●	●	TEGX...R/L	1603○○	16	200	30	11	14.6	**20**	0.4	FC400890T	TKY10F
S20RSTFER/L16	●	●		1603○○	20	200	37	13	18	**25**	0.4	FC400890T	TKY10F
S25SSTFER/L16	●	●		1603○○	25	250	40	17	23	**32**	0.4	FC400890T	TKY10F

∗ Clamp Torque (N • m) : FC400890T=2.5

RECOMMENDED CUTTING CONDITIONS

	Work Material	Grade	Cutting Speed (m/min)	l/d=3		l/d=4		l/d=5		l/d=6	
				Feed (mm/rev)	Depth of Cut (mm)	Feed (mm/rev)	Depth of Cut (mm)	Feed (mm/rev)	Depth of Cut (mm)	Feed (mm/rev)	Depth of Cut (mm)
N	Aluminium Alloy	**HTi10**	400 (200—600)	0.15 (0.05—0.25)	—3.0	0.15 (0.05—0.25)	—3.0	0.1 (0.05—0.2)	—2.5	0.1 (0.05—0.2)	—1.0
		MD220	800 (200—1500)	0.15 (0.05—0.25)	—3.0	0.15 (0.05—0.25)	—3.0	0.1 (0.05—0.2)	—2.5	0.1 (0.05—0.2)	—1.0

(Note 1) The insert photos are only examples. The letters refer to the chip breaker and the dimension refers to the inscribed circle.
(Note 2) When using insert with right and left hand chip breaker, please use left hand insert for right hand holder and right hand insert for left hand holder.

● : Inventory maintained in Japan.

TE○○ type inserts	**➤ A144**	**SPARE PARTS**	**➤ P001**
PCD inserts	**➤ B066**	**TECHNICAL DATA**	**➤ Q001**

Memo

HOW TO READ THE STANDARD OF GROOVING

●How this section page is organized

①Classified according to external or internal applications.
②Sub-classified according to product series.
(Refer to the index on the next page.)

[For External Grooving] [For Internal Grooving]

FIGURE SHOWING THE TOOLING APPLICATION
uses illustrations and arrows to depict available machining applications such as cutting off, grooving, and copying.

INDICATION OF HOLDER TYPE ACCORDING TO APPLICATION
indicates the holder types, such as the standard type or the L type, according to machining application.

TITLE OF PRODUCT

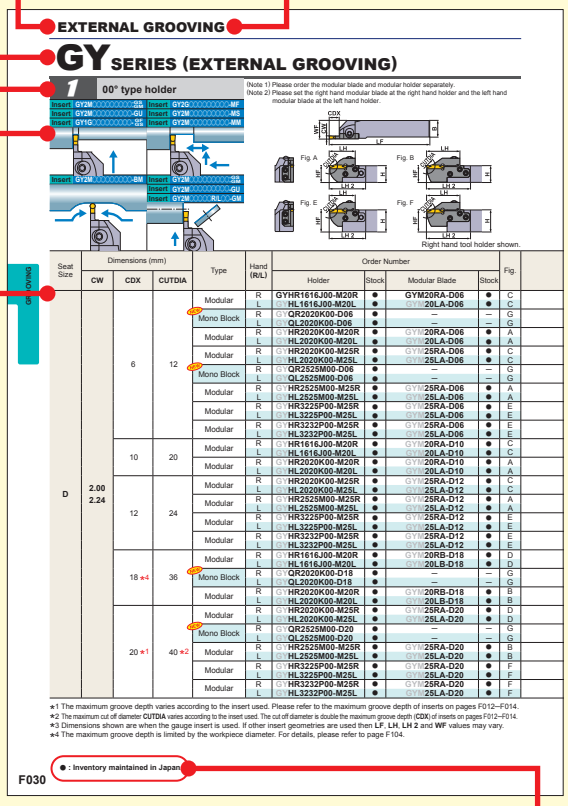
PRODUCT SECTION

INDICATION OF EXTERNAL/ FACE GROOVING/INTERNAL APPLICATION

PRODUCT FEATURES

MIN. CUTTING DIAMETER
is colour-coded to let you find, at a glance, the minimum cutting diameters for internal machining.

GEOMETRY


EXTERNAL GROOVING

GY SERIES (EXTERNAL GROOVING)

1 00° type holder

(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

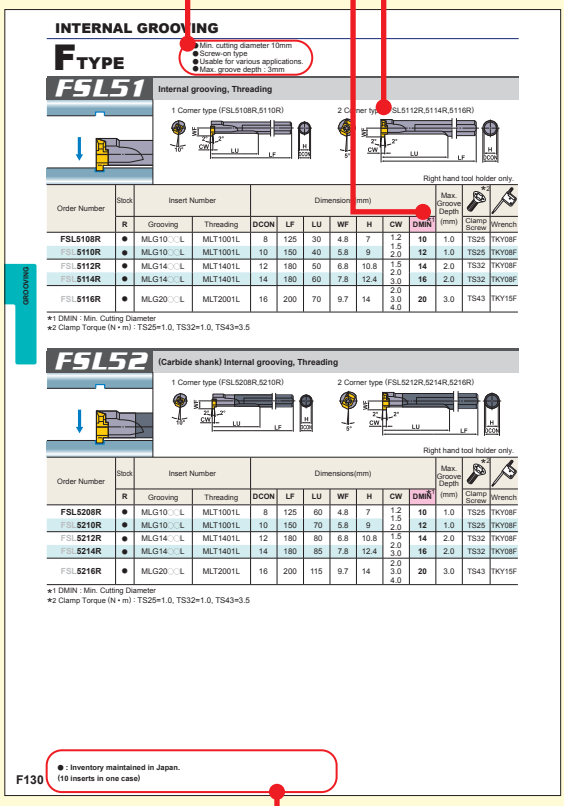
Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Holder	Stock	Modular Blade	Stock	Fig.
D	2.00 2.24	6	12	Modular	R	GYHR1616J00-M20R	●	GYM20RA-D06	●	C
					L	GYHL1616J00-M20L	●	GYM20LA-D06	●	C
				Mono Block	R	GYQR2020K00-D06	●	–	–	G
					L	GYQL2020K00-D06	●	–	–	G
				Modular	R	GYHR2020K00-M20R	●	GYM20RA-D06	●	A
					L	GYHL2020K00-M20L	●	GYM20LA-D06	●	A
				Modular	R	GYHR2020K00-M25R	●	GYM25RA-D06	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-D06	●	C
				Mono Block	R	GYQR2525M00-D06	●	–	–	G
					L	GYQL2525M00-D06	●	–	–	G
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-D06	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-D06	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-D06	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-D06	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-D06	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-D06	●	E
		10	20	Modular	R	GYHR1616J00-M20R	●	GYM20RA-D10	●	C
					L	GYHL1616J00-M20L	●	GYM20LA-D10	●	C
				Modular	R	GYHR2020K00-M20R	●	GYM20RA-D10	●	A
					L	GYHL2020K00-M20L	●	GYM20LA-D10	●	A
		12	24	Modular	R	GYHR2020K00-M25R	●	GYM25RA-D12	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-D12	●	C
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-D12	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-D12	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-D12	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-D12	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-D12	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-D12	●	E
		18 ⁎4	36	Modular	R	GYHR1616J00-M20R	●	GYM20RB-D18	●	D
					L	GYHL1616J00-M20L	●	GYM20LB-D18	●	D
				Mono Block	R	GYQR2020K00-D18	●	–	–	G
					L	GYQL2020K00-D18	●	–	–	G
				Modular	R	GYHR2020K00-M20R	●	GYM20RB-D18	●	B
					L	GYHL2020K00-M20L	●	GYM20LB-D18	●	B
		20 ⁎1	40 ⁎2	Modular	R	GYHR2020K00-M25R	●	GYM25RA-D20	●	D
					L	GYHL2020K00-M25L	●	GYM25LA-D20	●	D
				Mono Block	R	GYQR2525M00-D20	●	–	–	G
					L	GYQL2525M00-D20	●	–	–	G
				Modular	R	GYHR2626M00-M25R	●	GYM25RA-D20	●	B
					L	GYHL2626M00-M25L	●	GYM25LA-D20	●	B
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-D20	●	F
					L	GYHL3225P00-M25L	●	GYM25LA-D20	●	F
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-D20	●	F
					L	GYHL3232P00-M25L	●	GYM25LA-D20	●	F

⁎1 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012–F014.
⁎2 The maximum cut off diameter CUTDIA varies according to the insert used. The cut off diameter is double the maximum groove depth (CDX) of inserts on pages F012–F014.
⁎3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then LF, LH, LH 2 and WF values may vary.
⁎4 The maximum groove depth is limited by the workpiece diameter. For details, please refer to page F104.

● : Inventory maintained in Japan

F030


INTERNAL GROOVING

F TYPE

● Min. cutting diameter 10mm
● Screw-on type
● Usable for various applications.
● Max. groove depth : 3mm

FSL51 Internal grooving, Threading

1 Corner type (FSL5108R,5110R) 2 Corner type (FSL5112R,5114R,5116R)

Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions(mm)							Max. Groove Depth (mm)	Clamp Screw	Wrench
	R	Grooving	Threading	DCON	LF	LU	WF	H	CW	DMIN⁎1			
FSL5108R	●	MLG10□□L	MLT1001L	8	125	30	4.8	7	1.2 1.5 2.0	10	1.0	TS25	TKY08F
FSL5110R	●	MLG10□□L	MLT1001L	10	150	40	5.8	9	1.5 2.0	12	1.0	TS25	TKY08F
FSL5112R	●	MLG14□□L	MLT1401L	12	180	50	6.8	10.8	1.5 2.0	14	2.0	TS32	TKY08F
FSL5114R	●	MLG14□□L	MLT1401L	14	180	60	7.8	12.4	3.0	16	2.0	TS32	TKY08F
FSL5116R	●	MLG20□□L	MLT2001L	16	200	70	9.7	14	2.0 3.0 4.0	20	3.0	TS43	TKY15F

⁎1 DMIN : Min. Cutting Diameter
⁎2 Clamp Torque (N・m) : TS25=1.0, TS32=1.0, TS43=3.5

FSL52 (Carbide shank) Internal grooving, Threading

1 Corner type (FSL5208R,5210R) 2 Corner type (FSL5212R,5214R,5216R)

Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions(mm)							Max. Groove Depth (mm)	Clamp Screw	Wrench
	R	Grooving	Threading	DCON	LF	LU	WF	H	CW	DMIN⁎1			
FSL5208R	●	MLG10□□L	MLT1001L	8	125	60	4.8	7	1.2 1.5 2.0	10	1.0	TS25	TKY08F
FSL5210R	●	MLG10□□L	MLT1001L	10	150	70	5.8	9	1.5 2.0	12	1.0	TS25	TKY08F
FSL5212R	●	MLG14□□L	MLT1401L	12	180	80	6.8	10.8	1.5 2.0	14	2.0	TS32	TKY08F
FSL5214R	●	MLG14□□L	MLT1401L	14	180	85	7.8	12.4	3.0	16	2.0	TS32	TKY08F
FSL5216R	●	MLG20□□L	MLT2001L	16	200	115	9.7	14	2.0 3.0 4.0	20	3.0	TS43	TKY15F

⁎1 DMIN : Min. Cutting Diameter
⁎2 Clamp Torque (N・m) : TS25=1.0, TS32=1.0, TS43=3.5

● : Inventory maintained in Japan.
(10 inserts in one case)

F130

PRODUCT STANDARDS
indicates order numbers, stock status (per right/left hand), holders, Modular Blade, groove widths, maximum groove depths, maximum cut-off diameters, dimensions, applicable inserts, and cutting edge shapes.

LEGEND FOR STOCK STATUS MARK
is shown on the left hand page of each double-page spread.

●To Order : For holder, please specify ①order number and hand of tool (right/left).
For insert, please specify ①insert number and ②grade.

TURNING TOOLS

GROOVING

CLASSIFICATION (EXTERNAL CUTTING)····· F002
CLASSIFICATION (INTERNAL CUTTING)····· F003
REFERENCE MATERIAL····· F015
QUICK INDEX····· F016

STANDARD OF GROOVING TOOLS

EXTERNAL CUTTING

FEATURES OF THE GY SERIES····· F004
GY SERIES ORDER NUMBER····· F010
GY SERIES INSERTS····· F012
GY SERIES QUICK INDEX····· F016
GY SERIES····· F028
UG HOLDER····· F120
MG HOLDER····· F122
SMG HOLDER····· F124

INTERNAL CUTTING

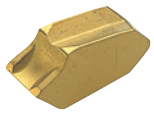
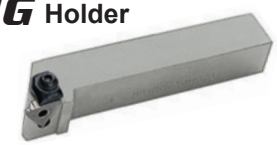
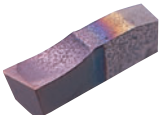
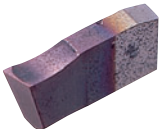
GY SERIES····· F094
MICRO-MINI BORING BARS····· F125
MICRO-MINI TWIN BORING BARS····· F126
F TYPE BORING BARS····· F130
D TYPE BORING HEAD····· F132

*Arranged by Alphabetical order

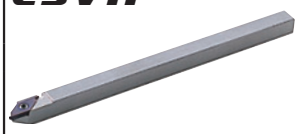
F125 **C○○○R-BLS**
F126 **CG**
F132 **DPT4**
F130 **FSL51**
F130 **FSL52**
F028 **GY**
F120 **KGBN**
F121 **KGT**
F122 **MGH**
F123 **MGT**
F131 **MLG**
F131 **MLT**
F128 **RBH**
F129 **SBH**
F124 **SMGH**
F124 **SMGT**
F124 **SMTT**
F121 **UGH**
F120 **UGHN**

CLASSIFICATION

EXTERNAL CUTTING

Name of Tool Holder	Insert Shape	Features	Groove Width According to Cutting Mode (mm)						Page
			Shallow Grooving	Deep Grooving	Cutting Off	Copying	Recessing	Face Grooving	
GY Series 		Modular blade type ● Clamp-on type. ● The modular blade allows for high rigidity and accuracy. (Tri Lock System) ● Various insert types. Mono block type ● Spring clamp type.	1.5 2 2.24 2.39 2.5 2.74 3 3.18 3.24 4 4.24 4.75 5 5.24 6 6.31 6.35 8	1.5 2 2.24 2.39 2.5 2.74 3 3.18 3.24 4 4.24 4.75 5 5.24 6 6.31 6.35 8	1.5 2 2.24 2.39 2.5 2.74 3 3.18 3.24 4 4.24 4.75 5 5.24 6 6.31 6.35 8	2 2.5 3 3.18 4 4.75 5 6 6.35 8	2 2.5 3 3.18 4 4.75 5 6 6.35	2 2.24 2.39 2.5 2.74 3 3.18 3.24 4 4.24 4.75 5 5.24 6 6.31 6.35	**F028**
UG Holder 		● Spring clamp type. ● Strengthened insert clamping. ● Block and blade type and solid type series. ● Maximum cut off diameter : 120mm.	2.2 3.1 4.1 5.1	2.2 3.1 4.1 5.1	2.2 3.1 4.1 5.1				**F120**
MG Holder 		● Clamp-on type. ● Precision class insert. ● Positive insert suffers from negligible chattering and thus produces a good finished surface.	1.25 I 6						**F122**
SMG Holder 		● Screw-on type. ● Precision class insert. ● Positive insert suffers from negligible chattering and thus produces a good finished surface.	0.5 I 1.3						**F124**
SMALL TOOLS **GTAH GTBH GTCH** 		● For gang type tool posts. ● Small Shank : 8mm–16mm ● Possible to control the back clamping. ● High rigidity due to design of vertical insert. ● Economical due to the design of three-corner inserts.	0.3 I 3.0						**D016**
CTAH 		● For gang type tool posts. ● Small Shank : 8mm–16mm ● Due to the design of handed tool holders, able to minimize accumulation of workpieces. ● High rigidity due to design of vertical insert. ● Maximum cut off diameter : 12mm	0.7 1.0 1.5 2.0	0.7 1.0 1.5 2.0	0.7 1.0 1.5 2.0				**D018**
CTBH 		● For gang type tool posts. ● Small Shank : 10mm–16mm ● Single holder for inserts for back turning and cutting off. ● High rigidity due to design of vertical insert. ● Maximum cut off diameter : 16mm	1.5 2.0	1.5 2.0	1.5 2.0				**D020**
CTCH 		● For gang type tool posts. ● Small Shank : 10mm,12mm ● High cutting edge sharpness and excellent chip discharge. ● Maximum cut off diameter : 20mm	2.2 2.5	2.2 2.5	2.2 2.5				**D021**
CTDH 		● For gang type tool posts. ● Small Shank : 16mm ● High cutting edge sharpness and excellent chip discharge. ● Maximum cut off diameter : 23–35mm	2.5	2.5	2.5				**D022**
CTEH 		● For gang type tool posts. ● Small Shank : 16mm ● High cutting edge sharpness and excellent chip discharge. ● Maximum cut off diameter : 23–35mm	3.0	3.0	3.0				**D023**

EXTERNAL CUTTING

	Name of Tool Holder	Insert Shape	Features	Groove Width According to Cutting Mode (mm)					Page
				Shallow Grooving	Deep Grooving	Cutting Off	Copying	Face Grooving	
SMALL TOOLS	**CSVH** 		● For cam type tool posts. ● Small Shank : 7–12mm ● Single holder responds to front turning, back turning, grooving, threading and cutting off operations. ● The most suitable for machining of small parts with work diameter 5mm or smaller. ● Maximum groove depth : 0.3–2.5mm ● Maximum cut off diameter : 3–5mm	0.25 I 1.5		0.6 I 1.5			**D027**

INTERNAL CUTTING

Name of Tool Holder	Insert Shape	Features	Min. Cutting Diameter (mm)	Groove Width (mm)	Max. Groove Depth (mm)	Page
GY Series 		Modular blade type ● Clamp-on type. ● The modular blade allows for high rigidity and accuracy. (Tri Lock System) ● Various insert types. Mono block type ● Spring clamp type.	25	2 I 6.35	4 I 13	**F094**
FSL5 		● Screw-on type. ● Precision class insert. ● Holder is capable of performing both grooving and threading. ● Maximum groove depth : 3mm.	10	1.2 I 4.0	1.0 I 3.0	**F130**
DPT4 		● Pin lock type. ● Precision class insert. ● Exchangable head type.	40	1.25 I 4.5	1.2 I 4.5	**F132**
MICRO-MINI TWIN Boring Bars 	–	● Solid carbide type. ● Economical due to single holder with two cutting edges.	3.0	1.0 I 2.0	1.0 I 2.0	**F126**
MICRO-MINI Boring Bars 	–	● Solid carbide type. ● Insert can be ground to suit the application.	3.2	2.0 I 3.0	1.0 I 2.0	**F125**

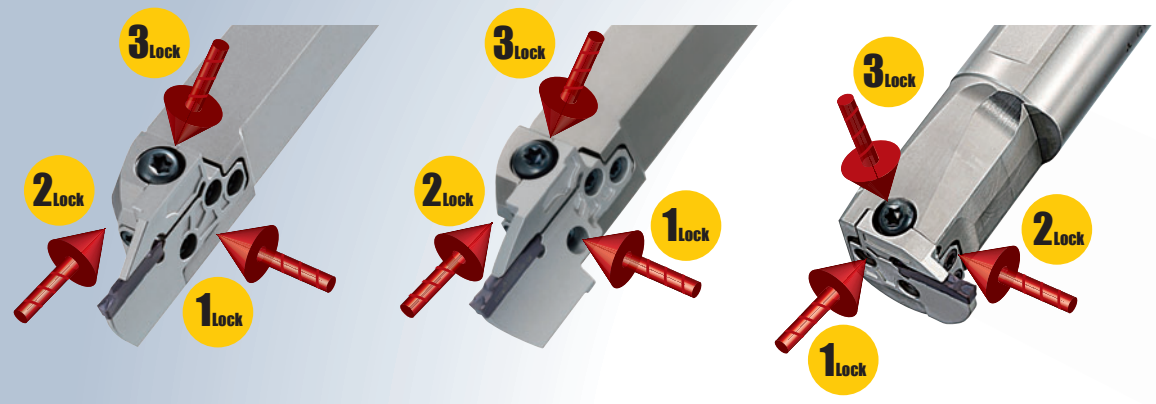
GY SERIES

GY series offers ultimate rigidity and accuracy for stable grooving.

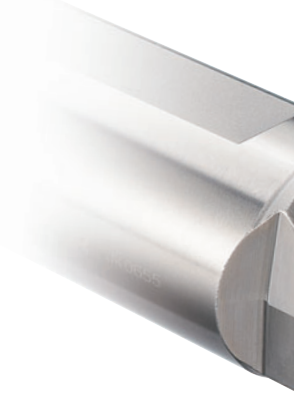
New Tri Lock System for increased stability and performance!

Innovative Tri Lock System

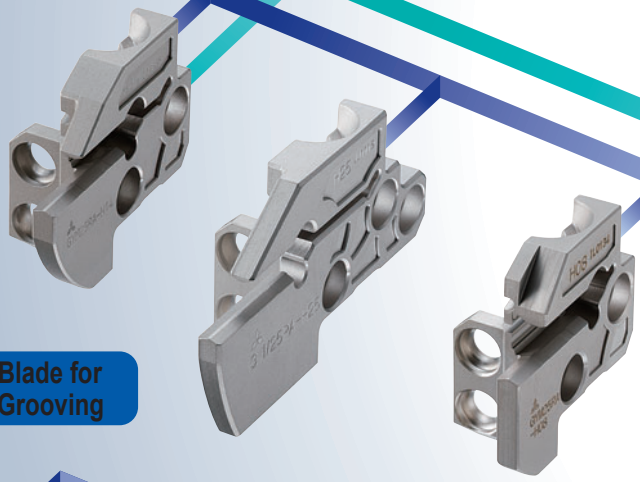
- Mitsubishi Materials has developed a new and unique, modular blade system. The Tri-Lock system ensures the blade is securely fixed in 3 directions (side, front and top) giving high rigidity for a stable grooving performance.





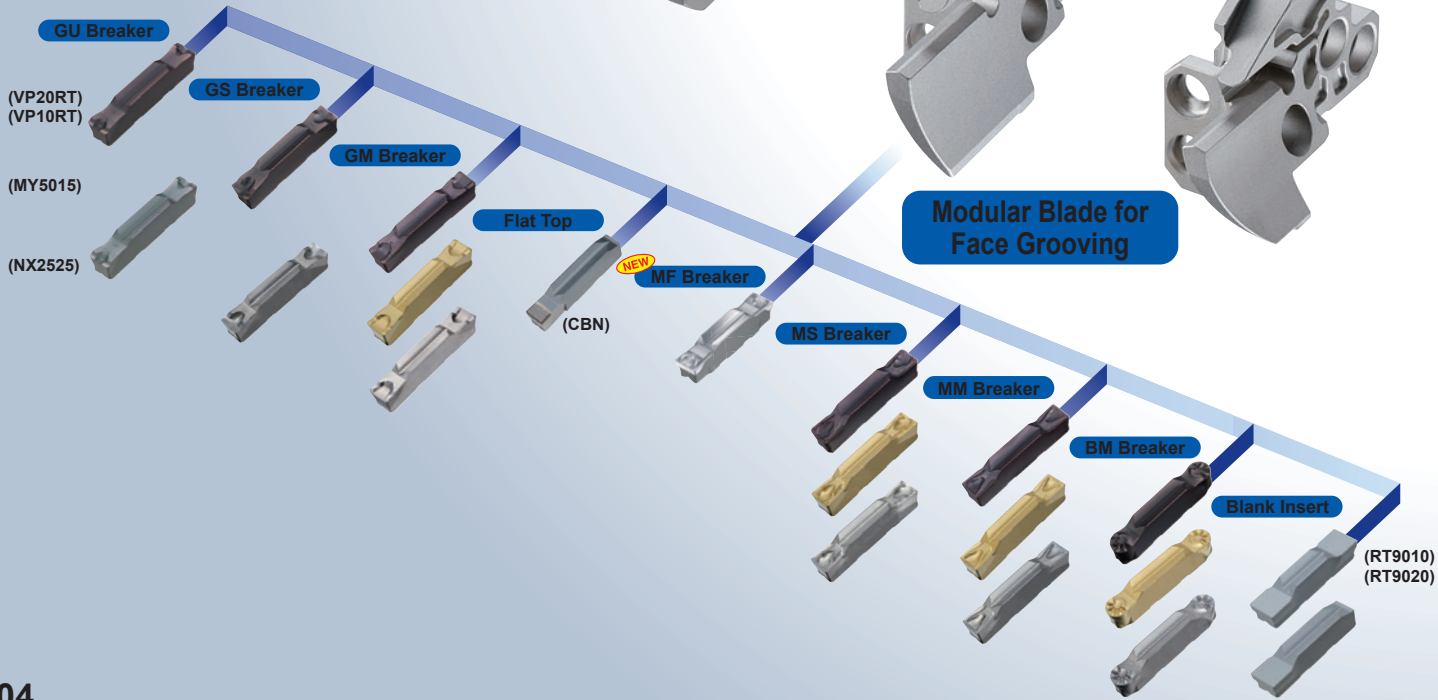


Modular Blade for External / Internal Grooving



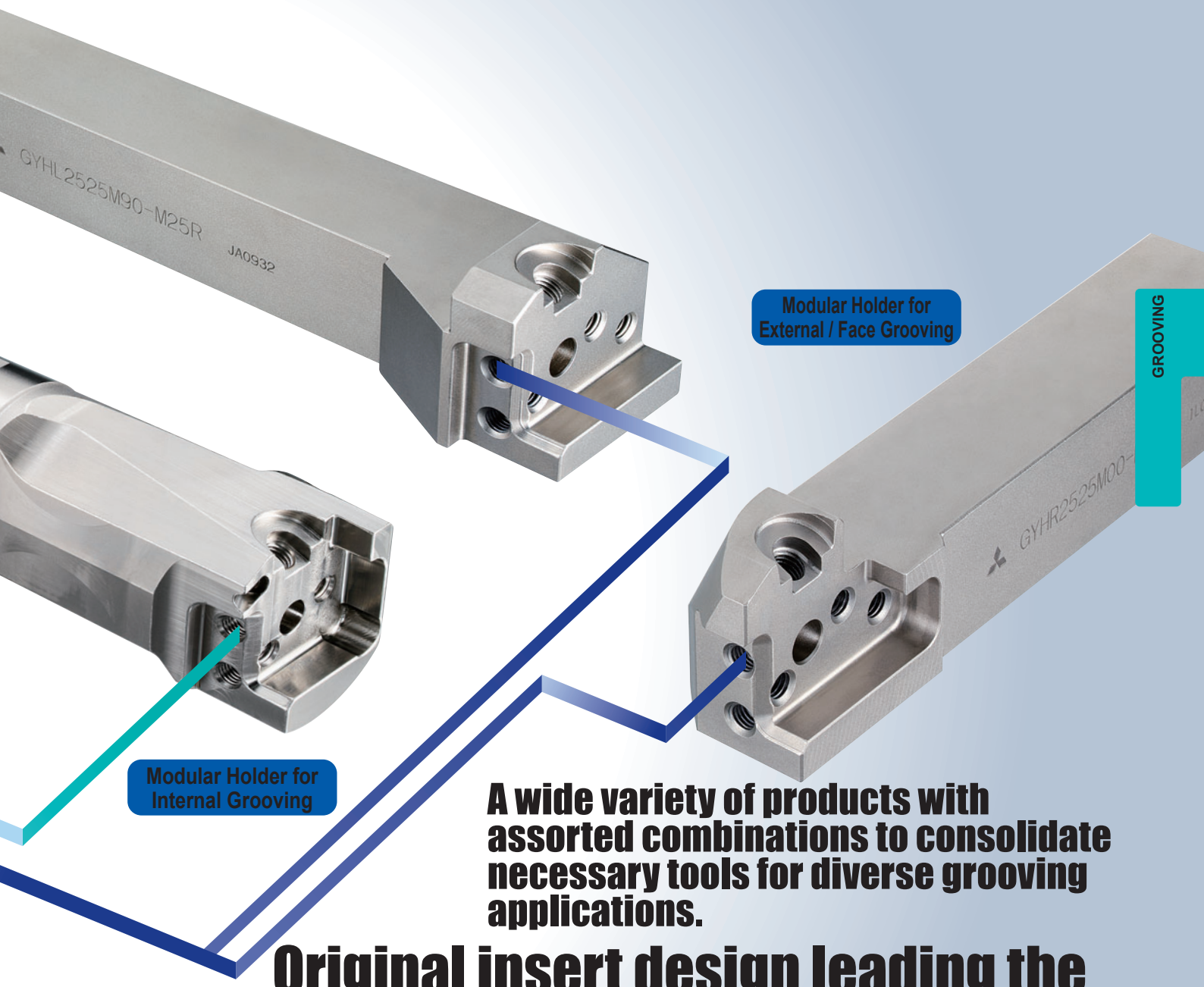
Modular Blade for External Grooving

GU Breaker
(VP20RT)
(VP10RT)
GS Breaker
GM Breaker
(MY5015)
(NX2525)
Flat Top
(CBN)
NEW
MF Breaker
MS Breaker
MM Breaker
BM Breaker
Blank Insert
(RT9010)
(RT9020)



Modular Blade for Face Grooving

Easy to use modular blade system allows flexible tool management but maintains an overall strength comparable to a mono block type holder.

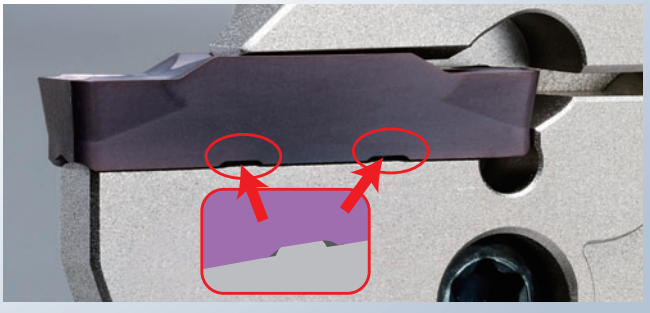


A wide variety of products with assorted combinations to consolidate necessary tools for diverse grooving applications.

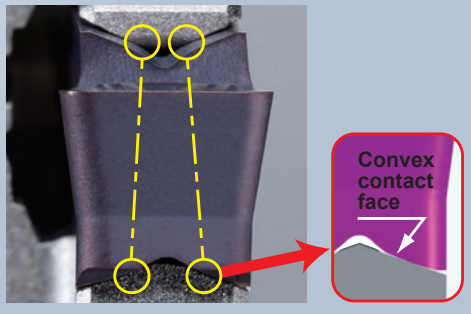
Original insert design leading the way to new grooving applications !

Highly reliable insert clamping

- Safety keys prevent insert movement.



- The convex geometry ensures high precision clamping.

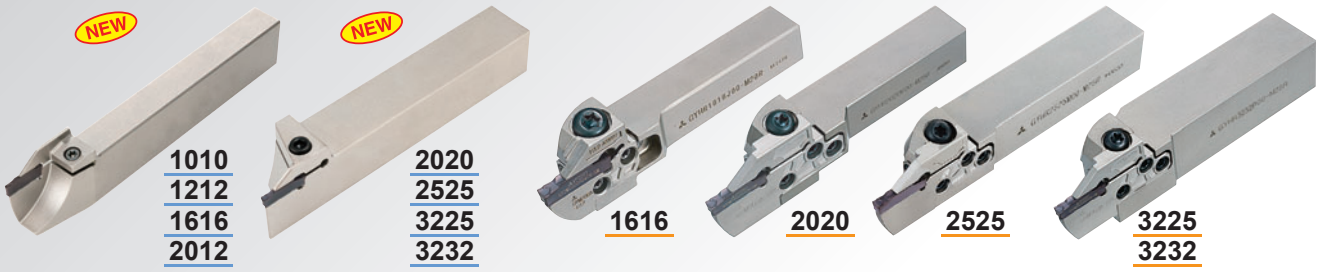


GY SERIES

A wide selection of holders and inserts available for diverse grooving applications.

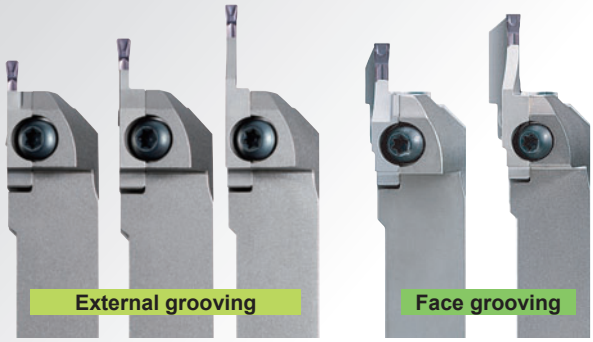
External • Face holders

Corresponding blades to a variety of modular holders with different shank sizes.

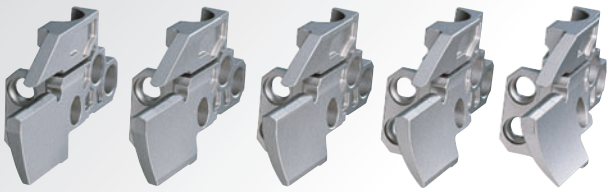


Mono block type | **Modular type**

A wide selection of holders and inserts available for diverse grooving applications



Applicable for various diameters of face grooves by the wide array of modular blades with different grooving diameters.



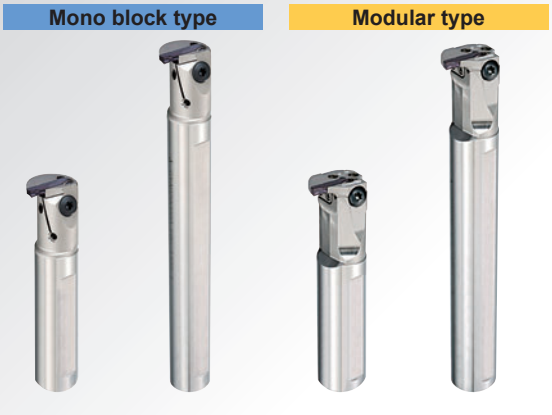
Internal holders

A wide range of holders available from minimum diameter of ø25mm.

Mono block type	Modular type
Min.cutting diameter ϕ25, ϕ32	Min.cutting diameter ϕ40, ϕ50, ϕ60, ϕ70



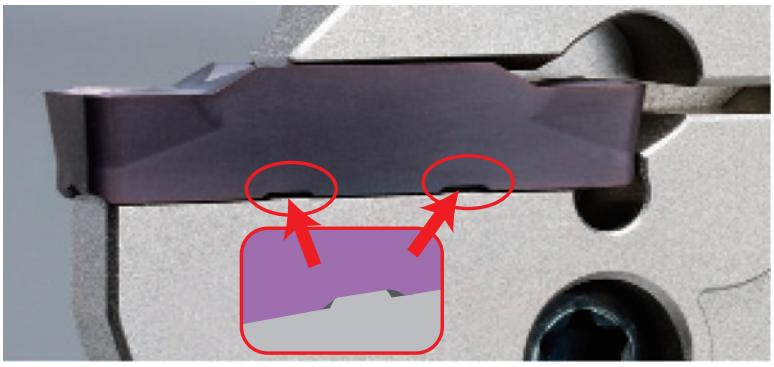
Short shank types are standard stocked.



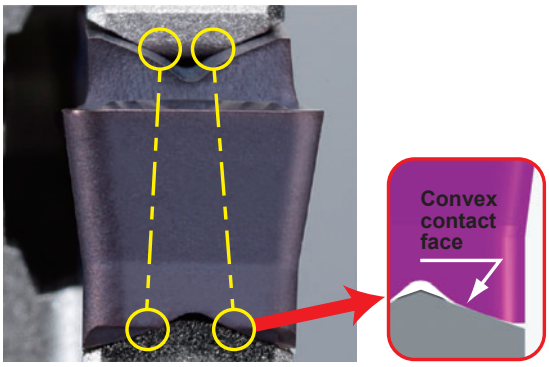
Original insert design leading the way to new grooving applications.

Highly reliable insert clamping

Safety keys prevent insert movement.



The convex geometry ensures high precision clamping.

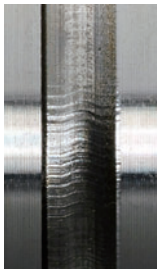


Comparison of finished surface

GY series can achieve stable machining at the cutting conditions which created vibration with a conventional modular type tool.



GY



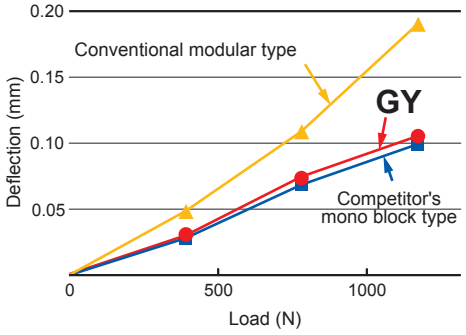
Conventional modular type

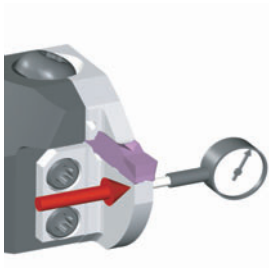
<Cutting Conditions>

Workpiece	: SCM440
Insert width	: 5mm
Cutting speed	: 150m/min
Feed	: 0.2mm/rev
Groove depth	: 23mm

Rigidity comparison

The GY series provides rigidity comparable to a mono block type grooving tool.



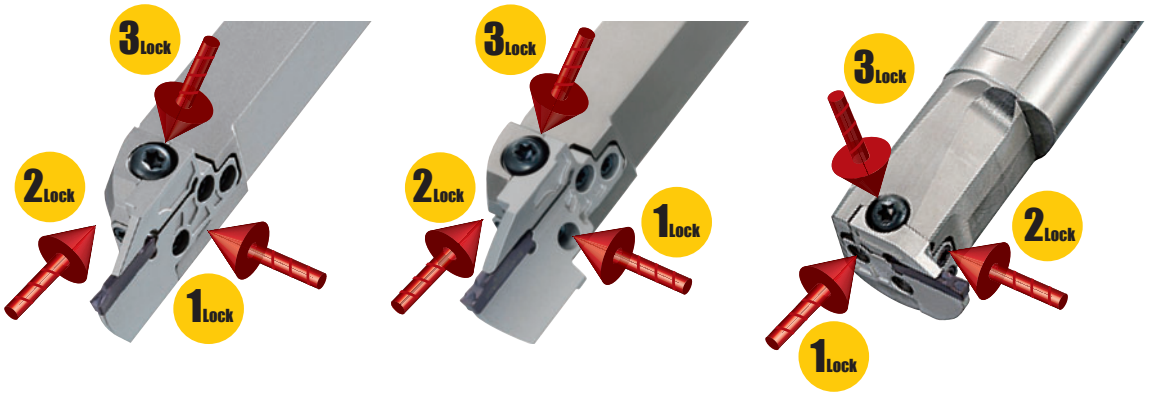


(Tool body for 5mm insert)

New TRI-LOCK System for increased stability and performance!

TRI-LOCK System

The TRI-LOCK system ensures the blade is securely fixed in 3 directions (side, front and top), giving high rigidity for stable grooving performance.

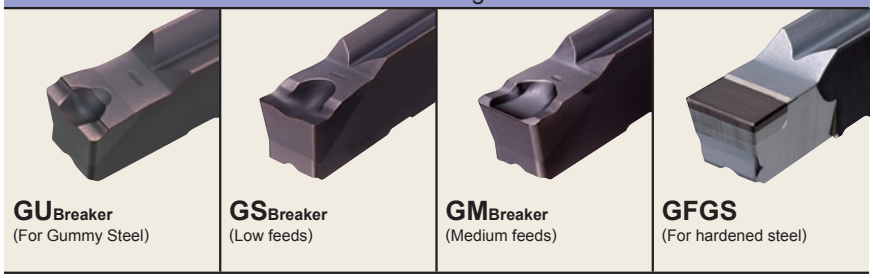


INSERT

A WIDE SELECTION OF INSERTS

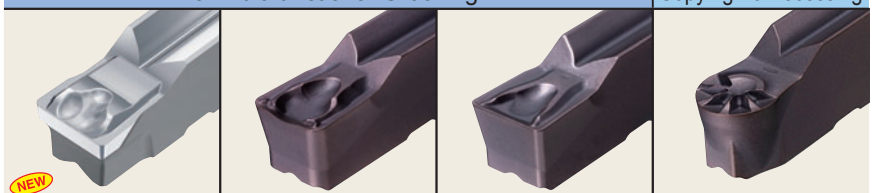
Breaker system

Grooving



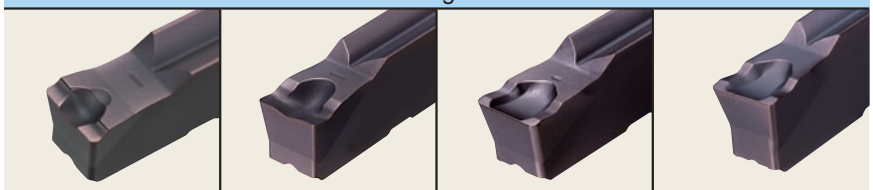
GU Breaker (For Gummy Steel)	GS Breaker (Low feeds)	GM Breaker (Medium feeds)	GFGS (For hardened steel)

For Multifunctional Grooving / Copying/For recessing



NEW MF Breaker (G class)	MS Breaker (Low feeds)	MM Breaker (Medium feeds)	BM Breaker

Cutting Off



GU Breaker (For Gummy Steel)	GS Breaker (Low feeds)	GM Breaker (Medium feeds)	R/L05-GM Breaker (Medium feeds)

Selection of groove widths

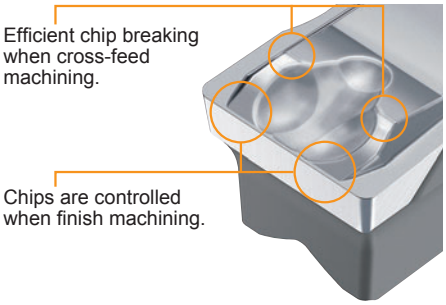


Different corner radii available



NEW

MF Breaker

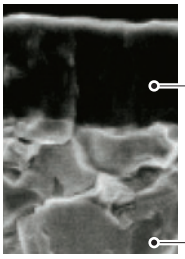


INSERT GRADE

Machining Condition \ Work Material	P Steel	M Stainless Steel	K Cast Iron	S Heat resistant Alloy / Titanium Alloy	H Hardened steel
Stable ↑ Machining Condition ↓ Unstable	NX2525 MY5015 VP10RT VP20RT	VP10RT VP20RT	MY5015 VP10RT VP20RT	VP10RT / RT9010 VP20RT	MB8025

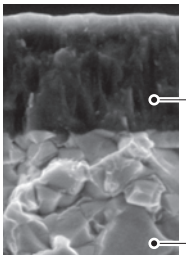
Note1) VP20RT is the first recommended grade for materials other than hardened steel.
Note2) For VP10RT, VP20RT and MY5015, wet cutting is recommended.

VP20RT (1st Recommendation)



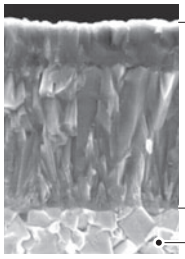
● PVD coated grade suitable for a wide range of applications. The combination of a special tough cemented carbide substrate with MIRACLE coating provides an excellent balance of wear and fracture resistance.

VP10RT (2nd Recommendation)



● PVD coated grade with a cemented carbide substrate harder than VP20RT. For use on difficult to cut materials and for extending tool life.

MY5015



● MY5015 is a CVD coated grade with excellent wear resistance even at high temperatures. It provides longer tool life when machining cast and ductile cast irons. Also suitable for high speed continuous cutting of steels.

RT9010

● First recommended grade for Titanium alloys.
Not recommended for use on non-ferrous alloys.

NX2525

● NX2525, a cermet grade for finish machining of steels and for good surface finishes at lower cutting speeds.

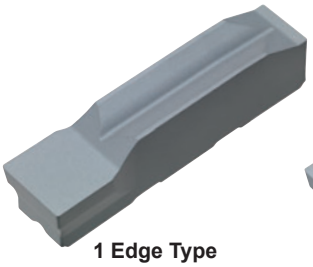
MB8025

● MB8025 is a sintered CBN grade for hardened steel.

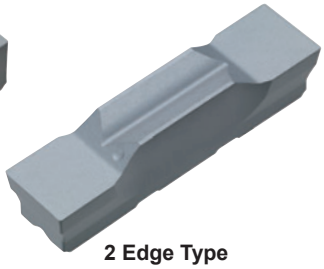
GROOVING

BLANK INSERTS

● Blank inserts for custom grinding



1 Edge Type



2 Edge Type

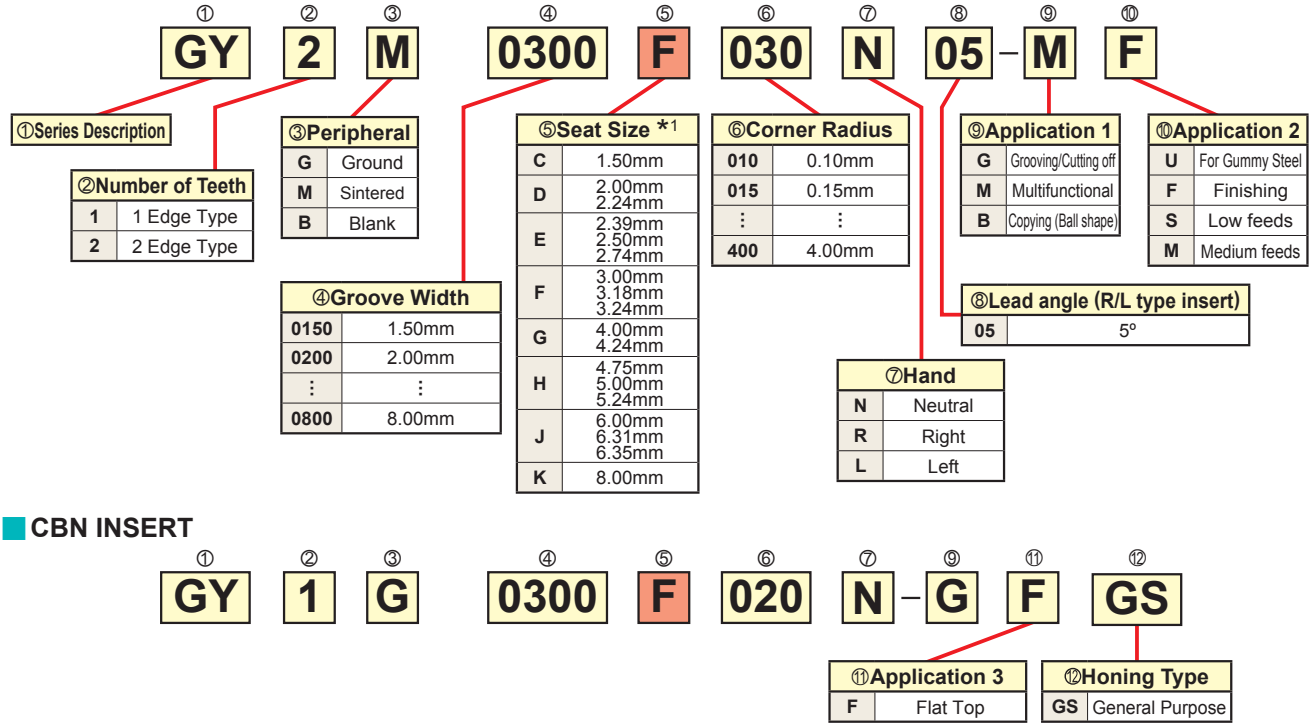
RT9010/RT9020 for insert blank

● First recommendation on insert blank is RT9020 due to the tougher carbide substrate and suitable for a wide range of application.
RT9010 is a harder substrate than RT9020 and is ideal for long tool life on stable cutting applications.
Coating is recommended for application on steel, stainless steel and cast iron materials.

*** Insert blank is not suitable for machining without grinding.**
Refer to the following URL for more information.
http://www.mitsubishicarbide.net/contents/mmc/ja/manual/blank_inserts.pdf

GY SERIES ORDER NUMBER

INSERT

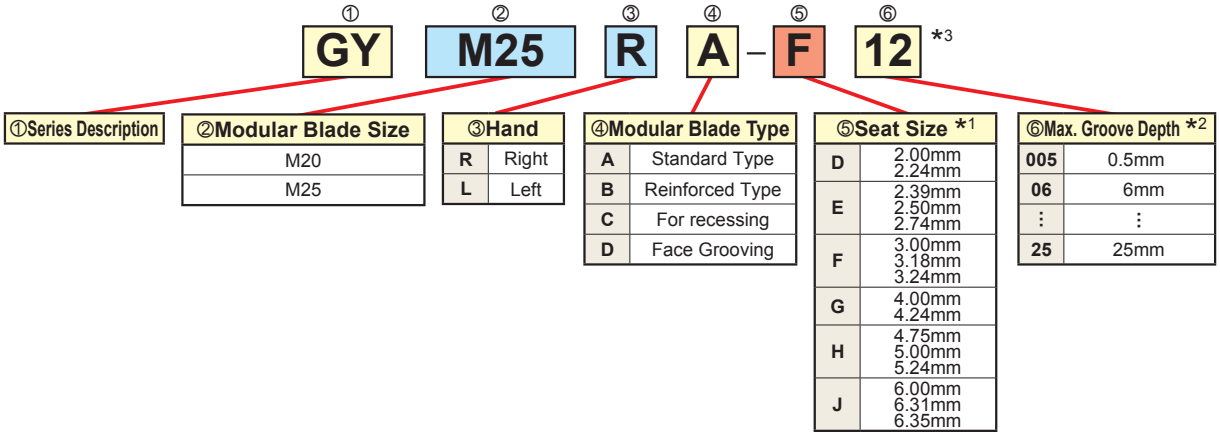


CBN INSERT

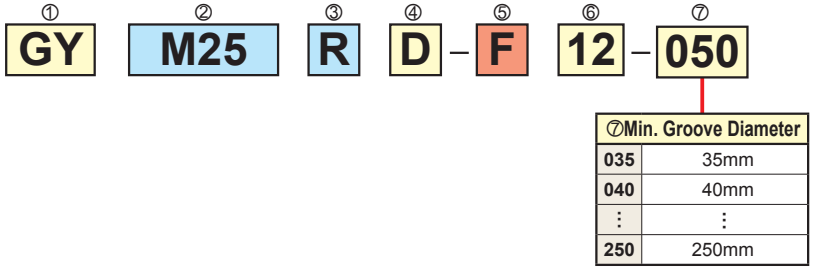
*1 Select a seat size with the same symbol as that of modular blade and mono block holder.

MODULAR BLADE

EXTERNAL/INTERNAL/FOR RECESSING



FACE GROOVING



*1 Select a seat size with the same symbol as that of the insert.
*2 The maximum groove depth is a value when used for external grooving and changes according to the insert used. For internal grooving, refer to the maximum groove depth on pages F094—F100.
*3 GYM20R/LA-○10, GYM20R/LA-○12, GYM25R/LA-○12 and GYM25R/LA-○14 can be used for both external and internal grooving.

EXTERNAL/FACE GROOVING/FOR RECESSING

MONO BLOCK HOLDER

①	②	③	④	⑤	⑥		⑦	⑧
GY	P	R	2525	M	00	–	K	25

①Series Description

②Holder Type

S	Mono block type for Swiss style lathes
P	With mono block offset
Q	Without mono block offset
H	Modular holder

③Hand of Holder

R	Right
L	Left

④Shank Diameter(H x W)

1010	10mmx10mm
1212	12mmx12mm
1616	16mmx16mm
2012	20mmx12mm
2020	20mmx20mm
2525	25mmx25mm
3225	32mmx25mm
3232	32mmx32mm

⑤Holder Length

J	110mm
JX	120mm
K	125mm
M	150mm
P	170mm

⑥Angle

00	0°
50	50°
90	90°

⑦Seat Size *1

C	1.50mm
D	2.00mm 2.24mm
E	2.39mm 2.50mm 2.74mm
F	3.00mm 3.18mm 3.24mm
G	4.00mm 4.24mm
H	4.75mm 5.00mm 5.24mm
J	6.00mm 6.31mm 6.35mm
K	8.00mm

⑧Max. Groove Depth

06	6mm
08	8mm
⋮	⋮
25	25mm

MODULAR HOLDER

①	②	③	④	⑤	⑥		⑨	⑩
GY	H	R	2525	M	00	–	M25	R

⑨Modular Blade Size

M20
M25

⑩Hand of Modular Blade

R	Right
L	Left

*1 Select a seat size with the same symbol as that of the insert.

INTERNAL

MONO BLOCK HOLDER

①	②	③	④	⑤	⑥	⑦		⑧	⑨
GY	A	R	20	K	90	A	–	F	06

①Series Description

②Holder Type

A	Mono Block
D	Modular holder

③Hand of Holder

R	Right
L	Left

④Shank Diameter

20	20mm
25	25mm
32	32mm
40	40mm
50	50mm

⑤Holder Length

K	125mm
L	140mm
M	150mm
P	170mm
Q	180mm
R	200mm
S	250mm
T	300mm

⑥Angle

90	90°

⑦Neck Length

A	30mm
B	40mm
C	50mm
D	60mm
F	80mm

⑧Seat Size *1

D	2.00mm 2.24mm
E	2.39mm 2.50mm 2.74mm
F	3.00mm 3.18mm 3.24mm
G	4.00mm 4.24mm
H	4.75mm 5.00mm 5.24mm
J	6.00mm 6.31mm 6.24mm

⑨Max. Groove Depth

06	6mm
07	7mm

MODULAR HOLDER

①	②	③	④	⑤	⑥	⑦		⑩	⑪
GY	D	R	40	M	90	D	–	M25	L

⑩Modular Blade Size

M20
M25

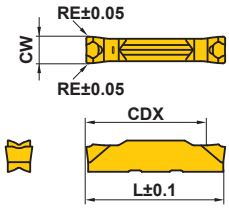
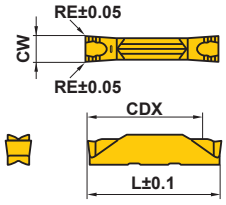
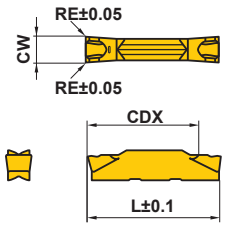
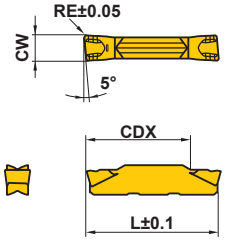
⑪Hand of Modular Blade

R	Right
L	Left

*1 Select a seat size with the same symbol as that of the insert.

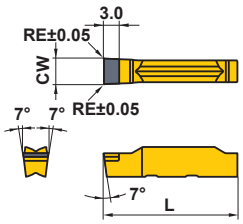
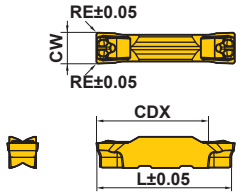
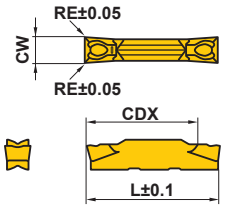
GY INSERTS

INSERTS

Applications	Geometry	Order Number	Stock: Coated VP10RT	Coated VP20RT	Coated MY5015	Cermet NX2525	Carbide RT9010	Carbide RT9020	CBN MB8025	Seat Size	Dimensions (mm): CW Grooving Width	CW Tolerance	RE	CDX	*2 L
For Grooving / Cutting off	**GU Breaker** (For gummy steel) 	**GY2M0200D020N-GU**	●	●		●				D	2.00	±0.03	0.2	19.7	20.70
		GY2M0239E020N-GU	●	●		●				E	2.39	±0.03	0.2	19.8	20.70
		GY2M0250E020N-GU	●	●		●				E	2.50	±0.03	0.2	19.5	20.70
		GY2M0300F030N-GU	●	●		●				F	3.00	±0.03	0.3	19.3	20.70
		GY2M0318F030N-GU	●	●		●				F	3.18	±0.03	0.3	19.3	20.70
		GY2M0400G030N-GU	●	●		●				G	4.00	±0.04	0.3	24.2	25.65
		GY2M0475H040N-GU	●	●		●				H	4.75	±0.04	0.4	24.2	25.65
		GY2M0500H040N-GU	●	●		●				H	5.00	±0.04	0.4	24.2	25.65
		GY2M0600J040N-GU	●	●		●				J	6.00	±0.04	0.4	24.2	25.65
		GY2M0635J040N-GU	●	●		●				J	6.35	±0.04	0.4	24.2	25.65
	GS Breaker (Low feeds) 	NEW **GY2M0150C010N-GS**	●	●		●				C	1.50	±0.03	0.1	13.4	14.70
		GY2M0200D020N-GS	●	●		●				D	2.00	±0.03	0.2	18.7	20.70
		GY2M0239E020N-GS	●	●		●				E	2.39	±0.03	0.2	18.5	20.70
		GY2M0250E020N-GS	●	●		●				E	2.50	±0.03	0.2	18.5	20.70
		GY2M0300F020N-GS	●	●		●				F	3.00	±0.03	0.2	18.5	20.70
		GY2M0318F020N-GS	●	●		●				F	3.18	±0.03	0.2	18.5	20.70
		GY2M0400G020N-GS	●	●		●				G	4.00	±0.04	0.2	23.9	25.65
		GY2M0475H030N-GS	●	●		●				H	4.75	±0.04	0.3	23.9	25.65
		GY2M0500H030N-GS	●	●		●				H	5.00	±0.04	0.3	24.0	25.65
		GY2M0600J030N-GS	●	●		●				J	6.00	±0.04	0.3	24.1	25.65
		GY2M0635J030N-GS	●	●		●				J	6.35	±0.04	0.3	24.1	25.65
		NEW **GY2M0800K030N-GS**	●	●						K	8.00	±0.04	0.3	29.1	30.50
	GM Breaker (Medium feeds) 	NEW **GY2M0150C020N-GM**	●	●		●				C	1.50	±0.03	0.2	13.9	14.70
		GY2M0200D020N-GM	●	●	●	●				D	2.00	±0.03	0.2	19.4	20.70
		GY2M0239E020N-GM	●	●	●	●				E	2.39	±0.03	0.2	19.4	20.70
		GY2M0250E020N-GM	●	●	●	●				E	2.50	±0.03	0.2	19.4	20.70
		GY2M0300F030N-GM	●	●	●	●				F	3.00	±0.03	0.3	19.4	20.70
		GY2M0318F030N-GM	●	●	●	●				F	3.18	±0.03	0.3	19.4	20.70
		GY2M0400G030N-GM	●	●	●	●				G	4.00	±0.04	0.3	24.4	25.65
		GY2M0475H040N-GM	●	●	●	●				H	4.75	±0.04	0.4	24.3	25.65
		GY2M0500H040N-GM	●	●	●	●				H	5.00	±0.04	0.4	24.3	25.65
		GY2M0600J040N-GM	●	●	●	●				J	6.00	±0.04	0.4	24.3	25.65
		GY2M0635J040N-GM	●	●	●	●				J	6.35	±0.04	0.4	24.3	25.65
		NEW **GY2M0800K050N-GM**	●	●	●					K	8.00	±0.04	0.5	29.3	30.50
For Cutting off	**R/L05-GM Breaker**  Right hand insert shown.	**GY2M0200D020R05-GM**	●	●						D	2.00	±0.03	0.2	19.5	20.80
		GY2M0200D020L05-GM	●	●						D	2.00	±0.03	0.2	19.5	20.80
		GY2M0250E020R05-GM	●	●						E	2.50	±0.03	0.2	19.5	20.825
		GY2M0250E020L05-GM	●	●						E	2.50	±0.03	0.2	19.5	20.825
		GY2M0300F030R05-GM	●	●						F	3.00	±0.03	0.3	19.5	20.85
		GY2M0300F030L05-GM	●	●						F	3.00	±0.03	0.3	19.5	20.85
		GY2M0400G030R05-GM	●	●						G	4.00	±0.04	0.3	24.5	25.85
		GY2M0400G030L05-GM	●	●						G	4.00	±0.04	0.3	24.5	25.85
		GY2M0500H040R05-GM	●	●						H	5.00	±0.04	0.4	24.5	25.95
		GY2M0500H040L05-GM	●	●						H	5.00	±0.04	0.4	24.5	25.95

*2 L dimension depends on the breaker. Refer to F015 table.

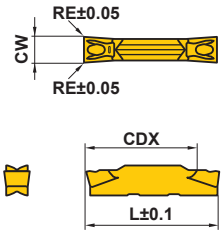
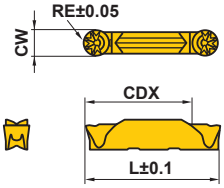
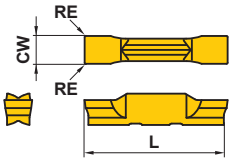
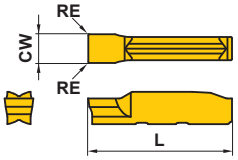
● : Inventory maintained in Japan.
(10 inserts in one case) (CBN inserts are available in 1 piece in one case.)

Applications	Geometry	Order Number	Stock							Seat Size	Dimensions (mm)				
			Coated			Cermet		Carbide		CBN		CW		RE	CDX	∗2
			VP10RT	VP20RT	MY5015	NX2525		RT9010	RT9020	MB8025		Grooving Width	Tolerance			L
For Grooving	**Flat Top** (For hardened steel) 	**GY1G0200D020N-GFGS**								●	D	2.00	±0.03	0.2	—	20.70
		GY1G**0239E020N-GFGS**								●	E	2.39	±0.03	0.2	—	20.70
		GY1G**0250E020N-GFGS**								●	E	2.50	±0.03	0.2	—	20.70
		GY1G**0300F020N-GFGS**								●	F	3.00	±0.03	0.2	—	20.70
		GY1G**0318F020N-GFGS**								●	F	3.18	±0.03	0.2	—	20.70
		GY1G**0400G020N-GFGS**								●	G	4.00	±0.03	0.2	—	25.65
		GY1G**0475H020N-GFGS**								●	H	4.75	±0.03	0.2	—	25.65
		GY1G**0500H020N-GFGS**								●	H	5.00	±0.03	0.2	—	25.65
For Multifunctional Grooving	**MF Breaker** (Finishing) NEW 	**GY2G0200D020N-MF**	●	●		●		●			D	2.00	±0.02	0.2	19.5	21.05
		∗1GY2G**0224D015N-MF**	●	●		●		●			D	2.24	±0.02	0.15	19.8	21.05
		GY2G**0239E020N-MF**	●	●		●		●			E	2.39	±0.02	0.2	19.2	21.05
		GY2G**0250E020N-MF**	●	●		●		●			E	2.50	±0.02	0.2	19.4	21.05
		∗1GY2G**0274E020N-MF**	●	●		●		●			E	2.74	±0.02	0.2	19.7	21.05
		GY2G**0300F020N-MF**	●	●		●		●			F	3.00	±0.02	0.2	19.5	21.05
		GY2G**0300F040N-MF**	●	●		●		●			F	3.00	±0.02	0.4	19.3	21.05
		GY2G**0318F020N-MF**	●	●		●		●			F	3.18	±0.02	0.2	19.5	21.05
		GY2G**0318F040N-MF**	●	●		●		●			F	3.18	±0.02	0.4	19.3	21.05
		∗1GY2G**0324F020N-MF**	●	●		●		●			F	3.24	±0.02	0.2	19.5	21.05
		GY2G**0400G020N-MF**	●	●		●		●			G	4.00	±0.02	0.2	24.9	25.95
		GY2G**0400G040N-MF**	●	●		●		●			G	4.00	±0.02	0.4	24.7	25.95
		GY2G**0400G080N-MF**	●	●		●		●			G	4.00	±0.02	0.8	24.3	25.95
		∗1GY2G**0424G020N-MF**	●	●		●		●			G	4.24	±0.02	0.2	24.9	25.95
		GY2G**0475H020N-MF**	●	●		●		●			H	4.75	±0.02	0.2	24.4	25.95
		GY2G**0475H040N-MF**	●	●		●		●			H	4.75	±0.02	0.4	24.2	25.95
		GY2G**0475H080N-MF**	●	●		●		●			H	4.75	±0.02	0.8	23.8	25.95
		GY2G**0500H020N-MF**	●	●		●		●			H	5.00	±0.02	0.2	24.4	25.95
		GY2G**0500H040N-MF**	●	●		●		●			H	5.00	±0.02	0.4	24.2	25.95
		GY2G**0500H080N-MF**	●	●		●		●			H	5.00	±0.02	0.8	23.8	25.95
		∗1GY2G**0524H020N-MF**	●	●		●		●			H	5.24	±0.02	0.2	24.4	25.95
		GY2G**0600J020N-MF**	●	●		●		●			J	6.00	±0.02	0.2	24.4	25.95
		GY2G**0600J040N-MF**	●	●		●		●			J	6.00	±0.02	0.4	24.2	25.95
		GY2G**0600J080N-MF**	●	●		●		●			J	6.00	±0.02	0.8	23.8	25.95
		∗1GY2G**0631J020N-MF**	●	●		●		●			J	6.31	±0.02	0.2	24.4	25.95
		GY2G**0635J020N-MF**	●	●		●		●			J	6.35	±0.02	0.2	24.4	25.95
		GY2G**0635J040N-MF**	●	●		●		●			J	6.35	±0.02	0.4	24.2	25.95
		GY2G**0635J080N-MF**	●	●		●		●			J	6.35	±0.02	0.8	23.8	25.95
	MS Breaker (Low feeds) 	**GY2M0200D020N-MS**	●	●	●	●					D	2.00	±0.03	0.2	19.1	20.70
		GY2M**0250E020N-MS**	●	●	●	●					E	2.50	±0.03	0.2	19.1	20.70
		GY2M**0300F020N-MS**	●	●	●	●					F	3.00	±0.03	0.2	19.2	20.70
		GY2M**0300F040N-MS**	●	●	●	●					F	3.00	±0.03	0.4	18.9	20.70
		GY2M**0400G020N-MS**	●	●	●	●					G	4.00	±0.04	0.2	24.2	25.65
		GY2M**0400G040N-MS**	●	●	●	●					G	4.00	±0.04	0.4	23.9	25.65
		GY2M**0500H040N-MS**	●	●	●	●					H	5.00	±0.04	0.4	23.9	25.65
		GY2M**0500H080N-MS**	●	●	●	●					H	5.00	±0.04	0.8	23.5	25.65
		GY2M**0600J040N-MS**	●	●	●	●					J	6.00	±0.04	0.4	23.9	25.65
		GY2M**0600J080N-MS**	●	●	●	●					J	6.00	±0.04	0.8	23.5	25.65
	NEW	GY2M**0800K080N-MS**	●	●	●						K	8.00	±0.04	0.8	28.5	30.50

∗1 Circlip corresponding width of cut

GY INSERTS

INSERTS

Applications	Geometry	Order Number	Stock: Coated VP10RT	Coated VP20RT	Coated MY5015	Cermet NX2525	Carbide RT9010	Carbide RT9020	CBN MB8025	Seat Size	Dimensions (mm): CW Grooving Width	CW Tolerance	RE	CDX	*2 L
For Multifunctional Grooving	**MM Breaker** (Medium feeds) 	**GY2M0200D020N-MM**	●	●	●	●				D	2.00	±0.03	0.2	19.1	20.70
		GY2M0250E020N-MM	●	●	●	●				E	2.50	±0.03	0.2	19.1	20.70
		GY2M0300F020N-MM	●	●	●	●				F	3.00	±0.03	0.2	19.1	20.70
		GY2M0300F040N-MM	●	●	●	●				F	3.00	±0.03	0.4	18.9	20.70
		GY2M0300F080N-MM	●	●	●	●				F	3.00	±0.03	0.8	18.5	20.70
		GY2M0400G020N-MM	●	●	●	●				G	4.00	±0.04	0.2	24.1	25.65
		GY2M0400G040N-MM	●	●	●	●				G	4.00	±0.04	0.4	23.9	25.65
		GY2M0400G080N-MM	●	●	●	●				G	4.00	±0.04	0.8	23.5	25.65
		GY2M0500H040N-MM	●	●	●	●				H	5.00	±0.04	0.4	23.9	25.65
		GY2M0500H080N-MM	●	●	●	●				H	5.00	±0.04	0.8	23.5	25.65
		GY2M0600J040N-MM	●	●	●	●				J	6.00	±0.04	0.4	23.9	25.65
		GY2M0600J080N-MM	●	●	●	●				J	6.00	±0.04	0.8	23.5	25.65
		NEW GY2M0800K080N-MM	●	●	●					K	8.00	±0.04	0.8	28.5	30.50
		NEW GY2M0800K120N-MM	●	●	●					K	8.00	±0.04	1.2	28.1	30.50
For Copying / For Recessing	**BM Breaker** 	**GY2M0200D100N-BM**	●	●	●	●				D	2.00	±0.03	1.00	19.5	20.90
		GY2M0250E125N-BM	●	●	●	●				E	2.50	±0.03	1.25	19.3	20.90
		GY2M0300F150N-BM	●	●	●	●				F	3.00	±0.03	1.50	19.0	20.90
		GY2M0318F159N-BM	●	●	●	●				F	3.18	±0.03	1.59	18.9	20.90
		GY2M0400G200N-BM	●	●	●	●				G	4.00	±0.04	2.00	23.4	25.80
		GY2M0475H238N-BM	●	●	●	●				H	4.75	±0.04	2.38	22.9	25.80
		GY2M0500H250N-BM	●	●	●	●				H	5.00	±0.04	2.50	22.8	25.80
		GY2M0600J300N-BM	●	●	●	●				J	6.00	±0.04	3.00	22.5	25.90
		GY2M0635J318N-BM	●	●	●	●				J	6.35	±0.04	3.18	22.3	25.90
		NEW GY2M0800K400N-BM	●	●	●					K	8.00	±0.04	4.00	26.5	30.80
*1 Blank	**2 Edge Type** 	**GY2B0220D020N**				●	●	●		D	2.20	±0.10	0.2	—	21.05
		GY2B0270E020N				●	●	●		E	2.70	±0.10	0.2	—	21.05
		GY2B0340F020N				●	●	●		F	3.40	±0.10	0.2	—	21.05
		GY2B0420G020N				●	●	●		G	4.20	±0.10	0.2	—	26.00
		GY2B0520H020N				●	●	●		H	5.20	±0.10	0.2	—	26.00
		GY2B0655J020N				●	●	●		J	6.55	±0.10	0.2	—	26.00
	1 Edge Type 	**GY1B0220D020N**				●	●	●		D	2.20	±0.10	0.2	—	21.07
		GY1B0270E020N				●	●	●		E	2.70	±0.10	0.2	—	21.10
		GY1B0340F020N				●	●	●		F	3.40	±0.10	0.2	—	21.00
		GY1B0420G020N				●	●	●		G	4.20	±0.10	0.2	—	25.86
		GY1B0520H020N				●	●	●		H	5.20	±0.10	0.2	—	25.90
		GY1B0655J020N				●		●		J	6.55	±0.10	0.2	—	25.90

*1 **Insert blank is not suitable for machining without grinding.**
Refer to the following URL for more information.
http://www.mitsubishicarbide.net/contents/mmc/ja/manual/blank_inserts.pdf

*2 L dimension depends on the breaker. Refer to F015 table.

● : **Inventory maintained in Japan.**
(10 inserts in one case)

C-TYPE CIRCLIP STANDARDS LIST

Category	Application		Standard	Width (Tolerance) For shaft				Width (Tolerance) For hole			
C-type stop ring 	For shaft	For hole	ANSI B27.7/27.8 (US) BS 3673 (UK) DIN 471/472 (De) NF E 22 163 (Fr) UNI 7435/7438 (It)	0.5 0.7 0.8 0.9 1.1 1.3 1.6 1.85 2.15 2.65 3.15 4.15 5.15 6.2	+0.14 0 +0.18 0 +0.22 0	0.305 0.457 0.737 0.991 1.168 1.422 1.727 2.184 2.616 3.048 3.531	+0.051 0 +0.076 0 +0.102 0 +0.127 0 +0.152 0	1.15 1.35 1.75 1.95 2.2 2.7 3.2 4.2	+0.14 0 +0.18 0	9 1.1 1.3 1.6 1.85 2.15 2.65 3.15 4.15 5.15 6.2	+0.14 0 +0.18 0 +0.22 0	0.457 0.737 0.991 1.168 1.422 1.727 2.184 2.616 3.048	+0.051 0 +0.076 0 +0.102 0 +0.127 0
C-type concentric stop ring 	For shaft	For hole	JIS B 2804 (JP)										
E-type stop ring 	For shaft		N1*** American	0.32 0.5 0.7 1.0 1.2 1.4	+0.05 0 +0.10 0 +0.14 0	0.305 0.457 0.584 0.737 0.991 1.168 1.422 1.727	+0.051 0 +0.076 0 +0.102 0	0.3 0.4 0.5 0.7 0.9 1.15 1.75 2.2	+0.05 0 +0.10 0 +0.14 0				

O-RING STANDARDS

Category	Standard	Width (Tolerance) General				Width (Tolerance) For oil pressure				Width (Tolerance) For air pressure			
For stable	DIN 3770/3771 (De)	2.54 3.18 4.32 6.1 8.0	+0.13 0	2.5 3.2 4.7 7.5 11.1	+0.14 0	1.9 2.3 2.9 3.6 4.5 5.5 7.0 8.6 10.7	+0.1 0 +0.15 0 +0.2 0 +0.3 0 +0.4 0 +0.5 0	2.3 3.1 3.7 6.4 9.0	+0.2 0				
	JIS B 2401 (JP) ISO 3601	3.2 4.0 7.5 11.0	+0.2 0										
For dynamic	SMS 1586/1588 (Se) BS 1806/4518 (UK)							2.4 3.6 4.8 7.1 9.5	+0.25 0	2.3 3.1 3.7 6.4 9.0	+0.2 0	2.2 3.4 4.6 6.9 9.3	+0.25 0
	SAE AS-568 (US)	2.39 3.58 4.78 7.14 9.58	+0.25 0										

G-class insert with MF breaker is available for single-step machining.
Conventional GY series insert is available for single-step machining.
Machined in multiple steps or by cross feed machining.

L dimension tolerance conversion table

Grooving Width **CW** (mm)	*1 Dimensions **L** (mm)	*2 Dimensional tolerance (mm) versus standard dimension (L) of each breaker						
		GU	**GS/GM**	**MS/MM**	**R/L-GM**	Flat Top	**MF**	**BM**
1.50	14.70		0					
2.00	20.70	0	0	0	0.10	-0.30	0.35	0.20
2.24	*3 (20.7)						0.35	
2.39	20.70	0	0			-0.30	0.35	
2.50	20.70	0	0	0	0.125	-0.30	0.35	0.20
2.74	*3 (20.7)						0.35	
3.00	20.70	0	0	0	0.15	-0.30	0.35	0.20
3.18	20.70	0	0			-0.30	0.35	0.20
3.24	*3 (20.7)						0.35	
4.00	25.65	0	0	0	0.20	-0.35	0.30	0.15
4.24	*3 (25.65)						0.30	
4.75	25.65	0	0			-0.35	0.30	0.15
5.00	25.65	0	0	0	0.30	-0.35	0.30	0.15
5.24	*3 (25.65)						0.30	
6.00	25.65	0	0	0			0.30	0.25
6.31	*3 (25.65)						0.30	
6.35	25.65	0	0				0.30	0.25
8.00	30.50		0	0				0.30

*1 This value is used at the described holder dimension.
*2 ■ when there is no applicable breaker.
*3 The standard dimensions shown here use an approximate insert width.

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List for selecting modular holder from modular blade (For External and Internal Grooving)

Seat Size	Modular Blade		Modular holder		Cutting Mode	Holder angle	Page
	Order Number	Hand (R/L)	Order Number	Hand (R/L)			
D	GYM20RA-D06	R	GYHR1616J00-M20R	R	Ext.	00°	F030
			GYHR2020K00-M20R	R			
			GYHL2020K90-M20R	L		90°	F044
	GYM20LA-D06	L	GYHL1616J00-M20L	L	Ext.	00°	F030
			GYHL2020K00-M20L	L			
			GYHR2020K90-M20L	R		90°	F044
	GYM20RA-D10	R	GYHR1616J00-M20R	R	Ext.	00°	F030
			GYHR2020K00-M20R	R			
			GYHL2020K90-M20R	L		90°	F044
			GYDL32L90C-M20R	L	Int.	90°	F094
			GYDL32S90C-M20R	L			
			GYDL40M90D-M20R	L			
	GYM20LA-D10	L	GYHL1616J00-M20L	L	Ext.	00°	F030
			GYHL2020K00-M20L	L			
			GYHR2020K90-M20L	R		90°	F044
			GYDR32L90C-M20L	R	Int.	90°	F094
			GYDR32S90C-M20L	R			
			GYDR40M90D-M20L	R			
	GYM20RB-D18	R	GYHR1616J00-M20R	R	Ext.	00°	F030
			GYHR2020K00-M20R	R			
			GYHL2020K90-M20R	L		90°	F044
	GYM20LB-D18	L	GYHL1616J00-M20L	L	Ext.	00°	F030
			GYHL2020K00-M20L	L			
			GYHR2020K90-M20L	R		90°	F044
	GYM25RA-D06	R	GYHR2020K00-M25R	R	Ext.	00°	F030
			GYHR2525M00-M25R	R			
			GYHR3225P00-M25R	R			
			GYHR3232P00-M25R	R			
			GYHL2525M90-M25R	L		90°	F044
	GYM25LA-D06	L	GYHL2020K00-M25L	L	Ext.	00°	F030
			GYHL2525M00-M25L	L			
			GYHL3225P00-M25L	L			
			GYHL3232P00-M25L	L			
			GYHR2525M90-M25L	R		90°	F044
	GYM25RA-D12	R	GYHR2020K00-M25R	R	Ext.	00°	F030
			GYHR2525M00-M25R	R			
			GYHR3225P00-M25R	R			
			GYHR3232P00-M25R	R			
			GYHL2525M90-M25R	L		90°	F044
			GYDL40T90D-M25R	L	Int.	90°	F094
			GYDL40M90D-M25R	L			
			GYDL40T90D-M25R	L			
			GYDL50P90F-M25R	L			
			GYDL50T90F-M25R	L			
	GYM25LA-D12	L	GYHL2020K00-M25L	L	Ext.	00°	F030
			GYHL2525M00-M25L	L			
			GYHL3225P00-M25L	L			
			GYHL3232P00-M25L	L			
			GYHR2525M90-M25L	R		90°	F044
			GYDR40T90D-M25L	R	Int.	90°	F094
			GYDR40M90D-M25L	R			
			GYDR40T90D-M25L	R			
			GYDR50P90F-M25L	R			
			GYDR50T90F-M25L	R			
	GYM25RA-D20	R	GYHR2020K00-M25R	R	Ext.	00°	F030
			GYHR2525M00-M25R	R			
			GYHR3225P00-M25R	R			
			GYHR3232P00-M25R	R			
			GYHL2525M90-M25R	L		90°	F044
	GYM25LA-D20	L	GYHL2020K00-M25L	L	Ext.	00°	F030
			GYHL2525M00-M25L	L			
			GYHL3225P00-M25L	L			
			GYHL3232P00-M25L	L			
			GYHR2525M90-M25L	R		90°	F044

Seat Size	Modular Blade		Modular holder		Cutting Mode	Holder angle	Page
	Order Number	Hand (R/L)	Order Number	Hand (R/L)			
E	GYM20RA-E06	R	GYHR1616J00-M20R	R	Ext.	00°	F032
			GYHR2020K00-M20R	R			
			GYHL2020K90-M20R	L		90°	F044
	GYM20LA-E06	L	GYHL1616J00-M20L	L	Ext.	00°	F032
			GYHL2020K00-M20L	L			
			GYHR2020K90-M20L	R		90°	F044
	GYM20RA-E10	R	GYHR1616J00-M20R	R	Ext.	00°	F032
			GYHR2020K00-M20R	R			
			GYHL2020K90-M20R	L		90°	F044
			GYDL32L90C-M20R	L	Int.	90°	F096
			GYDL32S90C-M20R	L			
			GYDL40M90D-M20R	L			
			GYDL40T90D-M20R	L			
	GYM20LA-E10	L	GYHL1616J00-M20L	L	Ext.	00°	F032
			GYHL2020K00-M20L	L			
			GYHR2020K90-M20L	R		90°	F044
			GYDR32L90C-M20L	R	Int.	90°	F096
			GYDR32S90C-M20L	R			
			GYDR40M90D-M20L	R			
			GYDR40T90D-M20L	R			
	GYM20RB-E18	R	GYHR1616J00-M20R	R	Ext.	00°	F032
			GYHR2020K00-M20R	R			
			GYHL2020K90-M20R	L		90°	F044
	GYM20LB-E18	L	GYHL1616J00-M20L	L	Ext.	00°	F032
			GYHL2020K00-M20L	L			
			GYHR2020K90-M20L	R		90°	F044
	GYM25RA-E06	R	GYHR2020K00-M25R	R	Ext.	00°	F032
			GYHR2525M00-M25R	R			
			GYHR3225P00-M25R	R			
			GYHR3232P00-M25R	R			
			GYHL2525M90-M25R	L		90°	F044
	GYM25LA-E06	L	GYHL2020K00-M25L	L	Ext.	00°	F032
			GYHL2525M00-M25L	L			
			GYHL3225P00-M25L	L			
			GYHL3232P00-M25L	L			
			GYHR2525M90-M25L	R		90°	F044
	GYM25RA-E12	R	GYHR2020K00-M25R	R	Ext.	00°	F032
			GYHR2525M00-M25R	R			
			GYHR3225P00-M25R	R			
			GYHR3232P00-M25R	R			
			GYHL2525M90-M25R	L		90°	F044
			GYDL40M90D-M25R	L	Int.	90°	F096
			GYDL40T90D-M25R	L			
			GYDL50P90F-M25R	L			
			GYDL50T90F-M25R	L			
	GYM25LA-E12	L	GYHL2020K00-M25L	L	Ext.	00°	F032
			GYHL2525M00-M25L	L			
			GYHL3225P00-M25L	L			
			GYHL3232P00-M25L	L			
			GYHR2525M90-M25L	R		90°	F044
			GYDR40M90D-M25L	R	Int.	90°	F096
			GYDR40T90D-M25L	R			
			GYDR50P90F-M25L	R			
			GYDR50T90F-M25L	R			
	GYM25RA-E20	R	GYHR2020K00-M25R	R	Ext.	00°	F032
			GYHR2525M00-M25R	R			
			GYHR3225P00-M25R	R			
			GYHR3232P00-M25R	R			
			GYHL2525M90-M25R	L		90°	F044
	GYM25LA-E20	L	GYHL2020K00-M25L	L	Ext.	00°	F032
			GYHL2525M00-M25L	L			
			GYHL3225P00-M25L	L			
			GYHL3232P00-M25L	L			
			GYHR2525M90-M25L	R		90°	F044

Seat Size	Modular Blade		Modular holder		Cutting Mode	Holder angle	Page
	Order Number	Hand (R/L)	Order Number	Hand (R/L)			
F	GYM20RA-F06	R	GYHR1616J00-M20R	R	Ext.	00°	F034
			GYHR2020K00-M20R	R			
			GYHL2020K90-M20R	L		90°	F046
	GYM20LA-F06	L	GYHL1616J00-M20L	L	Ext.	00°	F034
			GYHL2020K00-M20L	L			
			GYHR2020K90-M20L	R		90°	F046
	GYM20RA-F10	R	GYHR1616J00-M20R	R	Ext.	00°	F034
			GYHR2020K00-M20R	R			
			GYHL2020K90-M20R	L		90°	F046
			GYDL32L90C-M20R	L	Int.	90°	F098
			GYDL32S90C-M20R	L			
			GYDL40M90D-M20R	L			
			GYDL40T90D-M20R	L			
	GYM20LA-F10	L	GYHL1616J00-M20L	L	Ext.	00°	F034
			GYHL2020K00-M20L	L			
			GYHR2020K90-M20L	R		90°	F046
			GYDR32L90C-M20L	R	Int.	90°	F098
			GYDR32S90C-M20L	R			
			GYDR40M90D-M20L	R			
			GYDR40T90D-M20L	R			
	GYM20RB-F18	R	GYHR1616J00-M20R	R	Ext.	00°	F034
			GYHR2020K00-M20R	R			
			GYHL2020K90-M20R	L		90°	F046
	GYM20LB-F18	L	GYHL1616J00-M20L	L	Ext.	00°	F034
			GYHL2020K00-M20L	L			
			GYHR2020K90-M20L	R		90°	F046
	GYM25RA-F06	R	GYHR2020K00-M25R	R	Ext.	00°	F034
			GYHR2525M00-M25R	R			
			GYHR3225P00-M25R	R			
			GYHR3232P00-M25R	R			
			GYHL2525M90-M25R	L		90°	F046
	GYM25LA-F06	L	GYHL2020K00-M25L	L	Ext.	00°	F034
			GYHL2525M00-M25L	L			
			GYHL3225P00-M25L	L			
			GYHL3232P00-M25L	L			
			GYHR2525M90-M25L	R		90°	F046
	GYM25RA-F12	R	GYHR2020K00-M25R	R	Ext.	00°	F034
			GYHR2525M00-M25R	R			
			GYHR3225P00-M25R	R			
			GYHR3232P00-M25R	R			
			GYHL2525M90-M25R	L		90°	F046
			GYDL40M90D-M25R	L	Int.	90°	F098
			GYDL40T90D-M25R	L			
			GYDL50P90F-M25R	L			
			GYDL50T90F-M25R	L			
	GYM25LA-F12	L	GYHL2020K00-M25L	L	Ext.	00°	F034
			GYHL2525M00-M25L	L			
			GYHL3225P00-M25L	L			
			GYHL3232P00-M25L	L			
			GYHR2525M90-M25L	R		90°	F046
			GYDR40M90D-M25L	R	Int.	90°	F098
			GYDR40T90D-M25L	R			
			GYDR50P90F-M25L	R			
			GYDR50T90F-M25L	R			
	GYM25RA-F20	R	GYHR2020K00-M25R	R	Ext.	00°	F034
			GYHR2525M00-M25R	R			
			GYHR3225P00-M25R	R			
			GYHR3232P00-M25R	R			
			GYHL2525M90-M25R	L		90°	F046
	GYM25LA-F20	L	GYHL2020K00-M25L	L	Ext.	00°	F034
			GYHL2525M00-M25L	L			
			GYHL3225P00-M25L	L			
			GYHL3232P00-M25L	L			
			GYHR2525M90-M25L	R		90°	F046

Seat Size	Modular Blade		Modular holder		Cutting Mode	Holder angle	Page
	Order Number	Hand (R/L)	Order Number	Hand (R/L)			
G	GYM20RA-G12	R	GYHR1616J00-M20R	R	Ext.	00°	F036
			GYHR2020K00-M20R	R			
			GYHL2020K90-M20R	L		90°	F046
			GYDL32L90C-M20R	L	Int.	90°	F098
			GYDL32S90C-M20R	L			
			GYDL40M90D-M20R	L			
			GYDL40T90D-M20R	L			
	GYM20LA-G12	L	GYHL1616J00-M20L	L	Ext.	00°	F036
			GYHL2020K00-M20L	L			
			GYHR2020K90-M20L	R		90°	F046
			GYDR32L90C-M20L	R	Int.	90°	F098
			GYDR32S90C-M20L	R			
			GYDR40M90D-M20L	R			
			GYDR40T90D-M20L	R			
	GYM25RA-G08	R	GYHR2020K00-M25R	R	Ext.	00°	F036
			GYHR2525M00-M25R	R			
			GYHR3225P00-M25R	R			
			GYHR3232P00-M25R	R			
			GYHL2525M90-M25R	L		90°	F046
	GYM25LA-G08	L	GYHL2020K00-M25L	L	Ext.	00°	F036
			GYHL2525M00-M25L	L			
			GYHL3225P00-M25L	L			
			GYHL3232P00-M25L	L			
			GYHR2525M90-M25L	R		90°	F046
	GYM25RA-G14	R	GYHR2020K00-M25R	R	Ext.	00°	F036
			GYHR2525M00-M25R	R			
			GYHR3225P00-M25R	R			
			GYHR3232P00-M25R	R			
			GYHL2525M90-M25R	L		90°	F046
			GYDL40M90D-M25R	L	Int.	90°	F098
			GYDL40T90D-M25R	L			
			GYDL50P90F-M25R	L			
			GYDL50T90F-M25R	L			
	GYM25LA-G14	L	GYHL2020K00-M25L	L	Ext.	00°	F036
			GYHL2525M00-M25L	L			
			GYHL3225P00-M25L	L			
			GYHL3232P00-M25L	L			
			GYHR2525M90-M25L	R		90°	F046
			GYDR40M90D-M25L	R	Int.	90°	F098
			GYDR40T90D-M25L	R			
			GYDR50P90F-M25L	R			
			GYDR50T90F-M25L	R			
	GYM25RA-G25	R	GYHR2020K00-M25R	R	Ext.	00°	F036
			GYHR2525M00-M25R	R			
			GYHR3225P00-M25R	R			
			GYHR3232P00-M25R	R			
			GYHL2525M90-M25R	L		90°	F046
	GYM25LA-G25	L	GYHL2020K00-M25L	L	Ext.	00°	F036
			GYHL2525M00-M25L	L			
			GYHL3225P00-M25L	L			
			GYHL3232P00-M25L	L			
			GYHR2525M90-M25L	R		90°	F046

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List for selecting modular holder from modular blade (For External and Internal Grooving)

Seat Size	Modular Blade		Modular holder		Cutting Mode	Holder angle	Page
	Order Number	Hand (R/L)	Order Number	Hand (R/L)			
H	GYM20RA-H12	R	GYHR1616J00-M20R	R	Ext.	00°	F038
			GYHR2020K00-M20R	R			
			GYHL2020K90-M20R	L		90°	F048
			GYDL32L90C-M20R	L	Int.	90°	F100
			GYDL32S90C-M20R	L			
			GYDL40M90D-M20R	L			
			GYDL40T90D-M20R	L			
	GYM20LA-H12	L	GYHL1616J00-M20L	L	Ext.	00°	F038
			GYHL2020K00-M20L	L			
			GYHR2020K90-M20L	R		90°	F048
			GYDR32L90C-M20L	R	Int.	90°	F100
			GYDR32S90C-M20L	R			
			GYDR40M90D-M20L	R			
			GYDR40T90D-M20L	R			
	GYM25RA-H08	R	GYHR2020K00-M25R	R	Ext.	00°	F038
			GYHR2525M00-M25R	R			
			GYHR3225P00-M25R	R			
			GYHR3232P00-M25R	R			
			GYHL2525M90-M25R	L		90°	F048
	GYM25LA-H08	L	GYHL2020K00-M25L	L	Ext.	00°	F038
			GYHL2525M00-M25L	L			
			GYHL3225P00-M25L	L			
			GYHL3232P00-M25L	L			
			GYHR2525M90-M25L	R		90°	F048
	GYM25RA-H14	R	GYHR2020K00-M25R	R	Ext.	00°	F038
			GYHR2525M00-M25R	R			
			GYHR3225P00-M25R	R			
			GYHR3232P00-M25R	R			
			GYHL2525M90-M25R	L		90°	F048
			GYDL40M90D-M25R	L	Int.	90°	F100
			GYDL40T90D-M25R	L			
			GYDL50P90F-M25R	L			
			GYDL50T90F-M25R	L			
	GYM25LA-H14	L	GYHL2020K00-M25L	L	Ext.	00°	F038
			GYHL2525M00-M25L	L			
			GYHL3225P00-M25L	L			
			GYHL3232P00-M25L	L			
			GYHR2525M90-M25L	R		90°	F048
			GYDR40M90D-M25L	R	Int.	90°	F100
			GYDR40T90D-M25L	R			
			GYDR50P90F-M25L	R			
			GYDR50T90F-M25L	R			
	GYM25RA-H25	R	GYHR2020K00-M25R	R	Ext.	00°	F038
			GYHR2525M00-M25R	R			
			GYHR3225P00-M25R	R			
			GYHR3232P00-M25R	R			
			GYHL2525M90-M25R	L		90°	F048
	GYM25LA-H25	L	GYHL2020K00-M25L	L	Ext.	00°	F038
			GYHL2525M00-M25L	L			
			GYHL3225P00-M25L	L			
			GYHL3232P00-M25L	L			
			GYHR2525M90-M25L	R		90°	F048

Seat Size	Modular Blade		Modular holder		Cutting Mode	Holder angle	Page
	Order Number	Hand (R/L)	Order Number	Hand (R/L)			
J	GYM25RA-J08	R	GYHR2020K00-M25R	R	Ext.	00°	F040
			GYHR2525M00-M25R	R			
			GYHR3225P00-M25R	R			
			GYHR3232P00-M25R	R			
			GYHL2525M90-M25R	L		90°	F048
	GYM25LA-J08	L	GYHL2020K00-M25L	L	Ext.	00°	F040
			GYHL2525M00-M25L	L			
			GYHL3225P00-M25L	L			
			GYHL3232P00-M25L	L			
			GYHR2525M90-M25L	R		90°	F048
	GYM25RA-J14	R	GYHR2020K00-M25R	R	Ext.	00°	F040
			GYHR2525M00-M25R	R			
			GYHR3225P00-M25R	R			
			GYHR3232P00-M25R	R			
			GYHL2525M90-M25R	L		90°	F048
			GYDL40M90D-M25R	L	Int.	90°	F100
			GYDL40T90D-M25R	L			
			GYDL50P90F-M25R	L			
			GYDL50T90F-M25R	L			
	GYM25LA-J14	L	GYHL2020K00-M25L	L	Ext.	00°	F040
			GYHL2525M00-M25L	L			
			GYHL3225P00-M25L	L			
			GYHL3232P00-M25L	L			
			GYHR2525M90-M25L	R		90°	F048
			GYDR40M90D-M25L	R	Int.	90°	F100
			GYDR40T90D-M25L	R			
			GYDR50P90F-M25L	R			
			GYDR50T90F-M25L	R			
	GYM25RA-J25	R	GYHR2020K00-M25R	R	Ext.	00°	F040
			GYHR2525M00-M25R	R			
			GYHR3225P00-M25R	R			
			GYHR3232P00-M25R	R			
			GYHL2525M90-M25R	L		90°	F048
	GYM25LA-J25	L	GYHL2020K00-M25L	L	Ext.	00°	F040
			GYHL2525M00-M25L	L			
			GYHL3225P00-M25L	L			
			GYHL3232P00-M25L	L			
			GYHR2525M90-M25L	R		90°	F048

List for selecting modular blade set at modular holder (For External and Face Grooving)

Modular holder					Modular Blade		
Order Number	Hand (R/L)	Cutting Mode	Holder angle	Seat Size	Order Number	Hand (R/L)	Page
GYHR1616J00-M20R	R	Ext.	00°	D	GYM20RA-D06	R	F030
					GYM20RA-D10	R	
					GYM20RB-D18	R	
				E	GYM20RA-E06	R	F032
					GYM20RA-E10	R	
					GYM20RB-E18	R	
				F	GYM20RA-F06	R	F034
					GYM20RA-F10	R	
					GYM20RB-F18	R	
				G	GYM20RA-G12	R	F036
				H	GYM20RA-H12	R	F038
GYHL1616J00-M20L	L	Ext.	00°	D	GYM20LA-D06	L	F030
					GYM20LA-D10	L	
					GYM20LB-D18	L	
				E	GYM20LA-E06	L	F032
					GYM20LA-E10	L	
					GYM20LB-E18	L	
				F	GYM20LA-F06	L	F034
					GYM20LA-F10	L	
					GYM20LB-F18	L	
				G	GYM20LA-G12	L	F036
				H	GYM20LA-H12	L	F038
GYHR2020K00-M20R	R	Ext.	00°	D	GYM20RA-D06	R	F030
					GYM20RA-D10	R	
					GYM20RB-D18	R	
				E	GYM20RA-E06	R	F032
					GYM20RA-E10	R	
					GYM20RB-E18	R	
				F	GYM20RA-F06	R	F034
					GYM20RA-F10	R	
					GYM20RB-F18	R	
				G	GYM20RA-G12	R	F036
				H	GYM20RA-H12	R	F038
GYHL2020K00-M20L	L	Ext.	00°	D	GYM20LA-D06	L	F030
					GYM20LA-D10	L	
					GYM20LB-D18	L	
				E	GYM20LA-E06	L	F032
					GYM20LA-E10	L	
					GYM20LB-E18	L	
				F	GYM20LA-F06	L	F034
					GYM20LA-F10	L	
					GYM20LB-F18	L	
				G	GYM20LA-G12	L	F036
				H	GYM20LA-H12	L	F038
GYHR2020K00-M25R	R	Ext.	00°	D	GYM25RA-D06	R	F030
					GYM25RA-D12	R	
					GYM25RA-D20	R	
				E	GYM25RA-E06	R	F032
					GYM25RA-E12	R	
					GYM25RA-E20	R	
				F	GYM25RA-F06	R	F034
					GYM25RA-F12	R	
					GYM25RA-F20	R	
				G	GYM25RA-G08	R	F036
					GYM25RA-G14	R	
					GYM25RA-G25	R	
				H	GYM25RA-H08	R	F038
					GYM25RA-H14	R	
					GYM25RA-H25	R	
				J	GYM25RA-J08	R	F040
					GYM25RA-J14	R	
					GYM25RA-J25	R	

Modular holder					Modular Blade		
Order Number	Hand (R/L)	Cutting Mode	Holder angle	Seat Size	Order Number	Hand (R/L)	Page
GYHR2020K00-M25R	R	Face	00°	D	GYM25RD-D12-040	R	F052
					GYM25RD-D12-050	R	
					GYM25RD-D12-060	R	
					GYM25RD-D12-075	R	
					GYM25RD-D12-100	R	F054
					GYM25RD-D12-135	R	
					GYM25RD-D12-180	R	
				E	GYM25RD-E12-040	R	F056
					GYM25RD-E12-050	R	
					GYM25RD-E12-060	R	
					GYM25RD-E12-075	R	
					GYM25RD-E12-100	R	F058
					GYM25RD-E12-135	R	
					GYM25RD-E12-180	R	
				F	GYM25RD-F12-035	R	F060
					GYM25RD-F12-040	R	
					GYM25RD-F12-050	R	
					GYM25RD-F12-060	R	F062
					GYM25RD-F12-075	R	
					GYM25RD-F20-060	R	
					GYM25RD-F20-075	R	
					GYM25RD-F12-100	R	F064
					GYM25RD-F12-135	R	
					GYM25RD-F20-100	R	
					GYM25RD-F20-135	R	
					GYM25RD-F12-180	R	F066
					GYM25RD-F12-225	R	
					GYM25RD-F20-180	R	
					GYM25RD-F20-225	R	
				G	GYM25RD-G14-040	R	F068
					GYM25RD-G14-050	R	
					GYM25RD-G14-060	R	
					GYM25RD-G25-060	R	
					GYM25RD-G14-085	R	F070
					GYM25RD-G14-125	R	
					GYM25RD-G25-085	R	
					GYM25RD-G25-125	R	
					GYM25RD-G14-180	R	F072
					GYM25RD-G14-250	R	
					GYM25RD-G25-180	R	
					GYM25RD-G25-250	R	
				H	GYM25RD-H14-050	R	F074
					GYM25RD-H14-060	R	
					GYM25RD-H25-060	R	
					GYM25RD-H14-085	R	F076
					GYM25RD-H14-125	R	
					GYM25RD-H25-085	R	
					GYM25RD-H25-125	R	
					GYM25RD-H14-180	R	F078
					GYM25RD-H14-250	R	
					GYM25RD-H25-180	R	
					GYM25RD-H25-250	R	
				J	GYM25RD-J14-050	R	F080
					GYM25RD-J14-070	R	
					GYM25RD-J14-110	R	
					GYM25RD-J25-070	R	
					GYM25RD-J25-110	R	
					GYM25RD-J14-170	R	F082
					GYM25RD-J14-250	R	
					GYM25RD-J25-170	R	
					GYM25RD-J25-250	R	

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List for selecting modular blade set at modular holder (For External and Face Grooving)

Modular holder		Cutting Mode	Holder angle	Seat Size	Modular Blade		Page
Order Number	Hand (R/L)				Order Number	Hand (R/L)	
GYHL2020K00-M25L	L	Ext.	00°	D	GYM25LA-D06	L	F030
					GYM25LA-D12	L	
					GYM25LA-D20	L	
				E	GYM25LA-E06	L	F032
					GYM25LA-E12	L	
					GYM25LA-E20	L	
				F	GYM25LA-F06	L	F034
					GYM25LA-F12	L	
					GYM25LA-F20	L	
				G	GYM25LA-G08	L	F036
					GYM25LA-G14	L	
					GYM25LA-G25	L	
				H	GYM25LA-H08	L	F038
					GYM25LA-H14	L	
					GYM25LA-H25	L	
				J	GYM25LA-J08	L	F040
					GYM25LA-J14	L	
					GYM25LA-J25	L	
		Face	00°	D	GYM25LD-D12-040	L	F052
					GYM25LD-D12-050	L	
					GYM25LD-D12-060	L	
					GYM25LD-D12-075	L	
					GYM25LD-D12-100	L	F054
					GYM25LD-D12-135	L	
					GYM25LD-D12-180	L	
				E	GYM25LD-E12-040	L	F056
					GYM25LD-E12-050	L	
					GYM25LD-E12-060	L	
					GYM25LD-E12-075	L	
					GYM25LD-E12-100	L	F058
					GYM25LD-E12-135	L	
					GYM25LD-E12-180	L	
				F	GYM25LD-F12-035	L	F060
					GYM25LD-F12-040	L	
					GYM25LD-F12-050	L	
					GYM25LD-F12-060	L	F062
					GYM25LD-F12-075	L	
					GYM25LD-F12-100	L	F064
					GYM25LD-F12-135	L	
					GYM25LD-F12-180	L	F066
					GYM25LD-F12-225	L	
					GYM25LD-F20-060	L	F062
					GYM25LD-F20-075	L	
					GYM25LD-F20-100	L	F064
					GYM25LD-F20-135	L	
					GYM25LD-F20-180	L	F066
					GYM25LD-F20-225	L	
				G	GYM25LD-G14-040	L	F068
					GYM25LD-G14-050	L	
					GYM25LD-G14-060	L	
					GYM25LD-G14-085	L	F070
					GYM25LD-G14-125	L	
					GYM25LD-G14-180	L	F072
					GYM25LD-G14-250	L	
					GYM25LD-G25-060	L	F068
					GYM25LD-G25-085	L	F070
					GYM25LD-G25-125	L	
					GYM25LD-G25-180	L	F072
					GYM25LD-G25-250	L	

Modular holder		Cutting Mode	Holder angle	Seat Size	Modular Blade		Page
Order Number	Hand (R/L)				Order Number	Hand (R/L)	
GYHL2020K00-M25L	L	Face	00°	H	GYM25LD-H14-050	L	F074
					GYM25LD-H14-060	L	
					GYM25LD-H14-085	L	F076
					GYM25LD-H14-125	L	
					GYM25LD-H14-180	L	F078
					GYM25LD-H14-250	L	
					GYM25LD-H25-060	L	F074
					GYM25LD-H25-085	L	F076
					GYM25LD-H25-125	L	
					GYM25LD-H25-180	L	F078
					GYM25LD-H25-250	L	
				J	GYM25LD-J14-050	L	F080
					GYM25LD-J14-070	L	
					GYM25LD-J14-110	L	
					GYM25LD-J14-170	L	F082
					GYM25LD-J14-250	L	
					GYM25LD-J25-070	L	F080
					GYM25LD-J25-110	L	
					GYM25LD-J25-170	L	F082
					GYM25LD-J25-250	L	
GYHR2020K50-M20L	R	Ext.	Recessing	D	GYM20LC-D005	L	F050
				E	GYM20LC-E005	L	
				F	GYM20LC-F005	L	
				G	GYM20LC-G005	L	
				H	GYM20LC-H005	L	
GYHL2020K50-M20R	L	Ext.	Recessing	D	GYM20RC-D005	R	F050
				E	GYM20RC-E005	R	
				F	GYM20RC-F005	R	
				G	GYM20RC-G005	R	
				H	GYM20RC-H005	R	
GYHR2020K90-M20L	R	Ext.	90°	D	GYM20LA-D06	L	F044
					GYM20LA-D10	L	
					GYM20LB-D18	L	
				E	GYM20LA-E06	L	
					GYM20LA-E10	L	
					GYM20LB-E18	L	
				F	GYM20LA-F06	L	F046
					GYM20LA-F10	L	
					GYM20LB-F18	L	
				G	GYM20LA-G12	L	
				H	GYM20LA-H12	L	F048
GYHL2020K90-M20R	L	Ext.	90°	D	GYM20RA-D06	R	F044
					GYM20RA-D10	R	
					GYM20RB-D18	R	
				E	GYM20RA-E06	R	
					GYM20RA-E10	R	
					GYM20RB-E18	R	
				F	GYM20RA-F06	R	F046
					GYM20RA-F10	R	
					GYM20RB-F18	R	
				G	GYM20RA-G12	R	
				H	GYM20RA-H12	R	F048

Modular holder		Cutting Mode	Holder angle	Seat Size	Modular Blade		Page
Order Number	Hand (R/L)				Order Number	Hand (R/L)	
GYHR2525M00-M25R	R	Ext.	00°	D	GYM25RA-D06	R	F030
					GYM25RA-D12	R	
					GYM25RA-D20	R	
				E	GYM25RA-E06	R	F032
					GYM25RA-E12	R	
					GYM25RA-E20	R	
				F	GYM25RA-F06	R	F034
					GYM25RA-F12	R	
					GYM25RA-F20	R	
				G	GYM25RA-G08	R	F036
					GYM25RA-G14	R	
					GYM25RA-G25	R	
				H	GYM25RA-H08	R	F038
					GYM25RA-H14	R	
					GYM25RA-H25	R	
				J	GYM25RA-J08	R	F040
					GYM25RA-J14	R	
					GYM25RA-J25	R	
		Face	00°	D	GYM25RD-D12-040	R	F052
					GYM25RD-D12-050	R	
					GYM25RD-D12-060	R	
					GYM25RD-D12-075	R	
					GYM25RD-D12-100	R	F054
					GYM25RD-D12-135	R	
					GYM25RD-D12-180	R	
				E	GYM25RD-E12-040	R	F056
					GYM25RD-E12-050	R	
					GYM25RD-E12-060	R	
					GYM25RD-E12-075	R	
					GYM25RD-E12-100	R	F058
					GYM25RD-E12-135	R	
					GYM25RD-E12-180	R	
				F	GYM25RD-F12-035	R	F060
					GYM25RD-F12-040	R	
					GYM25RD-F12-050	R	
					GYM25RD-F12-060	R	F062
					GYM25RD-F12-075	R	
					GYM25RD-F12-100	R	F064
					GYM25RD-F12-135	R	
					GYM25RD-F12-180	R	F066
					GYM25RD-F12-225	R	
					GYM25RD-F20-060	R	F062
					GYM25RD-F20-075	R	
					GYM25RD-F20-100	R	F064
					GYM25RD-F20-135	R	
					GYM25RD-F20-180	R	F066
					GYM25RD-F20-225	R	
				G	GYM25RD-G14-040	R	F068
					GYM25RD-G14-050	R	
					GYM25RD-G14-060	R	
					GYM25RD-G14-085	R	F070
					GYM25RD-G14-125	R	
					GYM25RD-G14-180	R	F072
					GYM25RD-G14-250	R	
					GYM25RD-G25-060	R	F068
					GYM25RD-G25-085	R	F070
					GYM25RD-G25-125	R	
					GYM25RD-G25-180	R	F072
					GYM25RD-G25-250	R	

Modular holder		Cutting Mode	Holder angle	Seat Size	Modular Blade		Page
Order Number	Hand (R/L)				Order Number	Hand (R/L)	
GYHR2525M00-M25R	R	Face	00°	H	GYM25RD-H14-050	R	F074
					GYM25RD-H14-060	R	
					GYM25RD-H14-085	R	F076
					GYM25RD-H14-125	R	
					GYM25RD-H14-180	R	F078
					GYM25RD-H14-250	R	
					GYM25RD-H25-060	R	F074
					GYM25RD-H25-085	R	F076
					GYM25RD-H25-125	R	
					GYM25RD-H25-180	R	F078
					GYM25RD-H25-250	R	
				J	GYM25RD-J14-050	R	F080
					GYM25RD-J14-070	R	
					GYM25RD-J14-110	R	
					GYM25RD-J14-170	R	F082
					GYM25RD-J14-250	R	
					GYM25RD-J25-070	R	F080
					GYM25RD-J25-110	R	
					GYM25RD-J25-170	R	F082
					GYM25RD-J25-250	R	
GYHL2525M00-M25L	L	Ext.	00°	D	GYM25LA-D06	L	F030
					GYM25LA-D12	L	
					GYM25LA-D20	L	
				E	GYM25LA-E06	L	F032
					GYM25LA-E12	L	
					GYM25LA-E20	L	
				F	GYM25LA-F06	L	F034
					GYM25LA-F12	L	
					GYM25LA-F20	L	
				G	GYM25LA-G08	L	F036
					GYM25LA-G14	L	
					GYM25LA-G25	L	
				H	GYM25LA-H08	L	F038
					GYM25LA-H14	L	
					GYM25LA-H25	L	
				J	GYM25LA-J08	L	F040
					GYM25LA-J14	L	
					GYM25LA-J25	L	
		Face	00°	D	GYM25LD-D12-040	L	F052
					GYM25LD-D12-050	L	
					GYM25LD-D12-060	L	
					GYM25LD-D12-075	L	
					GYM25LD-D12-100	L	F054
					GYM25LD-D12-135	L	
					GYM25LD-D12-180	L	
				E	GYM25LD-E12-040	L	F056
					GYM25LD-E12-050	L	
					GYM25LD-E12-060	L	
					GYM25LD-E12-075	L	
					GYM25LD-E12-100	L	F058
					GYM25LD-E12-135	L	
					GYM25LD-E12-180	L	

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List for selecting modular blade set at modular holder (For External and Face Grooving)

Modular holder					Modular Blade		
Order Number	Hand (R/L)	Cutting Mode	Holder angle	Seat Size	Order Number	Hand (R/L)	Page
GYHL2525M00-M25L	L	Face	00°	F	GYM25LD-F12-035	L	F060
					GYM25LD-F12-040	L	
					GYM25LD-F12-050	L	
					GYM25LD-F12-060	L	F062
					GYM25LD-F12-075	L	
					GYM25LD-F12-100	L	F064
					GYM25LD-F12-135	L	
					GYM25LD-F12-180	L	F066
					GYM25LD-F12-225	L	
					GYM25LD-F20-060	L	F062
					GYM25LD-F20-075	L	
					GYM25LD-F20-100	L	F064
					GYM25LD-F20-135	L	
					GYM25LD-F20-180	L	F066
					GYM25LD-F20-225	L	
				G	GYM25LD-G14-040	L	F068
					GYM25LD-G14-050	L	
					GYM25LD-G14-060	L	
					GYM25LD-G14-085	L	F070
					GYM25LD-G14-125	L	
					GYM25LD-G14-180	L	F072
					GYM25LD-G14-250	L	
					GYM25LD-G25-060	L	F068
					GYM25LD-G25-085	L	F070
					GYM25LD-G25-125	L	
					GYM25LD-G25-180	L	F072
					GYM25LD-G25-250	L	
				H	GYM25LD-H14-050	L	F074
					GYM25LD-H14-060	L	
					GYM25LD-H14-085	L	F076
					GYM25LD-H14-125	L	
					GYM25LD-H14-180	L	F078
					GYM25LD-H14-250	L	
					GYM25LD-H25-060	L	F074
					GYM25LD-H25-085	L	F076
					GYM25LD-H25-125	L	
					GYM25LD-H25-180	L	F078
					GYM25LD-H25-250	L	
				J	GYM25LD-J14-050	L	F080
					GYM25LD-J14-070	L	
					GYM25LD-J14-110	L	
					GYM25LD-J14-170	L	F082
					GYM25LD-J14-250	L	
					GYM25LD-J25-070	L	F080
					GYM25LD-J25-110	L	
					GYM25LD-J25-170	L	F082
					GYM25LD-J25-250	L	
GYHR2525M50-M25L	R	Ext.	Recessing	D	GYM25LC-D005	L	F050
				E	GYM25LC-E005	L	
				F	GYM25LC-F005	L	
				G	GYM25LC-G005	L	
				H	GYM25LC-H005	L	
				J	GYM25LC-J005	L	
GYHL2525M50-M25R	L	Ext.	Recessing	D	GYM25RC-D005	R	F050
				E	GYM25RC-E005	R	
				F	GYM25RC-F005	R	
				G	GYM25RC-G005	R	
				H	GYM25RC-H005	R	
				J	GYM25RC-J005	R	

Modular holder					Modular Blade		
Order Number	Hand (R/L)	Cutting Mode	Holder angle	Seat Size	Order Number	Hand (R/L)	Page
GYHR2525M90-M25L	R	Ext.	90°	D	GYM25LA-D06	L	F044
					GYM25LA-D12	L	
					GYM25LA-D20	L	
				E	GYM25LA-E06	L	F044
					GYM25LA-E12	L	
					GYM25LA-E20	L	
				F	GYM25LA-F06	L	F046
					GYM25LA-F12	L	
					GYM25LA-F20	L	
				G	GYM25LA-G08	L	F046
					GYM25LA-G14	L	
					GYM25LA-G25	L	
				H	GYM25LA-H08	L	F048
					GYM25LA-H14	L	
					GYM25LA-H25	L	
				J	GYM25LA-J08	L	F048
					GYM25LA-J14	L	
					GYM25LA-J25	L	
GYHR2525M90-M25L	R	Face	90°	D	GYM25LD-D12-040	L	F084
					GYM25LD-D12-050	L	
					GYM25LD-D12-060	L	
					GYM25LD-D12-075	L	
					GYM25LD-D12-100	L	
					GYM25LD-D12-135	L	
					GYM25LD-D12-180	L	
				E	GYM25LD-E12-040	L	F084
					GYM25LD-E12-050	L	
					GYM25LD-E12-060	L	
					GYM25LD-E12-075	L	
					GYM25LD-E12-100	L	
					GYM25LD-E12-135	L	
					GYM25LD-E12-180	L	
				F	GYM25LD-F12-035	L	F086
					GYM25LD-F12-040	L	
					GYM25LD-F12-050	L	
					GYM25LD-F12-060	L	
					GYM25LD-F12-075	L	
					GYM25LD-F12-100	L	
					GYM25LD-F12-135	L	
					GYM25LD-F12-180	L	
					GYM25LD-F12-225	L	
					GYM25LD-F20-060	L	
					GYM25LD-F20-075	L	
					GYM25LD-F20-100	L	
					GYM25LD-F20-135	L	
					GYM25LD-F20-180	L	
					GYM25LD-F20-225	L	
				G	GYM25LD-G14-040	L	F088
					GYM25LD-G14-050	L	
					GYM25LD-G14-060	L	
					GYM25LD-G14-085	L	
					GYM25LD-G14-125	L	
					GYM25LD-G14-180	L	
					GYM25LD-G14-250	L	
					GYM25LD-G25-060	L	
					GYM25LD-G25-085	L	
					GYM25LD-G25-125	L	
					GYM25LD-G25-180	L	
					GYM25LD-G25-250	L	

Modular holder		Cutting Mode	Holder angle	Seat Size	Modular Blade		Page
Order Number	Hand (R/L)				Order Number	Hand (R/L)	
GYHR2525M90-M25L	R	Face	90°	H	GYM25LD-H14-050	L	F090
					GYM25LD-H14-060	L	
					GYM25LD-H14-085	L	
					GYM25LD-H14-125	L	
					GYM25LD-H14-180	L	
					GYM25LD-H14-250	L	
					GYM25LD-H25-060	L	
					GYM25LD-H25-085	L	
					GYM25LD-H25-125	L	
					GYM25LD-H25-180	L	
					GYM25LD-H25-250	L	
				J	GYM25LD-J14-050	L	F092
					GYM25LD-J14-070	L	
					GYM25LD-J14-110	L	
					GYM25LD-J14-170	L	
					GYM25LD-J14-250	L	
					GYM25LD-J25-070	L	
					GYM25LD-J25-110	L	
					GYM25LD-J25-170	L	
					GYM25LD-J25-250	L	
GYHL2525M90-M25R	L	Ext.	90°	D	GYM25RA-D06	R	F044
					GYM25RA-D12	R	
					GYM25RA-D20	R	
				E	GYM25RA-E06	R	F044
					GYM25RA-E12	R	
					GYM25RA-E20	R	
				F	GYM25RA-F06	R	F046
					GYM25RA-F12	R	
					GYM25RA-F20	R	
				G	GYM25RA-G08	R	F046
					GYM25RA-G14	R	
					GYM25RA-G25	R	
				H	GYM25RA-H08	R	F048
					GYM25RA-H14	R	
					GYM25RA-H25	R	
				J	GYM25RA-J08	R	F048
					GYM25RA-J14	R	
					GYM25RA-J25	R	
		Face	90°	D	GYM25RD-D12-040	R	F084
					GYM25RD-D12-050	R	
					GYM25RD-D12-060	R	
					GYM25RD-D12-075	R	
					GYM25RD-D12-100	R	
					GYM25RD-D12-135	R	
					GYM25RD-D12-180	R	
				E	GYM25RD-E12-040	R	F084
					GYM25RD-E12-050	R	
					GYM25RD-E12-060	R	
					GYM25RD-E12-075	R	
					GYM25RD-E12-100	R	
					GYM25RD-E12-135	R	
					GYM25RD-E12-180	R	

Modular holder		Cutting Mode	Holder angle	Seat Size	Modular Blade		Page
Order Number	Hand (R/L)				Order Number	Hand (R/L)	
GYHL2525M90-M25R	L	Face	90°	F	GYM25RD-F12-035	R	F086
					GYM25RD-F12-040	R	
					GYM25RD-F12-050	R	
					GYM25RD-F12-060	R	
					GYM25RD-F12-075	R	
					GYM25RD-F12-100	R	
					GYM25RD-F12-135	R	
					GYM25RD-F12-180	R	
					GYM25RD-F12-225	R	
					GYM25RD-F20-060	R	
					GYM25RD-F20-075	R	
					GYM25RD-F20-100	R	
					GYM25RD-F20-135	R	
					GYM25RD-F20-180	R	
					GYM25RD-F20-225	R	
				G	GYM25RD-G14-040	R	F088
					GYM25RD-G14-050	R	
					GYM25RD-G14-060	R	
					GYM25RD-G14-085	R	
					GYM25RD-G14-125	R	
					GYM25RD-G14-180	R	
					GYM25RD-G14-250	R	
					GYM25RD-G25-060	R	
					GYM25RD-G25-085	R	
					GYM25RD-G25-125	R	
					GYM25RD-G25-180	R	
					GYM25RD-G25-250	R	
				H	GYM25RD-H14-050	R	F090
					GYM25RD-H14-060	R	
					GYM25RD-H14-085	R	
					GYM25RD-H14-125	R	
					GYM25RD-H14-180	R	
					GYM25RD-H14-250	R	
					GYM25RD-H25-060	R	
					GYM25RD-H25-085	R	
					GYM25RD-H25-125	R	
					GYM25RD-H25-180	R	
					GYM25RD-H25-250	R	
				J	GYM25RD-J14-050	R	F092
					GYM25RD-J14-070	R	
					GYM25RD-J14-110	R	
					GYM25RD-J14-170	R	
					GYM25RD-J14-250	R	
					GYM25RD-J25-070	R	
					GYM25RD-J25-110	R	
					GYM25RD-J25-170	R	
					GYM25RD-J25-250	R	
GYHR3225P00-M25R	R	Ext.	00°	D	GYM25RA-D06	R	F030
					GYM25RA-D12	R	
					GYM25RA-D20	R	
				E	GYM25RA-E06	R	F032
					GYM25RA-E12	R	
					GYM25RA-E20	R	
				F	GYM25RA-F06	R	F034
					GYM25RA-F12	R	
					GYM25RA-F20	R	
				G	GYM25RA-G08	R	F036
					GYM25RA-G14	R	
					GYM25RA-G25	R	
				H	GYM25RA-H08	R	F038
					GYM25RA-H14	R	
					GYM25RA-H25	R	

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List for selecting modular blade set at modular holder (For External and Face Grooving)

Modular holder					Modular Blade		
Order Number	Hand (R/L)	Cutting Mode	Holder angle	Seat Size	Order Number	Hand (R/L)	Page
GYHR3225P00-M25R	R	Ext.	00°	J	GYM25RA-J08	R	F040
					GYM25RA-J14	R	
					GYM25RA-J25	R	
		Face	00°	D	GYM25RD-D12-040	R	F052
					GYM25RD-D12-050	R	
					GYM25RD-D12-060	R	
					GYM25RD-D12-075	R	
					GYM25RD-D12-100	R	F054
					GYM25RD-D12-135	R	
					GYM25RD-D12-180	R	
				E	GYM25RD-E12-040	R	F056
					GYM25RD-E12-050	R	
					GYM25RD-E12-060	R	
					GYM25RD-E12-075	R	
					GYM25RD-E12-100	R	F058
					GYM25RD-E12-135	R	
					GYM25RD-E12-180	R	
				F	GYM25RD-F12-035	R	F060
					GYM25RD-F12-040	R	
					GYM25RD-F12-050	R	
					GYM25RD-F12-060	R	F062
					GYM25RD-F12-075	R	
					GYM25RD-F12-100	R	F064
					GYM25RD-F12-135	R	
					GYM25RD-F12-180	R	F066
					GYM25RD-F12-225	R	
					GYM25RD-F20-060	R	F062
					GYM25RD-F20-075	R	
					GYM25RD-F20-100	R	F064
					GYM25RD-F20-135	R	
					GYM25RD-F20-180	R	F066
					GYM25RD-F20-225	R	
				G	GYM25RD-G14-040	R	F068
					GYM25RD-G14-050	R	
					GYM25RD-G14-060	R	
					GYM25RD-G14-085	R	F070
					GYM25RD-G14-125	R	
					GYM25RD-G14-180	R	F072
					GYM25RD-G14-250	R	
					GYM25RD-G25-060	R	F068
					GYM25RD-G25-085	R	F070
					GYM25RD-G25-125	R	
					GYM25RD-G25-180	R	F072
					GYM25RD-G25-250	R	
				H	GYM25RD-H14-050	R	F074
					GYM25RD-H14-060	R	
					GYM25RD-H14-085	R	F076
					GYM25RD-H14-125	R	
					GYM25RD-H14-180	R	F078
					GYM25RD-H14-250	R	
					GYM25RD-H25-060	R	F074
					GYM25RD-H25-085	R	F076
					GYM25RD-H25-125	R	
					GYM25RD-H25-180	R	F078
					GYM25RD-H25-250	R	

Modular holder					Modular Blade		
Order Number	Hand (R/L)	Cutting Mode	Holder angle	Seat Size	Order Number	Hand (R/L)	Page
GYHR3225P00-M25R	R	Face	00°	J	GYM25RD-J14-050	R	F080
					GYM25RD-J14-070	R	
					GYM25RD-J14-110	R	
					GYM25RD-J14-170	R	F082
					GYM25RD-J14-250	R	
					GYM25RD-J25-070	R	F080
					GYM25RD-J25-110	R	
					GYM25RD-J25-170	R	F082
					GYM25RD-J25-250	R	
GYHL3225P00-M25L	L	Ext.	00°	D	GYM25LA-D06	L	F030
					GYM25LA-D12	L	
					GYM25LA-D20	L	
				E	GYM25LA-E06	L	F032
					GYM25LA-E12	L	
					GYM25LA-E20	L	
				F	GYM25LA-F06	L	F034
					GYM25LA-F12	L	
					GYM25LA-F20	L	
				G	GYM25LA-G08	L	F036
					GYM25LA-G14	L	
					GYM25LA-G25	L	
				H	GYM25LA-H08	L	F038
					GYM25LA-H14	L	
					GYM25LA-H25	L	
				J	GYM25LA-J08	L	F040
					GYM25LA-J14	L	
					GYM25LA-J25	L	
		Face	00°	D	GYM25LD-D12-040	L	F052
					GYM25LD-D12-050	L	
					GYM25LD-D12-060	L	
					GYM25LD-D12-075	L	
					GYM25LD-D12-100	L	F054
					GYM25LD-D12-135	L	
					GYM25LD-D12-180	L	
				E	GYM25LD-E12-040	L	F056
					GYM25LD-E12-050	L	
					GYM25LD-E12-060	L	
					GYM25LD-E12-075	L	
					GYM25LD-E12-100	L	F058
					GYM25LD-E12-135	L	
					GYM25LD-E12-180	L	
				F	GYM25LD-F12-035	L	F060
					GYM25LD-F12-040	L	
					GYM25LD-F12-050	L	
					GYM25LD-F12-060	L	F062
					GYM25LD-F12-075	L	
					GYM25LD-F12-100	L	F064
					GYM25LD-F12-135	L	
					GYM25LD-F12-180	L	F066
					GYM25LD-F12-225	L	
					GYM25LD-F20-060	L	F062
					GYM25LD-F20-075	L	
					GYM25LD-F20-100	L	F064
					GYM25LD-F20-135	L	
					GYM25LD-F20-180	L	F066
					GYM25LD-F20-225	L	

Modular holder		Cutting Mode	Holder angle	Seat Size	Modular Blade		Page
Order Number	Hand (R/L)				Order Number	Hand (R/L)	
GYHL3225P00-M25L	L	Face	00°	G	GYM25LD-G14-040	L	F068
					GYM25LD-G14-050	L	
					GYM25LD-G14-060	L	
					GYM25LD-G14-085	L	F070
					GYM25LD-G14-125	L	
					GYM25LD-G14-180	L	F072
					GYM25LD-G14-250	L	
					GYM25LD-G25-060	L	F068
					GYM25LD-G25-085	L	F070
					GYM25LD-G25-125	L	
					GYM25LD-G25-180	L	F072
					GYM25LD-G25-250	L	
				H	GYM25LD-H14-050	L	F074
					GYM25LD-H14-060	L	
					GYM25LD-H14-085	L	F076
					GYM25LD-H14-125	L	
					GYM25LD-H14-180	L	F078
					GYM25LD-H14-250	L	
					GYM25LD-H25-060	L	F074
					GYM25LD-H25-085	L	F076
					GYM25LD-H25-125	L	
					GYM25LD-H25-180	L	F078
					GYM25LD-H25-250	L	
				J	GYM25LD-J14-050	L	F080
					GYM25LD-J14-070	L	
					GYM25LD-J14-110	L	
					GYM25LD-J14-170	L	F082
					GYM25LD-J14-250	L	
					GYM25LD-J25-070	L	F080
					GYM25LD-J25-110	L	
					GYM25LD-J25-170	L	F082
					GYM25LD-J25-250	L	
GYHR3232P00-M25R	R	Ext.	00°	D	GYM25RA-D06	R	F030
					GYM25RA-D12	R	
					GYM25RA-D20	R	
				E	GYM25RA-E06	R	F032
					GYM25RA-E12	R	
					GYM25RA-E20	R	
				F	GYM25RA-F06	R	F034
					GYM25RA-F12	R	
					GYM25RA-F20	R	
				G	GYM25RA-G08	R	F036
					GYM25RA-G14	R	
					GYM25RA-G25	R	
				H	GYM25RA-H08	R	F038
					GYM25RA-H14	R	
					GYM25RA-H25	R	
				J	GYM25RA-J08	R	F040
					GYM25RA-J14	R	
					GYM25RA-J25	R	
		Face	00°	D	GYM25RD-D12-040	R	F052
					GYM25RD-D12-050	R	
					GYM25RD-D12-060	R	
					GYM25RD-D12-075	R	
					GYM25RD-D12-100	R	F054
					GYM25RD-D12-135	R	
					GYM25RD-D12-180	R	

Modular holder		Cutting Mode	Holder angle	Seat Size	Modular Blade		Page
Order Number	Hand (R/L)				Order Number	Hand (R/L)	
GYHR3232P00-M25R	R	Face	00°	E	GYM25RD-E12-040	R	F056
					GYM25RD-E12-050	R	
					GYM25RD-E12-060	R	
					GYM25RD-E12-075	R	
					GYM25RD-E12-100	R	F058
					GYM25RD-E12-135	R	
					GYM25RD-E12-180	R	
				F	GYM25RD-F12-035	R	F060
					GYM25RD-F12-040	R	
					GYM25RD-F12-050	R	
					GYM25RD-F12-060	R	F062
					GYM25RD-F12-075	R	
					GYM25RD-F12-100	R	F064
					GYM25RD-F12-135	R	
					GYM25RD-F12-180	R	F066
					GYM25RD-F12-225	R	
					GYM25RD-F20-060	R	F062
					GYM25RD-F20-075	R	
					GYM25RD-F20-100	R	F064
					GYM25RD-F20-135	R	
					GYM25RD-F20-180	R	F066
					GYM25RD-F20-225	R	
				G	GYM25RD-G14-040	R	F068
					GYM25RD-G14-050	R	
					GYM25RD-G14-060	R	
					GYM25RD-G14-085	R	F070
					GYM25RD-G14-125	R	
					GYM25RD-G14-180	R	F072
					GYM25RD-G14-250	R	
					GYM25RD-G25-060	R	F068
					GYM25RD-G25-085	R	F070
					GYM25RD-G25-125	R	
					GYM25RD-G25-180	R	F072
					GYM25RD-G25-250	R	
				H	GYM25RD-H14-050	R	F074
					GYM25RD-H14-060	R	
					GYM25RD-H14-085	R	F076
					GYM25RD-H14-125	R	
					GYM25RD-H14-180	R	F078
					GYM25RD-H14-250	R	
					GYM25RD-H25-060	R	F074
					GYM25RD-H25-085	R	F076
					GYM25RD-H25-125	R	
					GYM25RD-H25-180	R	F078
					GYM25RD-H25-250	R	
				J	GYM25RD-J14-050	R	F080
					GYM25RD-J14-070	R	
					GYM25RD-J14-110	R	
					GYM25RD-J14-170	R	F082
					GYM25RD-J14-250	R	
					GYM25RD-J25-070	R	F080
					GYM25RD-J25-110	R	
					GYM25RD-J25-170	R	F082
					GYM25RD-J25-250	R	

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List for selecting modular blade set at modular holder (For External and Face Grooving)

Modular holder					Modular Blade		
Order Number	Hand (R/L)	Cutting Mode	Holder angle	Seat Size	Order Number	Hand (R/L)	Page
GYHL3232P00-M25L	L	Ext.	00°	D	GYM25LA-D06	L	F030
					GYM25LA-D12	L	
					GYM25LA-D20	L	
				E	GYM25LA-E06	L	F032
					GYM25LA-E12	L	
					GYM25LA-E20	L	
				F	GYM25LA-F06	L	F034
					GYM25LA-F12	L	
					GYM25LA-F20	L	
				G	GYM25LA-G08	L	F036
					GYM25LA-G14	L	
					GYM25LA-G25	L	
				H	GYM25LA-H08	L	F038
					GYM25LA-H14	L	
					GYM25LA-H25	L	
				J	GYM25LA-J08	L	F040
					GYM25LA-J14	L	
					GYM25LA-J25	L	
		Face	00°	D	GYM25LD-D12-040	L	F052
					GYM25LD-D12-050	L	
					GYM25LD-D12-060	L	
					GYM25LD-D12-075	L	
					GYM25LD-D12-100	L	F054
					GYM25LD-D12-135	L	
					GYM25LD-D12-180	L	
				E	GYM25LD-E12-040	L	F056
					GYM25LD-E12-050	L	
					GYM25LD-E12-060	L	
					GYM25LD-E12-075	L	
					GYM25LD-E12-100	L	F058
					GYM25LD-E12-135	L	
					GYM25LD-E12-180	L	
				F	GYM25LD-F12-035	L	F060
					GYM25LD-F12-040	L	
					GYM25LD-F12-050	L	
					GYM25LD-F12-060	L	F062
					GYM25LD-F12-075	L	
					GYM25LD-F12-100	L	F064
					GYM25LD-F12-135	L	
					GYM25LD-F12-180	L	F066
					GYM25LD-F12-225	L	
					GYM25LD-F20-060	L	F062
					GYM25LD-F20-075	L	
					GYM25LD-F20-100	L	F064
					GYM25LD-F20-135	L	
					GYM25LD-F20-180	L	F066
					GYM25LD-F20-225	L	
				G	GYM25LD-G14-040	L	F068
					GYM25LD-G14-050	L	
					GYM25LD-G14-060	L	
					GYM25LD-G14-085	L	F070
					GYM25LD-G14-125	L	
					GYM25LD-G14-180	L	F072
					GYM25LD-G14-250	L	
					GYM25LD-G25-060	L	F068
					GYM25LD-G25-085	L	F070
					GYM25LD-G25-125	L	
					GYM25LD-G25-180	L	F072
					GYM25LD-G25-250	L	

Modular holder					Modular Blade		
Order Number	Hand (R/L)	Cutting Mode	Holder angle	Seat Size	Order Number	Hand (R/L)	Page
GYHL3232P00-M25L	L	Face	00°	H	GYM25LD-H14-050	L	F074
					GYM25LD-H14-060	L	
					GYM25LD-H14-085	L	F076
					GYM25LD-H14-125	L	
					GYM25LD-H14-180	L	F078
					GYM25LD-H14-250	L	
					GYM25LD-H25-060	L	F074
					GYM25LD-H25-085	L	F076
					GYM25LD-H25-125	L	
					GYM25LD-H25-180	L	F078
					GYM25LD-H25-250	L	
				J	GYM25LD-J14-050	L	F080
					GYM25LD-J14-070	L	
					GYM25LD-J14-110	L	
					GYM25LD-J14-170	L	F082
					GYM25LD-J14-250	L	
					GYM25LD-J25-070	L	F080
					GYM25LD-J25-110	L	
					GYM25LD-J25-170	L	F082
					GYM25LD-J25-250	L	

List for selecting modular blade set at modular holder (For Internal Grooving)

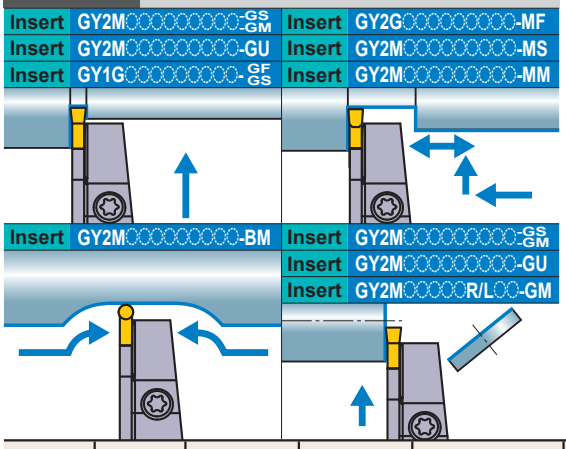
Modular holder				Modular Blade		
Order Number	Hand (R/L)	Holder angle	Seat Size	Order Number	Hand (R/L)	Page
GYDR32L90C-M20L	R	90°	D	GYM20LA-D10	L	F094
			E	GYM20LA-E10	L	F096
			F	GYM20LA-F10	L	F098
			G	GYM20LA-G12	L	
			H	GYM20LA-H12	L	F100
GYDL32L90C-M20R	L	90°	D	GYM20RA-D10	R	F094
			E	GYM20RA-E10	R	F096
			F	GYM20RA-F10	R	F098
			G	GYM20RA-G12	R	
			H	GYM20RA-H12	R	F100
GYDR32S90C-M20L	R	90°	D	GYM20LA-D10	L	F094
			E	GYM20LA-E10	L	F096
			F	GYM20LA-F10	L	F098
			G	GYM20LA-G12	L	
			H	GYM20LA-H12	L	F100
GYDL32S90C-M20R	L	90°	D	GYM20RA-D10	R	F094
			E	GYM20RA-E10	R	F096
			F	GYM20RA-F10	R	F098
			G	GYM20RA-G12	R	
			H	GYM20RA-H12	R	F100
GYDR40M90D-M20L	R	90°	D	GYM20LA-D10	L	F094
			E	GYM20LA-E10	L	F096
			F	GYM20LA-F10	L	F098
			G	GYM20LA-G12	L	
			H	GYM20LA-H12	L	F100
GYDL40M90D-M20R	L	90°	D	GYM20RA-D10	R	F094
			E	GYM20RA-E10	R	F096
			F	GYM20RA-F10	R	F098
			G	GYM20RA-G12	R	
			H	GYM20RA-H12	R	F100
GYDR40M90D-M25L	R	90°	D	GYM25LA-D12	L	F094
			E	GYM25LA-E12	L	F096
			F	GYM25LA-F12	L	F098
			G	GYM25LA-G14	L	
			H	GYM25LA-H14	L	F100
			J	GYM25LA-J14	L	
GYDL40M90D-M25R	L	90°	D	GYM25RA-D12	R	F094
			E	GYM25RA-E12	R	F096
			F	GYM25RA-F12	R	F098
			G	GYM25RA-G14	R	
			H	GYM25RA-H14	R	F100
			J	GYM25RA-J14	R	
GYDR40T90D-M20L	R	90°	D	GYM20LA-D10	L	F094
			E	GYM20LA-E10	L	F096
			F	GYM20LA-F10	L	F098
			G	GYM20LA-G12	L	
			H	GYM20LA-H12	L	F100
GYDL40T90D-M20R	L	90°	D	GYM20RA-D10	R	F094
			E	GYM20RA-E10	R	F096
			F	GYM20RA-F10	R	F098
			G	GYM20RA-G12	R	
			H	GYM20RA-H12	R	F100
GYDR40T90D-M25L	R	90°	D	GYM25LA-D12	L	F094
			E	GYM25LA-E12	L	F096
			F	GYM25LA-F12	L	F098
			G	GYM25LA-G14	L	
			H	GYM25LA-H14	L	F100
			J	GYM25LA-J14	L	
GYDL40T90D-M25R	L	90°	D	GYM25RA-D12	R	F094
			E	GYM25RA-E12	R	F096
			F	GYM25RA-F12	R	F098
			G	GYM25RA-G14	R	
			H	GYM25RA-H14	R	F100
			J	GYM25RA-J14	R	

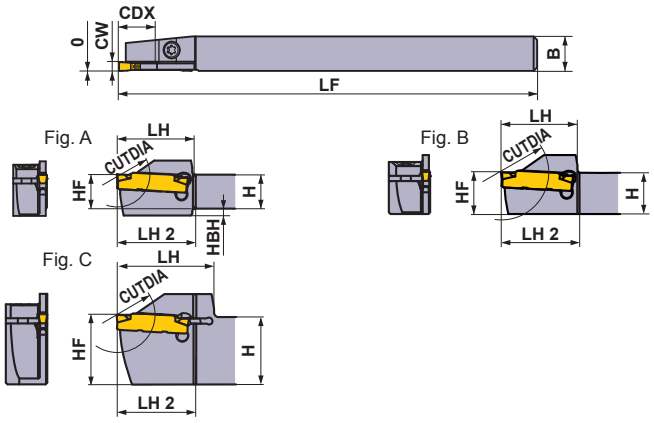
Modular holder				Modular Blade		
Order Number	Hand (R/L)	Holder angle	Seat Size	Order Number	Hand (R/L)	Page
GYDR50P90F-M25L	R	90°	D	GYM25LA-D12	L	F094
			E	GYM25LA-E12	L	F096
			F	GYM25LA-F12	L	F098
			G	GYM25LA-G14	L	
			H	GYM25LA-H14	L	F100
			J	GYM25LA-J14	L	
GYDL50P90F-M25R	L	90°	D	GYM25RA-D12	R	F094
			E	GYM25RA-E12	R	F096
			F	GYM25RA-F12	R	F098
			G	GYM25RA-G14	R	
			H	GYM25RA-H14	R	F100
			J	GYM25RA-J14	R	
GYDR50T90F-M25L	R	90°	D	GYM25LA-D12	L	F094
			E	GYM25LA-E12	L	F096
			F	GYM25LA-F12	L	F098
			G	GYM25LA-G14	L	
			H	GYM25LA-H14	L	F100
			J	GYM25LA-J14	L	
GYDL50T90F-M25R	L	90°	D	GYM25RA-D12	R	F094
			E	GYM25RA-E12	R	F096
			F	GYM25RA-F12	R	F098
			G	GYM25RA-G14	R	
			H	GYM25RA-H14	R	F100
			J	GYM25RA-J14	R	

GY SERIES (External for Swiss style lathes)

1 00° type holder

NEW





Right hand tool holder shown.

Seat Size	CW	CDX *4	CUTDIA	Type	Hand (R/L)	Order Number Holder	Stock	Fig.
C	1.50	11	22	Mono Block	R	GYSR1010JX00-C11	●	A
					L	GYSL1010JX00-C11	●	A
		13	26	Mono Block	R	GYSR1212JX00-C13	●	B
					L	GYSL1212JX00-C13	●	B
		17 *1	34 *2	Mono Block	R	GYSR1616JX00-C17	●	B
					L	GYSL1616JX00-C17	●	B
		18 *1	36 *2	Mono Block	R	GYSR2012JX00-C18	●	C
					L	GYSL2012JX00-C18	●	C
D	2.00 2.24	11	22	Mono Block	R	GYSR1010JX00-D11	●	A
					L	GYSL1010JX00-D11	●	A
		13	26	Mono Block	R	GYSR1212JX00-D13	●	B
					L	GYSL1212JX00-D13	●	B
		17	34	Mono Block	R	GYSR1616JX00-D17	●	B
					L	GYSL1616JX00-D17	●	B
		18	36	Mono Block	R	GYSR2012JX00-D18	●	C
					L	GYSL2012JX00-D18	●	C
E	2.39 2.50 2.74	11	22	Mono Block	R	GYSR1010JX00-E11	●	A
					L	GYSL1010JX00-E11	●	A
		13	26	Mono Block	R	GYSR1212JX00-E13	●	B
					L	GYSL1212JX00-E13	●	B
		17	34	Mono Block	R	GYSR1616JX00-E17	●	B
					L	GYSL1616JX00-E17	●	B
		18	36	Mono Block	R	GYSR2012JX00-E18	●	C
					L	GYSL2012JX00-E18	●	C
F	3.00 3.18 3.24	11	22	Mono Block	R	GYSR1010JX00-F11	●	A
					L	GYSL1010JX00-F11	●	A
		13	26	Mono Block	R	GYSR1212JX00-F13	●	B
					L	GYSL1212JX00-F13	●	B
		17	34	Mono Block	R	GYSR1616JX00-F17	●	B
					L	GYSL1616JX00-F17	●	B
		18	36	Mono Block	R	GYSR2012JX00-F18	●	C
					L	GYSL2012JX00-F18	●	C

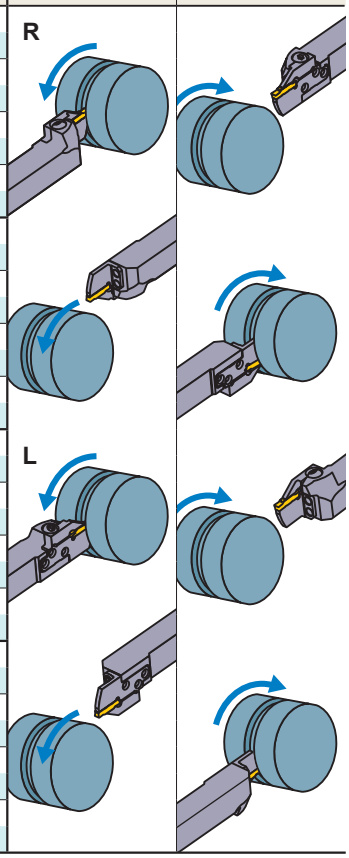
*1 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.
*2 The maximum cut off diameter **CUTDIA** varies according to the insert used. The cut off diameter is double the maximum groove depth (**CDX**) of inserts on pages F012—F014.
*3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH** and **LH 2** values may vary.
*4 The maximum groove depth is limited by the workpiece diameter. For details, please refer to page F104.

● : Inventory maintained in Japan.

SPARE PARTS

Holder	 Clamp Screw	 Wrench
GYSR/L1010JX00-○11	CS350990T (Clamp Torque : 2.5N·m)	TKY10R
GYSR/L1212JX00-○13		
GYSR/L2012JX00-○18		
GYSR/L1616JX00-○17	TS4SBL (Clamp Torque : 3.5N·m)	TKY15R

Dimensions (mm) *3							Cutting Mode	
H	B	LF	LH	LH 2	HF	HBH	Clockwise	Anticlockwise
10	10	120	22	16	10	2	R	
10	10	120	22	16	10	2		
12	12	120	22	16	12	—		
12	12	120	22	16	12	—		
16	16	120	27	17	16	—		
16	16	120	27	17	16	—		
20	12	120	28	16	20	—		
20	12	120	28	16	20	—		
10	10	120	22	23	10	2		
10	10	120	22	23	10	2		
12	12	120	22	23	12	—		
12	12	120	22	23	12	—		
16	16	120	27	24	16	—		
16	16	120	27	24	16	—		
20	12	120	28	23	20	—		
20	12	120	28	23	20	—		
10	10	120	22	23	10	2	L	
10	10	120	22	23	10	2		
12	12	120	22	23	12	—		
12	12	120	22	23	12	—		
16	16	120	27	24	16	—		
16	16	120	27	24	16	—		
20	12	120	28	23	20	—		
20	12	120	28	23	20	—		
10	10	120	22	23	10	2		
10	10	120	22	23	10	2		
12	12	120	22	23	12	—		
12	12	120	22	23	12	—		
16	16	120	27	24	16	—		
16	16	120	27	24	16	—		
20	12	120	28	23	20	—		
20	12	120	28	23	20	—		



Insert selection

Seat Size	Geometry name
C	GY○○0150C○○○○–Breaker shown below
D	GY○○0200/0224D○○○○–Breaker shown below
E	GY○○0239/0250/0274E○○○○–Breaker shown below
F	GY○○0300/0318/0324F○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	05-GM (Cutting off)	GFGS (Hardened steel)
		Neutral	Neutral	Neutral	With hand	Neutral
C	1.50mm		●	●		
D	2.00mm	●	●	●	●	●
E	2.39mm	●	●	●		●
	2.50mm	●	●	●	●	●
F	3.00mm	●	●	●	●	●
	3.18mm	●	●	●		●

For multifunctional grooving breaker ➢ F013, F014

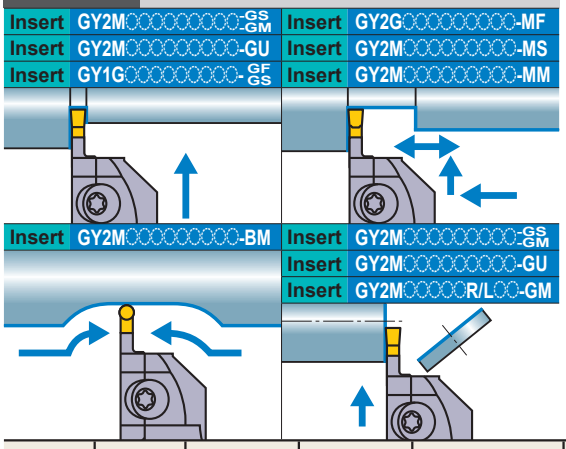
Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing)
					Ball shape
D	2.00mm	●	●	●	●
	2.24mm	●			
E	2.39mm	●			
	2.50mm	●	●	●	●
	2.74mm	●			
F	3.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8			●	
	3.18mm				●
	RE 0.2	●			
	RE 0.4	●			
	3.24mm	●			

● : Standard insert with dimensions

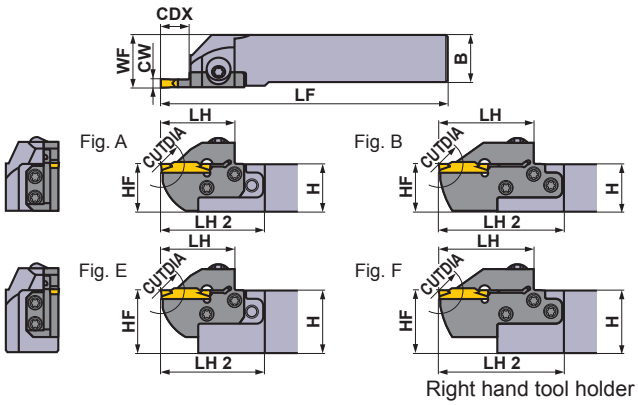
IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F102
CAUTION FOR USE ➢ F104

GY SERIES (EXTERNAL GROOVING)

1 00° type holder



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

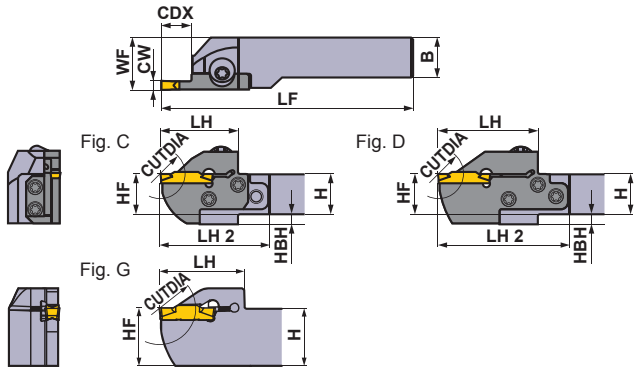


Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number Holder	Stock	Order Number Modular Blade	Stock	Fig.
D	2.00 2.24	6	12	Modular	R	GYHR1616J00-M20R	●	GYM20RA-D06	●	C
					L	GYHL1616J00-M20L	●	GYM20LA-D06	●	C
				NEW Mono Block	R	GYQR2020K00-D06	●	—	—	G
					L	GYQL2020K00-D06	●	—	—	G
				Modular	R	GYHR2020K00-M20R	●	GYM20RA-D06	●	A
					L	GYHL2020K00-M20L	●	GYM20LA-D06	●	A
				Modular	R	GYHR2020K00-M25R	●	GYM25RA-D06	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-D06	●	C
				NEW Mono Block	R	GYQR2525M00-D06	●	—	—	G
					L	GYQL2525M00-D06	●	—	—	G
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-D06	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-D06	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-D06	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-D06	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-D06	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-D06	●	E
		10	20	Modular	R	GYHR1616J00-M20R	●	GYM20RA-D10	●	C
					L	GYHL1616J00-M20L	●	GYM20LA-D10	●	C
				Modular	R	GYHR2020K00-M20R	●	GYM20RA-D10	●	A
					L	GYHL2020K00-M20L	●	GYM20LA-D10	●	A
		12	24	Modular	R	GYHR2020K00-M25R	●	GYM25RA-D12	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-D12	●	C
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-D12	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-D12	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-D12	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-D12	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-D12	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-D12	●	E
		18 ✶4	36	Modular	R	GYHR1616J00-M20R	●	GYM20RB-D18	●	D
					L	GYHL1616J00-M20L	●	GYM20LB-D18	●	D
				NEW Mono Block	R	GYQR2020K00-D18	●	—	—	G
					L	GYQL2020K00-D18	●	—	—	G
				Modular	R	GYHR2020K00-M20R	●	GYM20RB-D18	●	B
					L	GYHL2020K00-M20L	●	GYM20LB-D18	●	B
		20 ✶1	40 ✶2	Modular	R	GYHR2020K00-M25R	●	GYM25RA-D20	●	D
					L	GYHL2020K00-M25L	●	GYM25LA-D20	●	D
				NEW Mono Block	R	GYQR2525M00-D20	●	—	—	G
					L	GYQL2525M00-D20	●	—	—	G
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-D20	●	B
					L	GYHL2525M00-M25L	●	GYM25LA-D20	●	B
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-D20	●	F
					L	GYHL3225P00-M25L	●	GYM25LA-D20	●	F
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-D20	●	F
					L	GYHL3232P00-M25L	●	GYM25LA-D20	●	F

✶1 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.
✶2 The maximum cut off diameter **CUTDIA** varies according to the insert used. The cut off diameter is double the maximum groove depth (**CDX**) of inserts on pages F012—F014.
✶3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2** and **WF** values may vary.
✶4 The maximum groove depth is limited by the workpiece diameter. For details, please refer to page F104.

● : **Inventory maintained in Japan.**



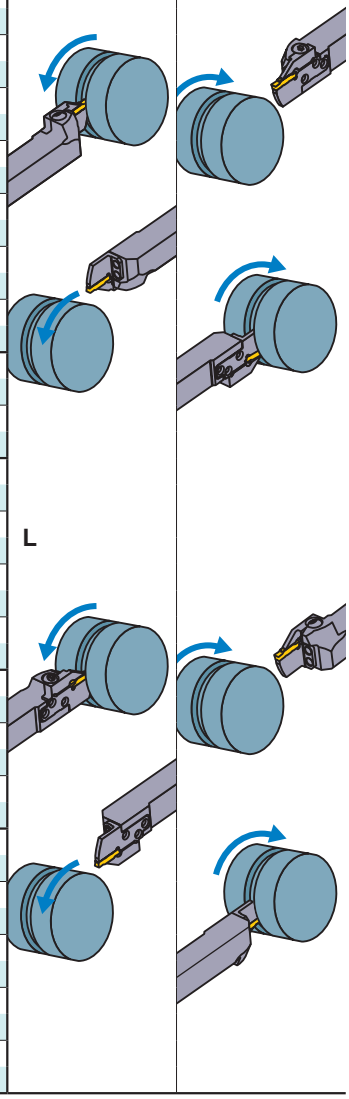
Right hand tool holder shown.

✱ Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench ✱
GYQR/L○○○○○○○○-○○○	HSC05030 (Clamp Torque : 7.0N·m)	—	HKY40R
GYHR/L○○○○○○○○-M20R/L	GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYHR/L○○○○○○○○-M25R/L		TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D

Dimensions (mm) ✱3								Cutting Mode	
H	B	LF	LH	LH 2	HF	WF	HBH	Clockwise	Anticlockwise
16	16	104	28	44	16	20	4	R	
16	16	104	28	44	16	20	4		
20	20	125	36	—	20	20.15	—		
20	20	125	36	—	20	20.15	—		
20	20	119	28	43	20	23	—		
20	20	119	28	43	20	23	—		
20	20	117	31	52	20	26	5		
20	20	117	31	52	20	26	5		
25	25	150	36	—	25	25.15	—		
25	25	150	36	—	25	25.15	—		
25	25	142	31	49	25	28	—		
25	25	142	31	49	25	28	—		
32	25	162	31	49	32	28	—		
32	25	162	31	49	32	28	—		
32	32	162	31	49	32	35	—		
32	32	162	31	49	32	35	—		
16	16	110	34	50	16	20	4		
16	16	110	34	50	16	20	4		
20	20	125	34	49	20	23	—		
20	20	125	34	49	20	23	—		
20	20	125	39	60	20	26	5		
20	20	125	39	60	20	26	5		
25	25	150	39	57	25	28	—	L	
25	25	150	39	57	25	28	—		
32	25	170	39	57	32	28	—		
32	25	170	39	57	32	28	—		
32	32	170	39	57	32	35	—		
32	32	170	39	57	32	35	—		
16	16	116	40	56	16	20	4		
16	16	116	40	56	16	20	4		
20	20	125	39	—	20	20.1	—		
20	20	125	39	—	20	20.1	—		
20	20	131	40	55	20	23	—		
20	20	131	40	55	20	23	—		
20	20	131	45	66	20	26	5		
20	20	131	45	66	20	26	5		
25	25	150	41	—	25	25.1	—		
25	25	150	41	—	25	25.1	—		
25	25	156	45	63	25	28	—		
25	25	156	45	63	25	28	—		
32	25	176	45	63	32	28	—		
32	25	176	45	63	32	28	—		
32	32	176	45	63	32	35	—		
32	32	176	45	63	32	35	—		



Insert selection

Seat Size	Geometry name
D	GY○○0200/0224D○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	05-GM (Cutting off)	GFGS (Hardened steel)
		Neutral	Neutral	Neutral	With hand	Neutral
D	2.00mm	●	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

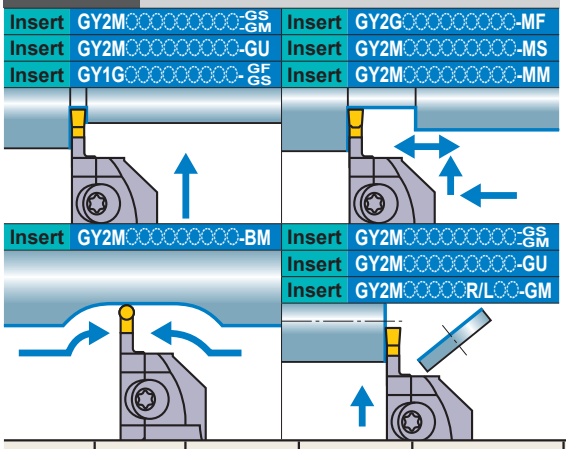
Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing)
					Ball shape
D	2.00mm	●	●	●	●
	2.24mm	●			

● : Standard insert with dimensions

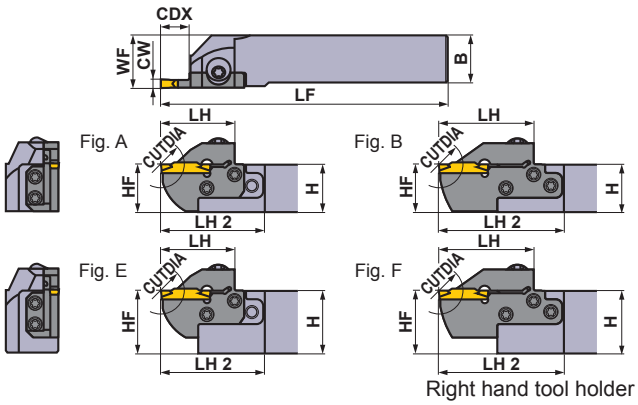
IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F102
CAUTION FOR USE ➢ F106

GY SERIES (EXTERNAL GROOVING)

1 00° type holder



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

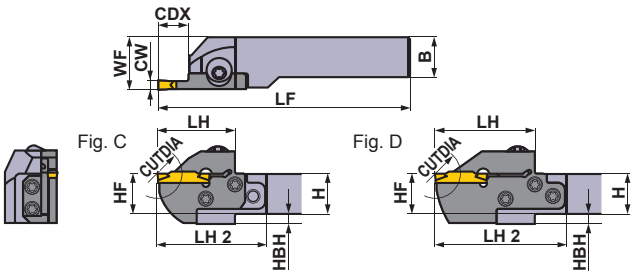


Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number				Fig.
						Holder	Stock	Modular Blade	Stock	
E	2.39 2.50 2.74	6	12	Modular	R	GYHR1616J00-M20R	●	GYM20RA-E06	●	C
					L	GYHL1616J00-M20L	●	GYM20LA-E06	●	C
				Modular	R	GYHR2020K00-M20R	●	GYM20RA-E06	●	A
					L	GYHL2020K00-M20L	●	GYM20LA-E06	●	A
				Modular	R	GYHR2020K00-M25R	●	GYM25RA-E06	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-E06	●	C
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-E06	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-E06	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-E06	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-E06	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-E06	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-E06	●	E
		10	20	Modular	R	GYHR1616J00-M20R	●	GYM20RA-E10	●	C
					L	GYHL1616J00-M20L	●	GYM20LA-E10	●	C
				Modular	R	GYHR2020K00-M20R	●	GYM20RA-E10	●	A
					L	GYHL2020K00-M20L	●	GYM20LA-E10	●	A
		12	24	Modular	R	GYHR2020K00-M25R	●	GYM25RA-E12	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-E12	●	C
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-E12	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-E12	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-E12	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-E12	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-E12	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-E12	●	E
		18 ✶4	36	Modular	R	GYHR1616J00-M20R	●	GYM20RB-E18	●	D
					L	GYHL1616J00-M20L	●	GYM20LB-E18	●	D
				Modular	R	GYHR2020K00-M20R	●	GYM20RB-E18	●	B
					L	GYHL2020K00-M20L	●	GYM20LB-E18	●	B
		20 ✶1	40 ✶2	Modular	R	GYHR2020K00-M25R	●	GYM25RA-E20	●	D
					L	GYHL2020K00-M25L	●	GYM25LA-E20	●	D
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-E20	●	B
					L	GYHL2525M00-M25L	●	GYM25LA-E20	●	B
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-E20	●	F
					L	GYHL3225P00-M25L	●	GYM25LA-E20	●	F
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-E20	●	F
					L	GYHL3232P00-M25L	●	GYM25LA-E20	●	F

✶1 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.
✶2 The maximum cut off diameter **CUTDIA** varies according to the insert used. The cut off diameter is double the maximum groove depth (**CDX**) of inserts on pages F012—F014.
✶3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2** and **WF** values may vary.
✶4 The maximum groove depth is limited by the workpiece diameter. For details, please refer to page F104.

● : Inventory maintained in Japan.



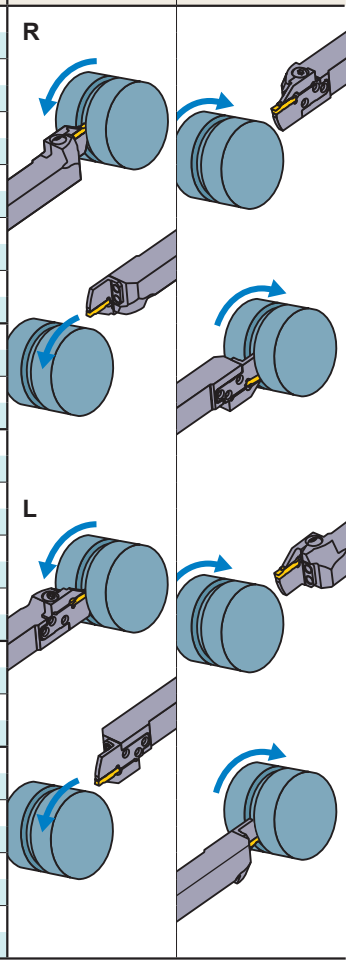
Right hand tool holder shown.

★ Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench ★
GYQR/L○○○○○○○○-○○○	HSC05030 (Clamp Torque : 7.0N·m)	—	HKY40R
GYHR/L○○○○○○○○-M20R/L	GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYHR/L○○○○○○○○-M25R/L		TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D

Dimensions (mm) ★3								Cutting Mode	
H	B	LF	LH	LH 2	HF	WF	HBH	Clockwise	Anticlockwise
16	16	104	28	44	16	20	4	R	
16	16	104	28	44	16	20	4		
20	20	119	28	43	20	23	—		
20	20	119	28	43	20	23	—		
20	20	117	31	52	20	26	5		
20	20	117	31	52	20	26	5		
25	25	142	31	49	25	28	—		
25	25	142	31	49	25	28	—		
32	25	162	31	49	32	28	—		
32	25	162	31	49	32	28	—		
32	32	162	31	49	32	35	—		
32	32	162	31	49	32	35	—		
16	16	110	34	50	16	20	4		
16	16	110	34	50	16	20	4		
20	20	125	34	49	20	23	—		
20	20	125	34	49	20	23	—		
20	20	125	39	60	20	26	5		
20	20	125	39	60	20	26	5		
25	25	150	39	57	25	28	—		
25	25	150	39	57	25	28	—		
32	25	170	39	57	32	28	—		
32	25	170	39	57	32	28	—		
32	32	170	39	57	32	35	—		
32	32	170	39	57	32	35	—		
16	16	116	40	56	16	20	4	L	
16	16	116	40	56	16	20	4		
20	20	131	40	55	20	23	—		
20	20	131	40	55	20	23	—		
20	20	131	45	66	20	26	5		
20	20	131	45	66	20	26	5		
25	25	156	45	63	25	28	—		
25	25	156	45	63	25	28	—		
32	25	176	45	63	32	28	—		
32	25	176	45	63	32	28	—		
32	32	176	45	63	32	35	—		
32	32	176	45	63	32	35	—		



Insert selection

Seat Size	Geometry name
E	GY○○0239/0250/0274E○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	Breaker / CW	GU (For gummy steel) Neutral	GS (Low) Neutral	GM (Medium) Neutral	05-GM (Cutting off) With hand	GFGS (Hardened steel) Neutral
E	2.39mm	●	●	●		●
	2.50mm	●	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

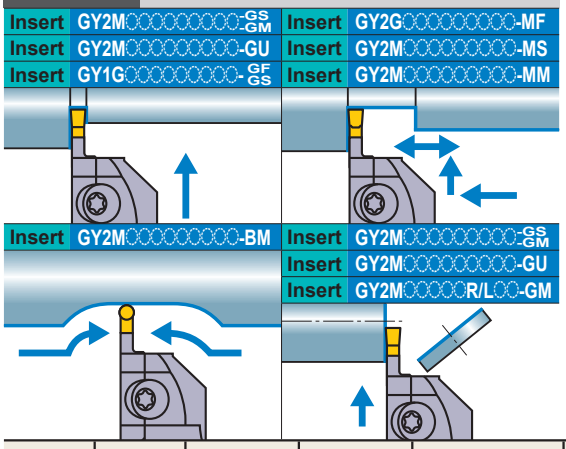
Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing) Ball shape
E	2.39mm	●			
	2.50mm	●	●	●	●
	2.74mm	●			

● : Standard insert with dimensions

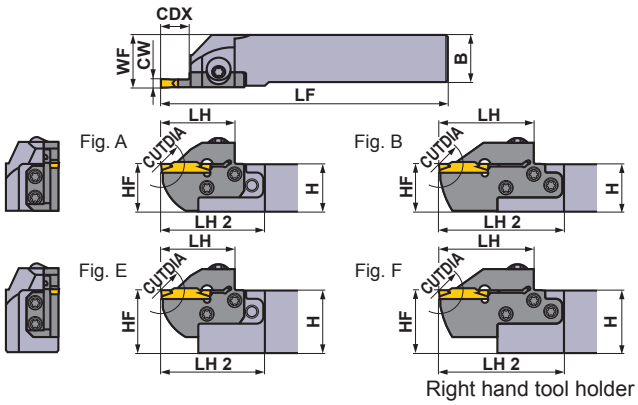
IDENTIFICATION	➢ F010, F011
CUTTING CONDITIONS	➢ F102
CAUTION FOR USE	➢ F106

GY SERIES (EXTERNAL GROOVING)

1 00° type holder



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

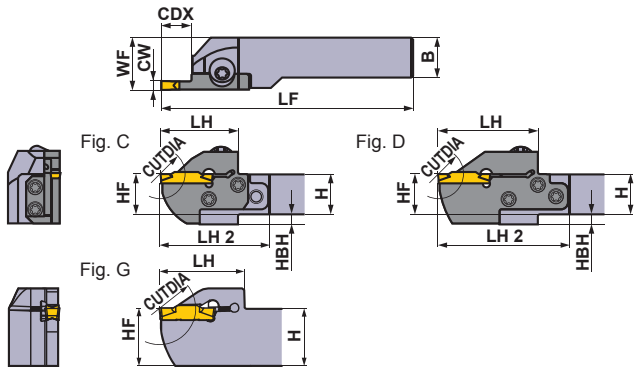


Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number Holder	Stock	Order Number Modular Blade	Stock	Fig.
F	3.00 3.18 3.24	6	12	Modular	R	GYHR1616J00-M20R	●	GYM20RA-F06	●	C
					L	GYHL1616J00-M20L	●	GYM20LA-F06	●	C
				NEW Mono Block	R	GYQR2020K00-F06	●	—	—	G
					L	GYQL2020K00-F06	●	—	—	G
				Modular	R	GYHR2020K00-M20R	●	GYM20RA-F06	●	A
					L	GYHL2020K00-M20L	●	GYM20LA-F06	●	A
				Modular	R	GYHR2020K00-M25R	●	GYM25RA-F06	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-F06	●	C
				NEW Mono Block	R	GYQR2525M00-F06	●	—	—	G
					L	GYQL2525M00-F06	●	—	—	G
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-F06	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-F06	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-F06	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-F06	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-F06	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-F06	●	E
		10	20	Modular	R	GYHR1616J00-M20R	●	GYM20RA-F10	●	C
					L	GYHL1616J00-M20L	●	GYM20LA-F10	●	C
				Modular	R	GYHR2020K00-M20R	●	GYM20RA-F10	●	A
					L	GYHL2020K00-M20L	●	GYM20LA-F10	●	A
		12	24	Modular	R	GYHR2020K00-M25R	●	GYM25RA-F12	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-F12	●	C
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-F12	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-F12	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-F12	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-F12	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-F12	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-F12	●	E
		18 ✶4	36	Modular	R	GYHR1616J00-M20R	●	GYM20RB-F18	●	D
					L	GYHL1616J00-M20L	●	GYM20LB-F18	●	D
				NEW Mono Block	R	GYQR2020K00-F18	●	—	—	G
					L	GYQL2020K00-F18	●	—	—	G
				Modular	R	GYHR2020K00-M20R	●	GYM20RB-F18	●	B
					L	GYHL2020K00-M20L	●	GYM20LB-F18	●	B
		20 ✶1	40 ✶2	Modular	R	GYHR2020K00-M25R	●	GYM25RA-F20	●	D
					L	GYHL2020K00-M25L	●	GYM25LA-F20	●	D
				NEW Mono Block	R	GYQR2525M00-F20	●	—	—	G
					L	GYQL2525M00-F20	●	—	—	G
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-F20	●	B
					L	GYHL2525M00-M25L	●	GYM25LA-F20	●	B
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-F20	●	F
					L	GYHL3225P00-M25L	●	GYM25LA-F20	●	F
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-F20	●	F
					L	GYHL3232P00-M25L	●	GYM25LA-F20	●	F

✶1 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.
✶2 The maximum cut off diameter **CUTDIA** varies according to the insert used. The cut off diameter is double the maximum groove depth (**CDX**) of inserts on pages F012—F014.
✶3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2** and **WF** values may vary.
✶4 The maximum groove depth is limited by the workpiece diameter. For details, please refer to page F104.

● : **Inventory maintained in Japan.**



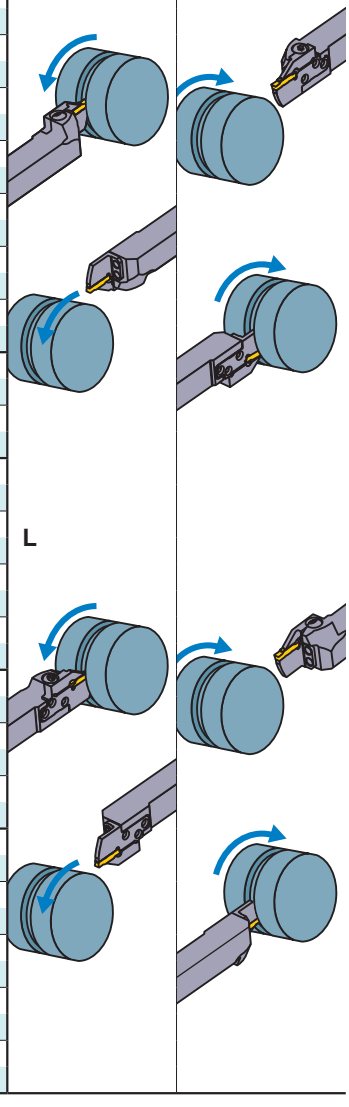
Right hand tool holder shown.

★ Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench ★
GYQR/L○○○○○○○○-○○○	HSC05030 (Clamp Torque : 7.0N·m)	—	HKY40R
GYHR/L○○○○○○○○-M20R/L	GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYHR/L○○○○○○○○-M25R/L		TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D

Dimensions (mm) ★3								Cutting Mode	
H	B	LF	LH	LH 2	HF	WF	HBH	Clockwise	Anticlockwise
16	16	104	28	44	16	20	4	R	
16	16	104	28	44	16	20	4		
20	20	125	36	—	20	20.3	—		
20	20	125	36	—	20	20.3	—		
20	20	119	28	43	20	23	—		
20	20	119	28	43	20	23	—		
20	20	117	31	52	20	26	5		
20	20	117	31	52	20	26	5		
25	25	150	36	—	25	25.3	—		
25	25	150	36	—	25	25.3	—		
25	25	142	31	49	25	28	—		
25	25	142	31	49	25	28	—		
32	25	162	31	49	32	28	—		
32	25	162	31	49	32	28	—		
32	32	162	31	49	32	35	—		
32	32	162	31	49	32	35	—		
16	16	110	34	50	16	20	4		
16	16	110	34	50	16	20	4		
20	20	125	34	49	20	23	—		
20	20	125	34	49	20	23	—		
20	20	125	39	60	20	26	5		
20	20	125	39	60	20	26	5		
25	25	150	39	57	25	28	—		
25	25	150	39	57	25	28	—		
32	25	170	39	57	32	28	—		
32	25	170	39	57	32	28	—		
32	32	170	39	57	32	35	—		
32	32	170	39	57	32	35	—		
16	16	116	40	56	16	20	4	L	
16	16	116	40	56	16	20	4		
20	20	125	39	—	20	20.25	—		
20	20	125	39	—	20	20.25	—		
20	20	131	40	55	20	23	—		
20	20	131	40	55	20	23	—		
20	20	131	45	66	20	26	5		
20	20	131	45	66	20	26	5		
25	25	150	41	—	25	25.25	—		
25	25	150	41	—	25	25.25	—		
25	25	156	45	63	25	28	—		
25	25	156	45	63	25	28	—		
32	25	176	45	63	32	28	—		
32	25	176	45	63	32	28	—		
32	32	176	45	63	32	35	—		
32	32	176	45	63	32	35	—		



Insert selection

Seat Size	Geometry name
F	GY○○0239/0250/0274E○○○○–Breaker shown below

For grooving/cutting off breaker ➤ F012, F013

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	05-GM (Cutting off)	GFGS (Hardened steel)
		Neutral	Neutral	Neutral	With hand	Neutral
F	3.00mm	●	●	●	●	●
	3.18mm	●	●	●		●

For multifunctional grooving breaker ➤ F013, F014

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing)
					Ball shape
F	3.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8			●	
	3.18mm				●
	RE 0.2	●			
	RE 0.4	●			
	3.24mm	●			

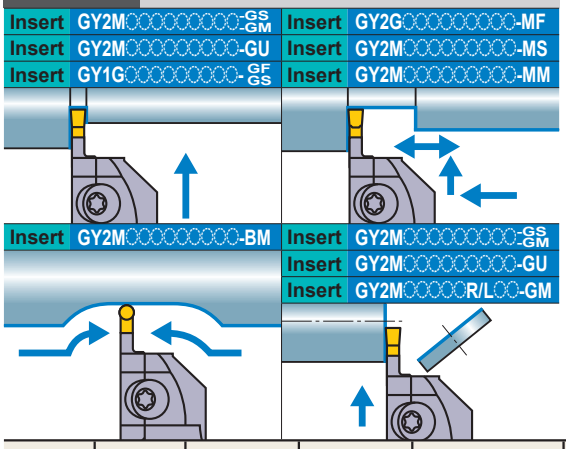
● : Standard insert with dimensions

GROOVING

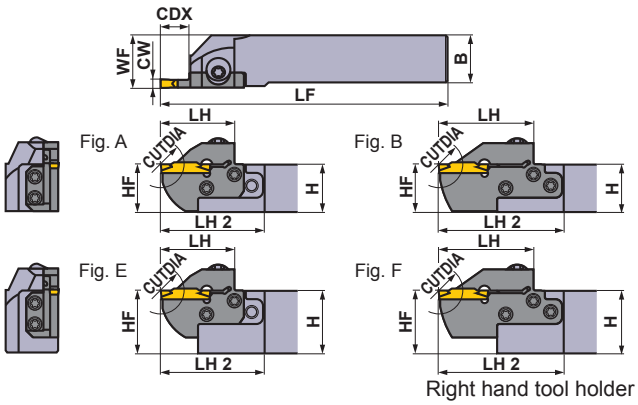
IDENTIFICATION ➤ F010, F011
CUTTING CONDITIONS ➤ F102
CAUTION FOR USE ➤ F106

GY SERIES (EXTERNAL GROOVING)

1 00° type holder



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

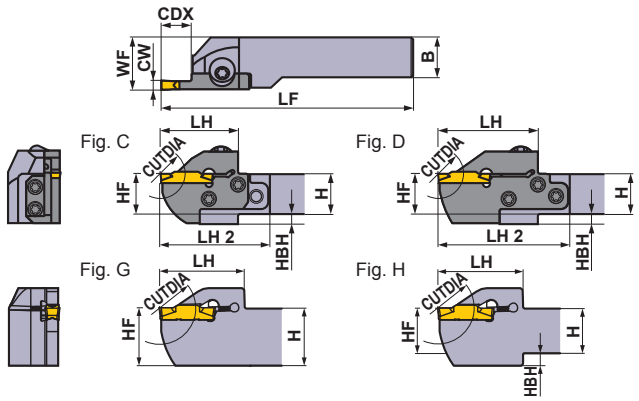


Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number Holder	Stock	Order Number Modular Blade	Stock	Fig.
G	4.00 4.24	8	16	NEW Mono Block	R	GYQR2020K00-G08	●	—	—	G
					L	GYQL2020K00-G08	●	—	—	G
				Modular	R	GYHR2020K00-M25R	●	GYM25RA-G08	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-G08	●	C
				NEW Mono Block	R	GYQR2525M00-G08	●	—	—	G
					L	GYQL2525M00-G08	●	—	—	G
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-G08	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-G08	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-G08	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-G08	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-G08	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-G08	●	E
		12	24	Modular	R	GYHR1616J00-M20R	●	GYM20RA-G12	●	C
					L	GYHL1616J00-M20L	●	GYM20LA-G12	●	C
				Modular	R	GYHR2020K00-M20R	●	GYM20RA-G12	●	A
					L	GYHL2020K00-M20L	●	GYM20LA-G12	●	A
		14	28	Modular	R	GYHR2020K00-M25R	●	GYM25RA-G14	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-G14	●	C
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-G14	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-G14	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-G14	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-G14	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-G14	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-G14	●	E
		25 ✶1	50 ✶2	NEW Mono Block	R	GYQR2020K00-G25	●	—	—	H
					L	GYQL2020K00-G25	●	—	—	H
				Modular	R	GYHR2020K00-M25R	●	GYM25RA-G25	●	D
					L	GYHL2020K00-M25L	●	GYM25LA-G25	●	D
				NEW Mono Block	R	GYQR2525M00-G25	●	—	—	G
					L	GYQL2525M00-G25	●	—	—	G
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-G25	●	B
					L	GYHL2525M00-M25L	●	GYM25LA-G25	●	B
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-G25	●	F
					L	GYHL3225P00-M25L	●	GYM25LA-G25	●	F
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-G25	●	F
					L	GYHL3232P00-M25L	●	GYM25LA-G25	●	F

✶1 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.
✶2 The maximum cut off diameter **CUTDIA** varies according to the insert used. The cut off diameter is double the maximum groove depth (**CDX**) of inserts on pages F012—F014.
✶3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2** and **WF** values may vary.

● : **Inventory maintained in Japan.**



Right hand tool holder shown.

★ Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench ★
GYQR/L○○○○○○○○-○○○	HSC05030 (Clamp Torque : 7.0N·m)	—	HKY40R
GYHR/L○○○○○○○-M20R/L	GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYHR/L○○○○○○○-M25R/L		TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D

Dimensions (mm) ★3								Cutting Mode	
H	B	LF	LH	LH 2	HF	WF	HBH	Clockwise	Anticlockwise
20	20	125	41	—	20	20.35	—	R	
20	20	125	41	—	20	20.35	—		
20	20	119	33	54	20	26	5		
20	20	119	33	54	20	26	5		
25	25	150	41	—	25	25.35	—		
25	25	150	41	—	25	25.35	—		
25	25	144	33	51	25	28	—		
25	25	144	33	51	25	28	—		
32	25	164	33	51	32	28	—		
32	25	164	33	51	32	28	—		
32	32	164	33	51	32	35	—		
32	32	164	33	51	32	35	—		
16	16	110	34	50	16	20	4		
16	16	110	34	50	16	20	4		
20	20	125	34	49	20	23	—		
20	20	125	34	49	20	23	—		
20	20	125	39	60	20	26	5		
20	20	125	39	60	20	26	5		
25	25	150	39	57	25	28	—		
25	25	150	39	57	25	28	—		
32	25	170	39	57	32	28	—		
32	25	170	39	57	32	28	—		
32	32	170	39	57	32	35	—		
32	32	170	39	57	32	35	—		
20	20	125	46	—	20	20.35	4	L	
20	20	125	46	—	20	20.35	4		
20	20	136	50	71	20	26	5		
20	20	136	50	71	20	26	5		
25	25	150	46	—	25	25.35	—		
25	25	150	46	—	25	25.35	—		
25	25	161	50	68	25	28	—		
25	25	161	50	68	25	28	—		
32	25	181	50	68	32	28	—		
32	25	181	50	68	32	28	—		
32	32	181	50	68	32	35	—		
32	32	181	50	68	32	35	—		

Insert selection

Seat Size	Geometry name
G	GY○○0239/0250/0274E○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	05-GM (Cutting off)	GFGS (Hardened steel)
		Neutral	Neutral	Neutral	With hand	Neutral
G	4.00mm	●	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing)
					Ball shape
G	4.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8	●		●	
	4.24mm	●			

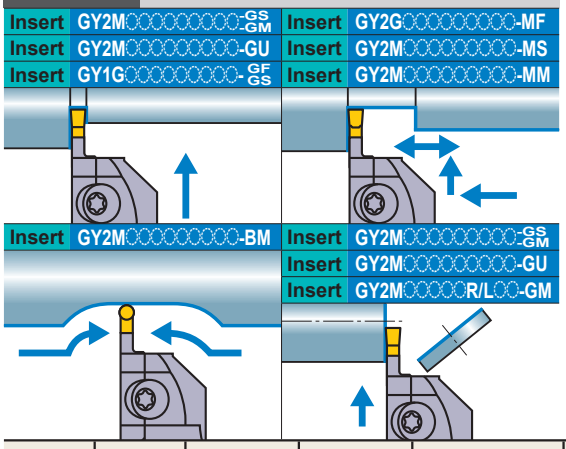
● : Standard insert with dimensions

GROOVING

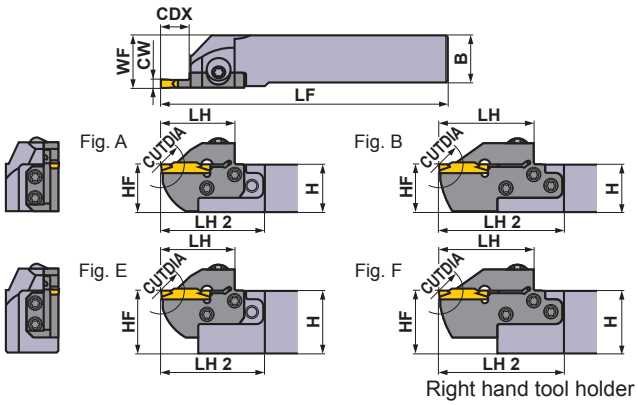
IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F102
CAUTION FOR USE ➢ F106

GY SERIES (EXTERNAL GROOVING)

1 00° type holder



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

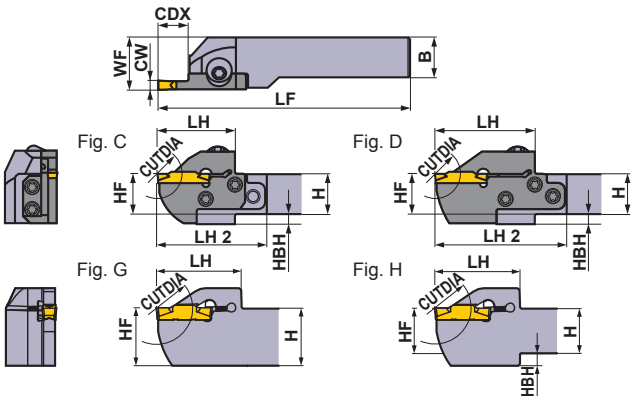


Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number Holder	Stock	Order Number Modular Blade	Stock	Fig.
H	4.75 5.00 5.24	8	16	NEW Mono Block	R	GYQR2020K00-H08	●	—	—	G
					L	GYQL2020K00-H08	●	—	—	G
				Modular	R	GYHR2020K00-M25R	●	GYM25RA-H08	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-H08	●	C
				NEW Mono Block	R	GYQR2525M00-H08	●	—	—	G
					L	GYQL2525M00-H08	●	—	—	G
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-H08	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-H08	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-H08	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-H08	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-H08	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-H08	●	E
		12	24	Modular	R	GYHR1616J00-M20R	●	GYM20RA-H12	●	C
					L	GYHL1616J00-M20L	●	GYM20LA-H12	●	C
				Modular	R	GYHR2020K00-M20R	●	GYM20RA-H12	●	A
					L	GYHL2020K00-M20L	●	GYM20LA-H12	●	A
		14	28	Modular	R	GYHR2020K00-M25R	●	GYM25RA-H14	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-H14	●	C
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-H14	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-H14	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-H14	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-H14	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-H14	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-H14	●	E
		25 ✶1	50 ✶2	NEW Mono Block	R	GYQR2020K00-H25	●	—	—	H
					L	GYQL2020K00-H25	●	—	—	H
				Modular	R	GYHR2020K00-M25R	●	GYM25RA-H25	●	D
					L	GYHL2020K00-M25L	●	GYM25LA-H25	●	D
				NEW Mono Block	R	GYQR2525M00-H25	●	—	—	G
					L	GYQL2525M00-H25	●	—	—	G
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-H25	●	B
					L	GYHL2525M00-M25L	●	GYM25LA-H25	●	B
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-H25	●	F
					L	GYHL3225P00-M25L	●	GYM25LA-H25	●	F
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-H25	●	F
					L	GYHL3232P00-M25L	●	GYM25LA-H25	●	F

✶1 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.
✶2 The maximum cut off diameter **CUTDIA** varies according to the insert used. The cut off diameter is double the maximum groove depth (**CDX**) of inserts on pages F012—F014.
✶3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2** and **WF** values may vary.

● : **Inventory maintained in Japan.**



Right hand tool holder shown.

★ Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench ★
GYQR/L○○○○○○○○-○○○	HSC05030 (Clamp Torque : 7.0N·m)	—	HKY40R
GYHR/L○○○○○○○-M20R/L	GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYHR/L○○○○○○○-M25R/L		TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D

Dimensions (mm) ★3								Cutting Mode	
H	B	LF	LH	LH 2	HF	WF	HBH	Clockwise	Anticlockwise
20	20	125	41	—	20	20.35	—	R	
20	20	125	41	—	20	20.35	—		
20	20	119	33	54	20	26	5		
20	20	119	33	54	20	26	5		
25	25	150	41	—	25	25.35	—		
25	25	150	41	—	25	25.35	—		
25	25	144	33	51	25	28	—		
25	25	144	33	51	25	28	—		
32	25	164	33	51	32	28	—		
32	25	164	33	51	32	28	—		
32	32	164	33	51	32	35	—		
32	32	164	33	51	32	35	—		
16	16	110	34	50	16	20	4		
16	16	110	34	50	16	20	4		
20	20	125	34	49	20	23	—		
20	20	125	34	49	20	23	—		
20	20	125	39	60	20	26	5		
20	20	125	39	60	20	26	5		
25	25	150	39	57	25	28	—		
25	25	150	39	57	25	28	—		
32	25	170	39	57	32	28	—		
32	25	170	39	57	32	28	—		
32	32	170	39	57	32	35	—		
32	32	170	39	57	32	35	—		
20	20	125	46	—	20	20.35	4	L	
20	20	125	46	—	20	20.35	4		
20	20	136	50	71	20	26	5		
20	20	136	50	71	20	26	5		
25	25	150	46	—	25	25.35	—		
25	25	150	46	—	25	25.35	—		
25	25	161	50	68	25	28	—		
25	25	161	50	68	25	28	—		
32	25	181	50	68	32	28	—		
32	25	181	50	68	32	28	—		
32	32	181	50	68	32	35	—		
32	32	181	50	68	32	35	—		

Insert selection

Seat Size	Geometry name
H	GY○○0475/0500/0524H○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	Breaker / CW	GU (For gummy steel) Neutral	GS (Low) Neutral	GM (Medium) Neutral	05-GM (Cutting off) With hand	GFGS (Hardened steel) Neutral
H	4.75mm	●	●	●		●
	5.00mm	●	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

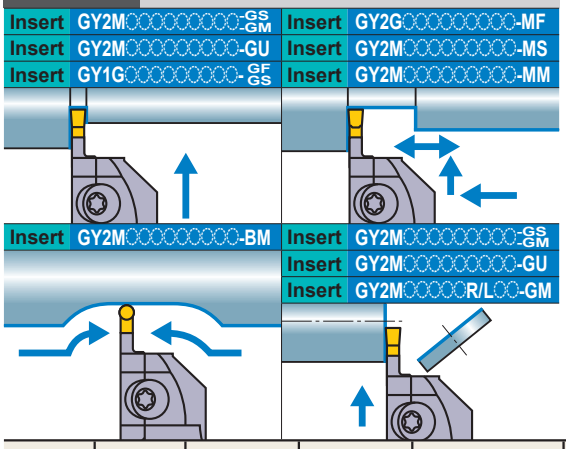
Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing) Ball shape
H	4.75mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			
	5.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	5.24mm	●			

● : Standard insert with dimensions

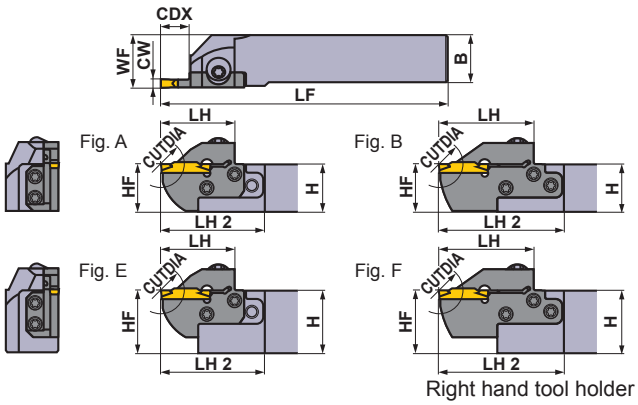
IDENTIFICATION	➢ F010, F011
CUTTING CONDITIONS	➢ F102
CAUTION FOR USE	➢ F106

GY SERIES (EXTERNAL GROOVING)

1 00° type holder



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

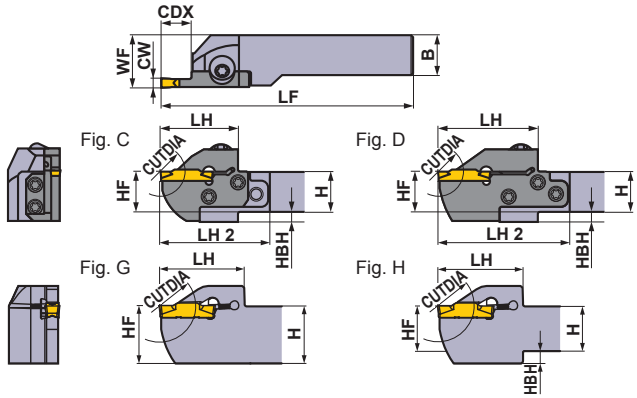


Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number Holder	Stock	Order Number Modular Blade	Stock	Fig.
J	6.00 6.31 6.35	8	16	NEW Mono Block	R	GYQR2020K00-J08	●	—	—	G
					L	GYQL2020K00-J08	●	—	—	G
				Modular	R	GYHR2020K00-M25R	●	GYM25RA-J08	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-J08	●	C
				NEW Mono Block	R	GYQR2525M00-J08	●	—	—	G
					L	GYQL2525M00-J08	●	—	—	G
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-J08	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-J08	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-J08	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-J08	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-J08	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-J08	●	E
		14	28	Modular	R	GYHR2020K00-M25R	●	GYM25RA-J14	●	C
					L	GYHL2020K00-M25L	●	GYM25LA-J14	●	C
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-J14	●	A
					L	GYHL2525M00-M25L	●	GYM25LA-J14	●	A
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-J14	●	E
					L	GYHL3225P00-M25L	●	GYM25LA-J14	●	E
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-J14	●	E
					L	GYHL3232P00-M25L	●	GYM25LA-J14	●	E
		25 ✶1	50 ✶2	NEW Mono Block	R	GYQR2020K00-J25	●	—	—	H
					L	GYQL2020K00-J25	●	—	—	H
				Modular	R	GYHR2020K00-M25R	●	GYM25RA-J25	●	D
					L	GYHL2020K00-M25L	●	GYM25LA-J25	●	D
				NEW Mono Block	R	GYQR2525M00-J25	●	—	—	G
					L	GYQL2525M00-J25	●	—	—	G
				Modular	R	GYHR2525M00-M25R	●	GYM25RA-J25	●	B
					L	GYHL2525M00-M25L	●	GYM25LA-J25	●	B
				Modular	R	GYHR3225P00-M25R	●	GYM25RA-J25	●	F
					L	GYHL3225P00-M25L	●	GYM25LA-J25	●	F
				Modular	R	GYHR3232P00-M25R	●	GYM25RA-J25	●	F
					L	GYHL3232P00-M25L	●	GYM25LA-J25	●	F

✶1 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.
✶2 The maximum cut off diameter **CUTDIA** varies according to the insert used. The cut off diameter is double the maximum groove depth (**CDX**) of inserts on pages F012—F014.
✶3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2** and **WF** values may vary.

● : **Inventory maintained in Japan.**



Right hand tool holder shown.

∗ Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench ∗
GYQR/L○○○○○○○○-○○○	HSC05030 (Clamp Torque : 7.0N·m)	—	HKY40R
GYHR/L○○○○○○○○-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D

Dimensions (mm) ∗3								Cutting Mode	
H	B	LF	LH	LH 2	HF	WF	HBH	Clockwise	Anticlockwise
20	20	125	41	—	20	20.35	—	R	
20	20	125	41	—	20	20.35	—		
20	20	119	33	54	20	26	5		
20	20	119	33	54	20	26	5		
25	25	150	41	—	25	25.35	—		
25	25	150	41	—	25	25.35	—		
25	25	144	33	51	25	28	—		
25	25	144	33	51	25	28	—		
32	25	164	33	51	32	28	—		
32	25	164	33	51	32	28	—		
32	32	164	33	51	32	35	—		
32	32	164	33	51	32	35	—		
20	20	125	39	60	20	26	5		
20	20	125	39	60	20	26	5		
25	25	150	39	57	25	28	—		
25	25	150	39	57	25	28	—		
32	25	170	39	57	32	28	—		
32	25	170	39	57	32	28	—		
32	32	170	39	57	32	35	—		
32	32	170	39	57	32	35	—		
20	20	125	46	—	20	20.35	4	L	
20	20	125	46	—	20	20.35	4		
20	20	136	50	71	20	26	5		
20	20	136	50	71	20	26	5		
25	25	150	46	—	25	25.35	—		
25	25	150	46	—	25	25.35	—		
25	25	161	50	68	25	28	—		
25	25	161	50	68	25	28	—		
32	25	181	50	68	32	28	—		
32	25	181	50	68	32	28	—		
32	32	181	50	68	32	35	—		
32	32	181	50	68	32	35	—		

Insert selection

Seat Size	Geometry name
J	GY○○0600/0631/0635J○○○○–Breaker shown below

For grooving/cutting off breaker ➤ F012

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	05-GM (Cutting off)	GFGS (Hardened steel)
		Neutral	Neutral	Neutral	With hand	Neutral
J	6.00mm	●	●	●		
	6.35mm	●	●	●		

For multifunctional grooving breaker ➤ F013, F014

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing)
					Ball shape
J	6.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	6.31mm	●			
	6.35mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			

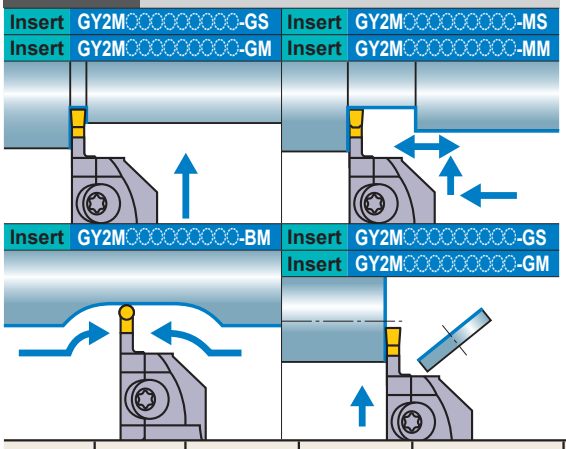
● : Standard insert with dimensions

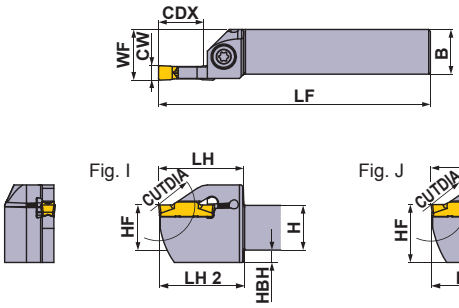
GROOVING

IDENTIFICATION ➤ F010, F011
CUTTING CONDITIONS ➤ F102
CAUTION FOR USE ➤ F106

GY SERIES (EXTERNAL GROOVING)

1 00° type holder





Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number				Fig.
						Holder	Stock	Modular Blade	Stock	
K	8.00	25 ∗1	50 ∗2	Mono Block	R	**GYPR2525M00-K25**	●	—	—	I
					L	**GYPL2525M00-K25**	●	—	—	I
				Mono Block	R	**GYPR3225P00-K25**	●	—	—	J
					L	**GYPL3225P00-K25**	●	—	—	J
				Mono Block	R	**GYPR3232P00-K25**	●	—	—	K
					L	**GYPL3232P00-K25**	●	—	—	K

∗1 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.
∗2 The maximum cut off diameter **CUTDIA** varies according to the insert used. The cut off diameter is double the maximum groove depth (**CDX**) of inserts on pages F012—F014.
∗3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2** and **WF** values may vary.

● : **Inventory maintained in Japan.**

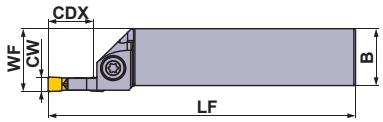
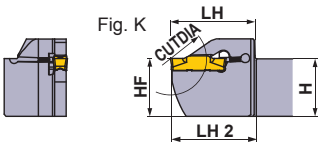


Fig. K



Right hand tool holder shown.

SPARE PARTS

Holder	 Clamp Screw	 Wrench
GYPR/L○○○○○00-K25	GY06013M (Clamp Torque : 6.0N·m)	TKY30R

Dimensions (mm) *3								Cutting Mode	
H	B	LF	LH	LH 2	HF	WF	HBH	Clockwise	Anticlockwise
25	25	150	47	48	25	28	7	R	
25	25	150	47	48	25	28	7		
32	25	170	47	48	32	28	—		
32	25	170	47	48	32	28	—		
32	32	170	47	48	32	35	—		
32	32	170	47	48	32	35	—		
								L	

Insert selection

Seat Size	Geometry name
K	GY○○0800K○○○○–Breaker shown below

For grooving/cutting off breaker ➤ F012

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	05-GM (Cutting off)	GFGS (Hardened steel)
		Neutral	Neutral	Neutral	With hand	Neutral
K	8.00mm		●	●		

For multifunctional grooving breaker ➤ F013, F014

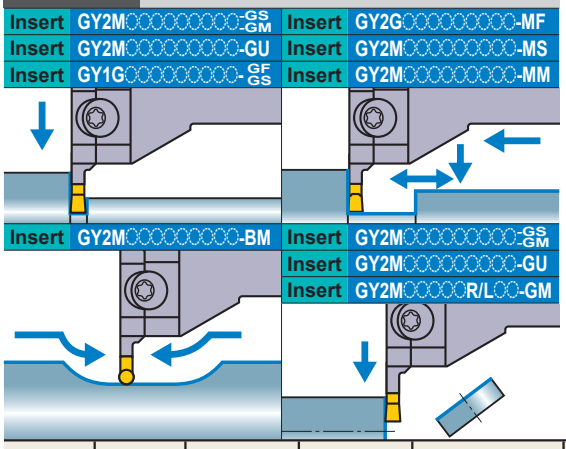
Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing)
					Ball shape
K	8.00mm				●
	RE 0.8		●	●	
	RE 1.2			●	

● : Standard insert with dimensions

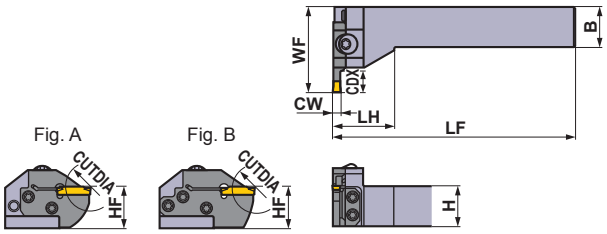
IDENTIFICATION ➤ F010, F011
CUTTING CONDITIONS ➤ F102
CAUTION FOR USE ➤ F106

GY SERIES (EXTERNAL GROOVING)

2 90° type holder



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.



Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number				Fig.
						Holder	Stock	Modular Blade	Stock	
D	2.00 2.24	6	12	Modular	R	**GYHR2020K90-M20L**	●	**GYM20LA-D06**	●	A
					L	**GYHL2020K90-M20R**	●	**GYM20RA-D06**	●	A
				Modular	R	**GYHR2525M90-M25L**	●	**GYM25LA-D06**	●	A
					L	**GYHL2525M90-M25R**	●	**GYM25RA-D06**	●	A
		10	20	Modular	R	**GYHR2020K90-M20L**	●	**GYM20LA-D10**	●	A
					L	**GYHL2020K90-M20R**	●	**GYM20RA-D10**	●	A
		12	24	Modular	R	**GYHR2525M90-M25L**	●	**GYM25LA-D12**	●	A
					L	**GYHL2525M90-M25R**	●	**GYM25RA-D12**	●	A
		18 ✶4	36	Modular	R	**GYHR2020K90-M20L**	●	**GYM20LB-D18**	●	B
					L	**GYHL2020K90-M20R**	●	**GYM20RB-D18**	●	B
		20 ✶1	40 ✶2	Modular	R	**GYHR2525M90-M25L**	●	**GYM25LA-D20**	●	B
					L	**GYHL2525M90-M25R**	●	**GYM25RA-D20**	●	B
E	2.39 2.50 2.74	6	12	Modular	R	**GYHR2020K90-M20L**	●	**GYM20LA-E06**	●	A
					L	**GYHL2020K90-M20R**	●	**GYM20RA-E06**	●	A
				Modular	R	**GYHR2525M90-M25L**	●	**GYM25LA-E06**	●	A
					L	**GYHL2525M90-M25R**	●	**GYM25RA-E06**	●	A
		10	20	Modular	R	**GYHR2020K90-M20L**	●	**GYM20LA-E10**	●	A
					L	**GYHL2020K90-M20R**	●	**GYM20RA-E10**	●	A
		12	24	Modular	R	**GYHR2525M90-M25L**	●	**GYM25LA-E12**	●	A
					L	**GYHL2525M90-M25R**	●	**GYM25RA-E12**	●	A
		18 ✶4	36	Modular	R	**GYHR2020K90-M20L**	●	**GYM20LB-E18**	●	B
					L	**GYHL2020K90-M20R**	●	**GYM20RB-E18**	●	B
		20 ✶1	40 ✶2	Modular	R	**GYHR2525M90-M25L**	●	**GYM25LA-E20**	●	B
					L	**GYHL2525M90-M25R**	●	**GYM25RA-E20**	●	B

✶1 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.
✶2 The maximum cut off diameter **CUTDIA** varies according to the insert used. The cut off diameter is double the maximum groove depth (**CDX**) of inserts on pages F012—F014.
✶3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH** and **WF** values may vary.
✶4 The maximum groove depth is limited by the workpiece diameter. For details, please refer to page F104.

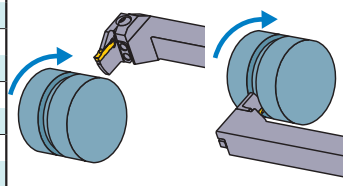
● : **Inventory maintained in Japan.**

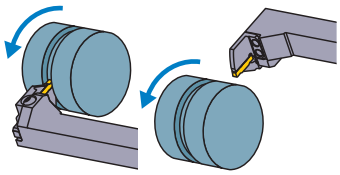
∗ Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench ∗
GYHR2020K90-M20L	GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYHL2020K90-M20R			
GYHR2525M90-M25L		TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHL2525M90-M25R			

	Dimensions (mm) ∗3						Cutting Mode
	H	B	LF	LH	HF	WF	
	20	20	125	35	20	39	R
	20	20	125	35	20	39	
	25	25	150	38	25	45	
	25	25	150	38	25	45	
	20	20	125	35	20	45	
	20	20	125	35	20	45	
	25	25	150	38	25	53	
	25	25	150	38	25	53	
	20	20	125	35	20	51	
	20	20	125	35	20	51	
	25	25	150	38	25	59	
	25	25	150	38	25	59	
	20	20	125	35	20	39	L
	20	20	125	35	20	39	
	25	25	150	38	25	45	
	25	25	150	38	25	45	
	20	20	125	35	20	45	
	20	20	125	35	20	45	
	25	25	150	38	25	53	
	25	25	150	38	25	53	
	20	20	125	35	20	51	
	20	20	125	35	20	51	
	25	25	150	38	25	59	
	25	25	150	38	25	59	





Insert selection

Seat Size	Geometry name
D	GY○○0200/0224D○○○○–Breaker shown below
E	GY○○0239/0250/0274E○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	05-GM (Cutting off)	GFGS (Hardened steel)
		Neutral	Neutral	Neutral	With hand	Neutral
D	2.00mm	●	●	●	●	●
E	2.39mm	●	●	●		●
	2.50mm	●	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

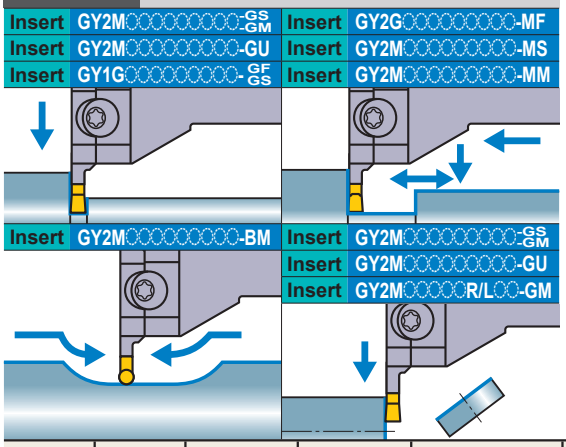
Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing)
					Ball shape
D	2.00mm	●	●	●	●
	2.24mm	●			
E	2.39mm	●			
	2.50mm	●	●	●	●
	2.74mm	●			

● : Standard insert with dimensions

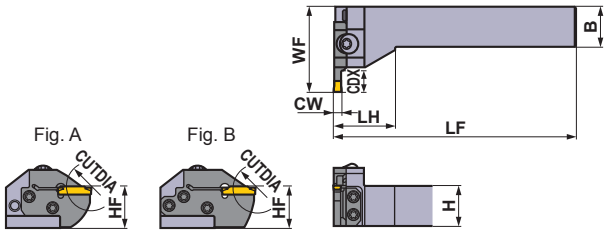
IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F102
CAUTION FOR USE ➢ F106

GY SERIES (EXTERNAL GROOVING)

2 90° type holder



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.



Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number				Fig.
						Holder	Stock	Modular Blade	Stock	
F	3.00 3.18 3.24	6	12	Modular	R	GYHR2020K90-M20L	●	GYM20LA-F06	●	A
					L	GYHL2020K90-M20R	●	GYM20RA-F06	●	A
				Modular	R	GYHR2525M90-M25L	●	GYM25LA-F06	●	A
					L	GYHL2525M90-M25R	●	GYM25RA-F06	●	A
		10	20	Modular	R	GYHR2020K90-M20L	●	GYM20LA-F10	●	A
					L	GYHL2020K90-M20R	●	GYM20RA-F10	●	A
		12	24	Modular	R	GYHR2525M90-M25L	●	GYM25LA-F12	●	A
					L	GYHL2525M90-M25R	●	GYM25RA-F12	●	A
		18 ✶4	36	Modular	R	GYHR2020K90-M20L	●	GYM20LB-F18	●	B
					L	GYHL2020K90-M20R	●	GYM20RB-F18	●	B
		20 ✶1	40 ✶2	Modular	R	GYHR2525M90-M25L	●	GYM25LA-F20	●	B
					L	GYHL2525M90-M25R	●	GYM25RA-F20	●	B
G	4.00 4.24	8	16	Modular	R	GYHR2525M90-M25L	●	GYM25LA-G08	●	A
					L	GYHL2525M90-M25R	●	GYM25RA-G08	●	A
		12	24	Modular	R	GYHR2020K90-M20L	●	GYM20LA-G12	●	A
					L	GYHL2020K90-M20R	●	GYM20RA-G12	●	A
		14	28	Modular	R	GYHR2525M90-M25L	●	GYM25LA-G14	●	A
					L	GYHL2525M90-M25R	●	GYM25RA-G14	●	A
		25 ✶1	50 ✶2	Modular	R	GYHR2525M90-M25L	●	GYM25LA-G25	●	B
					L	GYHL2525M90-M25R	●	GYM25RA-G25	●	B

✶1 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.
✶2 The maximum cut off diameter **CUTDIA** varies according to the insert used. The cut off diameter is double the maximum groove depth (**CDX**) of inserts on pages F012—F014.
✶3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH** and **WF** values may vary.
✶4 The maximum groove depth is limited by the workpiece diameter. For details, please refer to page F104.

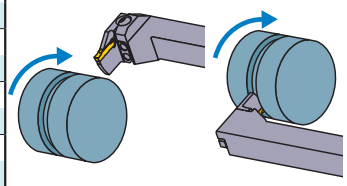
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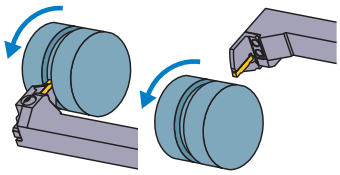
∗ Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench ∗
GYHR2020K90-M20L	GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYHL2020K90-M20R			
GYHR2525M90-M25L		TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHL2525M90-M25R			

	Dimensions (mm) ∗3						Cutting Mode
	H	B	LF	LH	HF	WF	
	20	20	125	35	20	39	R
	20	20	125	35	20	39	
	25	25	150	38	25	45	
	25	25	150	38	25	45	
	20	20	125	35	20	45	
	20	20	125	35	20	45	
	25	25	150	38	25	53	
	25	25	150	38	25	53	
	20	20	125	35	20	51	
	20	20	125	35	20	51	
	25	25	150	38	25	59	
	25	25	150	38	25	59	
	25	25	150	38	25	47	L
	25	25	150	38	25	47	
	20	20	125	35	20	45	
	20	20	125	35	20	45	
	25	25	150	38	25	53	
	25	25	150	38	25	53	
	25	25	150	38	25	64	
	25	25	150	38	25	64	





Insert selection

Seat Size	Geometry name
F	GY○○0300/0318/0324F○○○○–Breaker shown below
G	GY○○0400/0424G○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	05-GM (Cutting off)	GFGS (Hardened steel)
		Neutral	Neutral	Neutral	With hand	Neutral
F	3.00mm	●	●	●	●	●
	3.18mm	●	●	●		●
G	4.00mm	●	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

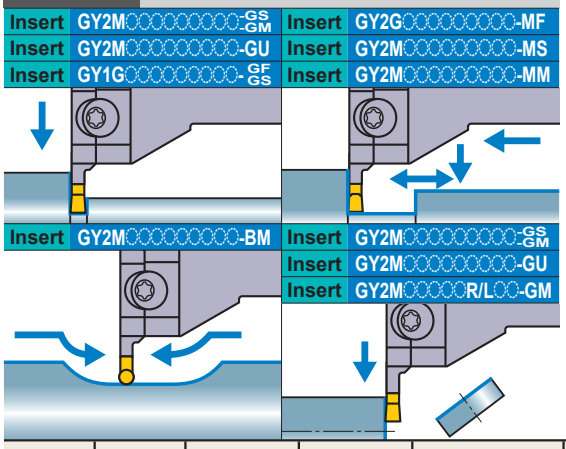
Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing)
					Ball shape
F	3.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8			●	
	3.18mm				●
	RE 0.2	●			
	RE 0.4	●			
	3.24mm	●			
G	4.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8	●		●	
	4.24mm	●			

● : Standard insert with dimensions

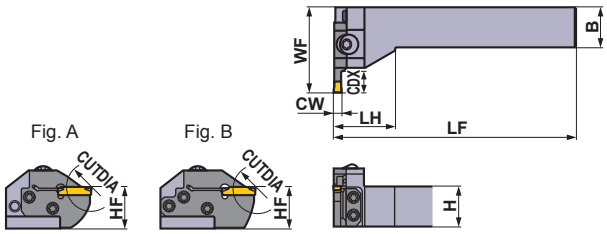
IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F102
CAUTION FOR USE ➢ F106

GY SERIES (EXTERNAL GROOVING)

2 90° type holder



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.



Right hand tool holder shown.

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number Holder	Stock	Order Number Modular Blade	Stock	Fig.
H	4.75 5.00 5.24	8	16	Modular	R	GYHR2525M90-M25L	●	GYM25LA-H08	●	A
					L	GYHL2525M90-M25R	●	GYM25RA-H08	●	A
		12	24	Modular	R	GYHR2020K90-M20L	●	GYM20LA-H12	●	A
					L	GYHL2020K90-M20R	●	GYM20RA-H12	●	A
		14	28	Modular	R	GYHR2525M90-M25L	●	GYM25LA-H14	●	A
					L	GYHL2525M90-M25R	●	GYM25RA-H14	●	A
		25 ✶1	50 ✶2	Modular	R	GYHR2525M90-M25L	●	GYM25LA-H25	●	B
					L	GYHL2525M90-M25R	●	GYM25RA-H25	●	B
J	6.00 6.31 6.35	8	16	Modular	R	GYHR2525M90-M25L	●	GYM25LA-J08	●	A
					L	GYHL2525M90-M25R	●	GYM25RA-J08	●	A
		14	28	Modular	R	GYHR2525M90-M25L	●	GYM25LA-J14	●	A
					L	GYHL2525M90-M25R	●	GYM25RA-J14	●	A
		25 ✶1	50 ✶2	Modular	R	GYHR2525M90-M25L	●	GYM25LA-J25	●	B
					L	GYHL2525M90-M25R	●	GYM25RA-J25	●	B

✶1 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.
✶2 The maximum cut off diameter **CUTDIA** varies according to the insert used. The cut off diameter is double the maximum groove depth (**CDX**) of inserts on pages F012—F014.
✶3 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH** and **WF** values may vary.

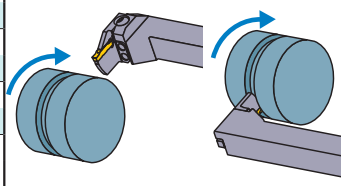
● : Inventory maintained in Japan.

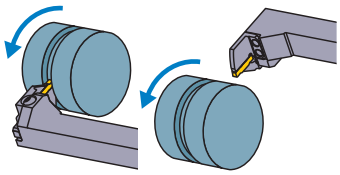
∗ Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder Number	Clamp Screw	Blade Screw (5 pcs.)	Wrench ∗
GYHR2020K90-M20L	GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYHL2020K90-M20R			
GYHR2525M90-M25L		TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHL2525M90-M25R			

	Dimensions (mm) ∗3						Cutting Mode
	H	B	LF	LH	HF	WF	
	25	25	150	38	25	47	R
	25	25	150	38	25	47	
	20	20	125	35	20	45	
	20	20	125	35	20	45	
	25	25	150	38	25	53	
	25	25	150	38	25	53	
	25	25	150	38	25	64	
	25	25	150	38	25	64	
	25	25	150	38	25	47	L
	25	25	150	38	25	47	
	25	25	150	38	25	53	
	25	25	150	38	25	53	
	25	25	150	38	25	64	
	25	25	150	38	25	64	





Insert selection

Seat Size	Geometry name
H	GY○○0475/0500/0524H○○○○–Breaker shown below
J	GY○○0600/0631/0635J○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	05-GM (Cutting off)	GFGS (Hardened steel)
		Neutral	Neutral	Neutral	With hand	Neutral
H	4.75mm	●	●	●		●
	5.00mm	●	●	●	●	●
J	6.00mm	●	●	●		
	6.35mm	●	●	●		

For multifunctional grooving breaker ➢ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying, Recessing)
					Ball shape
H	4.75mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			
	5.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	5.24mm	●			
J	6.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	6.31mm	●			
	6.35mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			

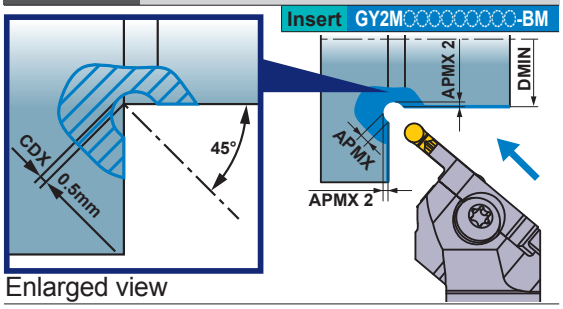
● : Standard insert with dimensions

IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F102
CAUTION FOR USE ➢ F106

GY SERIES (FOR EXTERNAL RECESSING)

3 For 50° recessing holder NEW

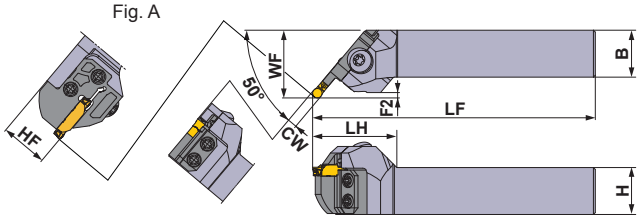
Insert GY2M○○○○○○○○-BM



Enlarged view

(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.

Fig. A



Right hand tool holder shown.

Seat Size	CW	CDX	DMIN	APMX	APMX 2	Type	Hand (R/L)	Order Number Holder	Stock	Order Number Modular Blade	Stock	Fig.
D	2.00	0.5	30	1.5	0.646	Modular	R	GYHR2020K50-M20L	●	GYM20LC-D005	●	A
							L	GYHL2020K50-M20R	●	GYM20RC-D005	●	A
						Modular	R	GYHR2525M50-M25L	●	GYM25LC-D005	●	A
							L	GYHL2525M50-M25R	●	GYM25RC-D005	●	A
E	2.50			1.75	0.72	Modular	R	GYHR2020K50-M20L	●	GYM20LC-E005	●	A
							L	GYHL2020K50-M20R	●	GYM20RC-E005	●	A
						Modular	R	GYHR2525M50-M25L	●	GYM25LC-E005	●	A
							L	GYHL2525M50-M25R	●	GYM25RC-E005	●	A
F	3.00 3.18			2	0.793	Modular	R	GYHR2020K50-M20L	●	GYM20LC-F005	●	A
							L	GYHL2020K50-M20R	●	GYM20RC-F005	●	A
						Modular	R	GYHR2525M50-M25L	●	GYM25LC-F005	●	A
							L	GYHL2525M50-M25R	●	GYM25RC-F005	●	A
G	4.00		20	2.5	0.939	Modular	R	GYHR2020K50-M20L	●	GYM20LC-G005	●	A
							L	GYHL2020K50-M20R	●	GYM20RC-G005	●	A
						Modular	R	GYHR2525M50-M25L	●	GYM25LC-G005	●	A
							L	GYHL2525M50-M25R	●	GYM25RC-G005	●	A
H	4.75 5.00			2.88	1.049	Modular	R	GYHR2020K50-M20L	●	GYM20LC-H005	●	A
							L	GYHL2020K50-M20R	●	GYM20RC-H005	●	A
						Modular	R	GYHR2525M50-M25L	●	GYM25LC-H005	●	A
							L	GYHL2525M50-M25R	●	GYM25RC-H005	●	A
J	6.00 6.35			3.5	1.232	Modular	R	GYHR2525M50-M25L	●	GYM25LC-J005	●	A
							L	GYHL2525M50-M25R	●	GYM25RC-J005	●	A

∗1 Cannot be used because external and face grooving blade interferes with the work.
∗2 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF**, **LH**, **WF** and **F2** values may vary.

● : Inventory maintained in Japan.

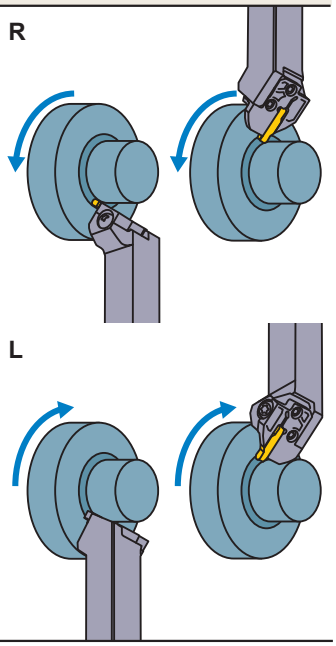
* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR/L2020K50-M20R/L	GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY25D
GYHR/L2525M50-M25R/L		TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D

Dimensions (mm) *2						
H	B	LF	LH	HF	WF	F2
20	20	125	40	20	32	1.6
20	20	125	40	20	32	1.6
25	25	150	45	25	35	1.6
25	25	150	45	25	35	1.6
20	20	125	40	20	32	1.8
20	20	125	40	20	32	1.8
25	25	150	45	25	35	1.8
25	25	150	45	25	35	1.8
20	20	125	40	20	32	2.0
20	20	125	40	20	32	2.0
25	25	150	45	25	35	2.0
25	25	150	45	25	35	2.0
20	20	125	40	20	32	2.4
20	20	125	40	20	32	2.4
25	25	150	45	25	35	2.4
25	25	150	45	25	35	2.4
20	20	125	40	20	33	2.8
20	20	125	40	20	33	2.8
25	25	150	45	25	36	2.8
25	25	150	45	25	36	2.8
25	25	150	44	25	36	3.4
25	25	150	44	25	36	3.4

Cutting Mode



Insert selection

Geometry name
GY2M○○○○○○○○○N-BM

For multifunctional grooving breaker ➤ F014		
Seat Size	Breaker / CW	BM (Copying, Recessing) Ball shape
D	2.00mm	●
E	2.50mm	●
F	3.00mm	●
	3.18mm	●
G	4.00mm	●
H	4.75mm	●
	5.00mm	●
J	6.00mm	●
	6.35mm	●

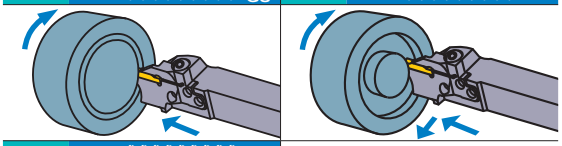
● : Standard insert with dimensions

IDENTIFICATION ➤ F010, F011
CUTTING CONDITIONS ➤ F105
CAUTION FOR USE ➤ F105

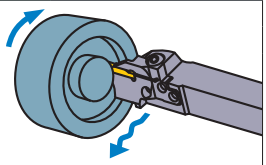
GY SERIES (FACE GROOVING)

4 00° type holder

Insert GY2M○○○○○○○○○-GS/GM
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-GU
Insert GY2M○○○○○○○○○-MS
Insert GY1G○○○○○○○○○-GF/GS
Insert GY2M○○○○○○○○○-MM



Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

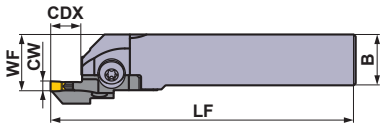


Fig. A

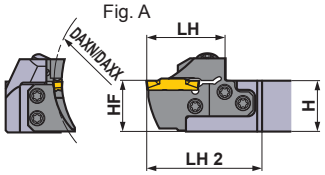
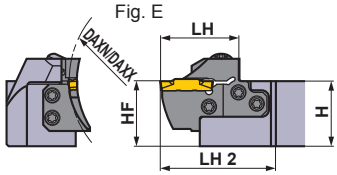


Fig. E



Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number				Fig.
							Holder	Stock	Modular Blade	Stock	
D	2.00 2.24	40	50	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-D12-040	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-D12-040	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-D12-040	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-D12-040	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-D12-040	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-D12-040	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-D12-040	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-D12-040	●	E
		50	60	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-D12-050	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-D12-050	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-D12-050	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-D12-050	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-D12-050	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-D12-050	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-D12-050	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-D12-050	●	E
		60	75	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-D12-060	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-D12-060	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-D12-060	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-D12-060	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-D12-060	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-D12-060	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-D12-060	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-D12-060	●	E
		75	100	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-D12-075	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-D12-075	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-D12-075	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-D12-075	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-D12-075	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-D12-075	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-D12-075	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-D12-075	●	E

∗1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.

● : Inventory maintained in Japan.

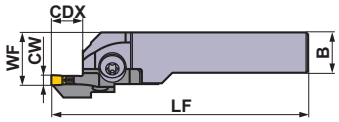
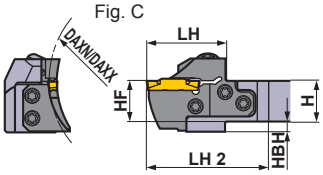


Fig. C



Right hand tool holder shown.

∗ Wrench : ① : Clamp Screw, ② : Blade Screw

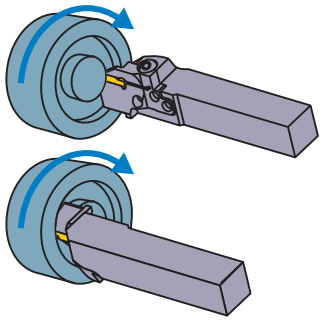
SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench ∗
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

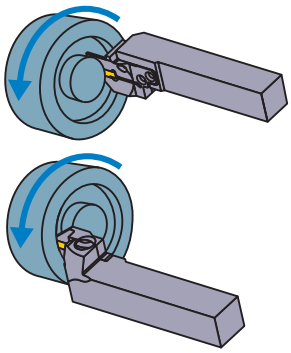
Dimensions (mm) ∗1							
H	B	LF	LH	LH 2	HF	WF	HBH
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—

Cutting Mode

R



L



Insert selection

Seat Size	Geometry name
D	GY○○0200/0224D○○○○−Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
D	2.00mm	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
D	2.00mm	●	●	●	●
	2.24mm	●			

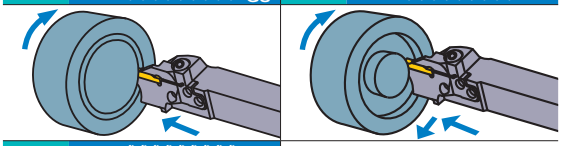
● : Standard insert with dimensions

IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F110
CAUTION FOR USE ➢ F112

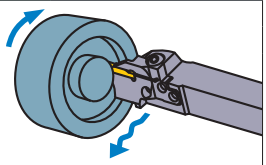
GY SERIES (FACE GROOVING)

4 00° type holder

Insert GY2M○○○○○○○○○-GS/GM
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-GU
Insert GY2M○○○○○○○○○-MS
Insert GY1G○○○○○○○○○-GF/GS
Insert GY2M○○○○○○○○○-MM



Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

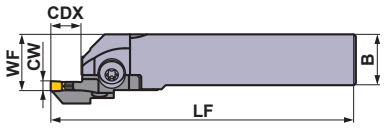


Fig. A

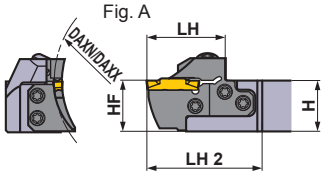
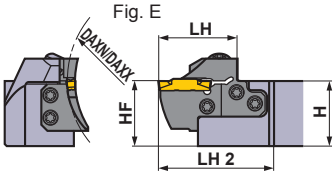


Fig. E



Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number				Fig.
							Holder	Stock	Modular Blade	Stock	
D	2.00 2.24	100	150	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-D12-100	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-D12-100	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-D12-100	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-D12-100	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-D12-100	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-D12-100	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-D12-100	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-D12-100	●	E
		135	200	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-D12-135	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-D12-135	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-D12-135	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-D12-135	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-D12-135	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-D12-135	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-D12-135	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-D12-135	●	E
		180	250	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-D12-180	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-D12-180	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-D12-180	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-D12-180	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-D12-180	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-D12-180	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-D12-180	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-D12-180	●	E

∗1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.

● : Inventory maintained in Japan.

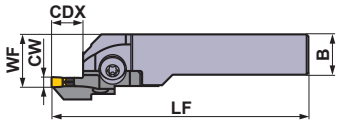
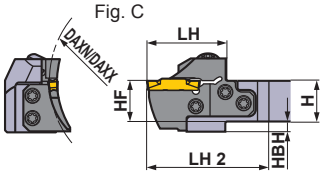


Fig. C



Right hand tool holder shown.

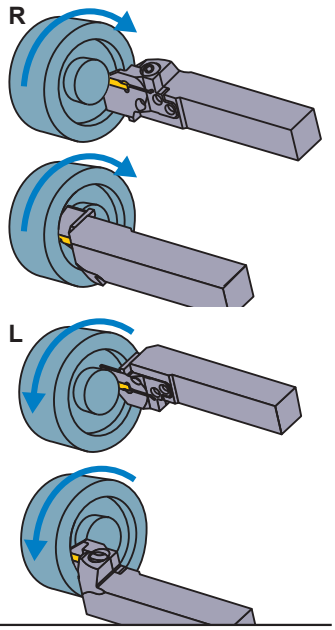
∗ Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench ∗
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

Dimensions (mm) ∗1							
H	B	LF	LH	LH 2	HF	WF	HBH
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—

Cutting Mode



Insert selection

Seat Size	Geometry name
D	GY○○0200/0224D○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
D	2.00mm	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
D	2.00mm	●	●	●	●
	2.24mm	●			

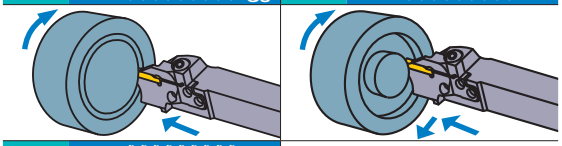
● : Standard insert with dimensions

IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F110
CAUTION FOR USE ➢ F112

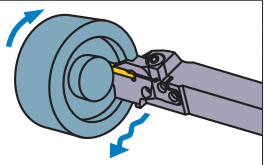
GY SERIES (FACE GROOVING)

4 00° type holder

Insert GY2M○○○○○○○○○-GS/GM
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-GU
Insert GY2M○○○○○○○○○-MS
Insert GY1G○○○○○○○○○-GF/GS
Insert GY2M○○○○○○○○○-MM



Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

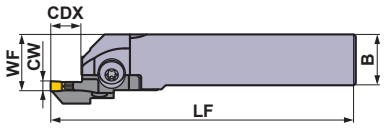


Fig. A

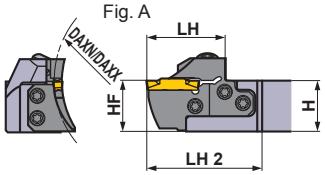
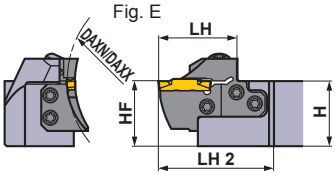


Fig. E



Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number				Fig.
							Holder	Stock	Modular Blade	Stock	
E	2.39 2.50 2.74	40	50	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-E12-040	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-E12-040	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-E12-040	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-E12-040	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-E12-040	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-E12-040	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-E12-040	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-E12-040	●	E
		50	60	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-E12-050	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-E12-050	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-E12-050	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-E12-050	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-E12-050	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-E12-050	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-E12-050	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-E12-050	●	E
		60	75	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-E12-060	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-E12-060	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-E12-060	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-E12-060	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-E12-060	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-E12-060	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-E12-060	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-E12-060	●	E
		75	100	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-E12-075	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-E12-075	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-E12-075	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-E12-075	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-E12-075	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-E12-075	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-E12-075	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-E12-075	●	E

∗1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.

● : Inventory maintained in Japan.

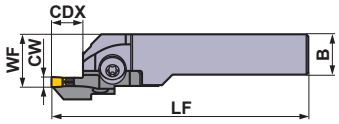
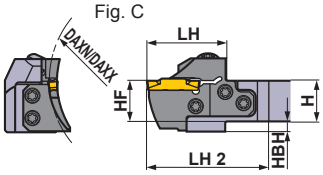


Fig. C



Right hand tool holder shown.

∗ Wrench : ① : Clamp Screw, ② : Blade Screw

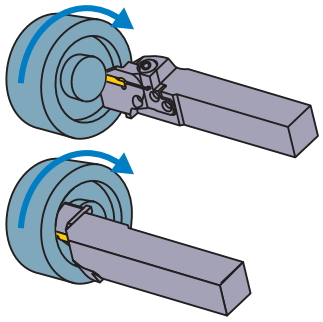
SPARE PARTS

Holder Number	Clamp Screw	Blade Screw (5 pcs.)	Wrench ∗
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

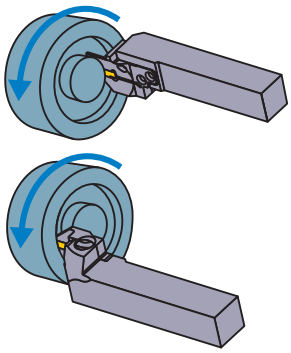
Dimensions (mm) ∗1							
H	B	LF	LH	LH 2	HF	WF	HBH
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—

Cutting Mode

R



L



Insert selection

Seat Size	Geometry name
E	GY○○0239/0250/0274E○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
E	2.39mm	●	●	●	●
	2.50mm	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying) Ball shape
E	2.39mm	●			
	2.50mm	●	●	●	●
	2.74mm	●			

● : Standard insert with dimensions

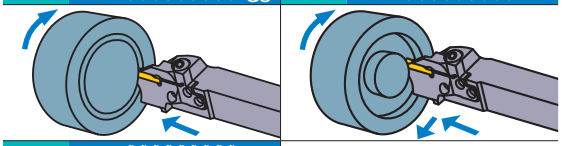
GROOVING

IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F110
CAUTION FOR USE ➢ F112

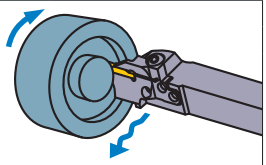
GY SERIES (FACE GROOVING)

4 00° type holder

Insert GY2M○○○○○○○○○-GS/GM
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-GU
Insert GY2M○○○○○○○○○-MS
Insert GY1G○○○○○○○○○-GF/GS
Insert GY2M○○○○○○○○○-MM



Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

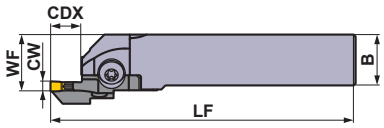


Fig. A

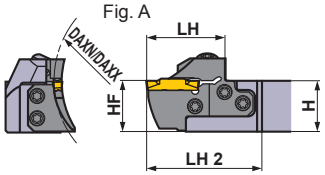
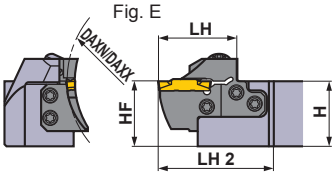


Fig. E



Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Order Number Modular Blade	Stock	Fig.
E	2.39 2.50 2.74	100	150	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-E12-100	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-E12-100	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-E12-100	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-E12-100	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-E12-100	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-E12-100	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-E12-100	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-E12-100	●	E
		135	200	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-E12-135	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-E12-135	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-E12-135	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-E12-135	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-E12-135	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-E12-135	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-E12-135	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-E12-135	●	E
		180	250	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-E12-180	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-E12-180	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-E12-180	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-E12-180	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-E12-180	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-E12-180	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-E12-180	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-E12-180	●	E

∗1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.

● : Inventory maintained in Japan.

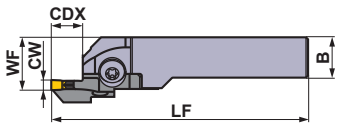
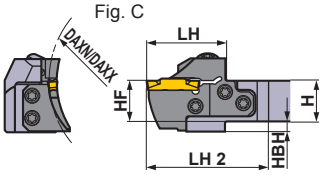


Fig. C



Right hand tool holder shown.

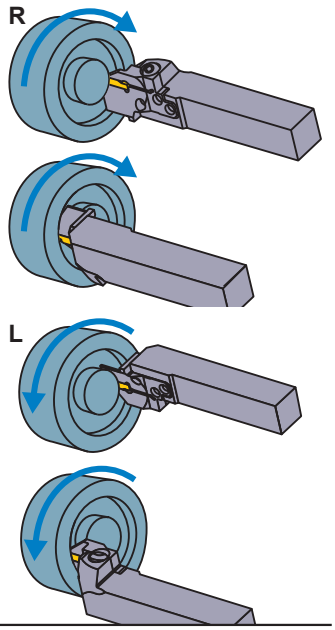
∗ Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench ∗
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

Dimensions (mm) ∗1							
H	B	LF	LH	LH 2	HF	WF	HBH
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—

Cutting Mode



Insert selection

Seat Size	Geometry name
E	GY○○0239/0250/0274E○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
E	2.39mm	●	●	●	●
	2.50mm	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
E	2.39mm	●			
	2.50mm	●	●	●	●
	2.74mm	●			

● : Standard insert with dimensions

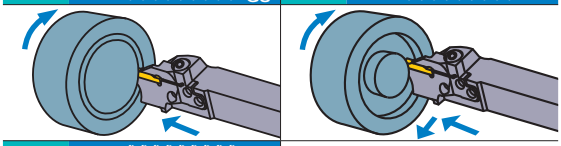
GROOVING

IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F110
CAUTION FOR USE ➢ F112

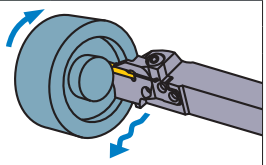
GY SERIES (FACE GROOVING)

4 00° type holder

Insert GY2M○○○○○○○○○-GS/GM
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-GU
Insert GY2M○○○○○○○○○-MS
Insert GY1G○○○○○○○○○-GF/GS
Insert GY2M○○○○○○○○○-MM



Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

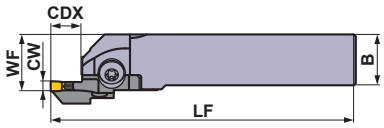


Fig. A

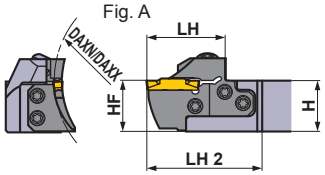
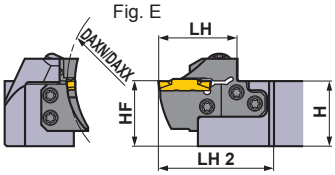


Fig. E



Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Order Number Modular Blade	Stock	Fig.
F	3.00 3.18 3.24	35	40	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F12-035	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-F12-035	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F12-035	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-F12-035	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F12-035	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-F12-035	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F12-035	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-F12-035	●	E
		40	50	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F12-040	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-F12-040	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F12-040	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-F12-040	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F12-040	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-F12-040	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F12-040	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-F12-040	●	E
		50	60	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F12-050	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-F12-050	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F12-050	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-F12-050	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F12-050	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-F12-050	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F12-050	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-F12-050	●	E

∗1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.

● : Inventory maintained in Japan.

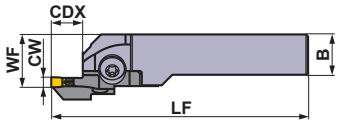
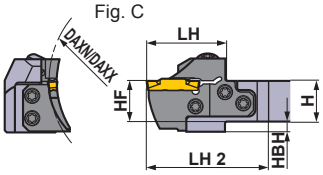


Fig. C



Right hand tool holder shown.

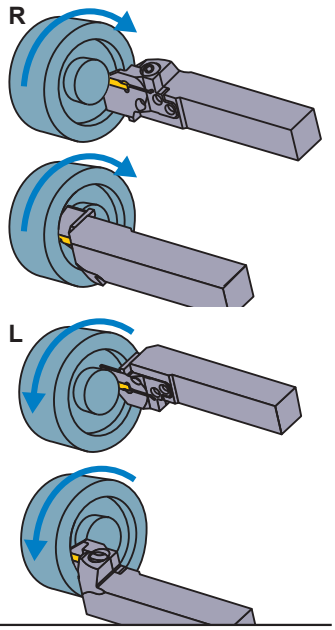
∗ Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench ∗
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

Dimensions (mm) ∗1							
H	B	LF	LH	LH 2	HF	WF	HBH
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—

Cutting Mode



Insert selection

Seat Size	Geometry name
F	GY○○0300/0318/0324F○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
F	3.00mm	●	●	●	●
	3.18mm	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
F	3.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8			●	
	3.18mm				●
	RE 0.2	●			
	RE 0.4	●			
	3.24mm	●			

● : Standard insert with dimensions

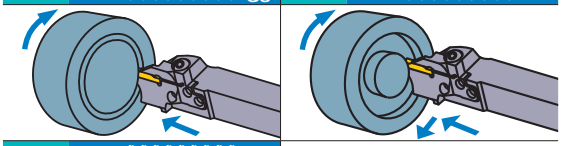
GROOVING

IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F110
CAUTION FOR USE ➢ F112

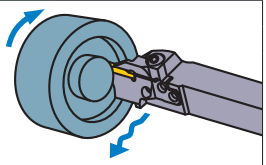
GY SERIES (FACE GROOVING)

4 00° type holder

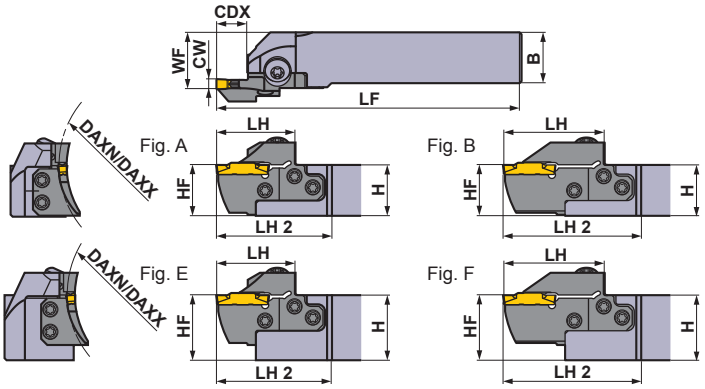
Insert GY2M○○○○○○○○○-GS-GM
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-GU
Insert GY2M○○○○○○○○○-MS
Insert GY1G○○○○○○○○○-GF-GS
Insert GY2M○○○○○○○○○-MM



Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

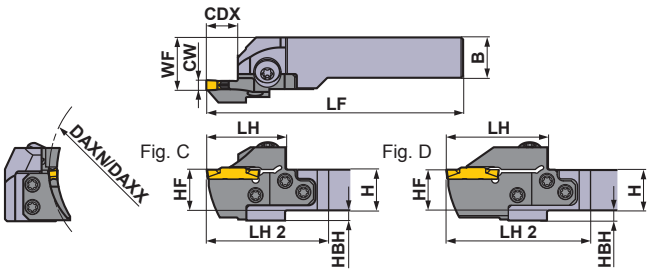


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Order Number Modular Blade	Stock	Fig.
F	3.00 3.18 3.24	60	75	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F12-060	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-F12-060	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F12-060	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-F12-060	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F12-060	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-F12-060	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F12-060	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-F12-060	●	E
				20 ⁎2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F20-060	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-F20-060	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F20-060	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-F20-060	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F20-060	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-F20-060	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F20-060	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-F20-060	●	F
		75	100	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F12-075	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-F12-075	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F12-075	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-F12-075	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F12-075	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-F12-075	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F12-075	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-F12-075	●	E
				20 ⁎2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F20-075	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-F20-075	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F20-075	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-F20-075	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F20-075	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-F20-075	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F20-075	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-F20-075	●	F

⁎1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
⁎2 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.

● : Inventory maintained in Japan.



Right hand tool holder shown.

∗ Wrench : ① : Clamp Screw, ② : Blade Screw

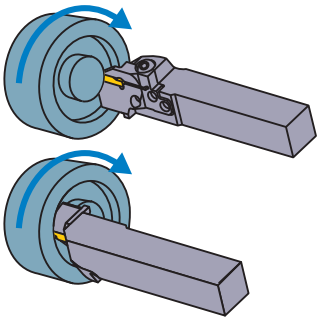
SPARE PARTS

Holder	Clamp Screw	Blade Screw 5 pcs.	Wrench ∗
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

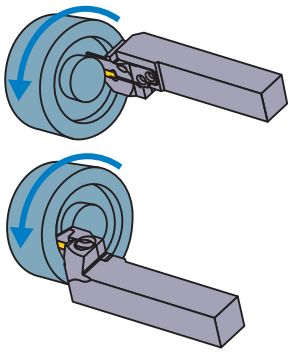
Dimensions (mm) ∗1							
H	B	LF	LH	LH 2	HF	WF	HBH
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	131	45	66	20	26	5
20	20	131	45	66	20	26	5
25	25	156	45	63	25	28	—
25	25	156	45	63	25	28	—
32	25	176	45	63	32	28	—
32	25	176	45	63	32	28	—
32	32	176	45	63	32	35	—
32	32	176	45	63	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	131	45	66	20	26	5
20	20	131	45	66	20	26	5
25	25	156	45	63	25	28	—
25	25	156	45	63	25	28	—
32	25	176	45	63	32	28	—
32	25	176	45	63	32	28	—
32	32	176	45	63	32	35	—
32	32	176	45	63	32	35	—

Cutting Mode

R



L



Insert selection

Seat Size	Geometry name
F	GY○○0300/0318/0324F○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
F	3.00mm	●	●	●	●
	3.18mm	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
F	3.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8			●	
	3.18mm				●
	RE 0.2	●			
	RE 0.4	●			
	3.24mm	●			

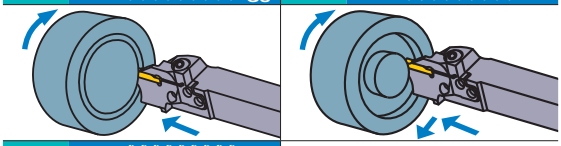
● : Standard insert with dimensions

IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F110
CAUTION FOR USE ➢ F112

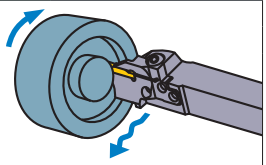
GY SERIES (FACE GROOVING)

4 00° type holder

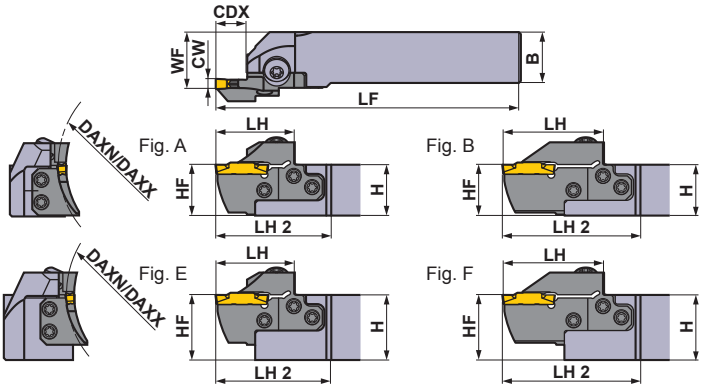
Insert GY2M○○○○○○○○○-GS/GM
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-GU
Insert GY2M○○○○○○○○○-MS
Insert GY1G○○○○○○○○○-GF/GS
Insert GY2M○○○○○○○○○-MM



Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

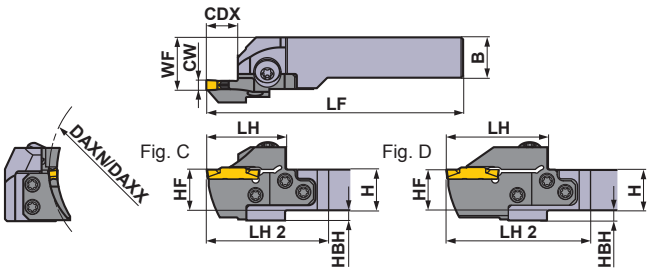


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Order Number Modular Blade	Stock	Fig.
F	3.00 3.18 3.24	100	150	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F12-100	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-F12-100	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F12-100	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-F12-100	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F12-100	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-F12-100	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F12-100	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-F12-100	●	E
				20 ✶2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F20-100	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-F20-100	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F20-100	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-F20-100	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F20-100	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-F20-100	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F20-100	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-F20-100	●	F
		135	200	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F12-135	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-F12-135	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F12-135	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-F12-135	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F12-135	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-F12-135	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F12-135	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-F12-135	●	E
				20 ✶2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F20-135	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-F20-135	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F20-135	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-F20-135	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F20-135	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-F20-135	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F20-135	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-F20-135	●	F

✶1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
✶2 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.

● : Inventory maintained in Japan.



Right hand tool holder shown.

∗ Wrench : ① : Clamp Screw, ② : Blade Screw

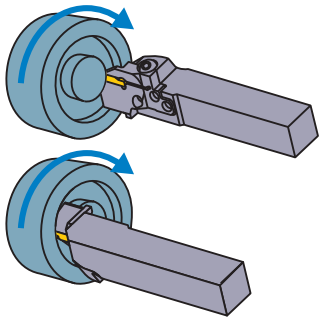
SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench ∗
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

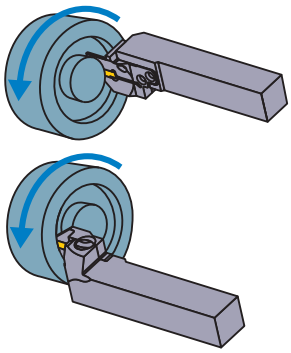
Dimensions (mm) ∗1							
H	B	LF	LH	LH 2	HF	WF	HBH
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	131	45	66	20	26	5
20	20	131	45	66	20	26	5
25	25	156	45	63	25	28	—
25	25	156	45	63	25	28	—
32	25	176	45	63	32	28	—
32	25	176	45	63	32	28	—
32	32	176	45	63	32	35	—
32	32	176	45	63	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	131	45	66	20	26	5
20	20	131	45	66	20	26	5
25	25	156	45	63	25	28	—
25	25	156	45	63	25	28	—
32	25	176	45	63	32	28	—
32	25	176	45	63	32	28	—
32	32	176	45	63	32	35	—
32	32	176	45	63	32	35	—

Cutting Mode

R



L



Insert selection

Seat Size	Geometry name
F	GY○○0300/0318/0324F○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
F	3.00mm	●	●	●	●
	3.18mm	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
F	3.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8			●	
	3.18mm				●
	RE 0.2	●			
	RE 0.4	●			
	3.24mm	●			

● : Standard insert with dimensions

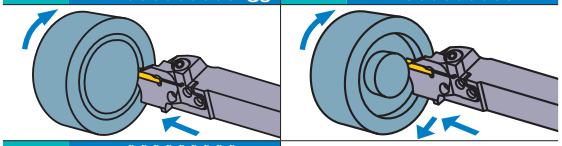
GROOVING

IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F110
CAUTION FOR USE ➢ F112

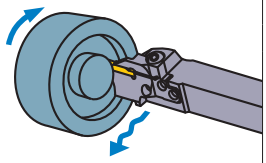
GY SERIES (FACE GROOVING)

4 00° type holder

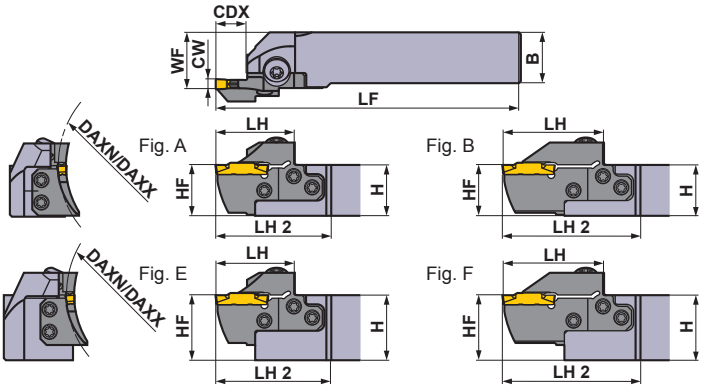
Insert GY2M○○○○○○○○○-GS-GM
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-GU
Insert GY2M○○○○○○○○○-MS
Insert GY1G○○○○○○○○○-GF-GS
Insert GY2M○○○○○○○○○-MM



Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

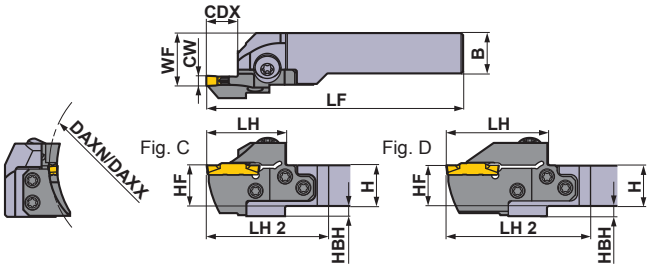


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Order Number Modular Blade	Stock	Fig.
F	3.00 3.18 3.24	180	250	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F12-180	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-F12-180	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F12-180	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-F12-180	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F12-180	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-F12-180	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F12-180	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-F12-180	●	E
				20 ⁎2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F20-180	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-F20-180	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F20-180	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-F20-180	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F20-180	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-F20-180	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F20-180	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-F20-180	●	F
		225	999	12	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F12-225	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-F12-225	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F12-225	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-F12-225	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F12-225	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-F12-225	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F12-225	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-F12-225	●	E
				20 ⁎2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-F20-225	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-F20-225	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-F20-225	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-F20-225	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-F20-225	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-F20-225	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-F20-225	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-F20-225	●	F

⁎1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
⁎2 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.

● : Inventory maintained in Japan.



Right hand tool holder shown.

∗ Wrench : ① : Clamp Screw, ② : Blade Screw

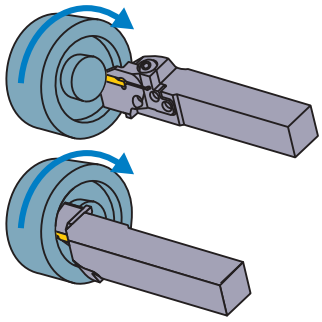
SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench ∗
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

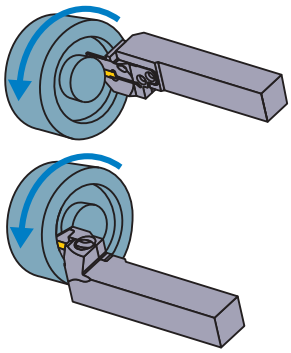
Dimensions (mm) ∗1							
H	B	LF	LH	LH 2	HF	WF	HBH
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	131	45	66	20	26	5
20	20	131	45	66	20	26	5
25	25	156	45	63	25	28	—
25	25	156	45	63	25	28	—
32	25	176	45	63	32	28	—
32	25	176	45	63	32	28	—
32	32	176	45	63	32	35	—
32	32	176	45	63	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	131	45	66	20	26	5
20	20	131	45	66	20	26	5
25	25	156	45	63	25	28	—
25	25	156	45	63	25	28	—
32	25	176	45	63	32	28	—
32	25	176	45	63	32	28	—
32	32	176	45	63	32	35	—
32	32	176	45	63	32	35	—

Cutting Mode

R



L



Insert selection

Seat Size	Geometry name
F	GY○○0300/0318/0324F○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
F	3.00mm	●	●	●	●
	3.18mm	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
F	3.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8			●	
	3.18mm				●
	RE 0.2	●			
	RE 0.4	●			
	3.24mm	●			

● : Standard insert with dimensions

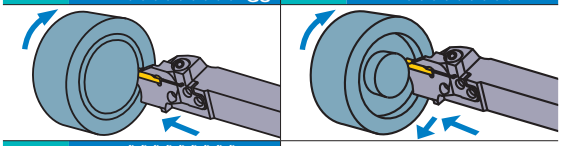
GROOVING

IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F110
CAUTION FOR USE ➢ F112

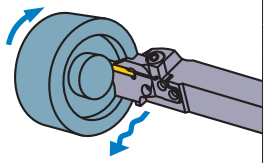
GY SERIES (FACE GROOVING)

4 00° type holder

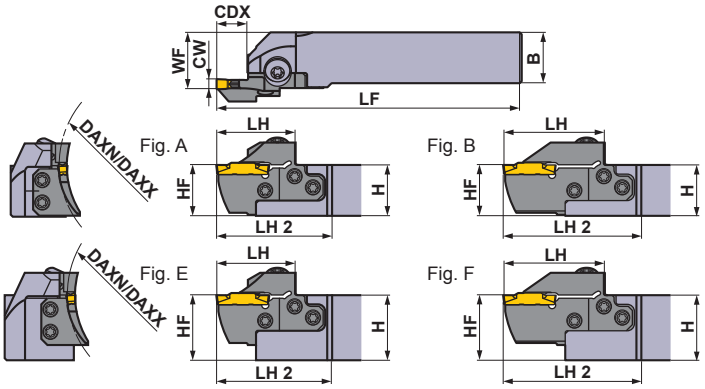
Insert GY2M○○○○○○○○○-GS/-GM
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-GU
Insert GY2M○○○○○○○○○-MS
Insert GY1G○○○○○○○○○-GF/GS
Insert GY2M○○○○○○○○○-MM



Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

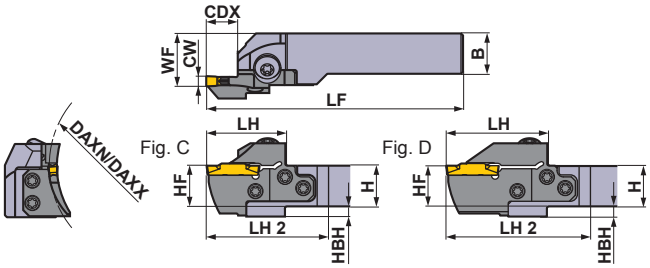


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Order Number Modular Blade	Stock	Fig.
G	4.00 4.24	40	50	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G14-040	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-G14-040	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G14-040	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-G14-040	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G14-040	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-G14-040	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G14-040	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-G14-040	●	E
		50	60	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G14-050	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-G14-050	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G14-050	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-G14-050	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G14-050	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-G14-050	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G14-050	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-G14-050	●	E
		60	85	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G14-060	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-G14-060	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G14-060	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-G14-060	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G14-060	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-G14-060	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G14-060	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-G14-060	●	E
				25 ✶2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G25-060	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-G25-060	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G25-060	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-G25-060	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G25-060	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-G25-060	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G25-060	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-G25-060	●	F

✶1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
✶2 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.

● : Inventory maintained in Japan.



Right hand tool holder shown.

∗ Wrench : ① : Clamp Screw, ② : Blade Screw

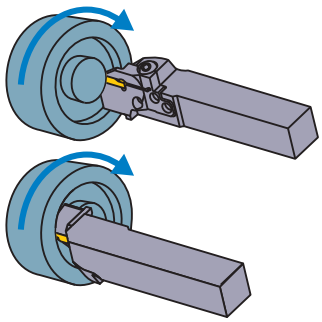
SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench ∗
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

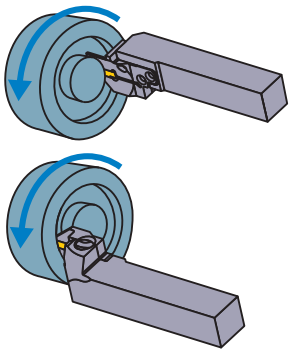
Dimensions (mm) ∗1							
H	B	LF	LH	LH 2	HF	WF	HBH
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	136	50	71	20	26	5
20	20	136	50	71	20	26	5
25	25	161	50	68	25	28	—
25	25	161	50	68	25	28	—
32	25	181	50	68	32	28	—
32	25	181	50	68	32	28	—
32	32	181	50	68	32	35	—
32	32	181	50	68	32	35	—

Cutting Mode

R



L



Insert selection

Seat Size	Geometry name
G	GY○○0400/0424G○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
G	4.00mm	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
G	4.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8	●		●	
	4.24mm	●			

● : Standard insert with dimensions

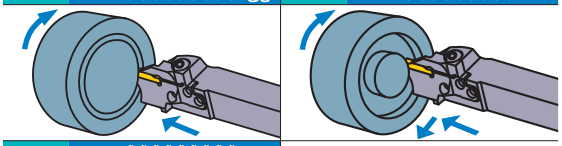
GROOVING

IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F110
CAUTION FOR USE ➢ F112

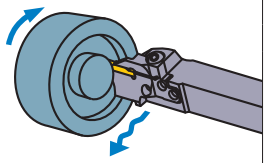
GY SERIES (FACE GROOVING)

4 00° type holder

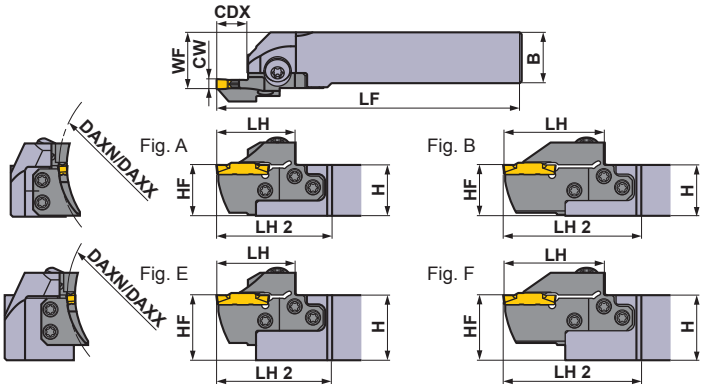
Insert GY2M○○○○○○○○○-GS/GM
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-GU
Insert GY2M○○○○○○○○○-MS
Insert GY1G○○○○○○○○○-GF/GS
Insert GY2M○○○○○○○○○-MM



Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

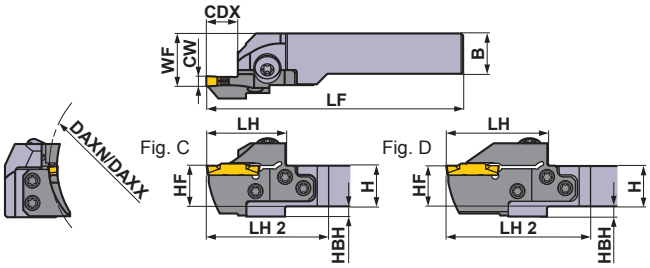


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Order Number Modular Blade	Stock	Fig.
G	4.00 4.24	85	125	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G14-085	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-G14-085	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G14-085	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-G14-085	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G14-085	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-G14-085	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G14-085	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-G14-085	●	E
				25 ⁎2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G25-085	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-G25-085	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G25-085	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-G25-085	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G25-085	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-G25-085	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G25-085	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-G25-085	●	F
		125	200	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G14-125	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-G14-125	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G14-125	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-G14-125	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G14-125	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-G14-125	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G14-125	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-G14-125	●	E
				25 ⁎2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G25-125	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-G25-125	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G25-125	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-G25-125	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G25-125	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-G25-125	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G25-125	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-G25-125	●	F

⁎1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
⁎2 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.

● : Inventory maintained in Japan.



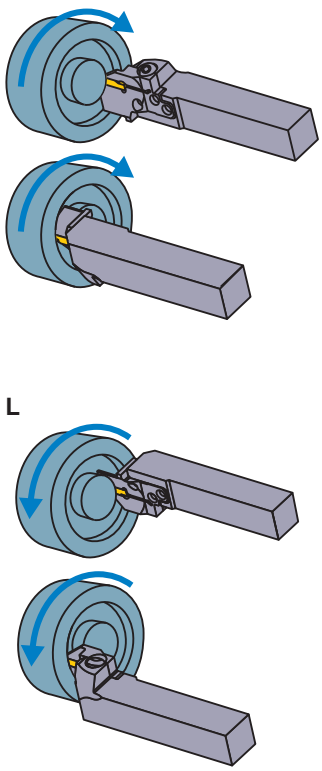
Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

	Dimensions (mm) *1								Cutting Mode
	H	B	LF	LH	LH 2	HF	WF	HBH	
	20	20	125	39	60	20	26	5	R
	20	20	125	39	60	20	26	5	
	25	25	150	39	57	25	28	—	
	25	25	150	39	57	25	28	—	
	32	25	170	39	57	32	28	—	
	32	25	170	39	57	32	28	—	
	32	32	170	39	57	32	35	—	
	32	32	170	39	57	32	35	—	
	20	20	136	50	71	20	26	5	
	20	20	136	50	71	20	26	5	
	25	25	161	50	68	25	28	—	
	25	25	161	50	68	25	28	—	
	32	25	181	50	68	32	28	—	
	32	25	181	50	68	32	28	—	
	32	32	181	50	68	32	35	—	
	32	32	181	50	68	32	35	—	
	20	20	125	39	60	20	26	5	L
	20	20	125	39	60	20	26	5	
	25	25	150	39	57	25	28	—	
	25	25	150	39	57	25	28	—	
	32	25	170	39	57	32	28	—	
	32	25	170	39	57	32	28	—	
	32	32	170	39	57	32	35	—	
	32	32	170	39	57	32	35	—	
	20	20	136	50	71	20	26	5	
	20	20	136	50	71	20	26	5	
	25	25	161	50	68	25	28	—	
	25	25	161	50	68	25	28	—	
	32	25	181	50	68	32	28	—	
	32	25	181	50	68	32	28	—	
	32	32	181	50	68	32	35	—	
	32	32	181	50	68	32	35	—	



Insert selection

Seat Size	Geometry name
G	GY○○0400/0424G○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
G	4.00mm	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
G	4.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8	●		●	
	4.24mm	●			

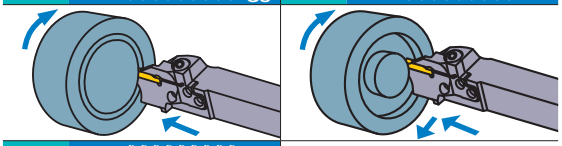
● : Standard insert with dimensions

IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F110
CAUTION FOR USE ➢ F112

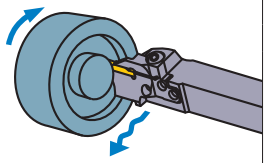
GY SERIES (FACE GROOVING)

4 00° type holder

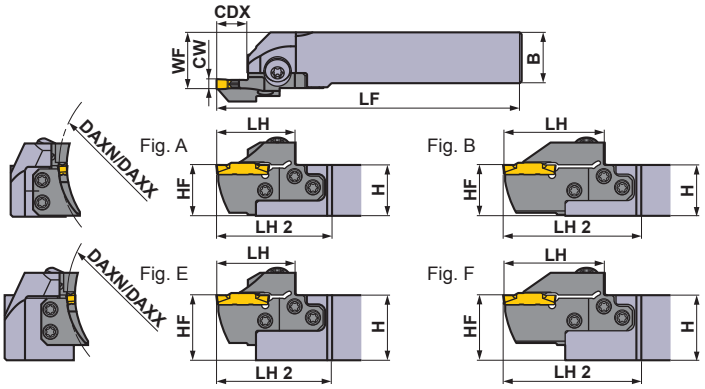
Insert GY2M○○○○○○○○○-GS/GM
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-GU
Insert GY2M○○○○○○○○○-MS
Insert GY1G○○○○○○○○○-GF/GS
Insert GY2M○○○○○○○○○-MM



Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

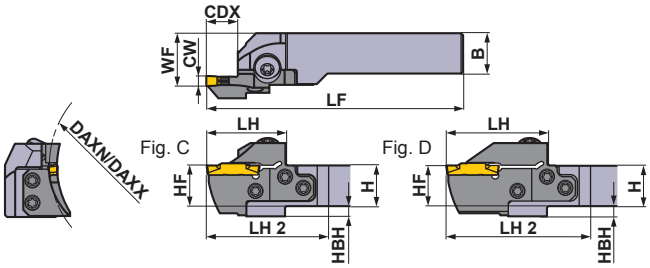


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Order Number Modular Blade	Stock	Fig.
G	4.00 4.24	180	280	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G14-180	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-G14-180	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G14-180	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-G14-180	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G14-180	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-G14-180	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G14-180	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-G14-180	●	E
				25 ∗2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G25-180	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-G25-180	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G25-180	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-G25-180	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G25-180	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-G25-180	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G25-180	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-G25-180	●	F
		250	999	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G14-250	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-G14-250	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G14-250	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-G14-250	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G14-250	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-G14-250	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G14-250	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-G14-250	●	E
				25 ∗2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-G25-250	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-G25-250	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-G25-250	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-G25-250	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-G25-250	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-G25-250	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-G25-250	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-G25-250	●	F

∗1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
∗2 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.

● : Inventory maintained in Japan.



Right hand tool holder shown.

∗ Wrench : ① : Clamp Screw, ② : Blade Screw

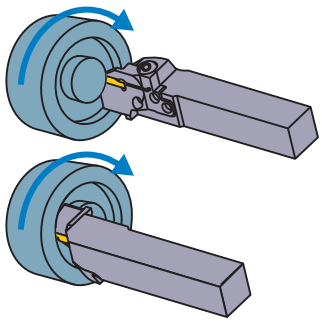
SPARE PARTS

Holder	Clamp Screw	Blade Screw 5 pcs.	Wrench ∗
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

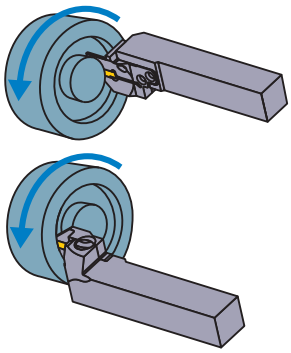
Dimensions (mm) ∗1							
H	B	LF	LH	LH 2	HF	WF	HBH
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	136	50	71	20	26	5
20	20	136	50	71	20	26	5
25	25	161	50	68	25	28	—
25	25	161	50	68	25	28	—
32	25	181	50	68	32	28	—
32	25	181	50	68	32	28	—
32	32	181	50	68	32	35	—
32	32	181	50	68	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	136	50	71	20	26	5
20	20	136	50	71	20	26	5
25	25	161	50	68	25	28	—
25	25	161	50	68	25	28	—
32	25	181	50	68	32	28	—
32	25	181	50	68	32	28	—
32	32	181	50	68	32	35	—
32	32	181	50	68	32	35	—

Cutting Mode

R



L



Insert selection

Seat Size	Geometry name
G	GY○○0400/0424G○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
G	4.00mm	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
G	4.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8	●		●	
	4.24mm	●			

● : Standard insert with dimensions

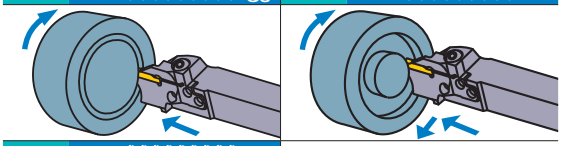
GROOVING

IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F110
CAUTION FOR USE ➢ F112

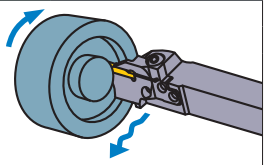
GY SERIES (FACE GROOVING)

4 00° type holder

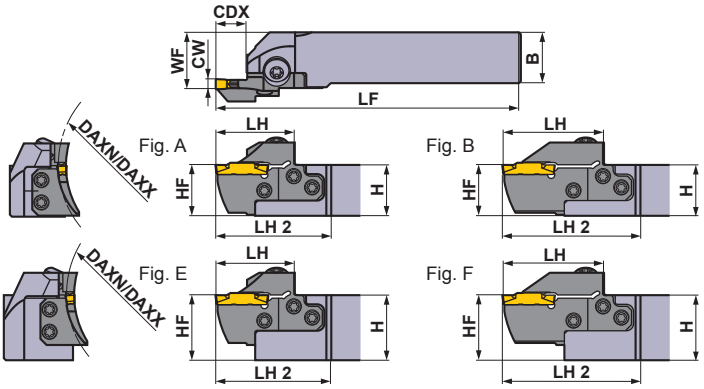
Insert GY2M○○○○○○○○○-GS/GM
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-GU
Insert GY2M○○○○○○○○○-MS
Insert GY1G○○○○○○○○○-GF/GS
Insert GY2M○○○○○○○○○-MM



Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

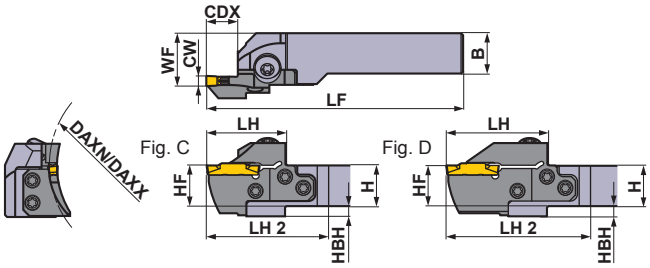


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number: Holder	Stock	Order Number: Modular Blade	Stock	Fig.
H	4.75 5.00 5.24	50	60	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-H14-050	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-H14-050	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-H14-050	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-H14-050	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-H14-050	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-H14-050	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-H14-050	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-H14-050	●	E
		60	85	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-H14-060	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-H14-060	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-H14-060	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-H14-060	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-H14-060	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-H14-060	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-H14-060	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-H14-060	●	E
				25 ∗2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-H25-060	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-H25-060	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-H25-060	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-H25-060	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-H25-060	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-H25-060	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-H25-060	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-H25-060	●	F

∗1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
∗2 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.

● : Inventory maintained in Japan.



Right hand tool holder shown.

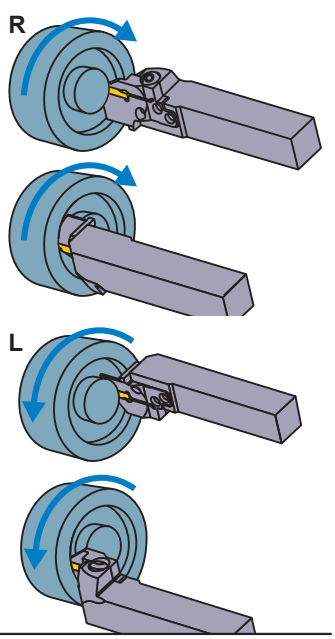
∗ Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw 5 pcs.	Wrench ∗
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

	Dimensions (mm) ∗1							
	H	B	LF	LH	LH 2	HF	WF	HBH
	20	20	125	39	60	20	26	5
	20	20	125	39	60	20	26	5
	25	25	150	39	57	25	28	—
	25	25	150	39	57	25	28	—
	32	25	170	39	57	32	28	—
	32	25	170	39	57	32	28	—
	32	32	170	39	57	32	35	—
	32	32	170	39	57	32	35	—
	20	20	125	39	60	20	26	5
	20	20	125	39	60	20	26	5
	25	25	150	39	57	25	28	—
	25	25	150	39	57	25	28	—
	32	25	170	39	57	32	28	—
	32	25	170	39	57	32	28	—
	32	32	170	39	57	32	35	—
	32	32	170	39	57	32	35	—
	20	20	136	50	71	20	26	5
	20	20	136	50	71	20	26	5
	25	25	161	50	68	25	28	—
	25	25	161	50	68	25	28	—
	32	25	181	50	68	32	28	—
	32	25	181	50	68	32	28	—
	32	32	181	50	68	32	35	—
	32	32	181	50	68	32	35	—

Cutting Mode



Insert selection

Seat Size	Geometry name
H	GY○○0475/0500/0524H○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
H	4.75mm	●	●	●	●
	5.00mm	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
H	4.75mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			
	5.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	5.24mm	●			

● : Standard insert with dimensions

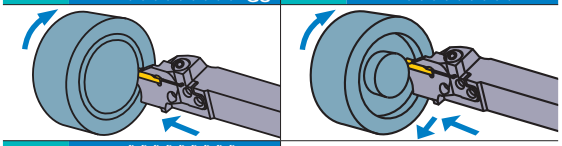
GROOVING

IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F110
CAUTION FOR USE ➢ F112

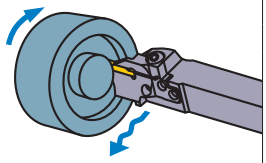
GY SERIES (FACE GROOVING)

4 00° type holder

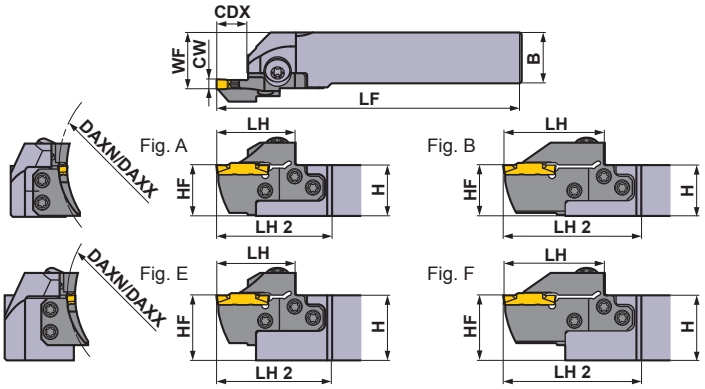
Insert GY2M○○○○○○○○○-GS/GM
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-GU
Insert GY2M○○○○○○○○○-MS
Insert GY1G○○○○○○○○○-GF/GS
Insert GY2M○○○○○○○○○-MM



Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

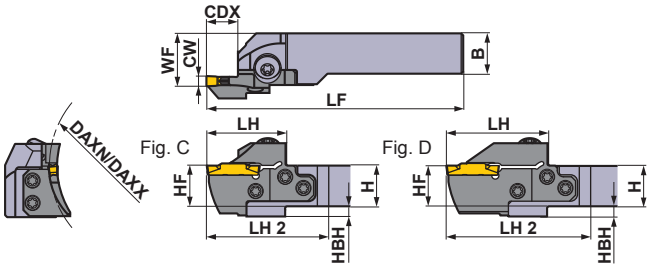


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Order Number Modular Blade	Stock	Fig.
H	4.75 5.00 5.24	85	125	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-H14-085	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-H14-085	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-H14-085	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-H14-085	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-H14-085	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-H14-085	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-H14-085	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-H14-085	●	E
				25 ∗2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-H25-085	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-H25-085	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-H25-085	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-H25-085	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-H25-085	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-H25-085	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-H25-085	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-H25-085	●	F
		125	200	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-H14-125	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-H14-125	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-H14-125	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-H14-125	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-H14-125	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-H14-125	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-H14-125	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-H14-125	●	E
				25 ∗2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-H25-125	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-H25-125	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-H25-125	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-H25-125	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-H25-125	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-H25-125	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-H25-125	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-H25-125	●	F

∗1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
∗2 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.

● : Inventory maintained in Japan.



Right hand tool holder shown.

∗ Wrench : ① : Clamp Screw, ② : Blade Screw

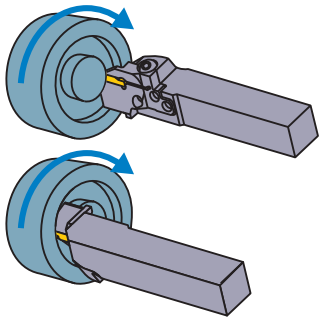
SPARE PARTS

Holder	Clamp Screw	Blade Screw 5 pcs.	Wrench ∗
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

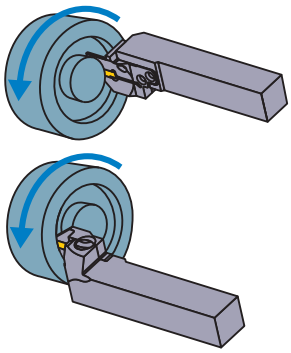
Dimensions (mm) ∗1							
H	B	LF	LH	LH 2	HF	WF	HBH
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	136	50	71	20	26	5
20	20	136	50	71	20	26	5
25	25	161	50	68	25	28	—
25	25	161	50	68	25	28	—
32	25	181	50	68	32	28	—
32	25	181	50	68	32	28	—
32	32	181	50	68	32	35	—
32	32	181	50	68	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	136	50	71	20	26	5
20	20	136	50	71	20	26	5
25	25	161	50	68	25	28	—
25	25	161	50	68	25	28	—
32	25	181	50	68	32	28	—
32	25	181	50	68	32	28	—
32	32	181	50	68	32	35	—
32	32	181	50	68	32	35	—

Cutting Mode

R



L



Insert selection

Seat Size	Geometry name
H	GY○○0475/0500/0524H○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
H	4.75mm	●	●	●	●
	5.00mm	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
H	4.75mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			
	5.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	5.24mm	●			

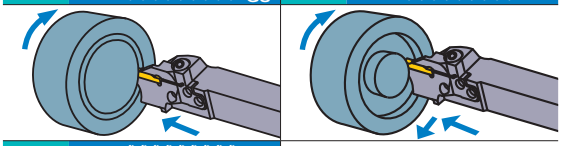
● : Standard insert with dimensions

IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F110
CAUTION FOR USE ➢ F112

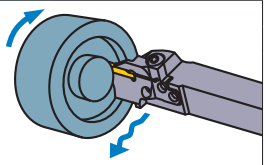
GY SERIES (FACE GROOVING)

4 00° type holder

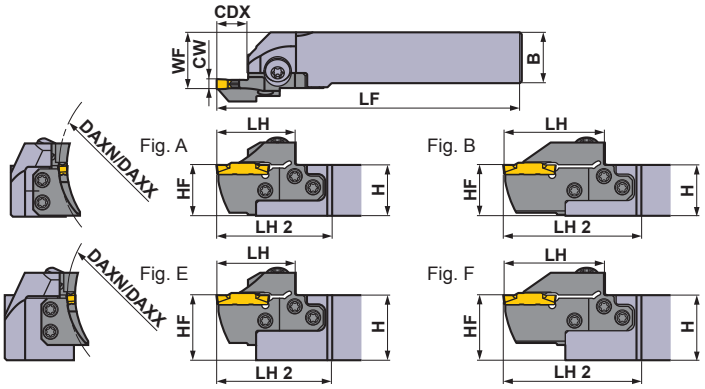
Insert GY2M○○○○○○○○○-GS/GM
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-GU
Insert GY2M○○○○○○○○○-MS
Insert GY1G○○○○○○○○○-GF/GS
Insert GY2M○○○○○○○○○-MM



Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

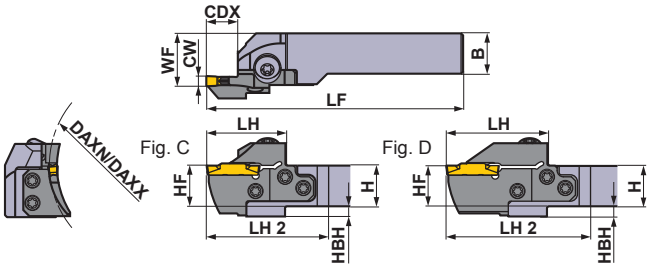


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Order Number Modular Blade	Stock	Fig.
H	4.75 5.00 5.24	180	280	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-H14-180	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-H14-180	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-H14-180	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-H14-180	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-H14-180	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-H14-180	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-H14-180	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-H14-180	●	E
				25 ✶2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-H25-180	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-H25-180	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-H25-180	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-H25-180	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-H25-180	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-H25-180	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-H25-180	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-H25-180	●	F
		250	999	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-H14-250	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-H14-250	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-H14-250	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-H14-250	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-H14-250	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-H14-250	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-H14-250	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-H14-250	●	E
				25 ✶2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-H25-250	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-H25-250	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-H25-250	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-H25-250	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-H25-250	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-H25-250	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-H25-250	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-H25-250	●	F

✶1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
✶2 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.

● : Inventory maintained in Japan.



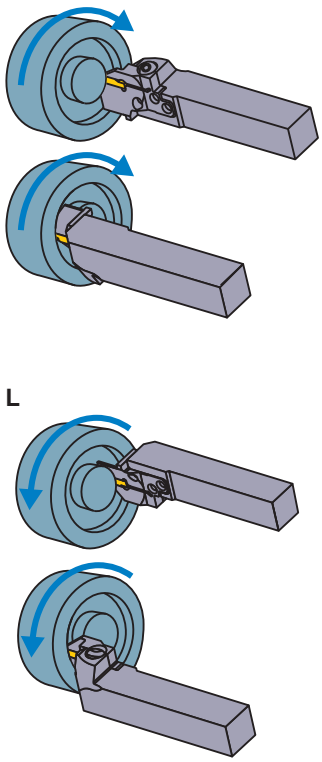
Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

	Dimensions (mm) *1								Cutting Mode
	H	B	LF	LH	LH 2	HF	WF	HBH	
	20	20	125	39	60	20	26	5	R
	20	20	125	39	60	20	26	5	
	25	25	150	39	57	25	28	—	
	25	25	150	39	57	25	28	—	
	32	25	170	39	57	32	28	—	
	32	25	170	39	57	32	28	—	
	32	32	170	39	57	32	35	—	
	32	32	170	39	57	32	35	—	
	20	20	136	50	71	20	26	5	
	20	20	136	50	71	20	26	5	
	25	25	161	50	68	25	28	—	
	25	25	161	50	68	25	28	—	
	32	25	181	50	68	32	28	—	
	32	25	181	50	68	32	28	—	
	32	32	181	50	68	32	35	—	
	32	32	181	50	68	32	35	—	
	20	20	125	39	60	20	26	5	L
	20	20	125	39	60	20	26	5	
	25	25	150	39	57	25	28	—	
	25	25	150	39	57	25	28	—	
	32	25	170	39	57	32	28	—	
	32	25	170	39	57	32	28	—	
	32	32	170	39	57	32	35	—	
	32	32	170	39	57	32	35	—	
	20	20	136	50	71	20	26	5	
	20	20	136	50	71	20	26	5	
	25	25	161	50	68	25	28	—	
	25	25	161	50	68	25	28	—	
	32	25	181	50	68	32	28	—	
	32	25	181	50	68	32	28	—	
	32	32	181	50	68	32	35	—	
	32	32	181	50	68	32	35	—	



Insert selection

Seat Size	Geometry name
H	GY○○0475/0500/0524H○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
H	4.75mm	●	●	●	●
	5.00mm	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
H	4.75mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			
	5.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	5.24mm	●			

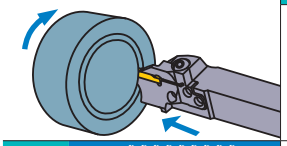
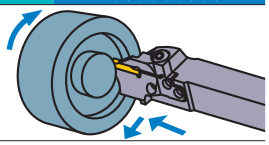
● : Standard insert with dimensions

IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F110
CAUTION FOR USE ➢ F112

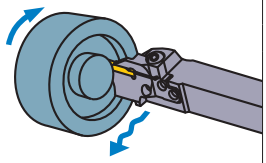
GY SERIES (FACE GROOVING)

4 00° type holder

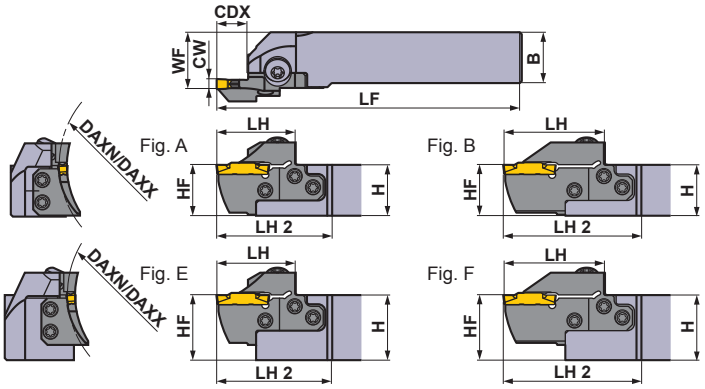
Insert GY2M○○○○○○○○○-GS/-GM
Insert GY2M○○○○○○○○○-GU
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-MS
Insert GY2M○○○○○○○○○-MM

Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

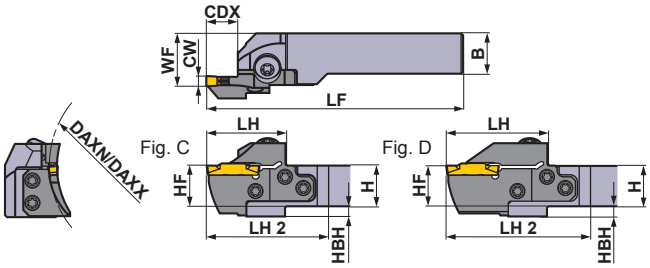


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Order Number Modular Blade	Stock	Fig.
J	6.00 6.31 6.35	50	70	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-J14-050	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-J14-050	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-J14-050	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-J14-050	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-J14-050	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-J14-050	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-J14-050	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-J14-050	●	E
		70	110	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-J14-070	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-J14-070	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-J14-070	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-J14-070	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-J14-070	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-J14-070	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-J14-070	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-J14-070	●	E
				25 ✶2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-J25-070	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-J25-070	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-J25-070	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-J25-070	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-J25-070	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-J25-070	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-J25-070	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-J25-070	●	F
		110	200	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-J14-110	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-J14-110	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-J14-110	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-J14-110	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-J14-110	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-J14-110	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-J14-110	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-J14-110	●	E
				25 ✶2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-J25-110	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-J25-110	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-J25-110	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-J25-110	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-J25-110	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-J25-110	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-J25-110	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-J25-110	●	F

✶1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
✶2 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.

● : Inventory maintained in Japan.



Right hand tool holder shown.

* Wrench : ① : Clamp Screw, ② : Blade Screw

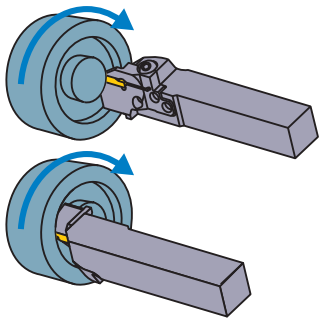
SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

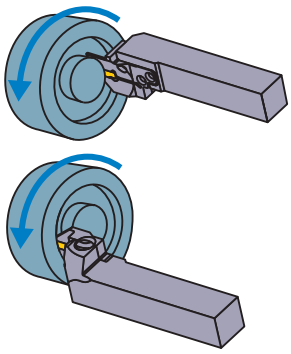
Dimensions (mm) *1							
H	B	LF	LH	LH 2	HF	WF	HBH
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	136	50	71	20	26	5
20	20	136	50	71	20	26	5
25	25	161	50	68	25	28	—
25	25	161	50	68	25	28	—
32	25	181	50	68	32	28	—
32	25	181	50	68	32	28	—
32	32	181	50	68	32	35	—
32	32	181	50	68	32	35	—
20	20	125	39	60	20	26	5
20	20	125	39	60	20	26	5
25	25	150	39	57	25	28	—
25	25	150	39	57	25	28	—
32	25	170	39	57	32	28	—
32	25	170	39	57	32	28	—
32	32	170	39	57	32	35	—
32	32	170	39	57	32	35	—
20	20	136	50	71	20	26	5
20	20	136	50	71	20	26	5
25	25	161	50	68	25	28	—
25	25	161	50	68	25	28	—
32	25	181	50	68	32	28	—
32	25	181	50	68	32	28	—
32	32	181	50	68	32	35	—
32	32	181	50	68	32	35	—

Cutting Mode

R



L



Insert selection

Seat Size	Geometry name
J	GY○○0600/0631/0635J○○○○–Breaker shown below

For grooving/cutting off breaker ➤ F012

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
J	6.00mm	●	●	●	
	6.35mm	●	●	●	

For multifunctional grooving breaker ➤ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
J	6.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	6.31mm	●			
	6.35mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			

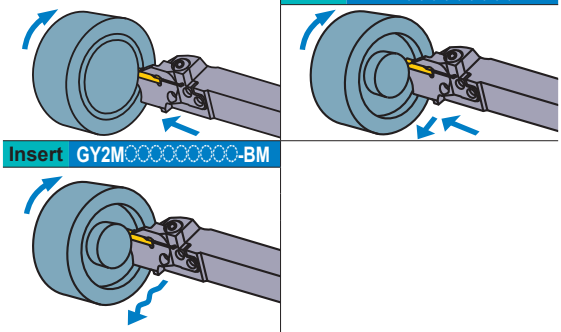
● : Standard insert with dimensions

IDENTIFICATION ➤ F010, F011
CUTTING CONDITIONS ➤ F110
CAUTION FOR USE ➤ F112

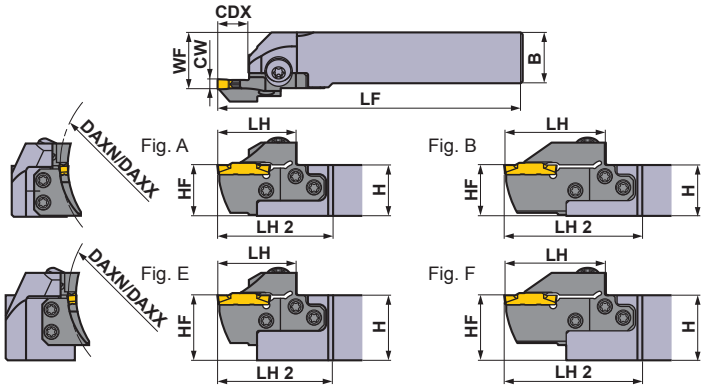
GY SERIES (FACE GROOVING)

4 00° type holder

Insert GY2M○○○○○○○○○-GS/-GM
Insert GY2M○○○○○○○○○-GU
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-MS
Insert GY2M○○○○○○○○○-MM
Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

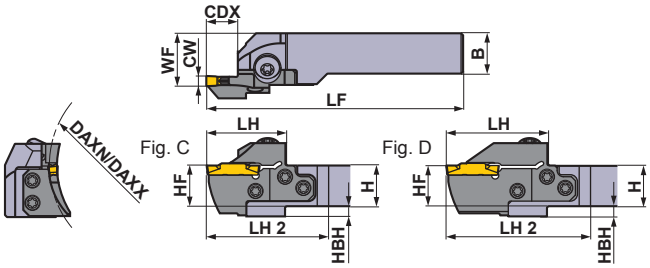


Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Order Number Modular Blade	Stock	Fig.
J	6.00 6.31 6.35	170	280	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-J14-170	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-J14-170	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-J14-170	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-J14-170	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-J14-170	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-J14-170	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-J14-170	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-J14-170	●	E
				25 ∗2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-J25-170	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-J25-170	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-J25-170	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-J25-170	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-J25-170	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-J25-170	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-J25-170	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-J25-170	●	F
		250	999	14	Modular	R	GYHR2020K00-M25R	●	GYM25RD-J14-250	●	C
						L	GYHL2020K00-M25L	●	GYM25LD-J14-250	●	C
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-J14-250	●	A
						L	GYHL2525M00-M25L	●	GYM25LD-J14-250	●	A
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-J14-250	●	E
						L	GYHL3225P00-M25L	●	GYM25LD-J14-250	●	E
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-J14-250	●	E
						L	GYHL3232P00-M25L	●	GYM25LD-J14-250	●	E
				25 ∗2	Modular	R	GYHR2020K00-M25R	●	GYM25RD-J25-250	●	D
						L	GYHL2020K00-M25L	●	GYM25LD-J25-250	●	D
					Modular	R	GYHR2525M00-M25R	●	GYM25RD-J25-250	●	B
						L	GYHL2525M00-M25L	●	GYM25LD-J25-250	●	B
					Modular	R	GYHR3225P00-M25R	●	GYM25RD-J25-250	●	F
						L	GYHL3225P00-M25L	●	GYM25LD-J25-250	●	F
					Modular	R	GYHR3232P00-M25R	●	GYM25RD-J25-250	●	F
						L	GYHL3232P00-M25L	●	GYM25LD-J25-250	●	F

∗1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH**, **LH 2**, and **WF** values may vary.
∗2 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.

● : Inventory maintained in Japan.



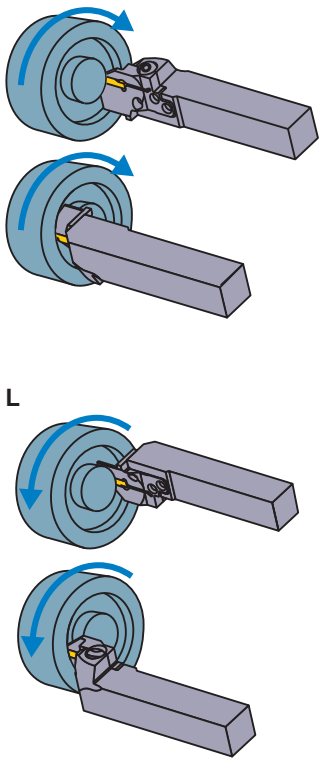
Right hand tool holder shown.

∗ Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw 5 pcs.	Wrench ∗
GYHR/L2020K00-M25R/L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHR/L2525M00-M25R/L			
GYHR/L3225P00-M25R/L			
GYHR/L3232P00-M25R/L			

	Dimensions (mm) ∗1								Cutting Mode
	H	B	LF	LH	LH 2	HF	WF	HBH	
	20	20	125	39	60	20	26	5	R
	20	20	125	39	60	20	26	5	
	25	25	150	39	57	25	28	—	
	25	25	150	39	57	25	28	—	
	32	25	170	39	57	32	28	—	
	32	25	170	39	57	32	28	—	
	32	32	170	39	57	32	35	—	
	32	32	170	39	57	32	35	—	
	20	20	136	50	71	20	26	5	
	20	20	136	50	71	20	26	5	
	25	25	161	50	68	25	28	—	
	25	25	161	50	68	25	28	—	
	32	25	181	50	68	32	28	—	
	32	25	181	50	68	32	28	—	
	32	32	181	50	68	32	35	—	
	32	32	181	50	68	32	35	—	
	20	20	125	39	60	20	26	5	L
	20	20	125	39	60	20	26	5	
	25	25	150	39	57	25	28	—	
	25	25	150	39	57	25	28	—	
	32	25	170	39	57	32	28	—	
	32	25	170	39	57	32	28	—	
	32	32	170	39	57	32	35	—	
	32	32	170	39	57	32	35	—	
	20	20	136	50	71	20	26	5	
	20	20	136	50	71	20	26	5	
	25	25	161	50	68	25	28	—	
	25	25	161	50	68	25	28	—	
	32	25	181	50	68	32	28	—	
	32	25	181	50	68	32	28	—	
	32	32	181	50	68	32	35	—	
	32	32	181	50	68	32	35	—	



Insert selection

Seat Size	Geometry name
J	GY○○0600/0631/0635J○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
J	6.00mm	●	●	●	
	6.35mm	●	●	●	

For multifunctional grooving breaker ➢ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
J	6.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	6.31mm	●			
	6.35mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			

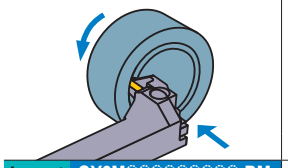
● : Standard insert with dimensions

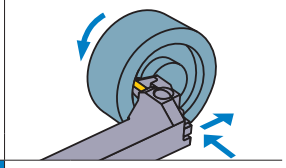
IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F110
CAUTION FOR USE ➢ F112

GY SERIES (FACE GROOVING)

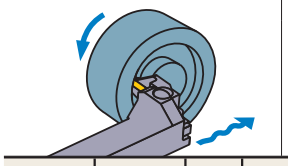
5 90° type holder

Insert GY2M○○○○○○○○○-GS/GM
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-GU
Insert GY2M○○○○○○○○○-MS
Insert GY1G○○○○○○○○○-GF/GS
Insert GY2M○○○○○○○○○-MM





Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.

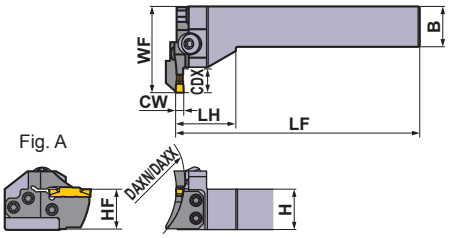


Fig. A

Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number				Fig.
							Holder	Stock	Modular Blade	Stock	
D	2.00 2.24	40	50	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-D12-040	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-D12-040	●	A
		50	60	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-D12-050	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-D12-050	●	A
		60	75	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-D12-060	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-D12-060	●	A
		75	100	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-D12-075	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-D12-075	●	A
		100	150	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-D12-100	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-D12-100	●	A
		135	200	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-D12-135	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-D12-135	●	A
		180	250	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-D12-180	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-D12-180	●	A
E	2.39 2.50 2.74	40	50	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-E12-040	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-E12-040	●	A
		50	60	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-E12-050	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-E12-050	●	A
		60	75	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-E12-060	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-E12-060	●	A
		75	100	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-E12-075	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-E12-075	●	A
		100	150	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-E12-100	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-E12-100	●	A
		135	200	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-E12-135	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-E12-135	●	A
		180	250	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-E12-180	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-E12-180	●	A

∗1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH** and **WF** values may vary.

● : Inventory maintained in Japan.

★ Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench ★
GYHR2525M90-M25L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHL2525M90-M25R			

Dimensions (mm) ★1						Cutting Mode
H	**B**	**LF**	**LH**	**HF**	**WF**	
25	25	150	38	25	53	R
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	L
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	

Insert selection

Seat Size	Geometry name
D	GY○○0200/0224D○○○○–Breaker shown below
E	GY○○0239/0250/0274E○○○○–Breaker shown below

For grooving/cutting off breaker ➤ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
D	2.00mm	●	●	●	●
E	2.39mm	●	●	●	●
	2.50mm	●	●	●	●

For multifunctional grooving breaker ➤ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying) Ball shape
D	2.00mm	●	●	●	●
	2.24mm	●			
E	2.39mm	●			
	2.50mm	●	●	●	●
	2.74mm	●			

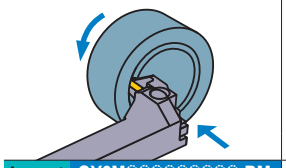
● : Standard insert with dimensions

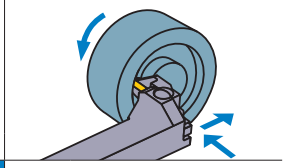
IDENTIFICATION	➤ F010, F011
CUTTING CONDITIONS	➤ F110
CAUTION FOR USE	➤ F112

GY SERIES (FACE GROOVING)

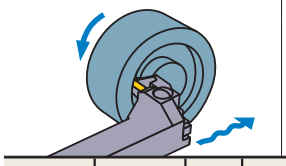
5 90° type holder

Insert GY2M○○○○○○○○○-GS/GM
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-GU
Insert GY2M○○○○○○○○○-MS
Insert GY1G○○○○○○○○○-GF/GS
Insert GY2M○○○○○○○○○-MM

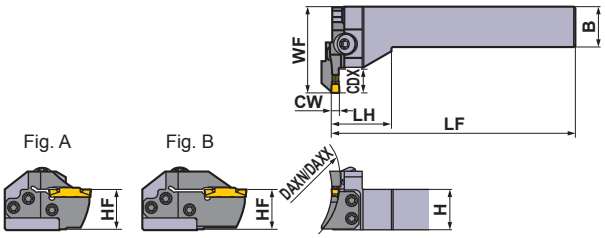




Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.



Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Order Number Modular Blade	Stock	Fig.
F	3.00 3.18 3.24	35	40	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F12-035	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-F12-035	●	A
		40	50	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F12-040	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-F12-040	●	A
		50	60	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F12-050	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-F12-050	●	A
		60	75	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F12-060	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-F12-060	●	A
				20 ⁎2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F20-060	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-F20-060	●	B
		75	100	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F12-075	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-F12-075	●	A
				20 ⁎2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F20-075	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-F20-075	●	B
		100	150	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F12-100	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-F12-100	●	A
				20 ⁎2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F20-100	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-F20-100	●	B
		135	200	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F12-135	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-F12-135	●	A
				20 ⁎2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F20-135	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-F20-135	●	B
		180	250	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F12-180	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-F12-180	●	A
				20 ⁎2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F20-180	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-F20-180	●	B
		225	999	12	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F12-225	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-F12-225	●	A
				20 ⁎2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-F20-225	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-F20-225	●	B

⁎1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH** and **WF** values may vary.
⁎2 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.

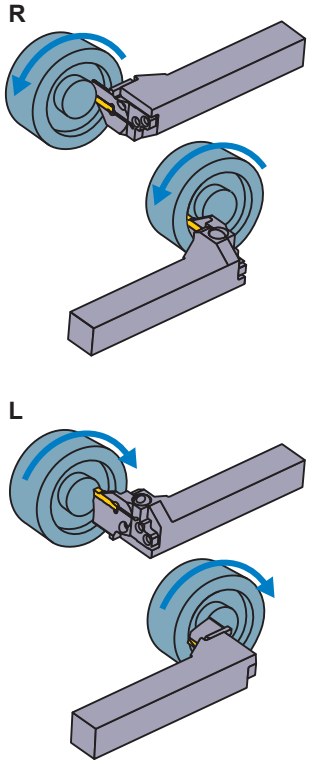
● : Inventory maintained in Japan.

★ Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench ★
GYHR2525M90-M25L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHL2525M90-M25R			

Dimensions (mm) ★1						Cutting Mode
H	B	LF	LH	HF	WF	
25	25	150	38	25	53	R
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	59	
25	25	150	38	25	59	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	59	
25	25	150	38	25	59	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	59	L
25	25	150	38	25	59	
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25	25	150	38	25	53	
25	25	150	38	25	59	
25	25	150	38	25	59	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	59	
25	25	150	38	25	59	
25	25	150	38	25	53	
25	25	150	38	25	53	



Insert selection

Seat Size	Geometry name
F	GY○○0300/0318/0324F○○○○–Breaker shown below

For grooving/cutting off breaker ➤ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
F	3.00mm	●	●	●	●
	3.18mm	●	●	●	●

For multifunctional grooving breaker ➤ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
F	3.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8			●	
	3.18mm				●
	RE 0.2	●			
	RE 0.4	●			
	3.24mm	●			

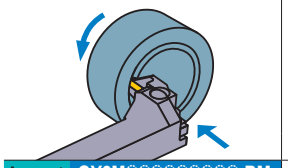
● : Standard insert with dimensions

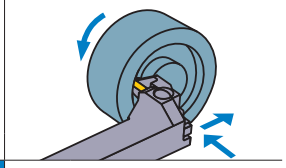
IDENTIFICATION ➤ F010, F011
CUTTING CONDITIONS ➤ F110
CAUTION FOR USE ➤ F112

GY SERIES (FACE GROOVING)

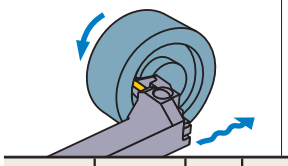
5 90° type holder

Insert GY2M○○○○○○○○○-GS/GM
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-GU
Insert GY2M○○○○○○○○○-MS
Insert GY1G○○○○○○○○○-GF/GS
Insert GY2M○○○○○○○○○-MM





Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.

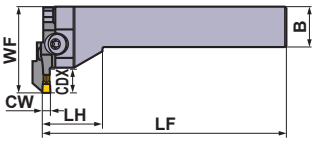


Fig. A

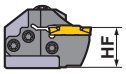


Fig. B



Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
G	4.00 4.24	40	50	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G14-040	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-G14-040	●	A
		50	60	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G14-050	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-G14-050	●	A
		60	85	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G14-060	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-G14-060	●	A
				25 ✱2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G25-060	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-G25-060	●	B
		85	125	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G14-085	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-G14-085	●	A
				25 ✱2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G25-085	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-G25-085	●	B
		125	200	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G14-125	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-G14-125	●	A
				25 ✱2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G25-125	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-G25-125	●	B
		180	280	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G14-180	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-G14-180	●	A
				25 ✱2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G25-180	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-G25-180	●	B
		250	999	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G14-250	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-G14-250	●	A
				25 ✱2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-G25-250	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-G25-250	●	B

✱1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH** and **WF** values may vary.
✱2 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.

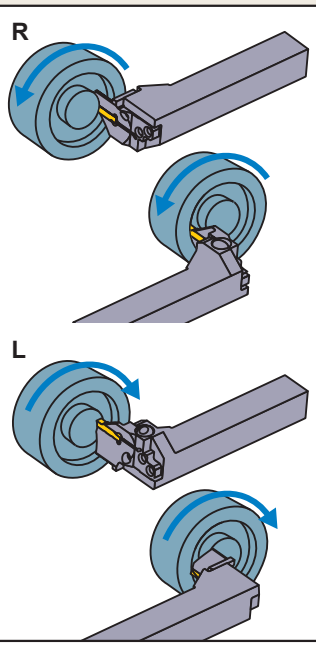
● : Inventory maintained in Japan.

★ Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench ★
GYHR2525M90-M25L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHL2525M90-M25R			

Dimensions (mm) ★1						Cutting Mode
H	**B**	**LF**	**LH**	**HF**	**WF**	
25	25	150	38	25	53	R
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	64	
25	25	150	38	25	64	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	64	
25	25	150	38	25	64	
25	25	150	38	25	53	L
25	25	150	38	25	53	
25	25	150	38	25	64	
25	25	150	38	25	64	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	64	
25	25	150	38	25	64	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	64	
25	25	150	38	25	64	



Insert selection

Seat Size	Geometry name
G	GY○○0400/0424G○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
G	4.00mm	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
G	4.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8	●		●	
	4.24mm	●			

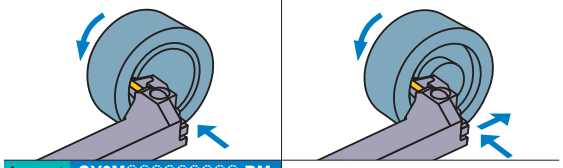
● : Standard insert with dimensions

IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F110
CAUTION FOR USE ➢ F112

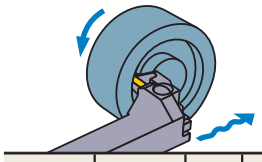
GY SERIES (FACE GROOVING)

5 90° type holder

Insert GY2M○○○○○○○○○-GS/GM
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-GU
Insert GY2M○○○○○○○○○-MS
Insert GY1G○○○○○○○○○-GF/GS
Insert GY2M○○○○○○○○○-MM



Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.

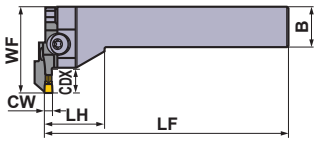


Fig. A

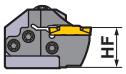


Fig. B



Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Order Number Modular Blade	Stock	Fig.
H	4.75 5.00 5.24	50	60	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-H14-050	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-H14-050	●	A
		60	85	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-H14-060	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-H14-060	●	A
				25 ✶2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-H25-060	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-H25-060	●	B
		85	125	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-H14-085	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-H14-085	●	A
				25 ✶2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-H25-085	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-H25-085	●	B
		125	200	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-H14-125	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-H14-125	●	A
				25 ✶2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-H25-125	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-H25-125	●	B
		180	280	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-H14-180	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-H14-180	●	A
				25 ✶2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-H25-180	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-H25-180	●	B
		250	999	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-H14-250	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-H14-250	●	A
				25 ✶2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-H25-250	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-H25-250	●	B

✶1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH** and **WF** values may vary.
✶2 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.

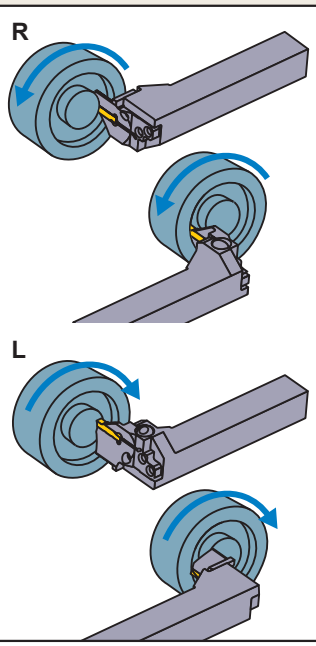
● : Inventory maintained in Japan.

* Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench *
GYHR2525M90-M25L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHL2525M90-M25R			

Dimensions (mm) *1						Cutting Mode
H	**B**	**LF**	**LH**	**HF**	**WF**	
25	25	150	38	25	53	R
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	64	
25	25	150	38	25	64	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	64	
25	25	150	38	25	64	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	64	L
25	25	150	38	25	64	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	64	
25	25	150	38	25	64	
25	25	150	38	25	53	
25	25	150	38	25	53	
25	25	150	38	25	64	
25	25	150	38	25	64	



Insert selection

Seat Size	Geometry name
H	GY○○0475/0500/0524H○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
H	4.75mm	●	●	●	●
	5.00mm	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
H	4.75mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			
	5.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	5.24mm	●			

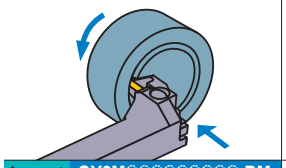
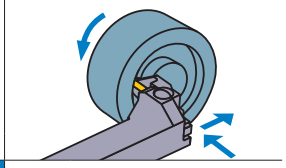
● : Standard insert with dimensions

IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F110
CAUTION FOR USE ➢ F112

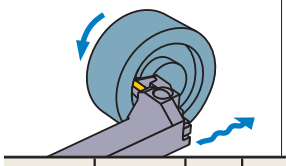
GY SERIES (FACE GROOVING)

5 90° type holder

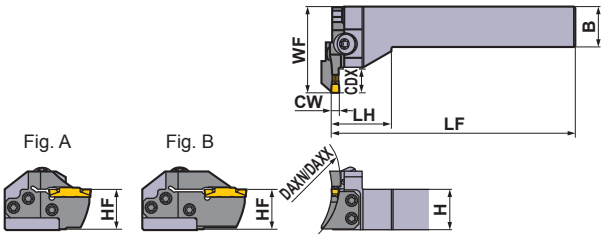
Insert GY2M○○○○○○○○○-GS/GM
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-GU
Insert GY2M○○○○○○○○○-MS
Insert GY1G○○○○○○○○○-GF/GS
Insert GY2M○○○○○○○○○-MM

Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.



Right hand tool holder shown.

Seat Size	CW	DAXN	DAXX	CDX	Type	Hand (R/L)	Order Number Holder	Stock	Order Number Modular Blade	Stock	Fig.
J	6.00 6.31 6.35	50	70	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-J14-050	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-J14-050	●	A
		70	110	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-J14-070	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-J14-070	●	A
				25 ✶2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-J25-070	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-J25-070	●	B
		110	200	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-J14-110	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-J14-110	●	A
				25 ✶2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-J25-110	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-J25-110	●	B
		170	280	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-J14-170	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-J14-170	●	A
				25 ✶2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-J25-170	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-J25-170	●	B
		250	999	14	Modular	R	GYHR2525M90-M25L	●	GYM25LD-J14-250	●	A
						L	GYHL2525M90-M25R	●	GYM25RD-J14-250	●	A
				25 ✶2	Modular	R	GYHR2525M90-M25L	●	GYM25LD-J25-250	●	B
						L	GYHL2525M90-M25R	●	GYM25RD-J25-250	●	B

✶1 Dimensions shown are when gauge insert is used. If other insert geometries are used then **LF**, **LH** and **WF** values may vary.
✶2 The maximum groove depth varies according to the insert used. Please refer to the maximum groove depth of inserts on pages F012—F014.

● : Inventory maintained in Japan.

★ Wrench : ① : Clamp Screw, ② : Blade Screw

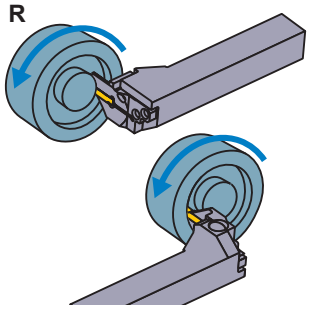
SPARE PARTS

Holder	Clamp Screw	Blade Screw (5 pcs.)	Wrench ★
GYHR2525M90-M25L	GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYHL2525M90-M25R			

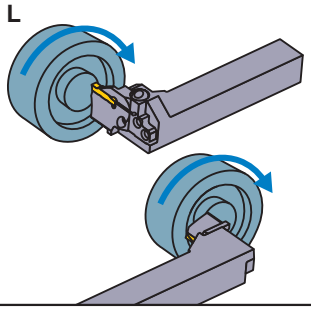
Dimensions (mm) ★1					
H	B	LF	LH	HF	WF
25	25	150	38	25	53
25	25	150	38	25	53
25	25	150	38	25	53
25	25	150	38	25	53
25	25	150	38	25	64
25	25	150	38	25	64
25	25	150	38	25	53
25	25	150	38	25	53
25	25	150	38	25	64
25	25	150	38	25	64
25	25	150	38	25	53
25	25	150	38	25	53
25	25	150	38	25	64
25	25	150	38	25	64
25	25	150	38	25	53
25	25	150	38	25	53
25	25	150	38	25	64
25	25	150	38	25	64

Cutting Mode

R



L



Insert selection

Seat Size	Geometry name
J	GY○○0600/0631/0635J○○○○–Breaker shown below

For grooving/cutting off breaker ➤ F012

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
J	6.00mm	●	●	●	
	6.35mm	●	●	●	

For multifunctional grooving breaker ➤ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
J	6.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	6.31mm	●			
	6.35mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			

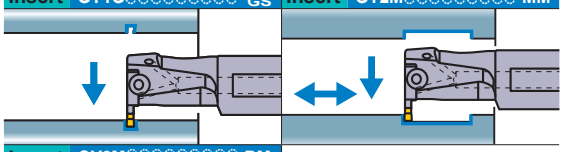
● : Standard insert with dimensions

IDENTIFICATION ➤ F010, F011
CUTTING CONDITIONS ➤ F110
CAUTION FOR USE ➤ F112

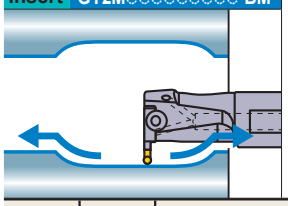
GY SERIES (INTERNAL GROOVING)

6 90° type holder

Insert GY2M○○○○○○○○○-GS/GM
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-GU
Insert GY2M○○○○○○○○○-MS
Insert GY1G○○○○○○○○○-GF/GS
Insert GY2M○○○○○○○○○-MM

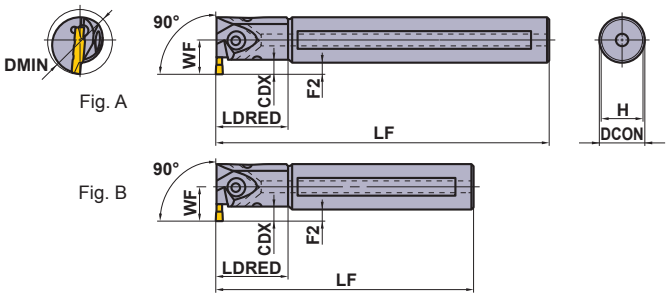


Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.

●Mono block type (Air / coolant through)



Right hand tool holder shown.

Seat Size	CW	CDX *3	DMIN	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
D	2.00 2.24	6	25	Mono Block	R	GYAR20K90A-D06	●	—	—	B
					L	GYAL20K90A-D06	●	—	—	B
				Mono Block	R	GYAR20Q90A-D06	●	—	—	A
					L	GYAL20Q90A-D06	●	—	—	A
			32	Mono Block	R	GYAR25K90B-D06	●	—	—	B
					L	GYAL25K90B-D06	●	—	—	B
				Mono Block	R	GYAR25R90B-D06	●	—	—	A
					L	GYAL25R90B-D06	●	—	—	A
		4—9.5 *1	40	Modular	R	GYDR32L90C-M20L	●	GYM20LA-D10	●	D
					L	GYDL32L90C-M20R	●	GYM20RA-D10	●	D
				Modular	R	GYDR32S90C-M20L	●	GYM20LA-D10	●	C
					L	GYDL32S90C-M20R	●	GYM20RA-D10	●	C
		5.5—9.5 *1	50	Modular	R	GYDR40M90D-M20L	●	GYM20LA-D10	●	D
					L	GYDL40M90D-M20R	●	GYM20RA-D10	●	D
				Modular	R	GYDR40T90D-M20L	●	GYM20LA-D10	●	C
					L	GYDL40T90D-M20R	●	GYM20RA-D10	●	C
		7—11.5 *1	60	Modular	R	GYDR40M90D-M25L	●	GYM25LA-D12	●	D
					L	GYDL40M90D-M25R	●	GYM25RA-D12	●	D
				Modular	R	GYDR40T90D-M25L	●	GYM25LA-D12	●	C
					L	GYDL40T90D-M25R	●	GYM25RA-D12	●	C
			70	Modular	R	GYDR50P90F-M25L	●	GYM25LA-D12	●	D
					L	GYDL50P90F-M25R	●	GYM25RA-D12	●	D
				Modular	R	GYDR50T90F-M25L	●	GYM25LA-D12	●	C
					L	GYDL50T90F-M25R	●	GYM25RA-D12	●	C

*1 The maximum groove depth varies according to the cutting diameter **DMIN**. For details, please refer to page F116.
*2 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF, LDRED, WF** and **F2** values may vary.
*3 The maximum groove depth (**CDX**) is a value within the dimension **LDRED**.

● : Inventory maintained in Japan.

●Modular blade type (Air / coolant through)

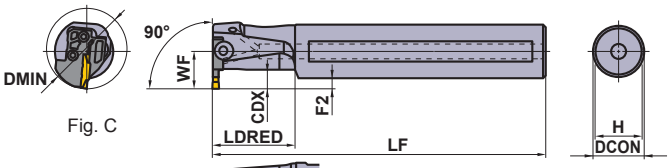


Fig. C

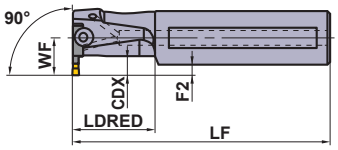


Fig. D

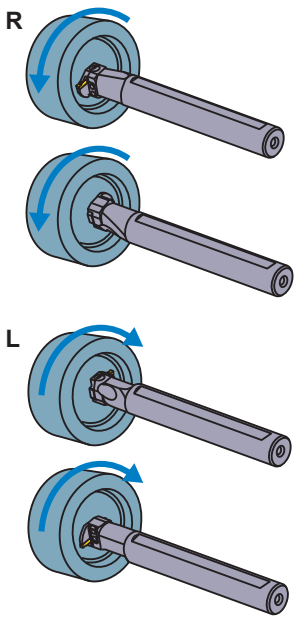
Right hand tool holder shown.

★ Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	① ② Clamp Screw	4 pcs. Blade Screw	① ② Wrench ★
GYAR/L20○90A-○06	①GY05016S (Clamp Torque : 5.0N·m)	–	①TKY20R
GYAR/L25○90B-○06			
GYDR/L32○90C-M20L/R	②GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYDR/L40○90D-M20L/R			
GYDR/L40○90D-M25L/R	②GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYDR/L50○90F-M25L/R			

	Dimensions (mm) ★2						Cutting Mode
	DCON	LF	LDRED	WF	F2	H	
	20	125	30	14.5	4.5	18	R
	20	125	30	14.5	4.5	18	
	20	180	30	14.5	4.5	18	
	20	180	30	14.5	4.5	18	
	25	125	40	19	6.5	23	
	25	125	40	19	6.5	23	
	25	200	40	19	6.5	23	
	25	200	40	19	6.5	23	
	32	140	50	22	6	30	
	32	140	50	22	6	30	
	32	250	50	22	6	30	
	32	250	50	22	6	30	
	40	150	60	28	8	37	
	40	150	60	28	8	37	
	40	300	60	28	8	37	
	40	300	60	28	8	37	
	40	150	60	28	8	37	
	40	150	60	28	8	37	
	40	300	60	28	8	37	
	40	300	60	28	8	37	
	50	170	80	34	9	47	
	50	170	80	34	9	47	
	50	300	80	34	9	47	
	50	300	80	34	9	47	



Insert selection

Seat Size	Geometry name
D	GY○○0200/0224D○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
D	2.00mm	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball nose
D	2.00mm	●	●	●	●
	2.24mm	●			

● : Standard insert with dimensions

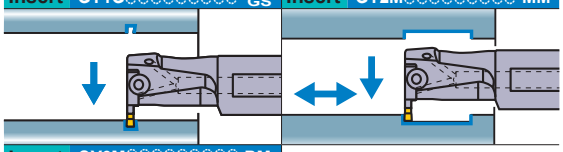
GROOVING

IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F116
CAUTION FOR USE ➢ F118

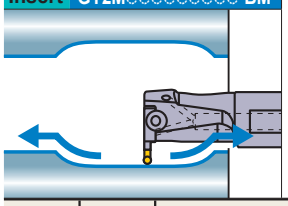
GY SERIES (INTERNAL GROOVING)

6 90° type holder

Insert GY2M○○○○○○○○○○-GS/GM
Insert GY2G○○○○○○○○○○-MF
Insert GY2M○○○○○○○○○○-GU
Insert GY2M○○○○○○○○○○-MS
Insert GY1G○○○○○○○○○○-GF/GS
Insert GY2M○○○○○○○○○○-MM

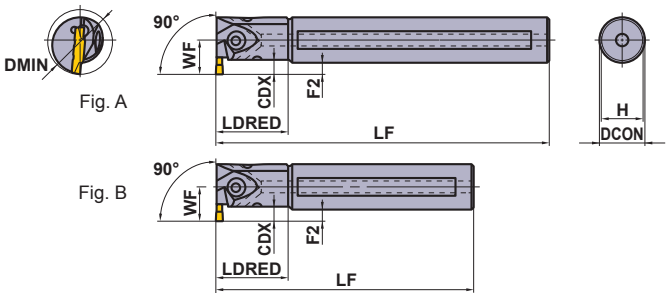


Insert GY2M○○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.

●Mono block type (Air / coolant through)



Right hand tool holder shown.

Seat Size	CW	CDX *3	DMIN	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
E	2.39 2.50 2.74	6	25	Mono Block	R	GYAR20K90A-E06	●	—	—	B
					L	GYAL20K90A-E06	●	—	—	B
				Mono Block	R	GYAR20Q90A-E06	●	—	—	A
					L	GYAL20Q90A-E06	●	—	—	A
			32	Mono Block	R	GYAR25K90B-E06	●	—	—	B
					L	GYAL25K90B-E06	●	—	—	B
				Mono Block	R	GYAR25R90B-E06	●	—	—	A
					L	GYAL25R90B-E06	●	—	—	A
		4—9.5 *1	40	Modular	R	GYDR32L90C-M20L	●	GYM20LA-E10	●	D
					L	GYDL32L90C-M20R	●	GYM20RA-E10	●	D
				Modular	R	GYDR32S90C-M20L	●	GYM20LA-E10	●	C
					L	GYDL32S90C-M20R	●	GYM20RA-E10	●	C
		5.5—9.5 *1	50	Modular	R	GYDR40M90D-M20L	●	GYM20LA-E10	●	D
					L	GYDL40M90D-M20R	●	GYM20RA-E10	●	D
				Modular	R	GYDR40T90D-M20L	●	GYM20LA-E10	●	C
					L	GYDL40T90D-M20R	●	GYM20RA-E10	●	C
		7—11.5 *1	60	Modular	R	GYDR40M90D-M25L	●	GYM25LA-E12	●	D
					L	GYDL40M90D-M25R	●	GYM25RA-E12	●	D
				Modular	R	GYDR40T90D-M25L	●	GYM25LA-E12	●	C
					L	GYDL40T90D-M25R	●	GYM25RA-E12	●	C
			70	Modular	R	GYDR50P90F-M25L	●	GYM25LA-E12	●	D
					L	GYDL50P90F-M25R	●	GYM25RA-E12	●	D
				Modular	R	GYDR50T90F-M25L	●	GYM25LA-E12	●	C
					L	GYDL50T90F-M25R	●	GYM25RA-E12	●	C

*1 The maximum groove depth varies according to the cutting diameter **DMIN**. For details, please refer to page F116.
*2 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF, LDRED, WF** and **F2** values may vary.
*3 The maximum groove depth (**CDX**) is a value within the dimension **LDRED**.

● : Inventory maintained in Japan.

●Modular blade type (Air / coolant through)

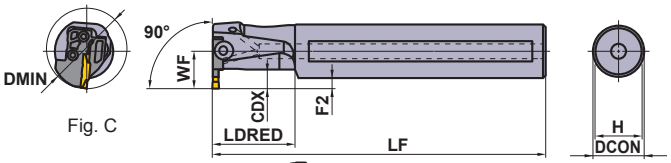


Fig. C

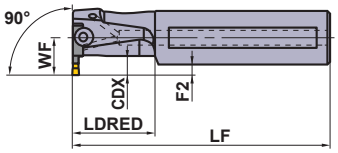


Fig. D

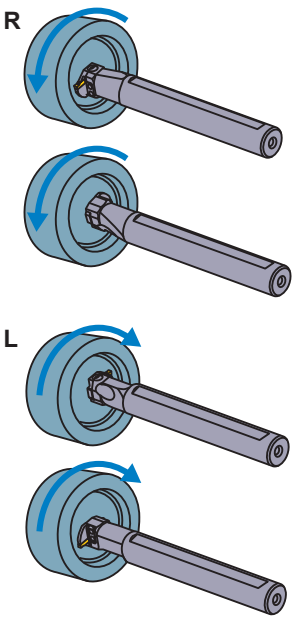
Right hand tool holder shown.

★ Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	① ② Clamp Screw	4 pcs. Blade Screw	① ② Wrench ★
GYAR/L20○90A-○06	①GY05016S (Clamp Torque : 5.0N·m)	–	①TKY20R
GYAR/L25○90B-○06			
GYDR/L32○90C-M20L/R	②GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYDR/L40○90D-M20L/R			
GYDR/L40○90D-M25L/R	②GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYDR/L50○90F-M25L/R			

Dimensions (mm) ★2						Cutting Mode
DCON	LF	LDRED	WF	F2	H	
20	125	30	14.5	4.5	18	R
20	125	30	14.5	4.5	18	
20	180	30	14.5	4.5	18	
20	180	30	14.5	4.5	18	
25	125	40	19	6.5	23	
25	125	40	19	6.5	23	
25	200	40	19	6.5	23	
25	200	40	19	6.5	23	
32	140	50	22	6	30	
32	140	50	22	6	30	
32	250	50	22	6	30	
32	250	50	22	6	30	
40	150	60	28	8	37	L
40	150	60	28	8	37	
40	300	60	28	8	37	
40	300	60	28	8	37	
40	150	60	28	8	37	
40	150	60	28	8	37	
40	300	60	28	8	37	
40	300	60	28	8	37	
50	170	80	34	9	47	
50	170	80	34	9	47	
50	300	80	34	9	47	
50	300	80	34	9	47	



Insert selection

Seat Size	Geometry name
E	GY○○0239/0250/0274E○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
E	2.39mm	●	●	●	●
	2.50mm	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball nose
E	2.39mm	●			
	2.50mm	●	●	●	●
	2.74mm	●			

● : Standard insert with dimensions

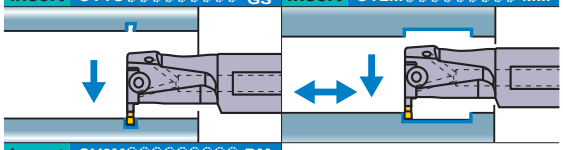
GROOVING

IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F116
CAUTION FOR USE ➢ F118

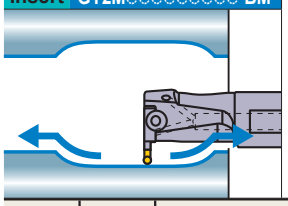
GY SERIES (INTERNAL GROOVING)

6 90° type holder

Insert GY2M○○○○○○○○○-GS/GM
Insert GY2G○○○○○○○○○-MF
Insert GY2M○○○○○○○○○-GU
Insert GY2M○○○○○○○○○-MS
Insert GY1G○○○○○○○○○-GF/GS
Insert GY2M○○○○○○○○○-MM

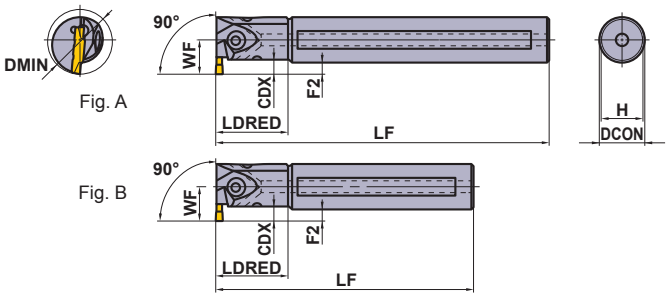


Insert GY2M○○○○○○○○○-BM



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.

●Mono block type (Air / coolant through)



Right hand tool holder shown.

Seat Size	CW	CDX *3	DMIN	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
F	3.00 3.18 3.24	6	25	Mono Block	R	GYAR20K90A-F06	●	—	—	B
					L	GYAL20K90A-F06	●	—	—	B
				Mono Block	R	GYAR20Q90A-F06	●	—	—	A
					L	GYAL20Q90A-F06	●	—	—	A
			32	Mono Block	R	GYAR25K90B-F06	●	—	—	B
					L	GYAL25K90B-F06	●	—	—	B
				Mono Block	R	GYAR25R90B-F06	●	—	—	A
					L	GYAL25R90B-F06	●	—	—	A
		4—9.5 *1	40	Modular	R	GYDR32L90C-M20L	●	GYM20LA-F10	●	D
					L	GYDL32L90C-M20R	●	GYM20RA-F10	●	D
				Modular	R	GYDR32S90C-M20L	●	GYM20LA-F10	●	C
					L	GYDL32S90C-M20R	●	GYM20RA-F10	●	C
		5.5—9.5 *1	50	Modular	R	GYDR40M90D-M20L	●	GYM20LA-F10	●	D
					L	GYDL40M90D-M20R	●	GYM20RA-F10	●	D
				Modular	R	GYDR40T90D-M20L	●	GYM20LA-F10	●	C
					L	GYDL40T90D-M20R	●	GYM20RA-F10	●	C
		7—11.5 *1	60	Modular	R	GYDR40M90D-M25L	●	GYM25LA-F12	●	D
					L	GYDL40M90D-M25R	●	GYM25RA-F12	●	D
				Modular	R	GYDR40T90D-M25L	●	GYM25LA-F12	●	C
					L	GYDL40T90D-M25R	●	GYM25RA-F12	●	C
			70	Modular	R	GYDR50P90F-M25L	●	GYM25LA-F12	●	D
					L	GYDL50P90F-M25R	●	GYM25RA-F12	●	D
				Modular	R	GYDR50T90F-M25L	●	GYM25LA-F12	●	C
					L	GYDL50T90F-M25R	●	GYM25RA-F12	●	C
G	4.00 4.24	7	32	Mono Block	R	GYAR25K90B-G07	●	—	—	B
					L	GYAL25K90B-G07	●	—	—	B
				Mono Block	R	GYAR25R90B-G07	●	—	—	A
					L	GYAL25R90B-G07	●	—	—	A
		4.5—11.5 *1	40	Modular	R	GYDR32L90C-M20L	●	GYM20LA-G12	●	D
					L	GYDL32L90C-M20R	●	GYM20RA-G12	●	D
				Modular	R	GYDR32S90C-M20L	●	GYM20LA-G12	●	C
					L	GYDL32S90C-M20R	●	GYM20RA-G12	●	C
		6—11.5 *1	50	Modular	R	GYDR40M90D-M20L	●	GYM20LA-G12	●	D
					L	GYDL40M90D-M20R	●	GYM20RA-G12	●	D
				Modular	R	GYDR40T90D-M20L	●	GYM20LA-G12	●	C
					L	GYDL40T90D-M20R	●	GYM20RA-G12	●	C
		7.5—13 *1	60	Modular	R	GYDR40M90D-M25L	●	GYM25LA-G14	●	D
					L	GYDL40M90D-M25R	●	GYM25RA-G14	●	D
				Modular	R	GYDR40T90D-M25L	●	GYM25LA-G14	●	C
					L	GYDL40T90D-M25R	●	GYM25RA-G14	●	C
			70	Modular	R	GYDR50P90F-M25L	●	GYM25LA-G14	●	D
					L	GYDL50P90F-M25R	●	GYM25RA-G14	●	D
				Modular	R	GYDR50T90F-M25L	●	GYM25LA-G14	●	C
					L	GYDL50T90F-M25R	●	GYM25RA-G14	●	C

*1 The maximum groove depth varies according to the cutting diameter **DMIN**. For details, please refer to page F116.
*2 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF, LDRED, WF** and **F2** values may vary.
*3 The maximum groove depth (**CDX**) is a value within the dimension **LDRED**.

● : Inventory maintained in Japan.

●Modular blade type (Air / coolant through)

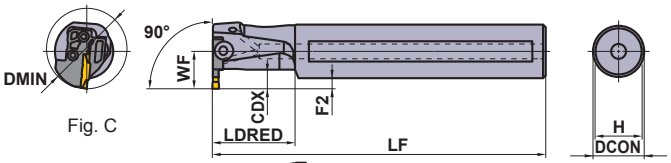


Fig. C

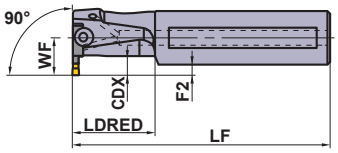


Fig. D

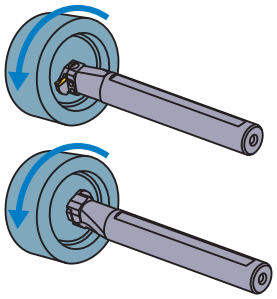
Right hand tool holder shown.

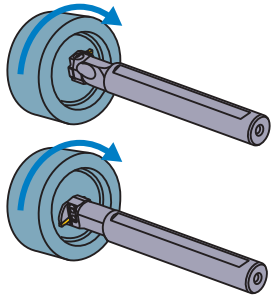
★ Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	① ② Clamp Screw	4 pcs. Blade Screw	① ② Wrench ★
GYAR/L20○90A-F06	①GY05016S (Clamp Torque : 5.0N·m)	–	①TKY20R
GYAR/L25○90B-○○○			
GYDR/L32○90C-M20L/R	②GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYDR/L40○90D-M20L/R			
GYDR/L40○90D-M25L/R	②GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYDR/L50○90F-M25L/R			

Dimensions (mm) ★2						Cutting Mode
DCON	LF	LDRED	WF	F2	H	
20	125	30	14.5	4.5	18	R
20	125	30	14.5	4.5	18	
20	180	30	14.5	4.5	18	
20	180	30	14.5	4.5	18	
25	125	40	19	6.5	23	
25	125	40	19	6.5	23	
25	200	40	19	6.5	23	
25	200	40	19	6.5	23	
32	140	50	22	6	30	
32	140	50	22	6	30	
32	250	50	22	6	30	
32	250	50	22	6	30	
40	150	60	28	8	37	
40	150	60	28	8	37	
40	300	60	28	8	37	
40	300	60	28	8	37	
40	150	60	28	8	37	
40	150	60	28	8	37	
40	300	60	28	8	37	
40	300	60	28	8	37	
50	170	80	34	9	47	
50	170	80	34	9	47	
50	300	80	34	9	47	
50	300	80	34	9	47	
25	125	40	19	6.5	23	L
25	125	40	19	6.5	23	
25	200	40	19	6.5	23	
25	200	40	19	6.5	23	
32	140	50	22	6	30	
32	140	50	22	6	30	
32	250	50	22	6	30	
32	250	50	22	6	30	
40	150	60	28	8	37	
40	150	60	28	8	37	
40	300	60	28	8	37	
40	300	60	28	8	37	
40	150	60	28	8	37	
40	150	60	28	8	37	
40	300	60	28	8	37	
40	300	60	28	8	37	
50	170	80	34	9	47	
50	170	80	34	9	47	
50	300	80	34	9	47	
50	300	80	34	9	47	





Insert selection

Seat Size	Geometry name
F	GY○○0300/0318/0324F○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
F	3.00mm	●	●	●	●
	3.18mm	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball nose
F	3.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8			●	
	3.18mm				●
	RE 0.2	●			
	RE 0.4	●			
	3.24mm	●			

Seat Size	Geometry name
G	GY○○0400/0424G○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
G	4.00mm	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball nose
G	4.00mm				●
	RE 0.2	●	●	●	
	RE 0.4	●	●	●	
	RE 0.8	●		●	
	4.24mm	●			

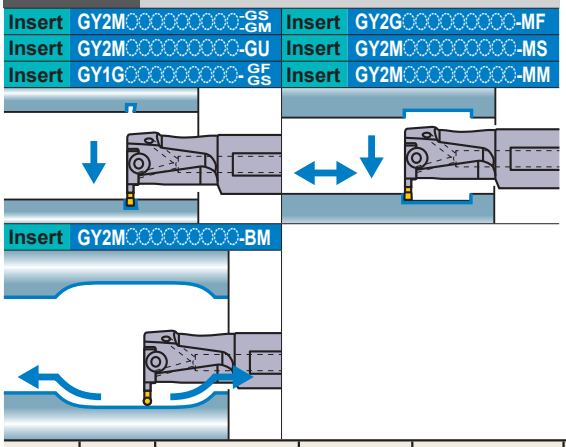
● : Standard insert with dimensions

GROOVING

IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F116
CAUTION FOR USE ➢ F118

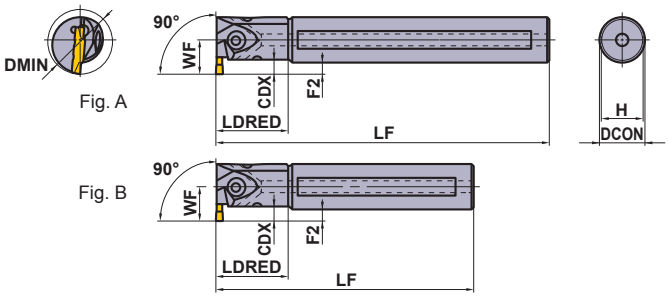
GY SERIES (INTERNAL GROOVING)

6 90° type holder



(Note 1) Please order the modular blade and modular holder separately.
(Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.

●Mono block type (Air / coolant through)



Right hand tool holder shown.

Seat Size	CW	CDX *3	DMIN	Type	Hand (R/L)	Order Number Holder	Stock	Modular Blade	Stock	Fig.
H	4.75 5.00 5.24	7	32	Mono Block	R	GYAR25K90B-H07	●	—	—	B
					L	GYAL25K90B-H07	●	—	—	B
				Mono Block	R	GYAR25R90B-H07	●	—	—	A
					L	GYAL25R90B-H07	●	—	—	A
		4.5—11.5 *1	40	Modular	R	GYDR32L90C-M20L	●	GYM20LA-H12	●	D
					L	GYDL32L90C-M20R	●	GYM20RA-H12	●	D
				Modular	R	GYDR32S90C-M20L	●	GYM20LA-H12	●	C
					L	GYDL32S90C-M20R	●	GYM20RA-H12	●	C
		6—11.5 *1	50	Modular	R	GYDR40M90D-M20L	●	GYM20LA-H12	●	D
					L	GYDL40M90D-M20R	●	GYM20RA-H12	●	D
				Modular	R	GYDR40T90D-M20L	●	GYM20LA-H12	●	C
					L	GYDL40T90D-M20R	●	GYM20RA-H12	●	C
		7.5—13 *1	60	Modular	R	GYDR40M90D-M25L	●	GYM25LA-H14	●	D
					L	GYDL40M90D-M25R	●	GYM25RA-H14	●	D
				Modular	R	GYDR40T90D-M25L	●	GYM25LA-H14	●	C
					L	GYDL40T90D-M25R	●	GYM25RA-H14	●	C
			70	Modular	R	GYDR50P90F-M25L	●	GYM25LA-H14	●	D
					L	GYDL50P90F-M25R	●	GYM25RA-H14	●	D
				Modular	R	GYDR50T90F-M25L	●	GYM25LA-H14	●	C
					L	GYDL50T90F-M25R	●	GYM25RA-H14	●	C
J	6.00 6.31 6.35	7.5—13 *1	60	Modular	R	GYDR40M90D-M25L	●	GYM25LA-J14	●	D
					L	GYDL40M90D-M25R	●	GYM25RA-J14	●	D
				Modular	R	GYDR40T90D-M25L	●	GYM25LA-J14	●	C
					L	GYDL40T90D-M25R	●	GYM25RA-J14	●	C
			70	Modular	R	GYDR50P90F-M25L	●	GYM25LA-J14	●	D
					L	GYDL50P90F-M25R	●	GYM25RA-J14	●	D
				Modular	R	GYDR50T90F-M25L	●	GYM25LA-J14	●	C
					L	GYDL50T90F-M25R	●	GYM25RA-J14	●	C

*1 The maximum groove depth varies according to the cutting diameter **DMIN**. For details, please refer to page F116.
*2 Dimensions shown are when the gauge insert is used. If other insert geometries are used then **LF, LDRED, WF** and **F2** values may vary.
*3 The maximum groove depth (**CDX**) is a value within the dimension **LDRED**.

● : Inventory maintained in Japan.

●Modular blade type (Air / coolant through)

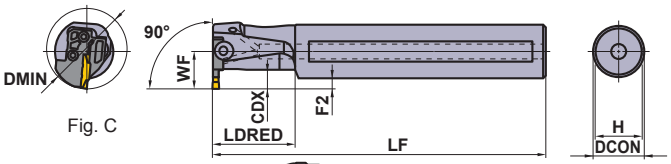


Fig. C

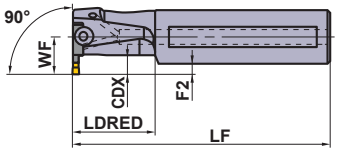


Fig. D

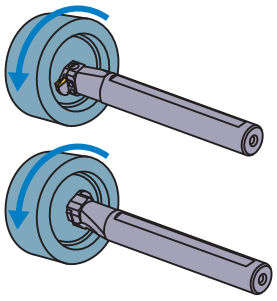
Right hand tool holder shown.

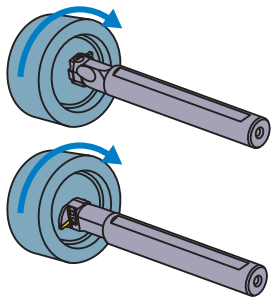
★ Wrench : ① : Clamp Screw, ② : Blade Screw

SPARE PARTS

Holder	① ② Clamp Screw	4 pcs. Blade Screw	① ② Wrench ★
GYAR/L25○90B-○07	①GY05016S (Clamp Torque : 5.0N·m)	–	①TKY20R
GYDR/L32○90C-M20L/R	②GY06013M (Clamp Torque : 6.0N·m)	TS407 (Clamp Torque : 3.5N·m)	①TKY30R ②TKY15D
GYDR/L40○90D-M20L/R			
GYDR/L40○90D-M25L/R	②GY06013M (Clamp Torque : 6.0N·m)	TS55 (Clamp Torque : 5.0N·m)	①TKY30R ②TKY25D
GYDR/L50○90F-M25L/R			

Dimensions (mm) ★2						Cutting Mode
DCON	LF	LDRED	WF	F2	H	
25	125	40	19	6.5	23	R
25	125	40	19	6.5	23	
25	200	40	19	6.5	23	
25	200	40	19	6.5	23	
32	140	50	22	6	30	
32	140	50	22	6	30	
32	250	50	22	6	30	
32	250	50	22	6	30	
40	150	60	28	8	37	
40	150	60	28	8	37	
40	300	60	28	8	37	
40	300	60	28	8	37	
40	150	60	28	8	37	
40	150	60	28	8	37	
40	300	60	28	8	37	
40	300	60	28	8	37	
50	170	80	34	9	47	
50	170	80	34	9	47	
50	300	80	34	9	47	
50	300	80	34	9	47	
40	150	60	28	8	37	L
40	150	60	28	8	37	
40	300	60	28	8	37	
40	300	60	28	8	37	
50	170	80	34	9	47	
50	170	80	34	9	47	
50	300	80	34	9	47	
50	300	80	34	9	47	





Insert selection

Seat Size	Geometry name
H	GY○○0475/0500/0524H○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
H	4.75mm	●	●	●	●
	5.00mm	●	●	●	●

For multifunctional grooving breaker ➢ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball nose
H	4.75mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			
	5.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	5.24mm	●			

Seat Size	Geometry name
J	GY○○0600/0631/0635J○○○○–Breaker shown below

For grooving/cutting off breaker ➢ F012, F013

Seat Size	CW \ Breaker	GU (For gummy steel)	GS (Low)	GM (Medium)	GFGS (Hardened steel)
J	6.00mm	●	●	●	
	6.35mm	●	●	●	

For multifunctional grooving breaker ➢ F013, F014

Seat Size	CW \ Breaker	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball nose
J	6.00mm				●
	RE 0.2	●			
	RE 0.4	●	●	●	
	RE 0.8	●	●	●	
	6.31mm	●			
	6.35mm				●
	RE 0.2	●			
	RE 0.4	●			
	RE 0.8	●			

● : Standard insert with dimensions

IDENTIFICATION ➢ F010, F011
CUTTING CONDITIONS ➢ F116
CAUTION FOR USE ➢ F118

RECOMMENDED CUTTING SPEED (m/min) [For External Grooving]

	Work Material	Hardness	Grade	Cutting Speed (m/min) 50 100 150 200 250 300
P	Mild Steel	≤160HB	VP20RT	100–220
			VP10RT	110–230
			NX2525	90–210
	Carbon Steel Alloy Steel	160–280HB	VP20RT	80–180
			VP10RT	90–190
			MY5015	110–250
			NX2525	70–170
		280HB≤	VP20RT	60–140
			VP10RT	70–150
			MY5015	90–210
			NX2525	55–135
M	Stainless Steel	≤270HB	VP20RT	60–140
			VP10RT	70–150
K	Gray Cast Iron	Tensile Strength ≤300MPa	VP20RT	80–180
			VP10RT	90–190
			MY5015	140–300
	Ductile Cast Iron	Tensile Strength ≤800MPa	VP20RT	60–140
			VP10RT	70–150
			MY5015	90–210
S	Heat Resistant Alloy Titanium Alloy	–	VP20RT	30–60
			VP10RT	40–70
			RT9010	40–70
H	Hardened steel	50HRC≤	MB8025	80–120

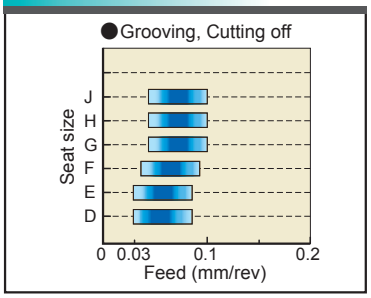
(Note 1) **VP20RT** is the first recommended grade for materials other than hardened steel.
(Note 2) For VP10RT, VP20RT and MY5015, wet cutting is recommended.

RECOMMENDED CUTTING CONDITIONS [For External Grooving]

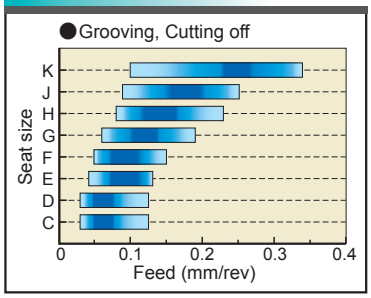
*Recommended cutting conditions when combining a GYHR/L2525M00/90-M24R\L modular holder and GYM25R/LA-○○○ modular blade.

Recommended feed rate and depth of cut

GU BREAKER



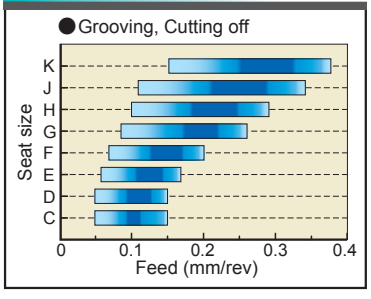
GS BREAKER



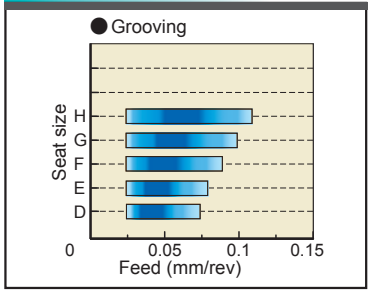
: 1st recommended area

Seat Size	Insert Width (mm)
C	1.50
D	2.00 2.24
E	2.39 2.50 2.74
F	3.00 3.18 3.24
G	4.00 4.24
H	4.75 5.00 5.24
J	6.00 6.31 6.35
K	8.00

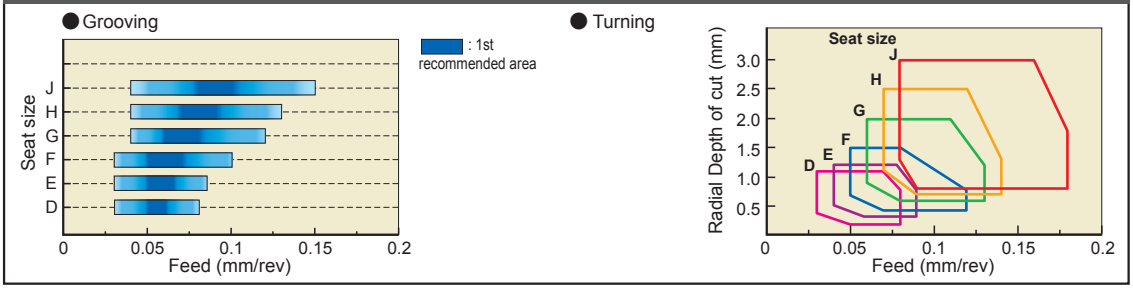
GM BREAKER



FLAT TOP GFGS (CBN)

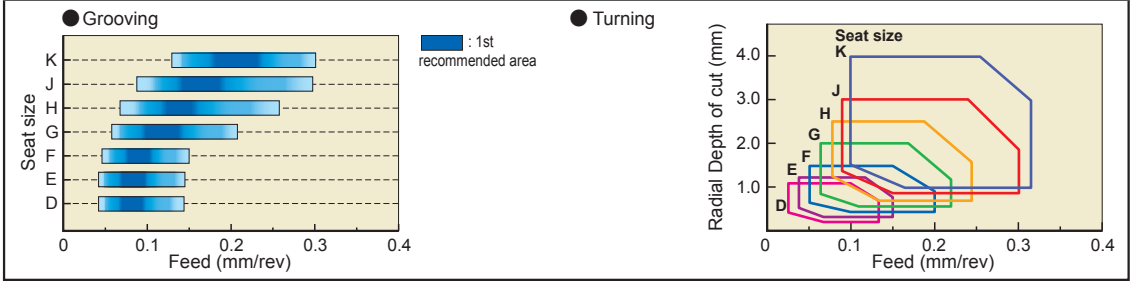


MF BREAKER

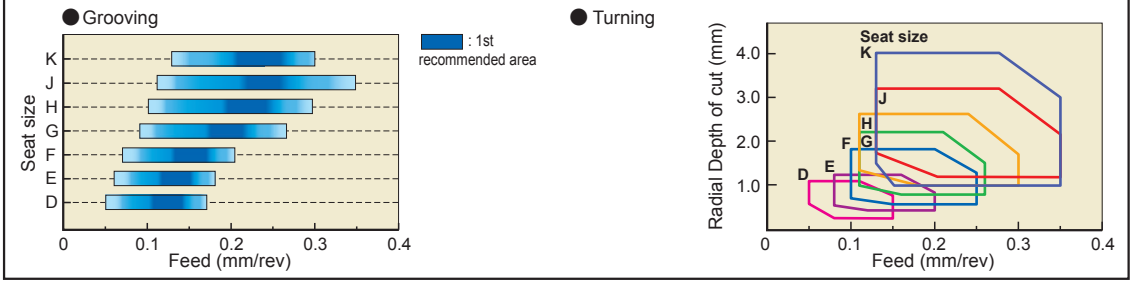


Seat Size	Insert Width (mm)
D	2.00 2.24
E	2.39 2.50 2.74
F	3.00 3.18 3.24
G	4.00 4.24
H	4.75 5.00 5.24
J	6.00 6.31 6.35
K	8.00

MS BREAKER



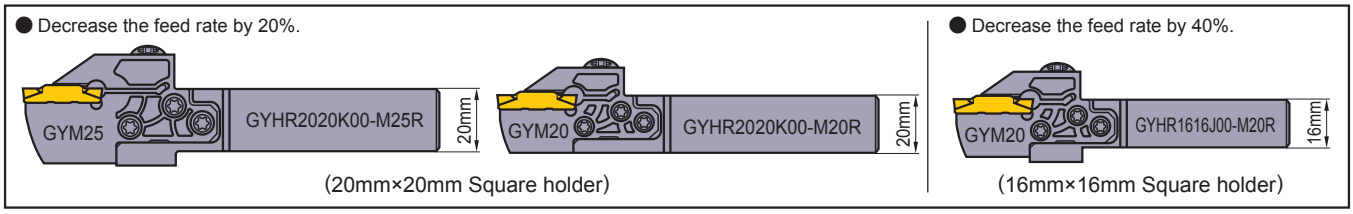
MM BREAKER



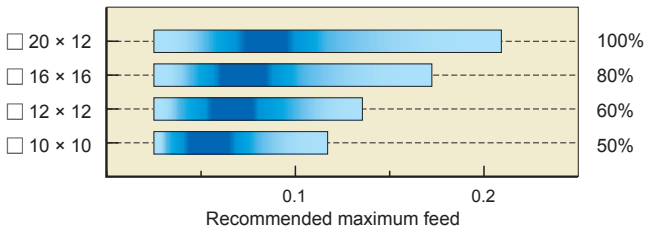
BM BREAKER



(Note) Lower the recommended cutting speed given in the table by 20% and 40% respectively when combining the following modular holders and modular blades.



In the case of mono block type holder for Swiss style lathes

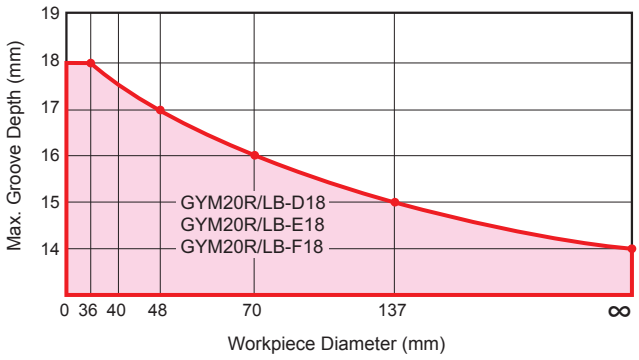


Please refer to the tables above on recommended cutting conditions for external grooving.
Apply the percentage ratio shown on each shank size with the values in the table.

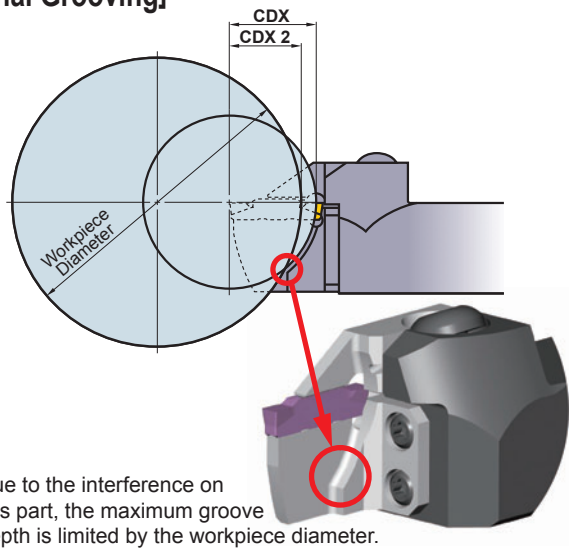
LIMITATION OF THE MAXIMUM GROOVE DEPTH [For External Grooving]

●When using the modular blade GYM○○R/LA-○○○
The maximum groove depth is not limited by the workpiece diameter.

●When using the modular blade GYM○○R/LB-○○○
The maximum groove depth is limited by the workpiece diameter.



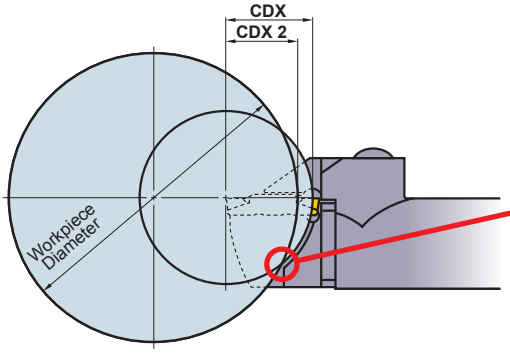
Max. Groove Depth



Due to the interference on this part, the maximum groove depth is limited by the workpiece diameter.

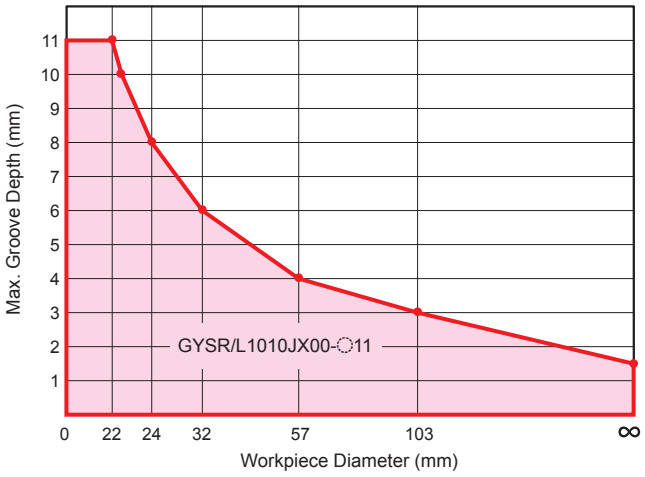
●In the case of mono block type holder for Swiss style lathes
The maximum groove depth is limited by the workpiece diameter.

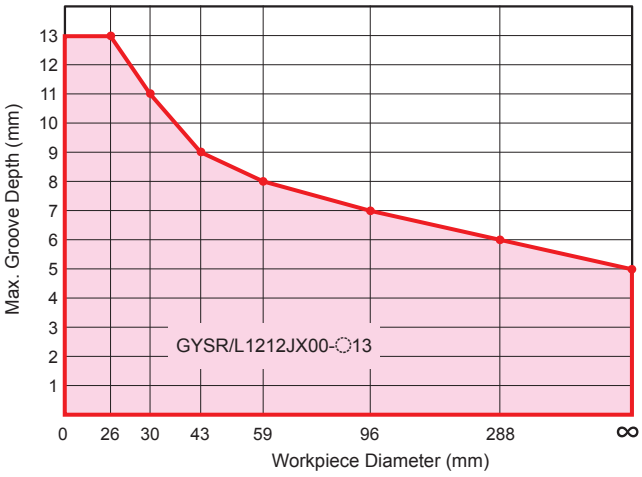
Max. Groove Depth

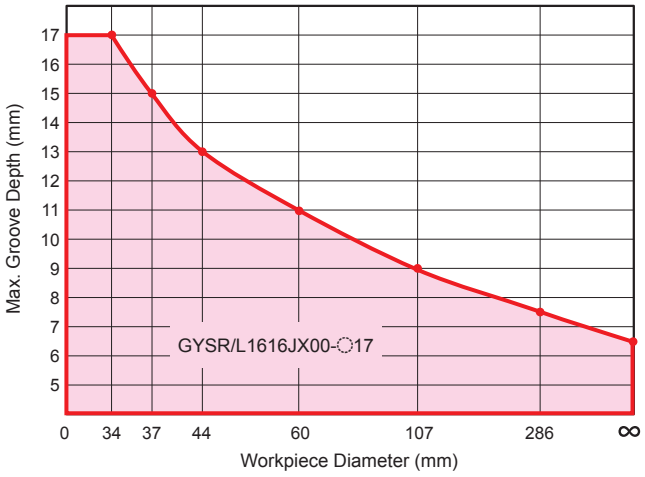


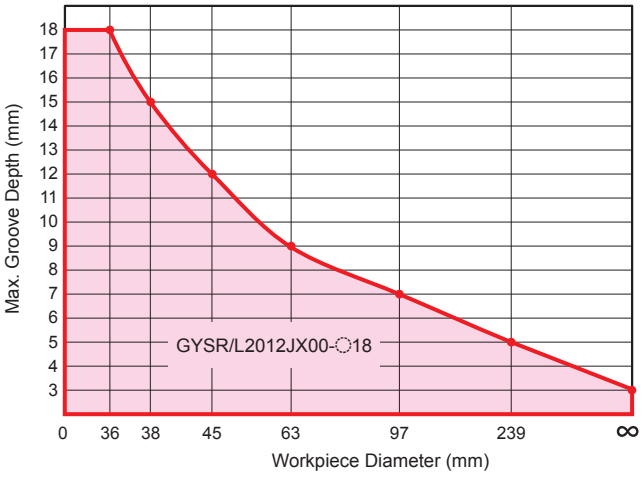


Due to interference, the maximum groove depth is limited by the workpiece diameter.







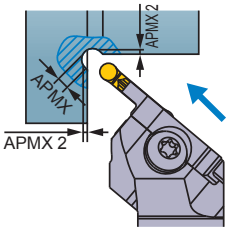


RECOMMENDED CUTTING SPEED (m/min) [For External Recessing]

	Work Material	Hardness	Grade	Cutting Speed (m/min) 50 100 150 200 250
P	Mild Steel	≤180HB	VP20RT	80–180
			VP10RT	90–190
	Carbon Steel Alloy Steel	180–280HB	VP20RT	60–140
			VP10RT	70–150
			MY5015	90–210
			NX2525	55–135
	Carbon Steel Alloy Steel	280–350HB	VP20RT	50–110
			VP10RT	60–120
			MY5015	80–160
			NX2525	45–105
M	Stainless Steel	≤350HB	VP20RT	50–110
			VP10RT	60–120
K	Gray Cast Iron	Tensile Strength ≤350MPa	VP20RT	60–140
			VP10RT	70–150
			MY5015	90–210
	Ductile Cast Iron	Tensile Strength ≤800MPa	VP20RT	50–110
			VP10RT	60–120
			MY5015	80–160
S	Titanium Alloy	–	VP20RT	30–60
			VP10RT	40–70
	Heat Resistant Alloy	–	VP20RT	30–60
			VP10RT	40–70

(Note 1) VP20RT is the first recommended grade for materials other than hardened steel.
(Note 2) For VP10RT, VP20RT and MY5015, wet cutting is recommended.

DISTANCE FROM WORK SURFACE TO RECESS DEPTH

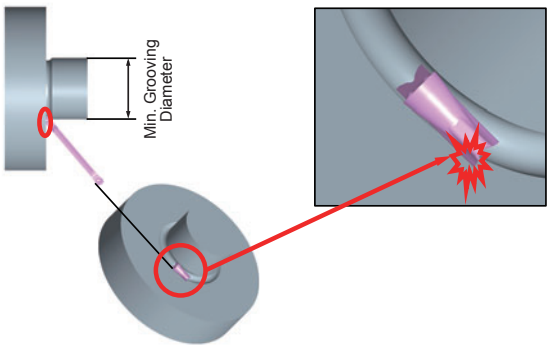


Grooving Width CW (mm)	Recess depth APMX (mm)	Distance from work surface to recess depth APMX 2 (mm)
2.00	1.50	0.646
2.50	1.75	0.720
3.00	2.00	0.793
3.18	2.09	0.819
4.00	2.50	0.939
4.75	2.88	1.049
5.00	3.00	1.086
6.00	3.50	1.232
6.35	3.68	1.283

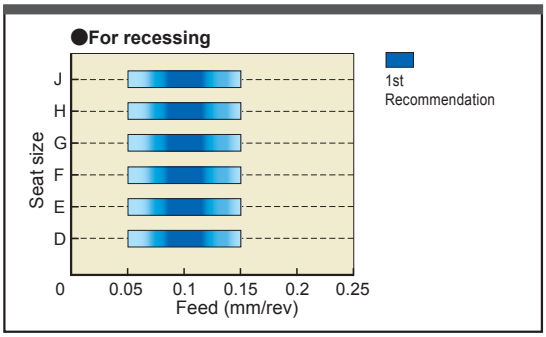
BM BREAKER

Minimum grooving diameter

Ensure the tool is suitable for the diameter being machined. Refer to the Min. Grooving Diameter D1 as shown in the table on the “page number” to avoid a collision with the workpiece shown below.



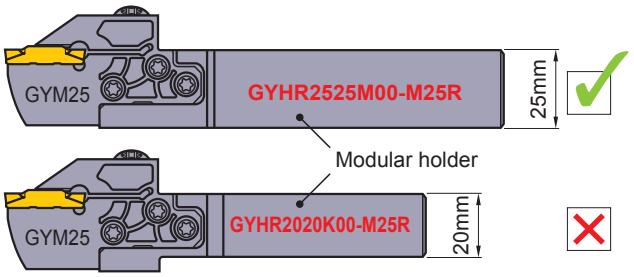
Recommended feed rate and depth of cut



TOOL SELECTION

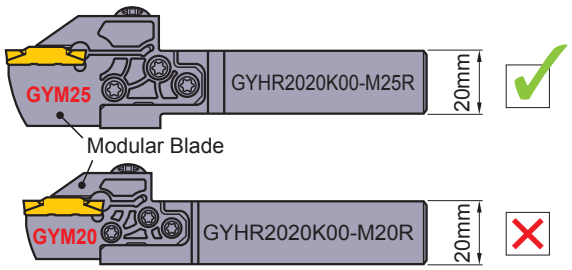
Notes when selecting the tool body

Precautions when selecting a modular holder.



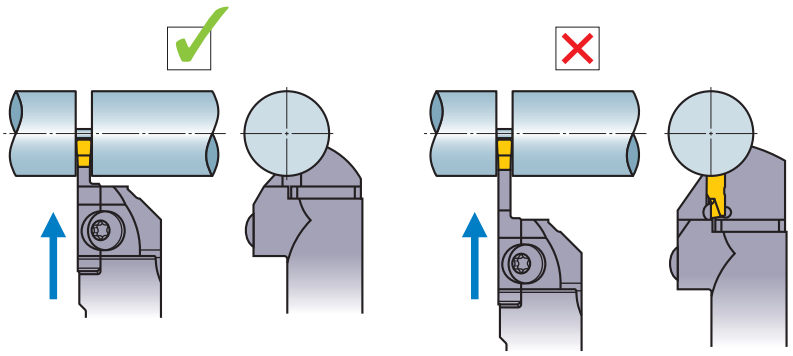
●Select a modular holder with the largest possible shank size to maintain mounting rigidity.

Modular blade (1)



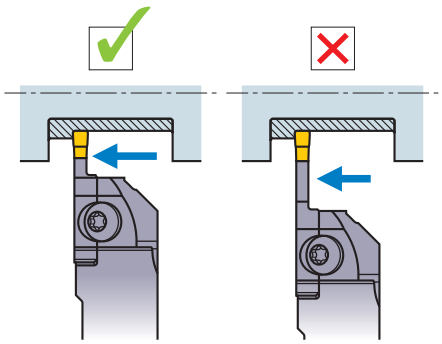
●If there is no restriction for use, select the largest modular blade for the same shank size.

Modular blade (2)



●Select the shortest possible blade suitable for the application.

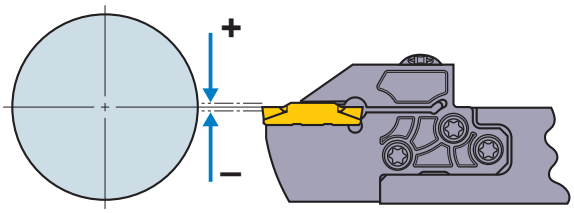
Modular blade (3)



●Select the shortest possible blade suitable for the application.

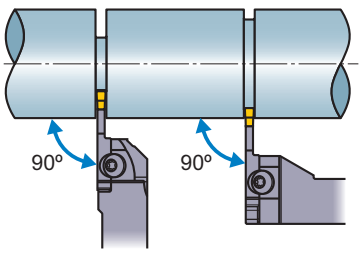
Notes when setting the tool

Setting of cutting edge height



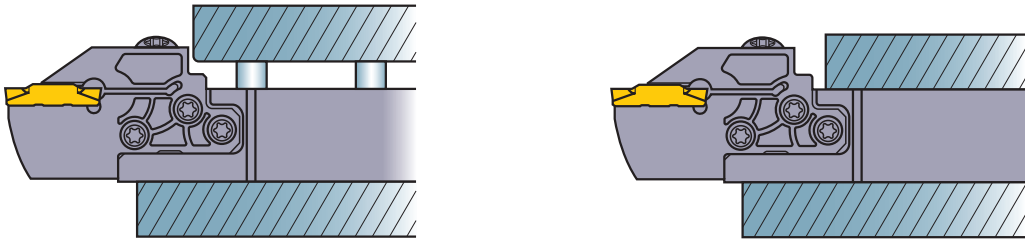
<Grooving/Cross-feed machining>
Set the cutting edge height to ±0.1mm parallel to the central axis.
<Cutting off>
Set the cutting edge height to 0–+0.2mm parallel to the central axis.

Tool body setting angle



●Set the insert perpendicular to the central axis.

Overhang

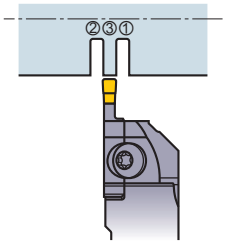


●When setting the tool, ensure that the overhang is as short as possible and avoid the step difference part as above figure shows.

MACHINING RECOMMENDATIONS

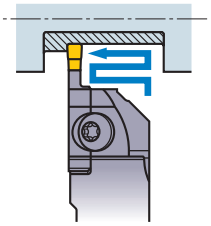
Notes on multi-functional machining (MF,MS,MM and BM breakers)

Machining narrow grooves



●It is recommended to carry out plunging in several passes. Following the steps above makes it difficult for chips to elongate. This also improves the accuracy of workpiece wall surface.

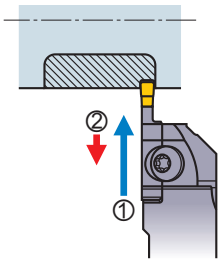
Machining wide grooves



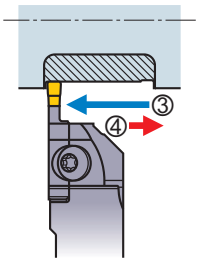
●It is recommended that cross-feed machining is used.

Machining wide grooves

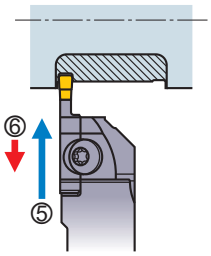
ROUGHING



①Carry out grooving.
②Retract the tool approx 0.1mm.

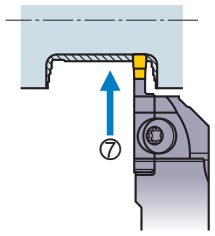


③Carry out cross feed machining.
④Retract the tool approx 0.1mm.

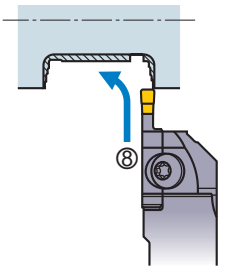


⑤Carry out grooving.
⑥Retract the tool approx 0.1mm.
* Repeat the steps ①–⑥.

FINISHING

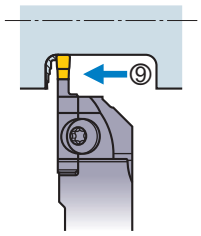


⑦Carry out grooving to the end point of the corner radius.

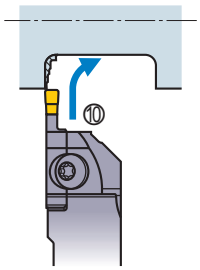


⑧Machining of the wall surface, corner radius and bottom face should be carried out in one process.

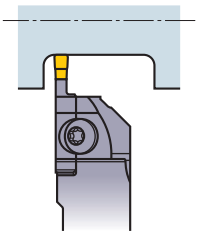
FINISHING



⑨Stop at the bottom of the corner radius.

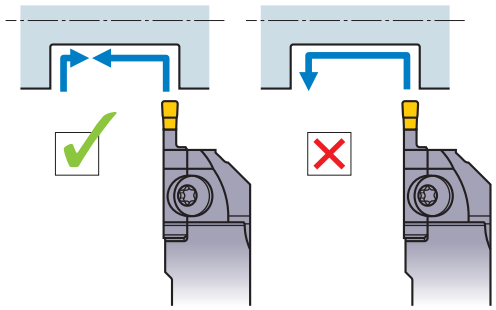


⑩Machine the counter wall to the corner radius in one process.



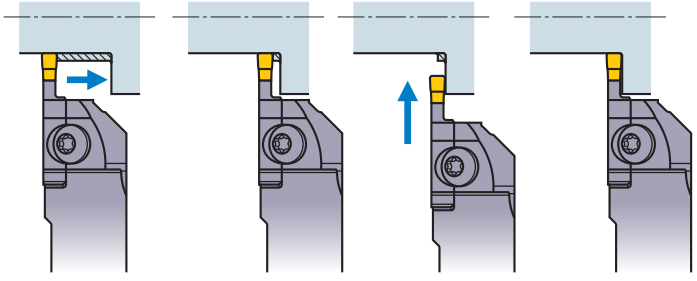
⑪Finish machining.

Precautions when finishing walls



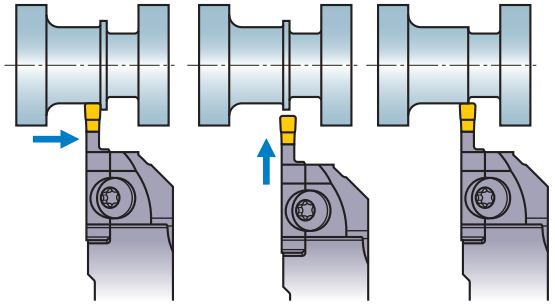
●To produce high accuracy walls using MS or MM breaker insert, do not carry out back turning. Plunging is recommended.

Wall machining



●When machining a wall, chip jamming can occur. In this case, stop cross feed machining just before the wall (at a point less than the insert width) then remove the remaining material by plunging.

Machining of a ring section

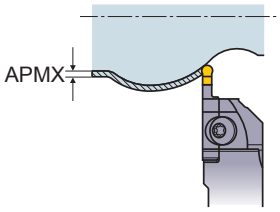


●When a ring remains in a cross feed end process, finish cross feed machining 1–1.5mm short of the end point, then remove the ring by plunging.

MACHINING RECOMMENDATIONS

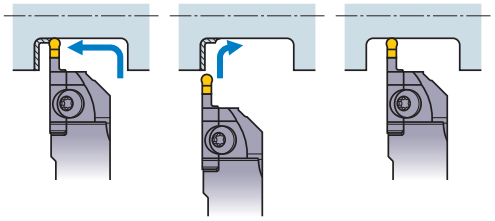
Notes on multi-functional machining (BM breaker)

Copying



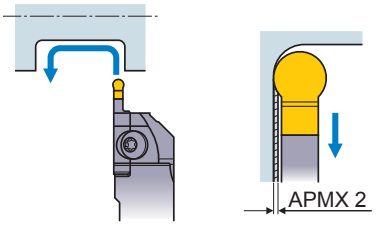
●With the BM breaker insert, 3 dimensional copying is possible.
Set the depth of cut (APMX) to 40% less than the insert width.

Roughing



●Use plunging and cross-feed machining.
When machining the corner, vibration is likely to occur.
To avoid this, reduce the feed by 50%.

Finishing



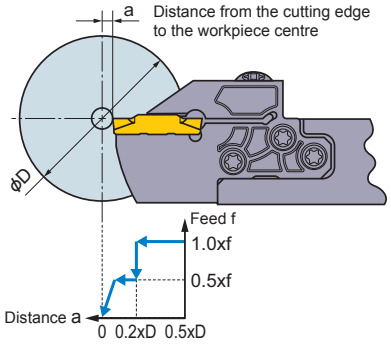
●Carry out finishing in one process.
For the depth of cut (APMX 2) when back turning, refer to the table on the right.

Insert	APMX 2 (mm)
GY2M0200D100N-BM	0.05
GY2M0250E125N-BM	0.10
GY2M0300F150N-BM	0.15
GY2M0318F159N-BM	
GY2M0400G200N-BM	0.20
GY2M0475H238N-BM	0.24
GY2M0500H250N-BM	
GY2M0600J300N-BM	0.30
GY2M0635J318N-BM	
GY2M0800K400N-BM	0.40

Notes for cutting off

Feed

<Feed>

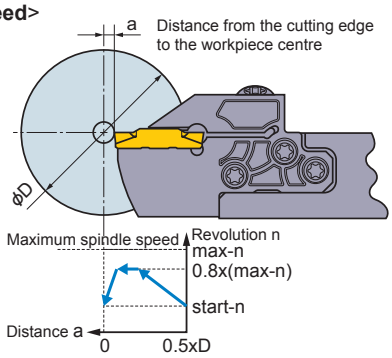


●When the cutting edge approaches the centre, reduce the feed by 50%.

●If necessary, stop the feed prior to reaching the centre of the workpiece to prevent it falling under its own weight.

Revolution

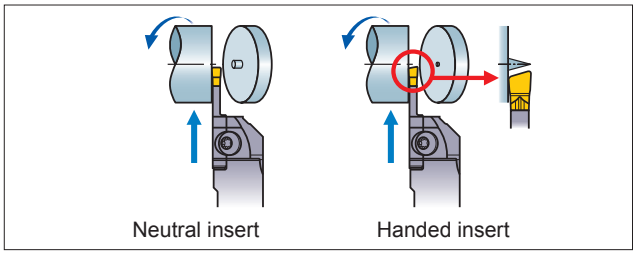
<Spindle speed>

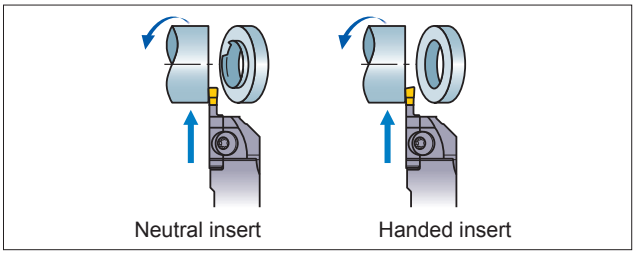


●When using constant cutting speed during a cutting off cycle, it is recommended to limit the spindle speed to 80% of maximum to ensure stability.

●To prevent the workpiece from being expelled, lower the spindle speed before finishing the grooving operation.

Insert

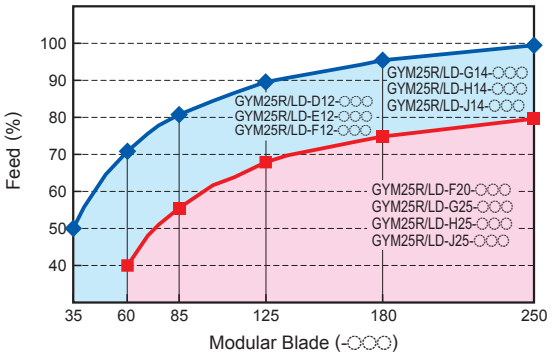




●When there is a centre stub on solid bar work or burrs are formed on pipe material, it is possible to decrease them by using a handed insert.
With a handed insert, machining tends to be less stable when compared to using a neutral insert.
Pay special attention to avoid fracturing of the cutting edge and decrease the feed when necessary.

Memo

RELATIONSHIP BETWEEN THE MODULAR BLADE AND FEED PER ROTATION [For Face Grooving]



(Note) Adjust the feed per rotation in the cutting conditions to the percentage shown in the table above.

GROOVING

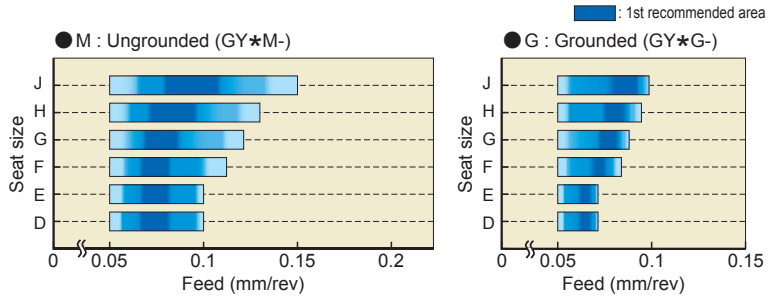
RECOMMENDED CUTTING SPEED (m/min) [For Face Grooving]

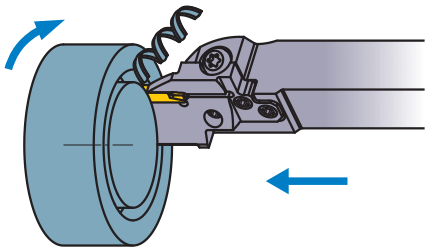
	Work Material	Hardness	Grade	Cutting Speed (m/min) 50 100 150 200 250 300
P	Mild Steel	≤160HB	VP20RT	80 – 180
			VP10RT	90 – 190
			NX2525	70 – 170
	Carbon Steel Alloy Steel	160–280HB	VP20RT	60 – 140
			VP10RT	70 – 150
			MY5015	90 – 210
			NX2525	55 – 135
		280HB≤	VP20RT	50 – 110
			VP10RT	60 – 120
			MY5015	80 – 160
			NX2525	45 – 105
M	Stainless Steel	≤270HB	VP20RT	50 – 110
			VP10RT	60 – 120
K	Gray Cast Iron	Tensile Strength ≤300MPa	VP20RT	60 – 140
			VP10RT	70 – 150
			MY5015	90 – 210
	Ductile Cast Iron	Tensile Strength ≤800MPa	VP20RT	50 – 110
			VP10RT	60 – 120
			MY5015	80 – 160
S	Heat Resistant Alloy Titanium Alloy	–	VP20RT	30 – 60
			VP10RT	40 – 70
			RT9010	40 – 70
H	Hardened steel	50HRC≤	MB8025	60 – 100

(Note 1) VP20RT is the first recommended grade for materials other than hardened steel.
(Note 2) For VP10RT, VP20RT and MY5015, wet cutting is recommended.

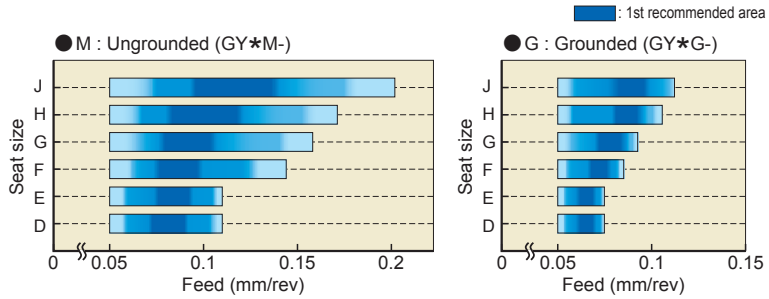
RECOMMENDED CUTTING CONDITIONS [For Face Grooving]

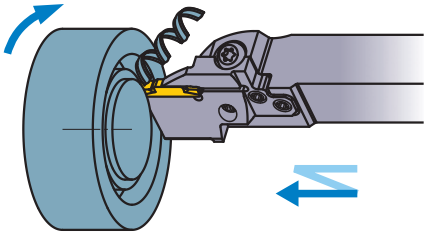
GROOVING





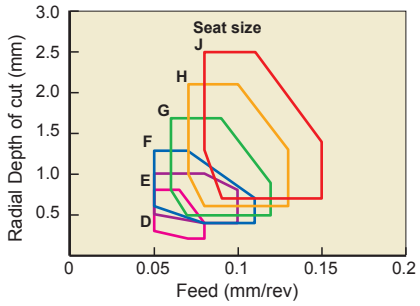
PLUNGING





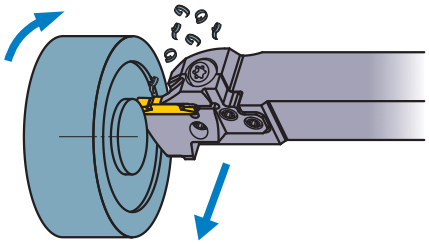
✱ After the 1st plunge, the width of cut should be set narrower than insert with CW.

TRAVERSE MACHINING (MF BREAKER)

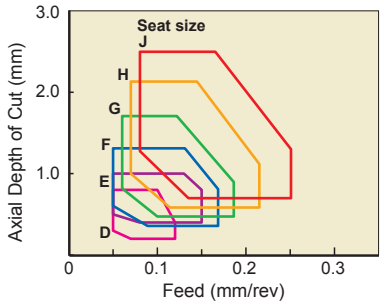


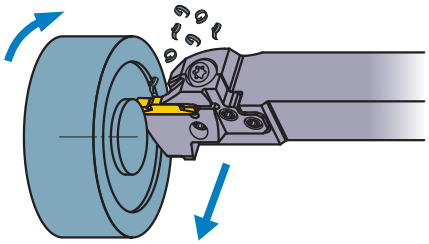
Seat Size	Insert Width (mm)
D	2.00 2.24
E	2.39 2.50 2.74
F	3.00 3.18 3.24

Seat Size	Insert Width (mm)
G	4.00 4.24
H	4.75 5.00 5.24
J	6.00 6.31 6.35

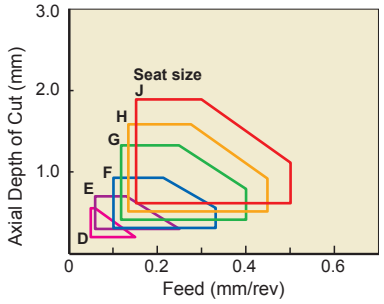


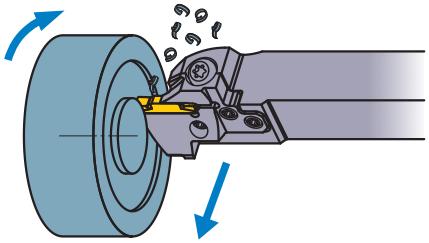
TRAVERSE MACHINING (MM/MS BREAKER)





TRAVERSE MACHINING (BM BREAKER)

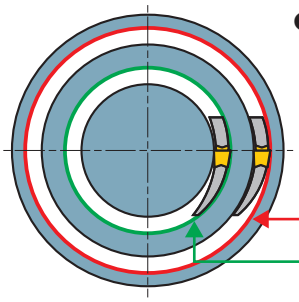




TOOL SELECTION

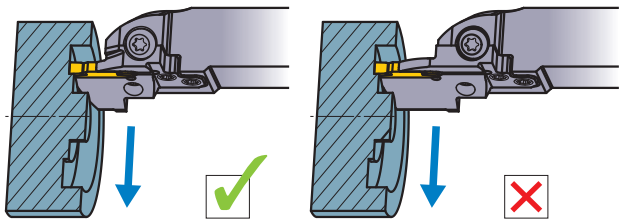
Notes when selecting the tool body

Modular blade (1)



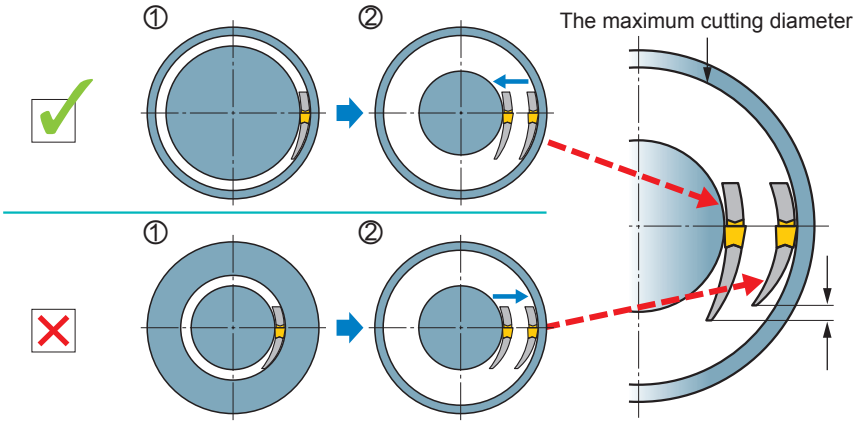
- Select a modular blade for face grooving, so that the cutting diameter at the first pass is within the range of DAXN minimum and DAXX maximum that are described in the table of dimensions.

Modular blade (2)



- Select the shortest possible blade suitable for the application.

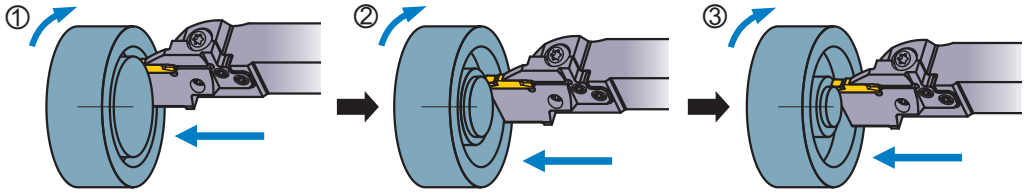
Modular blade (3)



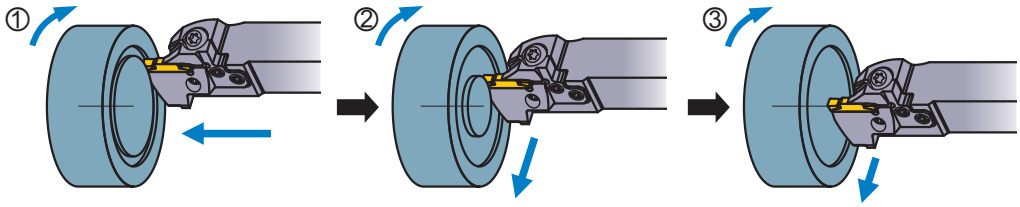
- Select the largest size blade within the maximum cutting diameter of the workpiece.
- Machine from the outer diameter towards the centre.
- Increased machining stability and rigidity is possible if a modular blade with the largest possible back metal is used.

- At first machine the maximum cutting diameter, there is no restriction in the cutting diameter on the remaining process.

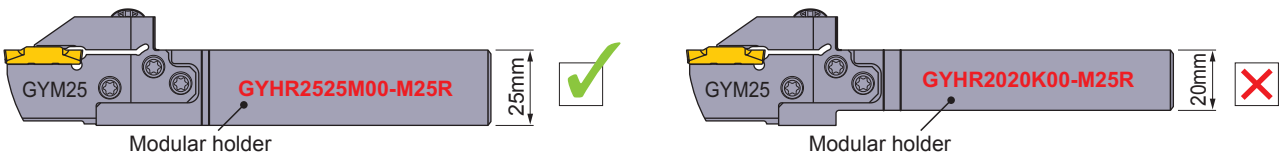
- When plunging in several passes.



- When combining plunging and infeed machining.



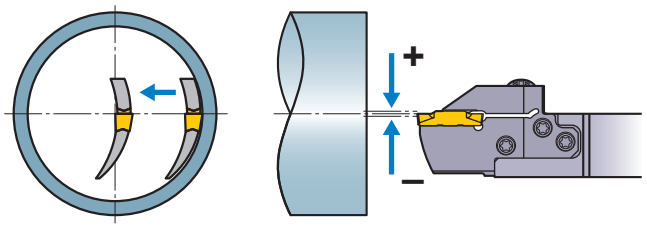
Precautions when selecting a modular holder.



- Select a modular holder with the largest possible shank size to maintain mounting rigidity.

Notes when setting the tool

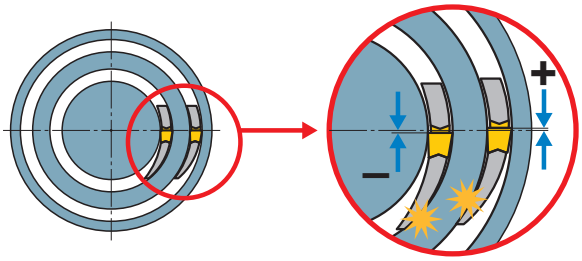
Setting the cutting edge height



●Set the cutting edge height to ±0.1mm parallel to the central axis.

●Cutting edge centre height check should be done by traverse machining towards the centre with a very small depth of cut and ensure that an even surface and no material remains at the centre point afterwards.

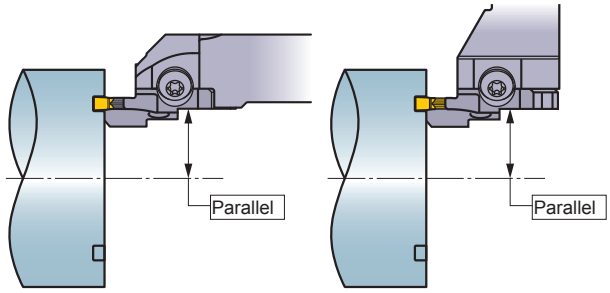
When intertering the wall of groove and the Modular blade



●If interference occurs even when the correct blade is used, the cutting edge height could be incorrect.

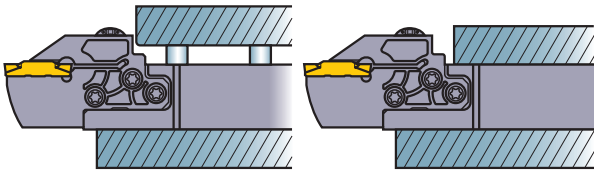
When interference occurs on the inner side of the blade, the cutting edge height is set too high.
When interference occurs on the outer side of the blade, the cutting edge height is set too low.

Setting the tool



●Set the insert parallel to the central axis.

Tool overhang



●When setting the tool, ensure that the overhang is as short as possible and avoid the step difference part as above figure shows.

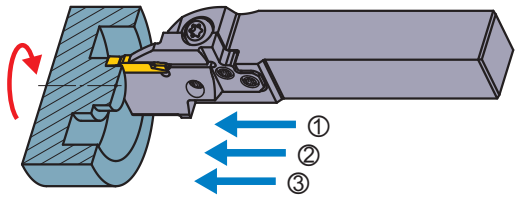
GROOVING

MACHINING RECOMMENDATIONS

Notes when face grooving

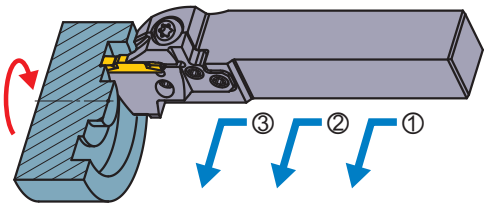
●**Always machine from the outer diameter towards the centre.**

Machining narrow grooves



●Plunging in several passes is recommended.

Machining wide grooves

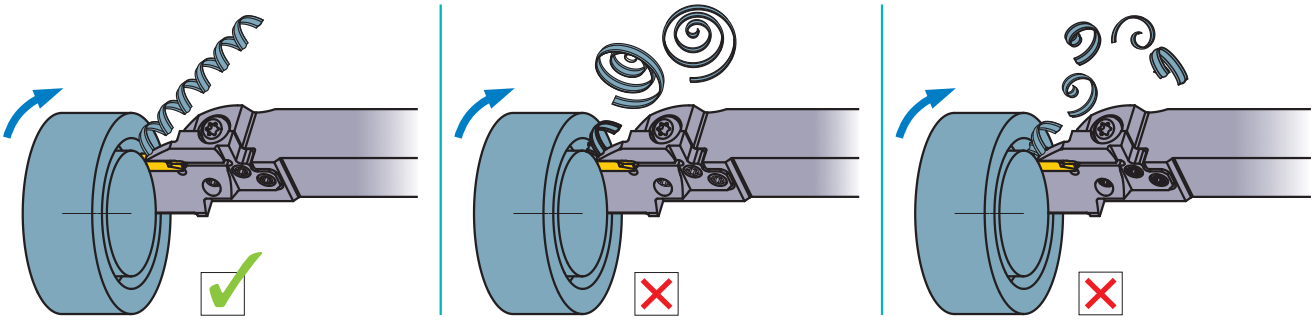


●Cross feed machining is recommended.

MACHINING RECOMMENDATIONS

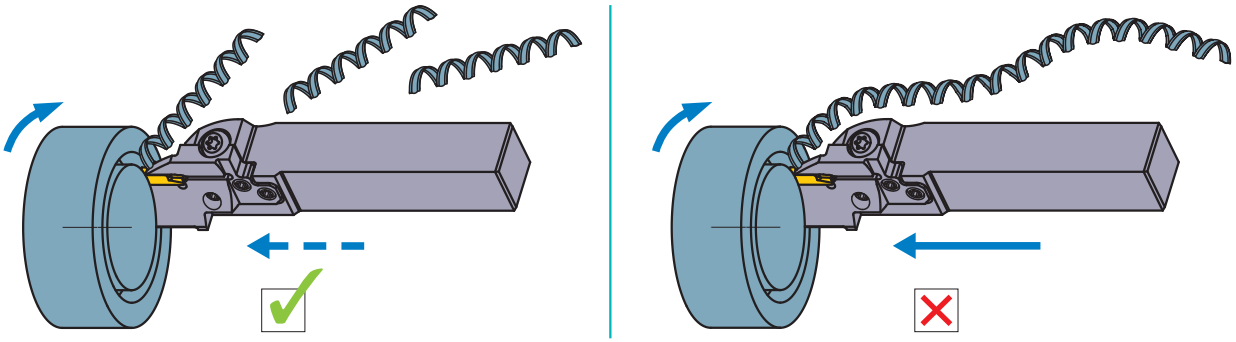
Notes when face grooving (2)

Notes on the first pass (1)



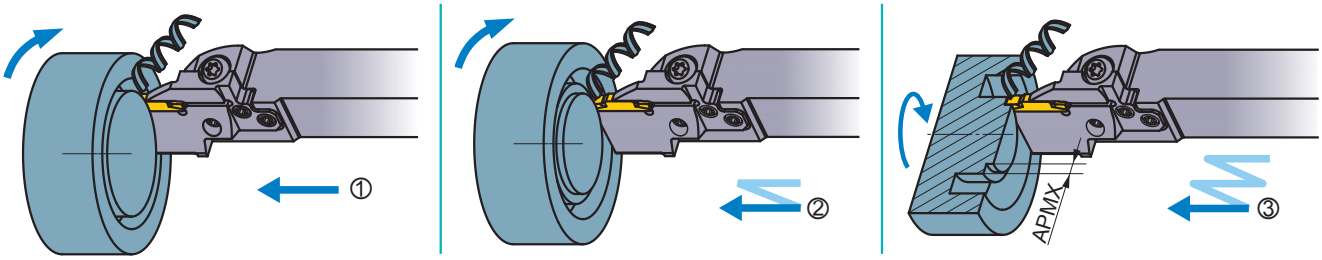
●During the first face grooving pass it is difficult to disperse broken chips and can lead to problems such as a chipped insert. Maintain longer chips that disperse easily by decreasing the feed per rotation.

Notes on the first pass (2)



●When chips become too long, use peck feed to break them into a suitable length.

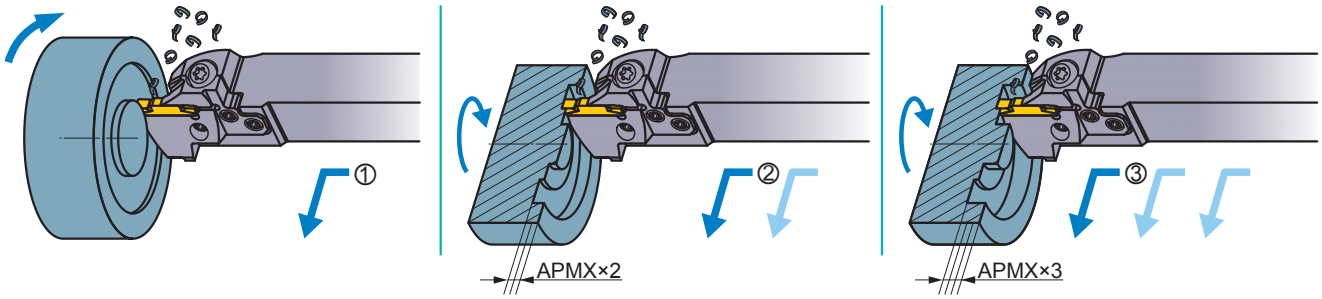
Notes when wide face grooving by plunging in several passes



●When machining a face groove in several passes, machine from the outer diameter towards the centre so that space for discharging chips is created to prevent insert damage caused by chip jamming.

●Plunging width of cut is recommended to be set at 60 - 80% of the insert width. This enhances the effect of the chipbreaker by enlarging the width of the groove to improve chip dispersal.

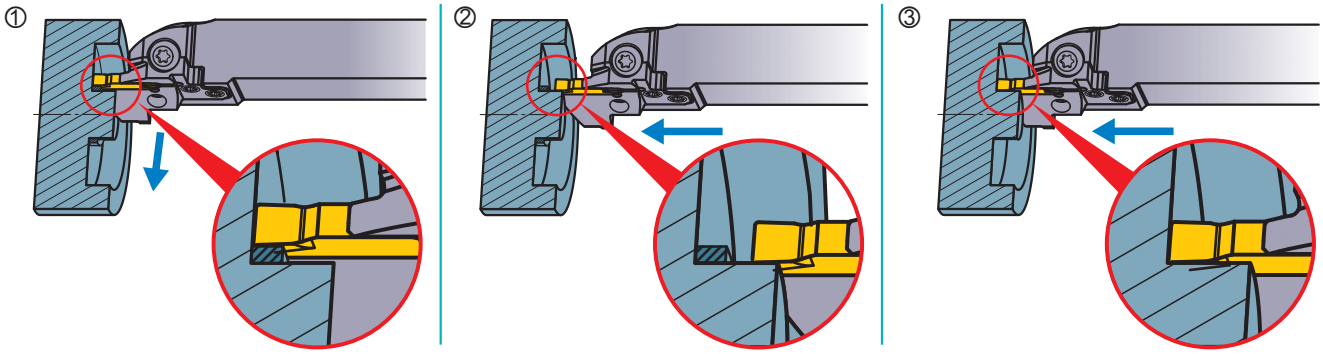
Notes when wide face grooving by combination of plunging and traverse machining (1)



●When face groove machining by using plunge feed and traverse machining, always machine from the outer diameter towards the centre to disperse chips outward to avoid chip jamming problems.

●Set the depth of cut within 40% of the insert width.

Notes when wide face grooving by combination of plunging and traverse machining (2)



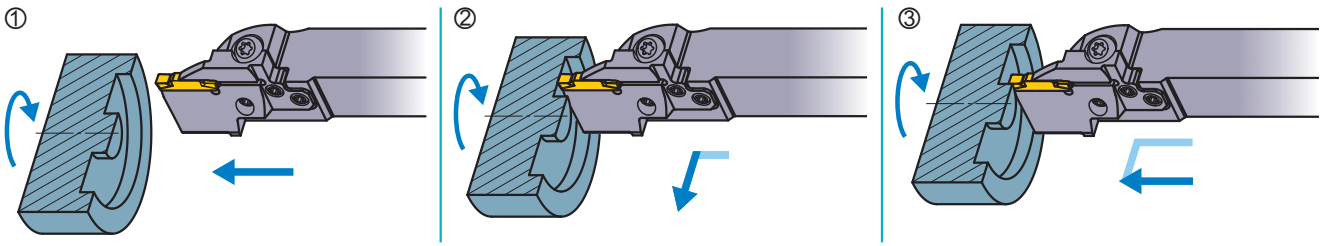
●When infeed machining at the bottom of a deep groove, chips may interfere on the cutting edge near the centre wall.
In such cases, stop infeed machining just before the centre wall (at a point less than the insert width) then remove the remaining material by plunging.

Notes when copying (BM Breaker)



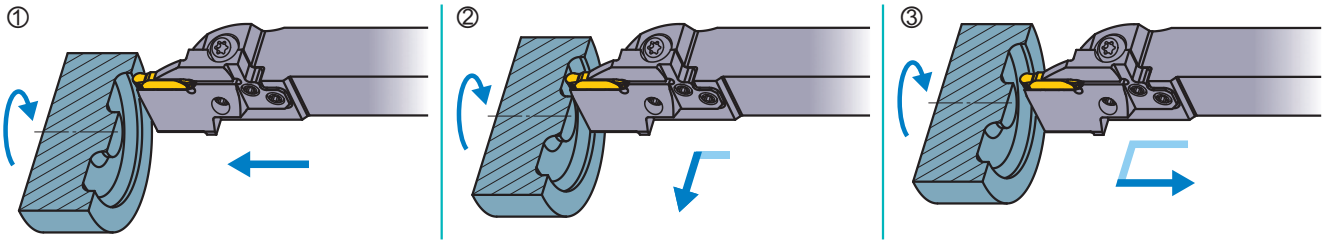
●With the BM breaker insert, 3 dimensional copying is possible. Set the depth of cut (APMX 2) to 30% less than the insert width.

Finishing (1)

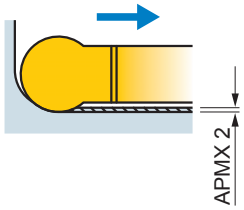


●When finish cutting, machine continuously from the outer wall to the bottom of the groove, then finally plunge cut the centre wall.

Finishing (2) (BM Breaker)



●Carry out finishing in one process.
For the depth of cut (APMX 2) when back turning, refer to the table on the right.

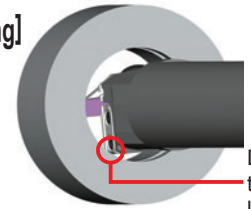


Insert	APMX 2 (mm)
GY2M0200D100N-BM	0.10
GY2M0250E125N-BM	
GY2M0300F150N-BM	
GY2M0318F159N-BM	
GY2M0400G200N-BM	0.15
GY2M0475H238N-BM	0.20
GY2M0500H250N-BM	
GY2M0600J300N-BM	0.25
GY2M0635J318N-BM	

LIMITATION OF THE MAXIMUM GROOVE DEPTH [For Internal Grooving]

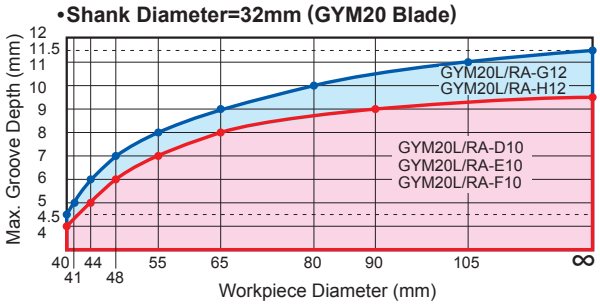
•When using the mono block type
The maximum groove depth is not limited by the cutting diameter.

•When using the modular blade type
The maximum groove depth is limited by the cutting diameter.

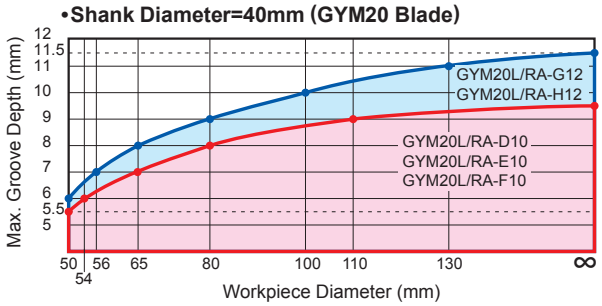


Due to interference of this part, the maximum groove depth is limited by the cutting diameter.

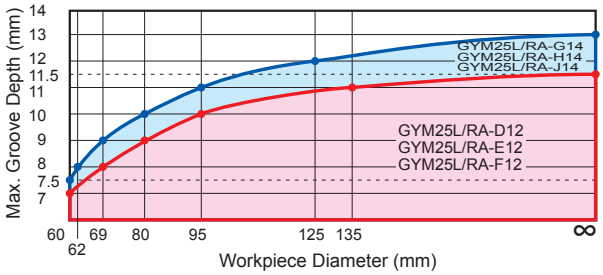
•Shank Diameter=32mm (GYM20 Blade)



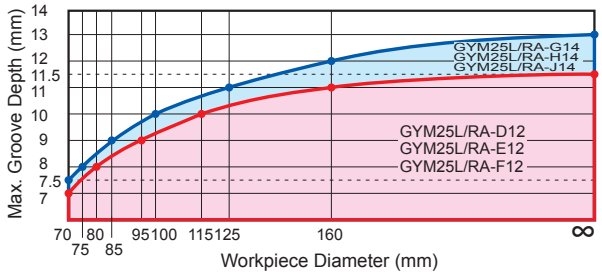
•Shank Diameter=40mm (GYM20 Blade)



•Shank Diameter=40mm (GYM25 Blade)



•Shank Diameter=50mm (GYM25 Blade)



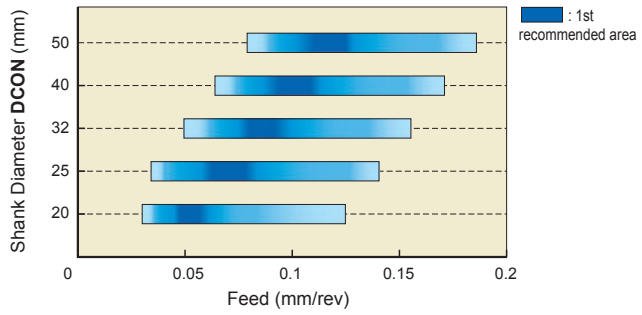
RECOMMENDED CUTTING SPEED (m/min) [For Internal Grooving]

	Work Material	Hardness	Grade	Cutting Speed (m/min) 50 100 150 200 250 300
P	Mild Steel	≤160HB	VP20RT	80–180
			VP10RT	90–190
			NX2525	70–170
	Carbon Steel Alloy Steel	160–280HB	VP20RT	60–140
			VP10RT	70–150
			MY5015	90–210
			NX2525	55–135
		280HB≤	VP20RT	50–110
			VP10RT	60–120
			MY5015	80–160
			NX2525	45–105
M	Stainless Steel	≤270HB	VP20RT	50–110
			VP10RT	60–120
K	Gray Cast Iron	Tensile Strength ≤300MPa	VP20RT	60–140
			VP10RT	70–150
			MY5015	90–210
	Ductile Cast Iron	Tensile Strength ≤800MPa	VP20RT	50–110
			VP10RT	60–120
			MY5015	80–160
S	Heat Resistant Alloy Titanium Alloy	–	VP20RT	30–60
			VP10RT	40–70
			RT9010	40–70
H	Hardened steel	50HRC≤	MB8025	60–100

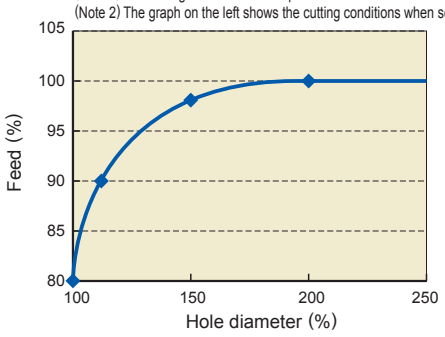
(Note 1) VP20RT is the first recommended grade for materials other than hardened steel.
(Note 2) For VP10RT, VP20RT and MY5015, wet cutting is recommended.

RECOMMENDED CUTTING CONDITIONS [For Internal Grooving]

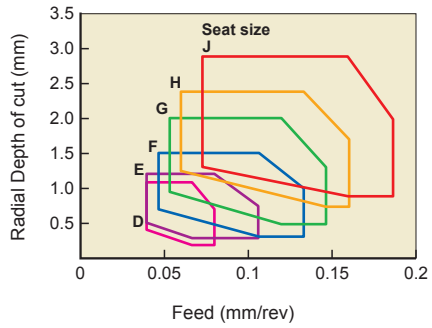
GROOVING



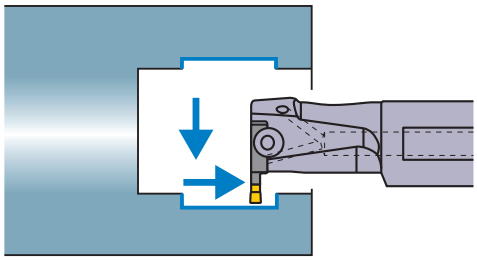
(Note 1) The cutting diameter 100% represents the minimum cutting diameter (DMIN).
(Note 2) The graph on the left shows the cutting conditions when setting the feed to 100%.



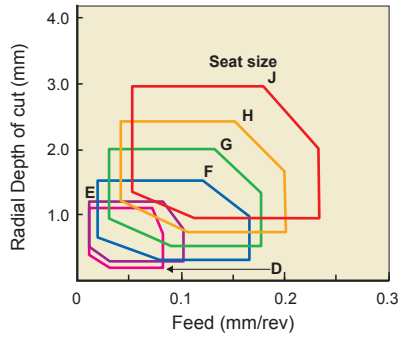
TRAVERSE MACHINING (MF BREAKER)



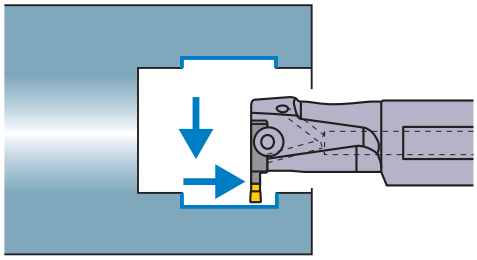
●When traverse machining a blind hole, it is recommended to carry out back turning considering chip disposal.



TRAVERSE MACHINING (MM/MS BREAKER)

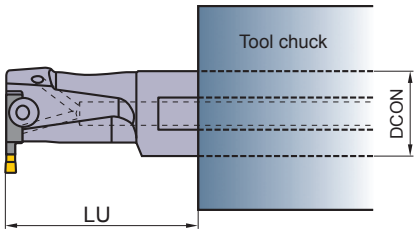


●When traverse machining a blind hole, it is recommended to carry out back turning considering chip disposal.



(Note) The above cutting conditions are for when using the tool overhang (LU) 1.6-2.0 times larger than the shank diameter (DCON). (L/D=1.6-2.0)
When using L/D larger than 2.0, reduce the cutting conditions.

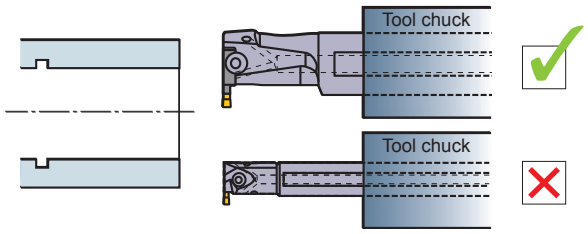
	Seat Size
	Insert Width (mm)
D	2.00 2.24
E	2.39 2.50 2.74
F	3.00 3.18 3.24
G	4.00 4.24
H	4.75 5.00 5.24
J	6.00 6.31 6.35



TOOL SELECTION

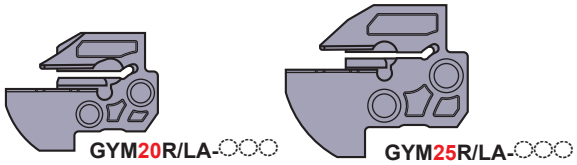
Notes when selecting the tool body

Holder



●When the overhang is the same, select a holder with the largest possible shank size to ensure sufficient clamping rigidity.

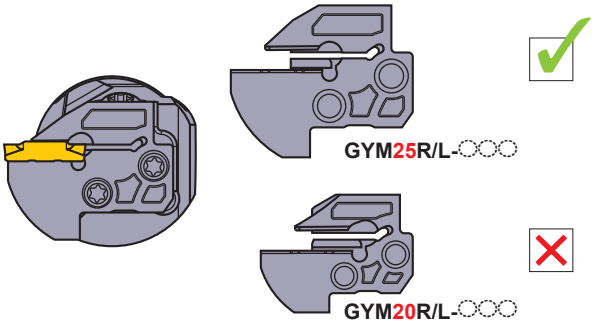
Modular blade (1)



GYM20R/LA-D10	GYM25R/LA-D12
GYM20R/LA-E10	GYM25R/LA-E12
GYM20R/LA-F10	GYM25R/LA-F12
GYM20R/LA-G12	GYM25R/LA-G14
GYM20R/LA-H12	GYM25R/LA-H14
	GYM25R/LA-J14

●For a ø40 shank holder, if there is no restriction for use, select a holder suitable for GYM25 blade.

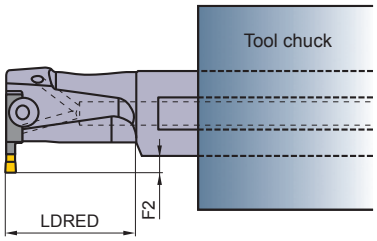
Modular blade (2)



●For an internal holder, select a modular blade listed above.

Notes when setting the tool

Overhang

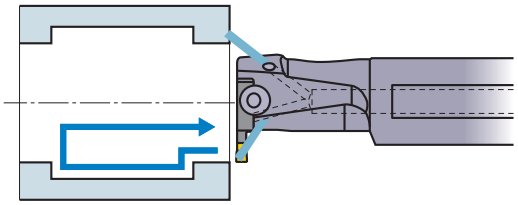


●The maximum groove depth is limited to the dimension LDRED. When machining with longer overhangs, refer to the dimension F2 of the tool used.

Notes on multi-function machining (MF, MS, MM and BM breakers)

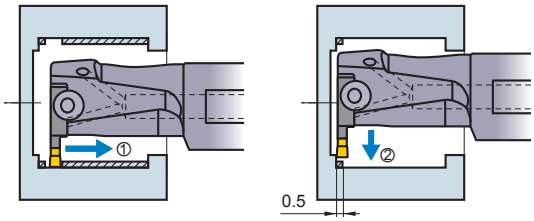
For internal grooving, the machining methods for external grooving (F107–F108) can be used, but please note the following precautions.

Coolant



●Supply large amounts of coolant for effective chip disposal during cutting. Maintain supply until the tool has been retracted completely for improved ship disposal.

Machining blind holes

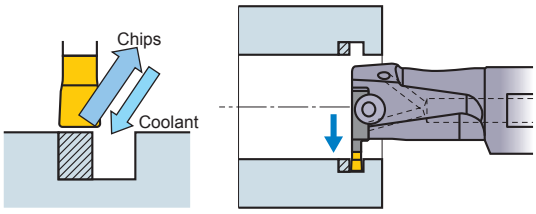


●As continuous chips tend to elongate at the back of the bore, the above operation is recommended.
The recommended width of cut for ② is 0.5mm.

Machining Wide Grooves

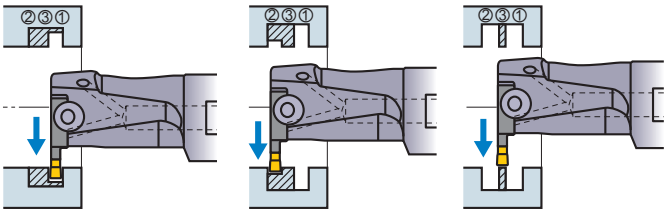
Grooving

●When the cutting edge width is x 2 ≥ groove width



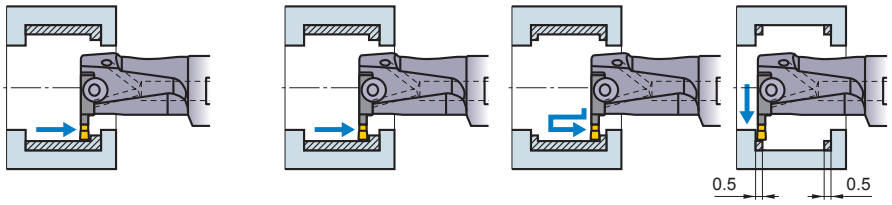
●When the depth of cut is shallower than the cutting edge width, continuous chips are usually produced. When plunging in several passes, it is recommended to carry out machining in the steps above. This ensures that coolant reaches the cutting edge and chips are easily discharged.

●When the cutting edge width is x 2 < groove width



●When the groove depth is larger than the cutting edge width, carry out plunging in the steps above to break up chips efficiently.

Turning

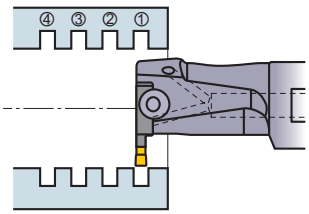


●When chip breaking and disposal are especially important, cross-feed machining is recommended.

●Wide face grooving when the corner R of the work piece is equal to the corner R of the insert, machine as shown above. (When corner R of the work piece is larger than corner R of the insert, refer to the description of external wide grooving.)

●If the groove depth exceeds a given level, chips may elongate at the wall. In such a case, increase the feed and carry out machining as shown above.

Machining instruction

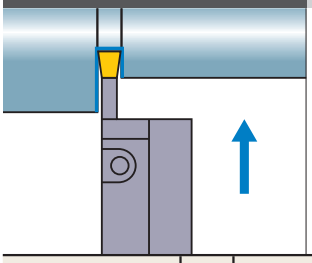


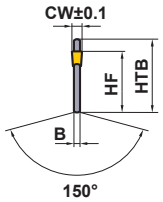
●It is recommended to carry out grooving from the front end of the workpiece.
This reduces workpiece deflection.

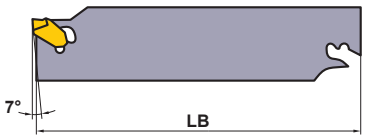
UG HOLDER

- Strengthened insert clamping force.
- Block and blade type and solid type series.
- Groove width 2.2—5.1mm

UGHN — External cutting off, Grooving



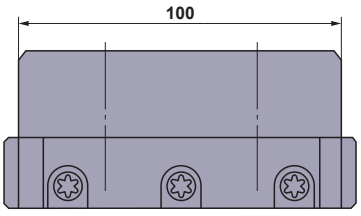


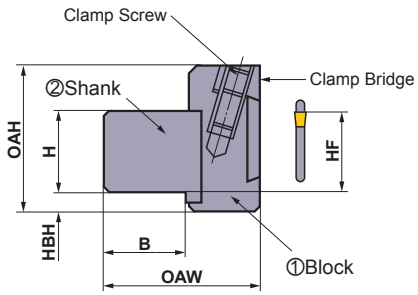


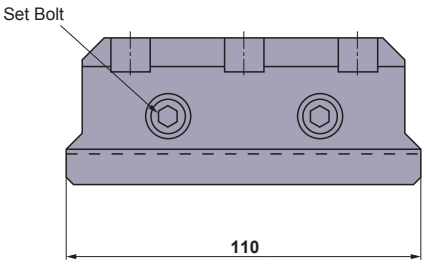
Order Number	Stock	Insert Number		Dimensions(mm)							Wrench	Tool Block
				CW	CUTDIA*1	CDX *2	B	HF	HTB	LB		
UGHN262	●	KGT	2◌	2.2	50	20	1.60	21.4	26	110	UGS1	KGBN26-20 KGBN26-25
UGHN**263**	●		3◌	3.1	75	32.5	2.35	21.4	26	110	UGS1	
UGHN**264**	●		4◌	4.1	80	35	3.20	21.4	26	110	UGS1	
UGHN**265**	●		5◌	5.1	80	35	4.00	21.4	26	110	UGS1	
UGHN**322**	●		2◌	2.2	50	20	1.60	25.0	32	150	UGS1	KGBN32-20 KGBN32-25
UGHN**323**	●		3◌	3.1	100	45	2.35	25.0	32	150	UGS1	
UGHN**324**	●		4◌	4.1	100	45	3.20	25.0	32	150	UGS1	
UGHN**325**	●		5◌	5.1	120	55	4.00	25.0	32	150	UGS1	

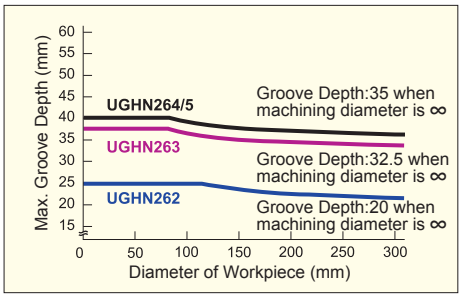
*1 CUTDIA : Max. Cut off Diameter
*2 CDX : Max. Groove Depth

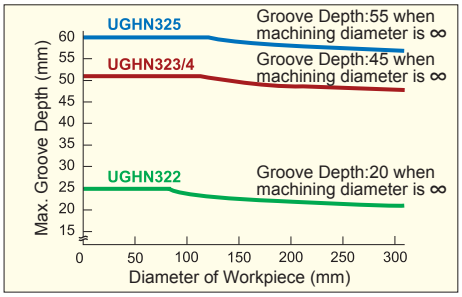
TOOL BLOCK











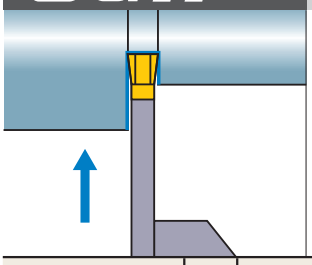
Order Number	Stock	Dimensions(mm)						① Clamp Bridge	① * Clamp Screw	① Wrench	② * Set Bolt	② Wrench
		H	HF	HBH	OAH	B	OAW					
KGBN26-20	●	20	20	11	45	20	43	KGC1	LS15T	TKY25R	HSC08016	HKY60R
KGBN**26-25**	●	25	25	6	45	25	48	KGC1	LS15T	TKY25R	HSC08016	HKY60R
KGBN**32-20**	●	20	20	15.6	52	20	43	KGC1	LS15T	TKY25R	HSC08016	HKY60R
KGBN**32-25**	●	25	25	10.6	52	25	48	KGC1	LS15T	TKY25R	HSC08016	HKY60R

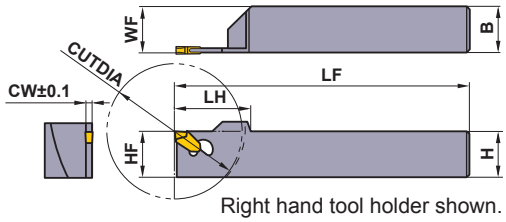
(Note) ①When ordering a block, the clamp bridge and clamp screw are included.
②When ordering a shank, the set bolts are included.
* Clamp Torque (N • m) : LS15T=8.5, HSC08016=24.0

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

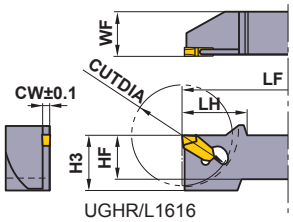
UGH

External cutting off, Grooving





Right hand tool holder shown.

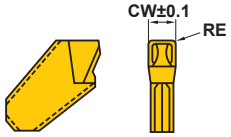
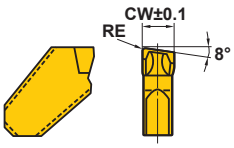


UGHR/L1616

Order Number	Stock		Insert Number		Dimensions(mm)										Wrench
	R	L			CW	CUTDIA	CDX *	B	HF	LF	LH	H	WF	H3	
UGHR/L1616H2	●	●	KGT	2	2.2	32	—	16	16	100	24	16	16.3	20	UGS1
UGHR/L1616H3	●	●		3	3.1	36	—	16	16	100	24	16	16.4	20	UGS1
UGHR/L2020K2A	●	●		2	2.2	32	—	20	20	125	24	20	20.3	—	UGS1
UGHR/L2020K2	●	●		2	2.2	42	8	20	20	125	25	20	20.3	—	UGS1
UGHR/L2020K3A	●	●		3	3.1	36	—	20	20	125	24	20	20.4	—	UGS1
UGHR/L2020K3	●	●		3	3.1	58	21	20	20	125	32	20	20.4	—	UGS1
UGHR/L2525M3	●	●		3	3.1	76	29	25	25	150	42	25	25.4	—	UGS1
UGHR/L2525M4	●	●		4	4.1	76	29	25	25	150	42	25	25.5	—	UGS1

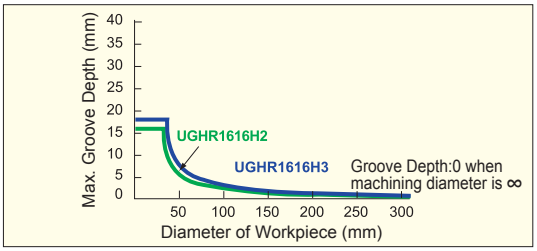
* CDX : Max. Groove Depth

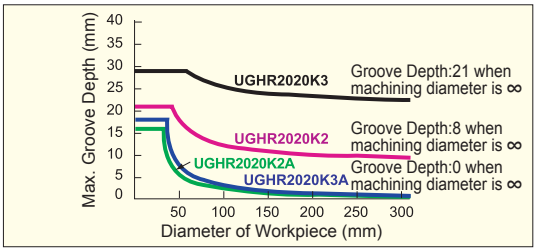
INSERTS

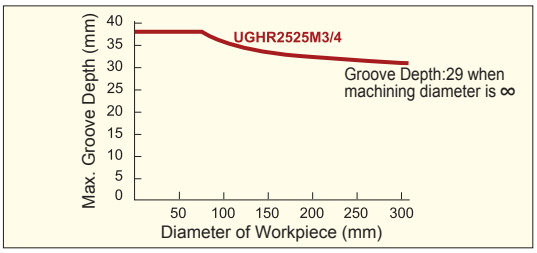
Order Number	Stock					Dimensions(mm)		Geometry
	Coated		Cermet		Carbide	CW	RE	
	UE6020	US735	NX2525		UTi20T			
KGT2N	▲		●		●	2.2	0.2	
KGT3N	▲	●	●		●	3.1	0.2	
KGT4N	▲	●	●		●	4.1	0.2	
KGT5N	▲	●	●		●	5.1	0.2	
KGT2R	▲		●		●	2.2	0.2	
KGT2L	▲		●		●	2.2	0.2	
KGT3R	▲		●		●	3.1	0.2	
KGT3L	▲		●		●	3.1	0.2	
KGT4R	▲		●		●	4.1	0.2	
KGT4L	▲		●		●	4.1	0.2	
KGT5R	▲		●		●	5.1	0.2	
KGT5L	▲		●		●	5.1	0.2	

Left hand tool holder shown.

(Note) The above insert is not compatible with other manufacturer's holders.







RECOMMENDED CUTTING CONDITIONS

Work Material		Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)			
					Groove Width 2.2mm	Groove Width 3.1mm	Groove Width 4.1mm	Groove Width 5.1mm
P	Mild Steel	≤180HB	UE6020 • NX2525 UTi20T	120 (100—140)	0.08 (0.06—0.1)	0.1 (0.08—0.12)	0.12 (0.1—0.14)	0.12 (0.1—0.14)
P	Carbon Steel Alloy Steel	180—280HB	UE6020 • NX2525 UTi20T	100 (80—120)	0.05 (0.04—0.06)	0.08 (0.06—0.1)	0.1 (0.08—0.12)	0.1 (0.08—0.12)
P	Carbon Steel Alloy Steel	280—350HB	UTi20T	80 (60—100)	0.05 (0.04—0.06)	0.08 (0.06—0.1)	0.1 (0.08—0.12)	0.1 (0.08—0.12)
M	Stainless Steel	≤200HB	US735	80 (60—100)	0.05 (0.04—0.06)	0.08 (0.06—0.1)	0.1 (0.08—0.12)	0.1 (0.08—0.12)

(Note) Please set the cutting edge height 0.1—0.2mm higher than center.

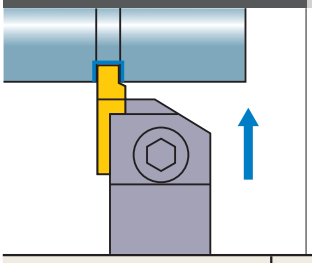
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

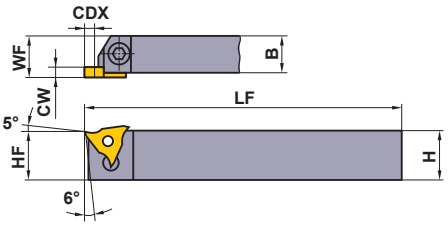
MG HOLDER

- Clamp-on type
- Positive insert suffers from negligible chattering and thus produces a good finished surface.
- Groove width 1.25–6.0mm

MGH

External grooving





Right hand tool holder shown.

Order Number	Stock		Insert Number		Dimensions(mm)						
	R	L			CW	CDX	H	B	LF	HF	WF
MGHR/L2020K3315	●	●	MGTR/L	33125 I 33400	1.25	1.2	20	20	125	20	20.2
					1.45	1.5					
					1.5≤CW≤2.3	3.0					
MGHR/L2020K3323	●	●			2.3＜CW≤3.3	3.0	20	20	125	20	20.2
MGHR/L2525M3315	●	●			1.25	1.2	25	25	150	25	25.2
					1.45	1.5					
					1.5≤CW≤2.3	3.0					
MGHR/L2525M3323	●	●			2.3＜CW≤3.3	3.0	25	25	150	25	25.2
MGHR/L2525M3333	●	●			3.3＜CW≤4.7	3.0	25	25	150	25	25.2
MGHR/L2020K4315	●	●	MGTR/L	43125 I 43470	1.25	1.2 (2.0)*	20	20	125	20	20.2
					1.45	1.5					
					1.5≤CW≤2.3	3.0 (3.5)*					
MGHR/L2020K4323	●	●			2.3＜CW≤3.3	4.5 (4.0)*	20	20	125	20	20.2
MGHR/L2020K4333	●	●			3.3＜CW≤4.7(4.0)*	4.5 (5.0)*	20	20	125	20	20.2
MGHR/L2525M4315	●	●			1.25	1.2 (2.0)*	25	25	150	25	25.2
					1.45	1.5					
					1.5≤CW≤2.3	3.0 (3.5)*					
MGHR/L2525M4323	●	●			2.3＜CW≤3.3	4.5 (4.0)*	25	25	150	25	25.2
MGHR/L2525M4333	●	●			3.3＜CW≤4.7(4.0)*	4.5 (5.0)*	25	25	150	25	25.2
MGHR/L2525M4447	●	●	MGTR/L	44500 I 44600	4.7＜CW≤6.3	4.5	25	25	150	25	25.2

* Dimensions when installing the CBN insert.

SPARE PARTS

Order Number		 *		
	Clamp Bridge	Clamp Screw	Spring	Wrench
MGHR/L2020K3315 I MGHR/L2525M4447	MTK1R/L	HBH06020	MES3	HKY40R

* Clamp Torque (N • m) : HBH06020=7.0

RECOMMENDED CUTTING CONDITIONS

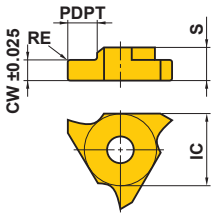
Work Material		Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel Alloy Steel	180–280HB	**VP20MF**	120 (100–140)	0.14 (0.03–0.25)
			NX2525	130 (100–160)	0.12 (0.03–0.2)
M	Stainless Steel	≤200HB	**VP20MF**	120 (100–140)	0.12 (0.03–0.18)
K	Gray Cast Iron	Tensile Strength ≤350MPa	**VP20MF**	120 (100–140)	0.12 (0.03–0.18)

(Note) For machining a narrow groove, apply a lower feed within the recommended range.

● : **Inventory maintained in Japan.**
(10 inserts in one case) (CBN inserts are available in 1 piece in one case.)

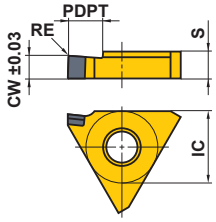
INSERTS

Order Number	Stock							Dimensions(mm)					Geometry
	Coated		Cermet		Carbide		CBN						
	VP20MF		NX2525		UTi20T		MB8025	CW	PDPT	IC	S	RE	
	R	L	R	L	R	L	R						
MGTR/L33125	●	●	●		●	●		1.25	1.2	9.525	4.76	0.2	**MGTR/L...**
MGTR/L**33145**	●	●	●		●	●		1.45	1.5	9.525	4.76	0.2	
MGTR/L**33150**	●	●	●	●	●	●		1.5	3	9.525	4.76	0.2	
MGTR/L**33175**	●	●	●	●	●	●		1.75	3	9.525	4.76	0.2	
MGTR/L**33200**	●	●	●	●	●	●		2	3	9.525	4.76	0.2	
MGTR/L**33230**	●	●			●	●		2.3	3	9.525	4.76	0.2	
MGTR/L**33250**	●	●	●	●	●	●		2.5	3	9.525	4.76	0.3	
MGTR/L**33270**	●	●			●	●		2.7	3	9.525	4.76	0.3	
MGTR/L**33280**	●	●			●	●		2.8	3	9.525	4.76	0.3	
MGTR/L**33300**	●	●	●	●	●	●		3	3	9.525	4.76	0.3	
MGTR/L**33320**	●	●			●			3.2	3	9.525	4.76	0.3	
MGTR/L**33330**		●			●	●		3.3	3	9.525	4.76	0.3	
MGTR/L**33350**	●	●	●		●	●		3.5	3	9.525	4.76	0.3	
MGTR/L**33400**	●	●	●	●	●	●		4	3	9.525	4.76	0.3	
MGTR/L**43125**	●	●	●	●	●	●	●	1.25	1.2	12.7	4.76	0.2	
MGTR/L**43145**	●	●		●	●	●		1.45	1.5	12.7	4.76	0.2	
MGTR/L**43150**	●	●	●	●	●	●	●	1.5	3	12.7	4.76	0.2	
MGTR/L**43175**	●	●	●	●	●	●		1.75	3	12.7	4.76	0.2	
MGTR/L**43200**	●	●	●	●	●	●	●	2	3	12.7	4.76	0.2	
MGTR/L**43230**	●	●	●	●		●		2.3	3	12.7	4.76	0.2	
MGTR/L**43250**	●	●	●	●	●	●	●	2.5	4.5	12.7	4.76	0.3	
MGTR/L**43260**	●	●	●		●	●		2.6	4.5	12.7	4.76	0.3	
MGTR/L**43270**	●	●			●	●		2.7	4.5	12.7	4.76	0.3	
MGTR/L**43280**		●		●	●	●		2.8	4.5	12.7	4.76	0.3	
MGTR/L**43300**	●	●	●	●	●	●	●	3	4.5	12.7	4.76	0.3	
MGTR/L**43320**	●				●	●		3.2	4.5	12.7	4.76	0.3	
MGTR/L**43330**		●		●	●	●		3.3	4.5	12.7	4.76	0.3	
MGTR/L**43350**	●	●	●	●	●	●	●	3.5	4.5	12.7	4.76	0.3	
MGTR/L**43400**	●	●	●		●	●	●	4	4.5	12.7	4.76	0.3	
MGTR/L**43420**	●	●	●		●	●		4.2	4.5	12.7	4.76	0.4	
MGTR/L**43430**	●	●	●		●	●		4.3	4.5	12.7	4.76	0.4	
MGTR/L**43450**	●	●	●	●	●	●		4.5	4.5	12.7	4.76	0.4	
MGTR/L**43470**	●	●	●	●	●	●		4.7	4.5	12.7	4.76	0.4	
MGTR/L**44500**	●	●			●	●		5	4.5	12.7	6.35	0.4	
MGTR/L**44550**	●				●			5.5	4.5	12.7	6.35	0.4	
MGTR/L**44600**	●				●	●		6	4.5	12.7	6.35	0.4	



Right hand insert shown.

CBN Insert



Right hand tool only.

GROOVING

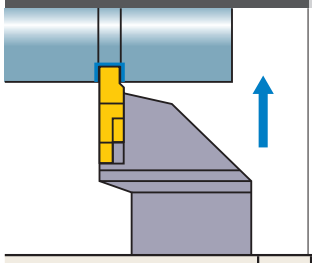
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

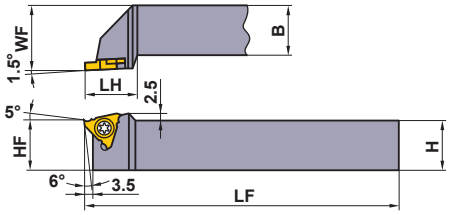
SMG HOLDER

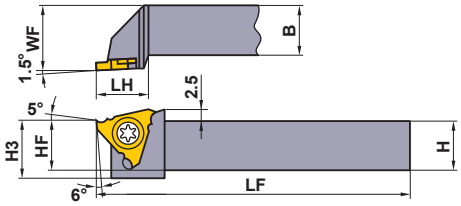
- Screw-on type
- Positive insert suffers from negligible chattering.
- Applicable to narrow grooving and threading.
- Groove width 0.3—1.3mm

SMGH

External grooving, Threading





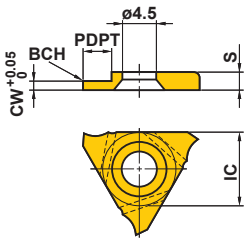


Right hand tool holder only.

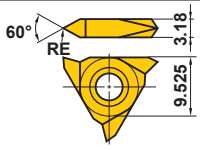
Order Number	Stock	Insert Number		Dimensions(mm)							*	
	R	Grooving	Threading	H	B	LF	LH	HF	WF	H3	Clamp Screw	Wrench
SMGHR1010E16	●	SMGTR 16×2○○○ 16×2○○○C	SMTTR 160360○○	10	10	70	16.5	10	12	14	FC400890T	TKY10F
SMGHR**1212F16**	●			12	12	80	16.5	12	16	14	FC400890T	TKY10F
SMGHR**1616H16**	●			16	16	100	20	16	20	—	FC400890T	TKY10F
SMGHR**2020K16**	●			20	20	125	20	20	25	—	FC400890T	TKY10F
SMGHR**2525M16**	●			25	25	150	20	25	32	—	FC400890T	TKY10F

* Clamp Torque (N • m) : FC400890T=2.5

SMG INSERTS (GROOVING)

Order Number	Stock				Dimensions(mm)					Geometry
	Cermet		Carbide		CW	PDPT	IC	S	BCH	
	NX2525		UTi20T	HTi10						
SMGTR16X2050				●	0.5	1.5	9.525	2	—	
SMGTR**16X2060**	●		●	●	0.6	1.5	9.525	2	—	
SMGTR**16X2050C**	●		●	●	0.5	1.5	9.525	2	0.05	
SMGTR**16X2060C**	●		●	●	0.6	1.5	9.525	2	0.05	
SMGTR**16X2070C**	●		●	●	0.7	2	9.525	2	0.05	
SMGTR**16X2075C**	●		●	●	0.75	2	9.525	2	0.05	
SMGTR**16X2080C**	●		●	●	0.8	2	9.525	2	0.1	
SMGTR**16X2090C**	●		●	●	0.9	2	9.525	2	0.1	
SMGTR**16X2095C**	●		●	●	0.95	2	9.525	2	0.1	
SMGTR**16X2100C**	●		●	●	1	2.5	9.525	2	0.1	
SMGTR**16X2110C**	●		●	●	1.1	2.5	9.525	2	0.1	
SMGTR**16X2120C**	●		●	●	1.2	2.5	9.525	2	0.1	
SMGTR**16X2130C**	●		●	●	1.3	2.5	9.525	2	0.1	

SMT INSERTS (THREADING)

Order Number	Stock	Dimensions(mm)	Thread Pitch (mm)	Geometry
	Carbide			
	UTi20T	RE		
SMTTR16036001	●	0.1	1.0—1.5	
SMTTR**16036002**	●	0.2	1.75—2.0	

(Note) Wet cutting is recommended.

● : **Inventory maintained in Japan. (10 inserts in one case)**

RECOMMENDED CUTTING CONDITIONS

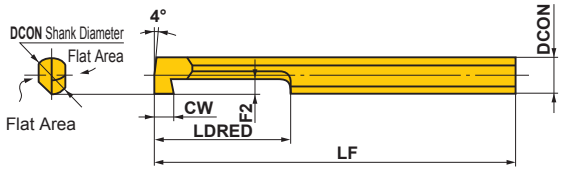
	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel Alloy Steel	180—280HB	**UTi20T**	100 (80—120)	0.07 (0.03—0.1)
			NX2525	130 (100—160)	0.07 (0.03—0.1)
M	Stainless Steel	≤200HB	**UTi20T**	130 (100—160)	0.1 (0.05—0.15)
K	Gray Cast Iron	Tensile Strength ≤350MPa	**UTi20T HTi10**	100 (80—120)	0.1 (0.05—0.15)
N	Aluminium Alloy	—	**HTi10**	350 (300—400)	0.1 (0.05—0.15)
	Brass	—	**HTi10**	250 (200—300)	0.1 (0.03—0.15)
	Acrylic	—	**HTi10**	250 (200—300)	0.1 (0.03—0.15)

MICRO-MINI

- Solid carbide type with min. cutting diameter 3.2mm.
- l/d is 5 times the diameter.
- Insert can be ground to suit the application.
- Suitable for a wide range of tooling including threading and grooving.

MICRO-MINI STANDARD (SOLID CARBIDE BORING BAR)

Order Number	Stock	Dimensions(mm)						Geometry
	Micro Grain Carbide							
	TF15	CW	DCON	LF	LDRED	DMIN*	F2	
C03FR-BLS	●	2.0	3	80	15	3.2	1.0	
C04FR-BLS	●	2.5	4	80	20	4.2	1.5	
C05HR-BLS	●	3.0	5	100	25	5.2	2.0	



Right hand tool only.

* DMIN : Min. Cutting Diameter

RECOMMENDED CUTTING CONDITIONS

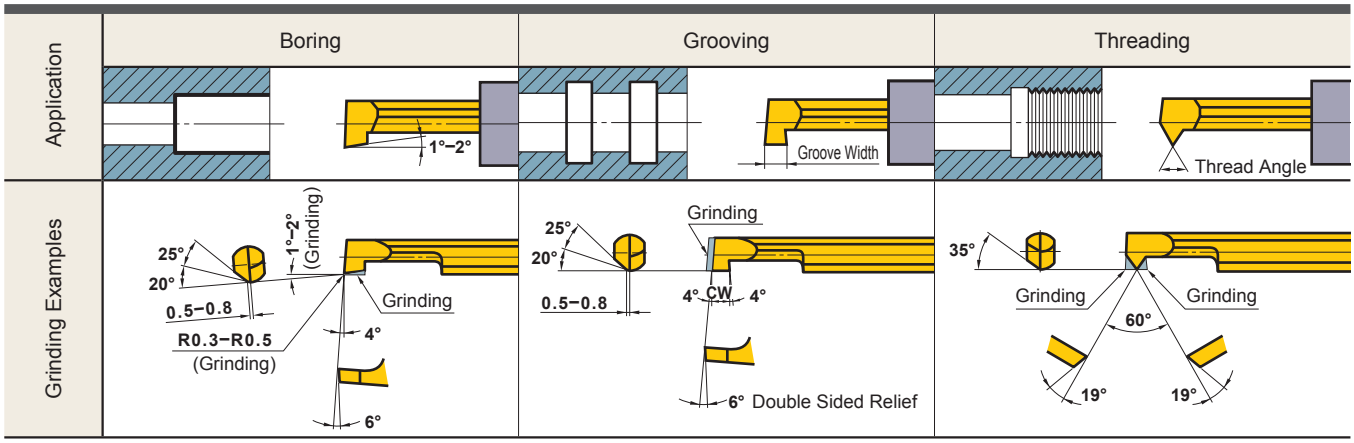
	Work Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Excrescence Quantity (l /d)	Edge Condition	
						Corner Radius or BCH *	Honing *
P	Carbon Steel · Alloy Steel 180—280HB	40 (30—50)	0.05 (—0.1)	0.2 (0.1—0.3)	5	0.1—0.5	0.01—0.05
M	Stainless Steel ≤200HB	40 (30—50)	0.05 (—0.1)	0.2 (0.1—0.3)	5	≤0.4	0—0.03
K	Gray Cast Iron ≤350MPa	40 (30—50)	0.05 (—0.05)	0.2 (0.1—0.3)	5	0.1—0.5	0.01—0.05
N	Non-ferrous Metal	80 (60—100)	0.05 (—0.1)	0.3 (0.1—0.5)	5	0.1—0.5	0—0.03

*Cutting edge is not honed. Please hone according to the application before machining.

GROOVING

GRINDING THE CUTTING EDGE OF MICRO-MINI

- MICRO-MINI can be applied to boring and grooving as supplied. But, it can also be reground as shown below.
- For shaping and regrinding, use a diamond whetstone approximately #250—#400. Please grind according to the application using the figure below as a reference.

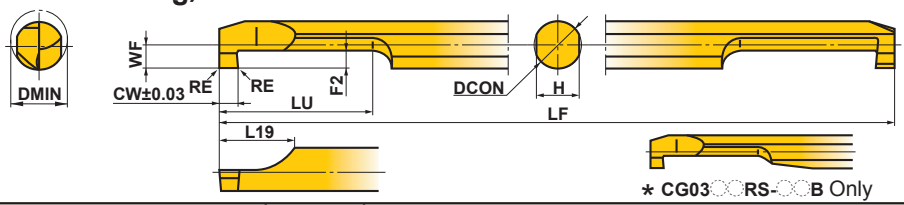


● : Inventory maintained in Japan. (MICRO MINI is available in 1 piece in one pack.)

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

MICRO-MINI TWIN

CG TYPE (Internal Grooving)

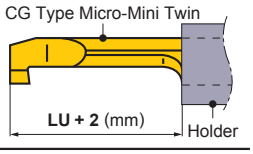


Order Number	Stock		Breaker	Dimensions (mm)									
	Micro Grain Carbide	Coated											
	TF15	VP15TF		DMIN	CW	F2	RE	DCON	LF	LU	L19	WF	H
CG0305RS-10	●	●	Without	3	1	1	0.05	3	50	5	6	1.3	2.7
CG0305RS-10B	●	●	With	3	1	1	0.05	3	50	5	6	1.3	2.7
CG0306RS-20	●	●	Without	3	2	1	0.1	3	50	6	6	1.3	2.7
CG0306RS-20B	●	●	With	3	2	1	0.1	3	50	6	6	1.3	2.7
CG03RS-10	●	●	Without	3	1	1	0.05	3	50	10	6	1.3	2.7
CG03RS-10B	●	●	With	3	1	1	0.05	3	50	10	6	1.3	2.7
CG03RS-20	●	●	Without	3	2	1	0.1	3	50	11	6	1.3	2.7
CG03RS-20B	●	●	With	3	2	1	0.1	3	50	11	6	1.3	2.7
CG0407RS-10	●	●	Without	4	1	1.5	0.05	4	60	7	7	1.8	3.6
CG0407RS-10B	●	●	With	4	1	1.5	0.05	4	60	7	7	1.8	3.6
CG0408RS-20	●	●	Without	4	2	1.5	0.1	4	60	8	7	1.8	3.6
CG0408RS-20B	●	●	With	4	2	1.5	0.1	4	60	8	7	1.8	3.6
CG04RS-10	●	●	Without	4	1	1.5	0.05	4	60	15	7	1.8	3.6
CG04RS-10B	●	●	With	4	1	1.5	0.05	4	60	15	7	1.8	3.6
CG04RS-20	●	●	Without	4	2	1.5	0.1	4	60	16	7	1.8	3.6
CG04RS-20B	●	●	With	4	2	1.5	0.1	4	60	16	7	1.8	3.6
CG0510RS-10	●	●	Without	5	1	2	0.05	5	70	10	8	2.3	4.5
CG0510RS-10B	●	●	With	5	1	2	0.05	5	70	10	8	2.3	4.5
CG0511RS-20	●	●	Without	5	2	2	0.1	5	70	11	8	2.3	4.5
CG0511RS-20B	●	●	With	5	2	2	0.1	5	70	11	8	2.3	4.5
CG05RS-10	●	●	Without	5	1	2	0.05	5	70	20	8	2.3	4.5
CG05RS-10B	●	●	With	5	1	2	0.05	5	70	20	8	2.3	4.5
CG05RS-20	●	●	Without	5	2	2	0.1	5	70	21	8	2.3	4.5
CG05RS-20B	●	●	With	5	2	2	0.1	5	70	21	8	2.3	4.5
CG0610RS-10	●	●	Without	6	1	2	0.05	6	75	10	8	2.8	5.4
CG0610RS-10B	●	●	With	6	1	2	0.05	6	75	10	8	2.8	5.4
CG0611RS-20	●	●	Without	6	2	2	0.1	6	75	11	8	2.8	5.4
CG0611RS-20B	●	●	With	6	2	2	0.1	6	75	11	8	2.8	5.4
CG06RS-10	●	●	Without	6	1	2	0.05	6	75	20	8	2.8	5.4
CG06RS-10B	●	●	With	6	1	2	0.05	6	75	20	8	2.8	5.4
CG06RS-20	●	●	Without	6	2	2	0.1	6	75	21	8	2.8	5.4
CG06RS-20B	●	●	With	6	2	2	0.1	6	75	21	8	2.8	5.4
CG0712RS-10	●	●	Without	7	1	2	0.05	7	85	12	8	3.3	6.4
CG0712RS-10B	●	●	With	7	1	2	0.05	7	85	12	8	3.3	6.4
CG0713RS-20	●	●	Without	7	2	2	0.1	7	85	13	8	3.3	6.4
CG0713RS-20B	●	●	With	7	2	2	0.1	7	85	13	8	3.3	6.4
CG07RS-10	●	●	Without	7	1	2	0.05	7	85	25	8	3.3	6.4
CG07RS-10B	●	●	With	7	1	2	0.05	7	85	25	8	3.3	6.4
CG07RS-20	●	●	Without	7	2	2	0.1	7	85	26	8	3.3	6.4
CG07RS-20B	●	●	With	7	2	2	0.1	7	85	26	8	3.3	6.4

● : Inventory maintained in Japan. (MICRO-MINI TWIN is available in 1 piece in one pack.)

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Cutting Speed (m/min)	Feed (mm/rev)		Recommended Tool Overhang (mm)
				CG03RS/CG04RS	CG05RS/CG06RS/CG07RS	
P	Carbon Steel · Alloy Steel	180−280HB	80 (40−120)	0.02 (0.01−0.03)	0.03 (0.01−0.05)	CG Type Micro-Mini Twin
M	Stainless Steel	≤200HB	80 (40−120)	0.02 (0.01−0.03)	0.03 (0.01−0.05)	
K	Gray Cast Iron	Tensile Strength ≤350MPa	80 (40−120)	0.03 (0.01−0.05)	0.03 (0.01−0.05)	
N	Non-ferrous Metal	−	120 (80−160)	0.03 (0.01−0.05)	0.05 (0.01−0.08)	



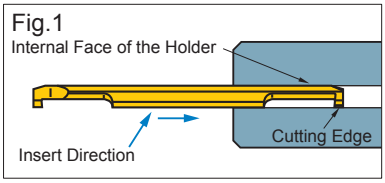
(Note) Wet cutting is recommended.

PRECAUTIONS WHEN USING THE MICRO-MINI TWIN

●When using a holder for general purpose / small automatic lathe:

1 To avoid chipping of the 2nd cutting edge take care when inserting the boring bar into the holder. Refer to fig.1. If the 2nd edge contacts the internal face of the holder there is a possibility that it may chip.

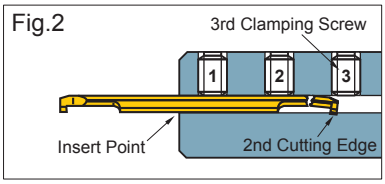
Fig.1



2 When using this type of holder, there is a possibility that damage to the shank and the 2nd cutting edge can occur. Make sure that the clamping screws are tightened to the set torque value. Additionally make sure that there is no clamping screw near the 2nd cutting edge as this can break the boring bar.

◎When using Mitsubishi holders
When using holders with a tool overhang of recommended quantity, ensure that the 3rd clamping screw is removed prior to machining. The set torque value for clamping screw is 2.0 N•m.

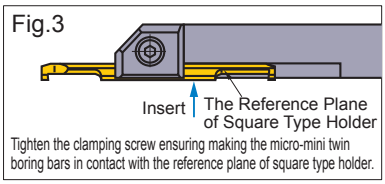
Fig.2



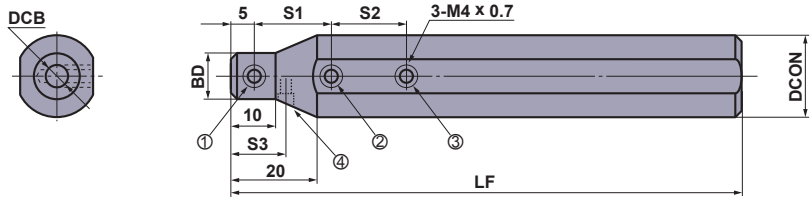
●When using a square type holder:

1 When installing the boring bar into the holder, tighten the clamp screws after ensuring the flats on the tool holder are parallel to the reference flats on the micro-mini bar. Refer to fig.3.
2 Make sure that the clamping screws are tightened to the recommended values.
3 Do not tighten the clamp screw without a bar in place, otherwise the bridge will be deformed.

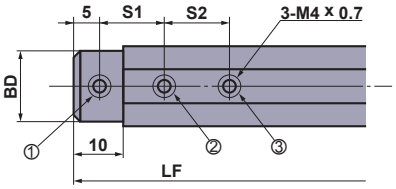
Fig.3



ROUND TYPE HOLDER



RBH22□□N has a temporary set screw for different machine specifications.
(Represented by number 4)



RBH158□□N, RBH16□□N,
RBH190□□N

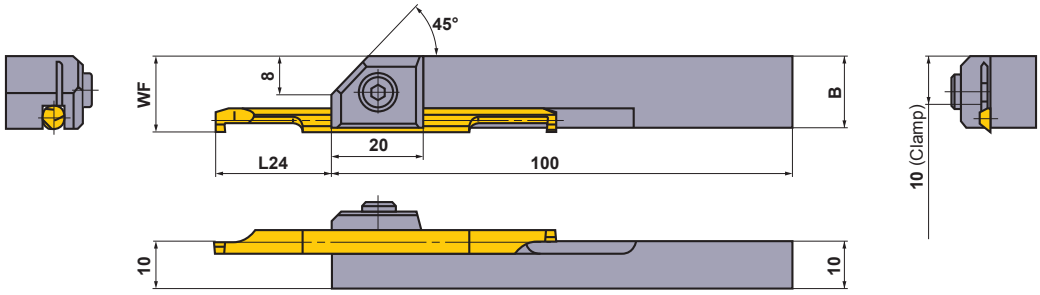
Order Number	Stock	Dimensions (mm)							MICRO-MINI C	MICRO-MINI TWIN CG	∗1 Clamp Screw				Wrench	Torque (N • m)
		DCON	DCB	BD	LF	S1	S2	S3			①	②	③	④		
RBH15830N	●	15.875	3	15	100	10	10	—	03FR-BLS	03RS-□□(B)	A	A	A	—	HKY20F	2.0
RBH**15840N**	●	15.875	4	15	100	15	15	—	04FR-BLS	04RS-□□(B)	A	A	A	—	HKY20F	2.0
RBH**15850N**	●	15.875	5	15	100	15	15	—	05HR-BLS	05RS-□□(B)	A	A	A	—	HKY20F	2.0
RBH**15860N**	●	15.875	6	15	100	15	15	—	—	06RS-□□(B)	A	A	A	—	HKY20F	2.0
RBH**15870N**	●	15.875	7	15	100	20	20	—	—	07RS-□□(B)	A	A	A	—	HKY20F	2.0
RBH1630N	●	16	3	15	100	10	10	—	03FR-BLS	03RS-□□(B)	A	A	A	—	HKY20F	2.0
RBH**1640N**	●	16	4	15	100	15	15	—	04FR-BLS	04RS-□□(B)	A	A	A	—	HKY20F	2.0
RBH**1650N**	●	16	5	15	100	15	15	—	05HR-BLS	05RS-□□(B)	A	A	A	—	HKY20F	2.0
RBH**1660N**	●	16	6	15	100	15	15	—	—	06RS-□□(B)	A	A	A	—	HKY20F	2.0
RBH**1670N**	●	16	7	15	100	20	20	—	—	07RS-□□(B)	A	A	A	—	HKY20F	2.0
∗2 **RBH19030N**	●	19.05	3	18	125	10	10	—	03FR-BLS	03RS-□□(B)	B	B	B	—	HKY20F	2.0
∗2 RBH**19040N**	●	19.05	4	18	125	15	15	—	04FR-BLS	04RS-□□(B)	B	B	B	—	HKY20F	2.0
∗2 RBH**19050N**	●	19.05	5	18	125	15	15	—	05HR-BLS	05RS-□□(B)	B	B	B	—	HKY20F	2.0
∗2 RBH**19060N**	●	19.05	6	18	125	15	15	—	—	06RS-□□(B)	B	B	B	—	HKY20F	2.0
∗2 RBH**19070N**	●	19.05	7	18	125	20	20	—	—	07RS-□□(B)	B	B	B	—	HKY20F	2.0
RBH2030N	●	20	3	12	125	10	10	—	03FR-BLS	03RS-□□(B)	A	A	B	—	HKY20F	2.0
RBH**2040N**	●	20	4	13	125	15	15	—	04FR-BLS	04RS-□□(B)	A	B	B	—	HKY20F	2.0
RBH**2050N**	●	20	5	14	125	15	15	—	05HR-BLS	05RS-□□(B)	A	B	B	—	HKY20F	2.0
RBH**2060N**	●	20	6	15	125	15	15	—	—	06RS-□□(B)	A	B	B	—	HKY20F	2.0
RBH**2070N**	●	20	7	16	125	20	20	—	—	07RS-□□(B)	A	B	B	—	HKY20F	2.0
RBH2230N	●	22	3	12	125	10	10	10	03FR-BLS	03RS-□□(B)	A	B	C	A	HKY20F	2.0
RBH**2240N**	●	22	4	13	125	15	15	12.5	04FR-BLS	04RS-□□(B)	A	B	B	A	HKY20F	2.0
RBH**2250N**	●	22	5	14	125	15	15	12.5	05HR-BLS	05RS-□□(B)	A	B	B	A	HKY20F	2.0
RBH**2260N**	●	22	6	15	125	15	15	15	—	06RS-□□(B)	A	B	B	A	HKY20F	2.0
RBH**2270N**	●	22	7	16	125	20	20	15	—	07RS-□□(B)	A	B	B	A	HKY20F	2.0
RBH2530N	●	25	3	12	150	10	10	—	03FR-BLS	03RS-□□(B)	A	B	C	—	HKY20F	2.0
RBH**2540N**	●	25	4	13	150	15	15	—	04FR-BLS	04RS-□□(B)	A	C	C	—	HKY20F	2.0
RBH**2550N**	●	25	5	14	150	15	15	—	05HR-BLS	05RS-□□(B)	A	C	C	—	HKY20F	2.0
RBH**2560N**	●	25	6	15	150	15	15	—	—	06RS-□□(B)	A	C	C	—	HKY20F	2.0
RBH**2570N**	●	25	7	16	150	20	20	—	—	07RS-□□(B)	A	C	C	—	HKY20F	2.0
RBH25430N	●	25.4	3	12	150	10	10	—	03FR-BLS	03RS-□□(B)	A	B	C	—	HKY20F	2.0
RBH**25440N**	●	25.4	4	13	150	15	15	—	04FR-BLS	04RS-□□(B)	A	C	C	—	HKY20F	2.0
RBH**25450N**	●	25.4	5	14	150	15	15	—	05HR-BLS	05RS-□□(B)	A	C	C	—	HKY20F	2.0
RBH**25460N**	●	25.4	6	15	150	15	15	—	—	06RS-□□(B)	A	C	C	—	HKY20F	2.0
RBH**25470N**	●	25.4	7	16	150	20	20	—	—	07RS-□□(B)	A	C	C	—	HKY20F	2.0

∗1 Order number of clamp screw A=HSS04004, B=HSS04006, C=HSS04008
∗2 Revised order number.

Conventional Order Number	Revised Order Number
RBH1930N	**RBH19030N**
RBH**1940N**	RBH**19040N**
RBH**1950N**	RBH**19050N**
RBH**1960N**	RBH**19060N**
RBH**1970N**	RBH**19070N**

● : Inventory maintained in Japan.

SQUARE TYPE HOLDER



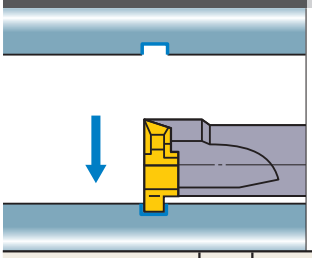
Order Number	Stock	Dimensions (mm)				MICRO-MINI TWIN **CG**	Clamp Screw	Wrench	Torque (N • m)
		MICRO-MINI TWIN **CG**							
		B	**WF**	**L24** *					
				Width of Cutting Edge 1mm	Width of Cutting Edge 2mm				
SBH1030R	●	13.8	13.8	13—17.5 (14)	14—16.5 (15)	03RS-10(B),03RS-20(B)	HSC05012	HKY40R	9.5
SBH1040R	●	14.7	14.8	18—22.5 (19)	19—21.5 (20)	04RS-10(B),04RS-20(B)	HSC05012	HKY40R	9.5
SBH1050R	●	15.6	15.8	23—27.5 (24)	24—26.5 (25)	05RS-10(B),05RS-20(B)	HSC05012	HKY40R	9.5
SBH1060R	●	16.5	16.8	23—32.5 (24)	24—31.5 (25)	06RS-10(B),06RS-20(B)	HSC05012	HKY40R	9.5
SBH1070R	●	17.4	17.8	28—38 (29)	29—37 (30)	07RS-10(B),07RS-20(B)	HSC05012	HKY40R	9.5

* L24 is the length of overhang for sufficient clamping, and ( ) is the recommended length for machining of carbon and alloy steel.

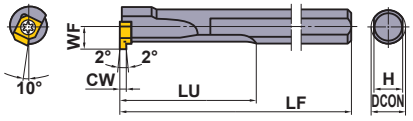
F TYPE

- Min. cutting diameter 10mm
- Screw-on type
- Usable for various applications.
- Max. groove depth : 3mm

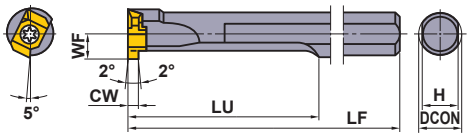
FSL51 Internal grooving, Threading



1 Corner type (FSL5108R,5110R)



2 Corner type (FSL5112R,5114R,5116R)

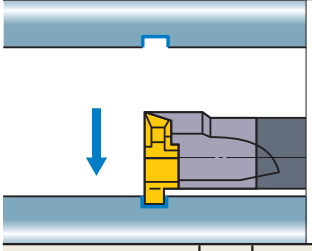


Right hand tool holder only.

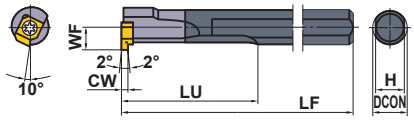
Order Number	Stock	Insert Number		Dimensions(mm)							Max. Groove Depth (mm)	✱2 Clamp Screw	Wrench
	R	Grooving	Threading	DCON	LF	LU	WF	H	CW	DMIN ✱1			
FSL5108R	●	MLG10○○L	MLT1001L	8	125	30	4.8	7	1.2 1.5 2.0	**10**	1.0	TS25	TKY08F
FSL**5110R**	●	MLG10○○L	MLT1001L	10	150	40	5.8	9		**12**	1.0	TS25	TKY08F
FSL**5112R**	●	MLG14○○L	MLT1401L	12	180	50	6.8	10.8	1.5 2.0 3.0	**14**	2.0	TS32	TKY08F
FSL**5114R**	●	MLG14○○L	MLT1401L	14	180	60	7.8	12.4		**16**	2.0	TS32	TKY08F
FSL**5116R**	●	MLG20○○L	MLT2001L	16	200	70	9.7	14	2.0 3.0 4.0	**20**	3.0	TS43	TKY15F

✱1 DMIN : Min. Cutting Diameter
✱2 Clamp Torque (N • m) : TS25=1.0, TS32=1.0, TS43=3.5

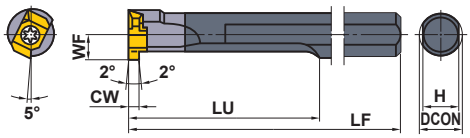
FSL52 (Carbide shank) Internal grooving, Threading



1 Corner type (FSL5208R,5210R)



2 Corner type (FSL5212R,5214R,5216R)



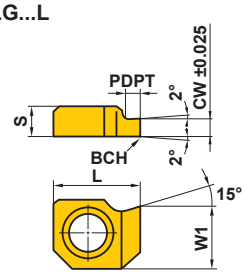
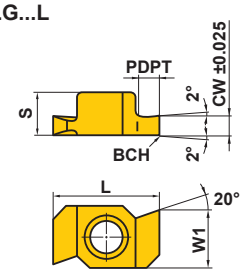
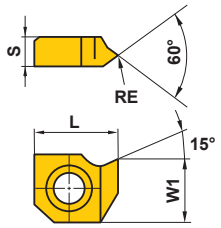
Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions(mm)							Max. Groove Depth (mm)	✱2 Clamp Screw	Wrench
	R	Grooving	Threading	DCON	LF	LU	WF	H	CW	DMIN ✱1			
FSL5208R	●	MLG10○○L	MLT1001L	8	125	60	4.8	7	1.2 1.5 2.0	**10**	1.0	TS25	TKY08F
FSL**5210R**	●	MLG10○○L	MLT1001L	10	150	70	5.8	9		**12**	1.0	TS25	TKY08F
FSL**5212R**	●	MLG14○○L	MLT1401L	12	180	80	6.8	10.8	1.5 2.0 3.0	**14**	2.0	TS32	TKY08F
FSL**5214R**	●	MLG14○○L	MLT1401L	14	180	85	7.8	12.4		**16**	2.0	TS32	TKY08F
FSL**5216R**	●	MLG20○○L	MLT2001L	16	200	115	9.7	14	2.0 3.0 4.0	**20**	3.0	TS43	TKY15F

✱1 DMIN : Min. Cutting Diameter
✱2 Clamp Torque (N • m) : TS25=1.0, TS32=1.0, TS43=3.5

● : Inventory maintained in Japan.
(10 inserts in one case)

INSERTS

Application	CW and pitch (mm)	Order Number	Coated UP20M	Carbide UTi20T	L	W1	PDPT	S	RE	BCH	Geometry
Grooving	1.2	**MLG1012L**		●	7	5	1	2.38	—	0.1	MLG...L 
	1.5	**MLG1015L**		●	7	5	1	2.38	—	0.1	
	2	**MLG1020L**		●	7	5	1	2.38	—	0.1	
	1.5	**MLG1415L**		●	11.8	6.5	2	4.76	—	0.1	MLG...L 
	2	**MLG1420L**		●	11.8	6.5	2	4.76	—	0.1	
	3	**MLG1430L**		●	11.8	6.5	2	4.76	—	0.1	
	2	**MLG2020L**		●	16.8	9.03	3	6.35	—	0.1	
	3	**MLG2030L**		●	16.8	9.03	3	6.35	—	0.1	
	4	**MLG2040L**		●	16.8	9.03	3	6.35	—	0.1	
Threading	Pitch 1.5—2.0	**MLT1001L**	●	●	7	5	—	2.38	0.1	—	MLT 
	Pitch 1.5—2.5	**MLT1401L**	●	●	11.8	6.5	—	4.76	0.1	—	
	Pitch 1.5—3.5	**MLT2001L**	●	●	16.8	9.03	—	6.35	0.1	—	

RECOMMENDED CUTTING CONDITIONS

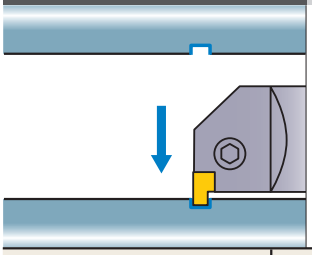
Work Material		Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)			
					1.2, 1.5mm	2.0mm	3.0mm	4.0mm
P	Carbon Steel Alloy Steel	180—280HB	**UP20M • UTi20T**	90 (60—120)	0.05 (0.02—0.08)	0.05 (0.02—0.08)	0.05 (0.02—0.08)	0.05 (0.02—0.08)
		280—350HB	**UP20M • UTi20T**	80 (50—100)	0.03 (0.02—0.04)	0.03 (0.02—0.04)	0.03 (0.02—0.04)	0.03 (0.02—0.04)

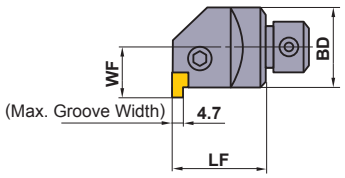
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

D TYPE BORING HEAD

- Min. cutting diameter : 40mm
- Pin lock type
- Exchangeable head type
- Groove width 1.25—4.7mm

DPT4 Internal grooving





Right hand tool holder only.

Order Number	Stock	Insert Number	Dimensions(mm)				Lock Pin	Lock Screw *2	Stop Ring	Wrench
	R		BD	LF	WF	DMIN *1				
DPT4132R	●	MGTL43○○○	32	40	20	**40**	P21S	HSP08014	E01	HKY40R
DPT4140R	●		40	50	25	**50**	P21S	HSP08014	E01	HKY40R

(Note) Please use left hand insert.

∗1 DMIN : Min. Cutting Diameter

∗2 Clamp Torque (N • m) : HSP08014=7.0

STANDARD ARBOR FOR D TYPE BORING HEAD

① **B** ② **1** ③ **32** ④ **32**

①Designation

②Arbor Length (mm)

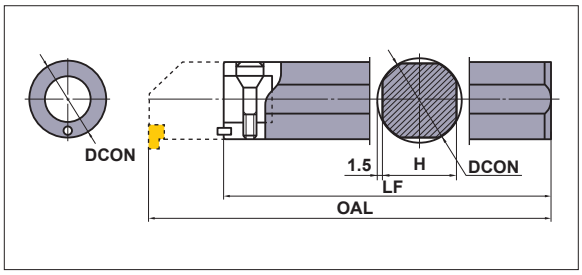
Symbol	DCON	LF	OAL
1	32	260	300
	40	310	360

③Arbor Diameter (mm)

Symbol	Diameter(DCON)
32	32
40	40

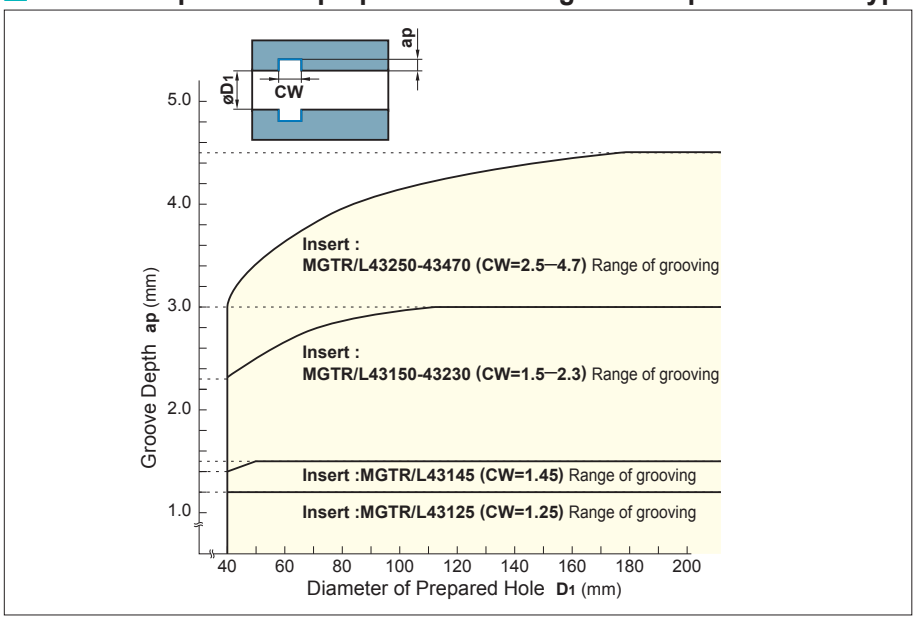
④Head Diameter (mm)

Symbol	Diameter(BD)
32	32
40	40



Order Number	Stock	Dimensions (mm)				Set Bolt	Wrench	Head Order Number
		DCON	LF	H	OAL			
B13232	●	32	260	29	300	SD32	HKY60R	**DPT4132R**
B14040	●	40	310	37	360	SD40	HKY60R	**DPT4140R**

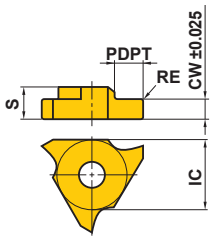
Relationship between prepared hole and groove depth for DPT4 type



● : Inventory maintained in Japan. (10 inserts in one case)

INSERTS

Order Number	Stock			Dimensions(mm)					Geometry
	Coated	Cermet	Carbide						
	VP20MF	NX2525	UTi20T	CW	PDPT	IC	S	RE	
MGTL43125	●	●	●	1.25	1.2	12.7	4.76	0.2	**MGTL...**
MGTL**43145**	●	●	●	1.45	1.5	12.7	4.76	0.2	
MGTL**43150**	●	●	●	1.5	3.0	12.7	4.76	0.2	
MGTL**43175**	●	●	●	1.75	3.0	12.7	4.76	0.2	
MGTL**43200**	●	●	●	2	3.0	12.7	4.76	0.2	
MGTL**43230**	●	●	●	2.3	3.0	12.7	4.76	0.2	
MGTL**43250**	●	●	●	2.5	4.5	12.7	4.76	0.3	
MGTL**43260**	●		●	2.6	4.5	12.7	4.76	0.3	
MGTL**43270**	●		●	2.7	4.5	12.7	4.76	0.3	
MGTL**43280**	●	●	●	2.8	4.5	12.7	4.76	0.3	
MGTL**43300**	●	●	●	3	4.5	12.7	4.76	0.3	
MGTL**43320**			●	3.2	4.5	12.7	4.76	0.3	
MGTL**43330**	●	●	●	3.3	4.5	12.7	4.76	0.3	
MGTL**43350**	●	●	●	3.5	4.5	12.7	4.76	0.3	
MGTL**43400**	●		●	4	4.5	12.7	4.76	0.3	
MGTL**43420**	●		●	4.2	4.5	12.7	4.76	0.4	
MGTL**43430**	●		●	4.3	4.5	12.7	4.76	0.4	
MGTL**43450**	●	●	●	4.5	4.5	12.7	4.76	0.4	
MGTL**43470**	●	●	●	4.7	4.5	12.7	4.76	0.4	



RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel Alloy Steel	180—280HB	**VP20MF**	120 (100—140)	0.14 (0.03—0.25)
			NX2525	130 (100—160)	0.12 (0.03—0.2)
M	Stainless Steel	≤200HB	**VP20MF**	120 (100—140)	0.12 (0.03—0.18)
K	Gray Cast Iron	Tensile Strength ≤350MPa	**VP20MF**	120 (100—140)	0.12 (0.03—0.18)

(Note) For machining a narrow groove, apply a lower feed within the recommended range.

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

HOW TO READ THE STANDARD OF THREADING

●How this section page is organized

①Classified according to external or internal applications.
②Sub-classified according to product series.
(Refer to the index on the next page.)

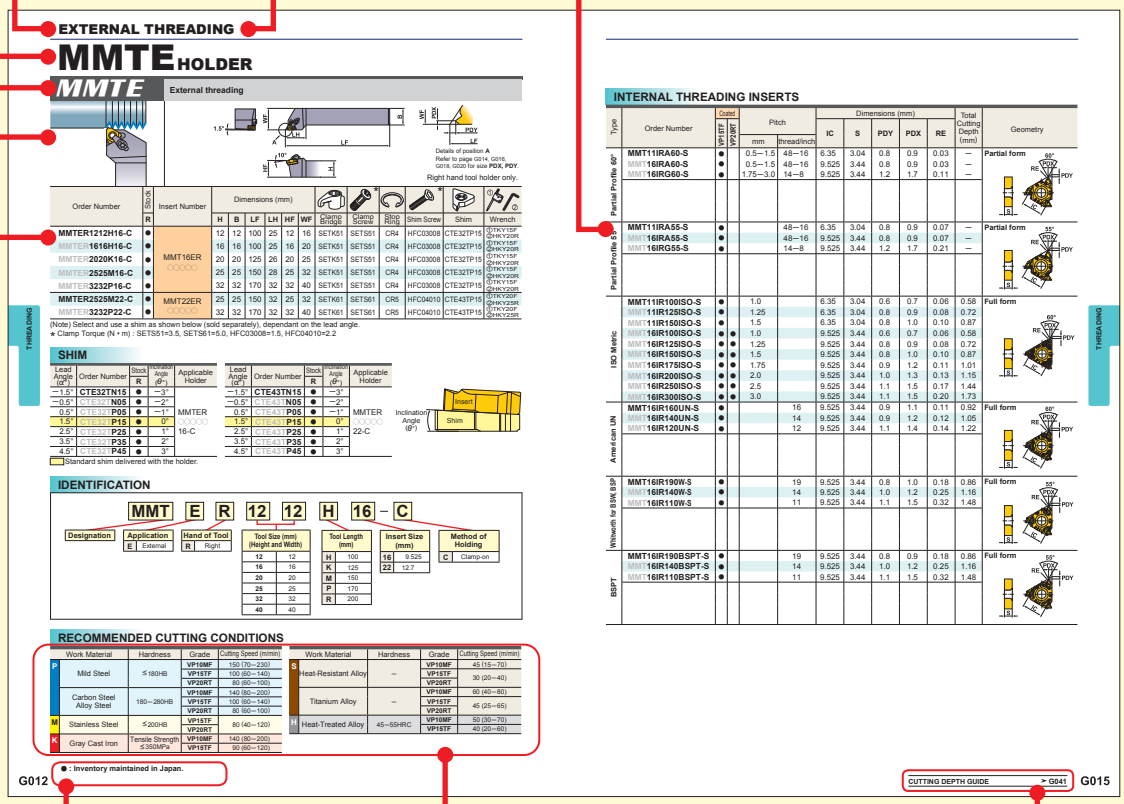
FIGURE SHOWING THE TOOLING APPLICATION
uses illustrations and arrows to depict the available machining applications, such as external and internal threading.

TYPE OF TOOL HOLDER
indicates the initial letters for the order number and cutting applications.

TITLE OF PRODUCT
PRODUCT SECTION

INDICATION OF EXTERNAL /INTERNAL APPLICATION

STANDARDS FOR APPLICABLE INSERTS
indicates stock status, dimensions, etc. for applicable inserts.



LEGEND FOR STOCK STATUS MARK
is shown on the left hand page of each double-page spread.

PAGE REFERENCE ·SPARE PARTS
indicates reference pages, including the above, on the right hand page of each double-page spread.

PRODUCT STANDARDS
indicates order numbers, stock status (per right/left hand), applicable inserts, holder dimensions, and spare parts.

RECOMMENDED CUTTING CONDITIONS
for each work material classification, indicates recommended cutting conditions according to the ISO categories for cutting grades, P, M, K, S, and H.

●To Order : For holder, please specify ①order number and hand of tool (right/left).
For insert, please specify ①insert number and ②grade.

TURNING TOOLS

THREADING

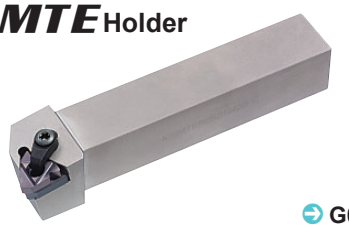
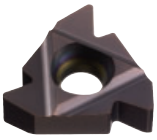
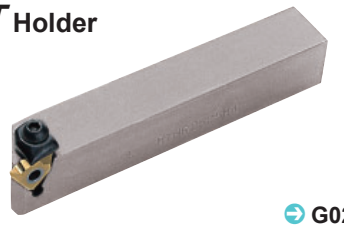
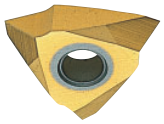
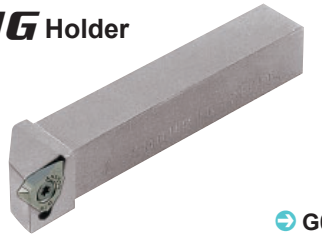
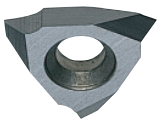
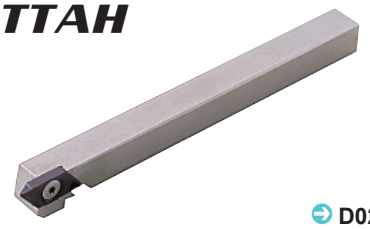
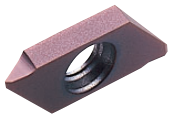
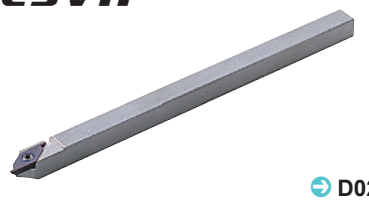
CLASSIFICATION (EXTERNAL THREADING) ····· G002
CLASSIFICATION (INTERNAL THREADING) ····· G003
CROSS REFERENCE OF THREAD PITCHES
EXTERNAL ····· G004
INTERNAL ····· G006
STANDARD THREAD AND CORRESPONDING INSERT • HOLDER ··· G008

STANDARD OF THREADING TOOLS
FEATURES OF MMT SERIES ····· G010
EXTERNAL THREADING
MMTE HOLDER ····· G012
MT HOLDER ····· G022
SMG HOLDER ····· G024
INTERNAL THREADING
MMTI TYPE BORING BARS ····· G013
MICRO-MINI TWIN BORING BARS ····· G026
F TYPE BORING BARS ····· G030
D TYPE BORING HEAD ····· G032
THREADING METHOD ····· G034
STANDARD OF DEPTH OF CUT ····· G039
TROUBLE SHOOTING ····· G043

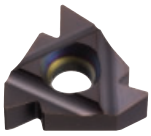
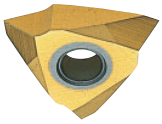
*Arranged by Alphabetical order

G026 **CT**
G032 **DPT2**
G030 **FSL51**
G030 **FSL52**
G031 **MLG (INSERTS)**
G031 **MLT (INSERTS)**
G014 **MMT (INSERTS)**
G012 **MMTE**
G013 **MMTI**
G022 **MT1**
G022 **MTH**
G023 **MTT (INSERTS)**
G033 **MTT (INSERTS)**
G028 **RBH**
G029 **SBH**
G024 **SMGH**
G025 **SMGT (INSERTS)**
G025 **SMTT (INSERTS)**

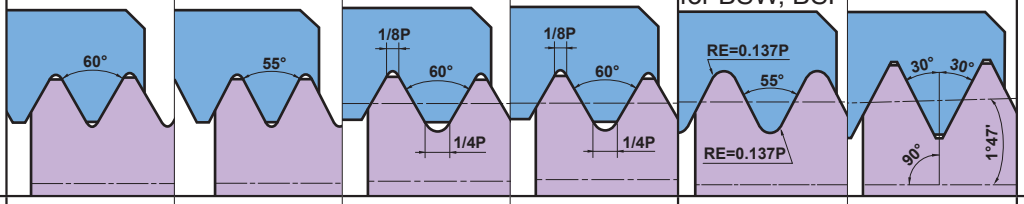
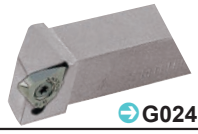
CLASSIFICATION (EXTERNAL THREADING)

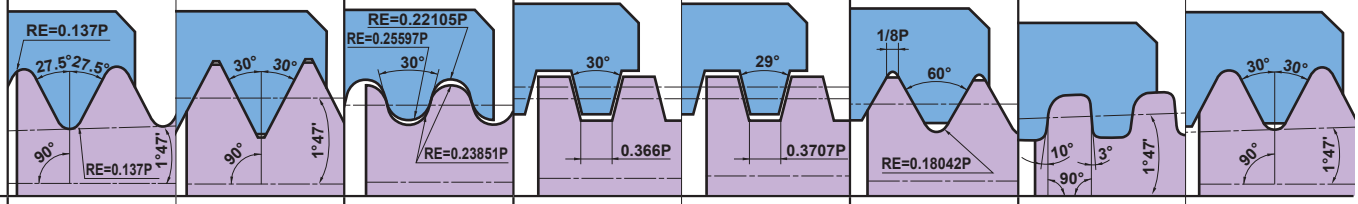
Name of Tool Holder	Insert Shape	Features	Shank Size (H x W x L) (mm)
MMTE Holder  G012		●Various insert types. ●M-class 3-D breaker inserts and G-class ground inserts available. ●Available with a wiper cutting edge to provide a precise thread geometry. ●Able to change lead angle by replacing shim.	12 x 12 x 100 16 x 16 x 100 20 x 20 x 125 25 x 25 x 150 32 x 32 x 170
MT Holder  G022		●Clamp-on type. ●Precision class insert. ●Positive insert suffers from negligible chattering and thus produces good finished surface.	16 x 16 x 100 20 x 20 x 125 25 x 25 x 150 32 x 32 x 170
SMG Holder  G024		●Screw-on type. ●Precision class insert. ●Positive insert suffers from negligible chattering and thus produces good finished surface. ●Holder is capable of performing both threading and grooving.	10 x 10 x 70 12 x 12 x 80 16 x 16 x 100 20 x 20 x 125 25 x 25 x 150
SMALL TOOLS **TTAH**  D024		●Tools to be equipped on Gang type tool posts. ●Small Shank: 8mm—16mm ●High rigidity due to designing of vertical insert. ●The screw designed for common use on front and back enables back clamping. ●Most suitable for threading diameters of 2 mm or smaller. ●Screw-on type.	8 x 10 x 120 10 x 10 x 120 12 x 12 x 120 16 x 16 x 120
CSVH  D027		●Tools to be equipped on Cam type tool posts. ●Small Shank: 7mm—12mm ●Single holder for front turning, back turning, grooving, threading and cutting off operations. ●The most suitable for machining of small parts with work diameter ϕ5mm or less. ●Screw-on type.	7 x 7 x 140 8 x 8 x 140 9.5 x 9.5 x 140 10 x 10 x 140 12 x 12 x 140

CLASSIFICATION (INTERNAL THREADING)

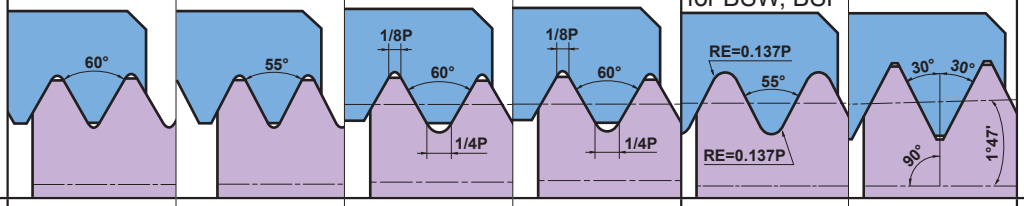
Name of Tool Holder	Insert Shape	Features	Shank Size (Dia. x L x Min. Cutting Dia.) (mm)
MMTI  G013		●Minimum cutting diameter 13mm. ●Various insert types. ●M-class 3-D breaker inserts and G-class ground inserts available. ●Available with a wiper cutting edge to provide a precise thread geometry. ●Able to change lead angle by replacing shim.	16 x 125 x 13 16 x 150 x 15 20 x 170 x 24 25 x 200 x 29 32 x 250 x 37 40 x 300 x 46
FSL5  G030		●Minimum cutting diameter 10mm. ●Screw-on type. ●Precision class insert. ●Applicable for threading, grooving and boring. ●Available with a carbide shank to prevent vibration when machining deep holes.	8 x 125 x 10 10 x 150 x 12 12 x 180 x 14 14 x 180 x 16 16 x 200 x 20
DPT2  G032		●Minimum cutting diameter 40mm. ●Pin lock type. ●Precision class insert. ●Exchangeable head type.	32 x 300 x 40 40 x 360 x 50
MICRO-MINI TWIN Boring Bars  G026	–	●Minimum cutting diameter 3mm. ●Solid carbide type. ●Economical two cutting edge type.	3 x 50 x 3 4 x 60 x 4.5 5 x 70 x 6 6 x 75 x 7
MICRO-MINI Boring Bars  E022	–	●Minimum cutting diameter 3.2mm. ●Solid carbide type. ●Insert can be ground to suit the application.	3 x 80 x 3.2 4 x 80 x 4.2 5 x 100 x 5.2

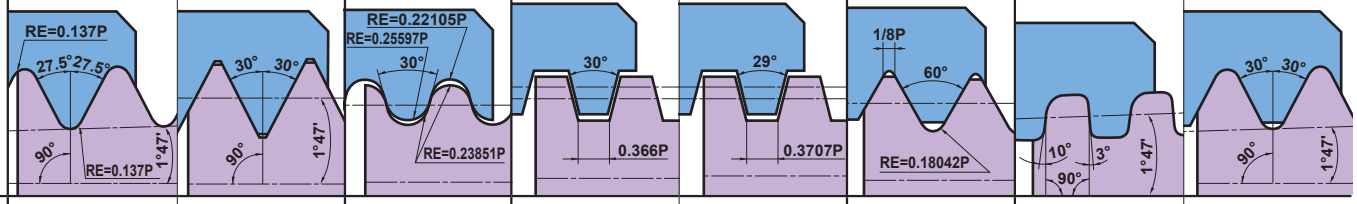
CROSS REFERENCE THREAD PITCH (EXTERNAL)

Application		General machining				Pipe fittings and couplings for gas and water		
Type		Partial Profile 60°	Partial Profile 55°	ISO Metric	American UN	Parallel Pipe Thread Whitworth for BSW, BSP	American NPT	
								
Symbol		M UNC UNF	W	M	UNC UNF	G(PF) Rp(PS) W	NPT	
Holder	Pitch	mm (thread/inch)	thread/inch	mm	thread/inch	thread/inch	thread/inch	
MMT Holder  G012	Full form	–	–	0.5—5.0	32—5	28—5	27, 18, 14 11.5, 8	
	Partial form	0.5—5.0 (48—5)	48—5	0.5—5.0	48—5	–	–	
MT Holder  G022	Partial form	0.25—4.5 (64—6)	20—9	0.25—4.5	64—6	–	–	
SMG Holder  G024	Partial form	0.25—2.0 (48—13)	–	0.25—2.0	48—13	–	–	

	Steam, gas and water line pipes		Pipe couplings for food and fire fighting industries	Motion transmissions		Aircraft and aerospace	Oil and gas	
	Taper Pipe Thread BSPT	American NPTF	Round DIN 405	ISO Trapezoidal 30°	American ACME	UNJ	API Buttress Casing	API Round Casing&Tubing
							
	R(PT) Rc(PT) Rp	NPTF	Rd	Tr (TM)	ACME (Tw)	UNJ	BCSG	CSG LCSG
	thread/inch	thread/inch	thread/inch	mm	thread/inch	thread/inch	thread/inch	thread/inch
	28, 19 14, 11	27, 18, 14 11.5, 8	10, 8 6, 4	1.5, 2 3, 4, 5	12, 10 8, 6, 5	32—8	5	10, 8
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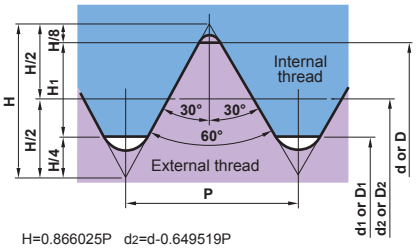
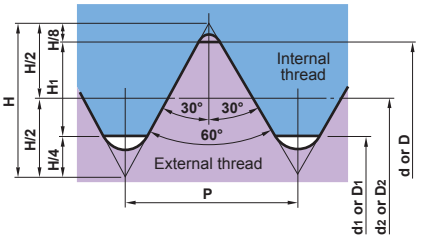
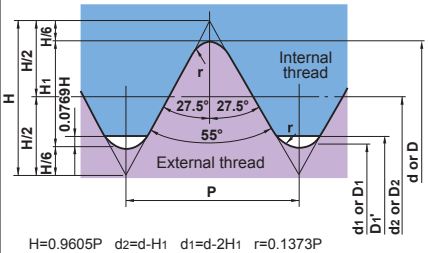
CROSS REFERENCE THREAD PITCH (INTERNAL)

Application		General machining				Pipe fittings and couplings for gas and water		
Type		Partial Profile 60°	Partial Profile 55°	ISO Metric	American UN	Parallel Pipe Thread Whitworth for BSW, BSP	American NPT	
								
Symbol		M UNC UNF	W	M	UNC UNF	G(PF) Rp(PS) W	NPT	
Holder	Pitch	mm (thread/inch)	thread/inch	mm	thread/inch	thread/inch	thread/inch	
MMT **Boring Bars**  G013	Full form	—	—	0.5—5.0	32—5	28—5	27, 18, 14 11.5, 8	
	Partial form	0.5—5.0 (48—5)	48—5	0.5—5.0	48—5	—	—	
FSL5 **Boring Bars**  G030	Partial form	1.5—3.5 (16—8)	—	1.5—3.5	16—8	—	—	
DPT2 **Boring Head**  G032	Partial form	0.25—4.5 (64—6)	—	0.25—4.5	64—6	—	—	
MICRO-MINI TWIN  G026	Partial form	0.5—1.75 (36—16)	—	0.5—1.75	36—16	—	—	

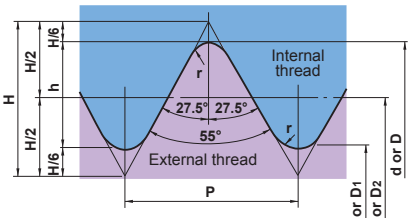
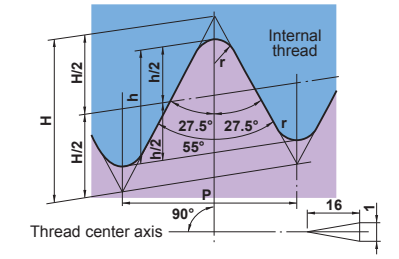
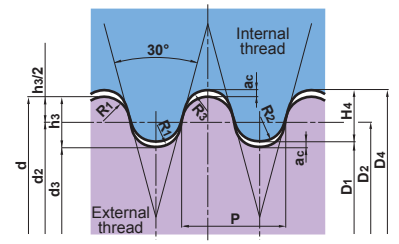
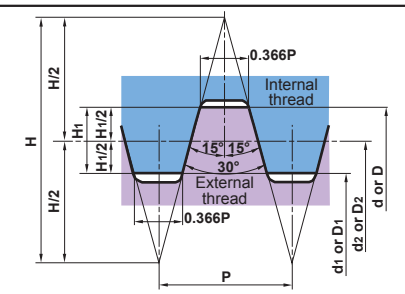
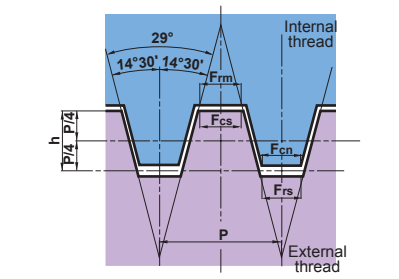
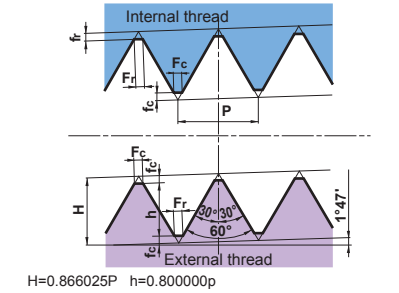
	Steam, gas and water line pipes		Pipe couplings for food and fire fighting industries	Motion transmissions		Aircraft and aerospace	Oil and gas	
	Taper Pipe Thread BSPT	American NPTF	Round DIN 405	ISO Trapezoidal 30°	American ACME	UNJ	API Buttress Casing	API Round Casing&Tubing
							
	R(PT) Rc(PT) Rp	NPTF	Rd	Tr (TM)	ACME (Tw)	UNJ	BCSG	CSG LCSG
	thread/inch	thread/inch	thread/inch	mm	thread/inch	thread/inch	thread/inch	thread/inch
	19, 14, 11	14, 11.5, 8	10, 8 6, 4	1.5, 2 3, 4, 5	12, 10 8, 6, 5	–	5	10, 8
	–	–	–	–	–	* –	–	–
	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–

* When machining an internal UNJ thread, cut an internal hole with the appropriate diameter. Then machine with 60° American UN. In this case, a full form type insert cannot be used.

STANDARD THREAD AND CORRESPONDING INSERT • HOLDER

Thread Name	Standard Thread Type	Type	Ext./Int.	Insert Number	Wiper/ General	Tool Holder	Page
ISO Metric	 H=0.866025P d2=d-0.649519P H1=0.541266P d1=d-1.082532P D=d D2=d2 D1=d1	M	Ext.	MMT○○ER○○○ISO	Wiper	MMTER○○○○○-C	G012
				MMT○○ER○○○ISO-S	Wiper		
				MMT○○ER○○○60	General		
				MMT○○ER○○○60-S	General		
				SMTTR/L160360○○	General	SMGHR/L○○○○16	G024
				MTTR/L4360○○	General	MTHR/L○○○○○4 MT1R/L○○○○○4	G022
			Int.	MMT○○IR○○○ISO	Wiper	MMTIR○○A○○○-SP○ MMTIR○○A○16-C	G013
				MMT○○IR○○○ISO-S	Wiper		
				MMT○○IR○○○60	General		
				MMT○○IR○○○60-S	General		
				MTTR/L4360○○	General	DPT2○○○R	G032
American UN	 H=0.866025×25.4/n d2=(d-0.649519/n)×25.4 H1=0.541266×25.4/n d1=(d-1.082532/n)×25.4 d=(d)×25.4 D=d D2=d2 D1=d1 P=25.4/thread	UNC UNF	Ext.	MMT○○ER○○○UN	Wiper	MMTER○○○○○-C	G012
				MMT○○ER○○○UN-S	Wiper		
				MMT○○ER○○○60	General		
				MMT○○ER○○○60-S	General		
				SMTTR/L160360○○	General	SMGHR/L○○○○16	G024
				MTTR/L4360○○	General	MTHR/L○○○○○4 MT1R/L○○○○○4	G022
			Int.	MMT○○IR○○○UN	Wiper	MMTIR○○A○○○-SP○ MMTIR○○A○16-C	G013
				MMT○○IR○○○UN-S	Wiper		
				MMT○○IR○○○60	General		
				MMT○○IR○○○60-S	General		
				MTTR/L4360○○	General	DPT2○○○R	G032
Whitworth for BSW, BSP	 H=0.9605P d2=d-H1 d1=d-2H1 r=0.1373P H1=0.6403P D1'=d1+2×0.0769H D=d D2=d2 D1=d1 P=25.4/thread	W	Ext.	MMT○○ER○○○W	Wiper	MMTER○○○○○-C	G012
				MMT○○ER○○○W-S	Wiper		
				MMT○○ER○○○55	General		
				MMT○○ER○○○55-S	General		
				MTTR/L4355○○	General	MTHR/L○○○○○4 MT1R/L○○○○○4	G022
			Int.	MMT○○IR○○○W	Wiper	MMTIR○○A○○○-SP○ MMTIR○○A○16-C	G013
				MMT○○IR○○○W-S	Wiper		
				MMT○○IR○○○55	General		
				MMT○○IR○○○55-S	General		
				MTTR/L4355○○	General	DPT2○○○R	G032

Wiper : Insert order number is determined by selected pitch.
General : An insert is applicable to several pitch types.

Thread Name	Standard Thread Type	Type	Ext./Int.	Insert Number	Wiper/ General	Tool Holder	Page
Parallel Pipe Thread	 H=0.960491P d2=d-h d1=d-2h r=0.137329P h=0.640327 D=d D2=d2 D1=d1 25.4/thread	PF G Rp	Ext.	MMT○○ER○○○W	Wiper	MMTER○○○○○-C	G012
				MMT○○ER○○○W-S	Wiper		
			Int.	MMT○○IR○○○W	Wiper	MMTIR○○A○○○-SP○ MMTIR○○A○16-C	G013
				MMT○○IR○○○W-S	Wiper		
BSPT	 H=0.960237P h=0.640327 r=0.137278P P=25.4/thread	BSPT	Ext.	MMT○○ER○○○BSPT	Wiper	MMTER○○○○○-C	G012
				MMT○○ER○○○BSPT-S	Wiper		
			Int.	MMT○○IR○○○BSPT	Wiper	MMTIR○○A○○○-SP○ MMTIR○○A○16-C	G013
				MMT○○IR○○○BSPT-S	Wiper		
Round DIN 405	 ac=0.05×P h3=H4=0.5×P R1=0.238507×P R2=0.255967×P R3=0.221047×P	Rd	Ext.	MMT○○ER○○○RD	Wiper	MMTER○○○○○-C	G012
			Int.	MMT○○IR○○○RD	Wiper	MMTIR○○A○○○-SP○ MMTIR○○A○16-C	G013
ISO Trapezoidal 30°		Tr	Ext.	MMT○○ER○○○TR	Wiper	MMTER○○○○○-C	G012
			Int.	MMT○○IR○○○TR	Wiper	MMTIR○○A○○○-SP○ MMTIR○○A○16-C	G013
American ACME		ACME	Ext.	MMT○○ER○○○ACME	Wiper	MMTER○○○○○-C	G012
			Int.	MMT○○IR○○○TACME	Wiper	MMTIR○○A○○○-SP○ MMTIR○○A○16-C	G013
American NPT	 H=0.866025P h=0.800000p	NPT	Ext.	MMT○○ER○○○NPT	Wiper	MMTER○○○○○-C	G012
			Int.	MMT○○IR○○○NPT	Wiper	MMTIR○○A○○○-SP○ MMTIR○○A○16-C	G013

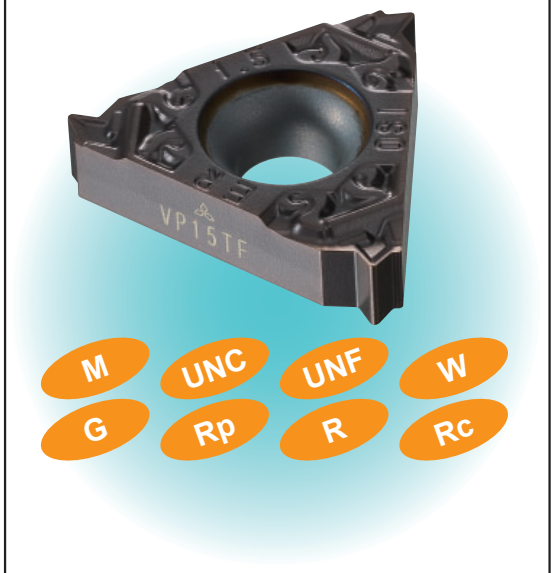
Wiper : Insert order number is determined by selected pitch.
General : An insert is applicable to several pitch types.

FEATURES OF MMT SERIES

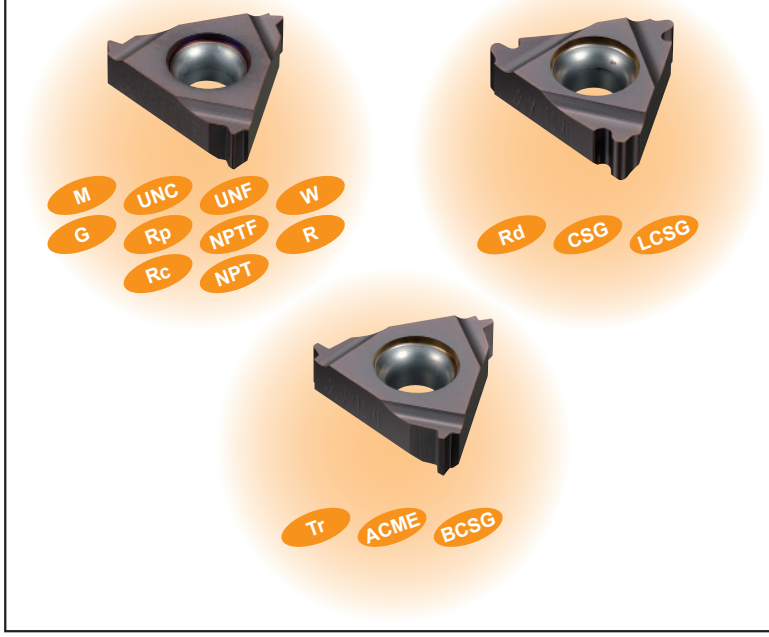
A WIDE VARIETY OF PRODUCTS

Mitsubishi Miracle Threading (MMT) series. 283 inserts and 26 holders.

M-CLASS INSERTS WITH 3-D CHIP BREAKERS



G-CLASS GROUND INSERTS



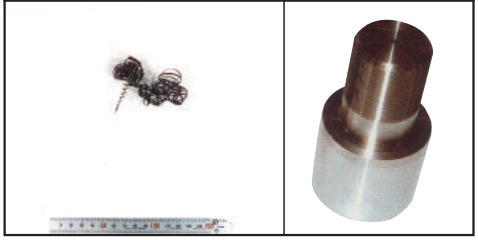
IDEAL CHIP CONTROL EVEN IN THE LATTER HALF OF PASSES WHEN CONTINUOUS CHIPS ARE USUALLY PRODUCED. (M-CLASS INSERTS WITH 3-D CHIP BREAKERS)

ISO metric external thread pitch 1.5mm Final pass (6th pass)

Competitor

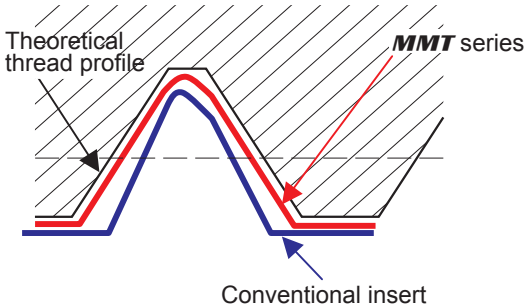


MMT



<Cutting Conditions>
Workpiece : JIS SCM440
Insert : MMT16ER150ISO-S
Grade : VP15TF
Cutting speed : 120m/min
Cutting method : Radial Infeed
Depth of cut : Fixed cut area
Pass : 6 times
Coolant : Wet

A HIGHER LEVEL OF PRECISION THAN CONVENTIONAL INSERTS (G-CLASS GROUND INSERTS)

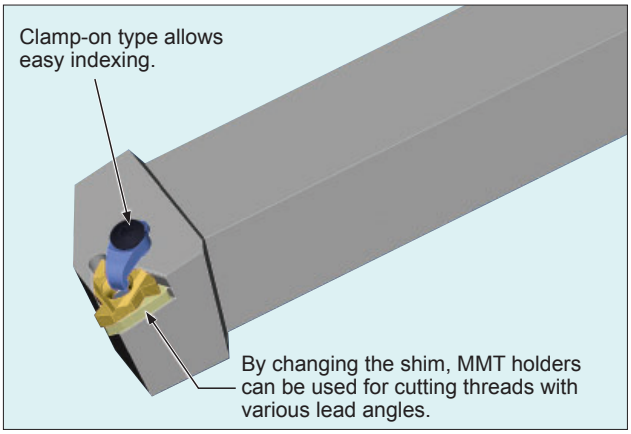


High precision threading can be achieved by using MMT inserts that feature a ground rake face and peripheral cutting edge.

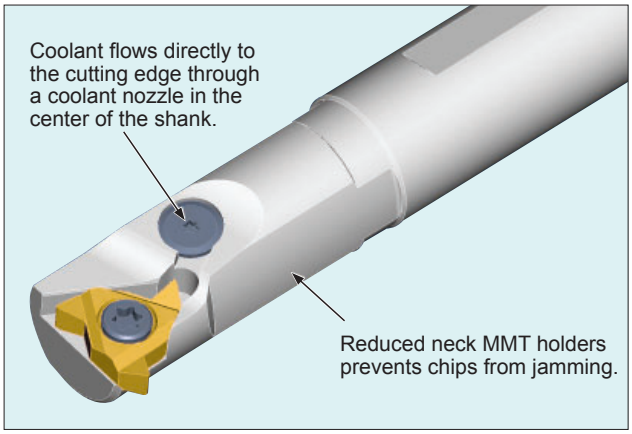
Thread Type	Threading Tolerance
ISO Metric	6g / 6H
American UN	2A / 2B
Whitworth for BSW, BSP	Medium Class A
BSPT	Standard BSPT
Round DIN 405	7h / 7H
ISO Trapezoidal 30°	7e / 7H
American ACME	3G
UNJ	3A
API Buttress Casing	Standard API
API Rounded Casing & Tubing	Standard API RD
American NPT	Standard NPT
American NPTF	Class2

HOLDER (Use of special surface treatment)

External

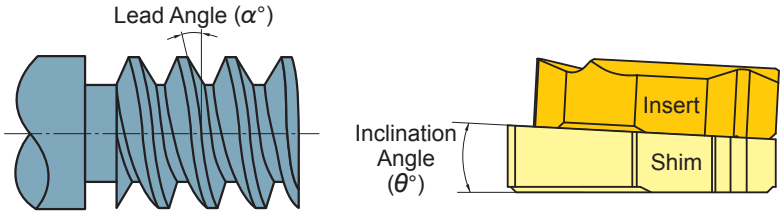


Internal



* Order number of coolant guide screw: TFS03006
(Except MMTIR1316/MMTIR1516)

SUITABLE FOR THREADING WITH A LARGE LEAD ANGLE



By changing only the shim, MMT holders can be used for turning of threads with various lead angles as well as the turning of left hand threads.

Lead Angle (α°)	Inclination Angle (θ°)
−1.5°	−3°
−0.5°	−2°
0.5°	−1°
1.5°	0°
2.5°	1°
3.5°	2°
4.5°	3°

Standard shim delivered with the holder.

GRADE

VP10MF (G-class ground insert only)

● Superior wear and plastic deformation resistance

- High wear and plastic deformation resistance for threading when maintaining the thread form is important. Suitable for continuous high precision machining with extensive tool life.
- Effective in combination with G-class inserts for high precision threading.

VP15TF (G-class ground insert, M-class insert with 3-D chip breakers)

● Wide versatility

- High fracture resistance during low rigidity applications such as bar feed machining. Able to withstand harsh conditions for long periods where conventional inserts would be liable to breakage.
- Effective combination of high cost performance M-class inserts with 3-D chip breakers.

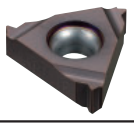
VP20RT (M-class insert with 3-D chip breakers)

● Excellent fracture resistance

- Suitable for stainless steel boring and unstable machining where inserts are vulnerable to fracturing.
- Effective combination of high cost performance M-class inserts with 3-D chip breakers.

CHOOSING M-CLASS INSERTS WITH 3-D CHIP BREAKERS OR G-CLASS INSERTS

Insert	Chip control	Precision of thread
M-class inserts with 3-D chip breakers 	◎	○

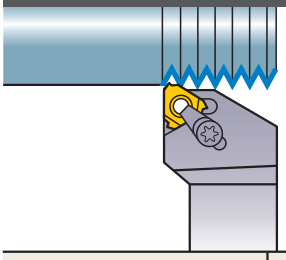
Insert	Chip control	Precision of thread
G-class inserts 	○	◎

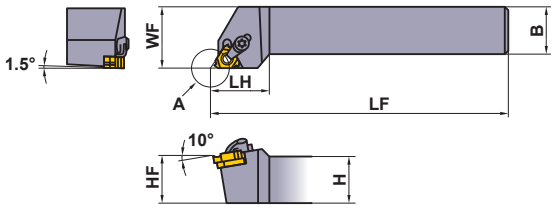
- For ideal chip control and a high cost performance ratio, M-class inserts with 3-D chip breakers are recommended.
- G-class inserts are recommended where higher precision is required.

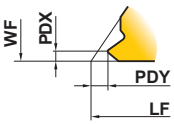
MMTE HOLDER

MMTE

External threading







Details of position **A**
Refer to page G014, G016, G018, G020 for size **PDX, PDY**.

Right hand tool holder only.

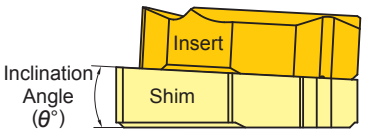
Order Number	Stock	Insert Number	Dimensions (mm)						Clamp Bridge	Clamp Screw *	Stop Ring	Shim Screw *	Shim	Wrench
	R		H	B	LF	LH	HF	WF						
MMTER1212H16-C	●	MMT16ER ○○○○○	12	12	100	25	12	16	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
MMTER**1616H16-C**	●		16	16	100	25	16	20	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
MMTER**2020K16-C**	●		20	20	125	26	20	25	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
MMTER**2525M16-C**	●		25	25	150	28	25	32	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
MMTER**3232P16-C**	●		32	32	170	32	32	40	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
MMTER2525M22-C	●	MMT22ER ○○○○○	25	25	150	32	25	32	SETK61	SETS61	CR5	HFC04010	CTE43TP15	①TKY20F ②HKY25R
MMTER**3232P22-C**	●		32	32	170	32	32	40	SETK61	SETS61	CR5	HFC04010	CTE43TP15	①TKY20F ②HKY25R

(Note) Select and use a shim as shown below (sold separately), dependant on the lead angle.
* Clamp Torque (N • m) : SETS51=3.5, SETS61=5.0, HFC03008=1.5, HFC04010=2.2

SHIM

Lead Angle (α°)	Order Number	Stock R	Inclination Angle (θ°)	Applicable Holder
−1.5°	**CTE32TN15**	●	−3°	MMTER ○○○○○ 16-C
−0.5°	CTE32T**N05**	●	−2°	
0.5°	CTE32T**P05**	●	−1°	
1.5°	CTE32T**P15**	●	0°	
2.5°	CTE32T**P25**	●	1°	
3.5°	CTE32T**P35**	●	2°	
4.5°	CTE32T**P45**	●	3°	

Lead Angle (α°)	Order Number	Stock R	Inclination Angle (θ°)	Applicable Holder
−1.5°	**CTE43TN15**	●	−3°	MMTER ○○○○○ 22-C
−0.5°	CTE43T**N05**	●	−2°	
0.5°	CTE43T**P05**	●	−1°	
1.5°	CTE43T**P15**	●	0°	
2.5°	CTE43T**P25**	●	1°	
3.5°	CTE43T**P35**	●	2°	
4.5°	CTE43T**P45**	●	3°	



Standard shim delivered with the holder.

IDENTIFICATION

MMT **E** **R** **12** **12** **H** **16** – **C**

Designation	Application	Hand of Tool	Tool Size (mm) (Height and Width)	Tool Length (mm)	Insert Size (mm)	Method of Holding
	E External	R Right	12 12	H 100	16 9.525	C Clamp-on
			16 16	K 125	22 12.7	
			20 20	M 150		
			25 25	P 170		
			32 32			

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	**VP10MF**	150 (70—230)
			VP15TF	100 (60—140)
			VP20RT	80 (60—100)
	Carbon Steel Alloy Steel	180—280HB	**VP10MF**	140 (80—200)
			VP15TF	100 (60—140)
			VP20RT	80 (60—100)
M	Stainless Steel	≤200HB	**VP15TF**	80 (40—120)
			VP20RT	
K	Gray Cast Iron	Tensile Strength ≤350MPa	**VP10MF**	140 (80—200)
			VP15TF	90 (60—120)

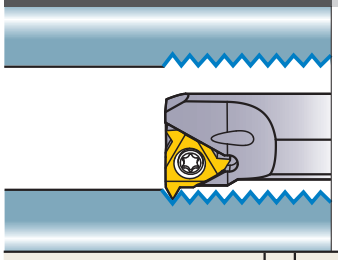
	Work Material	Hardness	Grade	Cutting Speed (m/min)
S	Heat-Resistant Alloy	—	**VP10MF**	45 (15—70)
			VP15TF	30 (20—40)
			VP20RT	
	Titanium Alloy	—	**VP10MF**	60 (40—80)
			VP15TF	45 (25—65)
			VP20RT	
H	Heat-Treated Alloy	45—55HRC	**VP10MF**	50 (30—70)
			VP15TF	40 (20—60)

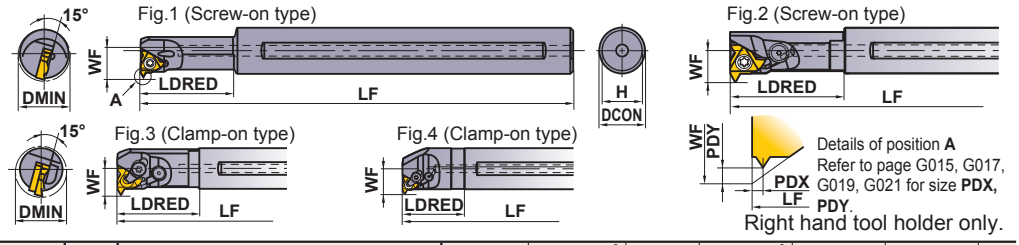
● : **Inventory maintained in Japan.**

MMTI TYPE BORING BARS

MMTI

Internal threading





Order Number	Stock	Insert Number	Lead Angle	Dimensions (mm)						Clamp Bridge	Clamp Screw *	Stop Ring	Shim Screw *	Shim	Wrench	Fig
	R			DCON	LF	LDRED	WF	H	DMIN							
MMTIR1316AK11-SP15	●	MMT11IR	1.5°	16	125	25	8.7	15	**13**	–	TS25	–	–	–	①TKY08F	1
MMTIR**1316AK11-SP25**	●		2.5°	16	125	25	8.7	15	**13**	–	TS25	–	–	–	①TKY08F	1
MMTIR**1316AK11-SP35**	●		3.5°	16	125	25	8.7	15	**13**	–	TS25	–	–	–	①TKY08F	1
MMTIR**1516AM11-SP15**	●		1.5°	16	150	32	9.7	15	**15**	–	TS25	–	–	–	①TKY08F	1
MMTIR**1516AM11-SP25**	●		2.5°	16	150	32	9.7	15	**15**	–	TS25	–	–	–	①TKY08F	1
MMTIR**1516AM11-SP35**	●		3.5°	16	150	32	9.7	15	**15**	–	TS25	–	–	–	①TKY08F	1
MMTIR1916AM16-SP15	●	MMT16IR	1.5°	16	150	40	12.2	15	**19**	–	CS350860T	–	–	–	①TKY15F	2
MMTIR**1916AM16-SP25**	●		2.5°	16	150	40	12.2	15	**19**	–	CS350860T	–	–	–	①TKY15F	2
MMTIR**1916AM16-SP35**	●		3.5°	16	150	40	12.2	15	**19**	–	CS350860T	–	–	–	①TKY15F	2
MMTIR**2420AQ16-C**	●		1.5°	20	180	40	14.2	19	**24**	SETK51	SETS51	CR4	HFC03006	CTI32TP15	①TKY15F ②HKY20R	3
MMTIR**2925AS16-C**	●		1.5°	25	250	60	16.7	23.4	**29**	SETK51	SETS51	CR4	HFC03006	CTI32TP15	①TKY15F ②HKY20R	3
MMTIR**3732AS16-C**	●		1.5°	32	250	48	20.5	30.4	**37**	SETK51	SETS51	CR4	HFC03006	CTI32TP15	①TKY15F ②HKY20R	4
MMTIR2420AQ22-SP15	●	MMT22IR	1.5°	20	180	50	15.5	19	**24**	–	TS43	–	–	–	①TKY15F	2
MMTIR**2420AQ22-SP25**	●		2.5°	20	180	50	15.5	19	**24**	–	TS43	–	–	–	①TKY15F	2
MMTIR**2420AQ22-SP35**	●		3.5°	20	180	50	15.5	19	**24**	–	TS43	–	–	–	①TKY15F	2
MMTIR**3025AR22-C**	●		1.5°	25	200	38	17.8	23.4	**30**	SETK61	SETS61	CR5	HFC04008	CTI43TP15	①TKY20F ②HKY25R	4
MMTIR**3832AS22-C**	●		1.5°	32	250	48	21.8	30.4	**38**	SETK61	SETS61	CR5	HFC04008	CTI43TP15	①TKY20F ②HKY25R	4
MMTIR**4640AT22-C**	●		1.5°	40	300	60	26.2	38	**46**	SETK61	SETS61	CR5	HFC04008	CTI43TP15	①TKY20F ②HKY25R	4

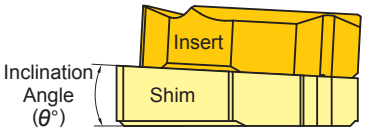
(Note) Select and use a shim as shown below (sold separately), dependant on the lead angle.
- A screw-on tool holder uses no shim. (The holder body has a lead angle.) Use a tool holder with the appropriate lead angle.
- Min. cutting diameter (DMIN) shows the internal hole diameter, not the thread diameter.

* Clamp Torque (N • m) : TS25=1.0, CS350860T=3.5, SETS51=3.5, TS43=3.5, SETS61=5.0, HFC03006=1.5, HFC04008=2.2

SHIM

Lead Angle (α°)	Order Number	Stock R	Inclination Angle (θ°)	Applicable Holder
−1.5°	**CTI32TN15**	●	−3°	MMTIR ○○○○ ○○16-C
−0.5°	CTI32T**N05**	●	−2°	
0.5°	CTI32T**P05**	●	−1°	
1.5°	CTI32T**P15**	●	0°	
2.5°	CTI32T**P25**	●	1°	
3.5°	CTI32T**P35**	●	2°	
4.5°	CTI32T**P45**	●	3°	

Lead Angle (α°)	Order Number	Stock R	Inclination Angle (θ°)	Applicable Holder
−1.5°	**CTI43TN15**	●	−3°	MMTIR ○○○○ ○○22-C
−0.5°	CTI43T**N05**	●	−2°	
0.5°	CTI43T**P05**	●	−1°	
1.5°	CTI43T**P15**	●	0°	
2.5°	CTI43T**P25**	●	1°	
3.5°	CTI43T**P35**	●	2°	
4.5°	CTI43T**P45**	●	3°	



Standard shim delivered with the holder.

IDENTIFICATION

MMT I R 13 16 A K 11 – S P15

Designation

Application

I	Internal

Hand of Tool

R	Right

Min.Cutting Diameter (mm)

Shank Diameter (mm)

Shank Material

A	Steel Shank with Coolant Hole

Tool Length (mm)

K	125	R	200
M	150	S	250
Q	180	T	300

Insert Size (mm)

11	6.35
16	9.525
22	12.7

Method of Holding

S	Screw-on
C	Clamp-on

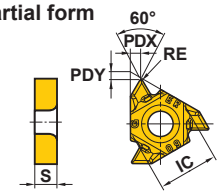
Lead Angle

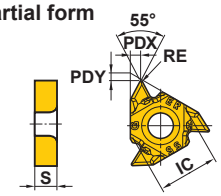
P15	1.5°
P25	2.5°
P35	3.5°

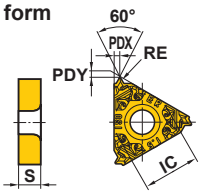
MMT M-CLASS INSERTS WITH 3-D CHIP BREAKERS

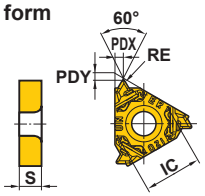
EXTERNAL THREADING INSERTS

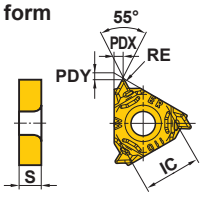
Type	Order Number	Coated VP15TF	Coated VP20RT	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
Partial Profile 60°	**MMT16ERA60-S**	●		0.5—1.5	48—16	9.525	3.44	0.8	0.9	0.06	—	Partial form 60°
	MMT16ERG60-S	●		1.75—3.0	14—8	9.525	3.44	1.2	1.7	0.23	—	
Partial Profile 55°	**MMT16ERA55-S**	●			48—16	9.525	3.44	0.8	0.9	0.07	—	Partial form 55°
	MMT16ERG55-S	●			14—8	9.525	3.44	1.2	1.7	0.23	—	
ISO Metric	**MMT16ER100ISO-S**	●	●	1.0		9.525	3.44	0.7	0.7	0.13	0.61	Full form 60°
	MMT16ER125ISO-S	●	●	1.25		9.525	3.44	0.8	0.9	0.16	0.77	
	MMT16ER150ISO-S	●	●	1.5		9.525	3.44	0.8	1.0	0.20	0.92	
	MMT16ER175ISO-S	●	●	1.75		9.525	3.44	0.9	1.2	0.22	1.07	
	MMT16ER200ISO-S	●	●	2.0		9.525	3.44	1.0	1.3	0.26	1.23	
	MMT16ER250ISO-S	●	●	2.5		9.525	3.44	1.1	1.5	0.33	1.53	
	MMT16ER300ISO-S	●	●	3.0		9.525	3.44	1.2	1.6	0.40	1.84	
American UN	**MMT16ER160UN-S**	●			16	9.525	3.44	0.9	1.1	0.23	0.97	Full form 60°
	MMT16ER140UN-S	●			14	9.525	3.44	1.0	1.2	0.26	1.11	
	MMT16ER120UN-S	●			12	9.525	3.44	1.1	1.4	0.30	1.30	
Whitworth for BSW, BSP	**MMT16ER190W-S**	●			19	9.525	3.44	0.8	1.0	0.18	0.86	Full form 55°
	MMT16ER140W-S	●			14	9.525	3.44	1.0	1.2	0.25	1.16	
	MMT16ER110W-S	●			11	9.525	3.44	1.1	1.5	0.32	1.48	
BSPT	**MMT16ER190BSPT-S**	●			19	9.525	3.44	0.8	0.9	0.18	0.86	Full form 55°
	MMT16ER140BSPT-S	●			14	9.525	3.44	1.0	1.2	0.25	1.16	
	MMT16ER110BSPT-S	●			11	9.525	3.44	1.1	1.5	0.32	1.48	

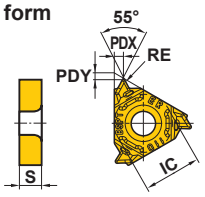












IDENTIFICATION

MMT | **16** | **E** | **R** | **100** | **ISO** – **S**

S	M-class inserts with 3-D chip breakers

Designation

Diameter of Inscribed Circle (mm)

11	6.35
16	9.525

Application

E	External
I	Internal

Hand of Tool

R	Right

Pitch

100	1.0mm	A	0.5—1.5mm or 48—16 thread/inch
125	1.25mm		
150	1.5mm	G	1.75—3.0mm or 14—8 thread/inch
175	1.75mm		
200	2.0mm		
250	2.5mm		
300	3.0mm		

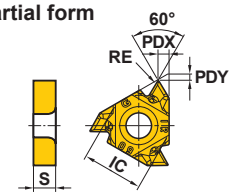
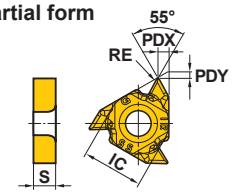
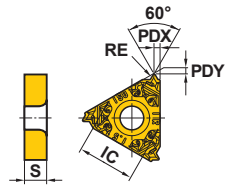
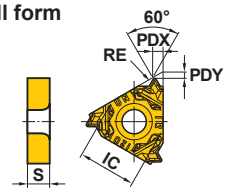
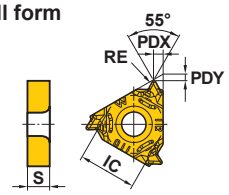
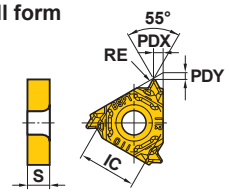
Threading Type

60	Partial Profile 60°
55	Partial Profile 55°
ISO	ISO Metric
W	Whitworth for BSW, BSP
BSPT	BSPT
UN	American UN

● : Inventory maintained in Japan. (5 inserts in one case)

CUTTING DEPTH GUIDE ➤ G039

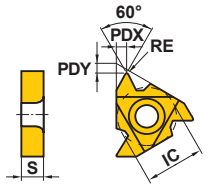
INTERNAL THREADING INSERTS

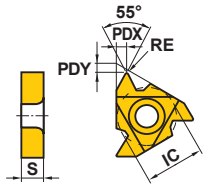
Type	Order Number	Coated VP15TF	Coated VP20RT	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
Partial Profile 60°	**MMT11IRA60-S**	●		0.5—1.5	48—16	6.35	3.04	0.8	0.9	0.03	—	Partial form 
	MMT**16IRA60-S**	●		0.5—1.5	48—16	9.525	3.44	0.8	0.9	0.03	—	
	MMT**16IRG60-S**	●		1.75—3.0	14—8	9.525	3.44	1.2	1.7	0.11	—	
Partial Profile 55°	**MMT11IRA55-S**	●			48—16	6.35	3.04	0.8	0.9	0.07	—	Partial form 
	MMT**16IRA55-S**	●			48—16	9.525	3.44	0.8	0.9	0.07	—	
	MMT**16IRG55-S**	●			14—8	9.525	3.44	1.2	1.7	0.21	—	
ISO Metric	**MMT11IR100ISO-S**	●		1.0		6.35	3.04	0.6	0.7	0.06	0.58	Full form 
	MMT**11IR125ISO-S**	●		1.25		6.35	3.04	0.8	0.9	0.08	0.72	
	MMT**11IR150ISO-S**	●		1.5		6.35	3.04	0.8	1.0	0.10	0.87	
	MMT**16IR100ISO-S**	●	●	1.0		9.525	3.44	0.6	0.7	0.06	0.58	
	MMT**16IR125ISO-S**	●	●	1.25		9.525	3.44	0.8	0.9	0.08	0.72	
	MMT**16IR150ISO-S**	●	●	1.5		9.525	3.44	0.8	1.0	0.10	0.87	
	MMT**16IR175ISO-S**	●	●	1.75		9.525	3.44	0.9	1.2	0.11	1.01	
	MMT**16IR200ISO-S**	●	●	2.0		9.525	3.44	1.0	1.3	0.13	1.15	
	MMT**16IR250ISO-S**	●	●	2.5		9.525	3.44	1.1	1.5	0.17	1.44	
	MMT**16IR300ISO-S**	●	●	3.0		9.525	3.44	1.1	1.5	0.20	1.73	
American UN	**MMT16IR160UN-S**	●			16	9.525	3.44	0.9	1.1	0.11	0.92	Full form 
	MMT**16IR140UN-S**	●			14	9.525	3.44	0.9	1.2	0.12	1.05	
	MMT**16IR120UN-S**	●			12	9.525	3.44	1.1	1.4	0.14	1.22	
Whitworth for BSW, BSP	**MMT16IR190W-S**	●			19	9.525	3.44	0.8	1.0	0.18	0.86	Full form 
	MMT**16IR140W-S**	●			14	9.525	3.44	1.0	1.2	0.25	1.16	
	MMT**16IR110W-S**	●			11	9.525	3.44	1.1	1.5	0.32	1.48	
BSPT	**MMT16IR190BSPT-S**	●			19	9.525	3.44	0.8	0.9	0.18	0.86	Full form 
	MMT**16IR140BSPT-S**	●			14	9.525	3.44	1.0	1.2	0.25	1.16	
	MMT**16IR110BSPT-S**	●			11	9.525	3.44	1.1	1.5	0.32	1.48	

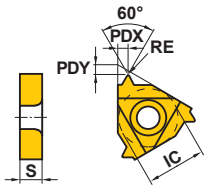
MMT G-CLASS GROUND INSERTS

EXTERNAL THREADING INSERTS

Type	Thread Tolerance	Order Number	Coated VP10MF	Coated VP15TF	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
Partial Profile 60°	—	MMT16ERA60	●	●	0.5—1.5	48—16	9.525	3.44	0.8	0.9	0.05	—	Partial form
		MMT16ERG60	●	●	1.75—3.0	14—8	9.525	3.44	1.2	1.7	0.27	—	
		MMT16ERAG60	●		0.5—3.0	48—8	9.525	3.44	1.2	1.7	0.08	—	
		MMT22ERN60	●		3.5—5.0	7—5	12.7	4.64	1.7	2.5	0.53	—	
Partial Profile 55°	—	MMT16ERA55	●	●		48—16	9.525	3.44	0.8	0.9	0.05	—	Partial form
		MMT16ERG55	●	●		14—8	9.525	3.44	1.2	1.7	0.21	—	
		MMT16ERAG55	●			48—8	9.525	3.44	1.2	1.7	0.07	—	
		MMT22ERN55	●			7—5	12.7	4.64	1.7	2.5	0.44	—	
ISO Metric	6g	MMT16ER050ISO	●		0.5		9.525	3.44	0.6	0.4	0.06	0.31	Full form
		MMT16ER075ISO	●		0.75		9.525	3.44	0.6	0.6	0.10	0.46	
		MMT16ER100ISO	●	●	1.0		9.525	3.44	0.7	0.7	0.16	0.61	
		MMT16ER125ISO	●	●	1.25		9.525	3.44	0.8	0.9	0.19	0.77	
		MMT16ER150ISO	●	●	1.5		9.525	3.44	0.8	1.0	0.23	0.92	
		MMT16ER175ISO	●	●	1.75		9.525	3.44	0.9	1.2	0.21	1.07	
		MMT16ER200ISO	●	●	2.0		9.525	3.44	1.0	1.3	0.31	1.23	
		MMT16ER250ISO	●	●	2.5		9.525	3.44	1.1	1.5	0.32	1.53	
		MMT16ER300ISO	●	●	3.0		9.525	3.44	1.2	1.6	0.46	1.84	
		MMT22ER350ISO	●		3.5		12.7	4.64	1.6	2.3	0.45	2.15	
		MMT22ER400ISO	●		4.0		12.7	4.64	1.6	2.3	0.52	2.45	
		MMT22ER450ISO	●		4.5		12.7	4.64	1.7	2.4	0.58	2.76	
		MMT22ER500ISO	●		5.0		12.7	4.64	1.7	2.5	0.63	3.07	







IDENTIFICATION

MMT **16** **E** **R** **050** **ISO**

Designation

Diameter of Inscribed Circle (mm)	
11	6.35
16	9.525
22	12.7

Application	
E	External
I	Internal

Hand of Tool	
R	Right

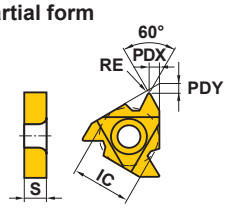
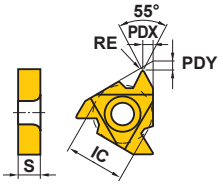
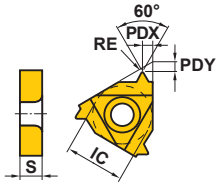
Pitch			
050	0.5mm	A	0.5—1.5mm or 48—16 thread/inch
075	0.75mm		
100	1.0mm		
125	1.25mm	G	1.75—3.0mm or 14—8 thread/inch
150	1.5mm		
175	1.75mm		
200	2.0mm	AG	0.5—3.0mm or 48—8 thread/inch
250	2.5mm		
300	3.0mm		
350	3.5mm	N	3.5—5.0mm or 7—5 thread/inch
400	4.0mm		
450	4.5mm		
500	5.0mm		

Threading Type	
60	Partial Profile 60°
55	Partial Profile 55°
ISO	ISO Metric
W	Whitworth for BSW, BSP
BSPT	BSPT
UN	American UN
RD	Round DIN 405
TR	ISO Trapezoidal 30°
ACME	American ACME
UNJ	UNJ
APBU	API Buttress Casing
APRD	API Round Casing&Tubing
NPT	NPT
NPTF	NPTF

● : Inventory maintained in Japan. (5 inserts in one case)

CUTTING DEPTH GUIDE ➤ G039

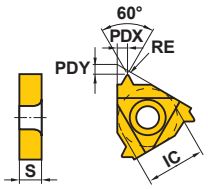
INTERNAL THREADING INSERTS

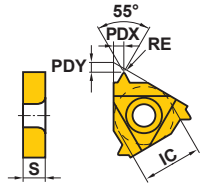
Type	Thread Tolerance	Order Number	Coated VP10MF	Coated VP15TF	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
Partial Profile 60°	—	**MMT11IRA60**	●	●	0.5—1.5	48—16	6.35	3.04	0.8	0.9	0.05	—	Partial form 
		MMT**16IRA60**	●	●	0.5—1.5	48—16	9.525	3.44	0.8	0.9	0.05	—	
		MMT**16IRG60**	●	●	1.75—3.0	14—8	9.525	3.44	1.2	1.7	0.16	—	
		MMT**16IRAG60**	●		0.5—3.0	48—8	9.525	3.44	1.2	1.7	0.05	—	
		MMT**22IRN60**	●		3.5—5.0	7—5	12.7	4.64	1.7	2.5	0.30	—	
Partial Profile 55°	—	**MMT11IRA55**	●	●		48—16	6.35	3.04	0.8	0.9	0.05	—	Partial form 
		MMT**16IRA55**	●	●		48—16	9.525	3.44	0.8	0.9	0.05	—	
		MMT**16IRG55**	●	●		14—8	9.525	3.44	1.2	1.7	0.21	—	
		MMT**16IRAG55**	●			48—8	9.525	3.44	1.2	1.7	0.07	—	
		MMT**22IRN55**	●			7—5	12.7	4.64	1.7	2.5	0.44	—	
ISO Metric	6H	**MMT11IR050ISO**	●		0.5		6.35	3.04	0.6	0.4	0.03	0.29	Full form 
		MMT**11IR075ISO**	●		0.75		6.35	3.04	0.6	0.6	0.04	0.43	
		MMT**11IR100ISO**	●	●	1.0		6.35	3.04	0.6	0.7	0.10	0.58	
		MMT**11IR125ISO**	●	●	1.25		6.35	3.04	0.8	0.9	0.12	0.72	
		MMT**11IR150ISO**	●	●	1.5		6.35	3.04	0.8	1.0	0.14	0.87	
		MMT**11IR175ISO**	●		1.75		6.35	3.04	0.9	1.1	0.10	1.01	
		MMT**11IR200ISO**	●		2.0		6.35	3.04	0.9	1.1	0.18	1.15	
		MMT**16IR050ISO**	●		0.5		9.525	3.44	0.6	0.4	0.03	0.29	
		MMT**16IR075ISO**	●		0.75		9.525	3.44	0.6	0.6	0.04	0.43	
		MMT**16IR100ISO**	●	●	1.0		9.525	3.44	0.6	0.7	0.10	0.58	
		MMT**16IR125ISO**	●	●	1.25		9.525	3.44	0.8	0.9	0.12	0.72	
		MMT**16IR150ISO**	●	●	1.5		9.525	3.44	0.8	1.0	0.14	0.87	
		MMT**16IR175ISO**	●	●	1.75		9.525	3.44	0.9	1.2	0.10	1.01	
		MMT**16IR200ISO**	●	●	2.0		9.525	3.44	1.0	1.3	0.18	1.15	
		MMT**16IR250ISO**	●	●	2.5		9.525	3.44	1.1	1.5	0.15	1.44	
		MMT**16IR300ISO**	●	●	3.0		9.525	3.44	1.1	1.5	0.26	1.73	
		MMT**22IR350ISO**	●		3.5		12.7	4.64	1.6	2.3	0.22	2.02	
		MMT**22IR400ISO**	●		4.0		12.7	4.64	1.6	2.3	0.25	2.31	
		MMT**22IR450ISO**	●		4.5		12.7	4.64	1.6	2.4	0.28	2.60	
		MMT**22IR500ISO**	●		5.0		12.7	4.64	1.6	2.3	0.32	2.89	

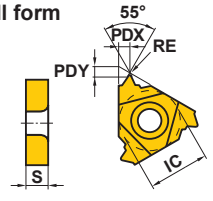
MMT G-CLASS GROUND INSERTS

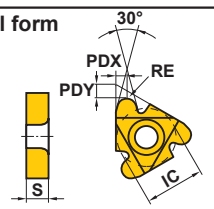
EXTERNAL THREADING INSERTS

Type	Thread Tolerance	Order Number	Coated VP10MF	Coated VP15TF	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
American UN	2A	MMT16ER320UN	●			32	9.525	3.44	0.6	0.6	0.09	0.49	Full form
		MMT16ER280UN	●			28	9.525	3.44	0.6	0.7	0.10	0.56	
		MMT16ER240UN	●			24	9.525	3.44	0.7	0.8	0.16	0.65	
		MMT16ER200UN	●			20	9.525	3.44	0.8	0.9	0.19	0.78	
		MMT16ER180UN	●			18	9.525	3.44	0.8	1.0	0.21	0.87	
		MMT16ER160UN	●	●		16	9.525	3.44	0.9	1.1	0.24	0.97	
		MMT16ER140UN	●	●		14	9.525	3.44	1.0	1.2	0.22	1.11	
		MMT16ER130UN	●			13	9.525	3.44	1.0	1.3	0.24	1.20	
		MMT16ER120UN	●	●		12	9.525	3.44	1.1	1.4	0.32	1.30	
		MMT16ER110UN	●			11	9.525	3.44	1.1	1.5	0.29	1.42	
		MMT16ER100UN	●			10	9.525	3.44	1.1	1.5	0.32	1.56	
		MMT16ER090UN	●			9	9.525	3.44	1.2	1.7	0.35	1.73	
		MMT16ER080UN	●			8	9.525	3.44	1.2	1.6	0.48	1.95	
		MMT22ER070UN	●			7	12.7	4.64	1.6	2.3	0.47	2.22	
		MMT22ER060UN	●			6	12.7	4.64	1.6	2.3	0.53	2.60	
		MMT22ER050UN	●			5	12.7	4.64	1.7	2.5	0.64	3.12	
Whitworth for BSW, BSP	Medium Class A	MMT16ER280W	●			28	9.525	3.44	0.6	0.7	0.09	0.58	Full form
		MMT16ER260W	●			26	9.525	3.44	0.7	0.8	0.10	0.63	
		MMT16ER200W	●			20	9.525	3.44	0.8	0.9	0.18	0.81	
		MMT16ER190W	●	●		19	9.525	3.44	0.8	1.0	0.19	0.86	
		MMT16ER180W	●			18	9.525	3.44	0.8	1.0	0.20	0.90	
		MMT16ER160W	●			16	9.525	3.44	0.9	1.1	0.23	1.02	
		MMT16ER140W	●	●		14	9.525	3.44	1.0	1.2	0.26	1.16	
		MMT16ER120W	●			12	9.525	3.44	1.1	1.4	0.30	1.36	
		MMT16ER110W	●	●		11	9.525	3.44	1.1	1.5	0.33	1.48	
		MMT16ER100W	●			10	9.525	3.44	1.1	1.5	0.37	1.63	
		MMT16ER090W	●			9	9.525	3.44	1.2	1.7	0.34	1.81	
		MMT16ER080W	●			8	9.525	3.44	1.2	1.5	0.39	2.03	
		MMT22ER070W	●			7	12.7	4.64	1.6	2.3	0.46	2.32	
		MMT22ER060W	●			6	12.7	4.64	1.6	2.3	0.53	2.71	
		MMT22ER050W	●			5	12.7	4.64	1.7	2.4	0.66	3.25	
BSPT	Standard BSPT	MMT16ER280BSPT	●			28	9.525	3.44	0.6	0.6	0.09	0.58	Full form
		MMT16ER190BSPT	●	●		19	9.525	3.44	0.8	0.9	0.14	0.86	
		MMT16ER140BSPT	●	●		14	9.525	3.44	1.0	1.2	0.26	1.16	
		MMT16ER110BSPT	●	●		11	9.525	3.44	1.1	1.5	0.33	1.48	
Round DIN 405	7h	MMT16ER100RD	●			10	9.525	3.44	1.1	1.2	0.60	1.27	Full form
		MMT16ER080RD	●			8	9.525	3.44	1.4	1.3	0.75	1.59	
		MMT16ER060RD	●			6	9.525	3.44	1.5	1.7	1.00	2.12	
		MMT22ER040RD	●			4	9.525	3.44	2.2	2.3	1.51	3.18	







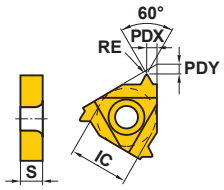


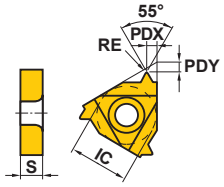
● : Inventory maintained in Japan. (5 inserts in one case)

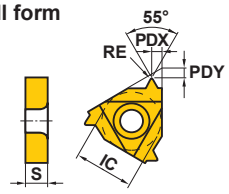
CUTTING DEPTH GUIDE ➤ G039

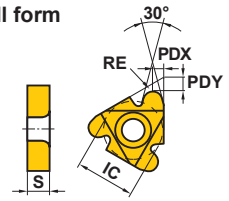
INTERNAL THREADING INSERTS

Type	Thread Tolerance	Order Number	Coated VP10MF	Coated VP15TF	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
American UN	2B	**MMT11IR320UN**	●			32	6.35	3.04	0.6	0.6	0.04	0.46	Full form
		MMT**11IR280UN**	●			28	6.35	3.04	0.6	0.7	0.05	0.52	
		MMT**11IR240UN**	●			24	6.35	3.04	0.7	0.8	0.09	0.61	
		MMT**11IR200UN**	●			20	6.35	3.04	0.8	0.9	0.11	0.73	
		MMT**11IR180UN**	●			18	6.35	3.04	0.8	1.0	0.12	0.81	
		MMT**11IR160UN**	●			16	6.35	3.04	0.9	1.1	0.14	0.92	
		MMT**11IR140UN**	●			14	6.35	3.04	0.9	1.1	0.11	1.05	
		MMT**16IR320UN**	●			32	9.525	3.44	0.6	0.6	0.04	0.46	
		MMT**16IR280UN**	●			28	9.525	3.44	0.6	0.7	0.05	0.52	
		MMT**16IR240UN**	●			24	9.525	3.44	0.7	0.8	0.09	0.61	
		MMT**16IR200UN**	●			20	9.525	3.44	0.8	0.9	0.11	0.73	
		MMT**16IR180UN**	●			18	9.525	3.44	0.8	1.0	0.12	0.81	
		MMT**16IR160UN**	●	●		16	9.525	3.44	0.9	1.1	0.14	0.92	
		MMT**16IR140UN**	●	●		14	9.525	3.44	0.9	1.2	0.11	1.05	
		MMT**16IR130UN**	●			13	9.525	3.44	1.0	1.3	0.10	1.13	
		MMT**16IR120UN**	●	●		12	9.525	3.44	1.1	1.4	0.18	1.22	
		MMT**16IR110UN**	●			11	9.525	3.44	1.1	1.5	0.13	1.33	
		MMT**16IR100UN**	●			10	9.525	3.44	1.1	1.5	0.15	1.47	
		MMT**16IR090UN**	●			9	9.525	3.44	1.2	1.7	0.17	1.63	
		MMT**16IR080UN**	●			8	9.525	3.44	1.1	1.5	0.27	1.83	
		MMT**22IR070UN**	●			7	12.7	4.64	1.6	2.3	0.23	2.09	
		MMT**22IR060UN**	●			6	12.7	4.64	1.6	2.3	0.26	2.44	
		MMT**22IR050UN**	●			5	12.7	4.64	1.6	2.3	0.32	2.93	
Whitworth for BSW, BSP	Medium Class A	**MMT11IR190W**	●			19	6.35	3.04	0.8	1.0	0.19	0.86	Full form
		MMT**11IR140W**	●			14	6.35	3.04	0.9	1.1	0.26	1.16	
		MMT**16IR280W**	●			28	9.525	3.44	0.6	0.7	0.09	0.58	
		MMT**16IR260W**	●			26	9.525	3.44	0.7	0.8	0.10	0.63	
		MMT**16IR200W**	●			20	9.525	3.44	0.8	0.9	0.18	0.81	
		MMT**16IR190W**	●	●		19	9.525	3.44	0.8	1.0	0.19	0.86	
		MMT**16IR180W**	●			18	9.525	3.44	0.8	1.0	0.20	0.90	
		MMT**16IR160W**	●			16	9.525	3.44	0.9	1.1	0.23	1.02	
		MMT**16IR140W**	●	●		14	9.525	3.44	1.0	1.2	0.26	1.16	
		MMT**16IR120W**	●			12	9.525	3.44	1.1	1.4	0.30	1.36	
		MMT**16IR110W**	●	●		11	9.525	3.44	1.1	1.5	0.33	1.48	
		MMT**16IR100W**	●			10	9.525	3.44	1.1	1.5	0.37	1.63	
		MMT**16IR090W**	●			9	9.525	3.44	1.2	1.7	0.34	1.81	
		MMT**16IR080W**	●			8	9.525	3.44	1.2	1.5	0.39	2.03	
		MMT**22IR070W**	●			7	12.7	4.64	1.6	2.3	0.46	2.32	
		MMT**22IR060W**	●			6	12.7	4.64	1.6	2.3	0.53	2.71	
		MMT**22IR050W**	●			5	12.7	4.64	1.7	2.4	0.66	3.25	
BSPT	Standard BSPT	**MMT11IR190BSPT**	●			19	6.35	3.04	0.8	0.9	0.14	0.86	Full form
		MMT**11IR140BSPT**	●			14	6.35	3.04	0.9	1.0	0.26	1.16	
		MMT**16IR190BSPT**	●	●		19	9.525	3.44	0.8	0.9	0.14	0.86	
		MMT**16IR140BSPT**	●	●		14	9.525	3.44	1.0	1.2	0.26	1.16	
		MMT**16IR110BSPT**	●	●		11	9.525	3.44	1.1	1.5	0.33	1.48	
Round DIN 405	7H	**MMT16IR100RD**	●			10	9.525	3.44	1.1	1.2	0.55	1.27	Full form
		MMT**16IR080RD**	●			8	9.525	3.44	1.4	1.4	0.70	1.59	
		MMT**16IR060RD**	●			6	9.525	3.44	1.4	1.5	0.93	2.12	
		MMT**22IR040RD**	●			4	12.7	4.64	2.2	2.3	1.40	3.18	





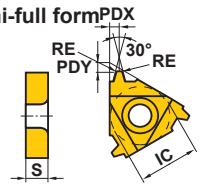


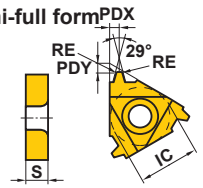


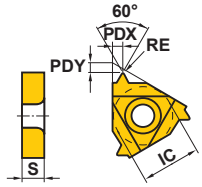
MMT G-CLASS GROUND INSERTS

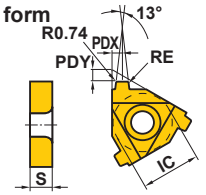
EXTERNAL THREADING INSERTS

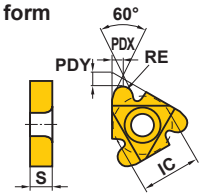
Type	Thread Tolerance	Order Number	Coated VP10MF	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
ISO Trapezoidal 30°	7e	MMT16ER150TR	●	1.5		9.525	3.44	1.0	1.1	0.08	0.90	Semi-full form
		MMT16ER200TR	●	2.0		9.525	3.44	1.1	1.3	0.15	1.25	
		MMT16ER300TR	●	3.0		9.525	3.44	1.3	1.5	0.15	1.75	
		MMT22ER400TR	●	4.0		12.7	4.64	1.7	1.9	0.15	2.25	
		MMT22ER500TR	●	5.0		12.7	4.64	2.1	2.5	0.15	2.75	
American ACME	3G	MMT16ER120ACME	●		12	9.525	3.44	1.1	1.2	0.08	1.19	Semi-full form
		MMT16ER100ACME	●		10	9.525	3.44	1.3	1.4	0.08	1.52	
		MMT16ER080ACME	●		8	9.525	3.44	1.4	1.5	0.10	1.84	
		MMT22ER060ACME	●		6	12.7	4.64	1.8	2.1	0.10	2.37	
		MMT22ER050ACME	●		5	12.7	4.64	2.0	2.3	0.10	2.79	
UNJ	3A	MMT16ER320UNJ	●		32	9.525	3.44	0.6	0.7	0.13	0.46	Full form
		MMT16ER280UNJ	●		28	9.525	3.44	0.7	0.7	0.14	0.52	
		MMT16ER240UNJ	●		24	9.525	3.44	0.7	0.8	0.17	0.61	
		MMT16ER200UNJ	●		20	9.525	3.44	0.8	0.9	0.20	0.73	
		MMT16ER180UNJ	●		18	9.525	3.44	0.8	1.0	0.22	0.81	
		MMT16ER160UNJ	●		16	9.525	3.44	0.9	1.1	0.25	0.92	
		MMT16ER140UNJ	●		14	9.525	3.44	1.0	1.2	0.29	1.05	
		MMT16ER120UNJ	●		12	9.525	3.44	1.1	1.3	0.33	1.22	
		MMT16ER100UNJ	●		10	9.525	3.44	1.2	1.5	0.40	1.47	
		MMT16ER080UNJ	●		8	9.525	3.44	1.2	1.6	0.51	1.83	
API Buttress Casing	Standard API	MMT22ER050APBU	●		5	12.7	4.64	3.1	1.9	0.18	1.55	Full form
API Round Casing&Tubing	Standard API RD	MMT16ER100APRD	●		10	9.525	3.44	1.2	1.4	0.34	1.41	Full form
		MMT16ER080APRD	●		8	9.525	3.44	1.3	1.5	0.41	1.81	
American NPT	Standard NPT	MMT16ER270NPT	●		27	9.525	3.44	0.7	0.8	0.04	0.66	Full form
		MMT16ER180NPT	●		18	9.525	3.44	0.8	1.0	0.08	1.01	
		MMT16ER140NPT	●		14	9.525	3.44	0.9	1.2	0.09	1.33	
		MMT16ER115NPT	●		11.5	9.525	3.44	1.1	1.5	0.11	1.64	
		MMT16ER080NPT	●		8	9.525	3.44	1.3	1.8	0.14	2.42	
American NPTF	Class 2	MMT16ER270NPTF	●		27	9.525	3.44	0.7	0.8	0.04	0.64	Full form
		MMT16ER180NPTF	●		18	9.525	3.44	0.8	1.0	0.04	1.00	
		MMT16ER140NPTF	●		14	9.525	3.44	0.9	1.2	0.04	1.35	
		MMT16ER115NPTF	●		11.5	9.525	3.44	1.1	1.5	0.04	1.63	
		MMT16ER080NPTF	●		8	9.525	3.44	1.3	1.8	0.04	2.38	

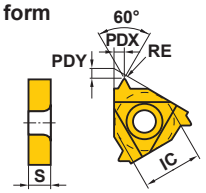


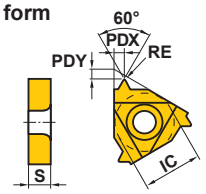












● : Inventory maintained in Japan. (5 inserts in one case)

CUTTING DEPTH GUIDE ➤ G040

INTERNAL THREADING INSERTS

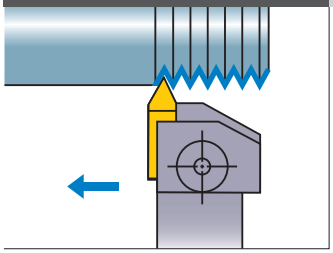
Type	Thread Tolerance	Order Number	Coated VP10MF	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
ISO Trapezoidal 30°	7H	**MMT16IR150TR**	●	1.5		9.525	3.44	1.0	1.1	0.08	0.90	Semi-full form
		MMT16IR200TR	●	2.0		9.525	3.44	1.1	1.3	0.15	1.25	
		MMT16IR300TR	●	3.0		9.525	3.44	1.3	1.5	0.15	1.75	
		MMT22IR400TR	●	4.0		12.7	4.64	1.7	1.9	0.15	2.25	
		MMT22IR500TR	●	5.0		12.7	4.64	2.1	2.5	0.15	2.75	
American ACME	3G	**MMT16IR120ACME**	●		12	9.525	3.44	1.2	1.3	0.05	1.19	Semi-full form
		MMT16IR100ACME	●		10	9.525	3.44	1.2	1.3	0.08	1.52	
		MMT16IR080ACME	●		8	9.525	3.44	1.4	1.5	0.10	1.84	
		MMT22IR060ACME	●		6	12.7	4.64	1.8	2.1	0.10	2.37	
		MMT22IR050ACME	●		5	12.7	4.64	2.0	2.3	0.10	2.79	
UNJ		When machining an internal UNJ thread, cut an internal hole with the appropriate diameter. Then machine with 60° American UN. In this case, a full form type insert cannot be used.										
API Buttress Casing	Standard API	**MMT22IR050APBU**	●		5	12.7	4.64	2.8	1.9	0.18	1.55	Full form
API Round Casing&Tubing	Standard API RD	**MMT16IR100APRD**	●		10	9.525	3.44	1.2	1.4	0.34	1.41	Full form
		MMT16IR080APRD	●		8	9.525	3.44	1.3	1.5	0.41	1.81	
American NPT	Standard NPT	**MMT16IR270NPT**	●		27	9.525	3.44	0.7	0.8	0.04	0.66	Full form
		MMT16IR180NPT	●		18	9.525	3.44	0.8	1.0	0.08	1.01	
		MMT16IR140NPT	●		14	9.525	3.44	0.9	1.2	0.09	1.33	
		MMT16IR115NPT	●		11.5	9.525	3.44	1.1	1.5	0.11	1.64	
		MMT16IR080NPT	●		8	9.525	3.44	1.3	1.8	0.14	2.42	
American NPTF	Class 2	**MMT16IR140NPTF**	●		14	9.525	3.44	0.9	1.2	0.04	1.35	Full form
		MMT16IR115NPTF	●		11.5	9.525	3.44	1.1	1.5	0.04	1.63	
		MMT16IR080NPTF	●		8	9.525	3.44	1.3	1.8	0.04	2.38	

MT HOLDER

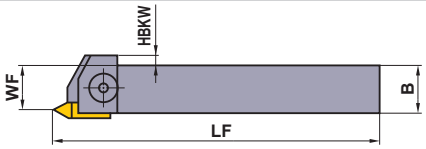
- Clamp-on type.
- Positive insert suffers from negligible chattering and thus produces good finished surfaces.
- Thread pitch ≤4.5mm.

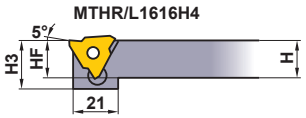
MTH

External threading



(Note) Cutting in the opposite direction is not possible.





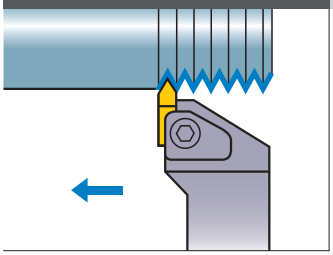
Right hand tool holder shown.

Order Number	Stock		Insert Number	Dimensions (mm)							Clamp Bridge	Clamp Screw *	Spring	Wrench
	R	L		H	B	LF	HF	H3	WF	HBKW				
MTHR/L1616H4	●	●	MTTR/L43□□□□	16	16	100	16	19	13.8	3	MTK1R/L	HBH06020	MES3	HKY40R
MTHR/L**2020K4**	●	●		20	20	125	20	—	17.8	—	MTK1R/L	HBH06020	MES3	HKY40R
MTHR/L**2525M4**	●	●		25	25	150	25	—	22.8	—	MTK1R/L	HBH06020	MES3	HKY40R

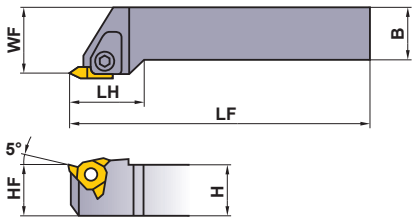
∗ Clamp Torque (N • m) : HBH06020=7.0

MT1

External threading



(Note) Cutting in the opposite direction is not possible.



Right hand tool holder shown.

Order Number	Stock		Insert Number	Dimensions (mm)						Clamp Bridge	Clamp Screw *	Spring	Wrench
	R	L		H	B	LF	LH	HF	WF				
MT1R/L2020K4	●	●	MTTR/L43□□□□	20	20	125	30	20	25	MTK1R/L	HBH06020	MES3	HKY40R
MT1R/L**2525M4**	●	●		25	25	150	30	25	32	MTK1R/L	HBH06020	MES3	HKY40R
MT1R/L**3232P4**	●	●		32	32	170	30	32	40	MTK1R/L	HBH06020	MES3	HKY40R

∗ Clamp Torque (N • m) : HBH06020=7.0

RECOMMENDED CUTTING CONDITIONS

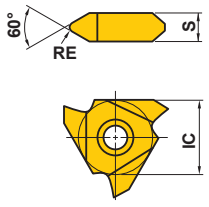
Work Material		Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	**UP20M**	140 (100—180)
			NX2525	200 (150—250)
			UTi20T	120 (100—150)
	Carbon Steel Alloy Steel	180—280HB	**UP20M**	120 (100—150)
			NX2525	170 (150—200)
			UTi20T	100 (70—120)

Work Material		Hardness	Grade	Cutting Speed (m/min)
M	Stainless Steel	≤200HB	**UP20M**	120 (80—150)
			UTi20T	100 (70—130)
K	Gray Cast Iron	Tensile Strength ≤350MPa	**UP20M**	80 (60—100)
			UTi20T	80 (60—100)
			HTi10	100 (70—130)

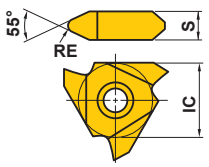
● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(10 inserts in one case)

INSERTS

Type	Order Number	Class	Coated	Cermet		Carbide		ISO Pitch mm (thread/inch)	Dimensions (mm)			Geometry
			UP20M	NX2525		UTi20T	HTi10		IC	S	RE	
Partial Profile 60°	**MTTR436000**	G		●		●		−0.8	12.7	4.76	0	**MTTR/L(60°)**
	MTT**R436001**	G	●	●		●	●	1.0−1.75	12.7	4.76	0.1	
	MTT**L436001**	G	●			●	●	1.0−1.75	12.7	4.76	0.1	
	MTT**R436002**	G	●	●		●	●	2.0−2.5	12.7	4.76	0.2	
	MTT**L436002**	G		●		●		2.0−2.5	12.7	4.76	0.2	
	MTT**R436003**	G	□	●		●	●	3.0−3.5	12.7	4.76	0.3	
	MTT**L436003**	G		●		●		3.0−3.5	12.7	4.76	0.3	
	MTT**R436004**	G		●		●		4.0−4.5	12.7	4.76	0.4	
Partial Profile 55°	**MTTR435501**	G		●		●		(28−10)	12.7	4.76	0.1	**MTTR(55°)**
	MTT**R435502**	G		●		●		(16−8)	12.7	4.76	0.2	
	MTT**R435503**	G		●		●		(11−8)	12.7	4.76	0.3	



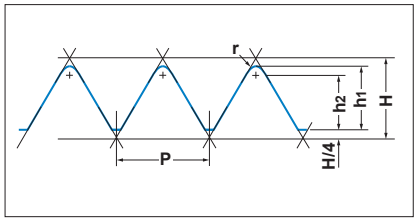
Right hand insert shown.



Right hand insert shown.

STANDARD OF DEPTH OF CUT

- The chart on the right shows the cutting depths when machining external ISO metric screw threads.
- When you use cermet grades or cut stainless steel, please increase the number of passes by 2−3 times.



METRIC SCREW THREAD

P (Pitch)		0.75	1.00	1.25	1.50	1.75	2.00	2.50	3.00	3.50	4.00	4.50
h_1		0.46	0.61	0.77	0.92	1.07	1.23	1.53	1.84	2.15	2.45	2.76
h_2		0.35	0.47	0.59	0.70	0.82	0.94	1.17	1.41	1.65	1.87	2.11
r (Corner Radius)		0.11	0.14	0.18	0.22	0.25	0.29	0.36	0.43	0.50	0.58	0.65
Number of Passes	1	0.18	0.20	0.20	0.25	0.25	0.25	0.30	0.30	0.35	0.35	0.40
	2	0.13	0.15	0.18	0.20	0.20	0.25	0.25	0.25	0.30	0.30	0.35
	3	0.10	0.10	0.12	0.15	0.20	0.20	0.20	0.25	0.25	0.25	0.30
	4	0.05	0.10	0.12	0.15	0.15	0.15	0.20	0.20	0.20	0.25	0.25
	5		0.06	0.10	0.10	0.12	0.15	0.15	0.20	0.20	0.25	0.25
	6			0.05	0.07	0.10	0.10	0.10	0.15	0.20	0.20	0.20
	7					0.05	0.08	0.10	0.15	0.15	0.20	0.20
	8						0.05	0.10	0.10	0.15	0.15	0.15
	9							0.08	0.10	0.10	0.15	0.15
	10							0.05	0.09	0.10	0.10	0.15
	11								0.05	0.10	0.10	0.10
	12									0.05	0.10	0.10
	13										0.05	0.10
	14											0.06

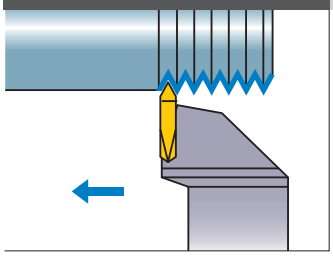
(Note) The first pass causes a high load on the cutting edge. In order to avoid damage, keep the depth of cut to 0.4−0.5mm maximum.

SMG HOLDER

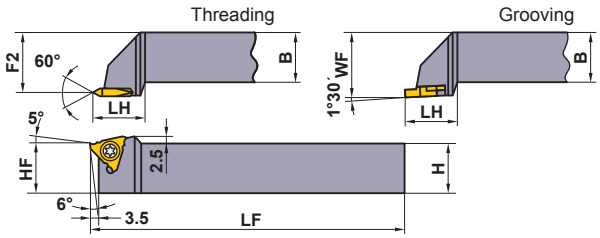
- Screw-on type.
- Positive insert suffers from negligible chattering.
- Suitable for narrow grooving and threading.
- Thread pitch ≤2.0 mm.

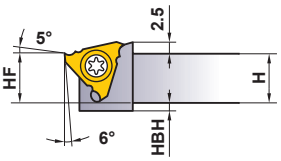
SMGH

External threading, Grooving



(Note) Cutting in the opposite direction is not possible.





SMGHR1010E16 : HBH=4
SMGHR1212F16 : HBH=2

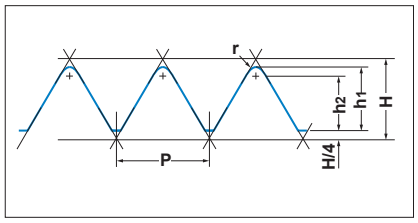
Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions (mm)							*	
	R	Threading	Grooving	H	B	LF	LH	HF	WF	F2	Clamp Screw	Wrench
SMGHR1010E16	●	SMTTR160360○○	SMGTR16X2○○○ SMGTR16X2○○○C	10	10	70	16.5	10	12	11.7	FC400890T	TKY10F
SMGHR**1212F16**	●			12	12	80	16.5	12	16	15.7	FC400890T	TKY10F
SMGHR**1616H16**	●			16	16	100	20	16	20	19.7	FC400890T	TKY10F
SMGHR**2020K16**	●			20	20	125	20	20	25	24.7	FC400890T	TKY10F
SMGHR**2525M16**	●			25	25	150	20	25	32	31.7	FC400890T	TKY10F

* Clamp Torque (N • m) : FC400890T=2.5

STANDARD OF DEPTH OF CUT

- The chart on the right shows the cutting depths when machining external ISO metric screw threads.
- When you use cermet grades or cut stainless steel, please increase the number of passes by 2—3 times.



METRIC SCREW THREAD

P (Pitch)		0.75	1.00	1.25	1.50	1.75	2.00
h1		0.46	0.61	0.77	0.92	1.07	1.23
h2		0.35	0.47	0.59	0.70	0.82	0.94
r (Corner Radius)		0.11	0.14	0.18	0.22	0.25	0.29
Number of Passes	1	0.18	0.20	0.20	0.25	0.25	0.25
	2	0.13	0.15	0.18	0.20	0.20	0.25
	3	0.10	0.10	0.12	0.15	0.20	0.20
	4	0.05	0.10	0.12	0.15	0.15	0.15
	5		0.06	0.10	0.10	0.12	0.15
	6			0.05	0.07	0.10	0.10
	7					0.05	0.08
	8						0.05
	9						

(Note) The first pass causes a high load on the cutting edge. In order to avoid damage, keep the depth of cut to 0.4—0.5mm maximum.

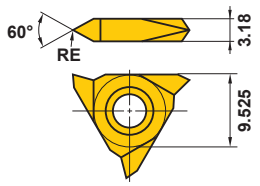
RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	**NX2525**	200 (150—250)
			UTi20T	120 (100—150)
	Carbon Steel Alloy Steel	180—280HB	**NX2525**	170 (150—200)
			UTi20T	100 (70—120)

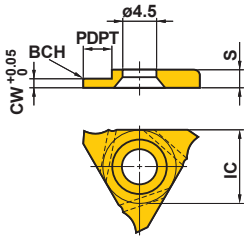
	Work Material	Hardness	Grade	Cutting Speed (m/min)
M	Stainless Steel	≤200HB	**UTi20T**	100 (70—130)
K	Gray Cast Iron	Tensile Strength ≤350MPa	**UTi20T**	80 (60—100)
			HTi10	100 (70—130)

● : Inventory maintained in Japan. (10 inserts in one case)

SMT INSERTS (Threading)

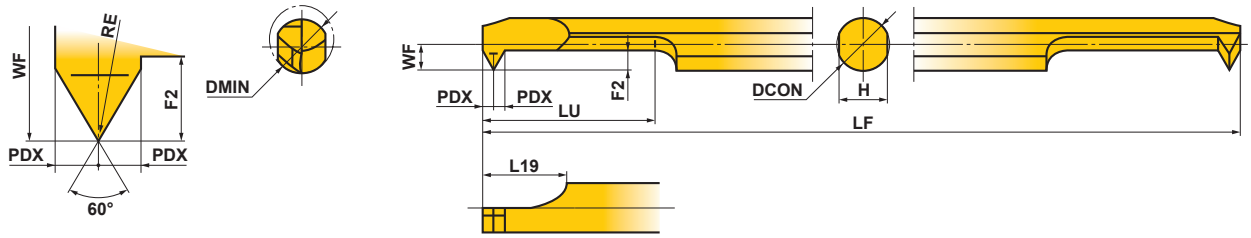
Order Number	Carbide	Thread Pitch (mm)	Dimensions (mm)	Geometry
	UTi20T		RE	
SMTTR16036001	●	1.0—1.5	0.1	
SMTTR**16036002**	●	1.75—2.0	0.2	

SMG INSERTS (Grooving)

Order Number	Cermet	Carbide		Dimensions (mm)					Geometry
	NX2525	UTi20T	HTi10	CW	PDPT	IC	S	BCH	
SMGTR16X2050			●	0.5	1.5	9.525	2	—	
SMGTR**16X2060**	●	●	●	0.6	1.5	9.525	2	—	
SMGTR**16X2050C**	●	●	●	0.5	1.5	9.525	2	0.05	
SMGTR**16X2060C**	●	●	●	0.6	1.5	9.525	2	0.05	
SMGTR**16X2070C**	●	●	●	0.7	2	9.525	2	0.05	
SMGTR**16X2075C**	●	●	●	0.75	2	9.525	2	0.05	
SMGTR**16X2080C**	●	●	●	0.8	2	9.525	2	0.1	
SMGTR**16X2090C**	●	●	●	0.9	2	9.525	2	0.1	
SMGTR**16X2095C**	●	●	●	0.95	2	9.525	2	0.1	
SMGTR**16X2100C**	●	●	●	1	2.5	9.525	2	0.1	
SMGTR**16X2110C**	●	●	●	1.1	2.5	9.525	2	0.1	
SMGTR**16X2120C**	●	●	●	1.2	2.5	9.525	2	0.1	
SMGTR**16X2130C**	●	●	●	1.3	2.5	9.525	2	0.1	

MICRO-MINI TWIN

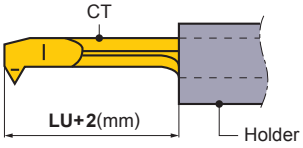
CT STANDARD



Order Number	Stock		Breaker	Threads				Dimensions (mm)								
	Micro Grain Carbide	Coated		Metric Screw		Unified Coarse Screw										
	TF15	VP15TF		Thread	Pitch (mm)	Thread	Pitch (thread/inch)	DMIN	RE	DCON	LF	LU	L19	WF	PDX	F2	H
CT0305RS-M4	●	●	Without	≥M4	0.5—1.0	≥NO.8-32UNC ≥NO.8-36UNF	36—24	3	0.03	3	50	5.2	6	1.3	0.6	1.2	2.7
CT03RS-M4	●	●	Without	≥M4	0.5—1.0		36—24	3	0.03	3	50	10.2	6	1.3	0.6	1.2	2.7
CT03RS-M4B	●	●	With	≥M4	0.5—1.0		36—24	3	0.03	3	50	10.2	6	1.3	0.6	1.2	2.7
CT0407RS-M6	●	●	Without	≥M6	0.75—1.25	≥1/4-20UNC ≥1/4-28UNF	28—20	4.5	0.05	4	60	7.6	7	1.8	0.8	1.7	3.6
CT04RS-M6	●	●	Without	≥M6	0.75—1.25		28—20	4.5	0.05	4	60	15.6	7	1.8	0.8	1.7	3.6
CT04RS-M6B	●	●	With	≥M6	0.75—1.25		28—20	4.5	0.05	4	60	15.6	7	1.8	0.8	1.7	3.6
CT0511RS-M8	●	●	Without	≥M8	0.75—1.5	≥5/16-18UNC ≥5/16-24UNF	24—18	6	0.05	5	70	11	8	2.3	1	2.2	4.5
CT05RS-M8	●	●	Without	≥M8	0.75—1.5		24—18	6	0.05	5	70	21	8	2.3	1	2.2	4.5
CT05RS-M8B	●	●	With	≥M8	0.75—1.5		24—18	6	0.05	5	70	21	8	2.3	1	2.2	4.5
CT0611RS-M10	●	●	Without	≥M10	0.75—1.75	≥3/8-16UNC ≥3/8-24UNF	24—16	7	0.05	6	75	11	8	2.8	1	2.2	5.4
CT06RS-M10	●	●	Without	≥M10	0.75—1.75		24—16	7	0.05	6	75	21	8	2.8	1	2.2	5.4
CT06RS-M10B	●	●	With	≥M10	0.75—1.75		24—16	7	0.05	6	75	21	8	2.8	1	2.2	5.4

● : Inventory maintained in Japan. (MICRO-MINI TWIN is available in 1 piece in one pack.)

RECOMMENDED CUTTING CONDITIONS

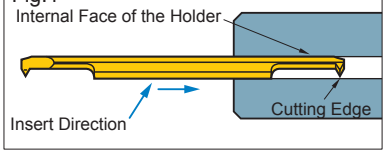
	Work Material	Cutting Speed (m/min)	Recommended Tool Overhang (mm)
P	Carbon Steel Alloy Steel	50 (30—80)	Micro-Mini Twin CT 
M	Stainless Steel	50 (30—80)	
K	Cast Iron	50 (30—80)	
N	Non-Ferrous Metal	80 (50—100)	

(Note 1) Wet cutting is recommended.
(Note 2) Pay special attention to machining of small diameters at high revolutions as the feed rate cannot keep up with the speed.

PRECAUTIONS WHEN USING THE MICRO-MINI TWIN

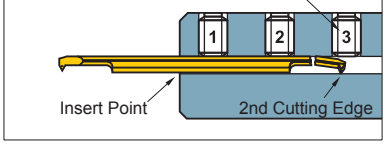
●When using a holder for general purpose / small automatic lathe:

1 To avoid chipping of the 2nd cutting edge take care when inserting the boring bar into the holder. Refer to fig.1. If the 2nd edge contacts the internal face of the holder there is a possibility that it may chip.

Fig.1


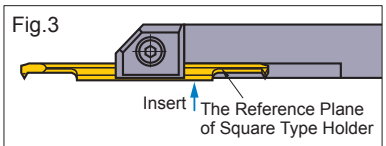
2 When using this type of holder, there is a possibility that damage to the shank and the 2nd cutting edge can occur. Make sure that the clamping screws are tightened to the set torque value. Additionally make sure that there is no clamping screw near the 2nd cutting edge as this can break the boring bar.

◎When using Mitsubishi holders
When using holders with a tool overhang of recommended quantity, ensure that the 3rd clamping screw is removed prior to machining. The set torque value for clamping screw is 2.0 N • m.

Fig.2


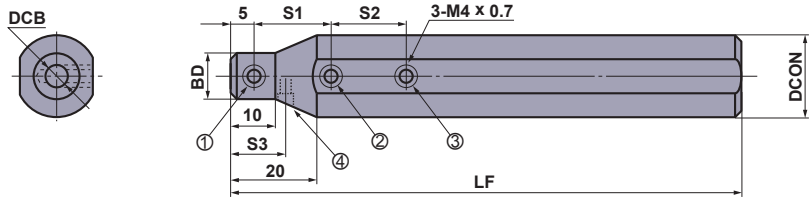
●When using a square type holder:

1 When installing the boring bar into the holder, tighten the clamp screws after ensuring the flats on the tool holder are parallel to the reference flats on the micro-mini bar. Refer to fig.3.
2 Make sure that the clamping screws are tightened to the recommended values.
3 Do not tighten the clamp screw without a bar in place, otherwise the bridge will be deformed.

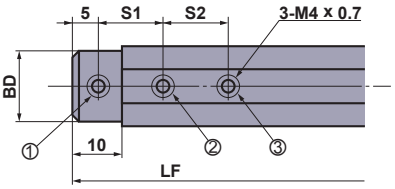
Fig.3


Tighten the clamping screw ensuring making the micro-mini twin boring bars in contact with the reference plane of square type holder.

ROUND TYPE HOLDER



RBH22□□N has a temporary set screw for different machine specifications.
(Represented by number 4)



RBH158□□N, RBH16□□N,
RBH190□□N

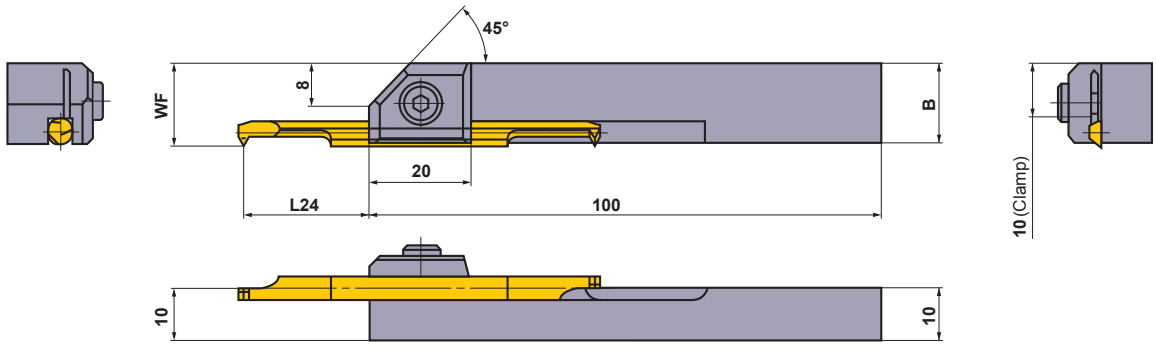
Order Number	Stock	Dimensions (mm)							Micro-Mini Twin CT	*1 Clamp Screw				Wrench	Torque (N•m)
		DCON	DCB	BD	LF	S1	S2	S3		①	②	③	④		
RBH15830N	●	15.875	3	15	100	10	10	—	0305RS-M4, 03RS-M4(B)	A	A	A	—	HKY20F	2.0
RBH**15840N**	●	15.875	4	15	100	15	15	—	0407RS-M6, 04RS-M6(B)	A	A	A	—	HKY20F	2.0
RBH**15850N**	●	15.875	5	15	100	15	15	—	0511RS-M8, 05RS-M8(B)	A	A	A	—	HKY20F	2.0
RBH**15860N**	●	15.875	6	15	100	15	15	—	0611RS-M10, 06RS-M10(B)	A	A	A	—	HKY20F	2.0
RBH1630N	●	16	3	15	100	10	10	—	0305RS-M4, 03RS-M4(B)	A	A	A	—	HKY20F	2.0
RBH**1640N**	●	16	4	15	100	15	15	—	0407RS-M6, 04RS-M6(B)	A	A	A	—	HKY20F	2.0
RBH**1650N**	●	16	5	15	100	15	15	—	0511RS-M8, 05RS-M8(B)	A	A	A	—	HKY20F	2.0
RBH**1660N**	●	16	6	15	100	15	15	—	0611RS-M10, 06RS-M10(B)	A	A	A	—	HKY20F	2.0
*2 **RBH19030N**	●	19.05	3	18	125	10	10	—	0305RS-M4, 03RS-M4(B)	B	B	B	—	HKY20F	2.0
*2 RBH**19040N**	●	19.05	4	18	125	15	15	—	0407RS-M6, 04RS-M6(B)	B	B	B	—	HKY20F	2.0
*2 RBH**19050N**	●	19.05	5	18	125	15	15	—	0511RS-M8, 05RS-M8(B)	B	B	B	—	HKY20F	2.0
*2 RBH**19060N**	●	19.05	6	18	125	15	15	—	0611RS-M10, 06RS-M10(B)	B	B	B	—	HKY20F	2.0
RBH2030N	●	20	3	12	125	10	10	—	0305RS-M4, 03RS-M4(B)	A	A	B	—	HKY20F	2.0
RBH**2040N**	●	20	4	13	125	15	15	—	0407RS-M6, 04RS-M6(B)	A	B	B	—	HKY20F	2.0
RBH**2050N**	●	20	5	14	125	15	15	—	0511RS-M8, 05RS-M8(B)	A	B	B	—	HKY20F	2.0
RBH**2060N**	●	20	6	15	125	15	15	—	0611RS-M10, 06RS-M10(B)	A	B	B	—	HKY20F	2.0
RBH2230N	●	22	3	12	125	10	10	10	0305RS-M4, 03RS-M4(B)	A	B	C	A	HKY20F	2.0
RBH**2240N**	●	22	4	13	125	15	15	12.5	0407RS-M6, 04RS-M6(B)	A	B	B	A	HKY20F	2.0
RBH**2250N**	●	22	5	14	125	15	15	12.5	0511RS-M8, 05RS-M8(B)	A	B	B	A	HKY20F	2.0
RBH**2260N**	●	22	6	15	125	15	15	15	0611RS-M10, 06RS-M10(B)	A	B	B	A	HKY20F	2.0
RBH2530N	●	25	3	12	150	10	10	—	0305RS-M4, 03RS-M4(B)	A	B	C	—	HKY20F	2.0
RBH**2540N**	●	25	4	13	150	15	15	—	0407RS-M6, 04RS-M6(B)	A	C	C	—	HKY20F	2.0
RBH**2550N**	●	25	5	14	150	15	15	—	0511RS-M8, 05RS-M8(B)	A	C	C	—	HKY20F	2.0
RBH**2560N**	●	25	6	15	150	15	15	—	0611RS-M10, 06RS-M10(B)	A	C	C	—	HKY20F	2.0
RBH25430N	●	25.4	3	12	150	10	10	—	0305RS-M4, 03RS-M4(B)	A	B	C	—	HKY20F	2.0
RBH**25440N**	●	25.4	4	13	150	15	15	—	0407RS-M6, 04RS-M6(B)	A	C	C	—	HKY20F	2.0
RBH**25450N**	●	25.4	5	14	150	15	15	—	0511RS-M8, 05RS-M8(B)	A	C	C	—	HKY20F	2.0
RBH**25460N**	●	25.4	6	15	150	15	15	—	0611RS-M10, 06RS-M10(B)	A	C	C	—	HKY20F	2.0

*1 Order number of clamp screw A=HSS04004, B=HSS04006, C=HSS04008
*2 Revised order number.

Conventional Order Number	Revised Order Number
RBH1930N	**RBH19030N**
RBH**1940N**	RBH**19040N**
RBH**1950N**	RBH**19050N**
RBH**1960N**	RBH**19060N**

● : Inventory maintained in Japan.

SQUARE TYPE HOLDER



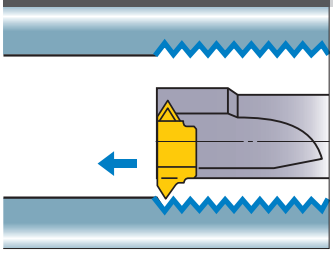
Order Number	Stock	Dimensions (mm) Micro-Mini Twin **CT**			Micro-Mini Twin **CT**	Clamp Screw	Wrench	Torque (N•m)
		B	**WF**	**L24 ***				
SBH1030R	●	13.8	13.8	13—17.5(14)	0305RS-M4, 03RS-M4(B)	HSC05012	HKY40R	9.5
SBH1040R	●	14.7	14.8	18.5—22(19.5)	0407RS-M6, 04RS-M6(B)	HSC05012	HKY40R	9.5
SBH1050R	●	15.6	15.8	24—26.5(25)	0511RS-M8, 05RS-M8(B)	HSC05012	HKY40R	9.5
SBH1060R	●	16.5	16.8	24—31.5(25)	0611RS-M10, 06RS-M10(B)	HSC05012	HKY40R	9.5

* L24 is the length of overhang for sufficient clamping, and ( ) is the recommended length for machining of carbon and alloy steel.

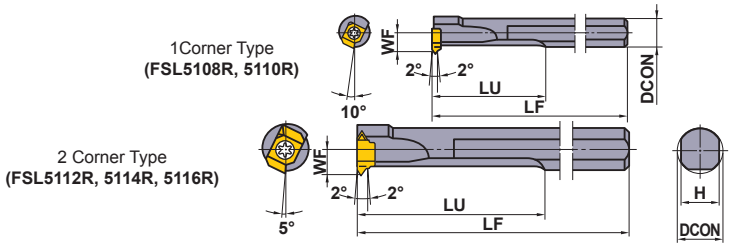
F TYPE BORING BARS

- Minimum cutting diameter 10mm.
- Screw-on type.
- Applicable to threading, grooving.
- Thread pitch 1.5—3.5mm.

FSL51 Internal threading, Grooving



(Note) Cutting in the opposite direction is not possible.

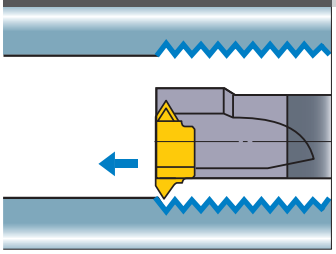


Right hand tool holder only.

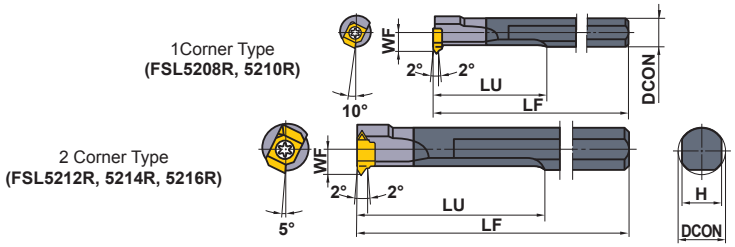
Order Number	Stock	Insert Number		Dimensions (mm)						*2	
	R	Threading	Grooving	DCON	LF	LU	WF	H	DMIN*1	Clamp Screw	Wrench
FSL5108R	●	MLT1001L	MLG10○○L	8	125	30	4.8	7	**10**	TS25	TKY08F
FSL5110R	●	MLT1001L	MLG10○○L	10	150	40	5.8	9	**12**	TS25	TKY08F
FSL5112R	●	MLT1401L	MLG14○○L	12	180	50	6.8	10.8	**14**	TS32	TKY08F
FSL5114R	●	MLT1401L	MLG14○○L	14	180	60	7.8	12.4	**16**	TS32	TKY08F
FSL5116R	●	MLT2001L	MLG20○○L	16	200	70	9.7	14	**20**	TS43	TKY15F

*1 DMIN : Min.Cutting Diameter
*2 Clamp Torque (N • m) : TS25=1.0, TS32=1.0, TS43=3.5

FSL52 (Carbide shank) Internal threading, Grooving



(Note) Cutting in the opposite direction is not possible.



Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions (mm)						*2	
	R	Threading	Grooving	DCON	LF	LU	WF	H	DMIN*1	Clamp Screw	Wrench
FSL5208R	●	MLT1001L	MLG10○○L	8	125	60	4.8	7	**10**	TS25	TKY08F
FSL5210R	●	MLT1001L	MLG10○○L	10	150	70	5.8	9	**12**	TS25	TKY08F
FSL5212R	●	MLT1401L	MLG14○○L	12	180	80	6.8	11	**14**	TS32	TKY08F
FSL5214R	●	MLT1401L	MLG14○○L	14	180	85	7.8	12	**16**	TS32	TKY08F
FSL5216R	●	MLT2001L	MLG20○○L	16	200	115	9.7	14	**20**	TS43	TKY15F

*1 DMIN : Min.Cutting Diameter
*2 Clamp Torque (N • m) : TS25=1.0, TS32=1.0, TS43=3.5

RECOMMENDED CUTTING CONDITIONS

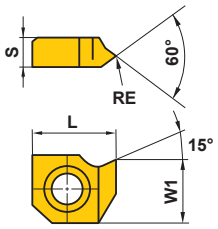
	Work Material	Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	**UP20M**	140 (100—180)
			UTi20T	120 (100—150)
	Carbon Steel Alloy Steel	180—280HB	**UP20M**	120 (100—150)
			UTi20T	100 (70—120)

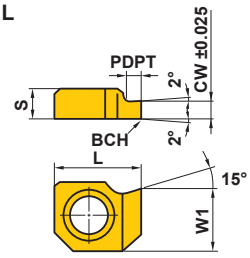
	Work Material	Hardness	Grade	Cutting Speed (m/min)
M	Stainless Steel	≤200HB	**UP20M**	120 (80—150)
			UTi20T	100 (70—130)
K	Gray Cast Iron	Tensile Strength ≤350MPa	**UP20M**	80 (60—100)
			UTi20T	80 (60—100)

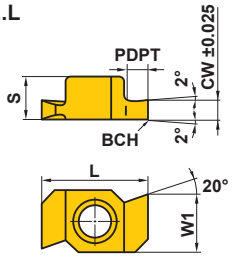
● : Inventory maintained in Japan.
(10 inserts in one case)

INSERTS

Type	Order Number	Coated UP20M	Carbide UTi20T	Pitch and CW (mm)	Dimensions (mm) L	W1	PDPT	S	BCH	RE	Geometry
Threading	**MLT1001L**	●	●	Pitch 1.5—2.0	7	5	—	2.38	—	0.1	MLT
	MLT**1401L**	●	●	Pitch 1.5—2.5	11.8	6.5	—	4.76	—	0.1	
	MLT**2001L**	●	●	Pitch 1.5—3.5	16.8	9.03	—	6.35	—	0.1	
Grooving	**MLG1012L**		●	1.2	7	5	1.0	2.38	0.1	—	MLG...L
	MLG**1015L**		●	1.5	7	5	1.0	2.38	0.1	—	
	MLG**1020L**		●	2	7	5	1.0	2.38	0.1	—	
	MLG1415L		●	1.5	11.8	6.5	2.0	4.76	0.1	—	MLG...L
	MLG**1420L**		●	2	11.8	6.5	2.0	4.76	0.1	—	
	MLG**1430L**		●	3	11.8	6.5	2.0	4.76	0.1	—	
	MLG**2020L**		●	2	16.8	9.03	3.0	6.35	0.1	—	
	MLG**2030L**		●	3	16.8	9.03	3.0	6.35	0.1	—	
	MLG**2040L**		●	4	16.8	9.03	3.0	6.35	0.1	—	



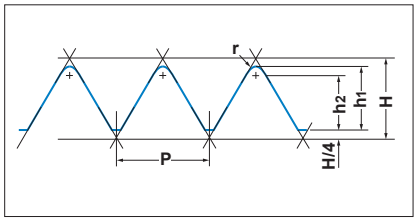




THREADING

STANDARD OF DEPTH OF CUT

- The chart on the right shows the cutting depths when machining external ISO metric screw threads.
- When you use cermet grades or cut stainless steel, please increase the number of passes by 2—3 times.



METRIC SCREW THREAD

P (Pitch)		0.75	1.00	1.25	1.50	1.75	2.00	2.50	3.00	3.50
h_1		0.43	0.58	0.72	0.87	1.01	1.15	1.44	1.73	2.02
h_2		0.38	0.51	0.63	0.76	0.88	1.01	1.21	1.51	1.77
r (Corner Radius)		0.05	0.07	0.09	0.11	0.13	0.14	0.18	0.22	0.25
Number of Passes	1	0.10	0.15	0.18	0.20	0.23	0.25	0.25	0.25	0.30
	2	0.10	0.13	0.15	0.20	0.20	0.20	0.22	0.25	0.25
	3	0.10	0.10	0.12	0.15	0.20	0.15	0.20	0.22	0.22
	4	0.08	0.10	0.12	0.15	0.15	0.15	0.20	0.20	0.20
	5	0.05	0.05	0.10	0.10	0.10	0.15	0.15	0.20	0.20
	6		0.05	0.05	0.07	0.08	0.10	0.10	0.15	0.20
	7					0.05	0.10	0.10	0.12	0.15
	8						0.05	0.10	0.10	0.15
	9							0.07	0.10	0.10
	10							0.05	0.09	0.10
	11								0.05	0.10
	12									0.05

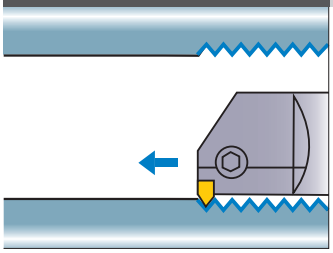
(Note) The first pass causes a high load on the cutting edge. In order to avoid damage, keep the depth of cut to 0.4—0.5mm maximum.

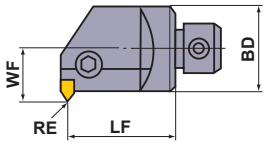
D TYPE BORING HEAD

- Minimum cutting diameter 40mm.
- Pin lock type.
- Exchangeable head type.
- Thread pitch ≤4.5mm.

DPT2

Internal threading





Right hand tool holder only.

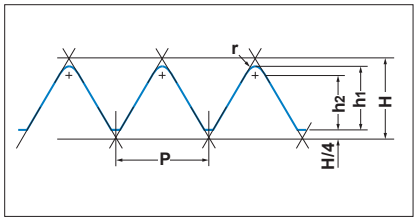
Order Number	Stock R	Insert Number	Dimensions (mm) BD	LF	WF	DMIN*2	RE	Lock Pin	Lock Screw *1	Stop Ring	Wrench
DPT2132R	●	MTTL4355◯◯ MTTL4360◯◯	32	40	20	**40**	0.1	P21S	HSP08014	E01	HKY40R
DPT**2140R**	●		40	50	25	**50**	0.1	P21S	HSP08014	E01	HKY40R

*1 Clamp Torque (N • m) : HSP08014=7.0
*2 DMIN : Min.Cutting Diameter

THREADING

STANDARD OF DEPTH OF CUT

- The chart on the right shows the cutting depths when machining external ISO metric screw threads.
- When you use cermet grades or cut stainless steel, please increase the number of passes by 2—3 times.



METRIC SCREW THREAD

P (Pitch)		0.75	1.00	1.25	1.50	1.75	2.00	2.50	3.00	3.50	4.00	4.50
h_1		0.43	0.58	0.72	0.87	1.01	1.15	1.44	1.73	2.02	2.31	2.60
h_2		0.38	0.51	0.63	0.76	0.88	1.01	1.21	1.51	1.77	2.02	2.28
r (Corner Radius)		0.05	0.07	0.09	0.11	0.13	0.14	0.18	0.22	0.25	0.29	0.32
Number of Passes	1	0.10	0.15	0.18	0.20	0.23	0.25	0.25	0.25	0.30	0.30	0.35
	2	0.10	0.13	0.15	0.20	0.20	0.20	0.22	0.25	0.25	0.25	0.30
	3	0.10	0.10	0.12	0.15	0.20	0.15	0.20	0.22	0.22	0.25	0.25
	4	0.08	0.10	0.12	0.15	0.15	0.15	0.20	0.20	0.20	0.25	0.25
	5	0.05	0.05	0.10	0.10	0.10	0.15	0.15	0.20	0.20	0.23	0.25
	6		0.05	0.05	0.07	0.08	0.10	0.10	0.15	0.20	0.20	0.20
	7					0.05	0.10	0.10	0.12	0.15	0.20	0.20
	8						0.05	0.10	0.10	0.15	0.15	0.15
	9							0.07	0.10	0.10	0.15	0.15
	10							0.05	0.09	0.10	0.10	0.15
	11								0.05	0.10	0.10	0.10
	12									0.05	0.08	0.10
	13										0.05	0.10
	14											0.05

(Note) The first pass causes a high load on the cutting edge. In order to avoid damage, keep the depth of cut to 0.4—0.5mm maximum.

RECOMMENDED CUTTING CONDITIONS

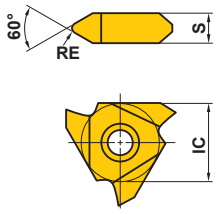
Work Material		Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	**UP20M**	140 (100—180)
			NX2525	200 (150—250)
			UTi20T	120 (100—150)
	Carbon Steel Alloy Steel	180—280HB	**UP20M**	120 (100—150)
			NX2525	170 (150—200)
			UTi20T	100 (70—120)

Work Material		Hardness	Grade	Cutting Speed (m/min)
M	Stainless Steel	≤200HB	**UP20M**	120 (80—150)
			UTi20T	100 (70—130)
K	Gray Cast Iron	Tensile Strength ≤350MPa	**UP20M**	80 (60—100)
			UTi20T	80 (60—100)
			HTi10	100 (70—130)

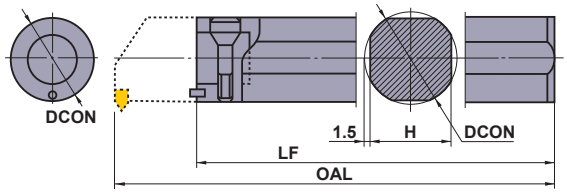
● : Inventory maintained in Japan.
(10 inserts in one case)

INSERTS

Type	Order Number	Class	Coated	Cermet		Carbide		ISO Pitch mm (thread/inch)	Dimensions (mm)			Geometry
			UP20M	NX2525		UTi20T	HTi10		IC	S	RE	
Partial Profile 60°	**MTTL436001**	G	●			●	●	1.0—1.75	12.7	4.76	0.1	**MTTL(60°)**
	MTT**L436002**	G		●		●		2.0—2.5	12.7	4.76	0.2	
	MTT**L436003**	G		●		●		3.0—3.5	12.7	4.76	0.3	

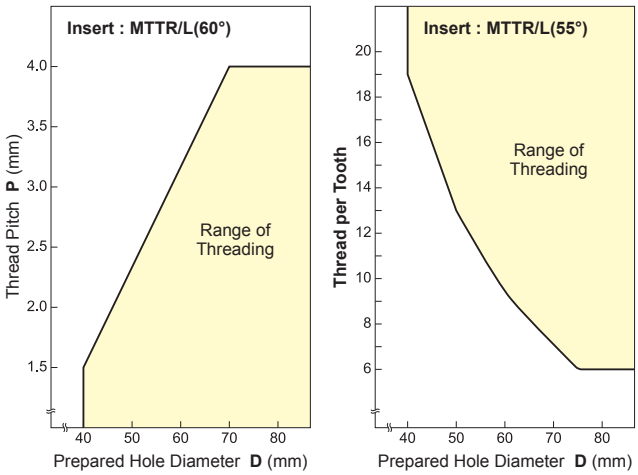


STANDARD ARBOR FOR D TYPE BORING HEAD

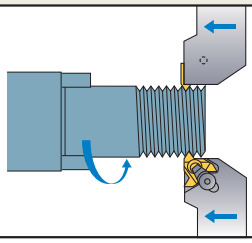
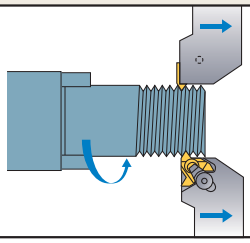
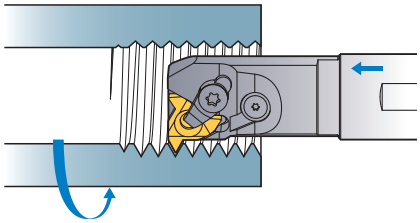
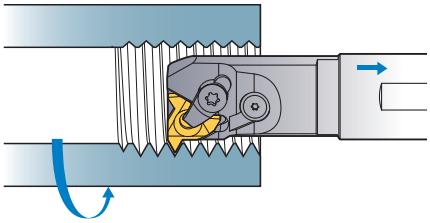


Order Number	Stock	Dimensions (mm)				Set Bolt	Wrench	Head
		DCON	LF	H	OAL			
B13232	●	32	260	29	300	SD32	HKY60R	DPT2132R
B14040	●	40	310	37	360	SD40	HKY60R	DPT2140R

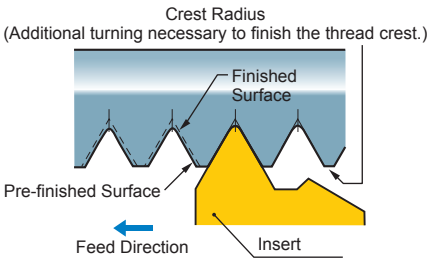
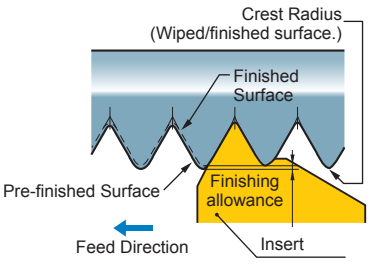
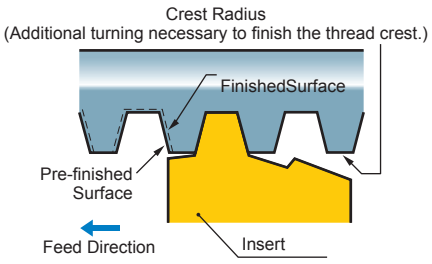
RANGE OF MACHINING



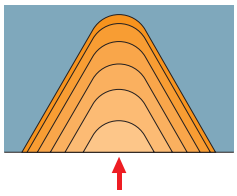
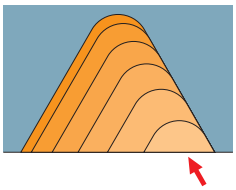
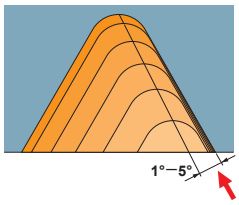
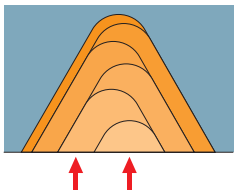
THREADING METHODS

	Right Hand Thread	Left Hand Thread
EXTERNAL	 Holder Reversed	 Holder Reversed
INTERNAL		

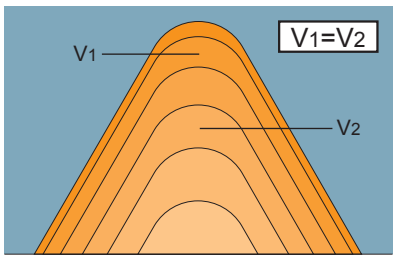
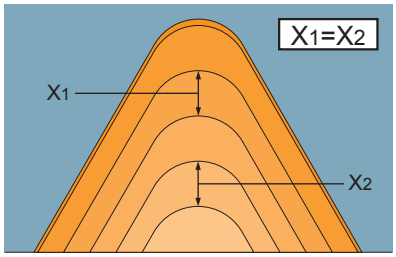
INSERT TYPES

Partial form	Full form	Semi-full form (Trapezoidal threads only)
● The same insert can be used for a range of pitches. ● Shorter tool life because the corner radius of the insert is smaller than that of the full form insert. ● Finishing with another operation is necessary.	● No deburring needed after threading. ● Requires different threading inserts.	● No deburring needed after threading. ● Requires different threading inserts. ● Finishing with another operation is necessary.
		

INFEED METHODS

Features	Radial Infeed	Flank Infeed	Modified Flank Infeed	Incremental Infeed
				
Advantages	● Easiest to use. (Standard programme for threading) ● Wide application. (Cutting conditions easy to change.) ● Uniform wear of the right and left sides of the cutting edge.	● Relatively easy to use. (Semi-standard program for threading.) ● Reduced cutting force. ● Suitable for large pitch threads or materials that peel easily. ● Good chip discharge.	● Preventing flank wear on the right side of the cutting edge. ● Reduced cutting force. ● Suitable for large pitch threads or materials that peel easily. ● Good chip discharge.	● Uniform flank wear of the right and left sides of the cutting edge. ● Reduced cutting force. ● Suitable for large pitch threads or materials that peel easily.
Disadvantages	● Difficult chip control. ● Subject to vibration in the later in stages of cutting. ● Ineffective for large pitch threading. ● Heavy load on the corner radius.	● Large flank wear on the right side of the cutting edge. ● Relatively difficult to change cutting depth. (Re-programming necessary)	● Complex machining programming. ● Difficult to change cutting depth. (Re-programming necessary)	● Complex machining programming. ● Difficult to change cutting depth. (Re-programming necessary) ● Difficult chip control.

THREADING DEPTH

	Features	
	Advantages	Disadvantages
 Fixed cut area	● Easy to use. (Standard programme for threading.) ● Superior resistance to vibration. (Constant cutting force.)	● Long chips generated during the final pass. ● Complex calculation of cutting depth when changing the number of passes.
 Fixed cutting depth	● Reduced load on corner radius during the first half of the passes. ● Easy chip control. (Optional setting of chip thickness) ● Easy to calculate cutting depth when changing the number of passes. ● Good chip control.	● Subject to vibration in the later stages of cutting. (Increased cutting force) ● In some cases, changing the NC programme is necessary.

* It is recommended to set the depth of cut of the final pass to 0.05mm−0.025mm.
Large cutting depths can cause vibration, leading to a poor surface finish.

●FORMULAE

■Formulae to calculate infeed for each pass in a reduced series.

$$\triangle ap_n = \frac{ap}{\sqrt{n_{ap}-1}} \times \sqrt{b}$$

$\triangle ap_n$: Depth of cut
n : Actual pass
ap : Total depth of cut
n_{ap} : Number of passes
b : 1st pass 0.3
2nd pass 2−1 = 1
3rd pass 3−1 = 2
•
•
nth pass n−1

(Example)
External threading (ISO Metric)
Pitch : 1.0mm
ap : 0.6mm
n_{ap} : 5 passes

1st Pass $\triangle ap_1 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{0.3} = 0.16 \rightarrow$ **0.16** ($\triangle ap_1$)
2st Pass $\triangle ap_2 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{2-1} = 0.3 \rightarrow$ **0.14** ($\triangle ap_2 - \triangle ap_1$)
3st Pass $\triangle ap_3 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{3-1} = 0.42 \rightarrow$ **0.12** ($\triangle ap_3 - \triangle ap_2$)
4st Pass $\triangle ap_4 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{4-1} = 0.52 \rightarrow$ **0.1** ($\triangle ap_4 - \triangle ap_3$)
5st Pass $\triangle ap_5 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{5-1} = 0.6 \rightarrow$ **0.08** ($\triangle ap_5 - \triangle ap_4$)

●NC PROGRAMME FOR MODIFIED FLANK INFEED

■Example) M12×1.0 5 passes modified 5°

External Threading	Internal Threading
G00 Z = 5.0 X = 14.0 G92 U−4.34 Z−13.0 F1.0 G00 W−0.07 G92 U−4.64 Z−13.0 F1.0 G00 W−0.06 G92 U−4.88 Z−13.0 F1.0 G00 W−0.05 G92 U−5.08 Z−13.0 F1.0 G00 W−0.03 G92 U−5.20 Z−13.0 F1.0 G00	G00 Z = 5.0 X = 10.0 G92 U4.34 Z−13.0 F1.0 G00 W−0.07 G92 U4.64 Z−13.0 F1.0 G00 W−0.05 G92 U4.84 Z−13.0 F1.0 G00 W−0.04 G92 U5.02 Z−13.0 F1.0 G00 W−0.03 G92 U5.14 Z−13.0 F1.0 G00

SELECTING CUTTING CONDITIONS

		Priority					
		Tool Life	Cutting Force	Surface Finish	Precision of thread	Chip Discharge	Efficiency (Reduced Passes)
Threading Methods	Radial	○		○	○		○
	Flank	(△ : Modified)	○	(△ : Modified)		○	
Cutting Depth	Fixed Cutting Depth					○	
	Fixed Cut Area	○	○	○	○		○

* Tool life and surface finish accuracy can be increased by changing the threading method from flank infeed to modified flank infeed.
* Chip control can be improved by increasing the cutting depth in the later half of passes.

CUTTING DEPTH AND THE NUMBER OF PASSES

Selection of the appropriate cutting depth and the right number of passes is vital for threading.

- For most threading, use a "threading cycle program," which has originally been installed on machines, and specify "total cutting depth" and "cutting depth in the first or final pass."
- Cutting depth and the number of passes are easy to change for the radial infeed method, thus making it easy to determine the appropriate cutting conditions.

FEATURES AND BENEFITS OF MITSUBISHI PRODUCTS

- Insert grades with high wear and plastic deformation resistance, specially produced for threading tools, ensure highly efficient cutting by enabling high-speed machining and a reduced number of passes.

Machining Cost Reduction

ADVICE ON IMPROVED THREADING

Increasing tool life

- To prevent damage to the corner radius - *Recommended method - Modified flank infeed*
- To have uniform flank wear on both sides of a cutting edge - *Recommended method - Radial infeed*
- To prevent crater wear - *Recommended method - Flank infeed*

Preventing chip problems

- Change to flank or modified infeed.
- During radial infeed cutting, use an inverted holder and change the coolant supply to a downward direction.
- When using the radial infeed method, set the minimum cutting depth at around 0.2mm to make the chips thicker.

To achieve highly efficient machining

- Increase cutting speed. (Dependant on the maximum revolution and rigidity of the machine.)
- Reduce the number of passes. (Reduce by 30-40%.)
- A reduced number of passes can improve chip discharge because of the thicker chips generated.

Preventing vibration

- Change to flank or modified infeed.
- When using radial infeed, reduce cutting depth in the later half of passes and lower the cutting speed.

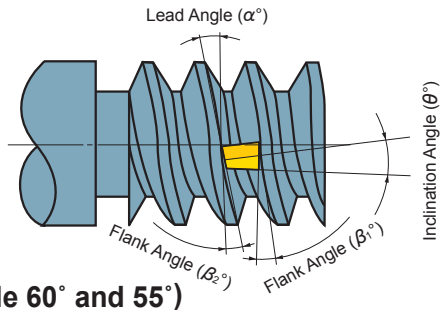
Increased surface finish accuracy

- A final wiping pass should be performed at the same depth of cut as the last regular pass.
- When using the flank infeed method, change to radial infeed only during the final pass.

SELECTING A SHIM FOR THE MMT SERIES

FLANK ANGLE AND LEAD ANGLE

Lead angle (α) depends on a combination of thread diameter and pitch. Select a shim so that the lead angle of the thread can coincide with the flank angles of the thread and insert (β_1, β_2). No need to change a shim for general threading with an MMT holder. When threading with a small diameter or large pitch, change the shim depending on the lead angle, referring to the table and graph below. When threading left hand threads, change to a shim with a negative inclination angle.



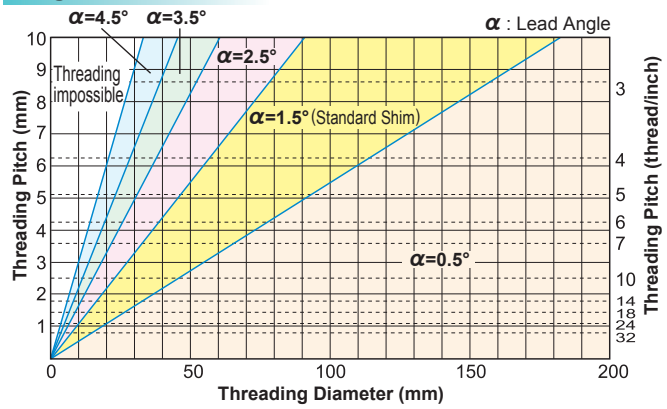
SHIM REFERENCE TABLE (THREADING DIAMETER) (Thread angle 60˚ and 55˚)

Pitch (mm) \ Lead Angle	Right Hand Thread (mm)						Left Hand Thread (mm)		
	Threading impossible	4.5°	3.5°	2.5°	1.5°	0.5°	Threading impossible	−1.5°	−0.5°
0.5	≤ϕ1.7	ϕ1.7 − ϕ2.3	ϕ2.3 − ϕ3.0	ϕ3.0 − ϕ4.6	ϕ4.6 − ϕ9.1	≥ϕ9.1	≤ϕ3.6	ϕ3.6 − ϕ9.1	≥ϕ9.1
0.75	≤ϕ2.5	ϕ2.5 − ϕ3.4	ϕ3.4 − ϕ4.6	ϕ4.6 − ϕ6.8	ϕ6.8 − ϕ13.7	≥ϕ13.7	≤ϕ5.5	ϕ5.5 − ϕ13.7	≥ϕ13.7
1	≤ϕ3.3	ϕ3.3 − ϕ4.6	ϕ4.6 − ϕ6.1	ϕ6.1 − ϕ9.1	ϕ9.1 − ϕ18.2	≥ϕ18.2	≤ϕ7.3	ϕ7.3 − ϕ18.2	≥ϕ18.2
1.25	≤ϕ4.1	ϕ4.1 − ϕ5.7	ϕ5.7 − ϕ7.6	ϕ7.6 − ϕ11.4	ϕ11.4 − ϕ22.8	≥ϕ22.8	≤ϕ9.1	ϕ9.1 − ϕ22.8	≥ϕ22.8
1.5	≤ϕ5.0	ϕ5.0 − ϕ6.8	ϕ6.8 − ϕ9.1	ϕ9.1 − ϕ13.7	ϕ13.7 − ϕ27.4	≥ϕ27.4	≤ϕ10.9	ϕ10.9 − ϕ27.4	≥ϕ27.4
1.75	≤ϕ5.8	ϕ5.8 − ϕ8.0	ϕ8.0 − ϕ10.6	ϕ10.6 − ϕ16.0	ϕ16.0 − ϕ31.9	≥ϕ31.9	≤ϕ12.8	ϕ12.8 − ϕ31.9	≥ϕ31.9
2	≤ϕ6.6	ϕ6.6 − ϕ9.1	ϕ9.1 − ϕ12.1	ϕ12.1 − ϕ18.2	ϕ18.2 − ϕ36.5	≥ϕ36.5	≤ϕ14.6	ϕ14.6 − ϕ36.5	≥ϕ36.5
2.5	≤ϕ8.3	ϕ8.3 − ϕ11.4	ϕ11.4 − ϕ15.2	ϕ15.2 − ϕ22.8	ϕ22.8 − ϕ45.6	≥ϕ45.6	≤ϕ18.2	ϕ18.2 − ϕ45.6	≥ϕ45.6
3	≤ϕ9.9	ϕ9.9 − ϕ13.7	ϕ13.7 − ϕ18.2	ϕ18.2 − ϕ27.3	ϕ27.3 − ϕ54.7	≥ϕ54.7	≤ϕ21.9	ϕ21.9 − ϕ54.7	≥ϕ54.7
3.5	≤ϕ11.6	ϕ11.6 − ϕ15.9	ϕ15.9 − ϕ21.3	ϕ21.3 − ϕ31.9	ϕ31.9 − ϕ63.8	≥ϕ63.8	≤ϕ25.5	ϕ25.5 − ϕ63.8	≥ϕ63.8
4	≤ϕ13.2	ϕ13.2 − ϕ18.2	ϕ18.2 − ϕ24.3	ϕ24.3 − ϕ36.5	ϕ36.5 − ϕ72.9	≥ϕ72.9	≤ϕ29.2	ϕ29.2 − ϕ72.9	≥ϕ72.9
4.5	≤ϕ14.9	ϕ14.9 − ϕ20.5	ϕ20.5 − ϕ27.3	ϕ27.3 − ϕ41.0	ϕ41.0 − ϕ82.1	≥ϕ82.1	≤ϕ32.8	ϕ32.8 − ϕ82.1	≥ϕ82.1
5	≤ϕ16.5	ϕ16.5 − ϕ22.8	ϕ22.8 − ϕ30.4	ϕ30.4 − ϕ45.6	ϕ45.6 − ϕ91.2	≥ϕ91.2	≤ϕ36.5	ϕ36.5 − ϕ91.2	≥ϕ91.2

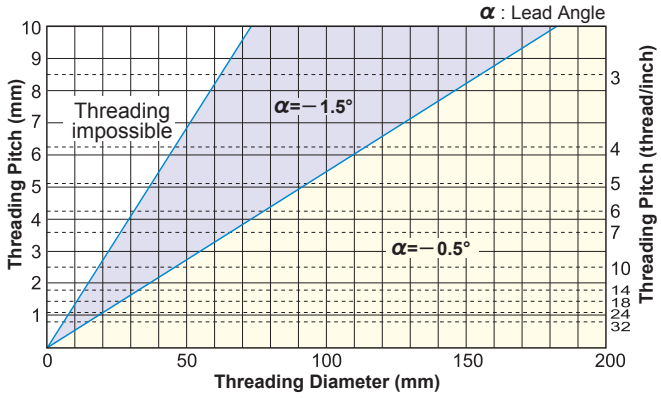
(Note) Back turning in the case of left hand threads.

SHIM REFERENCE GRAPH (Thread angle 60˚ and 55˚)

Right Hand Thread



Left Hand Thread



(Note) When a thread lead angle ≤ the tool flank angle, change the shim to prevent side interference with the insert.
(Refer to the table below for the calculation of thread lead angle and tool flank angle.)

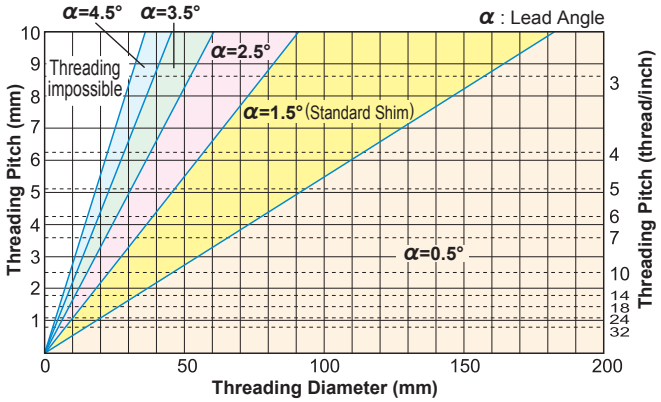
SHIM REFERENCE TABLE (THREADING DIAMETER) (Thread angle 30˚ and 29˚)

Pitch (mm) \ Lead Angle	Right Hand Thread (mm)						Left Hand Thread (mm)		
	Threading impossible	4.5°	3.5°	2.5°	1.5°	0.5°	Threading impossible	−1.5°	−0.5°
0.5	≤ϕ1.8	ϕ1.8 − ϕ2.3	ϕ2.3 − ϕ3.0	ϕ3.0 − ϕ4.6	ϕ4.6 − ϕ9.1	≥ϕ9.1	≤ϕ4.6	ϕ4.6 − ϕ9.1	≥ϕ9.1
0.75	≤ϕ2.7	ϕ2.7 − ϕ3.4	ϕ3.4 − ϕ4.6	ϕ4.6 − ϕ6.8	ϕ6.8 − ϕ13.7	≥ϕ13.7	≤ϕ6.8	ϕ6.8 − ϕ13.7	≥ϕ13.7
1	≤ϕ3.6	ϕ3.6 − ϕ4.6	ϕ4.6 − ϕ6.1	ϕ6.1 − ϕ9.1	ϕ9.1 − ϕ18.2	≥ϕ18.2	≤ϕ9.1	ϕ9.1 − ϕ18.2	≥ϕ18.2
1.25	≤ϕ4.5	ϕ4.5 − ϕ5.7	ϕ5.7 − ϕ7.6	ϕ7.6 − ϕ11.4	ϕ11.4 − ϕ22.8	≥ϕ22.8	≤ϕ11.4	ϕ11.4 − ϕ22.8	≥ϕ22.8
1.5	≤ϕ5.5	ϕ5.5 − ϕ6.8	ϕ6.8 − ϕ9.1	ϕ9.1 − ϕ13.7	ϕ13.7 − ϕ27.4	≥ϕ27.4	≤ϕ13.7	ϕ13.7 − ϕ27.4	≥ϕ27.4
1.75	≤ϕ6.4	ϕ6.4 − ϕ8.0	ϕ8.0 − ϕ10.6	ϕ10.6 − ϕ16.0	ϕ16.0 − ϕ31.9	≥ϕ31.9	≤ϕ16.0	ϕ16.0 − ϕ31.9	≥ϕ31.9
2	≤ϕ7.3	ϕ7.3 − ϕ9.1	ϕ9.1 − ϕ12.1	ϕ12.1 − ϕ18.2	ϕ18.2 − ϕ36.5	≥ϕ36.5	≤ϕ18.2	ϕ18.2 − ϕ36.5	≥ϕ36.5
2.5	≤ϕ9.1	ϕ9.1 − ϕ11.4	ϕ11.4 − ϕ15.2	ϕ15.2 − ϕ22.8	ϕ22.8 − ϕ45.6	≥ϕ45.6	≤ϕ22.8	ϕ22.8 − ϕ45.6	≥ϕ45.6
3	≤ϕ10.9	ϕ10.9 − ϕ13.7	ϕ13.7 − ϕ18.2	ϕ18.2 − ϕ27.3	ϕ27.3 − ϕ54.7	≥ϕ54.7	≤ϕ27.3	ϕ27.3 − ϕ54.7	≥ϕ54.7
3.5	≤ϕ12.7	ϕ12.7 − ϕ15.9	ϕ15.9 − ϕ21.3	ϕ21.3 − ϕ31.9	ϕ31.9 − ϕ63.8	≥ϕ63.8	≤ϕ31.9	ϕ31.9 − ϕ63.8	≥ϕ63.8
4	≤ϕ14.6	ϕ14.6 − ϕ18.2	ϕ18.2 − ϕ24.3	ϕ24.3 − ϕ36.5	ϕ36.5 − ϕ72.9	≥ϕ72.9	≤ϕ36.5	ϕ36.5 − ϕ72.9	≥ϕ72.9
4.5	≤ϕ16.4	ϕ16.4 − ϕ20.5	ϕ20.5 − ϕ27.3	ϕ27.3 − ϕ41.0	ϕ41.0 − ϕ82.1	≥ϕ82.1	≤ϕ41.0	ϕ41.0 − ϕ82.1	≥ϕ82.1
5	≤ϕ18.2	ϕ18.2 − ϕ22.8	ϕ22.8 − ϕ30.4	ϕ30.4 − ϕ45.6	ϕ45.6 − ϕ91.2	≥ϕ91.2	≤ϕ45.6	ϕ45.6 − ϕ91.2	≥ϕ91.2

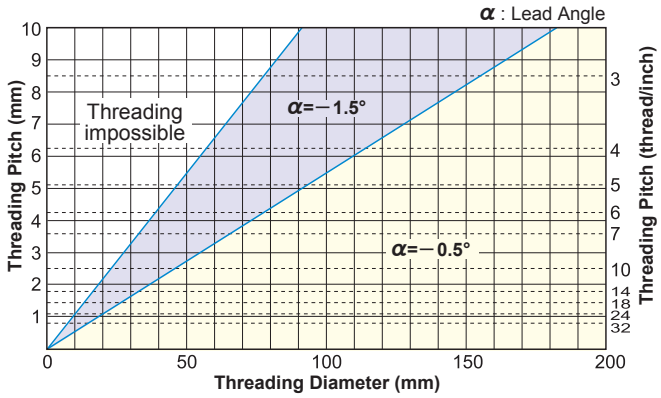
(Note) Back turning in the case of left hand threads.

SHIM REFERENCE GRAPH (Thread angle 30˚ and 29˚)

Right Hand Thread



Left Hand Thread



(Note) When a thread lead angle ≤ the tool flank angle, change the shim to prevent side interference with the insert.
(Refer to the table below for the calculation of thread lead angle and tool flank angle.)

Selection table

Lead Angle	Opening angle 60°/55° Right Hand Thread		Opening angle 60°/55° Left Hand Thread		Opening angle 30°/29° Right Hand Thread		Opening angle 30°/29° Left Hand Thread	
0	P05	P05	N05	N05	P05	P05	N05	N05
0.5	P05	P05	N05	N05	P05	P05	N05	N05
1	P15	P15	N15	N15	P15	P15	N15	N15
1.5	P15	P15	N15	N15	P15	P15	N15	N15
2	P25	P25	N15	N15	P25	P25	Compatible	Compatible
2.5	P25	P25	Compatible	Compatible	P25	P25	Compatible	Compatible
3	P35	P35	Compatible	Compatible	P35	P35	Compatible	Compatible
3.5	P35	P35	Compatible	Compatible	P35	P35	Compatible	Compatible
4	P45	P45	Compatible	Compatible	P45	P45	Compatible	Compatible
4.5	P45	P45	Compatible	Compatible	P45	P45	Compatible	Compatible
5	P45	P45	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
5.5	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible

(Note) Back turning in the case of left hand threads.

When replacing a shim, check if the difference between the thread lead angle and shim inclination angle is within:
2.5°−0.5° where thread helix angle is 60° (55°)
2°−1° where thread helix angle is 30° (29°)
∗ Inclination angle of a standard shim is 0°.
∗ The holder has a 1.5° lead angle.

CALCULATION OF THREAD LEAD ANGLE

$$\tan\alpha = \frac{l}{\pi d} = \frac{nP}{\pi d}$$

α: Lead angle
l : Lead
n : Number of threads
P : Pitch
d : Effective diameter of thread

EXAMPLE OF SELECTING A SHIM

• When the thread lead angle is 2.2°
①In the case when the thread helix angle is 60°
(2.2° lead angle) − (2.5−0.5°) = -0.3°−1.7° shim inclination angle is appropriate.
Threading with a standard shim (0° inclination angle) is possible. But, replacing with a shim with a 1° inclination angle is recommended, refer to Standard Shim List on pages G012 and G013.
②In the case when the thread helix angle is 30°
(2.2° lead angle) − (2−1°) = -0.2°−1.2° shim inclination angle is appropriate.
Replacing with a shim with a 1° inclination angle is recommended, referring to Standard Shim List on pages G012 and G013.

∗ Refer to the web catalogue.
http://www.mitsubishicarbide.net/mmc/jp/formula.html

RELIEF ANGLE OF AN INSERT SET ON A HOLDER

Thread Helix Angle	Internal Relief Angle	External Relief Angle
60°	8.8°	5.8°
55°	7.9°	5.2°
30°	4.1°	2.7°
29°	4°	2.6°

• Relief angles (β_2, β_1) of an insert become small when the thread helix angle of a trapezoidal, round, or other thread is small. Take care when selecting a shim.

STANDARD OF DEPTH OF CUT EXTERNAL (RADIAL INFEED)

ISO Metric

Pitch (mm)	Total Cutting Depth	Number of Passes														Insert Type	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts	M-class inserts with 3-D chip breakers
0.5	0.31	0.10	0.08	0.07	0.06											MMT16ER050ISO	—
0.75	0.46	0.16	0.14	0.10	0.06											MMT16ER075ISO	—
1.0	0.61	0.18	0.15	0.12	0.10	0.06										MMT16ER100ISO	MMT16ER100ISO-S
1.25	0.77	0.19	0.17	0.14	0.11	0.10	0.06									MMT16ER125ISO	MMT16ER125ISO-S
1.5	0.92	0.22	0.21	0.17	0.14	0.12	0.06									MMT16ER150ISO	MMT16ER150ISO-S
1.75	1.07	0.22	0.21	0.16	0.13	0.11	0.09	0.09	0.06							MMT16ER175ISO	MMT16ER175ISO-S
2.0	1.23	0.24	0.23	0.17	0.16	0.14	0.12	0.11	0.06							MMT16ER200ISO	MMT16ER200ISO-S
2.5	1.53	0.26	0.23	0.19	0.17	0.15	0.13	0.12	0.11	0.11	0.06					MMT16ER250ISO	MMT16ER250ISO-S
3.0	1.84	0.27	0.25	0.20	0.18	0.16	0.14	0.13	0.12	0.12	0.11	0.10	0.06			MMT16ER300ISO	MMT16ER300ISO-S
3.5	2.15	0.33	0.30	0.24	0.21	0.18	0.17	0.15	0.14	0.14	0.12	0.11	0.06			MMT22ER350ISO	—
4.0	2.45	0.34	0.31	0.24	0.22	0.19	0.17	0.16	0.14	0.14	0.13	0.12	0.12	0.11	0.06	MMT22ER400ISO	—
4.5	2.76	0.38	0.34	0.28	0.24	0.22	0.20	0.18	0.16	0.16	0.15	0.14	0.13	0.12	0.06	MMT22ER450ISO	—
5.0	3.07	0.42	0.38	0.32	0.27	0.24	0.22	0.20	0.18	0.18	0.17	0.16	0.15	0.12	0.06	MMT22ER500ISO	—

American UN

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes														Insert Type	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts	M-class inserts with 3-D chip breakers
32	0.49	0.17	0.15	0.11	0.06											MMT16ER320UN	—
28	0.56	0.17	0.14	0.10	0.09	0.06										MMT16ER280UN	—
24	0.65	0.18	0.16	0.14	0.11	0.06										MMT16ER240UN	—
20	0.78	0.20	0.18	0.13	0.11	0.10	0.06									MMT16ER200UN	—
18	0.87	0.22	0.20	0.15	0.13	0.11	0.06									MMT16ER180UN	—
16	0.97	0.22	0.20	0.15	0.12	0.11	0.11	0.06								MMT16ER160UN	MMT16ER160UN-S
14	1.11	0.23	0.21	0.16	0.13	0.11	0.11	0.10	0.06							MMT16ER140UN	MMT16ER140UN-S
13	1.20	0.25	0.22	0.17	0.14	0.13	0.12	0.11	0.06							MMT16ER130UN	—
12	1.30	0.28	0.23	0.18	0.16	0.14	0.13	0.12	0.06							MMT16ER120UN	MMT16ER120UN-S
11	1.42	0.28	0.23	0.19	0.16	0.14	0.13	0.12	0.11	0.06						MMT16ER110UN	—
10	1.56	0.28	0.24	0.19	0.16	0.14	0.13	0.13	0.12	0.11	0.06					MMT16ER100UN	—
9	1.73	0.34	0.29	0.22	0.17	0.15	0.14	0.13	0.12	0.11	0.06					MMT16ER090UN	—
8	1.95	0.35	0.30	0.24	0.19	0.16	0.15	0.14	0.13	0.12	0.11	0.06				MMT16ER080UN	—
7	2.22	0.37	0.33	0.28	0.24	0.20	0.17	0.16	0.15	0.14	0.12	0.06				MMT22ER070UN	—
6	2.60	0.42	0.35	0.29	0.25	0.21	0.18	0.17	0.16	0.15	0.13	0.12	0.11	0.06		MMT22ER060UN	—
5	3.12	0.43	0.39	0.31	0.27	0.24	0.22	0.20	0.19	0.19	0.18	0.17	0.15	0.12	0.06	MMT22ER050UN	—

Whitworth for BSW, BSP

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes														Insert Type	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts	M-class inserts with 3-D chip breakers
28	0.58	0.17	0.14	0.11	0.10	0.06										MMT16ER280W	—
26	0.63	0.18	0.15	0.13	0.11	0.06										MMT16ER260W	—
20	0.81	0.20	0.18	0.14	0.12	0.11	0.06									MMT16ER200W	—
19	0.86	0.21	0.19	0.15	0.13	0.12	0.06									MMT16ER190W	MMT16ER190W-S
18	0.90	0.25	0.19	0.15	0.13	0.12	0.06									MMT16ER180W	—
16	1.02	0.21	0.18	0.15	0.13	0.11	0.09	0.09	0.06							MMT16ER160W	—
14	1.16	0.23	0.21	0.17	0.14	0.12	0.12	0.11	0.06							MMT16ER140W	MMT16ER140W-S
12	1.36	0.27	0.25	0.20	0.16	0.15	0.14	0.13	0.06							MMT16ER120W	—
11	1.48	0.27	0.24	0.20	0.17	0.15	0.14	0.13	0.12	0.06						MMT16ER110W	MMT16ER110W-S
10	1.63	0.27	0.25	0.20	0.17	0.15	0.15	0.13	0.13	0.12	0.06					MMT16ER100W	—
9	1.81	0.28	0.26	0.21	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.06				MMT16ER090W	—
8	2.03	0.30	0.27	0.22	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.06			MMT16ER080W	—
7	2.32	0.34	0.32	0.26	0.22	0.20	0.18	0.17	0.16	0.15	0.14	0.12	0.06			MMT22ER070W	—
6	2.71	0.35	0.33	0.27	0.23	0.21	0.20	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.06	MMT22ER060W	—
5	3.25	0.42	0.40	0.35	0.29	0.26	0.24	0.22	0.20	0.19	0.18	0.17	0.15	0.12	0.06	MMT22ER050W	—

BSPT

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes														Insert Type	
		1	2	3	4	5	6	7	8	9						G-class ground inserts	M-class inserts with 3-D chip breakers
28	0.58	0.17	0.14	0.11	0.10	0.06										MMT16ER280BSPT	—
19	0.86	0.22	0.19	0.15	0.12	0.12	0.06									MMT16ER190BSPT	MMT16ER190BSPT-S
14	1.16	0.24	0.20	0.17	0.14	0.12	0.12	0.11	0.06							MMT16ER140BSPT	MMT16ER140BSPT-S
11	1.48	0.25	0.23	0.21	0.18	0.16	0.14	0.13	0.12	0.06						MMT16ER110BSPT	MMT16ER110BSPT-S

(Note) • Set the finishing allowance on a diameter at approx. 0.1mm when using a full form insert.
• Please note the cutting depth and the number of passes when a corner radius of a partial form insert or of an internal threading insert is small to prevent damage to the insert corner.
• Please set the cutting depth sufficiently deep enough on materials such as hardened steel or austenitic stainless steel to help prevent premature wear and chipping caused by the outer layer of the material.

STANDARD OF DEPTH OF CUT EXTERNAL (RADIAL INFEED)

Round DIN 405

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12	13	14		Insert Type
10	1.27	0.23	0.21	0.20	0.19	0.16	0.12	0.10	0.06								MMT16ER100RD
8	1.59	0.23	0.21	0.20	0.19	0.18	0.16	0.14	0.12	0.10	0.06						MMT16ER080RD
6	2.12	0.26	0.25	0.24	0.22	0.21	0.19	0.17	0.16	0.14	0.12	0.10	0.06				MMT16ER060RD
4	3.18	0.34	0.33	0.32	0.30	0.28	0.26	0.24	0.22	0.20	0.19	0.17	0.15	0.12	0.06		MMT22ER040RD

ISO Trapezoidal 30°

Pitch (mm)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12	13	14		Insert Type
1.5	0.90	0.23	0.21	0.16	0.13	0.11	0.06										MMT16ER150TR
2.0	1.25	0.29	0.26	0.21	0.17	0.14	0.12	0.06									MMT16ER200TR
3.0	1.75	0.32	0.31	0.24	0.19	0.18	0.17	0.15	0.13	0.06							MMT16ER300TR
4.0	2.25	0.33	0.32	0.24	0.22	0.21	0.17	0.16	0.15	0.14	0.13	0.12	0.06				MMT22ER400TR
5.0	2.75	0.35	0.32	0.26	0.24	0.22	0.21	0.19	0.19	0.17	0.15	0.14	0.13	0.12	0.06		MMT22ER500TR

American ACME

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12	13	14		Insert Type
12	1.19	0.27	0.23	0.20	0.17	0.14	0.12	0.06									MMT16ER120ACME
10	1.52	0.29	0.25	0.21	0.18	0.16	0.14	0.12	0.11	0.06							MMT16ER100ACME
8	1.84	0.30	0.26	0.22	0.19	0.16	0.15	0.14	0.13	0.12	0.11	0.06					MMT16ER080ACME
6	2.37	0.34	0.30	0.27	0.24	0.21	0.19	0.16	0.14	0.12	0.12	0.11	0.11	0.06			MMT22ER060ACME
5	2.79	0.36	0.33	0.30	0.26	0.23	0.20	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.06		MMT22ER050ACME

UNJ

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11					Insert Type
32	0.46	0.16	0.14	0.10	0.06												MMT16ER320UNJ
28	0.52	0.16	0.12	0.09	0.09	0.06											MMT16ER280UNJ
24	0.61	0.17	0.14	0.14	0.10	0.06											MMT16ER240UNJ
20	0.73	0.19	0.16	0.13	0.10	0.09	0.06										MMT16ER200UNJ
18	0.81	0.23	0.18	0.14	0.10	0.10	0.06										MMT16ER180UNJ
16	0.92	0.26	0.21	0.14	0.12	0.10	0.09										MMT16ER160UNJ
14	1.05	0.26	0.23	0.17	0.12	0.11	0.10	0.06									MMT16ER140UNJ
12	1.22	0.28	0.27	0.20	0.17	0.13	0.11	0.06									MMT16ER120UNJ
10	1.47	0.30	0.29	0.21	0.15	0.13	0.12	0.11	0.10	0.06							MMT16ER100UNJ
8	1.83	0.31	0.30	0.23	0.18	0.15	0.14	0.13	0.12	0.11	0.10	0.06					MMT16ER080UNJ

API Buttress Casing

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11					Insert Type
5	1.55	0.25	0.23	0.17	0.15	0.13	0.12	0.12	0.11	0.11	0.10	0.06					MMT22ER050APBU

API Round Casing&Tubing

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12				Insert Type
10	1.41	0.25	0.23	0.16	0.14	0.12	0.12	0.12	0.11	0.10	0.06						MMT16ER100APRD
8	1.81	0.25	0.24	0.19	0.16	0.14	0.14	0.13	0.13	0.13	0.13	0.11	0.06				MMT16ER080APRD

American NPT

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Insert Type
27	0.66	0.15	0.13	0.12	0.11	0.09	0.06										MMT16ER270NPT
18	1.01	0.20	0.16	0.14	0.13	0.12	0.11	0.09	0.06								MMT16ER180NPT
14	1.33	0.23	0.19	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.06						MMT16ER140NPT
11.5	1.64	0.24	0.19	0.17	0.15	0.15	0.13	0.13	0.12	0.11	0.10	0.09	0.06				MMT16ER115NPT
8	2.42	0.33	0.28	0.23	0.20	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.11	0.10	0.06	MMT16ER080NPT

American NPTF

Pitch (thread/inch)	Total Cutting Depth	Number of Passes 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Insert Type
27	0.64	0.16	0.14	0.11	0.09	0.08	0.06										MMT16ER270NPTF
18	1.00	0.19	0.16	0.14	0.13	0.12	0.11	0.09	0.06								MMT16ER180NPTF
14	1.35	0.23	0.21	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.06						MMT16ER140NPTF
11.5	1.63	0.24	0.23	0.19	0.15	0.13	0.11	0.11	0.11	0.10	0.10	0.10	0.06				MMT16ER115NPTF
8	2.38	0.32	0.27	0.23	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.11	0.10	0.06	MMT16ER080NPTF

(Note) • Set the finishing allowance on a diameter at approx. 0.1mm when using a full form insert.
• Please note the cutting depth and the number of passes when a corner radius of a partial form insert or of an internal threading insert is small to prevent damage to the insert corner.
• Please set the cutting depth sufficiently deep enough on materials such as hardened steel or austenitic stainless steel to help prevent premature wear and chipping caused by the outer layer of the material.

STANDARD OF DEPTH OF CUT INTERNAL (RADIAL INFEED)

ISO Metric

Pitch (mm)	Total Cutting Depth	Number of Passes														Insert Type			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts		M-class inserts with 3-D chip breakers	
0.5	0.29	0.09	0.07	0.07	0.06											MMT11IR050ISO	MMT16IR050ISO	—	—
0.75	0.43	0.15	0.13	0.09	0.06											MMT11IR075ISO	MMT16IR075ISO	—	—
1.0	0.58	0.17	0.15	0.11	0.09	0.06										MMT11IR100ISO	MMT16IR100ISO	MMT11IR100ISO-S	MMT16IR100ISO-S
1.25	0.72	0.18	0.16	0.12	0.11	0.09	0.06									MMT11IR125ISO	MMT16IR125ISO	MMT11IR125ISO-S	MMT16IR125ISO-S
1.5	0.87	0.21	0.20	0.16	0.13	0.11	0.06									MMT11IR150ISO	MMT16IR150ISO	MMT11IR150ISO-S	MMT16IR150ISO-S
1.75	1.01	0.21	0.20	0.15	0.12	0.10	0.09	0.08	0.06							MMT11IR175ISO	MMT16IR175ISO	—	MMT16IR175ISO-S
2.0	1.15	0.24	0.22	0.18	0.14	0.12	0.10	0.09	0.06							MMT11IR200ISO	MMT16IR200ISO	—	MMT16IR200ISO-S
2.5	1.44	0.25	0.24	0.21	0.15	0.13	0.12	0.10	0.09	0.09	0.06					—	MMT16IR250ISO	—	MMT16IR250ISO-S
3.0	1.73	0.26	0.25	0.22	0.17	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.06			—	MMT16IR300ISO	—	MMT16IR300ISO-S
3.5	2.02	0.32	0.30	0.23	0.19	0.17	0.15	0.14	0.13	0.12	0.11	0.10	0.06			—	MMT22IR350ISO	—	—
4.0	2.31	0.33	0.31	0.24	0.22	0.18	0.15	0.14	0.13	0.12	0.12	0.11	0.10	0.10	0.06	—	MMT22IR400ISO	—	—
4.5	2.60	0.36	0.33	0.28	0.24	0.21	0.19	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.06	—	MMT22IR450ISO	—	—
5.0	2.89	0.41	0.38	0.32	0.27	0.24	0.21	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.06	—	MMT22IR500ISO	—	—

American UN

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes														Insert Type		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts		M-class inserts with 3-D chip breakers
32	0.46	0.16	0.14	0.10	0.06											MMT11IR320UN	MMT16IR320UN	—
28	0.52	0.16	0.13	0.09	0.08	0.06										MMT11IR280UN	MMT16IR280UN	—
24	0.61	0.17	0.15	0.13	0.10	0.06										MMT11IR240UN	MMT16IR240UN	—
20	0.73	0.18	0.15	0.13	0.11	0.10	0.06									MMT11IR200UN	MMT16IR200UN	—
18	0.81	0.20	0.18	0.14	0.12	0.11	0.06									MMT11IR180UN	MMT16IR180UN	—
16	0.92	0.20	0.18	0.15	0.12	0.11	0.10	0.06								MMT11IR160UN	MMT16IR160UN	MMT16IR160UN-S
14	1.05	0.21	0.18	0.15	0.13	0.11	0.11	0.10	0.06							MMT11IR140UN	MMT16IR140UN	MMT16IR140UN-S
13	1.13	0.22	0.19	0.16	0.14	0.13	0.12	0.11	0.06							—	MMT16IR130UN	—
12	1.22	0.24	0.22	0.18	0.16	0.13	0.12	0.11	0.06							—	MMT16IR120UN	MMT16IR120UN-S
11	1.33	0.24	0.22	0.20	0.15	0.12	0.12	0.11	0.11	0.06						—	MMT16IR110UN	—
10	1.47	0.25	0.22	0.21	0.14	0.13	0.12	0.12	0.11	0.11	0.06					—	MMT16IR100UN	—
9	1.63	0.31	0.23	0.21	0.17	0.15	0.14	0.13	0.12	0.11	0.06					—	MMT16IR090UN	—
8	1.83	0.31	0.26	0.21	0.18	0.16	0.15	0.14	0.13	0.12	0.11	0.06				—	MMT16IR080UN	—
7	2.09	0.36	0.30	0.24	0.21	0.18	0.17	0.16	0.15	0.14	0.12	0.06				—	MMT22IR070UN	—
6	2.44	0.40	0.33	0.25	0.23	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.11	0.06		—	MMT22IR060UN	—
5	2.93	0.41	0.35	0.31	0.26	0.23	0.21	0.20	0.19	0.17	0.15	0.14	0.13	0.12	0.06	—	MMT22IR050UN	—

Whitworth for BSW, BSP

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes														Insert Type		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts		M-class inserts with 3-D chip breakers
28	0.58	0.17	0.14	0.11	0.10	0.06										—	MMT16IR280W	—
26	0.63	0.18	0.15	0.13	0.11	0.06										—	MMT16IR260W	—
20	0.81	0.20	0.18	0.14	0.12	0.11	0.06									—	MMT16IR200W	—
19	0.86	0.21	0.19	0.15	0.13	0.12	0.06									MMT11IR190W	MMT16IR190W	MMT16IR190W-S
18	0.90	0.25	0.19	0.15	0.13	0.12	0.06									—	MMT16IR180W	—
16	1.02	0.21	0.18	0.15	0.13	0.11	0.09	0.09	0.06							—	MMT16IR160W	—
14	1.16	0.23	0.21	0.17	0.14	0.12	0.12	0.11	0.06							MMT11IR140W	MMT16IR140W	MMT16IR140W-S
12	1.36	0.27	0.25	0.20	0.16	0.15	0.14	0.13	0.06							—	MMT16IR120W	MMT16IR120W-S
11	1.48	0.27	0.24	0.20	0.17	0.15	0.14	0.13	0.12	0.06						—	MMT16IR110W	—
10	1.63	0.27	0.25	0.20	0.17	0.15	0.15	0.13	0.13	0.12	0.06					—	MMT16IR100W	—
9	1.81	0.28	0.26	0.21	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.06				—	MMT16IR090W	—
8	2.03	0.30	0.27	0.22	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.06			—	MMT16IR080W	—
7	2.32	0.34	0.32	0.26	0.22	0.20	0.18	0.17	0.16	0.15	0.14	0.12	0.06			—	MMT22IR070W	—
6	2.71	0.35	0.33	0.27	0.23	0.21	0.20	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.06	—	MMT22IR060W	—
5	3.25	0.42	0.40	0.35	0.29	0.26	0.24	0.22	0.20	0.19	0.18	0.17	0.15	0.12	0.06	—	MMT22IR050W	—

(Note) • Set the finishing allowance on a diameter at approx. 0.1mm when using a full form insert.
• Please note the cutting depth and the number of passes when a corner radius of a partial form insert or of an internal threading insert is small to prevent damage to the insert corner.
• Please set the cutting depth sufficiently deep enough on materials such as hardened steel or austenitic stainless steel to help prevent premature wear and chipping caused by the outer layer of the material.

STANDARD OF DEPTH OF CUT INTERNAL (RADIAL INFEED)

BSPT

Pitch (thread/inch)	Total Cutting Depth	Number of Passes														Insert Type		
		1	2	3	4	5	6	7	8	9						G-class ground inserts		M-class inserts with 3-D chip breakers
19	0.86	0.22	0.19	0.15	0.12	0.12	0.06									MMT11IR190BSPT	MMT16IR190BSPT	MMT16IR190BSPT-S
14	1.16	0.24	0.20	0.17	0.14	0.12	0.12	0.11	0.06							MMT11IR140BSPT	MMT16IR140BSPT	MMT16IR140BSPT-S
11	1.48	0.25	0.23	0.21	0.18	0.16	0.14	0.13	0.12	0.06						—	MMT16IR110BSPT	MMT16IR110BSPT-S

Round DIN 405

Pitch (thread/inch)	Total Cutting Depth	Number of Passes														Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	
10	1.27	0.23	0.21	0.20	0.19	0.16	0.12	0.10	0.06							MMT16IR100RD
8	1.59	0.23	0.21	0.20	0.19	0.18	0.16	0.14	0.12	0.10	0.06					MMT16IR080RD
6	2.12	0.26	0.25	0.24	0.22	0.21	0.19	0.17	0.16	0.14	0.12	0.10	0.06			MMT16IR060RD
4	3.18	0.34	0.33	0.32	0.30	0.28	0.26	0.24	0.22	0.20	0.19	0.17	0.15	0.12	0.06	MMT22IR040RD

ISO Trapezoidal 30°

Pitch (mm)	Total Cutting Depth	Number of Passes														Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	
1.5	0.90	0.23	0.21	0.16	0.13	0.11	0.06									MMT16IR150TR
2	1.25	0.29	0.26	0.21	0.17	0.14	0.12	0.06								MMT16IR200TR
3	1.75	0.32	0.31	0.24	0.19	0.18	0.17	0.15	0.13	0.06						MMT16IR300TR
4	2.25	0.33	0.32	0.24	0.22	0.21	0.17	0.16	0.15	0.14	0.13	0.12	0.06			MMT22IR400TR
5	2.75	0.35	0.32	0.26	0.24	0.22	0.21	0.19	0.19	0.17	0.15	0.14	0.13	0.12	0.06	MMT22IR500TR

American ACME

Pitch (thread/inch)	Total Cutting Depth	Number of Passes														Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	
12	1.19	0.27	0.23	0.20	0.17	0.14	0.12	0.06								MMT16IR120ACME
10	1.52	0.29	0.25	0.21	0.18	0.16	0.14	0.12	0.11	0.06						MMT16IR100ACME
8	1.84	0.30	0.26	0.22	0.19	0.16	0.15	0.14	0.13	0.12	0.11	0.06				MMT16IR080ACME
6	2.37	0.34	0.30	0.27	0.24	0.21	0.19	0.16	0.14	0.12	0.12	0.11	0.11	0.06		MMT22IR060ACME
5	2.79	0.36	0.33	0.30	0.26	0.23	0.20	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.06	MMT22IR050ACME

API Buttress Casing

Pitch (thread/inch)	Total Cutting Depth	Number of Passes											Insert Type
		1	2	3	4	5	6	7	8	9	10	11	
5	1.55	0.25	0.23	0.17	0.15	0.13	0.12	0.12	0.11	0.11	0.10	0.06	MMT22IR050APBU

API Round Casing&Tubing

Pitch (thread/inch)	Total Cutting Depth	Number of Passes												Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	
10	1.41	0.25	0.23	0.16	0.14	0.12	0.12	0.12	0.11	0.10	0.06			MMT16IR100APRD
8	1.81	0.25	0.24	0.19	0.16	0.14	0.14	0.13	0.13	0.13	0.13	0.11	0.06	MMT16IR080APRD

American NPT

Pitch (thread/inch)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
27	0.66	0.15	0.13	0.12	0.11	0.09	0.06										MMT16IR270NPT
18	1.01	0.20	0.16	0.14	0.13	0.12	0.11	0.09	0.06								MMT16IR180NPT
14	1.33	0.23	0.19	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.06						MMT16IR140NPT
11.5	1.64	0.24	0.19	0.17	0.15	0.15	0.13	0.13	0.12	0.11	0.10	0.09	0.06				MMT16IR115NPT
8	2.42	0.33	0.28	0.23	0.20	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.11	0.10	0.06	MMT16IR080NPT

American NPTF

Pitch (thread/inch)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
14	1.35	0.23	0.21	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.06						MMT16IR140NPTF
11.5	1.63	0.24	0.23	0.19	0.15	0.13	0.11	0.11	0.11	0.10	0.10	0.10	0.06				MMT16IR115NPTF
8	2.38	0.32	0.27	0.23	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.11	0.10	0.06	MMT16IR080NPTF

(Note) • Set the finishing allowance on a diameter at approx. 0.1mm when using a full form insert.
• Please note the cutting depth and the number of passes when a corner radius of a partial form insert or of an internal threading insert is small to prevent damage to the insert corner.
• Please set the cutting depth sufficiently deep enough on materials such as hardened steel or austenitic stainless steel to help prevent premature wear and chipping caused by the outer layer of the material.

TROUBLE SHOOTING

Problems	Observation	Causes	Solutions
Low thread precision.	Threads do not mesh with each other.	Incorrect tool installation.	Set the insert center height at 0mm.
			Check holder inclination (Lateral).
	Shallow thread.	Incorrect depth of cut.	Modify the depth of cut.
		Lack of insert wear or plastic deformation resistance.	Refer to "Quickly generated flank wear." and "Large plastic deformation." below.
Poor surface finish.	Surface damage.	Chips wrap around or clog the work pieces.	Change to flank infeed and control the chip discharge direction.
			Change to an M-class insert with a 3-D chip breaker.
		The side of the insert cutting edge interferes with the workpiece.	Check the lead angle and select an appropriate shim.
	Surface tears.	Built-up edge (Welding).	Increase cutting speed.
			Increase coolant pressure and volume.
		Cutting resistance too high.	Decrease depth of cut per pass.
	Surface vibrations.	Cutting speed too high.	Decrease the cutting speed.
		Insufficient work piece or tool clamping.	Re-check work piece and tool clamping. (Chuck pressure, clamping allowance)
		Incorrect tool installation.	Set the insert center height at 0mm.
Short tool life.	Flank wear quickly generated.	Cutting speed too high.	Decrease the cutting speed.
		Too many passes causes abrasive wear.	Reduce the number of passes.
		Small depth of cut for the finishing pass.	Do not re-cut at 0mm depth of cut, larger than 0.05mm depth of cut is recommended.
	Non-uniform wear of the right and left sides of the cutting edge.	The work piece lead angle and the tool lead angle do not match.	Check the work piece lead angle and select an appropriate shim.
	Chipping and fracture.	Cutting speed too low.	Increase cutting speed.
		Cutting resistance too high.	Increase the number of passes and decrease the cutting resistance per pass.
		Unstable clamping.	Check work piece deflection.
			Shorten tool overhang.
			Recheck work piece and tool clamping. (Chuck pressure, clamping allowance)
		Chip packing.	Increase coolant pressure to blow away chips.
			Change the tool pass to control chips. (Lengthen each pass to allow the coolant to clear the chips.
			Change from standard internal cutting to back turning to prevent chip jamming.
		Non-chamfered work pieces causes high resistance at the start of each pass.	Chamfer the workpiece entry and exit faces.
	Large plastic deformation.	High cutting speed and large heat generation.	Decrease the cutting speed.
		Lack of coolant supply.	Check coolant is supply is sufficient.
			Increase coolant pressure and volume.
		Cutting resistance too high.	Increase the number of passes and decrease the cutting resistance per pass.

HOW TO READ THE STANDARD OF HSK-T TOOLS

●How this section page is organized

①Organized by application. (Refer to the index on the next page.)

PRODUCT TYPE
indicates the first four letters of the order number, as well as cutting applications.

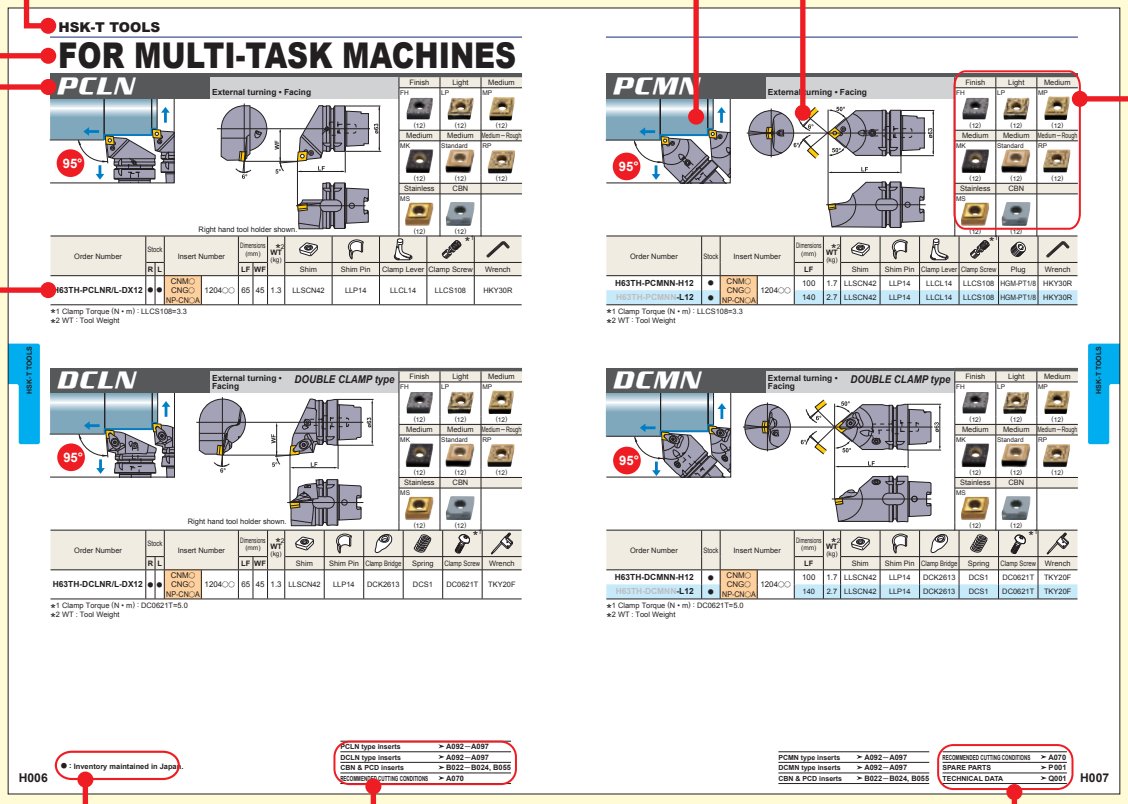
TITLE OF PRODUCT SERIES

PRODUCT SECTION

FIGURE SHOWING THE TOOLING APPLICATION
uses illustrations and arrows to depict available machining applications along with cutting edge lead angles.

GEOMETRY

CHIP BREAKER BY CUTTING APPLICATION



LEGEND FOR STOCK STATUS MARK
is shown on the left hand page of each double-page spread.

REFERENCE PAGE FOR APPLICABLE INSERTS
indicates reference pages for details of inserts that are applicable to the title product.

PAGE REFERENCE
·SPARE PARTS
·TECHNICAL DATA
indicates reference pages, including the above, on the right hand page of each double-page spread.

PRODUCT STANDARDS
Indicates order numbers, stock status (per right/left hand), applicable inserts, dimensions, and spare parts.

●To Order : Please specify
①order number and hand of tool (right/left).

HSK-T TOOLS

OVERVIEW OF HSK-T TOOLS ····· H002
CLASSIFICATION OF HSK-T TOOLS ····· H004
HSK-T TOOL STANDARDS
EXTERNAL TURNING • FACING
CN○○ INSERTS TOOL HOLDERS ····· H006
DN○○ INSERTS TOOL HOLDERS ····· H011
EXTERNAL TURNING • FACING • BORING
CN○○ INSERTS TOOL HOLDERS ····· H008
EXTERNAL TURNING • COPYING
DN○○ INSERTS TOOL HOLDERS ····· H009
EXTERNAL TURNING • FACING • COPYING
RC○○ INSERTS TOOL HOLDERS ····· H012
FACING • COPYING
VB○○ INSERTS TOOL HOLDERS ····· H013
GROOVING
MG INSERTS TOOL HOLDERS ····· H014
THREADING
MMT INSERTS TOOL HOLDERS ····· H016
MT INSERTS TOOL HOLDERS ····· H017

EXTERNAL TURNING TOOL HOLDERS ··· H019
BORING BAR HOLDERS ····· H021
BORING BAR SLEEVES ····· H022

*Arranged by Alphabetical order

H022 **H100TH-B○○-○○○**
H020 **H100TH-EN3232R/L-130**
H019 **H100TH-EV3232R/L-180**
H008 **H63TH-A○○○DCLNR/L12**
H021 **H63TH-B○○-○○**
H008 **H63TH-DCLNL-L12-3**
H006 **H63TH-DCLNR/L-DX12**
H007 **H63TH-DCMNN-H/L12**
H011 **H63TH-DDJNL-L15-3**
H009 **H63TH-DDJNR/L-DX15**
H010 **H63TH-DDNNN-H/L15**
H020 **H63TH-EN2525R/L-115**
H021 **H63TH-EV2020R/L-105-3**
H019 **H63TH-EV2525R/L-112**
H014 **H63TH-MGHR/L-DX43○○**
H016 **H63TH-MMTENR-H/L16**
H016 **H63TH-MMTER-DX16**
H017 **H63TH-MTHR/L-DX43**
H006 **H63TH-PCLNR/L-DX12**
H007 **H63TH-PCMNN-H/L12**
H009 **H63TH-PDJNR/L-DX15**
H010 **H63TH-PDNNN-H/L15**
H012 **H63TH-PRDCN-H/L12**
H012 **H63TH-PRGCR/L-DX12**
H013 **H63TH-SVPBR/L-DX16**
H013 **H63TH-SVVBN-H/L16**
H022 **SL32○○-90**

Tooling system
for turning on
multi-task machines

HSK TOOLS

HSK-T System

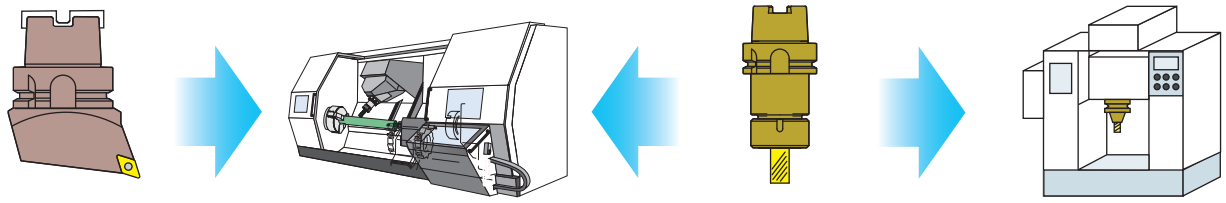
HSK-T is a new HSK system designed for turning on multi-task machines that are compatible with HSK-A type (ISO standard: ISO12164-1:2001).
The HSK system was developed by a consortium of 17 Japanese manufacturers and registered in ISO standard (ISO12164-3:2008) under the name HSK-T type in 2008 and JIS standard (JIS B6064-3) in 2013.



High accuracy cutting edge positioning

The HSK-T type has a closer tolerance between the spindle key and tool holder keyway than the HSK-A type. This results in higher cutting edge positional accuracies. For milling, the conventional HSK-A type tools can be still used.

Compatible with both multi-task machines and machining centres



HSK-T
Turning tool holder

HSK-T spindle
Multi-task machines

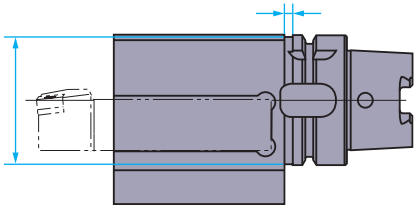
HSK-A
Rotating tool holder

HSK-A spindle
Machining centre

*Note
Short neck length from the flange with thick body of the HSK-T turning tool as shown in the figure at the left.
Because there are machines which cannot be mounted depending on the ATC specifications of the multi-task machine(HSK-A type), please check beforehand.
Also be careful of interference of the magazine with adjacent tools.

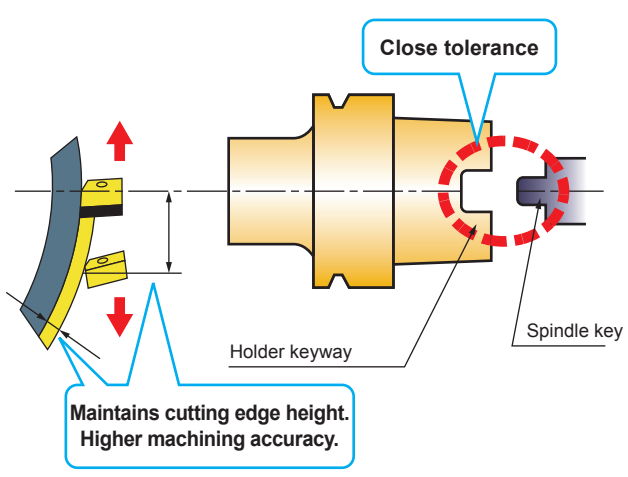
Neck length
HSK-T63 Min.4mm
HSK-T100 Min.5mm

Neck thickness
HSK-T63 Max.62mm
HSK-T100 Max.99mm

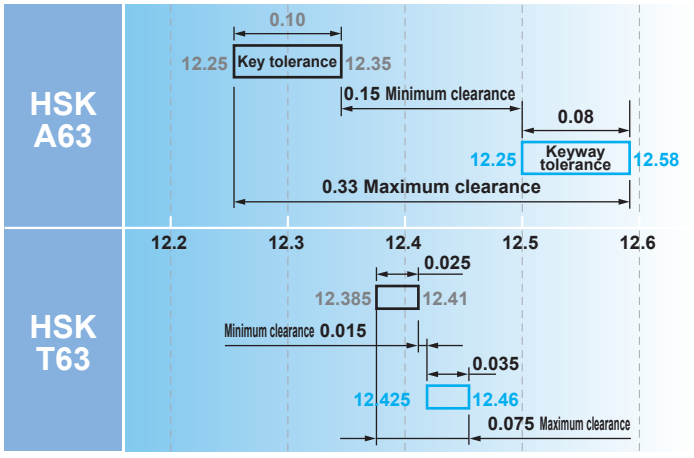


HSK-T turning tool standard (Example)

Improved keyway tolerance



Tolerance comparison (Example) (mm)

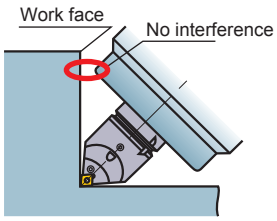


High accuracy and rigidity HSK-T type tooling system developed for use on multi-task machines.

Straight type tools suitable for use on multi-task machines

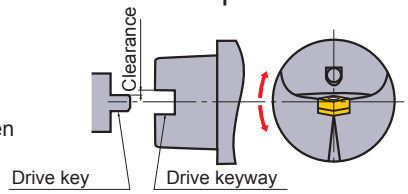
Avoid workpiece interference with improved tool accessibility.

By tilting the machines B spindle (main axis of the tool) at 45 deg, interference between the spindle, holder, workpiece and chuck can be avoided.



Improve centreline height by positioning the cutting edge at the centre of the spindle.

Increased stability and accuracy can be achieved because the cutting edge centreline height is not affected by the gap between the spindle and the key.



New one-action type double clamp series

The double clamp mechanism offers high rigidity, accuracy and reliability that ensures secure insert clamping. There fore making it suitable turning of difficult to machine materials such as stainless and heat resistant alloys.



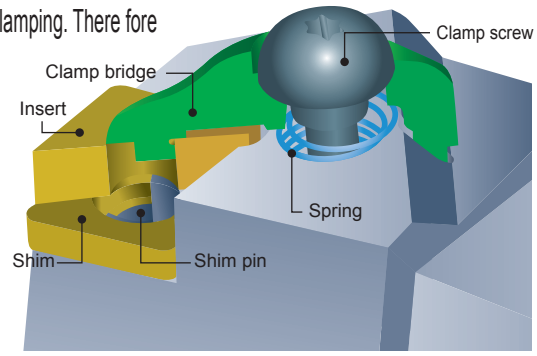
Handed type for turning and facing



Straight type for turning and facing



For turning, facing and boring



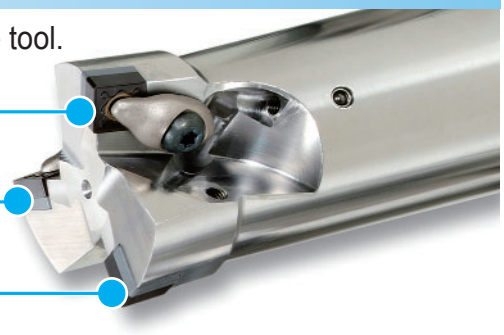
3 on 1 tool for process and tool consolidation

3 turning inserts of the same geometry can be installed on a single tool.

The same type of inserts can be installed for quick change with spare tools.

Different types of inserts can be installed for different applications (roughing, semi finishing and finishing)

Inserts in different grade types can be installed to cover various kinds of workpieces.



New HSK-T100 size for large workpieces

Larger tool holder sizes for high efficiency machining.

Square shank holder type



Boring bar / Drill type



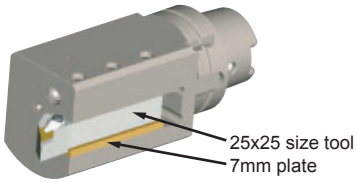
Sleeve



A single tool can be used with different sized tool holders.

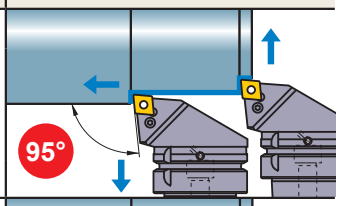
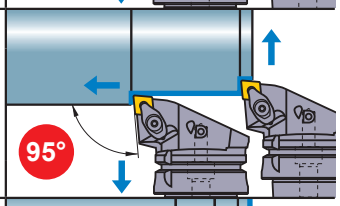
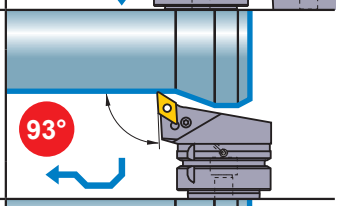
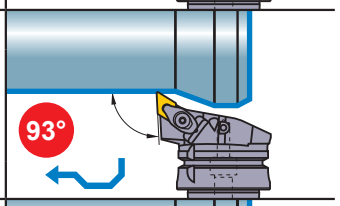
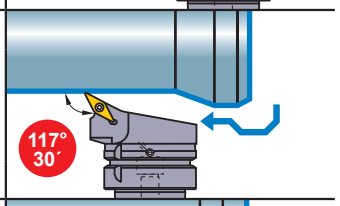
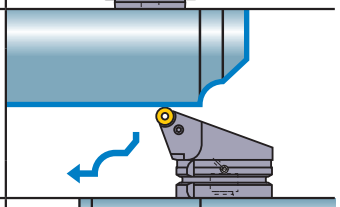
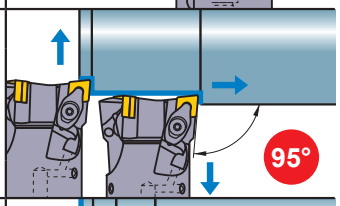
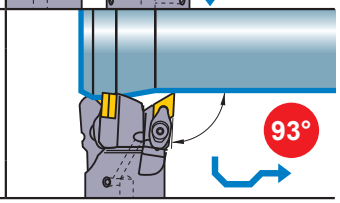
- Available for use with JIS B4126 (ISO 5610) 32x32 and 32x25 tools.
- Possible to fit a 25x25 tool by using a 7mm plate.

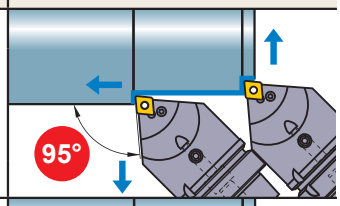
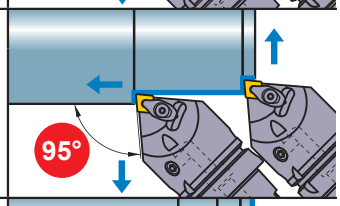
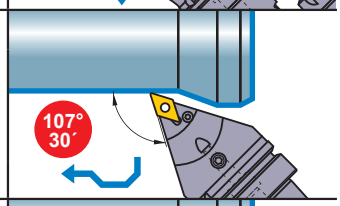
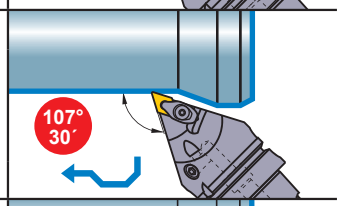
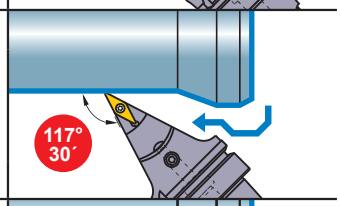
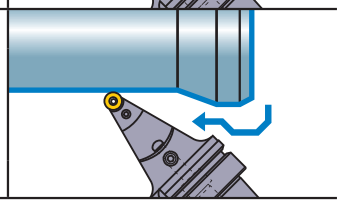
*Please prepare a plate on your own.



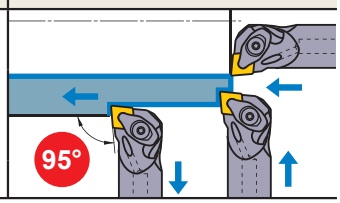
CLASSIFICATION OF HSK-T TOOLS

EXTERNAL TURNING • FACING • COPYING

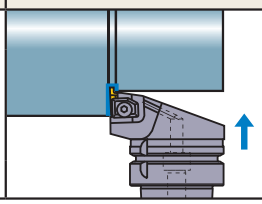
Order Number	Cutting Mode
H63TH-PCLNR/L-DX12  H006	
H63TH-DCLNR/L-DX12  H006	
H63TH-PDJNR/L-DX15  H009	
H63TH-DDJNR/L-DX15  H009	
H63TH-SVPBR/L-DX16  H013	
H63TH-PRGCR/L-DX12  H012	
H63TH-DCLNL-L12-3  H008	
H63TH-DDJNL-L15-3  H011	

Order Number	Cutting Mode
H63TH-PCMNN-H/L12  H007	
H63TH-DCMNN-H/L12  H007	
H63TH-PDNNN-H/L15  H010	
H63TH-DDNNN-H/L15  H010	
H63TH-SVVBN-H/L16  H013	
H63TH-PRDCN-H/L12  H012	

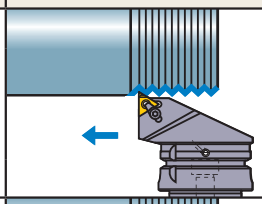
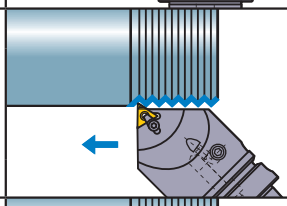
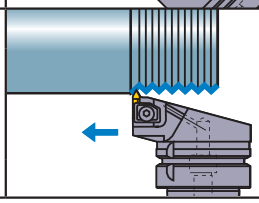
EXTERNAL TURNING • FACING• BORING

Order Number	Cutting Mode
H63TH-A25KDCLNR/L12 **H63TH-A32LDCLNR/L12**  H008	

GROOVING

Order Number	Cutting Mode
H63TH-MGHR/L-DX43○○  ➔ H014	

THREADING

Order Number	Cutting Mode
H63TH-MMTER-DX16  ➔ H016	
H63TH-MMTENR-H/L16  ➔ H016	
H63TH-MTHR/L-DX43  ➔ H017	

EXTERNAL TURNING TOOL HOLDERS

Order Number	Holder
H63TH-EV2525R/L-112 ➔ H019	
H100TH-EV3232R/L-180 ➔ H019	
H63TH-EN2525R/L-115 *1 ➔ H020	
H100TH-EN3232R/L-130 *1 ➔ H020	
H63TH-EV2020R/L-105-3 ➔ H021	

BORING BAR HOLDERS

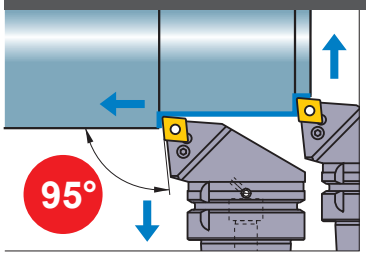
Order Number	Holder
H63TH-B○○-○○ ➔ H021	
H100TH-B○○-○○○ ➔ H022	
SL32○○-90 (Sleeve) *2 ➔ H022	

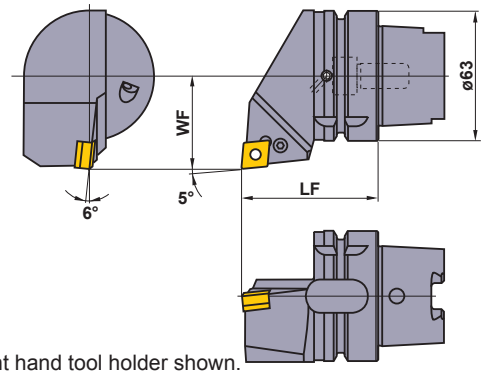
*1 Mitsubishi Materials is licensed for production and distribution of these tools from MORI SEIKI CO., LTD under Patent No.3720202.
*2 The SL32○○-90 sleeve is only for use with H100TH-B32-135.

FOR MULTI-TASK MACHINES

PCLN

External turning • Facing





Right hand tool holder shown.

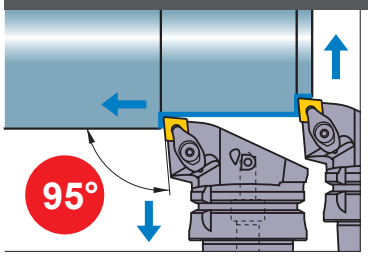
Finish	Light	Medium
FH	LP	MP
 (12)	 (12)	 (12)
Medium	**Medium**	**Medium–Rough**
MK	Standard	RP
 (12)	 (12)	 (12)
Stainless	**CBN**	
MS		
 (12)	 (12)	

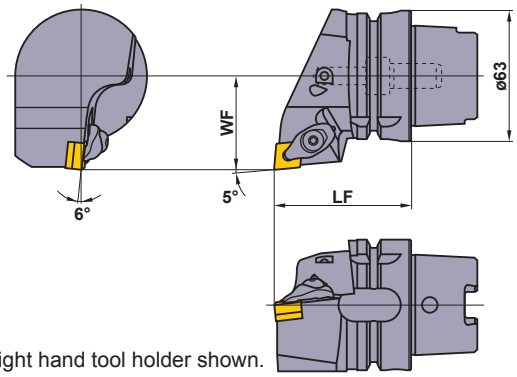
Order Number	Stock		Insert Number		Dimensions (mm)		∗2 WT (kg)				 ∗1	
	R	L			LF	WF		Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
H63TH-PCLNR/L-DX12	●	●	CNM○ CNG○ NP-CN○A	1204○○	65	45	1.3	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R

∗1 Clamp Torque (N • m) : LLCS108=3.3
∗2 WT : Tool Weight

DCLN

External turning • Facing ***DOUBLE CLAMP type***





Right hand tool holder shown.

Finish	Light	Medium
FH	LP	MP
 (12)	 (12)	 (12)
Medium	**Medium**	**Medium–Rough**
MK	Standard	RP
 (12)	 (12)	 (12)
Stainless	**CBN**	
MS		
 (12)	 (12)	

Order Number	Stock		Insert Number		Dimensions (mm)		∗2 WT (kg)					 ∗1	
	R	L			LF	WF		Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
H63TH-DCLNR/L-DX12	●	●	CNM○ CNG○ NP-CN○A	1204○○	65	45	1.3	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F

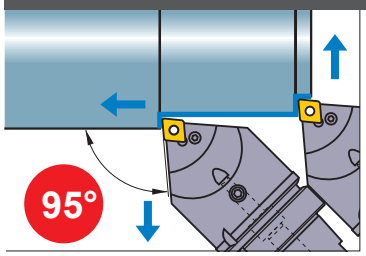
∗1 Clamp Torque (N • m) : DC0621T=5.0
∗2 WT : Tool Weight

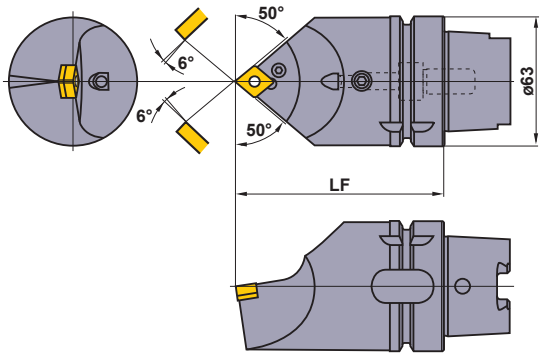
● : Inventory maintained in Japan.

PCLN type inserts	➤ A092–A097
DCLN type inserts	➤ A092–A097
CBN & PCD inserts	➤ B022–B024, B055
RECOMMENDED CUTTING CONDITIONS	➤ A070

PCMN

External turning • Facing





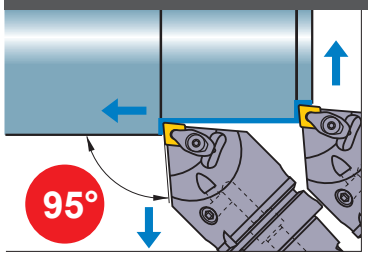
Finish	Light	Medium
FH	LP	MP
		
(12)	(12)	(12)
Medium	**Medium**	**Medium–Rough**
MK	Standard	RP
		
(12)	(12)	(12)
Stainless	**CBN**	
MS		
		
(12)	(12)	

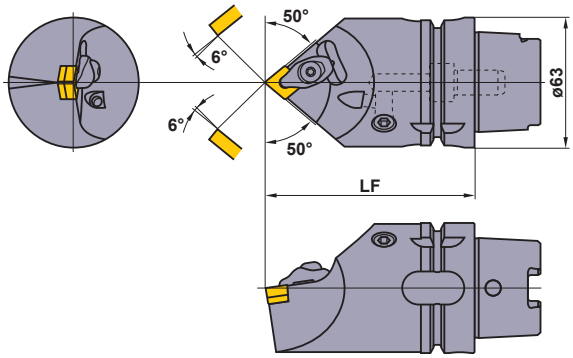
Order Number	Stock	Insert Number		Dimensions (mm) LF	*2 WT (kg)	Shim	Shim Pin	Clamp Lever	*1 Clamp Screw	Plug	Wrench
H63TH-PCMNN-H12	●	CNM○ CNG○ NP-CN○A	1204○○	100	1.7	LLSCN42	LLP14	LLCL14	LLCS108	HGM-PT1/8	HKY30R
H63TH-PCMNN-L12	●			140	2.7	LLSCN42	LLP14	LLCL14	LLCS108	HGM-PT1/8	HKY30R

*1 Clamp Torque (N • m) : LLCS108=3.3
*2 WT : Tool Weight

DCMN

External turning • Facing ***DOUBLE CLAMP type***





Finish	Light	Medium
FH	LP	MP
		
(12)	(12)	(12)
Medium	**Medium**	**Medium–Rough**
MK	Standard	RP
		
(12)	(12)	(12)
Stainless	**CBN**	
MS		
		
(12)	(12)	

Order Number	Stock	Insert Number		Dimensions (mm) LF	*2 WT (kg)	Shim	Shim Pin	Clamp Bridge	Spring	*1 Clamp Screw	Wrench
H63TH-DCMNN-H12	●	CNM○ CNG○ NP-CN○A	1204○○	100	1.7	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
H63TH-DCMNN-L12	●			140	2.7	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F

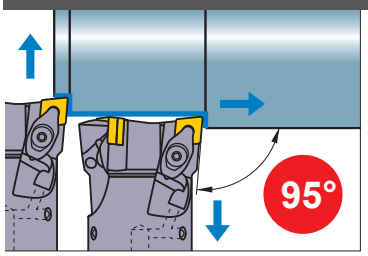
*1 Clamp Torque (N • m) : DC0621T=5.0
*2 WT : Tool Weight

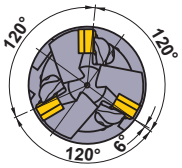
PCMN type inserts	➤ A092–A097	RECOMMENDED CUTTING CONDITIONS	➤ A070
DCMN type inserts	➤ A092–A097	SPARE PARTS	➤ P001
CBN & PCD inserts	➤ B022–B024, B055	TECHNICAL DATA	➤ Q001

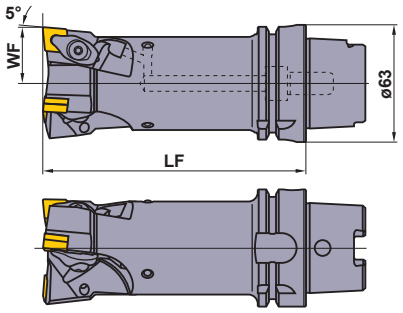
FOR MULTI-TASK MACHINES

DCLN

External turning • Facing — ***DOUBLE CLAMP type***







Left hand tool holder only.

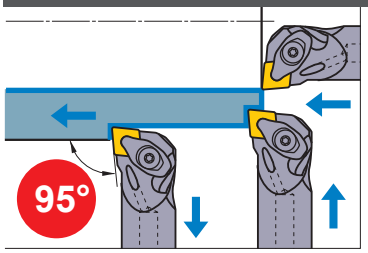
Finish	Light	Medium
FH  (12)	LP  (12)	MP  (12)
Medium	**Medium**	**Medium–Rough**
MK  (12)	Standard  (12)	RP  (12)
Stainless	**CBN**	
MS  (12)	 (12)	

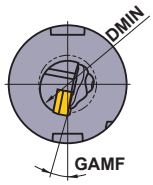
Order Number	Stock	Insert Number		Dimensions (mm)		*2 WT (kg)					*1 	
	L			LF	WF		Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
H63TH-DCLNL-L12-3	●	CNM○ CNG○ NP-CN○A	1204○○	140	30	2.2	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F

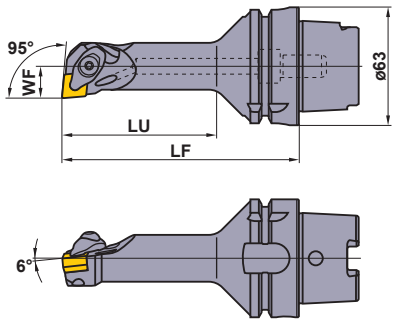
*1 Clamp Torque (N • m) : DC0621T=5.0
*2 WT : Tool Weight

DCLN

External turning • Facing • Boring — ***DOUBLE CLAMP type***







Right hand tool holder shown.

Finish	Light	Medium
FH  (12)	LP  (12)	MP  (12)
Medium	**Medium**	**Medium–Rough**
MK  (12)	Standard  (12)	RP  (12)
Stainless	**CBN**	
MS  (12)	 (12)	

Order Number	Stock		Insert Number		Dimensions (mm)				DMIN (mm)	*2 WT (kg)					*1 	
	R	L			LF	LU	WF	GAMF			Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
H63TH-A25KDCLNR/L12	●	●	CNM○ CNG○ NP-CN○A	1204○○	125	82	17	11°	32	1.1	LLSCP42	LLP14	DCK2613	DCS1	DC0621T	TKY20F
H63TH-**A32LDCLNR/L12**	●	●			140	100	22	13°	40	1.4	LLSCN42	LLP14	DCK2613	DCS1	DC0621T	TKY20F

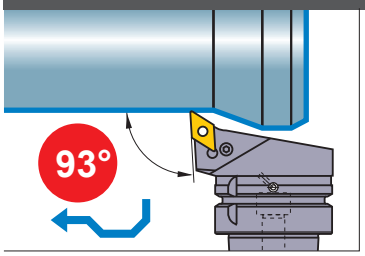
*1 Clamp Torque (N • m) : DC0621T=5.0
*2 WT : Tool Weight

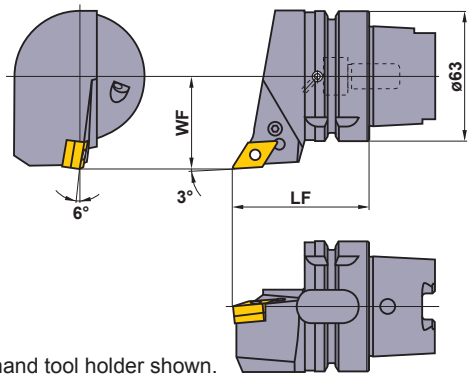
● : Inventory maintained in Japan.

DCLN type inserts	➤ A092—A097
CBN & PCD inserts	➤ B022—B024, B055
RECOMMENDED CUTTING CONDITIONS	➤ A070

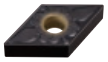
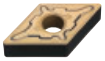
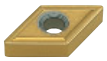
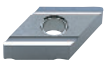
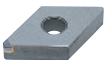
PDJN

External turning • Copying





Right hand tool holder shown.

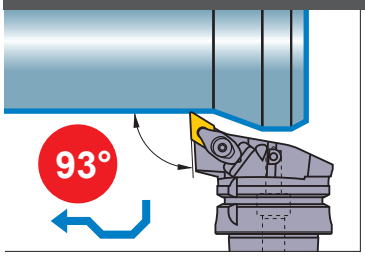
Finish	Light	Medium
FH	LP	MP
		
(15)	(15)	(15)
Medium	**Medium – Rough**	**Stainless**
MK	RP	MS
		
(15)	(15)	(15)
G Class	**CBN**	
R/L		
		
(15)	(15)	

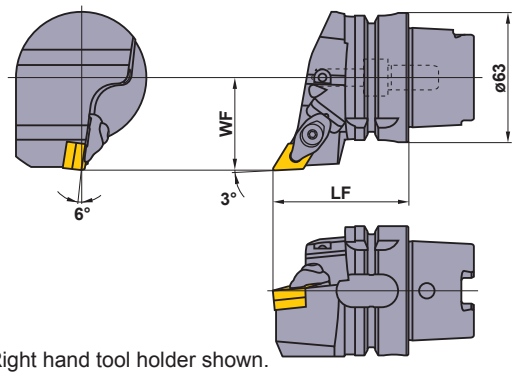
Order Number	Stock		Insert Number		Dimensions (mm)		∗3 WT (kg)	∗2			∗1	
	R	L			LF	WF		Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
H63TH-PDJNR/L-DX15	●	●	DNM○ DNG○ NP-DN○A	1504○○	65	45	1.2	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HKY30R

∗1 Clamp Torque (N • m) : LLCS108=3.3
∗2 Please use shim no. LLSDN42 with 6.35mm thick inserts. When using 6.35mm thick inserts, the shim should be ordered separately.
∗3 WT : Tool Weight

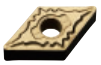
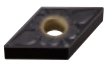
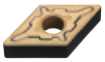
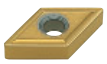
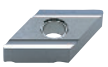
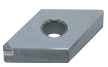
DDJN

External turning • Copying ***DOUBLE CLAMP type***





Right hand tool holder shown.

Finish	Light	Medium
FH	LP	MP
		
(15)	(15)	(15)
Medium	**Medium – Rough**	**Stainless**
MK	RP	MS
		
(15)	(15)	(15)
G Class	**CBN**	
R/L		
		
(15)	(15)	

Order Number	Stock		Insert Number		Dimensions (mm)		∗3 WT (kg)	∗2				∗1	
	R	L			LF	WF		Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
H63TH-DDJNR/L-DX15	●	●	DNM○ DNG○ NP-DN○A	1504○○	65	45	1.2	LLSDN43 (LLSDN42)	LLP24	DCK2613	DCS1	DC0621T	TKY20F

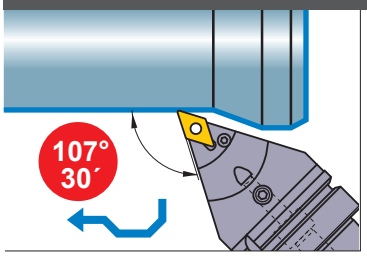
∗1 Clamp Torque (N • m) : DC0621T=5.0
∗2 Please use shim no. LLSDN42 with 6.35mm thick inserts. When using 6.35mm thick inserts, the shim should be ordered separately.
∗3 WT : Tool Weight

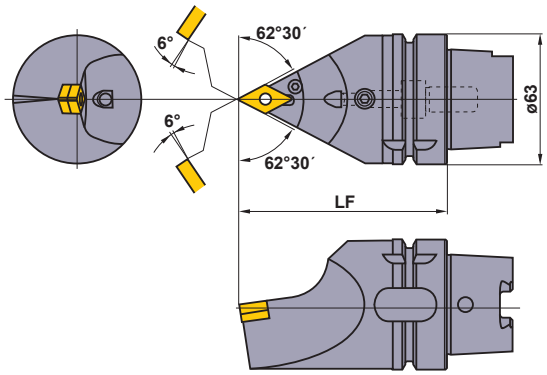
CBN & PCD inserts	➤ B025–B027, B055	RECOMMENDED CUTTING CONDITIONS	➤ A070
PDJN type inserts	➤ A098–A103	SPARE PARTS	➤ P001
DDJN type inserts	➤ A098–A103	TECHNICAL DATA	➤ Q001

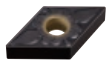
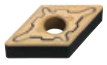
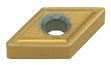
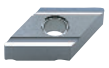
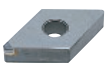
FOR MULTI-TASK MACHINES

PDNN

External turning • Copying





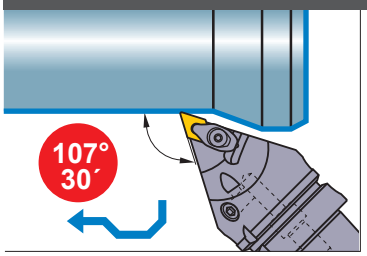
Finish	Light	Medium
FH	LP	MP
		
(15)	(15)	(15)
Medium	**Medium–Rough**	**Stainless**
MK	RP	MS
		
(15)	(15)	(15)
G Class	**CBN**	
R/L		
		
(15)	(15)	

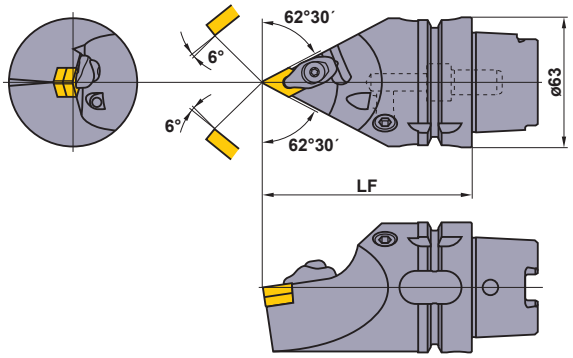
Order Number	Stock	Insert Number		Dimensions (mm) LF	∗3 WT (kg)	∗2 Shim	Shim Pin	Clamp Lever	∗1 Clamp Screw	Plug	Wrench
H63TH-PDNNN-H15	●	DNM○ DNG○ NP-DN○A	1504○○	100	1.6	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HGM-PT1/8	HKY30R
H63TH-PDNNN-L15	●			140	2.5	LLSDN43 (LLSDN42)	LLP14	LLCL24	LLCS108	HGM-PT1/8	HKY30R

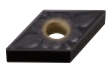
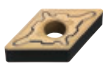
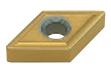
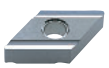
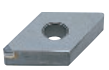
∗1 Clamp Torque (N • m) : LLCS108=3.3
∗2 Please use shim no. LLSDN42 with 6.35mm thick inserts. When using 6.35mm thick inserts, the shim should be ordered separately.
∗3 WT : Tool Weight

DDNN

External turning • Copying ***DOUBLE CLAMP type***





Finish	Light	Medium
FH	LP	MP
		
(15)	(15)	(15)
Medium	**Medium–Rough**	**Stainless**
MK	RP	MS
		
(15)	(15)	(15)
G Class	**CBN**	
R/L		
		
(15)	(15)	

Order Number	Stock	Insert Number		Dimensions (mm) LF	∗3 WT (kg)	∗2 Shim	Shim Pin	Clamp Bridge	Spring	∗1 Clamp Screw	Wrench
H63TH-DDNNN-H15	●	DNM○ DNG○ NP-DN○A	1504○○	100	1.6	LLSDN43 (LLSDN42)	LLP24	DCK2613	DCS1	DC0621T	TKY20F
H63TH-DDNNN-L15	●			140	2.5	LLSDN43 (LLSDN42)	LLP24	DCK2613	DCS1	DC0621T	TKY20F

∗1 Clamp Torque (N • m) : DC0621T=5.0
∗2 Please use shim no. LLSDN42 with 6.35mm thick inserts. When using 6.35mm thick inserts, the shim should be ordered separately.
∗3 WT : Tool Weight

HSK-T TOOLS

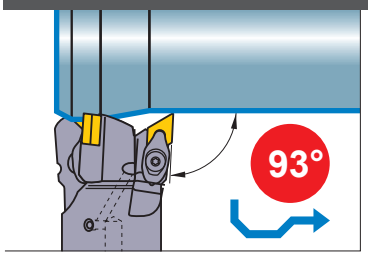
● : Inventory maintained in Japan.

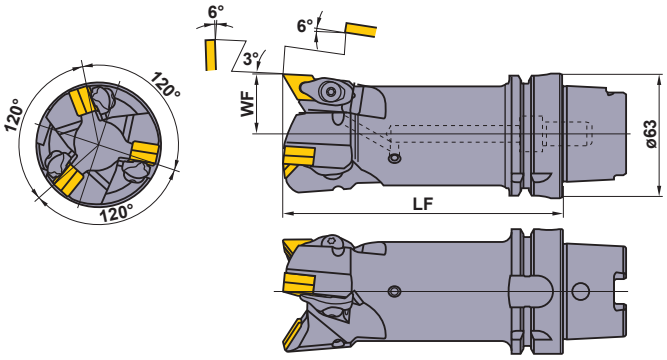
CBN & PCD inserts	➤ B025–B027, B055
PDNN type inserts	➤ A098–A103
DDNN type inserts	➤ A098–A103
RECOMMENDED CUTTING CONDITIONS	➤ A070

DDJN

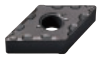
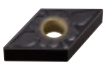
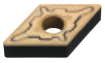
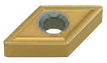
DOUBLE CLAMP type

External turning • Facing





Left hand tool holder only.

Finish	Light
FH	LP
	
(15)	(15)
Medium	**Medium**
MP	MK
	
(15)	(15)
Medium – Rough	**Stainless**
RP	MS
	
(15)	(15)

Order Number	Stock	Insert Number		Dimensions (mm)		∗3 WT (kg)	∗2				∗1	
	L			LF	WF		Shim	Shim Pin	Clamp Bridge	Spring	Clamp Screw	Wrench
H63TH-DDJNL-L15-3	●	DNM○ DNG○ NP-DN○A	1504○○	140	30	2.2	LLSDN43 (LLSDN42)	LLP24	DCK2613	DCS1	DC0621T	TKY20F

∗1 Clamp Torque (N • m) : DC0621T=5.0
∗2 Please use shim no. LLSDN42 with 6.35mm thick inserts. When using 6.35mm thick inserts, the shim should be ordered separately.
∗3 WT : Tool Weight

HSK-T TOOLS

DDNN type inserts ➤ A098–A103
CBN & PCD inserts ➤ B025–B027, B055
RECOMMENDED CUTTING CONDITIONS ➤ A070
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

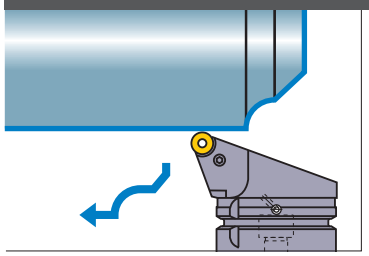
FOR MULTI-TASK MACHINES

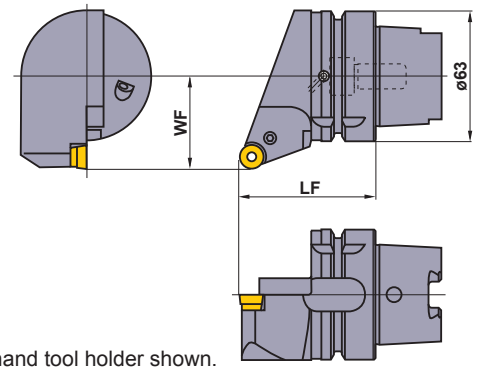
PRGC

External turning • Facing • Copying

Medium

(12)





Right hand tool holder shown.

Order Number	Stock		Insert Number		Dimensions (mm)		∗2 WT (kg)				∗1	
	R	L			LF	WF		Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
H63TH-PRGCR/L-DX12	●	●	RCMX	1204M0	65	45	1.2	LLSRN123	LLP13	LLCL112	LLCS106	HKY25R

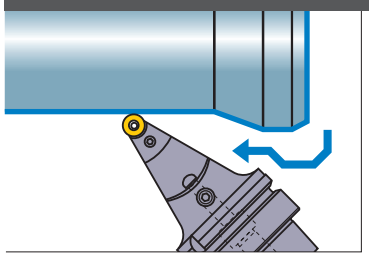
∗1 Clamp Torque (N • m) : LLCS106=2.2
∗2 WT : Tool Weight

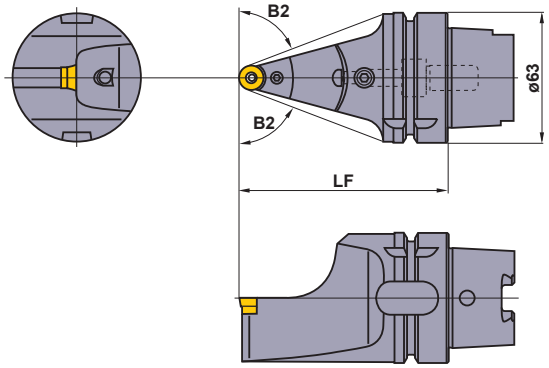
PRDC

External turning • Facing • Copying

Medium

(12)





Order Number	Stock	Insert Number		Dimensions (mm)		∗2 WT (kg)				∗1		
				LF	B2		Shim	Shim Pin	Clamp Lever	Clamp Screw	Plug	Wrench
H63TH-PRDCN-H12	●	RCMX	1204M0	100	69°	1.4	LLSRN123	LLP13	LLCL112	LLCS106	HGM-PT1/8	HKY25R
H63TH-PRDCN-**L12**	●			140	75°	2.3	LLSRN123	LLP13	LLCL112	LLCS106	HGM-PT1/8	HKY25R

∗1 Clamp Torque (N • m) : LLCS106=2.2
∗2 WT : Tool Weight

RECOMMENDED CUTTING CONDITIONS

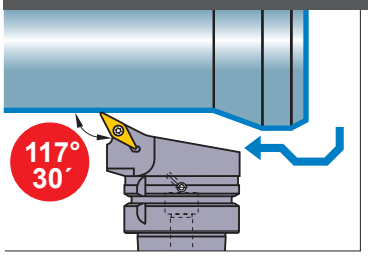
	Work Material	Hardness	Cutting Mode	Breaker	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	Medium Cutting	**Standard**	**UE6110**	205—350
	Carbon Steel • Alloy Steel	180HB—350HB	Medium Cutting	**Standard**	**UE6110**	150—260
M	Stainless Steel	≤200HB	Medium Cutting	**Standard**	**US735**	70—130

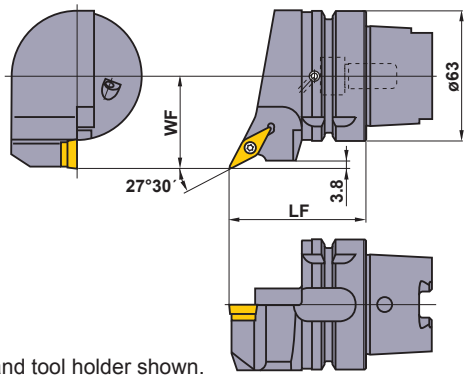
● : Inventory maintained in Japan.

PRGC type inserts ➤ A137
PRDC type inserts ➤ A137

SVPB

Facing • Copying





Right hand tool holder shown.

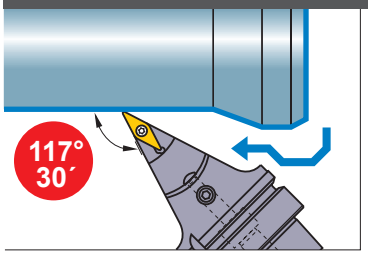
Finish	Light
R/L-F	SV
 (16)	 (16)
Medium	**Medium**
MV	MP
 (16)	 (16)
CBN	
 (16)	

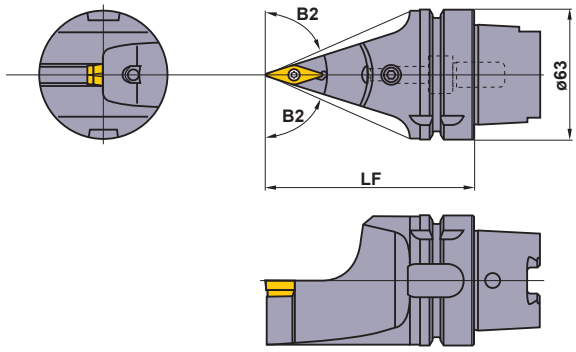
Order Number	Stock		Insert Number		Dimensions (mm)		∗2 WT (kg)			∗1 	
	R	L			LF	WF		Shim	Shim Pin	Clamp Screw	Wrench
H63TH-SVPBR/L-DX16	●	●	VBMT VBGT	1604○○	65	45	1.1	SPSVN32	BCP141	TS35D	TKY15F

∗1 Clamp Torque (N • m) : TS35D=3.5
∗2 WT : Tool Weight

SVVB

Facing • Copying





Finish	Light
R/L-F	SV
 (16)	 (16)
Medium	**Medium**
MV	MP
 (16)	 (16)
CBN	
 (16)	

Order Number	Stock	Insert Number		Dimensions (mm)		∗2 WT (kg)			∗1 		
				LF	B2		Shim	Shim Pin	Clamp Screw	Plug	Wrench
H63TH-SVVBN-H16	●	VBMT VBGT	1604○○	100	66°30'	1.3	SPSVN32	BCP141	TS35D	HGM-PT1/8	TKY15F
H63TH-SVVBN-**L16**	●			140	72°30'	2.2	SPSVN32	BCP141	TS35D	HGM-PT1/8	TKY15F

∗1 Clamp Torque (N • m) : TS35D=3.5
∗2 WT : Tool Weight

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Cutting Mode	Breaker	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	Finish Cutting	**F**	**AP25N**	250 (150—300)
			Medium Cutting	**MV**	**UE6020**	200 (150—250)
	Carbon Steel Alloy Steel	180HB—350HB	Finish Cutting	**F**	**AP25N**	210 (150—260)
			Medium Cutting	**MV**	**UE6020**	170 (120—210)
M	Stainless Steel	≤200HB	Medium Cutting	**MV**	**US735**	100 (70—120)
K	Gray Cast Iron	Tensile Strength≤350MPa	Medium Cutting	**MV**	**UE6020**	170 (140—200)

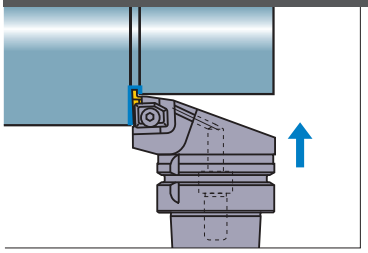
SVPB type inserts ➤ **A148—A150**
SVVB type inserts ➤ **A148—A150**
CBN inserts ➤ **B048**

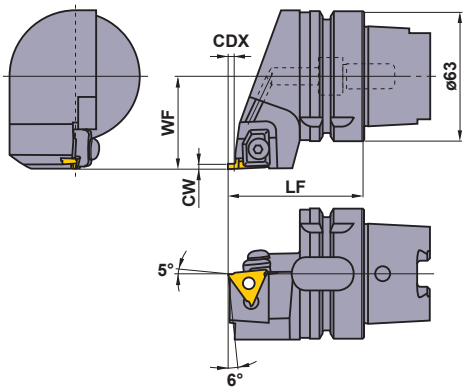
SPARE PARTS ➤ **P001**
TECHNICAL DATA ➤ **Q001**

FOR MULTI-TASK MACHINES

MG

Grooving





Right hand tool holder shown.

Order Number	Stock R	Stock L	Insert Number		Dimensions (mm) CW	CDX	LF	WF	*2 WT (kg)	Clamp Bridge	*1 Clamp Screw	Spring	Wrench
H63TH-MGHR/L-DX4315	●	●	MGTR/L	43125 I 43470	1.25	1.2	65	45	1.2	MTK1R/L	HBH06020	MES3	HKY40R
					1.45	1.5							
					1.5≤CW≤2.3	3							
H63TH-MGHR/L-DX4323	●	●			2.3<CW≤3.3	4.5							
H63TH-MGHR/L-DX4333	●	●			3.3<CW≤4.7	4.5							

*1 Clamp Torque (N • m) : HBH06020=7.0
*2 WT : Tool Weight

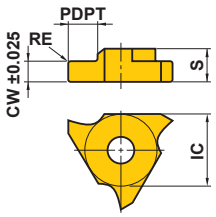
RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)
P	Carbon Steel Alloy Steel	180–350HB	**VP20MF**	120 (100–140)	0.10 (0.03–0.18)
			NX2525	130 (100–160)	0.12 (0.03–0.2)
M	Stainless Steel	≤200HB	**VP20MF**	120 (100–140)	0.10 (0.03–0.18)
K	Gray Cast Iron	Tensile Strength≤350MPa	**VP20MF**	120 (100–140)	0.10 (0.03–0.18)

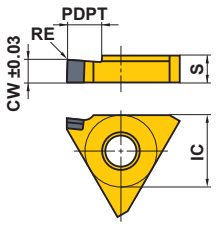
● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(10 inserts in one case) (CBN inserts are available in 1 piece in one case.)

INSERTS FOR MG TYPE

Order Number	Stock							Dimensions (mm)					Geometry
	Coated		Cermet		Carbide		CBN						
	VP20MF		NX2525		UTi20T		MB8025	CW	PDPT	IC	S	RE	
	R	L	R	L	R	L	R						
MGTR/L43125	●	●	●	□	●	●	●	1.25	1.2	12.7	4.76	0.2	**MGTR/L...**
MGTR/L**43145**	●	□		□	●	□		1.45	1.5	12.7	4.76	0.2	
MGTR/L**43150**	●	●	●	●	●	●	●	1.5	3	12.7	4.76	0.2	
MGTR/L**43175**	●	●	●	□	●	●		1.75	3	12.7	4.76	0.2	
MGTR/L**43200**	●	●	●	●	●	●	●	2	3	12.7	4.76	0.2	
MGTR/L**43230**	●	●	●	●		●		2.3	3	12.7	4.76	0.2	
MGTR/L**43250**	●	●	●	●	●	●	●	2.5	4.5	12.7	4.76	0.3	
MGTR/L**43260**	●	□	□		●	●		2.6	4.5	12.7	4.76	0.3	
MGTR/L**43270**	●	□			●	□		2.7	4.5	12.7	4.76	0.3	
MGTR/L**43280**		●		□	●	●		2.8	4.5	12.7	4.76	0.3	
MGTR/L**43300**	●	●	●	●	●	●	●	3	4.5	12.7	4.76	0.3	
MGTR/L**43320**	●				●	●		3.2	4.5	12.7	4.76	0.3	
MGTR/L**43330**		●		□	●	●		3.3	4.5	12.7	4.76	0.3	
MGTR/L**43350**	●	□	●	□	●	●	●	3.5	4.5	12.7	4.76	0.3	
MGTR/L**43400**	●	●	●		●	●	●	4	4.5	12.7	4.76	0.3	
MGTR/L**43420**	●	□	□		●	□		4.2	4.5	12.7	4.76	0.4	
MGTR/L**43430**	●	□	□		●	●		4.3	4.5	12.7	4.76	0.4	
MGTR/L**43450**	●	●	●	●	●	●		4.5	4.5	12.7	4.76	0.4	
MGTR/L**43470**	●	□	□	□	●	□		4.7	4.5	12.7	4.76	0.4	



CBN Insert



Right hand insert shown.

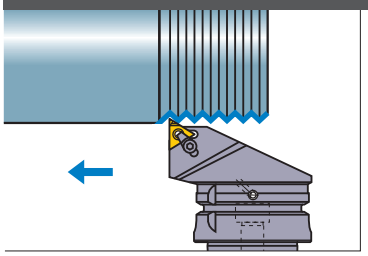
HSK-T TOOLS

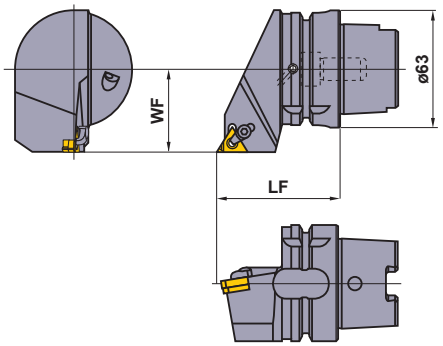
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

FOR MULTI-TASK MACHINES

MMTE

Threading





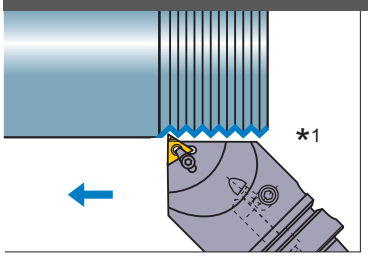
Right hand tool holder only.

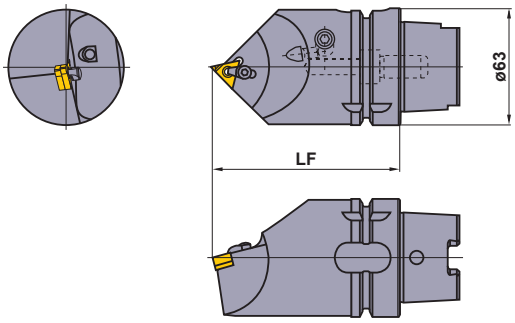
Order Number	Stock	Insert Number		Dimensions (mm)		∗2 WT (kg)	Clamp Bridge	∗1 Clamp Screw	Stop Ring	Shim	∗1 Shim Screw	①② Wrench
	R			LF	WF							
H63TH-MMTER-DX16	●	MMT16ER	○○○○○	65	45	1.2	SETK51	SETS51	CR4	CTE32TP15	HFC03008	①TKY15F ②HKY20R

∗1 Clamp Torque (N • m) : SETS51=3.5, HFC03008=1.5
∗2 WT : Tool Weight

MMTEN

Threading





Tool holder for right hand insert only.

Order Number	Stock	Insert Number		Dimensions (mm)	∗3 WT (kg)	Clamp Bridge	∗2 Clamp Screw	Stop Ring	Shim	∗2 Shim Screw	Plug	①② Wrench
				LF								
H63TH-MMTENR-H16	●	MMT16ER	○○○○○	100	1.7	SETK51	SETS51	CR4	CTE32TP15	HFC03008	HGM-PT1/8	①TKY15F ②HKY20R
H63TH-MMTENR-L16	●			140	2.7	SETK51	SETS51	CR4	CTE32TP15	HFC03008	HGM-PT1/8	①TKY15F ②HKY20R

∗1 For use with B axis tilted at 45 degrees.
∗2 Clamp Torque (N • m) : SETS51=3.5, HFC03008=1.5
∗3 WT : Tool Weight

RECOMMENDED CUTTING CONDITIONS

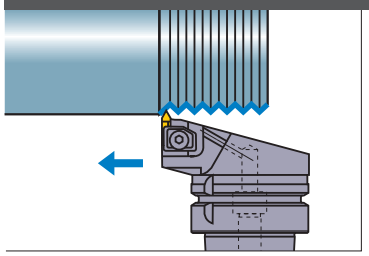
	Work Material	Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	**VP10MF**	150 (70—230)
			VP15TF	100 (60—140)
	Carbon Steel Alloy Steel	180—350HB	**VP10MF**	140 (80—200)
			VP15TF	100 (60—140)
M	Stainless Steel	≤200HB	**VP10MF**	130 (80—180)
			VP15TF	80 (40—120)
K	Gray Cast Iron	Tensile Strength≤350MPa	**VP10MF**	140 (80—200)
			VP15TF	90 (60—120)

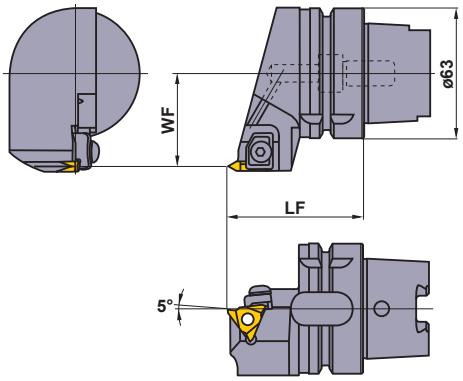
● : Inventory maintained in Japan.
(5 inserts in one case)

APPLICABLE INSERT ➤ **G014, G016, G018, G020**

MT

Threading





Right hand tool holder shown.

Order Number	Stock		Insert Number		Dimensions (mm)		∗2 WT (kg)		∗1		
	R	L			LF	WF		Clamp Bridge	Clamp Screw	Spring	Wrench
H63TH-MTHR/L-DX43	●	●	MTTR/L	43○○○○	65	45	1.2	MTK1R/L	HBH06020	MES3	HKY40R

∗1 Clamp Torque (N • m) : HBH06020=7.0
∗2 WT : Tool Weight

HSK-T TOOLS

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	**UP20M**	140 (100—180)
			NX2525	200 (150—250)
			UTi20T	120 (100—150)
	Carbon Steel Alloy Steel	180HB—350HB	**UP20M**	120 (100—150)
			NX2525	170 (150—200)
			UTi20T	100 (70—120)
M	Stainless Steel	≤200HB	**UP20M**	120 (80—150)
			UTi20T	100 (70—130)
K	Gray Cast Iron	Tensile Strength≤350MPa	**UP20M**	80 (60—100)
			UTi20T	80 (60—100)
			HTi10	100 (70—130)

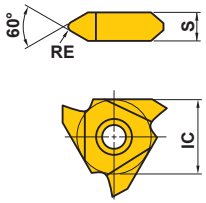
● : Inventory maintained in Japan.
(10 inserts in one case)

APPLICABLE INSERT ➤ H018
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

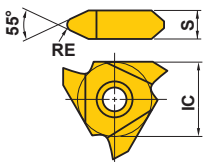
FOR MULTI-TASK MACHINES

INSERTS FOR MT TYPE

Type	Order Number	Class	Coated	Cermet		Carbide		ISO Pitch mm (thread/inch)	Dimensions (mm)			Geometry
			UP20M	NX2525		UTi20T	HTi10		IC	S	RE	
General • 60°	**MTTR436000**	G		●		●		—0.8	12.7	4.76	0	**MTTR/L(60°)** (G Class)
	MTTR436001	G	●	●		●	●	1.0—1.75	12.7	4.76	0.1	
	MTTL436001	G	●			●	●	1.0—1.75	12.7	4.76	0.1	
	MTTR436002	G	●	●		●	●	2.0—2.5	12.7	4.76	0.2	
	MTTL436002	G		●		●		2.0—2.5	12.7	4.76	0.2	
	MTTR436003	G	□	●		●	●	3.0—3.5	12.7	4.76	0.3	
	MTTL436003	G		●		●		3.0—3.5	12.7	4.76	0.3	
	MTTR436004	G		●		●		4.0—4.5	12.7	4.76	0.4	
General • 55°	**MTTR435501**	G		●		●		(28—10)	12.7	4.76	0.1	**MTTR/L(55°)** (G Class)
	MTTR435502	G		●		●		(16—8)	12.7	4.76	0.2	
	MTTR435503	G		●		●		(11—8)	12.7	4.76	0.3	



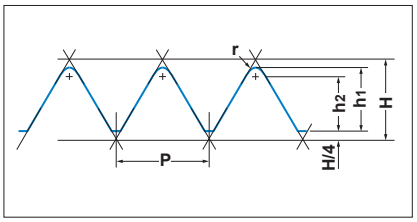
Right hand insert shown.



Right hand insert shown.

STANDARD DEPTH OF CUT

●The chart on the right shows the cutting depths when machining external ISO metric screw threads.
●When you use cermet grades or cut stainless steel, please increase the number of passes by 2—3 times.



METRIC THREAD

Unit : mm

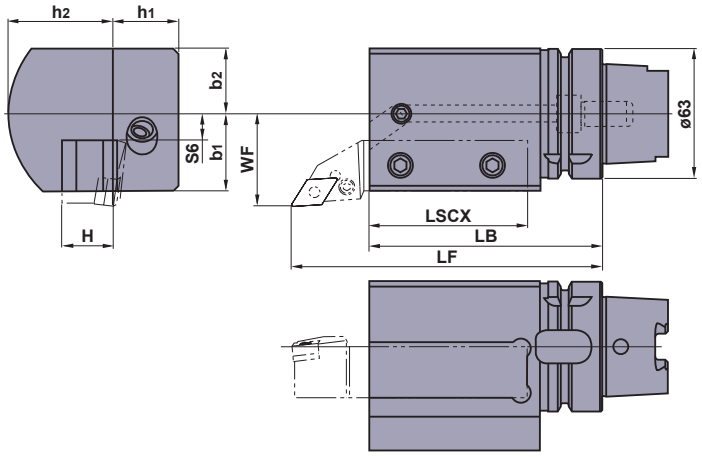
P (Pitch)		0.75	1.00	1.25	1.50	1.75	2.00	2.50	3.00	3.50	4.00	4.50
h_1		0.46	0.61	0.77	0.92	1.07	1.23	1.53	1.84	2.15	2.45	2.76
h_2		0.35	0.47	0.59	0.70	0.82	0.94	1.17	1.41	1.65	1.87	2.11
r (Corner Radius)		0.11	0.14	0.18	0.22	0.25	0.29	0.36	0.43	0.50	0.58	0.65
Number of Passes	1	0.18	0.20	0.20	0.25	0.25	0.25	0.30	0.30	0.35	0.35	0.40
	2	0.13	0.15	0.18	0.20	0.20	0.25	0.25	0.25	0.30	0.30	0.35
	3	0.10	0.10	0.12	0.15	0.20	0.20	0.20	0.25	0.25	0.25	0.30
	4	0.05	0.10	0.12	0.15	0.15	0.15	0.20	0.20	0.20	0.25	0.25
	5		0.06	0.10	0.10	0.12	0.15	0.15	0.20	0.20	0.25	0.25
	6			0.05	0.07	0.10	0.10	0.10	0.15	0.20	0.20	0.20
	7					0.05	0.08	0.10	0.15	0.15	0.20	0.20
	8						0.05	0.10	0.10	0.15	0.15	0.15
	9							0.08	0.10	0.10	0.15	0.15
	10							0.05	0.09	0.10	0.10	0.15
	11								0.05	0.10	0.10	0.10
	12									0.05	0.10	0.10
	13										0.05	0.10
	14											0.06

(Note) The first pass causes a high load on the cutting edge.
In order to avoid damage, keep the depth of cut to 0.4—0.5mm maximum.

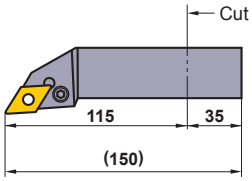
● : Inventory maintained in Japan. □ : Non stock, produced to order only.
▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

EXTERNAL TURNING TOOL HOLDERS

External turning • Facing



■This holder is for 25×25 size tools.
Please shorten the tool as shown below before use.



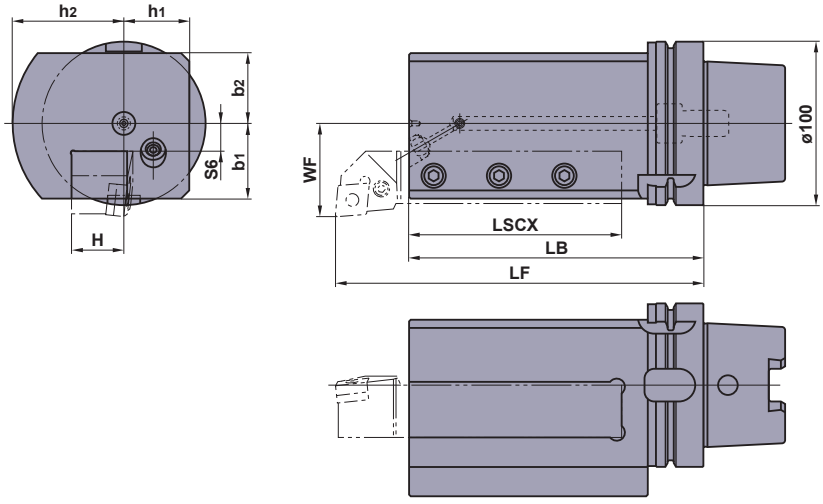
Right hand tool holder shown.

Order Number	Stock		Dimensions (mm)										WT* (kg)		
	R	L	LF	LB	LSCX	H	h1	h2	WF	S6	b1	b2		Clamp Screw	Plug
H63TH-EV2525R/L-112	●	●	150	112	77	25	32	53	45	13	38	32	3.9	HSS12025	HGM-PT1/8

* WT : Tool Weight

EXTERNAL TURNING TOOL HOLDERS

External turning • Facing



■This holder is for 32×32 and 32×25 size tools.

Right hand tool holder shown.

Order Number	Stock		Dimensions (mm)										WT* (kg)		
	R	L	LF	LB	LSCX	H	h1	h2	WF	S6	b1	b2		Clamp Screw	Plug
H100TH-EV3232R/L-180	●	●	220	180	130	32	40	68	57	17	46	43	11.7	HSS14035	HSS06006

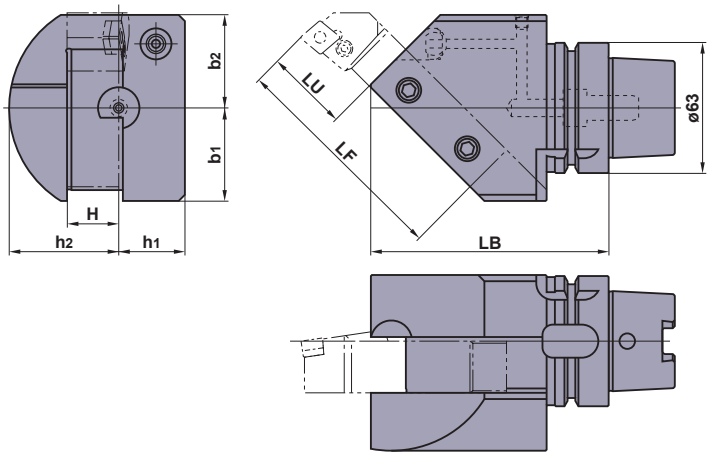
* WT : Tool Weight
(Note) Possible to fit a 25 x 25 tool by using a 7mm plate.

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

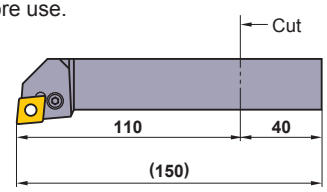
FOR MULTI-TASK MACHINES

EXTERNAL TURNING TOOL HOLDERS

External turning • Facing



■This holder is for 25×25 size tools.
Please shorten the tool as shown below before use.



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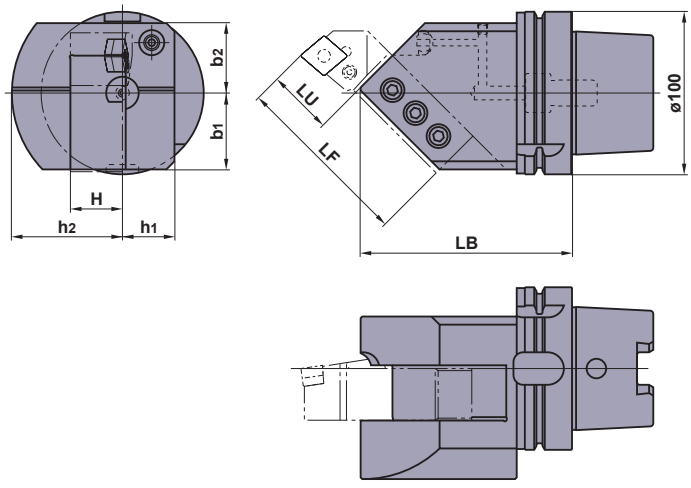
Right hand tool holder shown.

Order Number	Stock		Dimensions (mm)								WT* (kg)	Clamp Screw	Plug
	R	L	LB	LU	LF	H	h1	h2	b1	b2			
H63TH-EN2525R/L-115	●	●	115	40	110	25	32	53	45	45	3.7	HSS12030	HSS06006

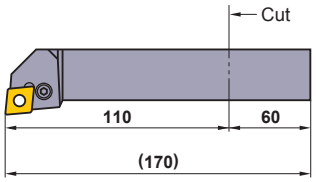
∗ WT : Tool Weight

EXTERNAL TURNING TOOL HOLDERS

External turning • Facing



■This holder is for 32×32 and 32×25 size tools.
Please shorten the tool as shown below before use.



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Right hand tool holder shown.

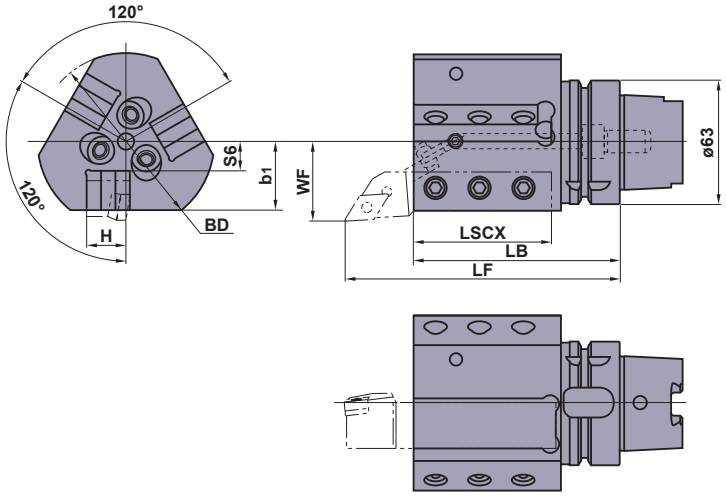
Order Number	Stock		Dimensions (mm)								WT* (kg)	Clamp Screw	Plug
	R	L	LB	LU	LF	H	h1	h2	b1	b2			
H100TH-EN3232R/L-130	●	●	130	40	110	32	32	68	47	43	6.6	HSS14030	HSS06006

∗ WT : Tool Weight
(Note) Possible to fit a 25 x 25 tool by using a 7mm plate.

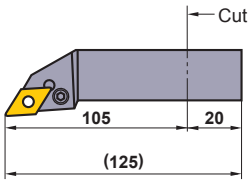
● : Inventory maintained in Japan.

EXTERNAL TURNING TOOL HOLDERS

External turning • Facing



■This holder is for 20×20 size tools.
Please shorten the tool as shown below before use.



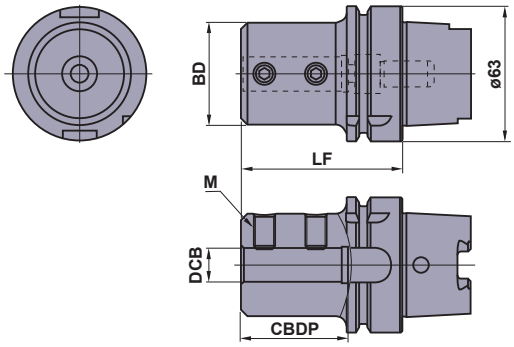
Right hand tool holder shown.

Order Number	Stock		Dimensions (mm)								WT* (kg)			
	R	L	LF	LB	LSCX	H	BD	WF	S6	b1		Clamp Screw	Nozzle Plug	Plug
H63TH-EV2020R/L-105-3	●	●	140	105	70	20	90	40	15	35	2.9	HSS12030	HSS05012	HSS06006

* WT : Tool Weight

BORING BAR HOLDERS

Boring



Order Number	Stock	Dimensions (mm)					WT* (kg)	
		BD	DCB	LF	CBDP	M		Clamp Screw
H63TH-B08-65	●	28	8	65	40	M8	0.9	HSS08010
H63TH-B10-70	●	35	10	70	45	M8	1.0	HSS08012
H63TH-B12-70	●	42	12	70	45	M8	1.1	HSS08012
H63TH-B16-75	●	48	16	75	50	M10	1.3	HSS10016
H63TH-B20-75	●	52	20	75	50	M10	1.4	HSS10016
H63TH-B25-83	●	62	25	83	58	M12	1.7	HSS12016
H63TH-B32-87	●	62	32	87	62	M12	1.7	HSS12016
H63TH-B40-97	●	65	40	97	72	M16	1.8	HSS16012

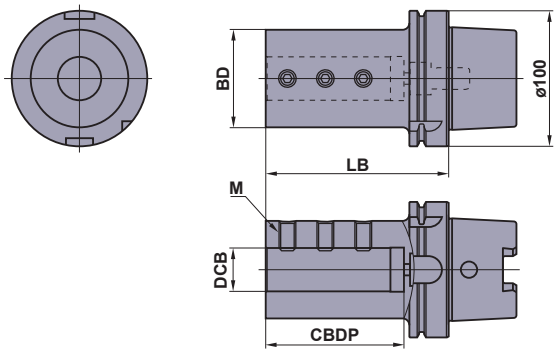
* WT : Tool Weight
(Note) Please shorten a boring bar to the required shank length. This holder is for boring bars and indexable type drills.

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

FOR MULTI-TASK MACHINES

BORING BAR HOLDERS

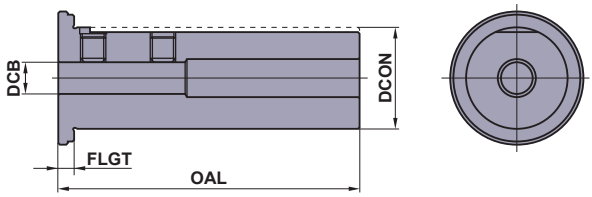
Boring



Order Number	Stock	Dimensions (mm)					WT* (kg)	Clamp Screw
		BD	DCB	LB	CBDP	M		
H100TH-B25-120	●	62	25	120	88	12	3.9	HSS12016
H100TH-B32-135	●	72	32	135	102	12	4.8	HSS12018
H100TH-B40-150	●	82	40	150	117	16	5.9	HSS16020
H100TH-B50-180	●	92	50	180	147	16	7.7	HSS16020

* WT : Tool Weight
(Note) Please shorten a boring bar to the required shank length. This holder is for boring bars and indexable type drills.

BORING BAR SLEEVES FOR H100TH-B32-135



Order Number	Stock	Dimensions (mm)				WT* (kg)	Clamp Screw
		DCB	DCON	OAL	FLGT		
SL3208-90	●	8	32	95	5	0.6	HSS06008
SL3210-90	●	10	32	95	5	0.5	HSS08008
SL3212-90	●	12	32	95	5	0.5	HSS08008
SL3216-90	●	16	32	95	5	0.5	HSS08006
SL3220-90	●	20	32	95	5	0.4	HSS08005

* WT : Tool Weight
(Note) These sleeves are only compatible with H100TH-B32-135 holder.

● : Inventory maintained in Japan.

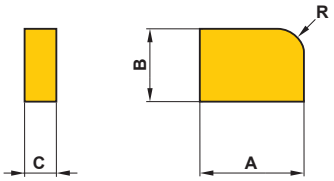
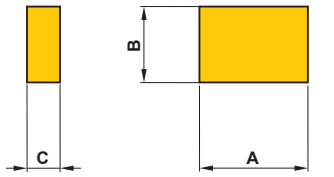
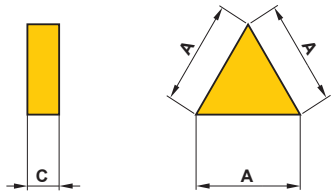
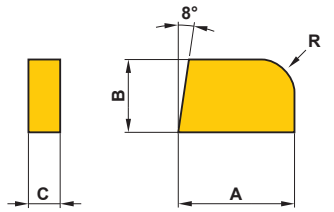
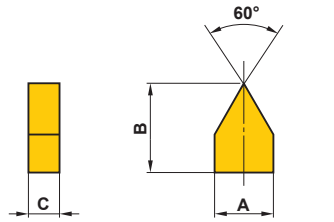
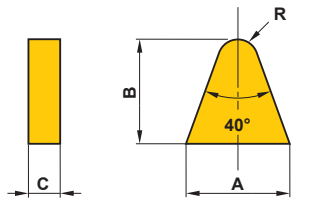
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

TURNING TOOLS

BRAZED TOOLS

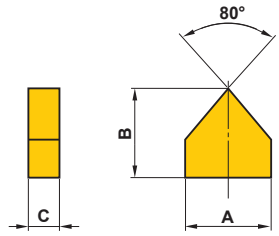
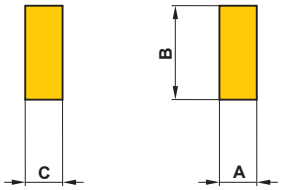
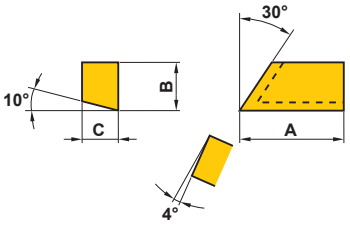
CARBIDE BLANK FOR TURNING TOOLS I002
CARBIDE RODS (MITSUBISHI STANDARD) I004
BRAZED TOOL HOLDERS I005

CARBIDE BLANK FOR TURNING TOOLS

Type	Geometry	Order Number	Stock								Dimensions (mm)			
			P			M	K							
			STi10 (HW-P10) *	STi20 (HW-P20) *	STi40T (HW-P40) *	UTi20T (HW-M20) *	HTi03A (HW-K01) *	HTi05T (HW-K01) *	HTi10 (HW-K10) *	HTi20 (HW-K20) *	A	B	C	R
01 Type		01-0	●	●	□	●	●	●	●	□	10	6	3	4
		01-1	●	●	●	●	●	●	●	●	13	9	3	5
		01-2	●	●	●	●	●	●	●	●	16	11	4	5
		01-3	●	●	●	●	□	□	●	●	19	13	5	5
		01-4	□	●	●	●	□	□	□	□	22	15	6	8
		01-5	□	□	□	●	□	□	□	□	25	17	7	8
For 31,32 Type		01-6	□	□	□	□	□	□	□	□	30	20	8	8
02 Type		02-0	●	●	●	●	●	●	●	●	10	6	3	—
		02-1	●	●	●	●	●	●	●	●	13	9	3	—
		02-2	●	●	●	●	●	●	●	●	16	11	4	—
		02-3	●	●	●	●	●	●	●	●	19	13	5	—
		02-4	●	●	●	●	□	●	●	●	22	15	6	—
		02-5	□	●	●	●	□	●	●	●	25	17	7	—
For 41,42 Type		02-6	□	●	●	●	□	●	●	●	30	20	8	—
03 Type		03-0	□	●	□	●	□	□	□	□	10	—	3	—
		03-1	□	●	□	●	●	□	●	□	12	—	3	—
		03-2	□	●	□	●	●	□	●	□	15	—	4	—
		03-3	□	●	□	●	□	●	●	●	18	—	5	—
		03-4	□	□	□	□	□	□	□	□	24	—	6	—
		03-5	□	□	□	□	□	□	□	□	24	—	7	—
For 37,38,47 Type		03-6	□	□	□	□	□	□	□	□	28	—	8	—
04 Type		04-0	●	●	□	●	●	●	●	●	10	6	3	4
		04-1	●	●	□	●	●	●	●	●	13	9	3	5
		04-2	●	●	●	●	●	●	●	●	16	11	4	5
		04-3	●	●	●	●	●	●	●	●	19	13	5	5
		04-4	□	●	□	●	□	□	●	□	22	15	6	8
		04-5	□	□	□	□	□	□	□	□	25	17	7	8
For 33,34 Type		04-6	□	□	□	□	□	□	□	□	30	20	8	8
05 Type		05-1	□	●	□	●	□	□	●	□	5	8	3	—
		05-2	●	●	□	●	□	□	●	□	6	10	4	—
		05-3	●	●	□	●	□	□	●	□	7	12	5	—
		05-4	□	●	□	●	□	□	□	□	9	16	6	—
		05-5	□	□	□	□	□	□	□	□	10	18	7	—
		05-6	□	□	□	□	□	□	□	□	11	20	8	—
For 49,51 Type														
06 Type		06-0	●	●	●	●	●	●	●	●	10	10	3	2
		06-1	●	●	●	●	●	●	●	●	13	13	3	2.5
		06-2	●	●	●	●	●	●	●	●	16	16	4	3
		06-3	●	●	●	●	●	●	●	●	19	19	5	4
		06-4	□	●	□	●	□	●	●	●	22	22	6	4
		06-5	□	□	□	□	□	□	□	□	25	25	7	5
		06-6	□	□	□	□	□	□	□	□	30	30	8	6
For 36,39,40 Type														

*( ) : Materials for cemented carbide tools and the classification for usage.

● : Inventory maintained in Japan. (10 inserts in one case)
□ : Non stock, produced to order only.

Type	Geometry	Order Number	Stock								Dimensions (mm)			
			P			M	K							
			STi10 (HW-P10) *	STi20 (HW-P20) *	STi40T (HW-P40) *	UTi20T (HW-M20) *	HTi03A (HW-K01) *	HTi05T (HW-K01) *	HTi10 (HW-K10) *	HTi20 (HW-K20) *	A	B	C	R
07 Type		**07-0**	●	●	□	●	□	●	●	□	10	10	3	—
		07-1	□	●	□	●	□	□	●	□	13	13	3	—
		07-2	□	●	□	●	□	□	●	□	16	16	4	—
		07-3	□	●	□	●	□	□	●	□	19	19	5	—
		07-4	□	□	□	□	□	□	□	□	25	20	6	—
		07-5	□	□	□	□	□	□	□	□	25	22	7	—
For 35 Type		**07-6**	□	□	□	□	□	□	□	□	30	25	8	—
08 Type		**08-1**	●	●	●	●	●	●	●	●	3	8	3	—
		08-3	●	●	●	●	●	●	●	●	4	13	4	—
		08-4	●	●	●	●	●	●	●	●	5	15	5	—
		08-5	●	●	●	●	□	●	●	●	6	17	6	—
		08-6	●	●	□	●	□	□	●	●	8	20	8	—
For 43 Type														
09E Type		**09E1**	●	●	□	□	□	□	□	□	20	10	7	—
For 95 Type														

*( ) : Materials for cemented carbide tools and the classification for usage.

CARBIDE RODS



LRB SERIES

Order Number	Stock			Dimensions (mm)	
	HTi10	TF15	MF10	D	L
LRB030	●	●	●	3	330
LRB040	●	●	●	4	330
LRB050	●	●	●	5	330
LRB060	●	●	●	6	330
LRB070	●	●	●	7	330
LRB080	●	●	●	8	330
LRB100	●	●	●	10	330
LRB120	●	●	●	12	330

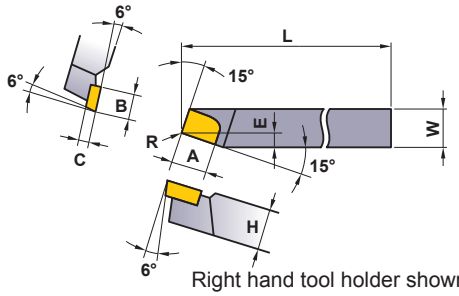
Symbol	Dimensions (mm)	Tolerance (mm)
D	0.5—2.5	+0.5 +0.2
	3—8	+0.5 +0.3
	10—12	+0.6 +0.3

Symbol	Dimensions (mm)	Tolerance (mm)	Bend (mm)
L	240	+10 0	0.15
	330	+10 0	0.3

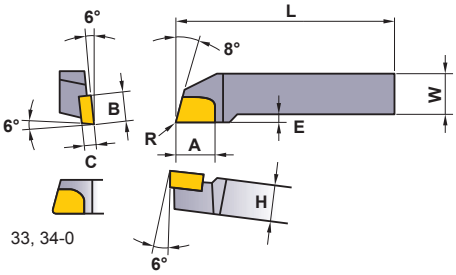
● : Inventory maintained in Japan. (LRB030~LRB080:10pcs/case LRB100&LRB120:5pcs/case)

BRAZED TOOL HOLDERS

Geometry	Order Number	R/L	Stock P STi10	Stock P STi20	Stock P STi40T	Stock M UTi20T	Stock K HTi05T	Stock K HTi10	Stock K HTi20	Dimensions (mm) Shank W	Shank H	Shank L	Shank E	Carbide A	Carbide B	Carbide C	Carbide R	Blank No.
31 Type(Right Hand) **32 Type**(Left Hand)	**31-0**	R		●		●				10	10	80	2.7	10	6	3	0.3	01-0
	32-0	L		●						10	10	80	2.7	10	6	3	0.3	01-0
	31-1	R		●		●		●		13	13	100	4	13	9	3	0.5	01-1
	32-1	L		●		●		●		13	13	100	4	13	9	3	0.5	01-1
	31-2	R		●		●		●		16	16	120	4.5	16	11	4	0.5	01-2
	32-2	L		●		●		●		16	16	120	4.5	16	11	4	0.5	01-2
	31-3	R	●	●		●	●	●	●	19	19	140	5.5	19	13	5	0.5	01-3
	32-3	L		●		●				19	19	140	5.5	19	13	5	0.5	01-3
	31-4	R	●	●		●	●	●		25	25	160	6.5	22	15	6	1	01-4
	32-4	L		●	●	●		●		25	25	160	6.5	22	15	6	1	01-4
33 Type(Right Hand) **34 Type**(Left Hand)	**33-0**	R	●	●		●	●	●	●	10	10	80	—	10	6	3	0.3	04-0
	34-0	L	●	●		●	●	●	●	10	10	80	—	10	6	3	0.3	04-0
	33-1	R	●	●	●	●	●	●	●	13	13	100	4	13	9	3	0.5	04-1
	34-1	L	●	●		●	●	●	●	13	13	100	4	13	9	3	0.5	04-1
	33-2	R	●	●	●	●	●	●	●	16	16	120	4	16	11	4	0.5	04-2
	34-2	L	●	●		●	●	●	●	16	16	120	4	16	11	4	0.5	04-2
	33-3	R	●	●	●	●	●	●	●	19	19	140	5	19	13	5	0.5	04-3
	34-3	L	●	●	●	●	●	●	●	19	19	140	5	19	13	5	0.5	04-3
	33-4	R	●	●	●	●	●	●	●	25	25	160	5	22	15	6	1	04-4
	34-4	L	●	●	●	●	●	●	●	25	25	160	5	22	15	6	1	04-4
	33-5	R		●		●				25	30	180	6	25	17	7	1	04-5
	34-5	L		●						25	30	180	6	25	17	7	1	04-5
	33-6	R		●		●				30	35	200	6	30	20	8	1	04-6
	34-6	L		●		●				30	35	200	6	30	20	8	1	04-6
35 Type	**35-0**	—	●	●		●	●	●	●	10	10	80	—	10	10	3	0.3	07-0
	35-1	—	●	●		●	●	●	●	13	13	100	—	13	13	3	0.5	07-1
	35-2	—	●	●		●	●	●	●	16	16	120	—	16	16	4	0.5	07-2
	35-3	—	●	●		●	●	●	●	19	19	140	—	19	19	5	0.5	07-3
	35-4	—		●		●	●	●		25	25	160	—	25	20	6	1	07-4
36 Type	**36-0**	—	●	●		●	●	●	●	10	10	80	—	10	10	3	2	06-0
	36-1	—	●	●		●	●	●	●	13	13	100	—	13	13	3	2.5	06-1
	36-2	—	●	●		●	●	●	●	16	16	120	—	16	16	4	3	06-2
	36-3	—	●	●	●	●	●	●	●	19	19	140	—	19	19	5	4	06-3
	36-4	—	●	●	●	●	●	●	●	25	25	160	—	22	22	6	4	06-4
	36-5	—		●				●		25	30	180	—	25	25	7	5	06-5
	36-6	—		●		●	●	●		30	35	200	—	30	30	8	6	06-6

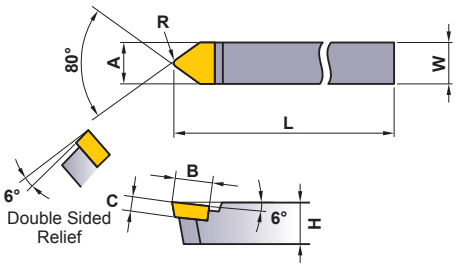


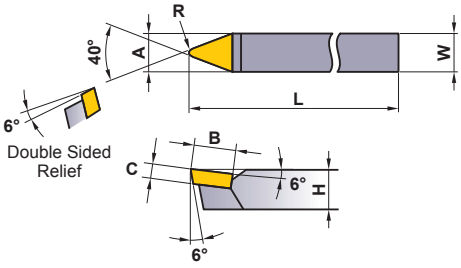
Right hand tool holder shown.



33, 34-0

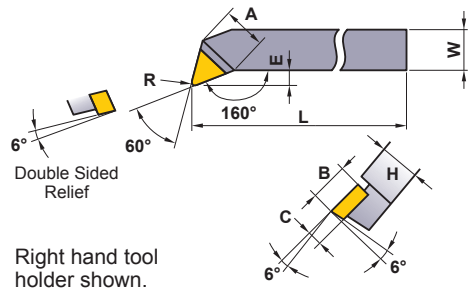
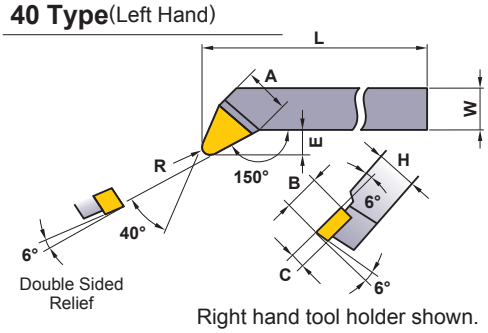
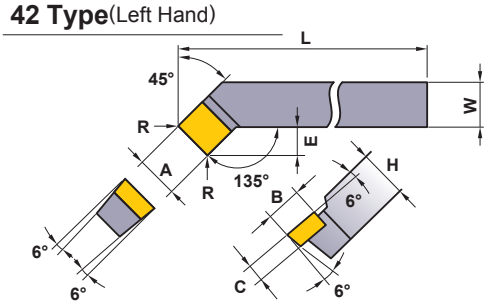
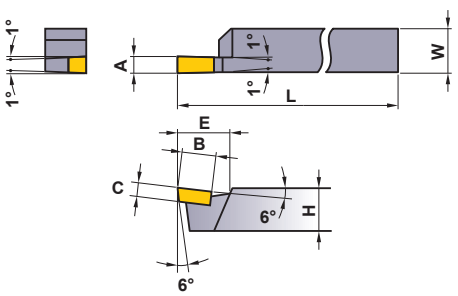
Right hand tool holder shown.





● : Inventory maintained in Japan.

BRAZED TOOL HOLDERS

Geometry	Order Number	R/L	Stock P STi10	Stock P STi20	Stock P STi40T	Stock M UTi20T	Stock K HTi05T	Stock K HTi10	Stock K HTi20	Dimensions (mm) Shank W	Shank H	Shank L	Shank E	Carbide A	Carbide B	Carbide C	Carbide R	Blank No.
37 Type(Right Hand) **38 Type**(Left Hand)  Right hand tool holder shown.	**37-1**	R	●	●		●	●	●		13	13	100	5	12	—	3	0.5	03-1
	38-1	L		●				●		13	13	100	5	12	—	3	0.5	03-1
	37-2	R	●	●		●	●	●		16	16	120	6	15	—	4	0.5	03-2
	38-2	L		●		●		●		16	16	120	6	15	—	4	0.5	03-2
	37-3	R	●	●		●	●	●		19	19	140	7	18	—	5	0.5	03-3
	38-3	L		●		●	●	●	●	19	19	140	7	18	—	5	0.5	03-3
	37-4	R	●	●		●	●	●		25	25	160	10	24	—	6	1	03-4
	38-4	L		●				●		25	25	160	10	24	—	6	1	03-4
39 Type(Right Hand) **40 Type**(Left Hand)  Right hand tool holder shown.	**39-0**	R	●	●		●	●	●	●	10	10	80	5	10	10	3	2	06-0
	40-0	L		●		●	●	●	●	10	10	80	5	10	10	3	2	06-0
	39-1	R	●	●		●	●	●	●	13	13	100	7	13	13	3	2.5	06-1
	40-1	L	●	●		●	●	●	●	13	13	100	7	13	13	3	2.5	06-1
	39-2	R	●	●	●	●	●	●	●	16	16	120	10	16	16	4	3	06-2
	40-2	L	●	●		●	●	●	●	16	16	120	10	16	16	4	3	06-2
	39-3	R	●	●	●	●	●	●	●	19	19	140	12	19	19	5	4	06-3
	40-3	L	●	●	●	●	●	●	●	19	19	140	12	19	19	5	4	06-3
	39-4	R	●	●	●	●	●	●	●	25	25	160	13	22	22	6	4	06-4
	40-4	L		●		●	●	●	●	25	25	160	13	22	22	6	4	06-4
41 Type(Right Hand) **42 Type**(Left Hand)  Right hand tool holder shown.	**41-0**	R		●		●				10	10	80	6	10	6	3	0.3	02-0
	41-1	R	●	●		●		●	●	13	13	100	7	13	9	3	0.5	02-1
	42-1	L		●		●		●		13	13	100	7	13	9	3	0.5	02-1
	41-2	R	●	●		●	●	●		16	16	120	10	16	11	4	0.5	02-2
	42-2	L		●		●		●		16	16	120	10	16	11	4	0.5	02-2
	41-3	R	●	●		●	●	●	●	19	19	140	12	19	13	5	0.5	02-3
	42-3	L	●	●		●	●	●		19	19	140	12	19	13	5	0.5	02-3
	41-4	R	●	●		●	●	●		25	25	160	13	22	15	6	1	02-4
	42-4	L		●		●		●		25	25	160	13	22	15	6	1	02-4
43 Type 	**43-1**	—	●	●		●	●	●	●	10	16	100	13	3	8	3	—	08-1
	43-2	—	●	●		●	●	●	●	13	19	120	16	3	8	3	—	08-1
	43-3	—	●	●	●	●	●	●	●	16	22	140	20	4	13	4	—	08-3
	43-4	—	●	●		●	●	●	●	19	25	160	25	5	15	5	—	08-4
	43-5	—		●		●				22	32	180	30	6	17	6	—	08-5

● : Inventory maintained in Japan.

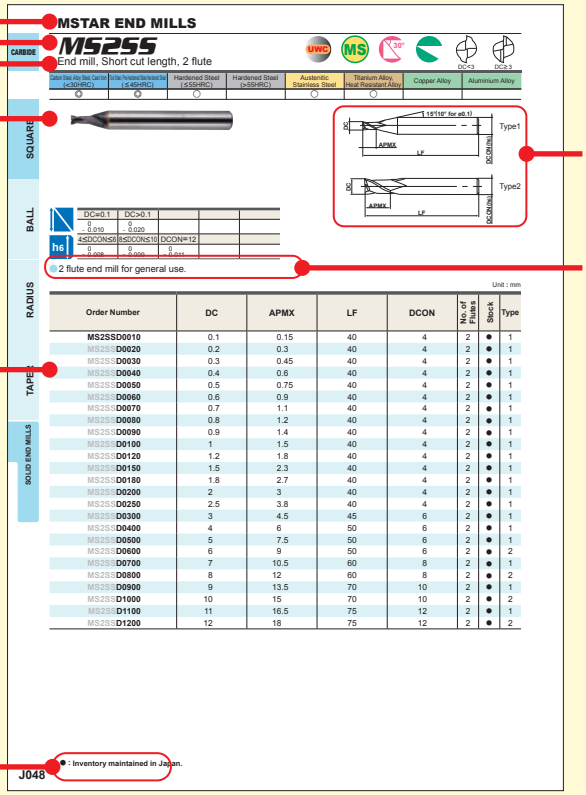
Geometry	Order Number	R/L	Stock					Dimensions (mm)										Blank No.
			P		M	K		Shank						Carbide				
			STi10	STi20	UTi20T	HTi05T	HTi10	W	H	L	d	E	l	A	B	C	R	
47Type (Right Hand)	**47-1**	R	●	●	●	●	●	13	13	140	12	7	50	10	–	3	0.5	03-0
	47-2	R	●	●	●	●	●	16	16	160	15	8	60	12	–	3	0.5	03-1
	47-3	R	●	●	●	●	●	19	19	190	18	9	80	15	–	4	0.5	03-2
	47-4	R		●	●			25	25	230	22	10	100	18	–	5	1	03-3
49Type (Right Hand)	**49-1**	R			●			13	13	100	–	–	–	5	8	3	–	05-1
	49-2	R	●	●	●		●	16	16	120	–	–	–	6	10	4	–	05-2
	49-3	R	●	●	●	●		19	19	140	–	–	–	7	12	5	–	05-3
	49-4	R	●	●	●			25	25	160	–	–	–	9	16	6	–	05-4
51Type (Right Hand)	**51-1**	R		●	●			13	13	140	12	8	50	5	8	3	–	05-1
	51-2	R		●	●			16	16	160	15	10	60	6	10	4	–	05-2
	51-3	R		●	●			19	19	190	18	12	80	7	12	5	–	05-3
95Type	**95-1**	R	●	●				25	25	160	–	5	–	20	10	7	1	09E1

HOW TO READ THE STANDARD OF SOLID END MILLS

●How this section page is organized

①Organized according to cutting mode for milling. (Refer to END MILL LIST.)

PHOTO OF PRODUCT
PRODUCT TITLE
ITEM NUMBER
PRODUCT BLOCK



GEOMETRY

PRODUCT FEATURES

LEGEND FOR STOCK STATUS MARK
is shown on the left hand page of each double-page spread.

PRODUCT STANDARDS
indicates order numbers, dimensions, and stock status.

●To Order:
For solid-carbide drill or brazed drill, please specify ①order number.

MILLING TOOLS

SOLID END MILLS

IDENTIFICATION ····· J002
SYMBOL DESCRIPTIONS ····· J003
COATING TECHNOLOGY ····· J004
TOOL NAVI ····· J006
END MILLS SELECTION CHART ····· J024

SOLID END MILLS STANDARD

CARBIDE
- SQUARE ····· J048
- BALL ····· J205
- RADIUS ····· J287
- TAPER ····· J355
- TAPER BALL ····· J367
- CHAMFERING ····· J377

CARBIDE
- INDEXABLE HEAD END MILLS ··· J436

HSS
- SQUARE ····· J378
- BALL ····· J434

*Arranged by Alphabetical order

J095 C2JS
J100 C2LA
J096 C2LS
J098 C2MA
J269 C2MB
J104 C2MHA
J092 C2MS
J102 C2SA
J091 C2SS
J124 C3SA
J304 C3SARB
J174 C4JC
J175 C4LC
J173 C4MC
J267 CBN2XLB
J302 CBN2XLRB
J123 CMH
J195 CMRA
J254 CRN2MB
J298 CRN2MRB
J081 CRN2MS
J083 CRN2XL
J256 CRN2XLB
J300 CRN2XLRB
J166 CRN4JC
J193 CSRA
J306 CSRARB
J260 DF2MB
J261 DF2XLB
J278 DF3XB
J167 DF4JC
J168 DF4XL
J171 DFC4JC
J172 DFCJRT
J345 DFPSRB
J086 DLC2MA
J265 DLC2MB
J387 G2MS
J410 G4LC
J404 G4MC
J192 GBE
J428 GMR
J414 GSFPR
J436 IMX
J431 JR
J399 KMH
J432 LR
J207 MP2MB
J206 MP2SB
J205 MP2SSB
J209 MP2XLB
J430 MR
J434 MRB
J065 MS2ES
J054 MS2JS
J056 MS2LS
J219 MS2MB
J052 MS2MD
J287 MS2MRB
J049 MS2MS
J355 MS2MT
J367 MS2MTB
J217 MS2SB
J048 MS2SS
J058 MS2XL
J062 MS2XL6
J221 MS2XLB
J290 MS2XLRB
J110 MS3ES
J141 MS4EC
J135 MS4JC
J360 MS4LT
J369 MS4LTB
J133 MS4MC
J308 MS4MRB
J132 MS4SC
J137 MS4XL
J130 MSJHD
J127 MSMHD
J311 MSMHDRB
J108 MSMHZD
J126 MSSHD
J385 S2MD
J396 S2SDA
J408 S4JC
J402 S4MD
J089 SED2KMG
J088 SED2KPG
J106 SEE2L
J177 SEE4L
J179 SEG4SA
J426 SR
J381 VA2MS
J380 VA2SS
J400 VA4MC
J422 VAJR
J424 VALR
J418 VAMFPR
J397 VAMH
J420 VAMR
J416 VASFPR
J377 VC2C
J243 VC2ESB
J079 VC2JS
J248 VC2MB
J249 VC2MDB
J076 VC2MS
J245 VC2PSB
J246 VC2PSBP
J074 VC2SS
J276 VC3MB
J162 VC4JC
J337 VC4JRB
J285 VC4MB
J160 VC4MC
J335 VC4SRB
J373 VC4STB
J189 VC6MH
J191 VC8MH
J339 VCHFRB
J188 VCLD
J164 VCMDSC
J121 VCMH
J342 VCMHDRB
J292 VCPSRB
J202 VCSFPR
J251 VCXB
J067 VF2MD
J069 VF2MV
J229 VF2SB
J232 VF2SDB
J233 VF2SDBL
J228 VF2SSB
J227 VF2WB
J071 VF2XL
J237 VF2XLB
J236 VF2XLBS
J271 VF3XB
J281 VF4MB
J143 VF4MD
J145 VF4MV
J279 VF4SVB
J183 VF6MHV
J187 VF6MHVCH
J348 VF6MHVRB
J353 VF6MHVRBCH
J204 VF6SVRCH
J190 VF8MHVCH
J354 VF8MHVRBCH
J314 VFFDRB
J315 VFHVRB
J148 VFJHV
J185 VFMD
J351 VFMDRB
J199 VFMFPR
J146 VFMHV
J150 VFMHVCH
J325 VFMHVRB
J327 VFMHVRBCH
J184 VFSD
J350 VFSDRB
J197 VFSFPR
J201 VFSFPRCH
J283 VQ4SVB
J155 VQJHV
J151 VQMHV
J328 VQMHVRB
J333 VQMHVRBF
J112 VQMHZV
J118 VQMHZVOH
J180 VQSVR
J157 VQXL
J379 1LA
J378 1MA
J391 2LS
J394 2MK
J389 2MS
J383 2SS
J412 4LC
J406 4MC

IDENTIFICATION

ORDER NUMBER OF END MILLS

MS 2 M S D0100 *

End mill names

VQ	:	SMART MIRACLE End Mills
VF	:	Impact Miracle end mills
MP	:	MS Plus End Mills
MS	:	Mstar end mills
VC	:	Miracle end mills
CRN	:	CRN coated end mills
DLC	:	DLC coated end mills
DFC	:	CVD diamond coated end mills
DF	:	Diamond coated end mills
CBN	:	CBN end mills
C	:	Carbide end mills
VA	:	Violet end mills
G	:	TiN coated end mills
S	:	KHAS end mills (High-grade powder high-speed steel)
K	:	KHA end mills (Powder metallurgy HSS)
None	:	Cobalt high-speed steel

Number of flutes

1	:	1flute
2	:	2flute
3	:	3flute
4	:	4flute
5	:	5flute
6	:	6flute
8	:	8flute
• • •		

Flute length

ES	:	Extra short
S	:	Short
M	:	Medium
J	:	Semi long
L	:	Long
XL	:	Long neck
X	:	Taper neck
SX	:	Extra long
MX	:	Extra long

Features

S	:	General-use
U	:	For stainless steel
K	:	For keyway
A	:	For light alloy
C	:	Center cut
D	:	For deep cut
V	:	Irregular spiral helix angle
B	:	Ball nose
R	:	Roughing
FPR	:	Fine roughing
H	:	High helix
T	:	Taper
TB	:	Taper ball nose
RB	:	Corner radius
CH	:	Coolant hole
3	:	3mm shank
6	:	6mm shank

Dimensions

D＊＊＊＊ : Diameter

ex.

D0050 →ϕ0.5

D0500 →ϕ5

R＊＊＊＊ : Radius of ball nose

ex.

R0050 → R0.5

R0500 → R5

Others

S＊＊	:	Shank diameter
N＊＊＊	:	Neck length
T＊＊＊＊	:	Taper angle one side
L＊＊	:	Flute length
A＊＊＊	:	Overall Length

＊Other types are available by special order.

SE E 2 040 S G

End mill names

SZ	:	Super square
BZ	:	Super ball
SE	:	Square end mill

Helix angle

D	:	30°
E	:	45°
G	:	Irregular spiral helix angle (38°/41°)

Number of flutes

2	:	2flute
4	:	4flute

Diameter

ex.

010 →ϕ1

050 →ϕ5

Shape

S	:	Short
M	:	Standard
L	:	Long
KP	:	For key way (+)
KM	:	For key way (-)

Coating

G : (Al, Ti)N Coating

＊Other types are available by special order.

SYMBOL DESCRIPTIONS

Tool material



Ultra micro grain carbide
Ultra micro grain carbide is used as the substrate material.



Cubic boron nitride
Mitsubishi's original CBN is used.



High hardness powder metallurgy HSS
High hardness powder metallurgy HSS is used as the substrate material.



Powder metallurgy HSS
Powder metallurgy HSS is used as the substrate material.



Ultra micro grain carbide
Cobalt high speed steel is used as the substrate material.



High speed steel
High speed steel is used as the substrate material.

Tolerances



Outside diameter tolerance
Indicates diameter tolerance of end mill.



R tolerance
Indicates the radial tolerance of a ball nose end mill.



R tolerance
Indicates the radial tolerance of an end mill with a corner radius.



Tolerance of Taper angle
Indicates the tolerance of the taper angle.



Tolerance of Point angle
Indicates the tolerance of the point angle.



R tolerance
Indicates the radial tolerance of a corner radius end mill.



Shank diameter tolerance
Indicates the shank diameter tolerance of end mill.

Coating



SMART MIRACLE Coating
(Al, Cr)N coaitng optimum for difficult-to-cut materials.



IMPACT MIRACLE Coating
Single phase nano crystal coating technology for higher film hardness and heat resistance.



(Al,Ti,Cr)N multilayer coating
Offers higher versatility for carbon steel, alloy steel and hardened steel.



(Al,Ti)N Coating
(Al,Ti)N offers higher versatility.



MIRACLE Coating
The original Miracle (Al,Ti)N coating.
Also suitable for dry cutting.



CRN Coating
Newly developed CrN coating for Copper Electrodes machining.



DLC Coating
Hardness similar to that of CVD diamond coating achieved with high adhesion strength.
(Jointly developed with NAGATA SEIKI CO.,LTD.)



CVD diamond coated end mills
Suitable for CFRP



Diamond Coating
Suitable for graphite machining.



VIOLET Coating
Increased tool life of 2–3 times that of TiN coated products.



TiN Coating
Increased tool life of 2–3 times that of non coated products.

Angle, sharp corner edge and gash land



Helix angle
Indicates the helix angle of the end mill.



Sharp corner edge
Indicates the end mill has a sharp corner edge.



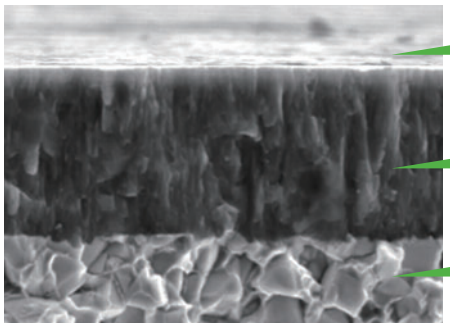
Gash land
Indicates the end mill cutting edge has a gash land.

COATING TECHNOLOGY



VQ SMART MIRACLE® Coating

Newly-developed (Al,Cr)N coating with improved wear resistance.
The smoothig treatment of the coating layer reduces the cutting resistance and improves chip discharge significantly. This next-generation coating offers longer tool life and higher efficiency in machining difficult-to-cut materials.



Smoothed surface"Zero-μ Surface"

Newly developed(Al,Cr)N coating

Super fine grade substrate



SMART MIRACLE Coating

ZERO- μ Surface

The original surface treatment technology offers smooth coatng layer. A good balance of smooth surface and sharpe edge allows smooth chip discharge and reduces the cutting resistance. Machining efficiency and tool life is improved.

MIRACLE SIGMA

VF ÍMPACT MIRACLE Coating

For higher hardness, higher speed and longer tool life!

In comparison with the conventional coating single-phase nano crystal coating technology offers higher coating hardness and heat resistance.
When machining hardened steels it can be seen that the IMPACT MIRACLE coating offers a lower friction of coefficient and as such prevents abnormal damage such as chipping.



FEATURES OF IMPACT MIRACLE COATING

	ÍMPACT MIRACLE Shingle phase nano coating (Al,Ti,Si)N	(Al,Ti,Si)N	(Al,Ti)N
Hardness (HV)	**3700**	3200	2800
Oxidation Temperature (℃)	**1300**	1100	840
Adhesion (N)[1)]	**100**	80	80
Wear Coefficient[2)](800℃)	**0.48**	0.53	0.58

1) Adhesion : Measured by critical load scratch test.
2) Coefficient of friction : Measured by ball-on-disk method.
(Counter gear : AISI D2 60HRC)

VC MIRACLE Coating (Al,Ti)N

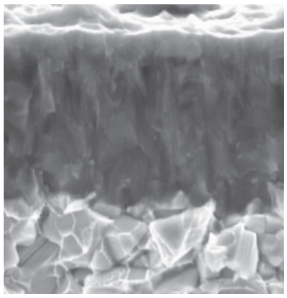
MIRACLE coating for high speed milling.

Miracle coating is produced by adding Al to the existing TiN coating.
This coating layer consists of a compound solid solution of (Al,Ti)N.
It has succeeded in improving the heat resistance during cutting and coating hardness, and thus delivers high performance in high hardness material machining and high speed dry cutting. It also has the high adhesion strength for the cemented carbide substrate, and extends the tool life significantly compared to conventional products.

MS+ (Al,Ti,Cr)N multilayer coating (MS Plus)

Suitable coating for a broad range of workpiece materials such as carbon steel, alloy steel and hardened steel of approx. 50HRC.

Our original coating technology enables a multilayer of (Al,Ti)N and (Al,Cr)N. It allows machining of a wide range of workpiece materials.



MIRACLE SIGMA

Properties of (Al,Ti,Cr)N multilayer coating (MS Plus)

	(Al,Ti,Cr)N multilayer	(Al,Ti)N	(Al,Cr)N
Hardness (HV)	**3200**	2800	3100
Oxidation Temperature (℃)	**1100**	800	1100
Adhesion (N)	**100**	80	80

CRN Coating

Specially designed for milling of copper electrode and copper alloy.

CRN coating has been developed for copper alloy milling. It has superior wear resistance and excellent adhesion strength by using Miracle coating technology. The excellent anti adhesion properties needed for copper machining has been achieved due to its low friction coefficient at high temperatures.

DLC Coating

Newly developed DLC coating.
Hardness similar to that of CVD diamond coating achieved with high adhesion strength.

Mitsubishi Materials and NAGATA SEIKI have jointly developed a unique DLC coating that has substantially increased "adhesion strength" compared to previous DLC coatings.

DFC Diamond Coating

Proprietary CVD diamond coating produces excellent wear resistance and smooth hole surface.

The newly developed CVD diamond coated carbide material achieves outstanding abrasion resistance and smoothness due to a proprietary fine multilayer diamond crystal control technology.

DF Diamond Coating

Diamond coating for non-ferrous and new non-metal materials.

Owing to Mitsubishi's unique plasma chemical vapor deposition (CVD) coating technology, great combination of coating hardness similar to that of natural diamond has been combined with a good adhesion to carbide substrates.
DF end mill series suitable for graphite machining.

V VIOLET Coating

(Al,Ti)N coating, excellent adhesion strength for HSS tools.

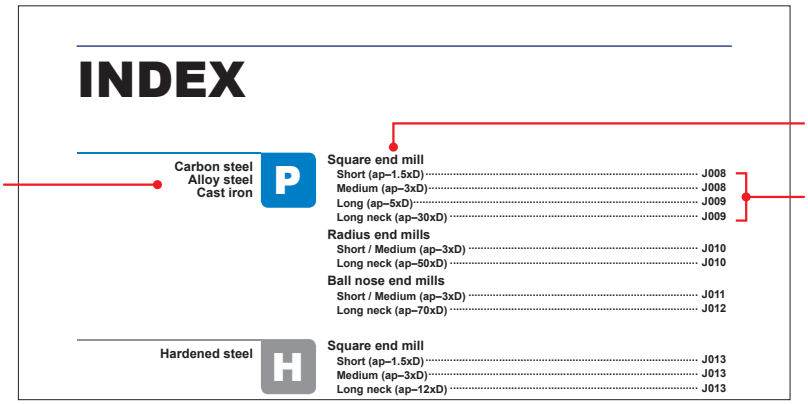
Violet coating is the name of the technology of successfully applying a Miracle type coating to HSS substrate tools. The newly developed technology of applying (Al,Ti)N coating at the low temperatures required for HSS substrates, means that Violet coating has the same level of adhesion strength as Miracle coating. Additionally high film hardness and excellent oxidation resistance properties have also been realised.

TOOL NAVI

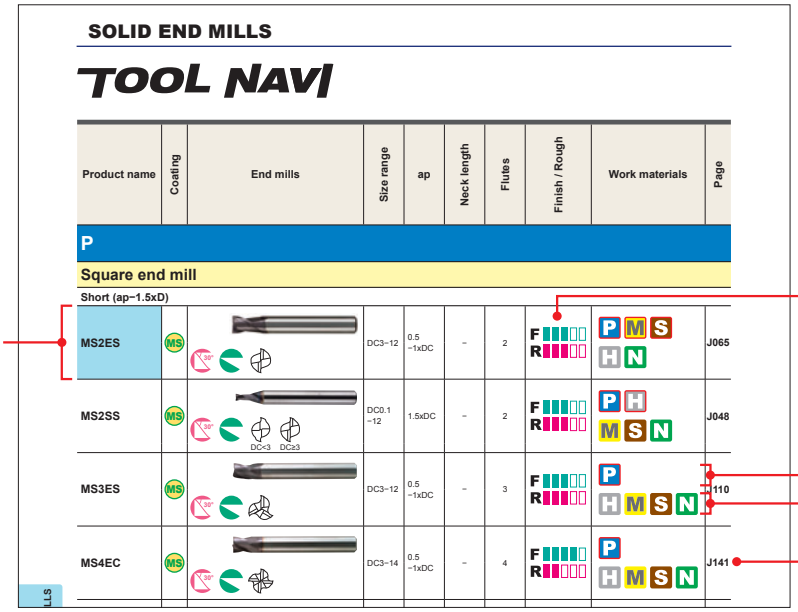
HOW TO USE TOOL NAVI

3 steps provide the correct tool and cutting data.

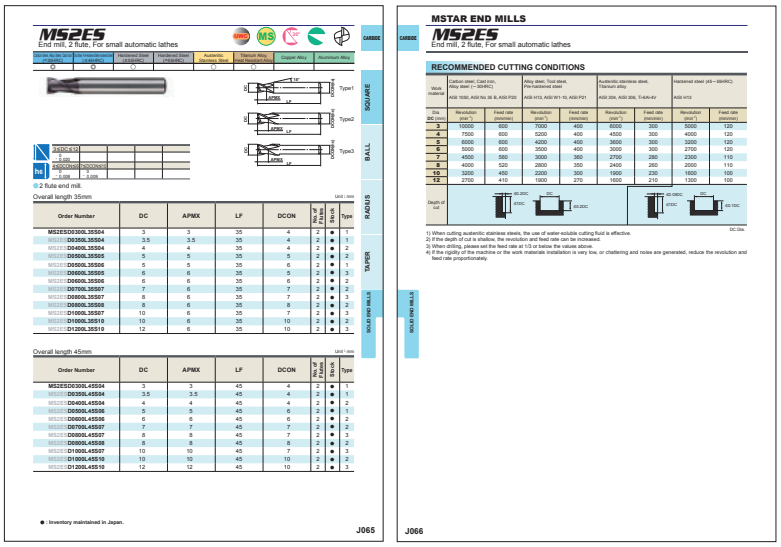
STEP1 Chose work material, end mill type and cutting length.



STEP2 Chose end mill.



STEP3 Chose size and cutting condition.



INDEX

Carbon steel / Alloy steel / Cast iron — P

Square end mill
- Short (ap–1.5xDC) ····· J008
- Medium (ap–3xDC) ····· J008
- Long (ap–5xDC) ····· J009
- Long neck (ap–30xDC) ····· J009

Radius end mills
- Short / Medium (ap–3xDC) ····· J010
- Long neck (ap–50xDC) ····· J010

Ball nose end mills
- Short / Medium (ap–3xDC) ····· J011
- Long neck (ap–70xDC) ····· J012

Hardened steel — H

Square end mill
- Short (ap–1.5xDC) ····· J013
- Medium (ap–3xDC) ····· J013
- Long neck (ap–12xDC) ····· J013

Radius end mills
- Short / Medium (ap–3xDC) ····· J013
- Long neck (ap–50xDC) ····· J014

Ball nose end mills
- Short / Medium (ap–3xDC) ····· J014
- Long neck (ap–70xDC) ····· J015

Austenitic Stainless steel — M

Ti alloy / Heat resistant alloys — S

Square end mill
- Short (ap–1.5xDC) ····· J016
- Medium (ap–3xDC) ····· J016
- Long (ap–5xDC) ····· J017
- Long neck (ap–30xDC) ····· J018

Radius end mills
- Short / Medium (ap–3xDC) ····· J018
- Long neck (ap–50xDC) ····· J019

Ball nose end mills
- Short / Medium (ap–3xDC) ····· J019
- Long neck (ap–20xDC) ····· J019

Copper alloy / Aluminium alloy — N

Square end mill
- Short (ap–1.5xDC) ····· J020
- Medium (ap–3xDC) ····· J020
- Long (ap–5xDC) ····· J020
- Long neck (ap–16xDC) ····· J021

Radius end mills
- Short / Medium (ap–3xDC) ····· J021
- Long neck (ap–30xDC) ····· J021

Ball nose end mills
- Short / Medium (ap–3xDC) ····· J022
- Long neck (ap–50xDC) ····· J022

Graphite / FRP — G

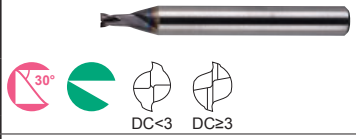
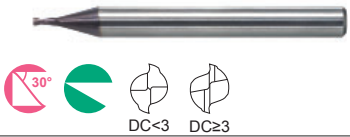
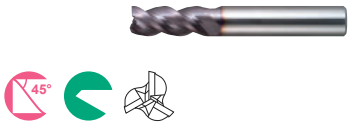
Square end mill
- Long (ap–5xDC) ····· J022
- Long neck (ap–10xDC) ····· J023

Radius end mills
- Long neck (ap–30xDC) ····· J023

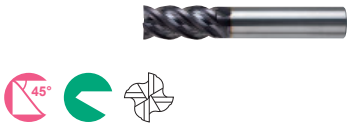
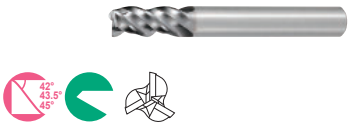
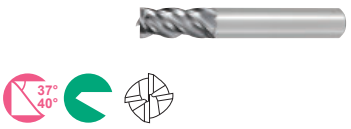
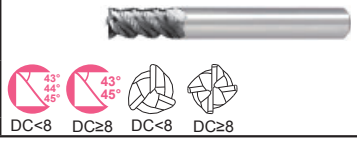
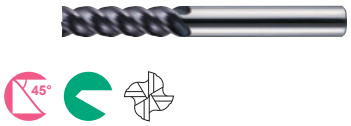
Ball nose end mills
- Short / Medium (ap–3xDC) ····· J023
- Long neck (ap–50xDC) ····· J023

* ap : Depth of Cut
* DC : Cutting Diameter

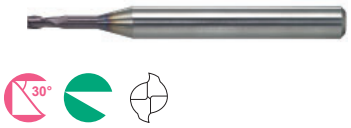
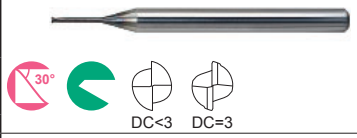
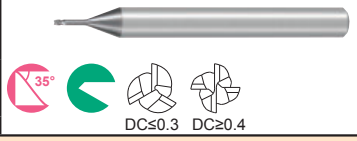
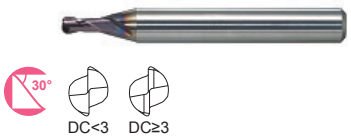
TOOL NAVI

Product name	Coating	End mills	Size range	ap	Neck length	Flutes	Finish / Rough	Work materials	Page
P									
Square end mill									
Short (ap−1.5xDC)									
MS2ES	MS		DC3−12	0.5 −1xDC	−	2	F R	P M S H N	J065
MS2SS	MS		DC0.1 −12	1.5xDC	−	2	F R	P H M S N	J048
MS3ES	MS		DC3−12	0.5 −1xDC	−	3	F R	P H M S N	J110
MS4EC	MS		DC3−14	0.5 −1xDC	−	4	F R	P H M S N	J141
MS4SC	MS		DC1−12	1.5xDC	−	4	F R	P H M S N	J132
MSSHD	MS		DC3−20	1.5xDC	−	4	F R	P M S H	J126
Medium (ap−3xDC)									
MS2MS	MS		DC0.2 −20	2xDC	−	2	F R	P H M S N	J049
MS2JS	MS		DC0.1 −12	3xDC	−	2	F R	P H M S N	J054
MSMHZD	MS		DC1−20	1.6 −2.5xDC	−	3	F R	P M S H N	J108

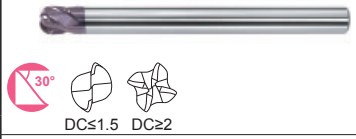
∗ ap : Depth of Cut
∗ DC : Cutting Diameter

Product name	Coating	End mills	Size range	ap	Neck length	Flutes	Finish / Rough	Work materials	Page
MSMHD	MS		DC2–25	2 –3.1xDC	–	4	F R	P M S H	J127
VFMFPR	VF		DC5–20	2.8 –3.5xDC	–	4	F R	P M S H	J199
VQMHZV MIRACLE SIGMA	VQ		DC1–20	1.6 –2.5xDC	–	3	F R	P M S N	J112
VQMHV MIRACLE SIGMA	VQ		DC2–25	2 –2.8xDC	–	4	F R	P M S N	J151
VQSVR MIRACLE SIGMA	VQ	 DC<8 DC≥8 DC<8 DC≥8	DC3–20	1.8 –2.2xDC	–	4	F R	P M S N	J180
Long (ap–5xDC)									
MSJHD	MS		DC2–20	2.8 –4xDC	–	4	F R	P M S H	J130
MS2LS	MS		DC0.2 –12	4xDC	–	2	F R	P H M S N	J056
MS4JC	MS	 DC<3 DC≥3 DC<3 DC≥3	DC1–12	4xDC	–	4	F R	P H M S N	J135
VQJHV MIRACLE SIGMA	VQ	 DC≤6 DC>6	DC2–20	3.3 –4xDC	–	4	F R	P M S N	J155
Long neck (ap–30xDC)									
MS2XL	MS	 DC<0.4 DC≥0.4	DC0.2 –6	1.3 –1.6xDC	2.5 –30xDC	2	F R	P H M S	J058

TOOL NAVI

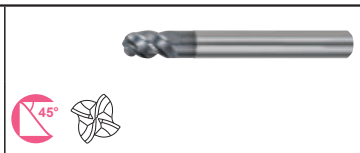
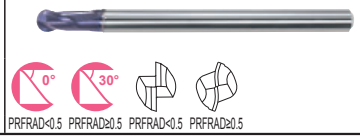
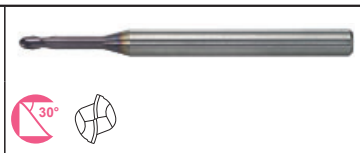
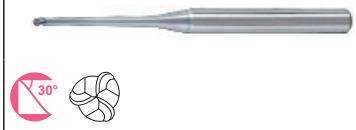
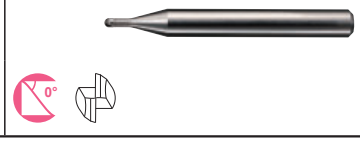
Product name	Coating	End mills	Size range	ap	Neck length	Flutes	Finish / Rough	Work materials	Page
P									
Square end mill									
Long neck (ap−30xDC)									
MS2XL6	MS		DC0.3 −2.5	1.5 −2.7xDC	2.5 −5xDC	2	F R	P H M S	J062
MS4XL	MS		DC1−10	1xDC	2.6 −16.2xDC	4	F R	P H M S	J137
VF2XL	VF		DC0.1 −3	1.5 −1.7xDC	2.5 −12.5xDC	2	F R	P H	J071
VQXL MIRACLE SIGMA	VQ		DC0.2 −1.0	1.5 −1.67xDC	2.5 −6xDC	3 4	F R	P M S H N	J157
Radius end mills									
Short / Medium (ap−3xDC)									
MSMHDRB	MS		DC2−20	2 −2.8xDC	−	4	F R	P M S H	J311
MS2MRB	MS		DC1−12	2xDC	−	2	F R	P H M S	J287
MS4MRB	MS		DC3−20	1.9 −2.8xDC	−	4	F R	P H M S	J308
VQMHVRB MIRACLE SIGMA	VQ		DC2−20	2 −2.8xDC	−	4	F R	P M S N	J328
Long neck (ap−50xDC)									
MS2XLRB	MS		DC1−6	1xDC	2−5xDC	2	F R	P H M S	J290

∗ ap : Depth of Cut ∗ DC : Cutting Diameter
∗ PRFRAD : Ball nose end mill radius

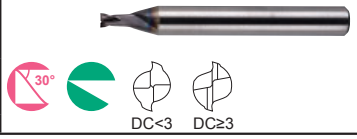
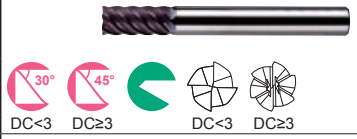
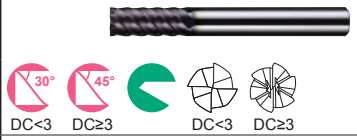
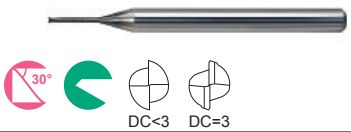
Product name	Coating	End mills	Size range	ap	Neck length	Flutes	Finish / Rough	Work materials	Page
VFHVRB	VF		DC1−16	1 −1.6xDC	2.6 −50xDC	4	F R	P H M S	J315
VCPSRB [High precision]	VC	 DC≤1.5 DC≥2	DC0.6 −12	1xDC	2.6 −13.3xDC	2 4	F R	P H M S	J292
CBN2XLRB	CBN		DC0.5 −2	0.6xDC	3−6xDC	2	F R	P H	J302
Ball nose end mills									
Short / Medium (ap−3xDC)									
MS2SB	MS		PRFRAD 0.1−6	1.5 −1.7xDC	−	2	F R	P H M S	J217
MS2MB	MS		PRFRAD 0.25−6	1.8 −3xDC	−	2	F R	P H M S	J219
MP2SSB MIRACLE SIGMA	MS+		PRFRAD 0.1−6	1xDC	−	2	F R	P H M S N	J205
MP2SB MIRACLE SIGMA	MS+		PRFRAD 0.1−6	1.5 −1.7xDC	−	2	F R	P H M S N	J206
MP2MB MIRACLE SIGMA	MS+		PRFRAD 0.25−6	1.8 −3xDC	−	2	F R	P H M S N	J207
VF2SDB	VF		PRFRAD 0.5−10	1−2xDC	−	2	F R	P H	J232
VF2SDBL	VF		PRFRAD 0.5−10	1−2xDC	−	2	F R	P H	J233

SOLID END MILLS

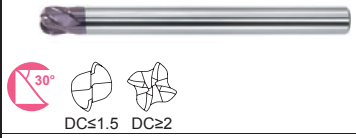
TOOL NAVI

Product name	Coating	End mills	Size range	ap	Neck length	Flutes	Finish / Rough	Work materials	Page
P									
Ball nose end mills									
Short / Medium (ap−3xDC)									
VQ4SVB MIRACLE SIGMA	VQ		PRFRAD 1−6	1.5xDC	−	4	F R	P M S N	J283
VC2PSBP [High precision]	VC	 PRFRAD<0.5 PRFRAD≥0.5 PRFRAD<0.5 PRFRAD≥0.5	PRFRAD 0.02−6	1−2xDC	−	2	F R	P H M S	J246
Long neck (ap−70xDC)									
MS2XLB	MS		PRFRAD 0.1−3	1xDC	2 −20xDC	2	F R	P H M S	J221
MP2XLB MIRACLE SIGMA	MS+		PRFRAD 0.05−3	0.7 −1xDC	1.2 −20xDC	2	F R	P H M S N	J209
VF2XLB	VF		PRFRAD 0.1−3	0.8xDC	2.5 −20xDC	2	F R	P H S	J237
VF2XLBS	VF		PRFRAD 0.2−1	0.8xDC	2.5 −12xDC	2	F R	P H S	J236
VF3XB	VF		PRFRAD 0.4−2.5	0.6 −0.9xDC	6.6 −70xDC	3	F R	P H S	J271
VF2WB	VF		PRFRAD 1−3	220°	2−3xDC	2	F R	P M S H	J227
CBN2XLB	CBN		PRFRAD 0.2−1	0.6 −0.8xDC	0.85 −4xDC	2	F R	P H	J267

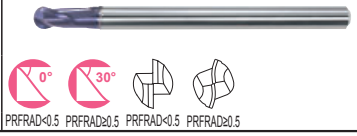
* ap : Depth of Cut
* DC : Cutting Diameter
* PRFRAD : Ball nose end mill radius

Product name	Coating	End mills	Size range	ap	Neck length	Flutes	Finish / Rough	Work materials	Page
H									
Square end mill									
Short (ap−1.5xDC)									
MS2SS	MS		DC0.1 −12	1.5xDC	−	2	F R	P H M S N	J048
Medium (ap−3xDC)									
VFSD	VF		DC1−12	2xDC	−	4 6	F R	P H	J184
VFMD	VF		DC1−25	2 −3.5xDC	−	4 6	F R	P H	J185
VF2MV	VF		DC0.5 −6	2.5xDC	−	2	F R	P H	J069
VF4MV	VF		DC6−20	2.5xDC	−	4	F R	P H	J145
Long neck (ap−12xDC)									
VF2XL	VF		DC0.1 −3	1.5 −1.7xDC	2.5 −12.5xDC	2	F R	P H	J071
Radius end mills									
Short / Medium (ap−3xDC)									
VFSDRB	VF		DC3−12	1xDC	−	6	F R	P H	J350
VFMDRB	VF		DC3−20	2.2 −3.3xDC	−	6	F R	P H	J351

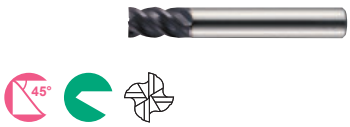
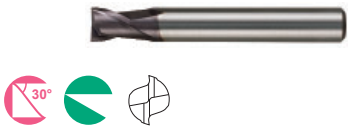
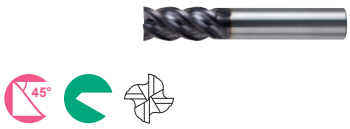
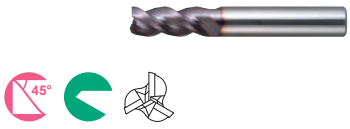
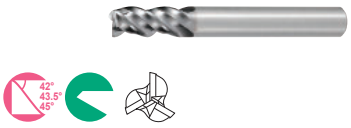
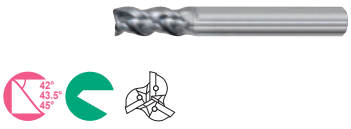
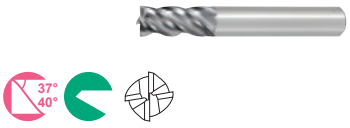
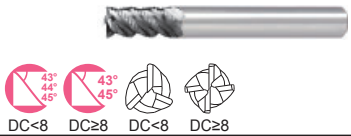
TOOL NAVI

Product name	Coating	End mills	Size range	ap	Neck length	Flutes	Finish / Rough	Work materials	Page
H									
Radius end mills									
Long neck (ap−50xDC)									
VFHVRB	VF		DC1−16	1 −1.6xDC	2.6 −50xDC	4	F R	P H M S	J315
VCPSRB [High precision]	VC		DC0.6 −12	1xDC	2.6 −13.3xDC	2 4	F R	P H M S	J292
NEW **VFFDRB**	VF		DC3−12	0.06DC	3DC	4 6	F R	H P	J314
CBN2XLRB	CBN		DC0.5 −2	0.6xDC	3−6xDC	2	F R	P H	J302
Ball nose end mills									
Short / Medium (ap−3xDC)									
VF2SSB	VF		PRFRAD 0.5−6	1xDC	−	2	F R	P H M S	J228
VF2SB	VF		PRFRAD 0.1−10	1−2xDC	−	2	F R	P H M S	J229
MP2SSB MIRACLE SIGMA	MS+		PRFRAD 0.1−6	1xDC	−	2	F R	P H M S N	J205
MP2SB MIRACLE SIGMA	MS+		PRFRAD 0.1−6	1.5 −1.7xDC	−	2	F R	P H M S N	J206
MP2MB MIRACLE SIGMA	MS+		PRFRAD 0.25−6	1.8 −3xDC	−	2	F R	P H M S N	J207

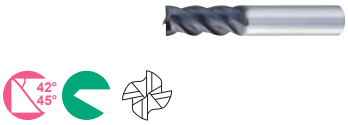
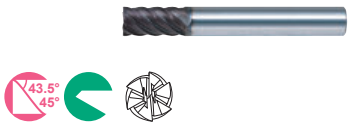
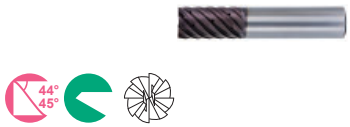
* ap : Depth of Cut
* DC : Cutting Diameter
* PRFRAD : Ball nose end mill radius

Product name	Coating	End mills	Size range	ap	Neck length	Flutes	Finish / Rough	Work materials	Page
VF2SDB	VF		PRFRAD 0.5–10	1–2xDC	–	2	F R	P H	J232
VF2SDBL	VF		PRFRAD 0.5–10	1–2xDC	–	2	F R	P H	J233
VF4MB	VF		PRFRAD 0.5–6	1.8 –3xDC	–	4	F R	P H M S	J281
VC2PSBP [High precision]	VC	 PRFRAD<0.5 PRFRAD≥0.5 PRFRAD<0.5 PRFRAD≥0.5	PRFRAD 0.02–6	1–2xDC	–	2	F R	P H M S	J246
Long neck (ap–70xDC)									
VF2XLB	VF		PRFRAD 0.1–3	0.8xDC	2.5 –20xDC	2	F R	P H S	J237
VF2XLBS	VF		PRFRAD 0.2–1	0.8xDC	2.5 –12xDC	2	F R	P H S	J236
MP2XLB MIRACLE SIGMA	MS+		PRFRAD 0.05–3	0.7 –1xDC	1.2 –20xDC	2	F R	P H M S N	J209
VF3XB	VF		PRFRAD 0.4 –2.5	0.6 –0.9xDC	6.6 –70xDC	3	F R	P H S	J271
CBN2XLB	CBN		PRFRAD 0.2–1	0.6 –0.8xDC	0.85 –4xDC	2	F R	P H	J267

TOOL NAVI

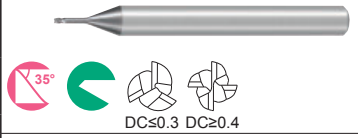
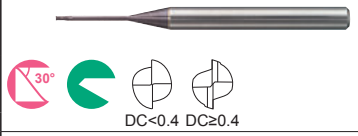
Product name	Coating	End mills	Size range	ap	Neck length	Flutes	Finish / Rough	Work materials	Page
M									
S									
Square end mill									
Short (ap−1.5xDC)									
MSSHD	MS		DC3−20	1.5xDC	−	4	F R	P M S H	J126
MS2ES	MS		DC3−12	0.5 −1xDC	−	2	F R	P M S H N	J065
Medium (ap−3xDC)									
MSMHD	MS		DC2−25	2 −3.1xDC	−	4	F R	P M S H	J127
MSMHZD	MS		DC1−20	1.6 −2.5xDC	−	3	F R	P M S H N	J108
VQMHZV MIRACLE SIGMA	VQ		DC1−20	1.6 −2.5xDC	−	3	F R	P M S N	J112
VQMHZVOH MIRACLE SIGMA	VQ		DC6−16	1.9 −2.4xDC	−	3	F R	P M S N	J118
VQMHV MIRACLE SIGMA	VQ		DC2−25	2 −2.8xDC	−	4	F R	P M S N	J151
VQSVR MIRACLE SIGMA	VQ	 DC<8 DC≥8 DC<8 DC≥8	DC3−20	1.8 −2.2xDC	−	4	F R	P M S N	J180

* ap : Depth of Cut
* DC : Cutting Diameter

Product name	Coating	End mills	Size range	ap	Neck length	Flutes	Finish / Rough	Work materials	Page
VFMHVCH	VF		DC16, DC20	2.2xDC	–	4	F R	M S P H	J150
VF6MHV	VF		DC6–20	1.9 –2.4xDC	–	6	F R	M S P H	J183
VF6MHVCH	VF		DC10 –20	1.9 –2.2xDC	–	6	F R	M S P H	J187
VF8MHVCH	VF		DC16, DC20	1.9 –2xDC	–	8	F R	M S P H	J190
VFSFPRCH	VF		DC16, DC20	1.9 –2.1xDC	–	4	F R	P M S H	J201
VF6SVRCH	VF		DC16, DC20	1.9 –2.1xDC	–	6	F R	P M S H	J204
VFMFPR	VF		DC5–20	2.8 –3.5xDC	–	4	F R	P M S H	J199
Long (ap–5xDC)									
VQJHV	VQ	 DC≤6 DC>6	DC2–20	3.3 –4xDC	–	4	F R	P M S N	J155
MSJHD	MS		DC2–20	2.8 –4xDC	–	4	F R	P M S H	J130

SOLID END MILLS

TOOL NAVI

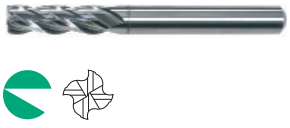
Product name	Coating	End mills	Size range	ap	Neck length	Flutes	Finish / Rough	Work materials	Page
M									
S									
Square end mill									
Long neck (ap−30xDC)									
VQXL MIRACLE SIGMA	VQ	 35° DC≤0.3 DC≥0.4	DC0.2 −1.0	1.5 −1.67xDC	2.5 −6xDC	3 4	F R	P M S H N	J157
MS2XL	MS	 30° DC<0.4 DC≥0.4	DC0.2 −6	1.3 −1.6xDC	2.5 −30xDC	2	F R	P H M S	J058
MS2XL6	MS	 30°	DC0.3 −2.5	1.5 −2.7xDC	2.5 −5xDC	2	F R	P H M S	J062
Radius end mills									
Short / Medium (ap−3xDC)									
MSMHDRB	MS	 45°	DC2−20	2 −2.8xDC	−	4	F R	P M S H	J311
VQMHVRB MIRACLE SIGMA	VQ	 37° 40°	DC2−20	2 −2.8xDC	−	4	F R	P M S N	J328
VQMHVRBF MIRACLE SIGMA	VQ	 37° 40°	DC6−16	2.2 −2.4xDC	−	4	F R	P S M	J333
VFMHVRBCH	VF	 42° 45°	DC16 −20	2.2 −2.3xDC	−	4	F R	P M S H	J327
VF6MHVRB	VF	 43.5° 45°	DC6−20	1.9 −2.4xDC	−	6	F R	M S P H	J348

* ap : Depth of Cut
* DC : Cutting Diameter
* PRFRAD : Ball nose end mill radius

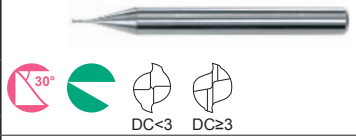
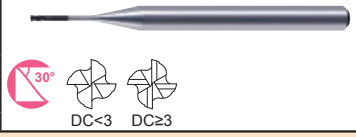
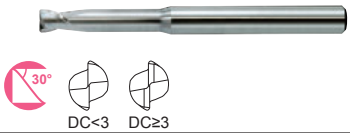
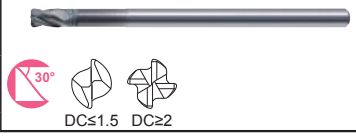
Product name	Coating	End mills	Size range	ap	Neck length	Flutes	Finish / Rough	Work materials	Page
VF6MHVRBCH	VF		DC10 −20	1.9 −2.2xDC	–	6	F R	M S P H	J353
VF8MHVRBCH	VF		DC16, DC20	1.9 −2xDC	–	8	F R	M S P H	J354
Long neck (ap−50xDC)									
VFHVRB	VF		DC1−16	1 −1.6xDC	2.6 −50xDC	4	F R	P H M S	J315
Ball nose end mills									
Short / Medium (ap−3xDC)									
VQ4SVB MIRACLE SIGMA	VQ		PRFRAD 1−6	1.5xDC	–	4	F R	P M S N	J283
Long neck (ap−20xDC)									
MP2XLB MIRACLE SIGMA	MS+		PRFRAD 0.05−3	0.7 −1xDC	1.2 −20xDC	2	F R	P H M S N	J209
VF2WB	VF		PRFRAD 1−3	220°	2−3xDC	2	F R	P M S H	J227

SOLID END MILLS

TOOL NAVI

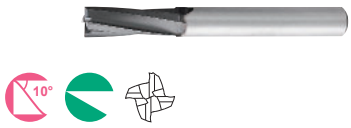
Product name	Coating	End mills	Size range	ap	Neck length	Flutes	Finish / Rough	Work materials	Page
N									
Square end mill									
Short (ap−1.5xDC)									
C3SA	–		DC10 −26	0.8 −1.3xDC	–	3	F R	N	J124
C2SA	–		DC3−20	0.9 −2xDC	–	2	F R	N	J102
CSRA	–		DC10 −25	1.1 −1.3xDC	–	3	F R	N	J193
Medium (ap−3xDC)									
CRN2MS	CRN		DC0.2 −12	2 −3.2xDC	–	2	F R	N	J081
C2MHA	–		DC3−25	1.5 −3xDC	–	2	F R	N	J104
CMRA	–		DC3−25	1.8 −2.8xDC	–	3	F R	N	J195
Long (ap−5xDC)									
CRN4JC	CRN		DC3−12	2.5 −4xDC	–	4	F R	N	J166
DF4JC	DF		DC3−12	3−4xDC	–	4	F R	N G	J167

* ap : Depth of Cut
* DC : Cutting Diameter

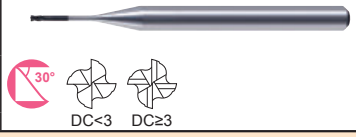
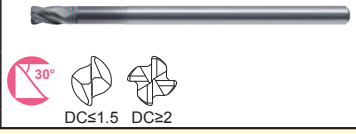
Product name	Coating	End mills	Size range	ap	Neck length	Flutes	Finish / Rough	Work materials	Page
Long neck (ap−16xDC)									
CRN2XL	CRN		DC0.2 −6	1.5 −1.7xDC	2.5 −16xDC	2	F R	N	J083
DF4XL	DF		DC1−12	1.5xDC	2.5 −10.6xDC	4	F R	N G	J168
Radius end mills									
Short / Medium (ap−3xDC)									
CRN2MRB	CRN		DC6−12	2.2 −2.4xDC	−	2	F R	N	J298
C3SARB	—		DC12 −25	0.8 −1.3xDC	−	3	F R	N	J304
CSRARB	—		DC10 −25	1.1 −1.3xDC	−	3	F R	N	J306
Long neck (ap−30xDC)									
CRN2XLRB	CRN		DC0.5 −6	1.5 −1.6xDC	5 −13xDC	2	F R	N	J300
DFPSRB	DF		DC0.5 −12	1.3 −1.5xDC	3.3 −30xDC	2 4	F R	N G	J345

SOLID END MILLS

TOOL NAVI

Product name	Coating	End mills	Size range	ap	Neck length	Flutes	Finish / Rough	Work materials	Page
N									
Ball nose end mills									
Short / Medium (ap−3xDC)									
CRN2MB	CRN		PRFRAD 0.2−6	1.8 −3xDC	−	2	F R	N	J254
DF2MB	DF		PRFRAD 3−6	4.6 −5xDC	−	2	F R	N G	J260
Long neck (ap−50xDC)									
CRN2XLB	CRN		PRFRAD 0.1−3	1xDC	2.5 −20xDC	2	F R	N	J256
DF2XLB	DF		PRFRAD 0.2−2	1.2 −1.5xDC	2.5 −40xDC	2	F R	N G	J261
DF3XB	DF		PRFRAD 0.5−2	1.5xDC	20 −50xDC	3	F R	N G	J278
G									
Square end mill									
Long (ap−5xDC)									
DF4JC	DF		DC3−12	3−4xDC	−	4	F R	N G	J167
DFC4JC	DFC		DC6−12	2.5 −3.8xDC	−	4	F R	G	J171
DFCJRT	DFC		DC6−12	2.5 −3.8xDC	−	10 12	F R	G	J172

* ap : Depth of Cut
* DC : Cutting Diameter
* PRFRAD : Ball nose end mill radius

Product name	Coating	End mills	Size range	ap	Neck length	Flutes	Finish / Rough	Work materials	Page
Long neck (ap−10xDC)									
DF4XL	DF		DC1−12	1.5xDC	2.5 −10.6xDC	4	F R	N G	J168
Radius end mills									
Long neck (ap−30xDC)									
DFPSRB	DF		DC0.5 −12	1.3 −1.5xDC	3.3 −30xDC	2 4	F R	N G	J345
Ball nose end mills									
Short / Medium (ap−3xDC)									
DF2MB	DF		PRFRAD 3−6	4.6 −5xDC	−	2	F R	N G	J260
Long neck (ap−50xDC)									
DF2XLB	DF		PRFRAD 0.2−2	1.2 −1.5xDC	2.5 −40xDC	2	F R	N G	J261
DF3XB	DF		PRFRAD 0.5−2	1.5xDC	20 −50xDC	3	F R	N G	J278

END MILLS SELECTION CHART CARBIDE (By Series)

Applications, Features	Type	No. of Flutes	Coating	Product Code	Shape	Size Range	Work Material P: Carbon Steel, Alloy Steel, Cast Iron	Work Material P: Tool steel, Pre-Hardened Steel, Hardened Steel	Work Material H: Hardened Steel(-55HRC)	Work Material H: Hardened Steel(55HRC-)	Work Material M: Austenitic Stainless Steel	Work Material S: Titanium Alloy, Heat Resistant Alloy	Work Material N: Copper Alloy	Work Material N: Aluminium Alloy	Page Number: Dimensions	Page Number: Cutting Conditions
MS PLUS END MILL SERIES																
General Use	BALL	2	MS+	MP2SSB	Ball nose, Short cut length, 2 flute, Short shank	PRFRAD 0.1–6	◎	◎	◎		○	○	○		J205	J208
			MS+	MP2SB	Ball nose, Short cut length, 2 flute	PRFRAD 0.1–6	◎	◎	○		○	○	○		J206	J208
			MS+	MP2MB	Ball nose, Medium cutting length, 2 flute	PRFRAD 0.25–6	◎	◎	○		○	○	○		J207	J208
	LONG NECK BALL		MS+	MP2XLB	End mill, Short cut length, 2 flute, Long neck	PRFRAD 0.05–3	◎	◎	○		○	○	○		J209	J214
MSTAR END MILL SERIES																
General Use	SQUARE	2	MS	MS2SS	End mill, Short cut length, 2 flute	DC 0.1–12	◎	◎	○		○	○			J048	J051
			MS	MS2MS	End mill, Medium cut length, 2 flute	DC 0.2–20	◎	◎	○		○	○			J049	J051
			MS	MS2MD	End mill, Medium cut length, 2 flute, Strong geometry type	DC 1–12	◎	◎	○		○	○			J052	J053
			MS	MS2JS	End mill, Semi long cut length, 2 flute	DC 0.1–12	◎	◎	○		○	○			J054	J055
			MS	MS2LS	End mill, Long cut length, 2 flute	DC 0.2–12	◎	◎	○		○	○			J056	J057
		4	MS	MS4SC	End mill, Short cut length, 4 flute	DC 1–12	◎	◎	○		○	○			J132	J134
			MS	MS4MC	End mill, Medium cut length, 4 flute	DC 1–20	◎	◎	○		○	○			J133	J134
			MS	MS4JC	End mill, Semi long cut length, 4 flute	DC 1–12	◎	◎	○		○	○			J135	J136
General Use, For Key Way Slotting		3	MS	MSMHZD	Slotting, Medium cut length, 3 flute	DC 1–20	◎	◎	○		◎	○			J108	J109
For high feed cutting		4	MS	MSSHD	High power, Short cut length, 4 flute	DC 3–20	◎	◎	○		◎	○			J126	J129
			MS	MSMHD	High power, Medium cut length, 4 flute	DC 2–25	◎	◎	○		◎	◎			J127	J129
			MS	MSJHD	High power, Semi long cut length, 4 flute	DC 2–20	◎	◎	○		◎	◎			J130	J131
	RADIUS		MS	MSMHDRB	High power, Corner radius, Medium cut length, 4 flute	DC 2–20	◎	◎	○		◎	◎			J311	J313

* DC : Cutting Diameter
* PRFRAD : Ball nose end mill radius

Applications, Features	Type	No. of Flutes	Coating	Product Code	Shape	Size Range	Work Material								Page Number	
							P		H		M	S	N		Dimensions	Cutting Conditions
							Carbon Steel, Alloy Steel, Cast Iron	Tool steel, Pre-Hardened Steel, Hardened Steel	Hardened Steel(-55HRC)	Hardened Steel(55HRC-)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy		
For Profiling	BALL	2	MS	MS2SB	Ball nose end mill, Short cut length, 2 flute	PRFRAD 0.1–6	◎	◎	○		○	○			J217	J220
			MS	MS2MB	Ball nose end mill, Medium cut length, 2 flute	PRFRAD 0.25–6	◎	◎	○		○	○			J219	J220
For Deep Slotting	LONG NECK SQUARE	2	MS	MS2XL	End mill, Short cut length, 2 flute, Long neck	DC 0.2–6	◎	◎	○		○	○			J058	J061
			MS	MS2XL6	End mill, Short cut length, 2 flute, 6mm shank	DC 0.3–2.5	◎	◎	○		○	○			J062	J064
		4	MS	MS4XL	End mill, Short cut length, 4 flute, Long neck	DC 1–10	◎	◎	○		○	○			J137	J140
	LONG NECK BALL	2	MS	MS2XLB	Ball nose end mill, Short cut length, 2 flute, Long neck	PRFRAD 0.1–3	◎	◎	○		○	○			J221	J226
	LONG NECK CORNER RADIUS	2	MS	MS2XLRB	Corner radius end mill, Short cut length, 2 flute, Long neck	DC 1–6	◎	◎	○		○	○			J290	J291
For Rib Milling	TAPER	4	MS	MS4LT	Taper end mill, Long cut length, 4 flute	DC 0.2–3	◎	◎	○		○				J360	J366
	TAPER BALL	4	MS	MS4LTB	Ball nose, 4 flute, Taper, For rib milling	PRFRAD 0.3–1	◎	◎	○		○	○			J369	J372
For Corner Radius	RADIUS	2	MS	MS2MRB	Corner radius end mill, Medium cut length, 2 flute	DC 1–12	◎	◎	○		○	○			J287	J289
		4	MS	MS4MRB	Corner radius end mill, Medium cut length, 4 flute	DC 3–20	◎	◎	○		○	○			J308	J310
For Angled Face Machining	TAPER	2	MS	MS2MT	Taper end mill, Medium cut length, 2 flute	DC 0.2–10	◎	◎	○		○	○			J355	J359
	TAPER BALL	2	MS	MS2MTB	Ball nose taper end mill, Medium cut length, 2 flute	PRFRAD 0.2–1.5	◎	◎	○		○	○			J367	J368
For Small Automatic Lathes	SQUARE	2	MS	MS2ES	End mill, 2 flute, For small automatic lathes	DC 3–12	◎	◎	○		○	○			J065	J066
		3	MS	MS3ES	End mill, 3 flute, For small automatic lathes	DC 3–12	◎	◎	○		○	○			J110	J111
		4	MS	MS4EC	End mill, 4 flute, For small automatic lathes	DC 3–14	◎	◎	○		○	○			J141	J142

END MILLS SELECTION CHART CARBIDE (By Series)

Applications, Features	Type	No. of Flutes	Coating	Product Code	Shape	Size Range	Work Material: P – Carbon Steel, Alloy Steel, Cast Iron	P – Tool steel, Pre-Hardened Steel, Hardened Steel	H – Hardened Steel (-55HRC)	H – Hardened Steel (55HRC-)	M – Austenitic Stainless Steel	S – Titanium Alloy, Heat Resistant Alloy	N – Copper Alloy	N – Aluminium Alloy	Page Number: Dimensions	Page Number: Cutting Conditions
SMART MIRACLE END MILL SERIES																
For Difficult-to-cut Materials	SQUARE	3 4	VQ	VQXL (NEW) MIRACLE SIGMA	End mill, Short cut length, 3–4 flute, Long neck	DC 0.2–1	◎	○			◎	◎	○		J157	J158
			VQ	VQSVR (NEW) MIRACLE SIGMA	Roughing end mill, Short cut length, 3–4 flute, Irregular helix flutes	DC 3–20	◎	○			◎	◎	○		J180	J181
		3	VQ	VQMHZV MIRACLE SIGMA	End mill, Medium cutting length, 3 flute for drilling and slotting	DC 1–20	◎	○			◎	◎	○		J112	J114
			VQ	VQMHZVOH MIRACLE SIGMA	End mill, Medium cutting length, 3 flute for drilling and slotting with internal through coolant holes	DC 6–16	◎	○			◎	◎	○		J118	J119
		4	VQ	VQMHV MIRACLE SIGMA	End mill, Medium cutting length, 4 flute, Irregular helix flutes	DC 2–25	◎	○			◎	◎	○		J151	J152
			VQ	VQJHV (NEW) MIRACLE SIGMA	End mill, Medium cut length, 4 flute, Irregular helix flutes	DC 2–20	◎	○			◎	◎	○		J155	J156
	BALL		VQ	VQ4SVB MIRACLE SIGMA	Ball nose, Medium cutting length, 4 flute	PRFRAD 1–6	○	○			◎	◎	○		J283	J284
	RADIUS		VQ	VQMHVRB MIRACLE SIGMA	Corner radius end mill, Medium cutting length, 4 flute, Irregular helix flutes	DC 2–20	◎	○			○	◎	○		J328	J330
			VQ	VQMHVRBF MIRACLE SIGMA	Corner radius end mill, Medium cutting length, 4 flute, Irregular helix flutes (for finishing)	DC 6–16	○	○			○	◎			J333	J334
IMPACT MIRACLE END MILL SERIES																
For Profiling of Special Geometry	WIDE BALL	2	VF	VF2WB	Wide ball nose, Medium cut length, 2 flute	PRFRAD 1–3	○	◎	○		◎	◎			J227	J227
For Machining of Hardened Steels	SQUARE	2	VF	VF2MD	End mill, Medium cut length, 2 flute, For hardened materials	DC 0.5–6	○	◎	◎	◎					J067	J068
			VF	VF2MV	End mill, Medium cut length, 2 flute, Irregular helix flutes	DC 0.5–6	○	◎	◎	◎					J069	J070
		4	VF	VF4MD	End mill, Medium cut length, 4 flute, For hardened materials	DC 1–20	○	◎	◎	◎					J143	J144
			VF	VF4MV	End mill, Medium cut length, 4 flute, Irregular helix flutes	DC 6–20	○	◎	◎	◎					J145	J145
		4 6	VF	VFSD	End mill, Short cut length, For hardened materials	DC 1–12	○	◎	◎	◎					J184	J186
			VF	VFMD	End mill, Medium cut length, For hardened materials	DC 1–25	○	◎	◎	◎					J185	J186
	BALL	2	VF	VF2SSB	Ball nose, Short cut length, 2 flute, Short shank	PRFRAD 0.5–6	○	◎	◎	◎	○	○			J228	J231

* DC : Cutting Diameter
* PRFRAD : Ball nose end mill radius

Applications, Features	Type	No. of Flutes	Coating	Product Code	Shape	Size Range	Work Material P: Carbon Steel, Alloy Steel, Cast Iron	Work Material P: Tool steel, Pre-Hardened Steel, Hardened Steel	Work Material H: Hardened Steel(-55HRC)	Work Material H: Hardened Steel(55HRC-)	Work Material M: Austenitic Stainless Steel	Work Material S: Titanium Alloy, Heat Resistant Alloy	Work Material N: Copper Alloy	Work Material N: Aluminium Alloy	Page Number: Dimensions	Page Number: Cutting Conditions
For Machining of Hardened Steels	BALL	2	VF	VF2SB	Ball nose, Short cut length, 2 flute, For hardened materials	PRFRAD 0.1–10	○	◎	◎	◎	○	○			J229	J231
		4	VF	VF4MB	Ball nose, Medium cut length, 4 flute	PRFRAD 0.5–6		◎	◎	◎	○	○			J281	J282
	RADIUS	4 6	VF	VFFDRB NEW	Multi-task corner radius end mill for impact miracle high speed cutting	DC 3–12	○	○	◎	◎					J314	J314
		6	VF	VFSDRB	IMPACT MIRACLE Corner radius end mill, 6 flute (S)	DC 3–12	○	◎	◎	◎					J350	J352
			VF	VFMDRB	Corner radius, Medium cut length, 6 flute, For hardened materials	DC 3–20	○	◎	◎	◎					J351	J352
	ROUGHING	3 4	VF	VFSFPR	Roughing end mill, Short cut length, 3–4 flute	DC 3–20	◎	◎	○		◎	◎			J197	J198
		4	VF	VFMFPR	Roughing end mill, Medium cut length, 4 flute	DC 5–20	◎	◎	○		◎	◎			J199	J200
For Deep Slotting of Hardened Steels	LONG NECK SQUARE	2	VF	VF2XL	End mill, 2 flute, Long neck	DC 0.1–3	○	◎	◎	◎					J071	J073
	LONG NECK BALL		VF	VF2XLBS	Ball nose, Medium cut length, 2 flute, Short shank	PRFRAD 0.2–1	○	◎	◎	◎		○			J236	J242
			VF	VF2XLB	IMPACT MIRACLE, Ball nose, 2 flute, Long neck	PRFRAD 0.1–3	○	◎	◎	◎		○			J237	J242
For Machining of Hardened Steels	TAPER NECK BALL	3	VF	VF3XB	Ball nose, Medium cut length, 3 flute, Taper neck	PRFRAD 0.4–2.5	○	◎	◎	◎	○	○			J271	J274
IMPACT MIRACLE BALL NOSE HIGH POWER END MILL SERIES																
For high feed cutting	BALL	2	VF	VF2SDB	Ball nose, Short cut length, 2 flute, Strong geometry type	PRFRAD 0.5–10	○	◎	◎	○					J232	J234
			VF	VF2SDBL	Ball nose, Short cut length, 2 flute, Strong geometry type, Long shank	PRFRAD 0.5–10	○	◎	◎	○					J233	J234
IMPACT MIRACLE CORNER RADIUS END MILL SERIES FOR HIGH EFFICIENCY MACHINIG, IRREGULAR HELIX																
For High Efficiency Machining	RADIUS	4	VF	VFHVRB	4 flute, Corner radius, Short cut length,Irregular helix flutes	DC 1–16	◎	◎	◎	◎	○	○			J315	J317
IMPACT MIRACLE END MILL SERIES FOR DIFFICULT TO CUT MATERIALS, IRREGULAR HELIX																
For Difficult-to-cut Materials	SQUARE	4	VF	VFMHV	End mill, Medium cut length, Irregular helix flutes	DC 2–20	○	○	○		◎	◎			J146	J147
			VF	VFJHV	End mill, Semi long cut length, Irregular helix flutes	DC 2–20	○	○	○		◎	◎			J148	J149
		6	VF	VF6MHV	End mill, Medium cut length, 6 flute, Irregular helix flutes	DC 6–20					◎	◎			J183	J183

END MILLS SELECTION CHART CARBIDE (By Series)

Applications, Features	Type	No. of Flutes	Coating	Product Code	Shape	Size Range	Work Material P: Carbon Steel, Alloy Steel, Cast Iron	Work Material P: Tool steel, Pre-Hardened Steel, Hardened Steel	Work Material H: Hardened Steel(-55HRC)	Work Material H: Hardened Steel(55HRC-)	Work Material M: Austenitic Stainless Steel	Work Material S: Titanium Alloy, Heat Resistant Alloy	Work Material N: Copper Alloy	Work Material N: Aluminium Alloy	Page Number: Dimensions	Page Number: Cutting Conditions
IMPACT MIRACLE END MILL SERIES FOR DIFFICULT TO CUT MATERIALS, IRREGULAR HELIX																
For Difficult-to-cut Materials	BALL	4	VF	VF4SVB	 Ball nose, Short cut length, 4 flute,Variable curve	PRFRAD 1–10	○	○			◎	◎			J279	J280
	RADIUS	4	VF	VFMHVRB	 Corner radius, Medium cut length, Irregular helix flutes	DC 6–20	◎	○	○		◎	◎			J325	J326
		6	VF	VF6MHVRB	 Corner radius, Medium cut length, 6 flute, Irregular helix flutes	DC 6–20	○	○	○		◎	◎			J348	J349
COOL STAR END MILL SERIES																
For Difficult-to-cut Materials	SQUARE	4	VF	VFMHVCH	 End mill, Medium cut length, 4 flute, Irregular helix flutes, with multiple internal through coolant holes	DC 16,20					◎	◎			J150	J150
		6	VF	VF6MHVCH	 End mill, Medium cut length, 6 flute, Irregular helix flutes, with multiple internal through coolant holes	DC 10,12 16,20					◎	◎			J187	J187
		8	VF	VF8MHVCH	 End mill, Medium cut length, 8 flute, Irregular helix flutes, with multiple internal through coolant holes	DC 16,20					◎	◎			J190	J190
	RADIUS	4	VF	VFMHVRBCH	 Corner radius end mill, Medium cut length, 4 flute, Irregular helix flutes, with multiple internal through coolant holes	DC 16–20					◎	◎			J327	J327
		6	VF	VF6MHVRBCH	 Corner radius end mill, Medium cut length, 6 flute, Irregular helix flutes, with multiple internal through coolant holes	DC 10,12 16,20					◎	◎			J353	J353
		8	VF	VF8MHVRBCH	 Corner radius end mill, Medium cut length, 8 flute, Irregular helix flutes, with multiple internal through coolant holes	DC 16,20					◎	◎			J354	J354
	ROUGHING	4	VF	VFSFPRCH	 Roughing end mill, Short cut length, 4 flute, with multiple internal through coolant holes	DC 16,20					◎	◎			J201	J201
		6	VF	VF6SVRCH	 Roughing end mill, Short cut length, 6 flute, Irregular helix flutes, with multiple internal through coolant holes	DC 16,20					◎	◎			J204	J204
MIRACLE END MILL SERIES																
General Use	SQUARE	2	VC	VC2SS	 End mill, Extra short cut length, 2 flute	DC 0.3–16	○	◎	◎		○	○			J074	J075
			VC	VC2MS	 End mill, Medium cut length, 2 flute	DC 0.3–25	○	◎	◎		○	○			J076	J078
			VC	VC2JS	 End mill, Semi long cut length, 2 flute	DC 1–25	○	◎	◎		○	○			J079	J080
		4	VC	VC4MC	 End mill, Medium cut length, 4 flute	DC 2–25	○	◎	◎	○	○	○			J160	J161
			VC	VC4JC	 End mill, Semi long cut length, 4 flute	DC 3–25	○	◎	◎	○	○	○			J162	J163
For high feed cutting	BALL	2	VC	VC2MDB	 MIRACLE ball nose high power end mill (M), 2 flute	PRFRAD 1.5 –12.5	○	◎	◎	○	○	○			J249	J250

* DC : Cutting Diameter
* PRFRAD : Ball nose end mill radius

Applications, Features	Type	No. of Flutes	Coating	Product Code	Shape	Size Range	Work Material								Page Number	
							P		H		M	S	N		Dimensions	Cutting Conditions
							Carbon Steel, Alloy Steel, Cast Iron	Tool steel, Pre-Hardened Steel, Hardened Steel	Hardened Steel(-55HRC)	Hardened Steel(55HRC-)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy		
For Profiling	BALL	2	VC	VC2ESB	Ball nose, Extra short cut length, 2 flute, Short shank	PRFRAD 0.15–6	○	◎	◎	○	○	○			J243	J244
			VC	VC2MB	Ball nose end mill, Medium cut length, 2 flute	PRFRAD 0.2 –12.5	○	◎	◎	○	○	○			J248	J250
For High Efficiency Machining		3	VC	VC3MB	Ball nose end mill, Medium cut length, 3 flute	PRFRAD 1–10	○	◎	◎	○	○	○			J276	J277
For Deep Slotting	TAPER NECK BALL	2	VC	VCXB	Ball nose taper end mill, Medium cut length, Taper neck	PRFRAD 0.5–6	○	◎	◎	○	○	○			J251	J253
For Corner Radius	RADIUS	4	VC	VC4SRB	Corner radius end mill, Short cut length, 4 flute	DC 4–12	○	◎	◎	○	○	○			J335	J336
			VC	VC4JRB	Corner radius end mill, Semi long cut length, 4 flute	DC 3–20	○	◎	○	○	○	○			J337	J338
For Roughing	ROUGHING	3 4	VC	VCSFPR	Roughing end mill, Short cut length, 3–4 flute	DC 3–20	◎	◎	○		◎	◎			J202	J203
For Chamfering	CHAMFERING	2	VC	VC2C	Chamfer cutter, 2 flute	DC 2–12	◎	◎	◎	○	◎	◎	○	○	J377	J377
MIRACLE NOVA END MILL SERIES																
For High-Precision Machining	BALL	2	VC	VC2PSB	Ball nose end mill, Short cut length, 2 flute, High precision	PRFRAD 0.05–6	◎	◎	◎		○	○			J245	J247
For Ultra high-precision Machining			VC	VC2PSBP	MIRACLE ball nose ultra high-precision end mill(S), 2 flute	PRFRAD 0.02–6	◎	◎	◎		○	○			J246	J247
MIRACLE ORBIT END MILL SERIES																
For High-Precision Machining	RADIUS	2 4	VC	VCPSRB	Corner radius end mill, Short cut length, 2–4 flute, High precision	DC 0.6–12	◎	◎	◎	◎	○	○			J292	J295
MIRACLE CORNER RADIUS END MILL SERIES FOR HIGH FEED MACHINING																
For High Feed Machining	RADIUS	4	VC	VCHFRB	Corner radius, Short flute length, 4 flute, High feed machining	DC 2–16	◎	◎	◎	○		○			J339	J341
MIRACLE END MILL SERIES FOR HIGH HARDNESS STEEL																
For Machining of Hardened Steels	SQUARE	4 6	VC	VCMDSC	End mill, Medium cut length, 4–6 flute	DC 0.5–3	○	◎	◎	◎					J164	J165
		6	VC	VCLD	End mill, Long cut length, 6 flute	DC 6–25	○	◎	◎	◎					J188	J188
	BALL	4	VC	VC4MB	Ball nose end mill, Medium cut length, 4 flute	PRFRAD 0.5–10	○	◎	◎	◎	○	○			J285	J286
For Angled Face Machining	TAPER BALL		VC	VC4STB	Ball nose taper end mill, Short cut length, 4 flute	PRFRAD 0.3–4	○	◎	◎	◎	○	○			J373	J375

END MILLS SELECTION CHART CARBIDE (By Series)

Applications, Features	Type	No. of Flutes	Coating	Product Code	Shape	Size Range	Work Material: P – Carbon Steel, Alloy Steel, Cast Iron	P – Tool steel, Pre-Hardened Steel, Hardened Steel	H – Hardened Steel(-55HRC)	H – Hardened Steel(55HRC-)	M – Austenitic Stainless Steel	S – Titanium Alloy, Heat Resistant Alloy	N – Copper Alloy	N – Aluminium Alloy	Page Number: Dimensions	Page Number: Cutting Conditions
MIRACLE END MILL SERIES FOR DIFFICULT TO CUT MATERIALS																
For Difficult-to-cut Materials	SQUARE	3 4	VC	VCMH	 End mill, Medium cut length, 3–4 flute, High helix angle	DC 3–25	○	◎	○		◎	◎			J121	J122
		6	VC	VC6MH	 End mill, Medium cut length, 6 flute, High helix angle	DC 6–25	◎	◎	○		◎	◎			J189	J189
		8	VC	VC8MH	 End mill, Medium cut length, 8 flute, High helix angle	DC 20–25	◎	◎	○		◎	◎			J191	J191
	RADIUS	4	VC	VCMHDRB	 Corner radius end mill, Medium cut length, 4 flute, High helix angle	DC 2–25	○	◎	◎	○	◎	◎			J342	J344
END MILL SERIES FOR SLOTTING																
For Key Way Slotting	SQUARE	2	MS	SED2KPG	 End mill, Medium cut length, 2 flute, + Tolerance	DC 2–16	◎	◎			○	○			J088	J090
			MS	SED2KMG	 End mill, Medium cut length, 2 flute, + Tolerance	DC 2–16	◎	◎			○	○			J089	J090
CRN END MILL SERIES																
For Copper Electrodes	SQUARE	2	CRN	CRN2MS	 End mill, Medium cut length, 2 flute, For copper electrodes	DC 0.2–12							◎	○	J081	J082
	LONG NECK SQUARE		CRN	CRN2XL	 End mill, Medium cut length, 2 flute, Long neck, For copper electrodes	DC 0.2–6							◎	○	J083	J085
	SQUARE	4	CRN	CRN4JC	 End mill, Semi long cut length, 4 flute, For copper electrodes	DC 3–12							◎	○	J166	J166
	BALL	2	CRN	CRN2MB	 Ball nose, Medium cut length, 2 flute, For copper electrodes	PRFRAD 0.2–6							◎	○	J254	J255
	LONG NECK BALL		CRN	CRN2XLB	 Ball nose, Medium cut length, 2 flute, Long neck, For copper electrodes	PRFRAD 0.1–3							◎	○	J256	J259
	RADIUS		CRN	CRN2MRB	 Corner radius, Medium cut length, 2 flute, For copper electrodes	DC 6–12							◎	○	J298	J299
	LONG NECK CORNER RADIUS		CRN	CRN2XLRB	 Corner radius, Medium cut length, 2 flute, For copper electrodes	DC 0.5–6							◎	○	J300	J301
DFC END MILL SERIES																
For CFRP machining	SQUARE	4	DFC	DFC4JC	 Diamond coating endmill, 4 flute	DC 6–12	CFRP : ○								J171	J171
	SQUARE WITH CROSS-NICK	—	DFC	DFCJRT	 Diamond coating endmill with cross-nick	DC 6–12									J172	J172

* DC : Cutting Diameter
* PRFRAD : Ball nose end mill radius

Applications, Features	Type	No. of Flutes	Coating	Product Code	Shape	Size Range	Work Material P: Carbon Steel, Alloy Steel, Cast Iron	Work Material P: Tool steel, Pre-Hardened Steel, Hardened Steel	Work Material H: Hardened Steel(-55HRC)	Work Material H: Hardened Steel(55HRC-)	Work Material M: Austenitic Stainless Steel	Work Material S: Titanium Alloy, Heat Resistant Alloy	Work Material N: Copper Alloy	Work Material N: Aluminium Alloy	Page Number: Dimensions	Page Number: Cutting Conditions
DF END MILL SERIES																
For Graphite	SQUARE	4	DF	DF4JC	End mill, Semi long cut length, 4 flute, For graphite	DC 3–12								○	J167	J167
	LONG NECK SQUARE	4	DF	DF4XL	End mill, Long neck, 4 flute, For graphite	DC 1–12								○	J168	J169
	BALL	2	DF	DF2MB	Ball nose, Medium cut length, 2 flute, For graphite	PRFRAD 3–6								○	J260	J260
	LONG NECK BALL	2	DF	DF2XLB	Ball nose, Medium cut length, 2 flute, Long neck, For graphite	PRFRAD 0.2–2								○	J261	J263
	TAPER NECK BALL	3	DF	DF3XB	Ball nose, Medium cut length, 3 flute, Taper neck, For graphite	PRFRAD 0.5–2								○	J278	J278
	RADIUS	2 4	DF	DFPSRB	Corner radius end mill, Short cut length, 2–4 flute, High precision, For graphite	DC 0.5–12								○	J345	J347
DLC END MILL SERIES																
For Machining of Aluminium Alloys	SQUARE	2	DLC	DLC2MA	Slot drill, Medium cut length, 2 flute	DC 1–20							○	◎	J086	J087
	BALL	2	DLC	DLC2MB	Ball nose, Medium cut length, 2 flute	PRFRAD 0.1–10							○	◎	J265	J266
ALIMASTER END MILL SERIES																
For Machining of Aluminium Alloys	SQUARE	2	—	C2SA	End mill, Short cut length, 2 flute, For aluminium alloy	DC 3–20							○	◎	J102	J103
		2	—	C2MA	End mill, Medium cut length, 2 flute, For aluminium alloy	DC 1–20								◎	J098	J099
		2	—	C2LA	End mill, Long cut length, 2 flute, For aluminium alloy	DC 1–20								◎	J100	J101
		2	—	C2MHA	End mill, Medium cut length, 2 flute, For aluminium alloy	DC 3–25								◎	J104	J105
		3	—	C3SA	End mill, Short cut length, 3 flute, For aluminium alloy	DC 10–26							○	◎	J124	J125
	RADIUS	3	—	C3SARB	Corner radius, Short cut length, 3 flute, For aluminium alloy	DC 12–25							○	◎	J304	J305
	ROUGHING	3	—	CSRA	Roughing end mill, Short cut length, 3 flute, For aluminium alloy	DC 10–25								◎	J193	J194
		3	—	CMRA	Roughing end mill, Medium cut length, 3 flute, For aluminium alloy	DC 3–25								◎	J195	J196
	ROUGHING RADIUS	3	—	CSRARB	Corner radius roughing end mill, Short cut length, 3 flute, For aluminium alloy	DC 10–25								◎	J306	J307

Graphite : ◎
GFRP : ○
CFRP : ○

GFRP : ○
CFRP : ○

END MILLS SELECTION CHART CARBIDE (By Series)

Applications, Features	Type	No. of Flutes	Coating	Product Code	Shape	Size Range	Work Material P: Carbon Steel, Alloy Steel, Cast Iron	Work Material P: Tool steel, Pre-Hardened Steel, Hardened Steel	Work Material H: Hardened Steel(-55HRC)	Work Material H: Hardened Steel(55HRC-)	Work Material M: Austenitic Stainless Steel	Work Material S: Titanium Alloy, Heat Resistant Alloy	Work Material N: Copper Alloy	Work Material N: Aluminium Alloy	Page Number: Dimensions	Page Number: Cutting Conditions
CARBIDE END MILL SERIES																
General Use	SQUARE	2	—	C2SS	End mill, Short cut length, 2 flute	DC 0.4–6	○	○			○	○	○	○	J091	J097
			—	C2MS	End mill, Medium cut length, 2 flute	DC 1–20	○	○			○	○	○	○	J092	J097
			—	C2JS	End mill, Semi long cut length, 2 flute	DC 1–25	○	○			○	○	○	○	J095	J097
			—	C2LS	End mill, Long cut length, 2 flute	DC 1–20	○	○			○	○	○	○	J096	J097
		4	—	C4MC	End mill, Medium cut length, 4 flute, Center cutting	DC 3–20	○	○			○	○	○	○	J173	J176
			—	C4JC	End mill, Semi long cut length, 4 flute, Center cutting	DC 3–25	○	○			○	○	○	○	J174	J176
			—	C4LC	End mill, Long cut length, 4 flute, Center cutting	DC 3–20	○	○			○	○	○	○	J175	J176
For Profiling	BALL	2	—	C2MB	Ball nose end mill, Medium cut length, 2 flute	PRFRAD 0.5–10	◎	○			○	○	○	○	J269	J270
High Helix	SQUARE	2	—	SEE2L	End mill, Long cut length, 2 flute	DC 3–20	◎	○			○	○	○	○	J106	J107
		4	—	SEE4L	End mill, Long cut length, 4 flute	DC 3–25	◎	○			○	○		○	J177	J178
For Machining of Aluminium Alloys			—	SEG4SA	End mill, Medium cut length, 4 flute, Irregular spiral helix angle, For aluminium alloy	DC 6–25							○	◎	J179	J179
For Difficult-to-cut Materials		3	—	CMH	End mill, Medium cut length, 3 flute	DC 6–16	○	◎			○	○		○	J123	—
CBN END MILL SERIES																
For Machining of Hardened Steels	SQUARE	1	—	GBE	End mill, 1 flute, Brazed type (CBN)	DC 6–12		○	◎	◎					J192	J192
	LONG NECK BALL	2	—	CBN2XLB	Ball nose, Short cut length, 2 flute, Long neck	PRFRAD 0.2–1	○	◎	◎	◎					J267	J268
	LONG NECK CORNER RADIUS		—	CBN2XLRB	Corner radius end mill, Medium cut length, 2 flute, Long neck	DC 0.5–2	○	◎	◎	◎					J302	J303

* DC : Cutting Diameter
* PRFRAD : Ball nose end mill radius

END MILLS SELECTION CHART CARBIDE(By Shape)

Type	No. of Flutes	Applications, Features	Coating	Product Code	Shape	Size Range	Work Material P: Carbon Steel, Alloy Steel, Cast Iron	Work Material P: Tool steel, Pre-Hardened Steel, Hardened Steel	Work Material H: Hardened Steel(-55HRC)	Work Material H: Hardened Steel(55HRC-)	Work Material M: Austenitic Stainless Steel	Work Material S: Titanium Alloy, Heat Resistant Alloy	Work Material N: Copper Alloy	Work Material N: Aluminium Alloy	Page Number: Dimensions	Page Number: Cutting Conditions
SQUARE																
	1	For Machining of Hardened Steels	—	GBE	End mill, 1 flute, Brazed type (CBN)	DC 6–12		○	◎	◎					J192	J192
	2	General Use	MS	MS2SS	End mill, Short cut length, 2 flute	DC 0.1–12	◎	◎	○		○	○			J048	J051
			MS	MS2MS	End mill, Medium cut length, 2 flute	DC 0.2–20	◎	◎	○		○	○			J049	J051
			MS	MS2MD	End mill, Medium cut length, 2 flute, Strong geometry type	DC 1–12	◎	◎	○		○	○			J052	J053
			MS	MS2JS	End mill, Semi long cut length, 2 flute	DC 0.1–12	◎	◎	○		○	○			J054	J055
			MS	MS2LS	End mill, Long cut length, 2 flute	DC 0.2–12	◎	◎	○		○	○			J056	J057
			VC	VC2SS	End mill, Extra short cut length, 2 flute	DC 0.3–16	○	◎	◎		○	○			J074	J075
			VC	VC2MS	End mill, Medium cut length, 2 flute	DC 0.3–25	○	◎	◎		○	○			J076	J078
			VC	VC2JS	End mill, Semi long cut length, 2 flute	DC 1–25	○	◎	◎		○	○			J079	J080
			—	C2SS	End mill, Short cut length, 2 flute	DC 0.4–6	○	○			○	○	○	○	J091	J097
			—	C2MS	End mill, Medium cut length, 2 flute	DC 1–20	○	○			○	○	○	○	J092	J097
			—	C2JS	End mill, Semi long cut length, 2 flute	DC 1–25	○	○			○	○	○	○	J095	J097
			—	C2LS	End mill, Long cut length, 2 flute	DC 1–20	○	○			○	○	○	○	J096	J097
		For Key Way Slotting	MS	SED2KPG	End mill, Medium cut length, 2 flute, + Tolerance	DC 2–16	◎	◎			○	○			J088	J090
			MS	SED2KMG	End mill, Medium cut length, 2 flute, + Tolerance	DC 2–16	◎	◎			○	○			J089	J090
		High helix	—	SEE2L	End mill, Long cut length, 2 flute	DC 3–20	◎	○			○	○	○	○	J106	J107
		For Small Automatic Lathes	MS	MS2ES	End mill, 2 flute, For small automatic lathes	DC 3–12	◎	◎	○		○	○			J065	J066

END MILLS SELECTION CHART CARBIDE(By Shape)

Type	No. of Flutes	Applications, Features	Coating	Product Code	Shape	Size Range	Work Material P: Carbon Steel, Alloy Steel, Cast Iron	Work Material P: Tool steel, Pre-Hardened Steel, Hardened Steel	Work Material H: Hardened Steel(-55HRC)	Work Material H: Hardened Steel(55HRC-)	Work Material M: Austenitic Stainless Steel	Work Material S: Titanium Alloy, Heat Resistant Alloy	Work Material N: Copper Alloy	Work Material N: Aluminium Alloy	Page Number: Dimensions	Page Number: Cutting Conditions
SQUARE																
2		For Machining of Hardened Steels	VF	VF2MD	End mill, Medium cut length, 2 flute, For hardened materials	DC 0.5–6	○	◎	◎	◎					J067	J068
2		For Machining of Hardened Steels	VF	VF2MV	End mill, Medium cut length, 2 flute, Irregular helix flutes	DC 0.5–6	○	◎	◎	◎					J069	J070
2		For Copper Electrodes	CRN	CRN2MS	End mill, Medium cut length, 2 flute, For copper electrodes	DC 0.2–12							◎	○	J081	J082
2		For Machining of Aluminium Alloys	DLC	DLC2MA	Slot drill, Medium cut length, 2 flute	DC 1–20	GFRP : ○ CFRP : ○						○	◎	J086	J087
2		For Machining of Aluminium Alloys	—	C2SA	End mill, Short cut length, 2 flute, For aluminium alloy	DC 3–20							○	◎	J102	J103
2		For Machining of Aluminium Alloys	—	C2MA	End mill, Medium cut length, 2 flute, For aluminium alloy	DC 1–20								◎	J098	J099
2		For Machining of Aluminium Alloys	—	C2LA	End mill, Long cut length, 2 flute, For aluminium alloy	DC 1–20								◎	J100	J101
2		For Machining of Aluminium Alloys	—	C2MHA	End mill, Medium cut length, 2 flute, For aluminium alloy	DC 3–25								◎	J104	J105
3		General Use, For Key Way Slotting	MS	MSMHZD	Slotting, Medium cut length, 3 flute	DC 1–20	◎	◎	○		◎	○			J108	J109
3		For Small Automatic Lathes	MS	MS3ES	End mill, 3 flute, For small automatic lathes	DC 3–12	◎	◎	○		○	○			J110	J111
3		For Difficult-to-cut Materials	VQ	VQMHZV MIRACLE SIGMA	End mill, Medium cutting length, 3 flute for drilling and slotting	DC 1–20	◎	○			◎	◎	○		J112	J114
3		For Difficult-to-cut Materials	VQ	VQMHZVOH MIRACLE SIGMA	End mill, Medium cutting length, 3 flute for drilling and slotting with internal through coolant holes	DC 6–16	◎	○			◎	◎	○		J118	J119
3		For Difficult-to-cut Materials	—	CMH	End mill, Medium cut length, 3 flute	DC 6–16	○	◎			○	○		○	J123	—
3		For Machining of Aluminium Alloys	—	C3SA	End mill, Short cut length, 3 flute, For aluminium alloy	DC 10–26							○	◎	J124	J125
3 4		For Difficult-to-cut Materials	VQ	VQXL NEW MIRACLE SIGMA	End mill, Short cut length, 3–4 flute, Long neck	DC 0.2–1	◎	○			◎	◎	○		J157	J158
3 4		For Difficult-to-cut Materials	VQ	VQSVR NEW MIRACLE SIGMA	Roughing end mill, Short cut length, 3–4 flute, Irregular helix flutes	DC 3–20	◎	○			◎	◎	○		J180	J181
3 4		For Difficult-to-cut Materials	VC	VCMH	End mill, Medium cut length, 3–4 flute, High helix angle	DC 3–25	○	◎	○		◎	◎			J121	J122

* DC : Cutting Diameter

Type	No. of Flutes	Applications, Features	Coating	Product Code	Shape	Size Range	Work Material								Page Number	
							P		H		M	S	N		Dimensions	Cutting Conditions
							Carbon Steel, Alloy Steel, Cast Iron	Tool steel, Pre-Hardened Steel, Hardened Steel	Hardened Steel(-55HRC)	Hardened Steel(55HRC-)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy		
	4	General Use	MS	MS4SC	End mill, Short cut length, 4 flute	DC 1–12	◎	◎	○		○	○			J132	J134
			MS	MS4MC	End mill, Medium cut length, 4 flute	DC 1–20	◎	◎	○		○	○			J133	J134
			MS	MS4JC	End mill, Semi long cut length, 4 flute	DC 1–12	◎	◎	○		○	○			J135	J136
			VC	VC4MC	End mill, Medium cut length, 4 flute	DC 2–25	○	◎	◎	○	○	○			J160	J161
			VC	VC4JC	End mill, Semi long cut length, 4 flute	DC 3–25	○	◎	◎	○	○	○			J162	J163
			—	C4MC	End mill, Medium cut length, 4 flute, Center cutting	DC 3–20	○	○			○	○	○	○	J173	J176
			—	C4JC	End mill, Semi long cut length, 4 flute, Center cutting	DC 3–25	○	○			○	○	○	○	J174	J176
			—	C4LC	End mill, Long cut length, 4 flute, Center cutting	DC 3–20	○	○			○	○	○	○	J175	J176
		For high feed cutting	MS	MSSHD	High power, Short cut length, 4 flute	DC 3–20	◎	◎	○		◎	◎			J126	J129
			MS	MSMHD	High power, Medium cut length, 4 flute	DC 2–25	◎	◎	○		◎	◎			J127	J129
			MS	MSJHD	High power, Semi long cut length, 4 flute	DC 2–20	◎	◎	○		◎	◎			J130	J131
		High helix	—	SEE4L	End mill, Long cut length, 4 flute	DC 3–25	◎	○			○	○		○	J177	J178
		For Small Automatic Lathes	MS	MS4EC	End mill, 4 flute, For small automatic lathes	DC 3–14	◎	◎	○		○	○			J141	J142
		For Machining of Hardened Steels	VF	VF4MD	End mill, Medium cut length, 4 flute, For hardened materials	DC 1–20	○	◎	◎	◎					J143	J144
			VF	VF4MV	End mill, Medium cut length, 4 flute, Irregular helix flutes	DC 6–20	○	◎	◎	◎					J145	J145
		For Difficult-to-cut Materials	VQ	VQMHV MIRACLE SIGMA	End mill, Medium cutting length, 4 flute, Irregular helix flutes	DC 2–25	◎	○			◎	◎	○		J151	J152
			VQ	VQJHV NEW MIRACLE SIGMA	End mill, Medium cut length, 4 flute, Irregular helix flutes	DC 2–20	◎	○			◎	◎	○		J155	J156
			VF	VFMHV	End mill, Medium cut length, Irregular helix flutes	DC 2–20	○	○	○		◎	◎			J146	J147

END MILLS SELECTION CHART CARBIDE(By Shape)

Type	No. of Flutes	Applications, Features	Coating	Product Code	Shape	Size Range	Work Material P: Carbon Steel, Alloy Steel, Cast Iron	Work Material P: Tool steel, Pre-Hardened Steel, Hardened Steel	Work Material H: Hardened Steel(-55HRC)	Work Material H: Hardened Steel(55HRC-)	Work Material M: Austenitic Stainless Steel	Work Material S: Titanium Alloy, Heat Resistant Alloy	Work Material N: Copper Alloy	Work Material N: Aluminium Alloy	Page Number: Dimensions	Page Number: Cutting Conditions
SQUARE																
	4	For Difficult-to-cut Materials	VF	VFJHV	End mill, Semi long cut length, Irregular helix flutes	DC 2–20	○	○	○		◎	◎			J148	J149
			VF	VFMHVCH	EEnd mill, Medium cut length, 4 flute, Irregular helix flutes, with multiple internal through coolant holes	DC 16,20					◎	◎			J150	J150
		For Copper Electrodes	CRN	CRN4JC	End mill, Semi long cut length, 4 flute, For copper electrodes	DC 3–12							◎	○	J166	J166
		For CFRP machining	DFC	DFC4JC	Diamond coating endmill, 4 flute	DC 6–12	CFRP : ○								J171	J171
		For Graphite	DF	DF4JC	End mill, Semi long cut length, 4 flute, For graphite	DC 3–12	Graphite : ◎ GFRP : ○ CFRP : ○							○	J167	J167
		For Machining of Aluminium Alloys	—	SEG4SA	End mill, Medium cut length, 4 flute, Irregular spiral helix angle, For aluminium alloy	DC 6–25							○	◎	J179	J179
	4 6	For Machining of Hardened Steels	VF	VFSD	End mill, Short cut length, For hardened materials	DC 1–12	○	◎	◎	◎					J184	J186
			VF	VFMD	End mill, Medium cut length, For hardened materials	DC 1–25	○	◎	◎	◎					J185	J186
			VC	VCMDSC	End mill, Medium cut length, 4–6 flute	DC 0.5–3	○	◎	◎	◎					J164	J165
	6		VC	VCLD	End mill, Long cut length, 6 flute	DC 6–25	○	◎	◎	◎					J188	J188
	6	For Difficult-to-cut Materials	VF	VF6MHV	End mill, Medium cut length, 6 flute, Irregular helix flutes	DC 6–20					◎	◎			J183	J183
			VF	VF6MHVCH	End mill, Medium cut length, Irregular helix flutes, with multiple internal through coolant holes	DC 10,12 16,20					◎	◎			J187	J187
			VC	VC6MH	End mill, Medium cut length, 6 flute, High helix angle	DC 6–25	◎	◎	○		◎	◎			J189	J189
	8		VF	VF8MHVCH	End mill, Medium cut length, Irregular helix flutes, with multiple internal through coolant holes	DC 16,20					◎	◎			J190	J190
			VC	VC8MH	End mill, Medium cut length, 8 flute, High helix angle	DC 20–25	◎	◎	○		◎	◎			J191	J191

* DC : Cutting Diameter
* PRFRAD : Ball nose end mill radius

Type	No. of Flutes	Applications, Features	Coating	Product Code	Shape	Size Range	Work Material P: Carbon Steel, Alloy Steel, Cast Iron	P: Tool steel, Pre-Hardened Steel, Hardened Steel	H: Hardened Steel(~55HRC)	H: Hardened Steel(55HRC~)	M: Austenitic Stainless Steel	S: Titanium Alloy, Heat Resistant Alloy	N: Copper Alloy	N: Aluminium Alloy	Page Number: Dimensions	Page Number: Cutting Conditions
LONG NECK SQUARE																
	2	For Deep Slotting	MS	MS2XL	End mill, Short cut length, 2 flute, Long neck	DC 0.2–6	◎	◎	○		○	○			J058	J061
		For Deep Slotting	MS	MS2XL6	End mill, Short cut length, 2 flute, 6mm shank	DC 0.3–2.5	◎	◎	○		○	○			J062	J064
		For Deep Slotting of Hardened Steels	VF	VF2XL	End mill, 2 flute, Long neck	DC 0.1–3	○	◎	◎	◎					J071	J073
		For copper electrodes	CRN	CRN2XL	End mill, Medium cut length, 2 flute, Long neck, For copper electrodes	DC 0.2–6							◎	○	J083	J085
	4	For Deep Slotting	MS	MS4XL	End mill, Short cut length, 4 flute, Long neck	DC 1–10	◎	◎	○		○	○			J137	J140
		For Graphite	DF	DF4XL	End mill, Long neck, 4 flute, For graphite	DC 1–12	Graphite : ◎ GFRP : ○ CFRP : ○							○	J168	J169
SQUARE WITH CROSS-NICK																
	–	For CFRP machining	DFC	DFCJRT	Diamond coating endmill with cross-nick	DC 6–12	CFRP : ○								J172	J172
TAPER																
	2	For Angled Face Machining	MS	MS2MT	Taper end mill, Medium cut length, 2 flute	DC 0.2–10	◎	◎	○		○	○			J355	J359
	4	For Rib Milling	MS	MS4LT	Taper end mill, Long cut length, 4 flute	DC 0.2–3	◎	◎	○		○				J360	J366
BALL																
	2	General Use	MS+	MP2SSB MIRACLE SIGMA	Ball nose, Short cut length, 2 flute, Short shank	PRFRAD 0.1–6	◎	◎	◎		○	○	○		J205	J208
			MS+	MP2SB MIRACLE SIGMA	Ball nose, Short cut length, 2 flute	PRFRAD 0.1–6	◎	◎	○		○	○	○		J206	J208
			MS+	MP2MB MIRACLE SIGMA	Ball nose, Medium cutting length, 2 flute	PRFRAD 0.25–6	◎	◎	○		○	○	○		J207	J208
		For high feed cutting	VF	VF2SDB	Ball nose, Short cut length, 2 flute, Strong geometry type	PRFRAD 0.5–10	○	◎	◎	○					J232	J234
			VF	VF2SDBL	Ball nose, Short cut length, 2 flute, Strong geometry type, Long shank	PRFRAD 0.5–10	○	◎	◎	○					J233	J234

END MILLS SELECTION CHART CARBIDE(By Shape)

Type	No. of Flutes	Applications, Features	Coating	Product Code	Shape	Size Range	Work Material P: Carbon Steel, Alloy Steel, Cast Iron	Work Material P: Tool steel, Pre-Hardened Steel, Hardened Steel	Work Material H: Hardened Steel(-55HRC)	Work Material H: Hardened Steel(55HRC-)	Work Material M: Austenitic Stainless Steel	Work Material S: Titanium Alloy, Heat Resistant Alloy	Work Material N: Copper Alloy	Work Material N: Aluminium Alloy	Page Number: Dimensions	Page Number: Cutting Conditions
BALL																
	2	For high feed cutting	VC	VC2MDB	MIRACLE ball nose high power end mill (M), 2 flute	PRFRAD 1.5 –12.5	○	◎	◎	○	○	○			J249	J250
		For Profiling	MS	MS2SB	Ball nose end mill, Short cut length, 2 flute	PRFRAD 0.1–6	◎	◎	○		○	○			J217	J220
			MS	MS2MB	Ball nose end mill, Medium cut length, 2 flute	PRFRAD 0.25–6	◎	◎	○		○	○			J219	J220
			VC	VC2ESB	Ball nose, Extra short cut length, 2 flute, Short shank	PRFRAD 0.15–6	○	◎	◎	○	○	○			J243	J244
			VC	VC2MB	Ball nose end mill, Medium cut length, 2 flute	PRFRAD 0.2 –12.5	○	◎	◎	○	○	○			J248	J250
			—	C2MB	Ball nose end mill, Medium cut length, 2 flute	PRFRAD 0.5–10	◎	○			○	○	○	○	J269	J270
		For High-Precision Machining	VC	VC2PSB	Ball nose end mill, Short cut length, 2 flute, High precision	PRFRAD 0.05–6	◎	◎	◎		○	○			J245	J247
		For Ultra high-precision Machining	VC	VC2PSBP	MIRACLE ball nose ultra high-precision end mill(S), 2 flute	PRFRAD 0.02–6	◎	◎	◎		○	○			J246	J247
		For Machining of Hardened Steels	VF	VF2SSB	Ball nose, Short cut length, 2 flute, Short shank	PRFRAD 0.5–6	○	◎	◎	◎	○	○			J228	J231
			VF	VF2SB	Ball nose, Short cut length, 2 flute, For hardened materials	PRFRAD 0.1–10	○	◎	◎	◎	○	○			J229	J231
		For Copper Electrodes	CRN	CRN2MB	Ball nose, Medium cut length, 2 flute, For copper electrodes	PRFRAD 0.2–6							◎	○	J254	J255
		For Graphite	DF	DF2MB	Ball nose, Medium cut length, 2 flute, For graphite	PRFRAD 3–6	Graphite : ◎ GFRP : ○ CFRP : ○							○	J260	J260
		For Machining of Aluminium Alloys	DLC	DLC2MB	Ball nose, Medium cut length, 2 flute	PRFRAD 0.1–10	GFRP : ○ CFRP : ○						○	◎	J265	J266
	3	For High Efficiency Machining	VC	VC3MB	Ball nose end mill, Medium cut length, 3 flute	PRFRAD 1–10	○	◎	◎	○	○	○			J276	J277
	4	For Machining of Hardened Steels	VF	VF4MB	Ball nose, Medium cut length, 4 flute	PRFRAD 0.5–6		◎	◎	◎	○	○			J281	J282
			VC	VC4MB	Ball nose end mill, Medium cut length, 4 flute	PRFRAD 0.5–10	○	◎	◎	◎	○	○			J285	J286
		For Difficult-to-cut Materials	VQ	VQ4SVB MIRACLE SIGMA	Ball nose, Medium cutting length, 4 flute	PRFRAD 1–6	○	○			◎	◎	○		J283	J284
			VF	VF4SVB	Ball nose, Short cut length, 4 flute,Variable curve	PRFRAD 1–10	○	○			◎	◎			J279	J280

* PRFRAD : Ball nose end mill radius

Type	No. of Flutes	Applications, Features	Coating	Product Code	Shape	Size Range	Work Material P: Carbon Steel, Alloy Steel, Cast Iron	Work Material P: Tool steel, Pre-Hardened Steel, Hardened Steel	Work Material H: Hardened Steel(-55HRC)	Work Material H: Hardened Steel(55HRC-)	Work Material M: Austenitic Stainless Steel	Work Material S: Titanium Alloy, Heat Resistant Alloy	Work Material N: Copper Alloy	Work Material N: Aluminium Alloy	Page Number: Dimensions	Page Number: Cutting Conditions
LONG NECK BALL																
	2	General Use	MS+	MP2XLB	End mill, Short cut length, 2 flute, Long neck	PRFRAD 0.05–3	◎	◎	○		○	○			J209	J214
		For Deep Slotting	MS	MS2XLB	Ball nose end mill, Short cut length, 2 flute, Long neck	PRFRAD 0.1–3	◎	◎	○		○	○			J221	J226
		For Machining of Hardened Steels	—	CBN2XLB	Ball nose, Short cut length, 2 flute, Long neck	PRFRAD 0.2–1	○	◎	◎	◎					J267	J268
		For Deep Slotting of Hardened Steels	VF	VF2XLBS	Ball nose, Medium cut length, 2 flute, Short shank	PRFRAD 0.2–1	○	◎	◎	◎		○			J236	J242
			VF	VF2XLB	IMPACT MIRACLE, Ball nose, 2 flute, Long neck	PRFRAD 0.1–3	○	◎	◎	◎		○			J237	J242
		For Copper Electrodes	CRN	CRN2XLB	Ball nose, Medium cut length, 2 flute, Long neck, For copper electrodes	PRFRAD 0.1–3							◎	○	J256	J259
		For Graphite	DF	DF2XLB	Ball nose, Medium cut length, 2 flute, Long neck, For graphite	PRFRAD 0.2–2	Graphite : ◎ GFRP : ○ CFRP : ○							○	J261	J263
TAPER NECK BALL																
	2	For Deep Slotting	VC	VCXB	Ball nose taper end mill, Medium cut length, Taper neck	PRFRAD 0.5–6	○	◎	◎	○	○	○			J251	J253
	3	For Deep Slotting of Hardened Steels	VF	VF3XB	Ball nose, Medium cut length, 3 flute, Taper neck	PRFRAD 0.4–2.5	○	◎	◎	◎	○	○			J271	J274
		For Graphite	DF	DF3XB	Ball nose, Medium cut length, 3 flute, Taper neck, For graphite	PRFRAD 0.5–2	Graphite : ◎ GFRP : ○ CFRP : ○							○	J278	J278
WIDE BALL																
	2	For Profiling of Special Geometry	VF	VF2WB	Wide ball nose, Medium cut length, 2 flute	PRFRAD 1–3	○	◎	○		◎	◎			J227	J227
TAPER BALL																
	2	For Angled Face Machining	MS	MS2MTB	Ball nose taper end mill, Medium cut length, 2 flute	PRFRAD 0.2–1.5	◎	◎	○		○	○			J367	J368
	4	For Rib Milling	MS	MS4LTB	Ball nose, 4 flute, Taper, For rib milling	PRFRAD 0.3–1	◎	◎	○		○	○			J369	J372
		For Machining of Hardened Steels	VC	VC4STB	Ball nose taper end mill, Short cut length, 4 flute	PRFRAD 0.3–4	○	◎	◎	◎	○	○			J373	J375

END MILLS SELECTION CHART CARBIDE(By Shape)

Type	No. of Flutes	Applications, Features	Coating	Product Code	Shape	Size Range	Work Material P: Carbon Steel, Alloy Steel, Cast Iron	P: Tool steel, Pre-Hardened Steel, Hardened Steel	H: Hardened Steel(-55HRC)	H: Hardened Steel(55HRC-)	M: Austenitic Stainless Steel	S: Titanium Alloy, Heat Resistant Alloy	N: Copper Alloy	N: Aluminium Alloy	Page Number: Dimensions	Page Number: Cutting Conditions
RADIUS																
	2	For Corner Radius	MS	MS2MRB	Corner radius end mill, Medium cut length, 2 flute	DC 1–12	◎	◎	○		○	○			J287	J289
	2	For Copper Electrodes	CRN	CRN2MRB	Corner radius, Medium cut length, 2 flute, For copper electrodes	DC 6–12							◎	○	J298	J299
	3	For Machining of Aluminium Alloys	—	C3SARB	Corner radius, Short cut length, 3 flute, For aluminium alloy	DC 12–25							○	◎	J304	J305
	2 4	For High-Precision Machining	VC	VCPSRB	Corner radius end mill, Short cut length, 2–4 flute, High precision	DC 0.6–12	◎	◎	◎	◎	○	○			J292	J295
	2 4	For Graphite	DF	DFPSRB	Corner radius end mill, Short cut length, 2–4 flute, High precision, For graphite	DC 0.5–12	Graphite : ◎ GFRP : ○ CFRP : ○							○	J345	J347
	4	For high feed cutting	MS	MSMHDRB	High power, Corner radius, Medium cut length, 4 flute	DC 2–20	◎	◎	○		◎	◎			J311	J313
	4	For High Efficiency Machining	VF	VFHVRB	4 flute, Corner radius, Short cut length,Irregular helix flutes	DC 1–16	◎	◎	◎	◎	○	○			J315	J317
	4	For High Feed Machining	VC	VCHFRB	Corner radius, Short flute length, 4 flute, High feed machining	DC 2–16	◎	◎	◎	○		○			J339	J341
	4	For Corner Radius	MS	MS4MRB	Corner radius end mill, Medium cut length, 4 flute	DC 3–20	◎	◎	○		○	○			J308	J310
	4	For Corner Radius	VC	VC4SRB	Corner radius end mill, Short cut length, 4 flute	DC 4–12	○	◎	◎	○	○	○			J335	J336
	4	For Corner Radius	VC	VC4JRB	Corner radius end mill, Semi long cut length, 4 flute	DC 3–20	○	◎	○	○	○	○			J337	J338
	4	For Difficult-to-cut Materials	VQ	VQMHVRB MIRACLE SIGMA	Corner radius end mill, Medium cutting length, 4 flute, Irregular helix flutes	DC 2–20	◎	○			○	◎	○		J328	J330
	4	For Difficult-to-cut Materials	VQ	VQMHVRBF MIRACLE SIGMA	Corner radius end mill, Medium cutting length, 4 flute, Irregular helix flutes (for finishing)	DC 6–16	○	○			○	◎			J333	J334
	4	For Difficult-to-cut Materials	VF	VFMHVRB	Corner radius, Medium cut length, Irregular helix flutes	DC 6–20	◎	○	○		◎	◎			J325	J326
	4	For Difficult-to-cut Materials	VF	VFMHVRBCH	Corner radius end mill, Medium cut length, 4 flute, Irregular helix flutes, with multiple internal through coolant holes	DC 16–20					◎	◎			J327	J327
	4	For Difficult-to-cut Materials	VC	VCMHDRB	Corner radius end mill, Medium cut length, 4 flute, High helix angle	DC 2–25	○	◎	◎	○	◎	◎			J342	J344
	4 6	For Machining of Hardened Steels	VF	VFFDRB NEW	Multi-task corner radius end mill for impact miracle high speed cutting	DC 3–12	○	○	◎	◎					J314	J314

* DC : Cutting Diameter

Type	No. of Flutes	Applications, Features	Coating	Product Code	Shape	Size Range	Work Material P: Carbon Steel, Alloy Steel, Cast Iron	Work Material P: Tool steel, Pre-Hardened Steel, Hardened Steel	Work Material H: Hardened Steel(-55HRC)	Work Material H: Hardened Steel(55HRC-)	Work Material M: Austenitic Stainless Steel	Work Material S: Titanium Alloy, Heat Resistant Alloy	Work Material N: Copper Alloy	Work Material N: Aluminium Alloy	Page Number: Dimensions	Page Number: Cutting Conditions
	6	For Machining of Hardened Steels	VF	VFSDRB	IMPACT MIRACLE Corner radius end mill, 6 flute (S)	DC 3–12	○	◎	◎	◎					J350	J352
	6	For Machining of Hardened Steels	VF	VFMDRB	Corner radius, Medium cut length, 6 flute, For hardened materials	DC 3–20	○	◎	◎	◎					J351	J352
	6	For Difficult-to-cut Materials	VF	VF6MHVRB	Corner radius, Medium cut length, 6 flute, Irregular helix flutes	DC 6–20	○	○	○		◎	◎			J348	J349
	6	For Difficult-to-cut Materials	VF	VF6MHVRBCH	Corner radius end mill, Medium cut length, 6 flute, Irregular helix flutes, with multiple internal through coolant holes	DC 10,12 16,20					◎	◎			J353	J353
	8	For Difficult-to-cut Materials	VF	VF8MHVRBCH	Corner radius end mill, Medium cut length, 8 flute, Irregular helix flutes, with multiple internal through coolant holes	DC 16,20					◎	◎			J354	J354
LONG NECK CORNER RADIUS																
	2	For Deep Slotting	MS	MS2XLRB	Corner radius end mill, Short cut length, 2 flute, Long neck	DC 1–6	◎	◎	○		○	○			J290	J291
	2	For Machining of Hardened Steels	—	CBN2XLRB	Corner radius end mill, Medium cut length, 2 flute, Long neck	DC 0.5–2	○	◎	◎	◎					J302	J303
	2	For Copper Electrodes	CRN	CRN2XLRB	Corner radius, Medium cut length, 2 flute, For copper electrodes	DC 0.5–6							◎	○	J300	J301
ROUGHING																
	3	For Machining of Aluminium Alloys	—	CSRA	Roughing end mill, Short cut length, 3 flute, For aluminium alloy	DC 10–25								◎	J193	J194
	3	For Machining of Aluminium Alloys	—	CMRA	Roughing end mill, Medium cut length, 3 flute, For aluminium alloy	DC 3–25								◎	J195	J196
	3 4	For Roughing	VC	VCSFPR	Roughing end mill, Short cut length, 3—4 flute	DC 3–20	◎	◎	○		◎	◎			J202	J203
	4	For Machining of Hardened Steels	VF	VFSFPR	Roughing end mill, Short cut length, 3—4 flute	DC 3–20	◎	◎	○		◎	◎			J197	J198
	4	For Machining of Hardened Steels	VF	VFMFPR	Roughing end mill, Medium cut length, 4 flute	DC 5–20	◎	◎	○		◎	◎			J199	J200
	4	For Difficult-to-cut Materials	VF	VFSFPRCH	Roughing end mill, Short cut length, 4 flute, with multiple internal through coolant holes	DC 16,20					◎	◎			J201	J201
	6	For Difficult-to-cut Materials	VF	VF6SVRCH	Roughing end mill, Short cut length, 6 flute, Irregular helix flutes, with multiple internal through coolant holes	DC 16,20					◎	◎			J204	J204

END MILLS SELECTION CHART CARBIDE(By Shape)

Type	No. of Flutes	Applications, Features	Coating	Product Code	Shape	Size Range	Work Material P: Carbon Steel, Alloy Steel, Cast Iron	P: Tool steel, Pre-Hardened Steel, Hardened Steel	H: Hardened Steel(-55HRC)	H: Hardened Steel(55HRC-)	M: Austenitic Stainless Steel	S: Titanium Alloy, Heat Resistant Alloy	N: Copper Alloy	N: Aluminium Alloy	Page Number: Dimensions	Page Number: Cutting Conditions
CORNER RADIUS, ROUGHING																
	3	For Machining of Aluminium Alloys	—	CSRARB	Corner radius roughing end mill, Short cut length, 3 flute, For aluminium alloy	DC 10–25								◎	J306	J307
CHAMFER CUTTER																
	2	For Chamfering	VC	VC2C	Chamfer cutter, 2 flute	DC 2–12	◎	◎	◎	○	◎	◎	○	○	J377	J377

* DC : Cutting Diameter

END MILLS SELECTION CHART HSS (By Series)

Applications, Features	Type	No. of Flutes	Coating	Product Code	Shape	Size Range	Work Material P: Carbon Steel, Alloy Steel, Cast Iron	Work Material P: Tool steel, Pre-Hardened Steel, Hardened Steel	Work Material H: Hardened Steel(-55HRC)	Work Material H: Hardened Steel(55HRC-)	Work Material M: Austenitic Stainless Steel	Work Material S: Titanium Alloy, Heat Resistant Alloy	Work Material N: Copper Alloy	Work Material N: Aluminium Alloy	Page Number: Dimensions	Page Number: Cutting Conditions
VIOLET END MILLS																
General Use	SQUARE	2	V	VA2SS	End mill, Short cut length, 2 flute	DC 3–20	◎	○			○	○			J380	J382
			V	VA2MS	End mill, Medium cut length, 2 flute	DC 3–40	◎	○			○	○			J381	J382
		4	V	VA4MC	End mill, Medium cut length, 4 flute	DC 3–30	◎	○			○	○			J400	J401
For Difficult-to-cut Materials		2 3 4	V	VAMH	End mill, Medium cut length, 2–4 flute	DC 5–30	◎	○			◎	○			J397	J398
For Roughing	ROUGHING	4 5 6	V	VASFPR	Roughing end mill, Short cut length, 4–6 flute, Fine pitch form	DC 5–50	◎	○			◎	○			J416	J417
			V	VAMFPR	Roughing end mill, Medium cut length, 4–6 flute, Fine pitch form	DC 5–50	◎	○			◎	○			J418	J419
			V	VAMR	Roughing end mill, Medium cut length, 4–6 flute	DC 5–50	◎	○			◎	○			J420	J421
			V	VAJR	Roughing end mill, Semi long cut length, 4–6 flute	DC 10–50	◎	○			◎	○			J422	J423
			V	VALR	Roughing end mill, Long cut length, 4–6 flute	DC 10–50	◎	○			◎	○			J424	J425
TIN COATED END MILLS																
General Use	SQUARE	2	G	G2MS	End mill, Medium cut length, 2 flute	DC 1–40	◎	○			○	○		○	J387	J388
		4	G	G4MC	End mill, Medium cut length, 4 flute	DC 3–30	◎	○			○	○		○	J404	J405
			G	G4LC	End mill, Long cut length, 4 flute, Center cutting	DC 3–40	◎	○			○	○		○	J410	J411
For Roughing	ROUGHING	3 4 6	G	GSFPR	Roughing end mill, Short cut length, 3–6 flute, Fine pitch form	DC 5–50	◎	○			○	○		○	J414	J415
		4 5 6	G	GMR	Roughing end mill, Medium cut length, 4–6 flute	DC 5–50	◎	○			○	○		○	J428	J429
TWO-FLUTE END MILLS																
General Use	SQUARE	2	—	2SS	End mill, Short cut length, 2 flute	DC 0.5–20	◎	○			○	○		○	J383	J384
			—	S2MD	End mill, Short cut length, 2 flute, KHA Super	DC 0.4–20	◎	○			○	○		○	J385	J386

HSS

END MILLS SELECTION CHART HSS (By Series)

Applications, Features	Type	No. of Flutes	Coating	Product Code	Shape	Size Range	Work Material P: Carbon Steel, Alloy Steel, Cast Iron	Work Material P: Tool steel, Pre-hardened Steel, Hardened Steel	Work Material H: Hardened Steel(-55HRC)	Work Material H: Hardened Steel(55HRC-)	Work Material M: Austenitic Stainless Steel	Work Material S: Titanium Alloy, Heat Resistant Alloy	Work Material N: Copper Alloy	Work Material N: Aluminium Alloy	Page Number: Dimensions	Page Number: Cutting Conditions
TWO-FLUTE END MILLS																
General Use	SQUARE	2	—	2MS	End mill, Medium cut length, 2 flute	DC 1–60	◎	○			○	○		○	J389	J393
General Use	SQUARE	2	—	2LS	End mill, Long cut length, 2 flute	DC 1–40	◎	○			○	○		○	J391	J393
For Key Way Slotting	SQUARE	2	—	2MK	End mill, Short cut length, 2 flute, For key ways	DC 3–20	◎	○			○			○	J394	—
FOUR-FLUTE END MILLS																
General Use	SQUARE	4	—	S4MD	End mill, Medium cut length, 4 flute	DC 2.5–20	◎	○			○	○		○	J402	J403
General Use	SQUARE	4	—	4MC	End mill, Medium cut length, 4 flute, Center cutting	DC 2.5–40	◎	○			○	○		○	J406	J407
General Use	SQUARE	4	—	S4JC	End mill, Semi long cut length, 4 flute	DC 3–40	◎	○			○	○		○	J408	J409
General Use	SQUARE	4	—	4LC	End mill, Long cut length, 4 flute, Center cutting	DC 3–40	◎	○			○	○		○	J412	J413
ROUGHING END MILLS																
For Roughing	ROUGHING	4 5 6	—	SR	Roughing end mill, Short cut length, 4–6 flute	DC 10–40	◎	○			○	○		○	J426	J427
For Roughing	ROUGHING	4 5 6	—	MR	Roughing end mill, Medium cut length, 4–6 flute	DC 5–50	◎	○			○	○		○	J430	J433
For Roughing	ROUGHING	4 5 6	—	JR	Roughing end mill, Semi long cut length, 4–6 flute	DC 10–50	◎	○			○	○		○	J431	J433
For Roughing	ROUGHING	4 5 6	—	LR	Roughing end mill, Long cut length, 4–6 flute	DC 10–50	◎	○			○	○		○	J432	J433
For Roughing	ROUGHING BALL NOSE	4	—	MRB	Ball nose roughing end mill, Medium cut length, 4 flute	PRFRAD 4–25	◎	○			○	○		○	J434	—
HIGH HELIX END MILLS																
For Difficult-to-cut Materials	SQUARE	2 3 4	—	KMH	End mill, Medium cut length, 2–4 flute, High helix angle	DC 5–20	◎	○			○	○	○	○	J399	J399
LIGHT ALLOY STEEL END MILLS																
For Machining of Aluminium Sashes	SQUARE	1	—	1MA	End mill, Medium cut length, 1 flute	DC 3–8								◎	J378	—
For Machining of Aluminium Sashes	SQUARE	1	—	1LA	End mill, Long cut length, 1 flute	DC 4–12								◎	J379	—
For Machining of Aluminium Alloys	SQUARE	2	—	S2SDA	End mill, Short cut length, 2 flute, For aluminium alloy	DC 3–20							○	◎	J396	J396

* DC : Cutting Diameter
* PRFRAD : Ball nose end mill radius

END MILLS SELECTION CHART HSS (By Shape)

Type	No. of Flutes	Applications, Features	Coating	Product Code	Shape	Size Range	Work Material P: Carbon Steel, Alloy Steel, Cast Iron	Work Material P: Tool steel, Pre-Hardened Steel, Hardened Steel	Work Material H: Hardened Steel(-55HRC)	Work Material H: Hardened Steel(55HRC-)	Work Material M: Austenitic Stainless Steel	Work Material S: Titanium Alloy, Heat Resistant Alloy	Work Material N: Copper Alloy	Work Material N: Aluminium Alloy	Page Number: Dimensions	Page Number: Cutting Conditions
SQUARE																
	1	For Machining of Aluminium Sashes	—	1MA	End mill, Medium cut length, 1 flute	DC 3–8								◎	J378	—
			—	1LA	End mill, Long cut length, 1 flute	DC 4–12								◎	J379	—
	2	General Use	V	VA2SS	End mill, Short cut length, 2 flute	DC 3–20	◎	○			○	○			J380	J382
			V	VA2MS	End mill, Medium cut length, 2 flute	DC 3–40	◎	○			○	○			J381	J382
			G	G2MS	End mill, Medium cut length, 2 flute	DC 1–40	◎	○			○	○		○	J387	J388
			—	2SS	End mill, Short cut length, 2 flute	DC 0.5–20	◎	○			○	○		○	J383	J384
			—	S2MD	End mill, Short cut length, 2 flute, KHA Super	DC 0.4–20	◎	○			○	○		○	J385	J386
			—	2MS	End mill, Medium cut length, 2 flute	DC 1–60	◎	○			○	○		○	J389	J393
			—	2LS	End mill, Long cut length, 2 flute	DC 1–40	◎	○			○	○		○	J391	J393
		For Key Way Slotting	—	2MK	End mill, Short cut length, 2 flute, For key ways	DC 3–20	◎	○			○			○	J394	—
		For Machining of Aluminium Alloys	—	S2SDA	End mill, Short cut length, 2 flute, For aluminium alloy	DC 3–20							○	◎	J396	J396
	2 3 4	For Difficult-to-cut Materials	V	VAMH	End mill, Medium cut length, 2–4 flute	DC 5–30	◎	○			◎	○			J397	J398
			—	KMH	End mill, Medium cut length, 2–4 flute, High helix angle	DC 5–20	◎	○			○	○	○	○	J399	J399
	4	General Use	V	VA4MC	End mill, Medium cut length, 4 flute	DC 3–30	◎	○			○	○			J400	J401
			G	G4MC	End mill, Medium cut length, 4 flute	DC 3–30	◎	○			○	○		○	J404	J405
			G	G4LC	End mill, Long cut length, 4 flute, Center cutting	DC 3–40	◎	○			○	○		○	J410	J411
			—	S4MD	End mill, Medium cut length, 4 flute	DC 2.5–20	◎	○			○	○		○	J402	J403

HSS

END MILLS SELECTION CHART HSS (By Shape)

Type	No. of Flutes	Applications, Features	Coating	Product Code	Shape	Size Range	Work Material P: Carbon Steel, Alloy Steel, Cast Iron	P: Tool steel, Pre-Hardened Steel, Hardened Steel	H: Hardened Steel(-55HRC)	H: Hardened Steel(55HRC-)	M: Austenitic Stainless Steel	S: Titanium Alloy, Heat Resistant Alloy	N: Copper Alloy	N: Aluminium Alloy	Page Number: Dimensions	Page Number: Cutting Conditions
SQUARE																
	4	General Use	—	4MC	End mill, Medium cut length, 4 flute, Center cutting	DC 2.5–40	◎	○			○	○		○	J406	J407
			—	S4JC	End mill, Semi long cut length, 4 flute	DC 3–40	◎	○			○	○		○	J408	J409
			—	4LC	End mill, Long cut length, 4 flute, Center cutting	DC 3–40	◎	○			○	○		○	J412	J413
ROUGHING																
	3 4 6	For Roughing	G	GSFPR	Roughing end mill, Short cut length, 3–6 flute, Fine pitch form	DC 5–50	◎	○			○	○		○	J414	J415
	4 5 6		V	VASFPR	Roughing end mill, Short cut length, 4–6 flute, Fine pitch form	DC 5–50	◎	○			◎	○			J416	J417
			V	VAMFPR	Roughing end mill, Medium cut length, 4–6 flute, Fine pitch form	DC 5–50	◎	○			◎	○			J418	J419
			V	VAMR	Roughing end mill, Medium cut length, 4–6 flute	DC 5–50	◎	○			◎	○			J420	J421
			V	VAJR	Roughing end mill, Semi long cut length, 4–6 flute	DC 10–50	◎	○			◎	○			J422	J423
			V	VALR	Roughing end mill, Long cut length, 4–6 flute	DC 10–50	◎	○			◎	○			J424	J425
			G	GMR	Roughing end mill, Medium cut length, 4–6 flute	DC 5–50	◎	○			○	○		○	J428	J429
			—	SR	Roughing end mill, Short cut length, 4–6 flute	DC 10–40	◎	○			○	○		○	J426	J427
			—	MR	Roughing end mill, Medium cut length, 4–6 flute	DC 5–50	◎	○			○	○		○	J430	J433
			—	JR	Roughing end mill, Semi long cut length, 4–6 flute	DC 10–50	◎	○			○	○		○	J431	J433
			—	LR	Roughing end mill, Long cut length, 4–6 flute	DC 10–50	◎	○			○	○		○	J432	J433
ROUGHING BALL NOSE																
	4	For Roughing	—	MRB	Ball nose roughing end mill, Medium cut length, 4 flute	PRFRAD 4–25	◎	○			○	○		○	J434	—

* DC : Cutting Diameter
* PRFRAD : Ball nose end mill radius

Memo

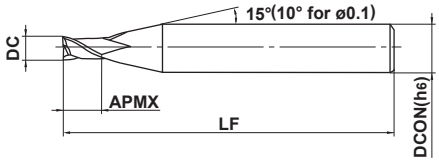
MS2SS

End mill, Short cut length, 2 flute

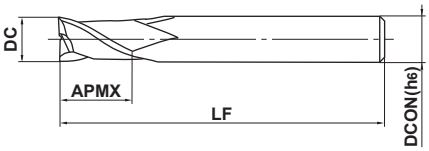


Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		





Type1



Type2

DC=0.1	DC>0.1			
0 - 0.010	0 - 0.020			
4≤DCON≤6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

h6

● 2 flute end mill for general use.

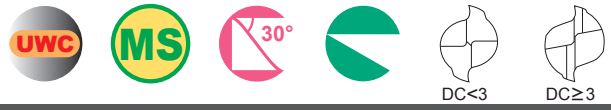
Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS2SSD0010	0.1	0.15	40	4	2	●	1
MS2SS**D0020**	0.2	0.3	40	4	2	●	1
MS2SS**D0030**	0.3	0.45	40	4	2	●	1
MS2SS**D0040**	0.4	0.6	40	4	2	●	1
MS2SS**D0050**	0.5	0.75	40	4	2	●	1
MS2SS**D0060**	0.6	0.9	40	4	2	●	1
MS2SS**D0070**	0.7	1.1	40	4	2	●	1
MS2SS**D0080**	0.8	1.2	40	4	2	●	1
MS2SS**D0090**	0.9	1.4	40	4	2	●	1
MS2SS**D0100**	1	1.5	40	4	2	●	1
MS2SS**D0120**	1.2	1.8	40	4	2	●	1
MS2SS**D0150**	1.5	2.3	40	4	2	●	1
MS2SS**D0180**	1.8	2.7	40	4	2	●	1
MS2SS**D0200**	2	3	40	4	2	●	1
MS2SS**D0250**	2.5	3.8	40	4	2	●	1
MS2SS**D0300**	3	4.5	45	6	2	●	1
MS2SS**D0400**	4	6	50	6	2	●	1
MS2SS**D0500**	5	7.5	50	6	2	●	1
MS2SS**D0600**	6	9	50	6	2	●	2
MS2SS**D0700**	7	10.5	60	8	2	●	1
MS2SS**D0800**	8	12	60	8	2	●	2
MS2SS**D0900**	9	13.5	70	10	2	●	1
MS2SS**D1000**	10	15	70	10	2	●	2
MS2SS**D1100**	11	16.5	75	12	2	●	1
MS2SS**D1200**	12	18	75	12	2	●	2

● : Inventory maintained in Japan.

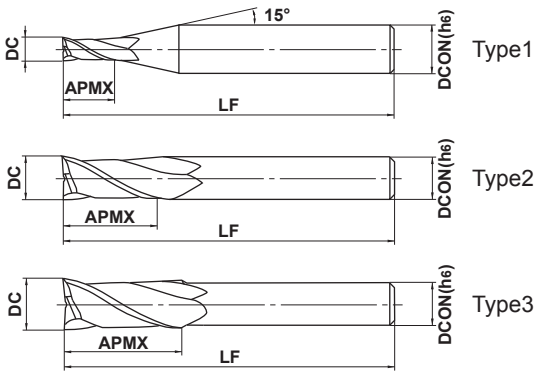
MS2MS

End mill, Medium cut length, 2 flute



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		





DC≤12	DC>12			
0 - 0.020	0 - 0.030			
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

2 flute end mill for general use.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS2MSD0020	0.2	0.4	40	4	2	●	1
MS2MSD0030	0.3	0.6	40	4	2	●	1
MS2MSD0040	0.4	0.8	40	4	2	●	1
MS2MSD0050	0.5	1	40	4	2	●	1
MS2MSD0060	0.6	1.2	40	4	2	●	1
MS2MSD0070	0.7	1.4	40	4	2	●	1
MS2MSD0080	0.8	1.6	40	4	2	●	1
MS2MSD0090	0.9	1.8	40	4	2	●	1
MS2MSD0100	1	2	40	4	2	●	1
MS2MSD0110	1.1	2.2	40	4	2	●	1
MS2MSD0120	1.2	2.4	40	4	2	●	1
MS2MSD0130	1.3	2.6	40	4	2	●	1
MS2MSD0140	1.4	2.8	40	4	2	●	1
MS2MSD0150	1.5	3	40	4	2	●	1
MS2MSD0160	1.6	3.2	40	4	2	●	1
MS2MSD0170	1.7	3.4	40	4	2	●	1
MS2MSD0180	1.8	3.6	40	4	2	●	1
MS2MSD0190	1.9	3.8	40	4	2	●	1
MS2MSD0200	2	4	40	4	2	●	1
MS2MSD0210	2.1	4.2	40	4	2	●	1
MS2MSD0220	2.2	4.4	40	4	2	●	1
MS2MSD0230	2.3	4.6	40	4	2	●	1
MS2MSD0240	2.4	4.8	40	4	2	●	1
MS2MSD0250	2.5	5	40	4	2	●	1
MS2MSD0260	2.6	5.2	40	4	2	●	1
MS2MSD0270	2.7	5.4	40	4	2	●	1
MS2MSD0280	2.8	5.6	40	4	2	●	1
MS2MSD0290	2.9	5.8	40	4	2	●	1
MS2MSD0300	3	6	45	6	2	●	1
MS2MSD0310	3.1	6.2	45	6	2	●	1
MS2MSD0320	3.2	6.4	45	6	2	●	1
MS2MSD0330	3.3	6.6	45	6	2	●	1
MS2MSD0340	3.4	6.8	45	6	2	●	1
MS2MSD0350	3.5	7	45	6	2	●	1

MS2MS

End mill, Medium cut length, 2 flute

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS2MSD0360	3.6	7.2	45	6	2	●	1
MS2MSD0370	3.7	7.4	45	6	2	●	1
MS2MSD0380	3.8	7.6	45	6	2	●	1
MS2MSD0390	3.9	7.8	45	6	2	●	1
MS2MSD0400	4	8	50	6	2	●	1
MS2MSD0410	4.1	8.2	50	6	2	●	1
MS2MSD0420	4.2	8.4	50	6	2	●	1
MS2MSD0430	4.3	8.6	50	6	2	●	1
MS2MSD0440	4.4	8.8	50	6	2	●	1
MS2MSD0450	4.5	9	50	6	2	●	1
MS2MSD0460	4.6	9.2	50	6	2	●	1
MS2MSD0470	4.7	9.4	50	6	2	●	1
MS2MSD0480	4.8	9.6	50	6	2	●	1
MS2MSD0490	4.9	9.8	50	6	2	●	1
MS2MSD0500	5	10	50	6	2	●	1
MS2MSD0510	5.1	10.2	50	6	2	●	1
MS2MSD0520	5.2	10.4	50	6	2	●	1
MS2MSD0530	5.3	10.6	50	6	2	●	1
MS2MSD0540	5.4	10.8	50	6	2	●	1
MS2MSD0550	5.5	11	50	6	2	●	1
MS2MSD0560	5.6	11.2	50	6	2	●	1
MS2MSD0570	5.7	11.4	50	6	2	●	1
MS2MSD0580	5.8	11.6	50	6	2	●	1
MS2MSD0590	5.9	11.8	50	6	2	●	1
MS2MSD0600	6	12	50	6	2	●	2
MS2MSD0650	6.5	13	60	8	2	●	1
MS2MSD0700	7	14	60	8	2	●	1
MS2MSD0750	7.5	15	60	8	2	●	1
MS2MSD0800	8	16	60	8	2	●	2
MS2MSD0850	8.5	17	70	10	2	●	1
MS2MSD0900	9	18	70	10	2	●	1
MS2MSD0950	9.5	19	70	10	2	●	1
MS2MSD1000	10	20	70	10	2	●	2
MS2MSD1100	11	22	75	12	2	●	1
MS2MSD1200	12	24	75	12	2	●	2
MS2MSD1600	16	32	90	16	2	●	2
MS2MSD1800	18	36	90	16	2	●	3
MS2MSD2000	20	40	100	20	2	●	2

● : Inventory maintained in Japan.

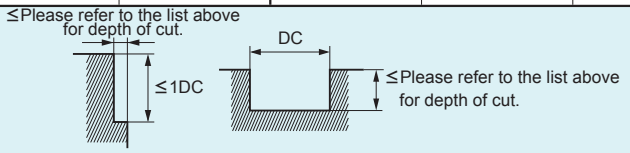
MS2SS
End mill, Short cut length, 2 flute

MS2MS
End mill, Medium cut length, 2 flute

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45－55HRC) AISI H13		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
0.1	40000	40	0.001	40000	40	0.001
0.2	40000	100	0.002	40000	100	0.002
0.3	40000	200	0.005	40000	200	0.005
0.4	40000	600	0.01	40000	600	0.01
0.5	40000	1000	0.015	40000	960	0.015
0.6	40000	1200	0.02	40000	1200	0.02
0.7	40000	1400	0.02	40000	1400	0.02
0.8	40000	1600	0.03	40000	1600	0.03
0.9	40000	1800	0.04	40000	1600	0.04
1	40000	2000	0.06	32000	1600	0.06
1.5	40000	3000	0.12	32000	1900	0.08
2	30000	3000	0.18	24000	1900	0.10
2.5	24000	2600	0.25	19000	1600	0.13
3	20000	2300	0.30	16000	1400	0.15
4	15000	2000	0.40	12000	1200	0.20
5	12000	1600	0.50	9000	900	0.25
6	10000	1400	0.60	7000	700	0.30
8	8000	1000	0.80	5600	550	0.40
10	6400	900	1.00	4500	500	0.50
12	5400	820	1.00	3800	450	0.50
16	2400	380	3.00	1200	100	0.80
20	1900	320	4.00	1000	80	1.00

Depth of cut



DC:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) When slotting with end mills with ϕ3 or larger, reduce the revolution to 50－70% and the feed rate to 40－60%.
3) When drilling, please set the feed rate at 1/3 or below the values above.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

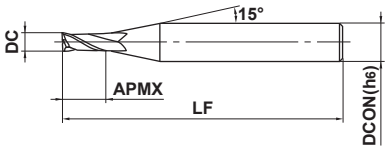
MS2MD

End mill, Medium cut length, 2 flute

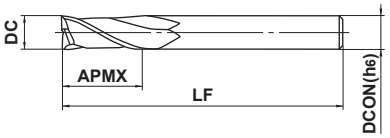
DC<3 DC≥3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		





Type1



Type2

1≤DC≤12				
0 - 0.020				
4≤DCON≤6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

● Strong edge type, 2 flute end mill with high resistance to corner fracturing.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS2MDD0100	1	2.5	40	4	2	●	1
MS2MDD0150	1.5	3.8	40	4	2	●	1
MS2MDD0200	2	5	40	4	2	●	1
MS2MDD0250	2.5	6.3	40	4	2	●	1
MS2MDD0300	3	7.5	50	6	2	●	1
MS2MDD0400	4	10	50	6	2	●	1
MS2MDD0500	5	12.5	50	6	2	●	1
MS2MDD0600	6	15	50	6	2	●	2
MS2MDD0800	8	20	60	8	2	●	2
MS2MDD1000	10	25	70	10	2	●	2
MS2MDD1200	12	30	90	12	2	●	2

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45—55HRC) AISI H13		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
1	40000	2000	0.06	32000	1600	0.06
1.5	40000	3000	0.12	32000	1900	0.08
2	30000	3000	0.18	24000	1900	0.10
2.5	24000	2600	0.25	19000	1600	0.13
3	20000	2300	0.30	16000	1400	0.15
4	15000	2000	0.40	12000	1200	0.20
5	12000	1600	0.50	9000	900	0.25
6	10000	1400	0.60	7000	700	0.30
8	8000	1000	0.80	5600	550	0.40
10	6400	900	1.00	4500	500	0.50
12	5400	820	1.00	3800	450	0.50
Depth of cut	≤Please refer to the list above for depth of cut. ≤1DC DC ≤Please refer to the list above for depth of cut. DC:Dia.					

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) When drilling, please set the feed rate at 1/3 or below the values above.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

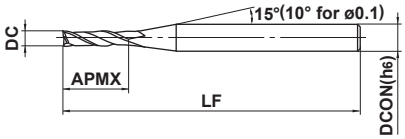
MS2JS

End mill, Semi long cut length, 2 flute

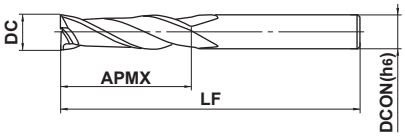


Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		





Type1



Type2

h6

DC=0.1	DC>0.1			
0 - 0.010	0 - 0.020			
4≤DCON≤6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

2 flute end mill for general use.

Unit : mm

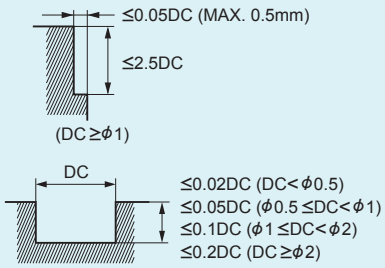
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS2JSD0010	0.1	0.3	40	4	2	●	1
MS2JSD0020	0.2	0.6	40	4	2	●	1
MS2JSD0030	0.3	0.9	40	4	2	●	1
MS2JSD0040	0.4	1.2	40	4	2	●	1
MS2JSD0050	0.5	1.5	40	4	2	●	1
MS2JSD0060	0.6	1.8	40	4	2	●	1
MS2JSD0070	0.7	2.1	40	4	2	●	1
MS2JSD0080	0.8	2.4	40	4	2	●	1
MS2JSD0090	0.9	2.7	40	4	2	●	1
MS2JSD0100	1	3	40	4	2	●	1
MS2JSD0120	1.2	3.6	40	4	2	●	1
MS2JSD0150	1.5	4.5	40	4	2	●	1
MS2JSD0180	1.8	5.4	40	4	2	●	1
MS2JSD0200	2	6	40	4	2	●	1
MS2JSD0250	2.5	7.5	40	4	2	●	1
MS2JSD0300	3	9	45	6	2	●	1
MS2JSD0400	4	12	50	6	2	●	1
MS2JSD0500	5	15	50	6	2	●	1
MS2JSD0600	6	18	50	6	2	●	2
MS2JSD0800	8	24	70	8	2	●	2
MS2JSD1000	10	30	90	10	2	●	2
MS2JSD1200	12	36	90	12	2	●	2

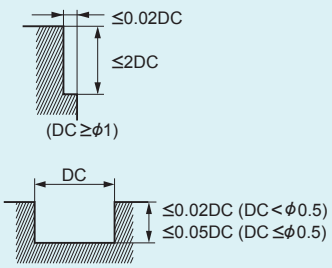
● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
0.1	40000	— (40)	40000	— (40)	40000	— (35)	40000	— (25)
0.2	40000	— (45)	40000	— (45)	40000	— (35)	32000	— (25)
0.3	40000	— (55)	32000	— (45)	27000	— (35)	21000	— (25)
0.4	32000	— (60)	24000	— (45)	20000	— (35)	16000	— (25)
0.5	25000	— (60)	19000	— (45)	16000	— (35)	13000	— (25)
0.6	21000	— (60)	16000	— (45)	13000	— (35)	11000	— (25)
0.7	18000	— (60)	14000	— (45)	11000	— (35)	9100	— (25)
0.8	16000	— (60)	12000	— (45)	9900	— (35)	8000	— (25)
0.9	14000	— (60)	11000	— (45)	8800	— (35)	7100	— (25)
1	13000	60 (60)	9500	45 (45)	8000	35 (35)	6400	25 (25)
1.5	8500	60 (60)	6400	45 (45)	5300	35 (35)	4200	25 (25)
2	6400	60 (60)	4800	45 (45)	4000	35 (35)	3200	25 (25)
2.5	5100	60 (60)	3800	45 (45)	3200	40 (40)	2500	25 (25)
3	4200	65 (60)	3400	55 (45)	2600	40 (40)	2100	25 (25)
4	3400	80 (60)	2700	65 (45)	2100 (1600)	50 (30)	1700	35 (25)
5	2900	100 (60)	2300	80 (45)	1800 (1350)	60 (30)	1500	40 (25)
6	2500	120 (60)	2000	100 (50)	1500 (1100)	75 (30)	1300	50 (25)
8	1900	130 (60)	1500	100 (50)	1200 (900)	80 (30)	1000	50 (25)
10	1600	130 (60)	1300	100 (50)	950 (710)	75 (30)	800	50 (25)
12	1300	120 (60)	1100	100 (50)	800 (600)	75 (30)	670	50 (25)

Depth of cut





( ) : Indicates standard revolution and feed rate for slotting.

DC:Dia.

1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) When drilling, please set the feed rate at 1/3 or below the values above.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MS2LS

End mill, Long cut length, 2 flute








DC<3

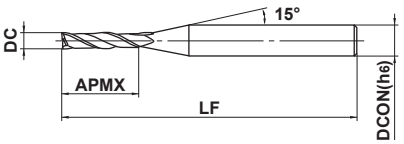
DC≥3

DC<3

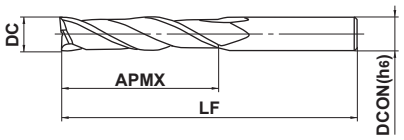
DC≥3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		





Type1



Type2

0.2≤DC≤12					
0 - 0.020					
4≤DCON≤6	8≤DCON≤10	DCON=12			
0 - 0.008	0 - 0.009	0 - 0.011			

h6

2 flute end mill for general use.

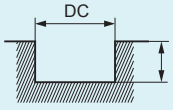
Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS2LSD0020	0.2	0.8	40	4	2	●	1
MS2LS**D0030**	0.3	1.2	40	4	2	●	1
MS2LS**D0040**	0.4	1.6	40	4	2	●	1
MS2LS**D0050**	0.5	2	40	4	2	●	1
MS2LS**D0060**	0.6	2.4	40	4	2	●	1
MS2LS**D0070**	0.7	2.8	40	4	2	●	1
MS2LS**D0080**	0.8	3.2	40	4	2	●	1
MS2LS**D0090**	0.9	3.6	40	4	2	●	1
MS2LS**D0100**	1	4	40	4	2	●	1
MS2LS**D0150**	1.5	6	40	4	2	●	1
MS2LS**D0200**	2	8	40	4	2	●	1
MS2LS**D0250**	2.5	10	50	4	2	●	1
MS2LS**D0300**	3	12	50	6	2	●	1
MS2LS**D0400**	4	16	50	6	2	●	1
MS2LS**D0500**	5	20	60	6	2	●	1
MS2LS**D0600**	6	24	60	6	2	●	2
MS2LS**D0800**	8	32	70	8	2	●	2
MS2LS**D1000**	10	40	90	10	2	●	2
MS2LS**D1200**	12	48	110	12	2	●	2

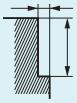
● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Slotting

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
0.2	40000	400	0.001	30000	250	0.001
0.3	40000	600	0.005	35000	420	0.005
0.4	40000	700	0.007	30000	420	0.007
0.5	40000	800	0.01	24000	380	0.01
0.6	33000	800	0.015	21000	480	0.01
0.7	28000	800	0.015	18000	480	0.015
0.8	25000	800	0.02	16000	480	0.02
0.9	22000	800	0.03	15000	500	0.03
1	20000	800	0.04	13000	500	0.04
1.5	13000	800	0.10	9000	500	0.10
2	10000	800	0.15	6700	500	0.15
2.5	9000	800	0.20	6000	500	0.20
3	8000	800	0.20	5200	460	0.20
4	6000	600	0.20	4000	340	0.20
5	4800	480	0.30	3200	280	0.20
6	4000	400	0.30	2600	210	0.20
8	3000	300	0.30	2000	170	0.30
10	2400	240	0.30	1600	140	0.30
12	2000	200	0.30	1300	110	0.30
Depth of cut	 ≤Please refer to the list above for depth of cut. DC:Dia.					

Side milling

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
3	3500	370	0.05	2600	250	0.03
4	2800	370	0.06	2100	200	0.03
5	2200	330	0.06	1700	160	0.03
6	1800	300	0.06	1500	140	0.03
8	1600	270	0.08	1100	140	0.04
10	1400	240	0.10	900	140	0.05
12	1200	200	0.10	750	120	0.06
Depth of cut	≤Please refer to the list above for depth of cut.  DC:Dia.					

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) When drilling, please set the feed rate at 1/3 or below the values above.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

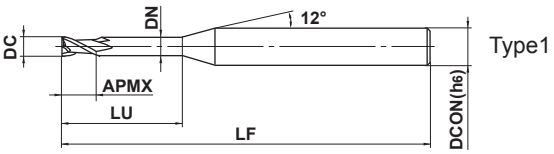
MS2XL

End mill, Short cut length, 2 flute, Long neck

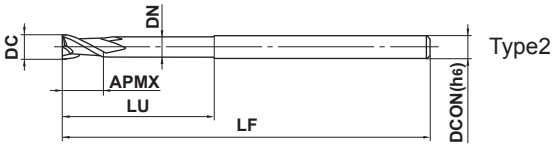


Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		





Type1



Type2

DC<0.5	DC≥0.5			
0 - 0.010	0 - 0.020			
4≤DCON≤6				
0 - 0.008				

h6

● 2 flute long neck end mill.

Unit : mm

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
MS2XLD0020N005	0.2	0.3	0.5	0.17	45	4	2	●	1
MS2XLD0020N010	0.2	0.3	1	0.17	45	4	2	●	1
MS2XLD0020N015	0.2	0.3	1.5	0.17	45	4	2	●	1
MS2XLD0030N010	0.3	0.4	1	0.27	45	4	2	●	1
MS2XLD0030N020	0.3	0.4	2	0.27	45	4	2	●	1
MS2XLD0030N030	0.3	0.4	3	0.27	45	4	2	●	1
MS2XLD0030N060	0.3	0.4	6	0.27	45	4	2	●	1
MS2XLD0030N090	0.3	0.4	9	0.27	45	4	2	●	1
MS2XLD0040N020	0.4	0.6	2	0.36	45	4	2	●	1
MS2XLD0040N030	0.4	0.6	3	0.36	45	4	2	●	1
MS2XLD0040N040	0.4	0.6	4	0.36	45	4	2	●	1
MS2XLD0040N080	0.4	0.6	8	0.36	45	4	2	●	1
MS2XLD0040N120	0.4	0.6	12	0.36	45	4	2	●	1
MS2XLD0050N020	0.5	0.7	2	0.46	45	4	2	●	1
MS2XLD0050N040	0.5	0.7	4	0.46	45	4	2	●	1
MS2XLD0050N060	0.5	0.7	6	0.46	45	4	2	●	1
MS2XLD0050N080	0.5	0.7	8	0.46	50	4	2	●	1
MS2XLD0050N100	0.5	0.7	10	0.46	50	4	2	●	1
MS2XLD0050N150	0.5	0.7	15	0.46	50	4	2	●	1
MS2XLD0060N020	0.6	0.9	2	0.56	45	4	2	●	1
MS2XLD0060N040	0.6	0.9	4	0.56	45	4	2	●	1
MS2XLD0060N060	0.6	0.9	6	0.56	45	4	2	●	1
MS2XLD0060N080	0.6	0.9	8	0.56	50	4	2	●	1
MS2XLD0060N100	0.6	0.9	10	0.56	50	4	2	●	1
MS2XLD0060N120	0.6	0.9	12	0.56	50	4	2	●	1
MS2XLD0060N180	0.6	0.9	18	0.56	50	4	2	●	1
MS2XLD0070N020	0.7	1	2	0.66	45	4	2	●	1
MS2XLD0070N040	0.7	1	4	0.66	45	4	2	●	1
MS2XLD0070N060	0.7	1	6	0.66	45	4	2	●	1
MS2XLD0070N080	0.7	1	8	0.66	50	4	2	●	1
MS2XLD0070N100	0.7	1	10	0.66	50	4	2	●	1
MS2XLD0080N040	0.8	1.2	4	0.76	45	4	2	●	1
MS2XLD0080N060	0.8	1.2	6	0.76	45	4	2	●	1
MS2XLD0080N080	0.8	1.2	8	0.76	50	4	2	●	1

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
MS2XLD0080N100	0.8	1.2	10	0.76	50	4	2	●	1
MS2XLD0080N120	0.8	1.2	12	0.76	50	4	2	●	1
MS2XLD0080N160	0.8	1.2	16	0.76	50	4	2	●	1
MS2XLD0080N240	0.8	1.2	24	0.76	60	4	2	●	1
MS2XLD0090N060	0.9	1.4	6	0.86	45	4	2	●	1
MS2XLD0090N080	0.9	1.4	8	0.86	50	4	2	●	1
MS2XLD0090N100	0.9	1.4	10	0.86	50	4	2	●	1
MS2XLD0090N150	0.9	1.4	15	0.86	60	4	2	●	1
MS2XLD0100N040	1	1.5	4	0.94	50	4	2	●	1
MS2XLD0100N060	1	1.5	6	0.94	50	4	2	●	1
MS2XLD0100N080	1	1.5	8	0.94	50	4	2	●	1
MS2XLD0100N100	1	1.5	10	0.94	50	4	2	●	1
MS2XLD0100N120	1	1.5	12	0.94	50	4	2	●	1
MS2XLD0100N160	1	1.5	16	0.94	60	4	2	●	1
MS2XLD0100N200	1	1.5	20	0.94	60	4	2	●	1
MS2XLD0100N250	1	1.5	25	0.94	70	4	2	●	1
MS2XLD0100N300	1	1.5	30	0.94	70	4	2	●	1
MS2XLD0120N060	1.2	1.8	6	1.14	50	4	2	●	1
MS2XLD0120N080	1.2	1.8	8	1.14	50	4	2	●	1
MS2XLD0120N100	1.2	1.8	10	1.14	50	4	2	●	1
MS2XLD0120N120	1.2	1.8	12	1.14	50	4	2	●	1
MS2XLD0120N160	1.2	1.8	16	1.14	60	4	2	●	1
MS2XLD0120N200	1.2	1.8	20	1.14	60	4	2	●	1
MS2XLD0150N060	1.5	2.3	6	1.44	50	4	2	●	1
MS2XLD0150N080	1.5	2.3	8	1.44	50	4	2	●	1
MS2XLD0150N100	1.5	2.3	10	1.44	50	4	2	●	1
MS2XLD0150N120	1.5	2.3	12	1.44	50	4	2	●	1
MS2XLD0150N140	1.5	2.3	14	1.44	60	4	2	●	1
MS2XLD0150N160	1.5	2.3	16	1.44	60	4	2	●	1
MS2XLD0150N180	1.5	2.3	18	1.44	60	4	2	●	1
MS2XLD0150N200	1.5	2.3	20	1.44	60	4	2	●	1
MS2XLD0150N250	1.5	2.3	25	1.44	70	4	2	●	1
MS2XLD0150N300	1.5	2.3	30	1.44	70	4	2	●	1
MS2XLD0150N380	1.5	2.3	38	1.44	80	4	2	●	1
MS2XLD0150N450	1.5	2.3	45	1.44	80	4	2	●	1
MS2XLD0200N060	2	3	6	1.9	50	4	2	●	1
MS2XLD0200N080	2	3	8	1.9	50	4	2	●	1
MS2XLD0200N100	2	3	10	1.9	50	4	2	●	1
MS2XLD0200N120	2	3	12	1.9	50	4	2	●	1
MS2XLD0200N140	2	3	14	1.9	60	4	2	●	1
MS2XLD0200N160	2	3	16	1.9	60	4	2	●	1
MS2XLD0200N180	2	3	18	1.9	60	4	2	●	1
MS2XLD0200N200	2	3	20	1.9	60	4	2	●	1
MS2XLD0200N250	2	3	25	1.9	70	4	2	●	1
MS2XLD0200N300	2	3	30	1.9	70	4	2	●	1
MS2XLD0200N350	2	3	35	1.9	80	4	2	●	1
MS2XLD0200N400	2	3	40	1.9	90	4	2	●	1
MS2XLD0200N500	2	3	50	1.9	100	4	2	●	1
MS2XLD0200N600	2	3	60	1.9	110	4	2	●	1
MS2XLD0250N080	2.5	3.7	8	2.4	50	4	2	●	1
MS2XLD0250N120	2.5	3.7	12	2.4	50	4	2	●	1
MS2XLD0250N160	2.5	3.7	16	2.4	60	4	2	●	1

MS2XL

End mill, Short cut length, 2 flute, Long neck

Unit : mm

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
MS2XLD0250N200	2.5	3.7	20	2.4	60	4	2	●	1
MS2XLD0250N250	2.5	3.7	25	2.4	70	4	2	●	1
MS2XLD0250N300	2.5	3.7	30	2.4	70	4	2	●	1
MS2XLD0250N400	2.5	3.7	40	2.4	90	4	2	●	1
MS2XLD0250N500	2.5	3.7	50	2.4	100	4	2	●	1
MS2XLD0300N080	3	4.5	8	2.8	50	6	2	●	1
MS2XLD0300N120	3	4.5	12	2.8	50	6	2	●	1
MS2XLD0300N160	3	4.5	16	2.8	60	6	2	●	1
MS2XLD0300N200	3	4.5	20	2.8	60	6	2	●	1
MS2XLD0300N250	3	4.5	25	2.8	70	6	2	●	1
MS2XLD0300N300	3	4.5	30	2.8	70	6	2	●	1
MS2XLD0300N400	3	4.5	40	2.8	90	6	2	●	1
MS2XLD0300N500	3	4.5	50	2.8	100	6	2	●	1
MS2XLD0400N120	4	6	12	3.8	50	6	2	●	1
MS2XLD0400N160	4	6	16	3.8	60	6	2	●	1
MS2XLD0400N200	4	6	20	3.8	60	6	2	●	1
MS2XLD0400N250	4	6	25	3.8	70	6	2	●	1
MS2XLD0400N300	4	6	30	3.8	70	6	2	●	1
MS2XLD0400N350	4	6	35	3.8	80	6	2	●	1
MS2XLD0400N400	4	6	40	3.8	90	6	2	●	1
MS2XLD0400N450	4	6	45	3.8	90	6	2	●	1
MS2XLD0400N500	4	6	50	3.8	100	6	2	●	1
MS2XLD0400N600	4	6	60	3.8	110	6	2	●	1
MS2XLD0500N160	5	7.5	16	4.8	60	6	2	●	1
MS2XLD0500N250	5	7.5	25	4.8	70	6	2	●	1
MS2XLD0500N350	5	7.5	35	4.8	80	6	2	●	1
MS2XLD0500N500	5	7.5	50	4.8	110	6	2	●	1
MS2XLD0500N600	5	7.5	60	4.8	120	6	2	●	1
MS2XLD0600N200	6	9	20	5.8	80	6	2	●	2
MS2XLD0600N300	6	9	30	5.8	90	6	2	●	2
MS2XLD0600N400	6	9	40	5.8	100	6	2	●	2
MS2XLD0600N500	6	9	50	5.8	110	6	2	●	2
MS2XLD0600N600	6	9	60	5.8	120	6	2	●	2

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material		Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21		
Dia. **DC** (mm)	Neck length **LU** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
0.2	**0.5**	40000	600	0.004
	1	40000	400	0.001
0.3	**1**	40000	650	0.007
	3	40000	500	0.002
	9	22000	150	0.001
0.4	**2**	40000	800	0.007
	4	40000	800	0.003
	12	17000	150	0.001
0.5	**2**	40000	950	0.01
	6	40000	700	0.003
	10	25000	400	0.002
	15	14000	150	0.001
0.6	**2**	40000	950	0.01
	6	40000	800	0.005
	10	25000	450	0.003
	18	12000	150	0.001
0.7	**2**	40000	1000	0.02
	6	40000	900	0.01
	8	30000	700	0.005
	10	11000	300	0.005
0.8	**4**	40000	1200	0.02
	8	40000	1000	0.01
	12	25000	400	0.003
	24	10000	150	0.001
0.9	**6**	40000	1300	0.02
	10	35000	1000	0.01
	15	9000	400	0.003
1	**6**	40000	1600	0.04
	8	40000	1600	0.03
	12	30000	1000	0.02
	20	15000	400	0.005
	30	8000	150	0.001
1.2	**6**	40000	1900	0.06
	8	40000	1900	0.04
	12	25000	1000	0.03
	20	6500	150	0.01

Work material		Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21		
Dia. **DC** (mm)	Neck length **LU** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
1.5	**6**	40000	2400	0.10
	10	30000	1800	0.05
	20	15000	600	0.02
	30	7500	300	0.005
	45	5000	150	0.001
1.6	**6**	40000	2400	0.12
	10	30000	1800	0.07
	16	20000	1000	0.04
2	**6**	40000	2400	0.18
	10	30000	1800	0.10
	16	20000	1000	0.06
	30	8000	500	0.04
	40	6000	250	0.01
	60	4200	150	0.003
2.5	**8**	25000	2500	0.20
	16	18000	1700	0.10
	20	12000	1000	0.08
	40	8000	400	0.03
	50	4000	150	0.015
3	**8**	20000	2000	0.30
	16	15000	1400	0.15
	20	10000	800	0.10
	40	5000	250	0.02
	50	3700	150	0.010
4	**12**	15000	3000	0.30
	20	11000	2200	0.22
	30	6400	1200	0.12
	40	4500	400	0.05
	50	2800	150	0.018
	60	1800	60	0.005
5	**16**	12000	2500	0.35
	35	5100	750	0.15
	60	2200	150	0.02
6	**20**	10000	2000	0.40
	40	4200	800	0.20
	60	1900	150	0.10

ap:Depth of Cut in the Axial Direction

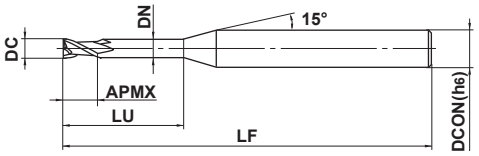
1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

MS2XL6

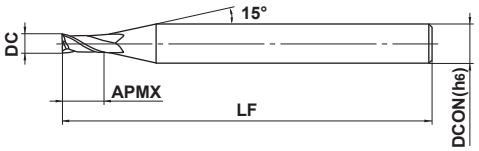
End mill, Short cut length, 2 flute, 6mm shank

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		





Type1



Type2

0.3≤DC≤2.5				
0 -0.020				
DCON=6				
0 -0.008				

- 2 flute long neck end mill.
- ϕ6 shank type.

Unit : mm

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
MS2XL6D0030N008	0.3	0.8	—	—	50	6	2	●	2
MS2XL6D0030N015	0.3	0.5	1.5	0.27	50	6	2	●	1
MS2XL6D0040N010	0.4	0.6	1	0.36	50	6	2	●	1
MS2XL6D0040N020	0.4	0.6	2	0.36	50	6	2	●	1
MS2XL6D0050N013	0.5	0.8	1.3	0.46	50	6	2	●	1
MS2XL6D0050N025	0.5	0.8	2.5	0.46	50	6	2	●	1
MS2XL6D0060N015	0.6	0.9	1.5	0.56	50	6	2	●	1
MS2XL6D0060N030	0.6	0.9	3	0.56	50	6	2	●	1
MS2XL6D0070N018	0.7	1.1	1.8	0.66	50	6	2	●	1
MS2XL6D0070N035	0.7	1.1	3.5	0.66	50	6	2	●	1
MS2XL6D0080N020	0.8	1.2	2	0.76	50	6	2	●	1
MS2XL6D0080N040	0.8	1.2	4	0.76	50	6	2	●	1
MS2XL6D0090N023	0.9	1.4	2.3	0.86	50	6	2	●	1
MS2XL6D0090N045	0.9	1.4	4.5	0.86	50	6	2	●	1
MS2XL6D0100N025	1	1.5	2.5	0.94	50	6	2	●	1
MS2XL6D0100N050	1	1.5	5	0.94	50	6	2	●	1
MS2XL6D0110N028	1.1	1.7	2.8	1.04	50	6	2	●	1
MS2XL6D0110N055	1.1	1.7	5.5	1.04	50	6	2	●	1
MS2XL6D0120N030	1.2	1.8	3	1.14	50	6	2	●	1
MS2XL6D0120N060	1.2	1.8	6	1.14	50	6	2	●	1
MS2XL6D0130N033	1.3	2	3.3	1.24	50	6	2	●	1
MS2XL6D0130N065	1.3	2	6.5	1.24	50	6	2	●	1
MS2XL6D0140N035	1.4	2.1	3.5	1.34	50	6	2	●	1
MS2XL6D0140N070	1.4	2.1	7	1.34	50	6	2	●	1
MS2XL6D0150N038	1.5	2.3	3.8	1.44	50	6	2	●	1
MS2XL6D0150N075	1.5	2.3	7.5	1.44	50	6	2	●	1
MS2XL6D0160N040	1.6	2.4	4	1.54	50	6	2	●	1
MS2XL6D0160N080	1.6	2.4	8	1.54	50	6	2	●	1
MS2XL6D0170N043	1.7	2.6	4.3	1.64	50	6	2	●	1
MS2XL6D0170N085	1.7	2.6	8.5	1.64	50	6	2	●	1
MS2XL6D0180N045	1.8	2.7	4.5	1.74	50	6	2	●	1
MS2XL6D0180N090	1.8	2.7	9	1.74	50	6	2	●	1
MS2XL6D0190N048	1.9	2.9	4.8	1.84	50	6	2	●	1
MS2XL6D0190N095	1.9	2.9	9.5	1.84	50	6	2	●	1

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
MS2XL6D0200N050	2	3	5	1.90	50	6	2	●	1
MS2XL6**D0200N100**	2	3	10	1.90	50	6	2	●	1
MS2XL6**D0210N053**	2.1	3.2	5.3	2.00	50	6	2	●	1
MS2XL6**D0210N105**	2.1	3.2	10.5	2.00	60	6	2	●	1
MS2XL6**D0220N055**	2.2	3.3	5.5	2.10	50	6	2	●	1
MS2XL6**D0220N110**	2.2	3.3	11	2.10	60	6	2	●	1
MS2XL6**D0230N058**	2.3	3.5	5.8	2.20	50	6	2	●	1
MS2XL6**D0230N115**	2.3	3.5	11.5	2.20	60	6	2	●	1
MS2XL6**D0240N060**	2.4	3.6	6	2.30	50	6	2	●	1
MS2XL6**D0240N120**	2.4	3.6	12	2.30	60	6	2	●	1
MS2XL6**D0250N063**	2.5	3.8	6.3	2.40	50	6	2	●	1
MS2XL6**D0250N125**	2.5	3.8	12.5	2.40	60	6	2	●	1

MS2XL6

End mill, Short cut length, 2 flute, 6mm shank

RECOMMENDED CUTTING CONDITIONS

Work material		Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		
Dia. **DC** (mm)	Neck length **LU** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
0.3	—	40000	500−1000	0.01	30000	300−800	0.01
	1.5			0.007			0.007
0.4	**1**	40000	500−1000	0.015	30000	300−800	0.015
	2			0.01			0.01
0.5	**1.3**	40000	500−1000	0.02	30000	300−800	0.02
	2.5			0.013			0.013
0.6	**1.5**	33000	500−1000	0.03	25000	300−800	0.03
	3			0.018			0.018
0.7	**1.8**	29000	500−1000	0.04	22000	300−800	0.04
	3.5			0.025			0.025
0.8	**2**	25000	500−1000	0.06	20000	300−800	0.06
	4			0.03			0.03
0.9	**2.3**	22000	500−1000	0.08	18000	300−800	0.08
	4.5			0.05			0.05
1	**2.5**	20000	500−1000	0.1	16000	300−800	0.1
	5			0.07			0.07
1.1	**2.8**	18000	500−1000	0.12	14000	300−800	0.12
	5.5			0.08			0.08
1.2	**3**	16000	500−1000	0.12	13000	300−800	0.12
	6			0.08			0.08
1.3	**3.3**	15000	500−1000	0.12	12000	300−800	0.12
	6.5			0.08			0.08
1.4	**3.5**	14000	500−1000	0.12	11000	300−800	0.12
	7			0.08			0.08
1.5	**3.8**	13000	500−1000	0.15	10000	300−800	0.15
	7.5			0.1			0.1
1.6	**4**	12000	500−1000	0.15	10000	300−800	0.15
	8			0.1			0.1
1.7	**4.3**	12000	500−1000	0.17	9500	300−800	0.17
	8.5			0.12			0.12
1.8	**4.5**	11000	500−1000	0.17	9000	300−800	0.17
	9			0.12			0.12
1.9	**4.8**	10000	500−1000	0.17	9000	300−800	0.17
	9.5			0.12			0.12
2	**5**	10000	500−1000	0.2	9000	300−800	0.2
	10			0.15			0.15
2.1	**5.3**	9800	500−1000	0.2	9000	300−800	0.2
	10.5			0.15			0.15
2.2	**5.5**	9600	500−1000	0.2	9000	300−800	0.2
	11			0.15			0.15
2.3	**5.8**	9400	500−1000	0.2	8800	300−800	0.2
	11.5			0.15			0.15
2.4	**6**	9200	500−1000	0.25	8700	300−800	0.25
	12			0.2			0.2
2.5	**6.3**	9000	500−1000	0.25	8500	300−800	0.25
	12.5			0.2			0.2

ap:Depth of Cut in the Axial Direction

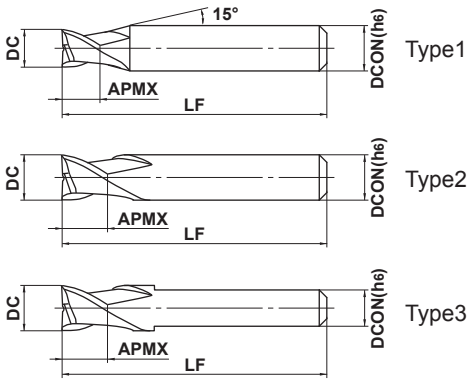
1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

MS2ES

End mill, 2 flute, For small automatic lathes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		





3≤DC≤12				
0 - 0.020				
4≤DCON≤6	7≤DCON≤10			
0 - 0.008	0 - 0.009			

h6

● 2 flute end mill.

Overall length 35mm

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS2ESD0300L35S04	3	3	35	4	2	●	1
MS2ESD0350L35S04	3.5	3.5	35	4	2	●	1
MS2ESD0400L35S04	4	4	35	4	2	●	2
MS2ESD0500L35S05	5	5	35	5	2	●	2
MS2ESD0500L35S06	5	5	35	6	2	●	1
MS2ESD0600L35S05	6	6	35	5	2	●	3
MS2ESD0600L35S06	6	6	35	6	2	●	2
MS2ESD0700L35S07	7	6	35	7	2	●	2
MS2ESD0800L35S07	8	6	35	7	2	●	3
MS2ESD0800L35S08	8	6	35	8	2	●	2
MS2ESD1000L35S07	10	6	35	7	2	●	3
MS2ESD1000L35S10	10	6	35	10	2	●	2
MS2ESD1200L35S10	12	6	35	10	2	●	3

Overall length 45mm

Unit : mm

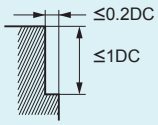
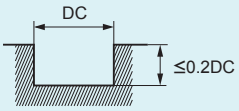
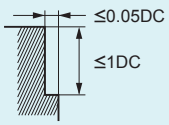
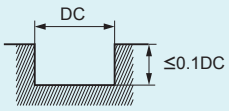
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS2ESD0300L45S04	3	3	45	4	2	●	1
MS2ESD0350L45S04	3.5	3.5	45	4	2	●	1
MS2ESD0400L45S04	4	4	45	4	2	●	2
MS2ESD0500L45S06	5	5	45	6	2	●	1
MS2ESD0600L45S06	6	6	45	6	2	●	2
MS2ESD0700L45S07	7	7	45	7	2	●	2
MS2ESD0800L45S07	8	8	45	7	2	●	3
MS2ESD0800L45S08	8	8	45	8	2	●	2
MS2ESD1000L45S07	10	10	45	7	2	●	3
MS2ESD1000L45S10	10	10	45	10	2	●	2
MS2ESD1200L45S10	12	12	45	10	2	●	3

● : Inventory maintained in Japan.

MS2ES

End mill, 2 flute, For small automatic lathes

RECOMMENDED CUTTING CONDITIONS

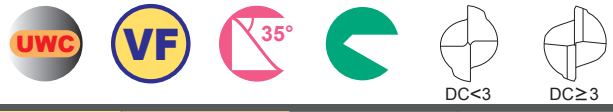
Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	10000	600	7000	400	6000	300	5000	120
4	7500	600	5200	400	4500	300	4000	120
5	6000	600	4200	400	3600	300	3200	120
6	5000	600	3500	400	3000	300	2700	120
7	4500	560	3000	360	2700	280	2300	110
8	4000	520	2800	350	2400	260	2000	110
10	3200	450	2200	300	1900	230	1600	100
12	2700	410	1900	270	1600	210	1300	100
Depth of cut								

DC:Dia.

1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) When drilling, please set the feed rate at 1/3 or below the values above.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

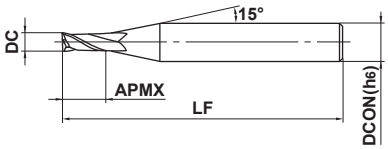
VF2MD

End mill, Medium cut length, 2 flute, For hardened materials

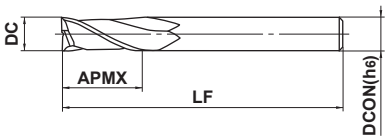


Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎				





Type1



Type2

h6	0.5≤DC≤6				
	0 - 0.020				
	4≤DCON≤6				
	0 - 0.008				

2 flute end mill suitable for high-speed machining of hardened steel.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VF2MDD0050	0.5	1.3	40	4	2	●	1
VF2MD**D0100**	1	2.5	40	4	2	●	1
VF2MD**D0150**	1.5	3.8	40	4	2	●	1
VF2MD**D0200**	2	5	40	4	2	●	1
VF2MD**D0250**	2.5	6.3	40	4	2	●	1
VF2MD**D0300**	3	7.5	50	6	2	●	1
VF2MD**D0400**	4	10	50	6	2	●	1
VF2MD**D0500**	5	12.5	50	6	2	●	1
VF2MD**D0600**	6	15	50	6	2	●	2

● : Inventory maintained in Japan.

VF2MD

End mill, Medium cut length, 2 flute, For hardened materials

RECOMMENDED CUTTING CONDITIONS

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			Hardened steel (45－55HRC) AISI H13			Hardened steel (55－62HRC) AISI D2		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
0.5	40000	1000	0.015	40000	960	0.015	30000	600	0.01
1	40000	2000	0.06	32000	1600	0.06	16000	550	0.05
1.5	40000	3000	0.12	32000	1900	0.08	10600	500	0.08
2	30000	3000	0.18	24000	1900	0.10	8100	400	0.1
2.5	24000	2600	0.25	19000	1600	0.13	6400	350	0.13
3	20000	2300	0.30	16000	1400	0.15	5400	300	0.15
4	15000	2000	0.40	12000	1200	0.20	4000	240	0.2
5	12000	1600	0.50	9000	900	0.25	3200	190	0.2
6	10000	1400	0.60	7000	700	0.30	2700	160	0.2
Depth of cut	≤Please refer to the list above for depth of cut. ≤1DC DC ≤Please refer to the list above for depth of cut. DC:Dia.								

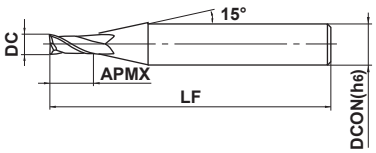
1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) When drilling, please set the feed rate at 1/3 or below the values above.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VF2MV

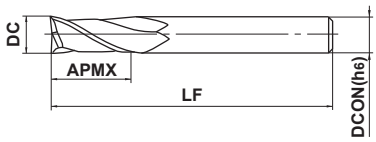
End mill, Medium cut length, 2 flute, Irregular helix flutes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎				





Type1



Type2

h6	0.5≤DC≤6				
	0 -0.020				
	4≤DCON≤6				
	0 -0.008				

An irregular helix 2 flute square end mill suitable for high-speed machining of hardened steel.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VF2MVD0050	0.5	1.3	40	4	2	●	1
VF2MV**D0100**	1	2.5	40	4	2	●	1
VF2MV**D0150**	1.5	3.8	40	4	2	●	1
VF2MV**D0200**	2	5	40	4	2	●	1
VF2MV**D0250**	2.5	6.3	40	4	2	●	1
VF2MV**D0300**	3	7.5	50	6	2	●	1
VF2MV**D0400**	4	10	50	6	2	●	1
VF2MV**D0500**	5	12.5	50	6	2	●	1
VF2MV**D0600**	6	15	50	6	2	●	2

● : Inventory maintained in Japan.

IMPACT MIRACLE END MILLS

VF2MV

End mill, Medium cut length, 2 flute, Irregular helix flutes

RECOMMENDED CUTTING CONDITIONS

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			Hardened steel (45－55HRC) AISI H13			Hardened steel (55－62HRC) AISI D2		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
0.5	40000	1000	0.015	40000	960	0.015	30000	600	0.01
1	40000	2000	0.06	32000	1600	0.06	16000	550	0.05
1.5	40000	3000	0.12	32000	1900	0.08	10600	500	0.08
2	30000	3000	0.18	24000	1900	0.10	8100	400	0.1
2.5	24000	2600	0.25	19000	1600	0.13	6400	350	0.13
3	20000	2300	0.30	16000	1400	0.15	5400	300	0.15
4	15000	2000	0.40	12000	1200	0.20	4000	240	0.2
5	12000	1600	0.50	9000	900	0.25	3200	190	0.2
6	10000	1400	0.60	7000	700	0.30	2700	160	0.2
Depth of cut	≤Please refer to the list above for depth of cut. ≤1DC DC ≤Please refer to the list above for depth of cut. DC:Dia.								

1) When slotting, reduce the revolutions by 50－70% and the feed rate by 40－60%.
2) For austenitic stainless steels, titanium and heat-resistant alloys, the VFMHV is recommended.
3) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

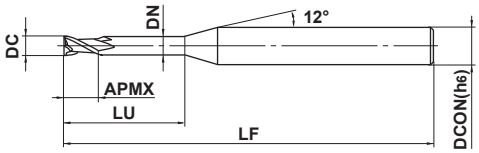
VF2XL

End mill, 2 flute, Long neck

UWC VF 30° DC<3 DC=3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎				





Type1

h6	0.1≤DC≤3				
	0 -0.020				
	4≤DCON≤6				
	0 -0.008				

2 flute long neck end mill for high-speed machining of hardened steels.

Unit : mm

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VF2XLD0010N005	0.1	0.15	0.5	0.085	45	4	2	●	1
VF2XLD0020N006	0.2	0.3	0.6	0.17	45	4	2	●	1
VF2XLD0020N010	0.2	0.3	1	0.17	45	4	2	●	1
VF2XLD0020N015	0.2	0.3	1.5	0.17	45	4	2	●	1
VF2XLD0030N010	0.3	0.5	1	0.27	45	4	2	●	1
VF2XLD0030N020	0.3	0.5	2	0.27	45	4	2	●	1
VF2XLD0030N030	0.3	0.5	3	0.27	45	4	2	●	1
VF2XLD0040N010	0.4	0.6	1	0.36	45	4	2	●	1
VF2XLD0040N020	0.4	0.6	2	0.36	45	4	2	●	1
VF2XLD0040N040	0.4	0.6	4	0.36	45	4	2	●	1
VF2XLD0050N020	0.5	0.8	2	0.46	45	4	2	●	1
VF2XLD0050N040	0.5	0.8	4	0.46	45	4	2	●	1
VF2XLD0050N060	0.5	0.8	6	0.46	45	4	2	●	1
VF2XLD0060N020	0.6	0.9	2	0.56	45	4	2	●	1
VF2XLD0060N040	0.6	0.9	4	0.56	45	4	2	●	1
VF2XLD0060N060	0.6	0.9	6	0.56	45	4	2	●	1
VF2XLD0080N040	0.8	1.2	4	0.76	45	4	2	●	1
VF2XLD0080N060	0.8	1.2	6	0.76	45	4	2	●	1
VF2XLD0080N080	0.8	1.2	8	0.76	50	4	2	●	1
VF2XLD0080N100	0.8	1.2	10	0.76	50	4	2	●	1
VF2XLD0100N040	1	1.5	4	0.94	50	4	2	●	1
VF2XLD0100N060	1	1.5	6	0.94	50	4	2	●	1
VF2XLD0100N080	1	1.5	8	0.94	50	4	2	●	1
VF2XLD0100N100	1	1.5	10	0.94	50	4	2	●	1
VF2XLD0100N120	1	1.5	12	0.94	50	4	2	●	1
VF2XLD0150N060	1.5	2.3	6	1.44	50	4	2	●	1
VF2XLD0150N080	1.5	2.3	8	1.44	50	4	2	●	1
VF2XLD0150N100	1.5	2.3	10	1.44	50	4	2	●	1
VF2XLD0150N120	1.5	2.3	12	1.44	50	4	2	●	1
VF2XLD0150N160	1.5	2.3	16	1.44	60	4	2	●	1
VF2XLD0200N060	2	3	6	1.9	50	4	2	●	1
VF2XLD0200N080	2	3	8	1.9	50	4	2	●	1
VF2XLD0200N100	2	3	10	1.9	50	4	2	●	1
VF2XLD0200N120	2	3	12	1.9	50	4	2	●	1

● : Inventory maintained in Japan.

VF2XL

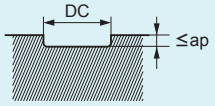
End mill, 2 flute, Long neck

Unit : mm

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VF2XLD0200N160	2	3	16	1.9	60	4	2	●	1
VF2XLD0200N200	2	3	20	1.9	60	4	2	●	1
VF2XLD0300N120	3	4.5	12	2.9	50	6	2	●	1
VF2XLD0300N160	3	4.5	16	2.9	60	6	2	●	1
VF2XLD0300N200	3	4.5	20	2.9	60	6	2	●	1

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material		Hardened steel (45—55HRC) AISI H13			Hardened steel (55—62HRC) AISI D2		
Dia. **DC** (mm)	Neck length **LU** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut per pass ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut per pass ap (mm)
0.1	**0.5**	40000	100	0.002	40000	80	0.001
0.2	**0.6**	40000	400	0.004	40000	360	0.004
	1	40000	300	0.003	40000	250	0.002
	1.5	40000	200	0.002	40000	150	0.001
0.3	**1**	40000	500	0.006	40000	450	0.004
	2	40000	400	0.003	38000	350	0.002
	3	38000	250	0.002	36000	200	0.001
0.4	**1**	40000	800	0.008	36000	500	0.006
	2	40000	500	0.007	30000	350	0.005
	4	36000	300	0.004	27000	200	0.003
0.5	**2**	40000	800	0.01	30000	600	0.009
	4	36000	600	0.008	27000	450	0.007
	6	30000	400	0.005	22000	300	0.004
0.6	**2**	40000	1000	0.015	30000	700	0.012
	4	36000	800	0.01	27000	500	0.01
	6	30000	600	0.006	22000	350	0.006
0.8	**4**	36000	1200	0.03	27000	900	0.02
	6	30000	900	0.02	22000	650	0.015
	8	24000	600	0.01	18000	450	0.008
	10	20000	400	0.008	15000	300	0.005
1	**4**	32000	1600	0.05	24000	1100	0.04
	6	32000	1400	0.04	24000	1000	0.03
	8	28000	1000	0.03	21000	750	0.02
	10	28000	800	0.02	21000	600	0.015
	12	24000	500	0.02	18000	370	0.01
1.5	**6**	22000	1200	0.08	16000	900	0.06
	8	22000	1100	0.07	16000	800	0.05
	10	22000	1000	0.06	16000	750	0.04
	12	20000	800	0.05	15000	600	0.03
	16	18000	500	0.03	13000	350	0.02
2	**6**	16000	1000	0.15	12000	750	0.15
	8	16000	1000	0.15	12000	750	0.1
	10	16000	800	0.1	12000	600	0.08
	12	16000	800	0.08	12000	600	0.06
	16	15000	600	0.06	11000	450	0.05
	20	14000	500	0.05	10000	350	0.04
3	**12**	11000	800	0.2	8200	600	0.15
	16	11000	600	0.15	8200	450	0.15
	20	11000	500	0.1	8200	350	0.1
Depth of cut		 DC:Dia.					

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

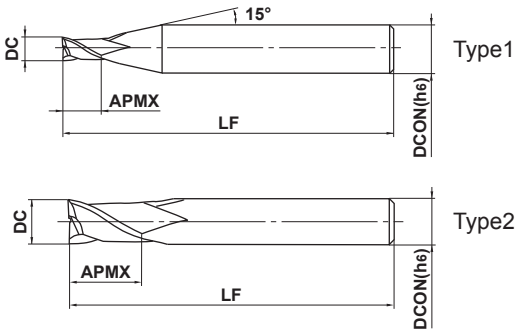
VC2SS

End mill, Extra short cut length, 2 flute



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎		○	○		





DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=6	8≤DCON≤10	12≤DCON≤16		
0 - 0.008	0 - 0.009	0 - 0.011		

h6

● 2 flute end mill for general use.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VC2SSD0030	0.3	0.6	50	6	2	●	1
VC2SSD0040	0.4	0.8	50	6	2	●	1
VC2SSD0050	0.5	0.8	50	6	2	●	1
VC2SSD0060	0.6	1	50	6	2	●	1
VC2SSD0070	0.7	1	50	6	2	●	1
VC2SSD0080	0.8	1.3	50	6	2	●	1
VC2SSD0090	0.9	1.3	50	6	2	●	1
VC2SSD0100	1	1.5	50	6	2	●	1
VC2SSD0110	1.1	1.5	50	6	2	●	1
VC2SSD0120	1.2	2	50	6	2	●	1
VC2SSD0130	1.3	2	50	6	2	●	1
VC2SSD0140	1.4	2	50	6	2	●	1
VC2SSD0150	1.5	2.5	50	6	2	●	1
VC2SSD0160	1.6	2.5	50	6	2	●	1
VC2SSD0170	1.7	2.5	50	6	2	●	1
VC2SSD0180	1.8	3	50	6	2	●	1
VC2SSD0190	1.9	3	50	6	2	●	1
VC2SSD0200	2	3	50	6	2	●	1
VC2SSD0210	2.1	3	50	6	2	●	1
VC2SSD0220	2.2	3.5	50	6	2	●	1
VC2SSD0230	2.3	3.5	50	6	2	●	1
VC2SSD0240	2.4	3.5	50	6	2	●	1
VC2SSD0250	2.5	4	50	6	2	●	1
VC2SSD0260	2.6	4	50	6	2	●	1
VC2SSD0270	2.7	4	50	6	2	●	1
VC2SSD0280	2.8	4	50	6	2	●	1
VC2SSD0290	2.9	4.5	50	6	2	●	1
VC2SSD0300	3	4.5	50	6	2	●	1
VC2SSD0350	3.5	5.5	50	6	2	●	1
VC2SSD0400	4	6	50	6	2	●	1
VC2SSD0450	4.5	7	50	6	2	●	1
VC2SSD0500	5	7.5	50	6	2	●	1
VC2SSD0550	5.5	8.5	50	6	2	●	1
VC2SSD0600	6	9	50	6	2	●	2

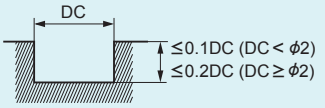
● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VC2SSD0800	8	12	60	8	2	●	2
VC2SS**D1000**	10	15	70	10	2	●	2
VC2SS**D1200**	12	18	75	12	2	●	2
VC2SS**D1400**	14	21	75	16	2	●	1
VC2SS**D1500**	15	23	80	16	2	●	1
VC2SS**D1600**	16	24	90	16	2	●	2

RECOMMENDED CUTTING CONDITIONS

Slotting

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Hardened steel (45−55HRC) AISI H13	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
0.3	40000	190	40000	190	40000	100
0.5	40000	380	40000	380	30000	140
1	30000	720	20000	480	15000	180
1.5	20000	960	14000	670	10000	190
2	15000	1100	10000	720	8000	200
3	10000	1150	7000	800	5000	210
4	7500	900	5200	620	4000	200
5	6000	720	4200	500	3200	160
6	5000	600	3500	420	2700	140
8	4000	520	2800	350	2000	120
10	3200	450	2200	290	1600	110
12	2700	410	1900	260	1300	100
16	2000	340	1400	210	1000	90
Depth of cut	 DC:Dia.					

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) When drilling, please set the feed rate at 1/3 or below the values above.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

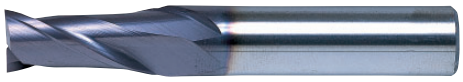
MIRACLE END MILLS

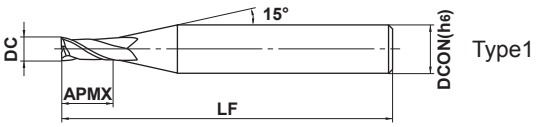
VC2MS

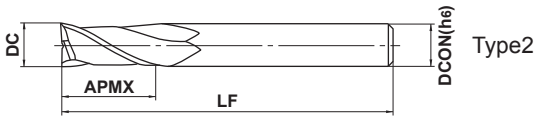
End mill, Medium cut length, 2 flute

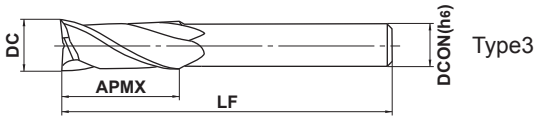


Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎		○	○		









h6

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=3	4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	20≤DCON≤25
0 - 0.006	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

● 2 flute end mill for general use.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VC2MSD0030	0.3	0.6	38	3	2	●	1
VC2MSD0040	0.4	0.8	38	3	2	●	1
VC2MSD0050	0.5	1	38	3	2	●	1
VC2MSD0060	0.6	1.2	38	3	2	●	1
VC2MSD0070	0.7	1.4	38	3	2	●	1
VC2MSD0080	0.8	1.6	38	3	2	●	1
VC2MSD0090	0.9	2	38	3	2	●	1
VC2MSD0100	1	2.5	40	4	2	●	1
VC2MSD0110	1.1	2.5	40	4	2	●	1
VC2MSD0120	1.2	3	40	4	2	●	1
VC2MSD0130	1.3	3	40	4	2	●	1
VC2MSD0140	1.4	3	40	4	2	●	1
VC2MSD0150	1.5	4	40	4	2	●	1
VC2MSD0160	1.6	4	40	4	2	●	1
VC2MSD0170	1.7	4	40	4	2	●	1
VC2MSD0180	1.8	5	40	4	2	●	1
VC2MSD0190	1.9	5	40	4	2	●	1
VC2MSD0200	2	6	40	4	2	●	1
VC2MSD0210	2.1	6	40	4	2	●	1
VC2MSD0220	2.2	6	40	4	2	●	1
VC2MSD0230	2.3	6	40	4	2	●	1
VC2MSD0240	2.4	8	40	4	2	●	1
VC2MSD0250	2.5	8	40	4	2	●	1
VC2MSD0260	2.6	8	40	4	2	●	1
VC2MSD0270	2.7	8	40	4	2	●	1
VC2MSD0280	2.8	8	40	4	2	●	1
VC2MSD0290	2.9	8	40	4	2	●	1
VC2MSD0300	3	8	45	6	2	●	1
VC2MSD0350	3.5	10	45	6	2	●	1
VC2MSD0400	4	11	45	6	2	●	1
VC2MSD0450	4.5	11	45	6	2	●	1
VC2MSD0500	5	13	50	6	2	●	1
VC2MSD0550	5.5	13	50	6	2	●	1
VC2MSD0600	6	13	50	6	2	●	2

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VC2MSD0650	6.5	16	60	8	2	●	1
VC2MSD0700	7	16	60	8	2	●	1
VC2MSD0750	7.5	16	60	8	2	●	1
VC2MSD0800	8	19	60	8	2	●	2
VC2MSD0850	8.5	19	70	10	2	●	1
VC2MSD0900	9	19	70	10	2	●	1
VC2MSD0950	9.5	19	70	10	2	●	1
VC2MSD1000	10	22	70	10	2	●	2
VC2MSD1050	10.5	22	75	12	2	●	1
VC2MSD1100	11	22	75	12	2	●	1
VC2MSD1150	11.5	22	75	12	2	●	1
VC2MSD1200	12	26	75	12	2	●	2
VC2MSD1250	12.5	26	75	12	2	●	3
VC2MSD1300	13	26	75	12	2	●	3
VC2MSD1400	14	26	75	12	2	●	3
VC2MSD1500	15	30	80	16	2	●	1
VC2MSD1600	16	32	90	16	2	●	2
VC2MSD1700	17	32	90	16	2	●	3
VC2MSD1800	18	32	90	16	2	●	3
VC2MSD1900	19	32	100	20	2	●	1
VC2MSD2000	20	38	100	20	2	●	2
VC2MSD2200	22	38	100	20	2	●	3
VC2MSD2400	24	45	120	25	2	●	1
VC2MSD2500	25	45	120	25	2	●	2

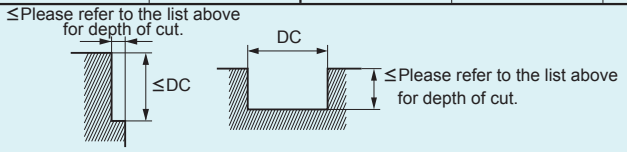
VC2MS

End mill, Medium cut length, 2 flute

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45－55HRC) AISI H13		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
0.3	40000	200	0.005	40000	200	0.005
0.5	40000	950	0.015	40000	950	0.015
1	40000	2000	0.06	32000	1600	0.06
1.5	40000	3000	0.12	32000	1900	0.08
2	30000	3000	0.18	24000	1900	0.10
2.5	24000	2600	0.25	19000	1600	0.13
3	20000	2300	0.30	16000	1400	0.15
4	15000	2000	0.40	12000	1200	0.20
5	12000	1600	0.50	9000	900	0.25
6	10000	1400	0.60	7000	700	0.30
8	8000	1000	0.80	5600	550	0.40
10	6400	900	1.00	4500	500	0.50
12	5400	820	1.00	3800	450	0.50
16	2400	380	3.00	1200	100	0.80
20	1900	320	4.00	1000	80	1.00

Depth of cut



DC:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) When slotting with end mills with ϕ3 or larger, reduce the revolution to 50－70% and the feed rate to 40－60%.
3) When drilling, please set the feed rate at 1/3 or below the values above.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VC2JS

End mill, Semi long cut length, 2 flute









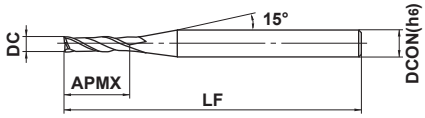


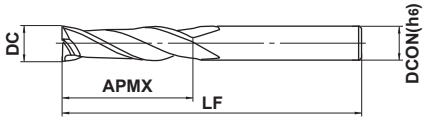


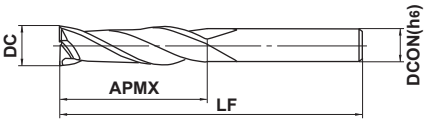


Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎		○	○		









DC≤12	DC>12			
0 - 0.020	0 - 0.030			
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	20≤DCON≤25	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

● 2 flute end mill with longer cut length than standard.

Unit : mm

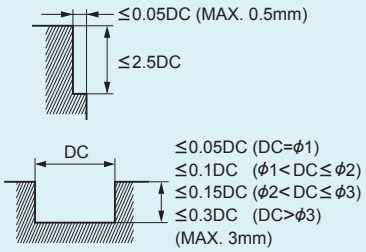
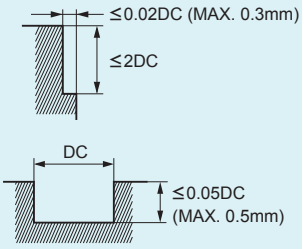
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VC2JSD0100	1	3.5	40	4	2	●	1
VC2JSD0150	1.5	5	40	4	2	●	1
VC2JSD0200	2	8	40	4	2	●	1
VC2JSD0250	2.5	10	40	4	2	●	1
VC2JSD0300	3	12	50	6	2	●	1
VC2JSD0350	3.5	15	50	6	2	●	1
VC2JSD0400	4	15	50	6	2	●	1
VC2JSD0450	4.5	15	50	6	2	●	1
VC2JSD0500	5	20	60	6	2	●	1
VC2JSD0550	5.5	20	60	6	2	●	1
VC2JSD0600	6	20	60	6	2	●	2
VC2JSD0650	6.5	25	70	8	2	●	1
VC2JSD0700	7	25	70	8	2	●	1
VC2JSD0750	7.5	25	70	8	2	●	1
VC2JSD0800	8	25	70	8	2	●	2
VC2JSD0850	8.5	25	90	10	2	●	1
VC2JSD0900	9	25	90	10	2	●	1
VC2JSD0950	9.5	25	90	10	2	●	1
VC2JSD1000	10	30	90	10	2	●	2
VC2JSD1050	10.5	30	90	12	2	●	1
VC2JSD1100	11	30	90	12	2	●	1
VC2JSD1150	11.5	30	90	12	2	●	1
VC2JSD1200	12	30	90	12	2	●	2
VC2JSD1300	13	35	90	12	2	●	3
VC2JSD1400	14	40	110	16	2	●	1
VC2JSD1500	15	40	110	16	2	●	1
VC2JSD1600	16	50	110	16	2	●	2
VC2JSD1700	17	50	110	20	2	●	1
VC2JSD1800	18	50	110	20	2	●	1
VC2JSD1900	19	55	110	20	2	●	1
VC2JSD2000	20	55	110	20	2	●	2
VC2JSD2200	22	65	140	25	2	●	1
VC2JSD2400	24	75	140	25	2	●	1
VC2JSD2500	25	75	140	25	2	●	2

● : Inventory maintained in Japan.

VC2JS

End mill, Semi long cut length, 2 flute

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	13000	60 (60)	9000	35 (35)	6500 (6500)	20 (20)	5700	20 (15)
2	6400	60 (60)	4800	45 (45)	3500 (3500)	30 (30)	3000	25 (15)
3	4200	65 (60)	3400	55 (55)	2600 (2600)	40 (40)	2100	30 (20)
4	3400	80 (60)	2700	65 (30)	2100 (1600)	50 (20)	1700	35 (20)
5	2900	100 (60)	2300	80 (40)	1800 (1350)	60 (25)	1500	40 (20)
6	2500	120 (60)	2000	100 (50)	1500 (1100)	75 (30)	1300	50 (25)
8	1900	130 (60)	1500	100 (50)	1200 (900)	85 (35)	1000	50 (25)
10	1600	130 (60)	1300	100 (50)	950 (710)	75 (30)	800	50 (25)
12	1300	120 (60)	1100	90 (45)	800 (600)	60 (25)	670	40 (20)
16	1000	80 (40)	820	65 (30)	600 (450)	45 (20)	500	30 (15)
20	800	65 (30)	650	50 (25)	480 (360)	40 (15)	400	25 (13)
25	650	50 (25)	520	40 (20)	380 (280)	30 (12)	320	20 (10)
Depth of cut								

DC:Dia.

( ) : Indicates standard revolution and feed rates for slotting.

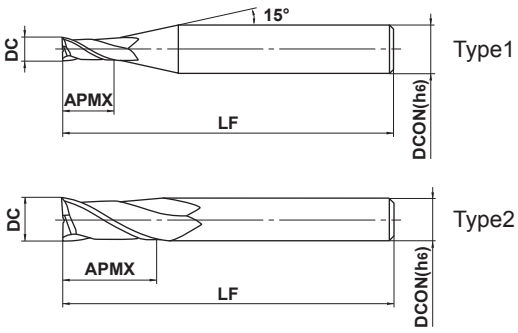
1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) When drilling, please set the feed rate at 1/3 or below the values above.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

CRN2MS

End mill, Medium cut length, 2 flute, For copper electrodes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
						◎	○





Type1

Type2

0.2≤DC≤12				
0 - 0.02				
4≤DCON≤6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

h6

● 2 flute end mill with CRN coating for copper electrode machining.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
CRN2MSD0020S04	0.2	0.4	40	4	2	●	1
CRN2MSD0020S06	0.2	0.4	45	6	2	●	1
CRN2MSD0030S04	0.3	0.6	40	4	2	●	1
CRN2MSD0030S06	0.3	0.6	45	6	2	●	1
CRN2MSD0040S04	0.4	0.8	40	4	2	●	1
CRN2MSD0040S06	0.4	0.8	45	6	2	●	1
CRN2MSD0050S04	0.5	1	40	4	2	●	1
CRN2MSD0050S06	0.5	1	45	6	2	●	1
CRN2MSD0060S04	0.6	1.2	40	4	2	●	1
CRN2MSD0070S04	0.7	1.4	40	4	2	●	1
CRN2MSD0080S04	0.8	1.6	40	4	2	●	1
CRN2MSD0080S06	0.8	1.6	45	6	2	●	1
CRN2MSD0090S04	0.9	2	40	4	2	●	1
CRN2MSD0100S04	1	2.5	40	4	2	●	1
CRN2MSD0100S06	1	2.5	45	6	2	●	1
CRN2MSD0110S04	1.1	2.5	40	4	2	●	1
CRN2MSD0120S04	1.2	3	40	4	2	●	1
CRN2MSD0120S06	1.2	3	45	6	2	●	1
CRN2MSD0130S04	1.3	3	40	4	2	●	1
CRN2MSD0140S04	1.4	3	40	4	2	●	1
CRN2MSD0150S04	1.5	4	40	4	2	●	1
CRN2MSD0150S06	1.5	4	45	6	2	●	1
CRN2MSD0160S04	1.6	4	40	4	2	●	1
CRN2MSD0170S04	1.7	4	40	4	2	●	1
CRN2MSD0180S04	1.8	5	40	4	2	●	1
CRN2MSD0190S04	1.9	5	40	4	2	●	1
CRN2MSD0200S06	2	6	45	6	2	●	1
CRN2MSD0250S06	2.5	8	45	6	2	●	1
CRN2MSD0300S06	3	8	45	6	2	●	1
CRN2MSD0400S06	4	11	45	6	2	●	1
CRN2MSD0500S06	5	13	50	6	2	●	1
CRN2MSD0600S06	6	13	50	6	2	●	2
CRN2MSD0800S08	8	19	60	8	2	●	2
CRN2MSD1000S10	10	22	70	10	2	●	2
CRN2MSD1200S12	12	26	75	12	2	●	2

● : Inventory maintained in Japan.

CRN2MS

End mill, Medium cut length, 2 flute, For copper electrodes

RECOMMENDED CUTTING CONDITIONS

Work material	Copper, Copper alloys		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
0.2	40000	600	0.01
0.3	40000	600	0.01
0.4	40000	800	0.01
0.5	40000	960	0.015
0.6	40000	1200	0.02
0.7	40000	1400	0.02
0.8	40000	1600	0.03
0.9	40000	1800	0.04
1	40000	2000	0.06
1.5	40000	3000	0.12
2	30000	3000	0.18
2.5	24000	2600	0.25
3	20000	2300	0.30
4	15000	2000	0.40
5	12000	1600	0.50
6	10000	1400	0.60
8	8000	1000	0.80
10	6400	900	1.00
12	5400	820	1.00
Depth of cut	≤Please refer to the list above for depth of cut. ≤DC	DC ≤Please refer to the list above for depth of cut.	DC:Dia.

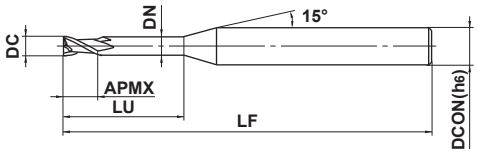
1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Water-soluble cutting fluid is recommended.
3) When drilling, please set the feed rate at 1/3 or below of the table value.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

CRN2XL

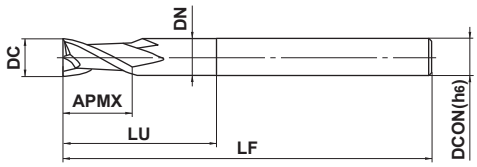
End mill, Medium cut length, 2 flute, Long neck, For copper electrodes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
						◎	○





Type1



Type2

h6					
0.2≤DC≤6					
0 - 0.02					
4≤DCON≤6					
0 - 0.008					

● 2 flute long neck end mill with CRN coating for copper electrode machining.

Unit : mm

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
CRN2XLD0020N005S04	0.2	0.3	0.5	0.17	50	4	2	●	1
CRN2XLD0020N005S06	0.2	0.3	0.5	0.17	50	6	2	●	1
CRN2XLD0020N010S04	0.2	0.3	1	0.17	50	4	2	●	1
CRN2XLD0020N010S06	0.2	0.3	1	0.17	50	6	2	●	1
CRN2XLD0020N015S04	0.2	0.3	1.5	0.17	50	4	2	●	1
CRN2XLD0020N015S06	0.2	0.3	1.5	0.17	50	6	2	●	1
CRN2XLD0030N010S04	0.3	0.5	1	0.27	50	4	2	●	1
CRN2XLD0030N010S06	0.3	0.5	1	0.27	50	6	2	●	1
CRN2XLD0030N030S04	0.3	0.5	3	0.27	50	4	2	●	1
CRN2XLD0030N030S06	0.3	0.5	3	0.27	50	6	2	●	1
CRN2XLD0040N020S04	0.4	0.6	2	0.36	50	4	2	●	1
CRN2XLD0040N020S06	0.4	0.6	2	0.36	50	6	2	●	1
CRN2XLD0040N040S04	0.4	0.6	4	0.36	50	4	2	●	1
CRN2XLD0040N040S06	0.4	0.6	4	0.36	50	6	2	●	1
CRN2XLD0040N060S04	0.4	0.6	6	0.36	50	4	2	●	1
CRN2XLD0040N060S06	0.4	0.6	6	0.36	50	6	2	●	1
CRN2XLD0050N020S04	0.5	0.8	2	0.46	50	4	2	●	1
CRN2XLD0050N020S06	0.5	0.8	2	0.46	50	6	2	●	1
CRN2XLD0050N040S04	0.5	0.8	4	0.46	50	4	2	●	1
CRN2XLD0050N040S06	0.5	0.8	4	0.46	50	6	2	●	1
CRN2XLD0050N060S04	0.5	0.8	6	0.46	50	4	2	●	1
CRN2XLD0050N060S06	0.5	0.8	6	0.46	50	6	2	●	1
CRN2XLD0050N080S04	0.5	0.8	8	0.46	50	4	2	●	1
CRN2XLD0050N080S06	0.5	0.8	8	0.46	50	6	2	●	1
CRN2XLD0080N040S04	0.8	1.2	4	0.76	50	4	2	●	1
CRN2XLD0080N040S06	0.8	1.2	4	0.76	50	6	2	●	1
CRN2XLD0080N060S04	0.8	1.2	6	0.76	50	4	2	●	1
CRN2XLD0080N060S06	0.8	1.2	6	0.76	50	6	2	●	1
CRN2XLD0080N080S04	0.8	1.2	8	0.76	50	4	2	●	1
CRN2XLD0080N080S06	0.8	1.2	8	0.76	50	6	2	●	1
CRN2XLD0080N100S04	0.8	1.2	10	0.76	50	4	2	●	1
CRN2XLD0080N100S06	0.8	1.2	10	0.76	50	6	2	●	1
CRN2XLD0100N060S04	1	1.5	6	0.94	50	4	2	●	1
CRN2XLD0100N060S06	1	1.5	6	0.94	50	6	2	●	1

● : Inventory maintained in Japan.

MIRACLE END CRN

CRN2XL

End mill, Medium cut length, 2 flute, Long neck, For copper electrodes

Unit : mm

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
CRN2XLD0100N080S04	1	1.5	8	0.94	50	4	2	●	1
CRN2XLD0100N080S06	1	1.5	8	0.94	50	6	2	●	1
CRN2XLD0100N100S04	1	1.5	10	0.94	50	4	2	●	1
CRN2XLD0100N100S06	1	1.5	10	0.94	50	6	2	●	1
CRN2XLD0100N120S04	1	1.5	12	0.94	50	4	2	●	1
CRN2XLD0100N120S06	1	1.5	12	0.94	50	6	2	●	1
CRN2XLD0100N160S04	1	1.5	16	0.94	55	4	2	●	1
CRN2XLD0100N160S06	1	1.5	16	0.94	55	6	2	●	1
CRN2XLD0150N060S04	1.5	2.3	6	1.44	50	4	2	●	1
CRN2XLD0150N060S06	1.5	2.3	6	1.44	50	6	2	●	1
CRN2XLD0150N080S04	1.5	2.3	8	1.44	50	4	2	●	1
CRN2XLD0150N080S06	1.5	2.3	8	1.44	50	6	2	●	1
CRN2XLD0150N100S04	1.5	2.3	10	1.44	50	4	2	●	1
CRN2XLD0150N100S06	1.5	2.3	10	1.44	50	6	2	●	1
CRN2XLD0150N120S04	1.5	2.3	12	1.44	50	4	2	●	1
CRN2XLD0150N120S06	1.5	2.3	12	1.44	50	6	2	●	1
CRN2XLD0150N160S04	1.5	2.3	16	1.44	55	4	2	●	1
CRN2XLD0150N160S06	1.5	2.3	16	1.44	55	6	2	●	1
CRN2XLD0150N200S04	1.5	2.3	20	1.44	60	4	2	●	1
CRN2XLD0150N200S06	1.5	2.3	20	1.44	60	6	2	●	1
CRN2XLD0200N060S06	2	3.0	6	1.90	50	6	2	●	1
CRN2XLD0200N080S06	2	3.0	8	1.90	50	6	2	●	1
CRN2XLD0200N100S06	2	3.0	10	1.90	50	6	2	●	1
CRN2XLD0200N120S06	2	3.0	12	1.90	50	6	2	●	1
CRN2XLD0200N160S06	2	3.0	16	1.90	55	6	2	●	1
CRN2XLD0200N200S06	2	3.0	20	1.90	60	6	2	●	1
CRN2XLD0250N080S06	2.5	3.8	8	2.40	50	6	2	●	1
CRN2XLD0250N120S06	2.5	3.8	12	2.40	55	6	2	●	1
CRN2XLD0250N160S06	2.5	3.8	16	2.40	60	6	2	●	1
CRN2XLD0250N200S06	2.5	3.8	20	2.40	65	6	2	●	1
CRN2XLD0300N200S06	3	4.5	20	2.90	65	6	2	●	1
CRN2XLD0400N200S06	4	6.0	20	3.90	65	6	2	●	1
CRN2XLD0500N250S06	5	7.5	25	4.90	70	6	2	●	1
CRN2XLD0600N300S06	6	9.0	30	5.85	70	6	2	●	2

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material		Copper, Copper alloys		
Dia. **DC** (mm)	Neck length **LU** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut per pass (mm)
0.2	**0.5**	40000	800	0.004
	1.0	40000	700	0.003
	1.5	40000	600	0.002
0.3	**1**	40000	800	0.007
	3	40000	600	0.002
0.4	**2**	40000	950	0.007
	4	40000	800	0.003
	6	40000	600	0.001
0.5	**2**	40000	950	0.01
	4	40000	800	0.005
	6	40000	700	0.002
0.8	**4**	40000	1200	0.02
	6	40000	1200	0.015
	8	40000	1000	0.01
1	**6**	40000	2000	0.04
	8	40000	2000	0.03
	10	30000	1200	0.02
	12	30000	1000	0.015
1.5	**6**	40000	2400	0.10
	8	40000	2200	0.09
	10	40000	2000	0.08
	12	30000	1800	0.05
	16	20000	1200	0.03
	20	15000	800	0.02
2	**6**	40000	2400	0.18
	8	40000	2200	0.15
	10	40000	2000	0.12
	12	30000	1500	0.10
	16	30000	1000	0.06
	20	15000	600	0.03
2.5	**8**	40000	3000	0.20
	12	40000	2800	0.15
	16	30000	2100	0.10
	20	20000	1000	0.08
3	**20**	20000	2000	0.12
4	**20**	15000	2000	0.30
5	**25**	12000	1500	0.35
6	**30**	10000	1200	0.40

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Water-soluble cutting fluid is recommended.
3) Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

MIRACLE END DLC

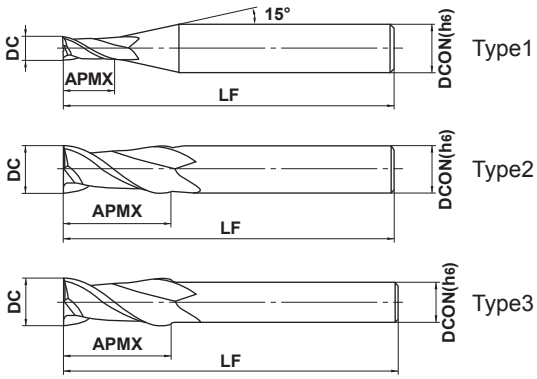
DLC2MA

Slot drill, Medium cut length, 2 flute

UWC DLC 30° DC<3 37.5° DC≥3 DC<3 DC≥3

Copper Alloy	Aluminium Alloy	Graphite	GFRP CFRP	Machineable Ceramics
○	◎	○	○	





DC≤12	DC>12			
0 - 0.020	0 - 0.030			
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

● 2 flute end mill with new high welding resistance DLC coating, ideal for machining non-ferrous materials.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
DLC2MAD0100	1	2.5	40	4	2	●	1
DLC2MAD0150	1.5	4	40	4	2	●	1
DLC2MAD0200	2	6	40	4	2	●	1
DLC2MAD0250	2.5	8	40	4	2	●	1
DLC2MAD0300	3	8	45	6	2	●	1
DLC2MAD0350	3.5	10	45	6	2	●	1
DLC2MAD0400	4	11	45	6	2	●	1
DLC2MAD0450	4.5	11	45	6	2	●	1
DLC2MAD0500	5	13	50	6	2	●	1
DLC2MAD0600	6	13	50	6	2	●	2
DLC2MAD0800	8	19	60	8	2	●	2
DLC2MAD1000	10	22	70	10	2	●	2
DLC2MAD1200	12	26	75	12	2	●	2
DLC2MAD1400	14	26	75	12	2	●	3
DLC2MAD1500	15	30	80	16	2	●	1
DLC2MAD1600	16	32	90	16	2	●	2
DLC2MAD1800	18	32	90	16	2	●	3
DLC2MAD2000	20	38	100	20	2	●	2

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Aluminium alloy		Aluminium cast, Copper, Copper alloys	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	40000	600	40000	460
2	40000	1100	38000	850
3	32000	1400	25000	950
4	24000	1500	19000	1000
5	19000	1600	15000	1000
6	16000	1900	13000	1100
8	12000	1900	9500	1200
10	9500	1900	7600	1200
12	8000	1900	6400	1200
16	6000	1900	4800	1200
20	4800	1500	3800	1000
Depth of cut	≤0.2DC (DC < ϕ3) ≤0.5DC (DC ≥ ϕ3) ≤1DC DC:Dia.			

Slotting

Work material	Aluminium alloy		Aluminium cast, Copper, Copper alloys	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	40000	460	40000	350
2	38000	850	32000	550
3	25000	950	21000	600
4	19000	1000	16000	650
5	15000	1000	13000	700
6	13000	1100	11000	750
8	9500	1200	8000	800
10	7600	1200	6400	800
12	6400	1200	5300	800
16	4800	1000	4000	720
20	3800	970	3200	660
Depth of cut	DC ≤1DC (MAX. 12mm) DC:Dia.			

1) When cutting a very hard workpiece, reduce the feed rate.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

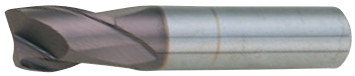
END MILL FOR SLOTTING

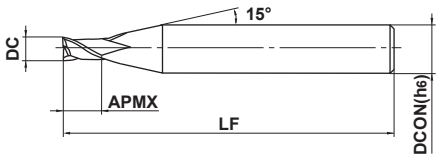
SED2KPG

End mill, Medium cut length, 2 flute, + Tolerance

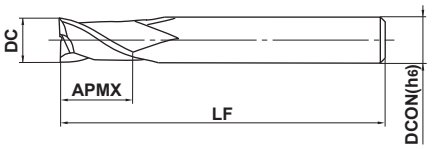


Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎			○	○		





Type1



Type2

2≤DC≤16				
0 + 0.02				
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16		
0 - 0.008	0 - 0.009	0 - 0.011		

h6

- 2 flute end mill for key way slotting with plus tolerance
- cutting diameter.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
SED2020KPG	2	3	45	4	2	●	1
SED2030KPG	3	5	45	6	2	●	1
SED2040KPG	4	6	45	6	2	●	1
SED2050KPG	5	8	50	6	2	●	1
SED2060KPG	6	9	50	6	2	●	2
SED2070KPG	7	10	60	8	2	●	1
SED2080KPG	8	12	60	8	2	●	2
SED2100KPG	10	15	65	10	2	●	2
SED2120KPG	12	15	65	12	2	●	2
SED2140KPG	14	15	70	16	2	●	1
SED2150KPG	15	15	70	16	2	●	1
SED2160KPG	16	15	70	16	2	●	2

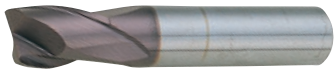
● : Inventory maintained in Japan.

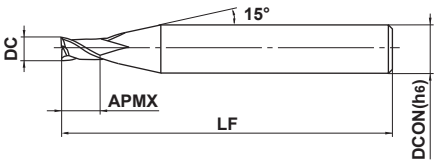
SED2KMG

End mill, Medium cut length, 2 flute, - Tolerance

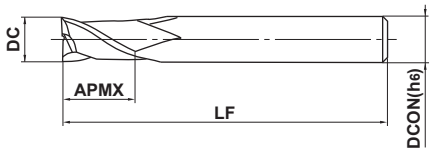


Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎			○	○		





Type1



Type2

h6

2≤DC≤16				
0 - 0.02				
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16		
0 - 0.008	0 - 0.009	0 - 0.011		

- 2 flute end mill for key way slotting with minus tolerance
- cutting diameter.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
SED2020KMG	2	3	45	4	2	●	1
SED2030KMG	3	5	45	6	2	●	1
SED2040KMG	4	6	45	6	2	●	1
SED2050KMG	5	8	50	6	2	●	1
SED2060KMG	6	9	50	6	2	●	2
SED2070KMG	7	10	60	8	2	●	1
SED2080KMG	8	12	60	8	2	●	2
SED2100KMG	10	15	65	10	2	●	2
SED2120KMG	12	15	65	12	2	●	2
SED2140KMG	14	15	70	16	2	●	1
SED2150KMG	15	15	70	16	2	●	1
SED2160KMG	16	15	70	16	2	●	2

END MILL FOR SLOTTING

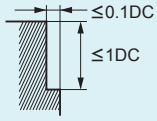
SED2KPG
End mill, Short cut length, 2 flute, For key ways

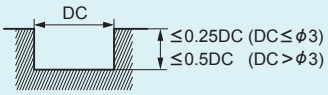
SED2KMG
End mill, Short cut length, 2 flute, For key ways

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Alloy steel (180−280HB) AISI 1045, AISI P20		Carbon steel, Alloy steel (280−380HB) AISI 1045, AISI P20		Pre-hardened steel (35−45HRC)		Stainless steel (270HB≥) AISI 420		Cast iron (Tensile Strength 350MPa≥) AISI No 35 B	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	13000	260 (260)	10300	200 (200)	8800	110 (110)	9800	170 (170)	21500	830 (830)
3	8500	340 (340)	6900	200 (200)	6400	110 (110)	6400	170 (170)	14300	850 (850)
4	6500	380 (380)	5200	250 (200)	4400	140 (110)	4800	200 (160)	10700	860 (860)
5	5100	400 (400)	4100	290 (230)	3500	140 (110)	3800	190 (150)	8600	850 (850)
6	4300	410 (410)	3400	290 (230)	2900	150 (120)	3200	180 (140)	7200	870 (870)
8	3200	410 (410)	2600	250 (200)	2200	140 (110)	2400	150 (120)	5400	880 (880)
10	2600	400 (400)	2070	240 (190)	1800	140 (110)	1900	140 (110)	4300	860 (860)
12	2200	360 (360)	1700	210 (170)	1500	130 (100)	1600	130 (105)	3600	860 (860)
14	1900	340 (340)	1500	200 (160)	1250	130 (100)	1400	130 (100)	3100	860 (860)
16	1600	320 (320)	1300	200 (160)	1100	130 (100)	1200	120 (95)	2700	870 (870)

Depth of cut





DC:Dia.

( ) : Indicates standard feed rate for slotting.

1) The cutting conditions above are a guide only to milling within the standard depth of cut.
2) Ductile cast iron milling has the same cutting conditions as carbon steel and alloy steel. (180−280HB)
3) When drilling, please set the feed rate at 1/3 or below of the values above.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

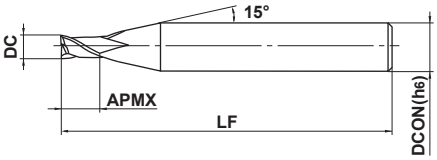
C2SS

End mill, Short cut length, 2 flute

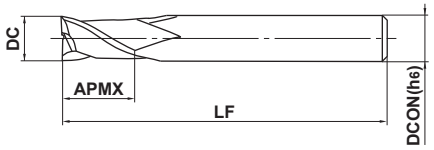


Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○			○	○	○	○





Type1



Type2

h6					
0.4≤DC≤6					
0 - 0.020					
4≤DCON≤6					
0 - 0.008					

2 flute end mill with short rigid geometry.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
C2SSD0040	0.4	0.8	40	4	2	●	1
C2SS**D0050**	0.5	0.8	40	4	2	●	1
C2SS**D0060**	0.6	1	40	4	2	●	1
C2SS**D0070**	0.7	1	40	4	2	●	1
C2SS**D0080**	0.8	1.3	40	4	2	●	1
C2SS**D0090**	0.9	1.3	40	4	2	●	1
C2SS**D0100**	1	1.5	40	4	2	●	1
C2SS**D0110**	1.1	1.5	40	4	2	●	1
C2SS**D0120**	1.2	2	40	4	2	●	1
C2SS**D0130**	1.3	2	40	4	2	●	1
C2SS**D0140**	1.4	2	40	4	2	●	1
C2SS**D0150**	1.5	2.5	40	4	2	●	1
C2SS**D0160**	1.6	2.5	40	4	2	●	1
C2SS**D0170**	1.7	2.5	40	4	2	●	1
C2SS**D0180**	1.8	3	40	4	2	●	1
C2SS**D0190**	1.9	3	40	4	2	●	1
C2SS**D0200**	2	3	40	4	2	●	1
C2SS**D0210**	2.1	3	40	4	2	●	1
C2SS**D0220**	2.2	3.5	40	4	2	●	1
C2SS**D0230**	2.3	3.5	40	4	2	●	1
C2SS**D0240**	2.4	3.5	40	4	2	●	1
C2SS**D0250**	2.5	4	40	4	2	●	1
C2SS**D0260**	2.6	4	40	4	2	●	1
C2SS**D0270**	2.7	4	40	4	2	●	1
C2SS**D0280**	2.8	4	40	4	2	●	1
C2SS**D0290**	2.9	4.5	40	4	2	●	1
C2SS**D0300**	3	4.5	45	6	2	●	1
C2SS**D0350**	3.5	5.5	45	6	2	●	1
C2SS**D0400**	4	6	45	6	2	●	1
C2SS**D0450**	4.5	7	45	6	2	●	1
C2SS**D0500**	5	7.5	50	6	2	●	1
C2SS**D0550**	5.5	8.5	50	6	2	●	1
C2SS**D0600**	6	9	50	6	2	●	2

● : Inventory maintained in Japan.

CARBIDE END MILLS

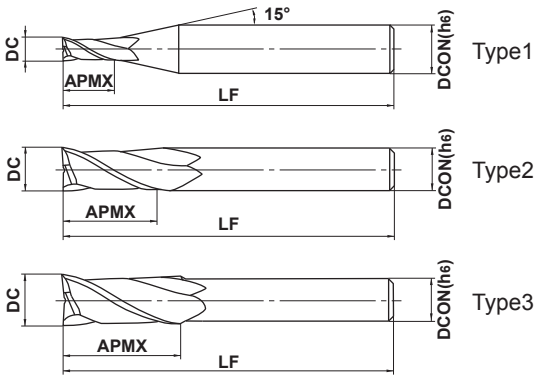
C2MS

End mill, Medium cut length, 2 flute



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○			○	○	○	○





DC≤12	DC>12			
0 - 0.020	0 - 0.030			
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

● 2 flute end mill for general use.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
C2MSD0100	1	2.5	40	4	2	●	1
C2MSD0110	1.1	2.5	40	4	2	●	1
C2MSD0120	1.2	3	40	4	2	●	1
C2MSD0130	1.3	3	40	4	2	●	1
C2MSD0140	1.4	3	40	4	2	●	1
C2MSD0150	1.5	4	40	4	2	●	1
C2MSD0160	1.6	4	40	4	2	●	1
C2MSD0170	1.7	4	40	4	2	●	1
C2MSD0180	1.8	5	40	4	2	●	1
C2MSD0190	1.9	5	40	4	2	●	1
C2MSD0200	2	6	40	4	2	●	1
C2MSD0210	2.1	6	40	4	2	●	1
C2MSD0220	2.2	6	40	4	2	●	1
C2MSD0230	2.3	6	40	4	2	●	1
C2MSD0240	2.4	8	40	4	2	●	1
C2MSD0250	2.5	8	40	4	2	●	1
C2MSD0260	2.6	8	40	4	2	●	1
C2MSD0270	2.7	8	40	4	2	●	1
C2MSD0280	2.8	8	40	4	2	●	1
C2MSD0290	2.9	8	40	4	2	●	1
C2MSD0300	3	8	45	6	2	●	1
C2MSD0310	3.1	8	45	6	2	●	1
C2MSD0320	3.2	8	45	6	2	●	1
C2MSD0330	3.3	8	45	6	2	●	1
C2MSD0340	3.4	10	45	6	2	●	1
C2MSD0350	3.5	10	45	6	2	●	1
C2MSD0360	3.6	10	45	6	2	●	1
C2MSD0370	3.7	10	45	6	2	●	1
C2MSD0380	3.8	11	45	6	2	●	1
C2MSD0390	3.9	11	45	6	2	●	1
C2MSD0400	4	11	45	6	2	●	1
C2MSD0410	4.1	11	45	6	2	●	1
C2MSD0420	4.2	11	45	6	2	●	1
C2MSD0430	4.3	11	45	6	2	●	1

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
C2MSD0440	4.4	11	45	6	2	●	1
C2MSD0450	4.5	11	45	6	2	●	1
C2MSD0460	4.6	11	45	6	2	●	1
C2MSD0470	4.7	11	45	6	2	●	1
C2MSD0480	4.8	13	50	6	2	●	1
C2MSD0490	4.9	13	50	6	2	●	1
C2MSD0500	5	13	50	6	2	●	1
C2MSD0510	5.1	13	50	6	2	●	1
C2MSD0520	5.2	13	50	6	2	●	1
C2MSD0530	5.3	13	50	6	2	●	1
C2MSD0540	5.4	13	50	6	2	●	1
C2MSD0550	5.5	13	50	6	2	●	1
C2MSD0560	5.6	13	50	6	2	●	1
C2MSD0570	5.7	13	50	6	2	●	1
C2MSD0580	5.8	13	50	6	2	●	1
C2MSD0590	5.9	13	50	6	2	●	1
C2MSD0600	6	13	50	6	2	●	2
C2MSD0610	6.1	16	60	8	2	●	1
C2MSD0620	6.2	16	60	8	2	●	1
C2MSD0630	6.3	16	60	8	2	●	1
C2MSD0640	6.4	16	60	8	2	●	1
C2MSD0650	6.5	16	60	8	2	●	1
C2MSD0660	6.6	16	60	8	2	●	1
C2MSD0670	6.7	16	60	8	2	●	1
C2MSD0680	6.8	16	60	8	2	●	1
C2MSD0690	6.9	16	60	8	2	●	1
C2MSD0700	7	16	60	8	2	●	1
C2MSD0710	7.1	16	60	8	2	●	1
C2MSD0720	7.2	16	60	8	2	●	1
C2MSD0730	7.3	16	60	8	2	●	1
C2MSD0740	7.4	16	60	8	2	●	1
C2MSD0750	7.5	16	60	8	2	●	1
C2MSD0760	7.6	19	60	8	2	●	1
C2MSD0770	7.7	19	60	8	2	●	1
C2MSD0780	7.8	19	60	8	2	●	1
C2MSD0790	7.9	19	60	8	2	●	1
C2MSD0800	8	19	60	8	2	●	2
C2MSD0810	8.1	19	70	10	2	●	1
C2MSD0820	8.2	19	70	10	2	●	1
C2MSD0830	8.3	19	70	10	2	●	1
C2MSD0840	8.4	19	70	10	2	●	1
C2MSD0850	8.5	19	70	10	2	●	1
C2MSD0860	8.6	19	70	10	2	●	1
C2MSD0870	8.7	19	70	10	2	●	1
C2MSD0880	8.8	19	70	10	2	●	1
C2MSD0890	8.9	19	70	10	2	●	1
C2MSD0900	9	19	70	10	2	●	1
C2MSD0910	9.1	19	70	10	2	●	1
C2MSD0920	9.2	19	70	10	2	●	1
C2MSD0930	9.3	19	70	10	2	●	1
C2MSD0940	9.4	19	70	10	2	●	1
C2MSD0950	9.5	19	70	10	2	●	1

CARBIDE END MILLS

C2MS

End mill, Medium cut length, 2 flute

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
C2MSD0960	9.6	22	70	10	2	●	1
C2MS**D0970**	9.7	22	70	10	2	●	1
C2MS**D0980**	9.8	22	70	10	2	●	1
C2MS**D0990**	9.9	22	70	10	2	●	1
C2MS**D1000**	10	22	70	10	2	●	2
C2MS**D1100**	11	22	75	12	2	●	1
C2MS**D1200**	12	26	75	12	2	●	2
C2MS**D1300**	13	26	75	12	2	●	3
C2MS**D1400**	14	26	75	12	2	●	3
C2MS**D1500**	15	30	80	16	2	●	1
C2MS**D1600**	16	32	90	16	2	●	2
C2MS**D1700**	17	32	90	16	2	●	3
C2MS**D1800**	18	32	90	16	2	●	3
C2MS**D1900**	19	32	100	20	2	●	1
C2MS**D2000**	20	38	100	20	2	●	2

● : Inventory maintained in Japan.

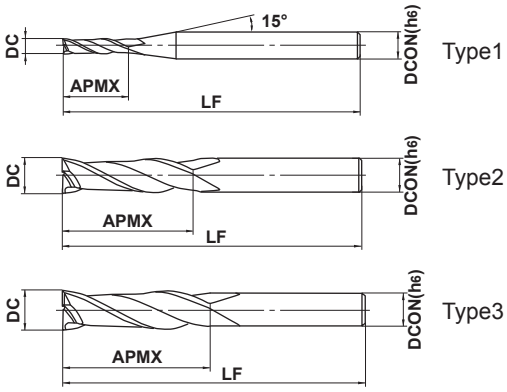
C2JS

End mill, Semi long cut length, 2 flute

UWC | 30° | DC<3 | DC≥3 | DC<3 | DC≥3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○			○	○	○	○





DC≤12	DC>12			
0 - 0.020	0 - 0.030			
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	20≤DCON≤25	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

● 2 flute uncoated end mill for general use.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
C2JSD0100	1	3.5	40	4	2	●	1
C2JS**D0150**	1.5	5	40	4	2	●	1
C2JS**D0200**	2	8	40	4	2	●	1
C2JS**D0250**	2.5	10	40	4	2	●	1
C2JS**D0300**	3	12	50	6	2	●	1
C2JS**D0350**	3.5	15	50	6	2	●	1
C2JS**D0400**	4	15	50	6	2	●	1
C2JS**D0450**	4.5	15	50	6	2	●	1
C2JS**D0500**	5	20	60	6	2	●	1
C2JS**D0550**	5.5	20	60	6	2	●	1
C2JS**D0600**	6	20	60	6	2	●	2
C2JS**D0650**	6.5	25	70	8	2	●	1
C2JS**D0700**	7	25	70	8	2	●	1
C2JS**D0750**	7.5	25	70	8	2	●	1
C2JS**D0800**	8	25	70	8	2	●	2
C2JS**D0850**	8.5	25	90	10	2	●	1
C2JS**D0900**	9	25	90	10	2	●	1
C2JS**D0950**	9.5	25	90	10	2	●	1
C2JS**D1000**	10	30	90	10	2	●	2
C2JS**D1050**	10.5	30	90	12	2	●	1
C2JS**D1100**	11	30	90	12	2	●	1
C2JS**D1150**	11.5	30	90	12	2	●	1
C2JS**D1200**	12	30	90	12	2	●	2
C2JS**D1300**	13	35	90	12	2	●	3
C2JS**D1400**	14	40	110	16	2	●	1
C2JS**D1500**	15	40	110	16	2	●	1
C2JS**D1600**	16	50	110	16	2	●	2
C2JS**D1700**	17	50	110	20	2	●	1
C2JS**D1800**	18	50	110	20	2	●	1
C2JS**D1900**	19	55	110	20	2	●	1
C2JS**D2000**	20	55	110	20	2	●	2
C2JS**D2200**	22	65	140	25	2	●	1
C2JS**D2400**	24	75	140	25	2	●	1
C2JS**D2500**	25	75	140	25	2	●	2

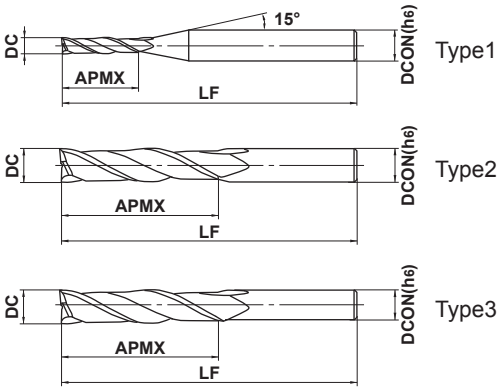
CARBIDE END MILLS

C2LS

End mill, Long cut length, 2 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○			○	○	○	○





DC≤12	DC>12			
0 - 0.020	0 - 0.030			
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

● 2 flute end mill with longer cut length than standard.

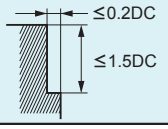
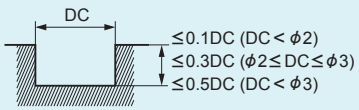
Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
C2LSD0100	1	4	40	4	2	●	1
C2LSD0150	1.5	6	40	4	2	●	1
C2LSD0200	2	9	40	4	2	●	1
C2LSD0250	2.5	12	40	4	2	●	1
C2LSD0300	3	20	60	6	2	●	1
C2LSD0350	3.5	22	60	6	2	●	1
C2LSD0400	4	25	60	6	2	●	1
C2LSD0450	4.5	25	60	6	2	●	1
C2LSD0500	5	30	70	6	2	●	1
C2LSD0550	5.5	30	70	6	2	●	1
C2LSD0600	6	30	70	6	2	●	2
C2LSD0650	6.5	30	90	8	2	●	1
C2LSD0700	7	40	90	8	2	●	1
C2LSD0750	7.5	40	90	8	2	●	1
C2LSD0800	8	40	90	8	2	●	2
C2LSD0850	8.5	40	100	10	2	●	1
C2LSD0900	9	40	100	10	2	●	1
C2LSD0950	9.5	40	100	10	2	●	1
C2LSD1000	10	50	100	10	2	●	2
C2LSD1050	10.5	50	110	12	2	●	1
C2LSD1100	11	50	110	12	2	●	1
C2LSD1150	11.5	50	110	12	2	●	1
C2LSD1200	12	50	110	12	2	●	2
C2LSD1250	12.5	50	120	12	2	●	3
C2LSD1300	13	50	120	12	2	●	3
C2LSD1400	14	70	130	16	2	●	1
C2LSD1500	15	70	130	16	2	●	1
C2LSD1600	16	70	130	16	2	●	2
C2LSD1700	17	70	140	20	2	●	1
C2LSD1800	18	70	140	20	2	●	1
C2LSD1900	19	70	140	20	2	●	1
C2LSD2000	20	70	140	20	2	●	2

● : Inventory maintained in Japan.

End mill, Short cut length, 2 flute **C2SS**
End mill, Medium cut length, 2 flute **C2MS**
End mill, Semi long cut length, 2 flute **C2JS** 1)
End mill, Long cut length, 2 flute **C2LS** 2)

RECOMMENDED CUTTING CONDITIONS

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1050, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—45HRC) AISI H13, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
0.5	17000	50 (50)	14000	45 (45)	11000	30 (30)	9000	30 (30)
1	10000	65 (65)	8500	55 (55)	6400	40 (40)	5200	35 (35)
2	5500	90 (90)	4800	80 (80)	3800	55 (55)	3100	50 (50)
3	4100	100 (100)	3500	85 (85)	2800	65 (65)	2300	60 (60)
4	3400	170 (135)	2900	140 (110)	2200	90 (70)	1900	80 (60)
5	2900	190 (150)	2400	150 (120)	1800	100 (80)	1500	90 (60)
6	2500	200 (160)	2100	170 (135)	1600	110 (90)	1300	95 (65)
8	1900	200 (160)	1600	170 (135)	1200	105 (85)	1000	100 (70)
10	1500	180 (145)	1250	150 (120)	950	95 (75)	800	90 (65)
12	1250	150 (120)	1050	130 (100)	800	80 (65)	660	75 (50)
16	940	110 (90)	800	95 (75)	600	60 (50)	500	55 (40)
20	750	90 (70)	640	80 (65)	480	50 (40)	400	45 (30)
Depth of cut	(C2SS, C2MS)   DC:Dia.							

( ) : Indicates standard feed rate for slotting.

1) Decrease the feed rate by 20—30% for C2JS.
2) Decrease the revolution by 20—30% and the feed rate by 40—50% for C2LS.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MIRACLE END ALIMASTER

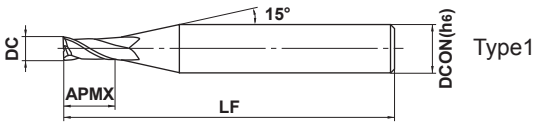
C2MA

End mill, Medium cut length, 2 flute, For aluminium alloy

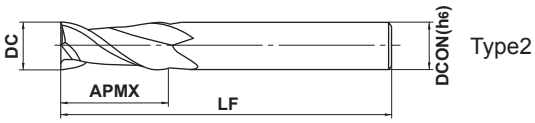
UWC | 30° DC<3 | 37.5° DC≥3 | DC<3 | DC≥3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎

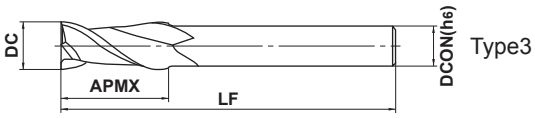




Type1



Type2



Type3

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

● 2 flute uncoated end mill designed especially for aluminium alloys.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
C2MAD0100	1	2.5	40	4	2	●	1
C2MA**D0150**	1.5	4	40	4	2	●	1
C2MA**D0200**	2	6	40	4	2	●	1
C2MA**D0250**	2.5	8	40	4	2	●	1
C2MA**D0300**	3	8	45	6	2	●	1
C2MA**D0400**	4	11	45	6	2	●	1
C2MA**D0500**	5	13	50	6	2	●	1
C2MA**D0600**	6	13	50	6	2	●	2
C2MA**D0800**	8	19	60	8	2	●	2
C2MA**D1000**	10	22	70	10	2	●	2
C2MA**D1200**	12	26	75	12	2	●	2
C2MA**D1400**	14	26	75	12	2	●	3
C2MA**D1500**	15	30	80	16	2	●	1
C2MA**D1600**	16	32	90	16	2	●	2
C2MA**D1800**	18	32	90	16	2	●	3
C2MA**D2000**	20	38	100	20	2	●	2

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Aluminium alloy		Aluminium cast	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	40000	600	40000	460
2	40000	1100	38000	850
3	32000	1400	25000	950
4	24000	1500	19000	1000
5	19000	1600	15000	1000
6	16000	1900	13000	1100
8	12000	1900	9500	1200
10	9500	1900	7600	1200
12	8000	1900	6400	1200
16	6000	1900	4800	1200
20	4800	1500	3800	1000
Depth of cut	≤0.2DC (DC < ϕ3) ≤0.5DC (DC ≥ ϕ3) ≤1DC DC:Dia.			

Slotting

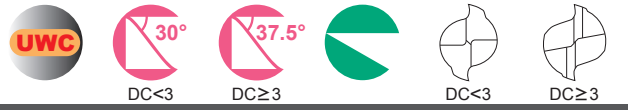
Work material	Aluminium alloy		Aluminium cast	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	40000	460	40000	350
2	38000	850	32000	550
3	25000	950	21000	600
4	19000	1000	16000	650
5	15000	1000	13000	700
6	13000	1100	11000	750
8	9500	1200	8000	800
10	7600	1200	6400	800
12	6400	1200	5300	800
16	4800	1000	4000	720
20	3800	970	3200	660
Depth of cut	DC ≤1DC (MAX. 12mm) DC:Dia.			

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Water-soluble cutting fluid is recommended.
3) Climb cutting is recommended for side milling.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MIRACLE END ALIMASTER

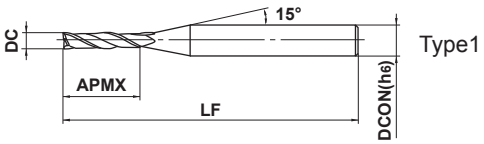
C2LA

End mill, Long cut length, 2 flute, For aluminium alloy

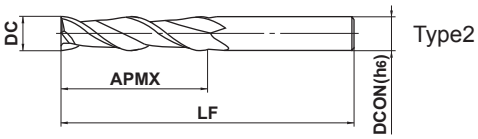


Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎





Type1



Type2

h6

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

● 2 flute uncoated end mill designed especially for aluminium alloys.

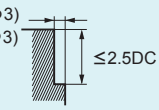
Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
C2LAD0100	1	4	40	4	2	●	1
C2LA**D0150**	1.5	6	40	4	2	●	1
C2LA**D0200**	2	9	40	4	2	●	1
C2LA**D0250**	2.5	12	40	4	2	●	1
C2LA**D0300**	3	20	60	6	2	●	1
C2LA**D0400**	4	25	60	6	2	●	1
C2LA**D0500**	5	30	70	6	2	●	1
C2LA**D0600**	6	30	70	6	2	●	2
C2LA**D0800**	8	40	90	8	2	●	2
C2LA**D1000**	10	50	100	10	2	●	2
C2LA**D1200**	12	50	110	12	2	●	2
C2LA**D1400**	14	70	130	16	2	●	1
C2LA**D1500**	15	70	130	16	2	●	1
C2LA**D1600**	16	70	130	16	2	●	2
C2LA**D1800**	18	70	140	20	2	●	1
C2LA**D2000**	20	70	140	20	2	●	2

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Aluminium alloy		Aluminium cast	
Cutting speed	150m/min		120m/min	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	40000	320	38000	240
2	24000	380	19000	240
3	16000	510	13000	330
4	12000	580	9500	380
5	9500	640	7600	400
6	8000	640	6400	400
8	6000	770	4800	480
10	4800	770	3800	480
12	4000	770	3200	480
16	3000	670	2400	430
20	2400	610	1900	390
Depth of cut	≤0.05DC (DC < φ3) ≤0.1DC (DC ≥ φ3)  ≤2.5DC DC:Dia.			

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Water-soluble cutting fluid is recommended.
3) Climb cutting is recommended for side milling.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

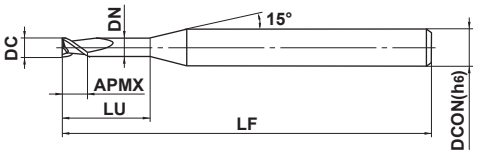
MIRACLE END ALIMASTER

C2SA

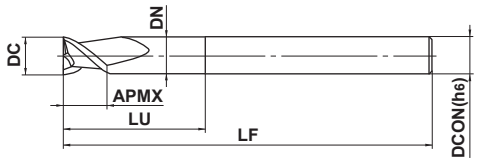
End mill, Short cut length, 2 flute, For aluminium alloy

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
						○	◎





Type1



Type2

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

● High efficiency machining for aluminium alloys.

Unit : mm

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
C2SAD0300N120	3	6	12	2.7	60	6	2	●	1
C2SA**D0400N120**	4	6	12	3.7	60	6	2	●	1
C2SA**D0500N150**	5	8	15	4.7	60	6	2	●	1
C2SA**D0600N160**	6	8	16	5.7	75	6	2	●	2
C2SA**D0800N200**	8	10	20	7.4	75	8	2	●	2
C2SA**D1000N300**	10	12	30	9.4	75	10	2	●	2
C2SA**D1000N350**	10	12	35	9.4	100	10	2	●	2
C2SA**D1200N300**	12	15	30	11.4	75	12	2	●	2
C2SA**D1200N350**	12	15	35	11.4	100	12	2	●	2
C2SA**D1200N400**	12	15	40	11.4	125	12	2	●	2
C2SA**D1600N300**	16	15	30	15.4	75	16	2	●	2
C2SA**D1600N400**	16	15	40	15.4	100	16	2	●	2
C2SA**D1600N450**	16	15	45	15.4	125	16	2	●	2
C2SA**D2000N400**	20	20	40	18	100	20	2	●	2
C2SA**D2000N500**	20	20	50	18	125	20	2	●	2

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Aluminium alloy	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)
3	40000	1800
4	36000	2400
5	30000	3000
6	27000	3200
8	20000	3400
10	16000	3600
12	13000	3600
16	10000	3600
20	8000	3300
Depth of cut	≤0.5DC, ≤0.8DC, DC:Dia.	

Slotting

Work material	Aluminium alloy	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)
3	40000	1600
4	36000	2100
5	30000	2700
6	27000	2800
8	20000	3000
10	16000	3200
12	13000	3200
16	10000	3200
20	8000	3000
Depth of cut	DC, ≤0.8DC, DC:Dia.	

1) Water-soluble cutting fluid is recommended.
2) Climb cutting is recommended for side milling.
3) If tool clamping is poor, the tool can be pulled out of the holder. Ensure that the tool is sufficiently clamped.
4) This table shows the cutting condition with less than 4D overhang length. If more than 4D, spindle speed, feed rate and depth of cut should be reduced.
5) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

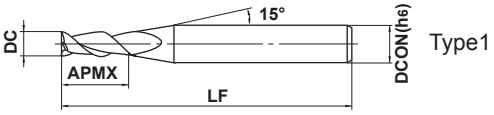
MIRACLE END ALIMASTER

C2MHA

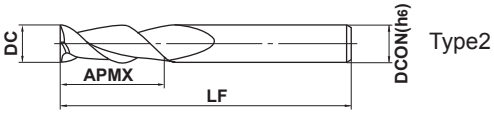
End mill, Medium cut length, 2 flute, For aluminium alloy

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎

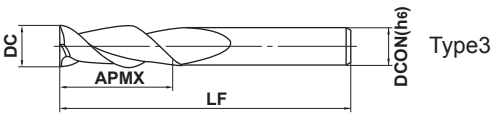




Type1



Type2



Type3

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=6	8≤DCON≤10	12≤DCON≤16	20≤DCON≤25	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

● High efficiency machining for aluminium alloys.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
C2MHAD0300	3	9	60	6	2	●	1
C2MHAD0400	4	12	60	6	2	●	1
C2MHAD0500	5	15	60	6	2	●	1
C2MHAD0600	6	18	60	6	2	●	2
C2MHAD0800	8	20	75	8	2	●	2
C2MHAD1000	10	25	75	10	2	●	2
C2MHAD1200	12	25	75	12	2	●	2
C2MHAD1400	14	32	75	12	2	●	3
C2MHAD1600	16	32	100	16	2	●	2
C2MHAD2000	20	38	125	20	2	●	2
C2MHAD2500	25	38	125	25	2	●	2

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Aluminium alloy	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)
3	40000	2400
4	36000	2600
5	30000	4000
6	27000	4000
8	20000	4000
10	16000	4500
12	13000	4500
16	10000	4500
20	8000	4300
25	6000	3600
Depth of cut	≤0.2DC, ≤1.5DC, DC:Dia.	

Slotting

Work material	Aluminium alloy	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)
3	40000	1500
4	36000	1800
5	30000	2800
6	27000	2800
8	20000	2800
10	16000	3200
12	13000	3200
16	10000	3200
20	8000	3000
25	6000	2500
Depth of cut	DC, ≤1DC (MAX. 20mm), DC:Dia.	

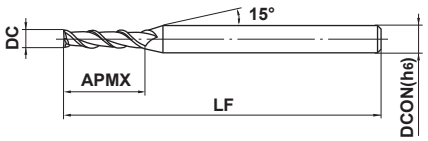
1) Water-soluble cutting fluid is recommended.
2) Climb cutting is recommended for side milling.
3) If tool clamping is poor, the tool can be pulled out of the holder. Ensure that the tool is sufficiently clamped.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

SEE2L

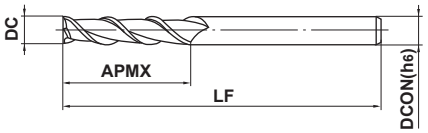
End mill, Long cut length, 2 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○	○	○





Type1



Type2

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

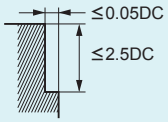
2 flute uncoated high helix end mill.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
SEE2030L	3	15	55	6	2	●	1
SEE2040L	4	20	60	6	2	●	1
SEE2050L	5	25	65	6	2	●	1
SEE2060L	6	25	65	6	2	●	2
SEE2070L	7	35	80	8	2	●	1
SEE2080L	8	35	80	8	2	●	2
SEE2090L	9	45	90	10	2	●	1
SEE2100L	10	45	95	10	2	●	2
SEE2110L	11	55	105	12	2	●	1
SEE2120L	12	55	105	12	2	●	2
SEE2150L	15	70	125	16	2	●	1
SEE2160L	16	70	125	16	2	●	2
SEE2200L	20	75	140	20	2	●	2

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Alloy steel (180—280HB) AISI 1045, AISI P20		Carbon steel, Alloy steel (280—380HB) AISI 1045, AISI P20		Pre-hardened steel (35—45HRC)		Stainless steel (270HB≥) AISI 420		Cast iron (Tensile Strength 350MPa≥) AISI No 35 B	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	3400	100	3000	40	2100	20	2600	40	5500	160
4	2400	110	2200	60	1600	30	1900	50	4200	180
5	2000	120	1800	60	1300	40	1500	50	3300	200
6	1600	120	1500	60	1000	40	1300	50	2800	210
8	1200	110	1100	60	800	40	960	50	2100	210
10	1000	100	880	60	640	40	760	50	1600	210
12	800	100	760	70	520	40	640	60	1400	210
16	600	90	560	70	400	40	480	70	1000	220
20	480	80	440	80	320	40	400	70	840	230
Depth of cut	 DC:Dia.									

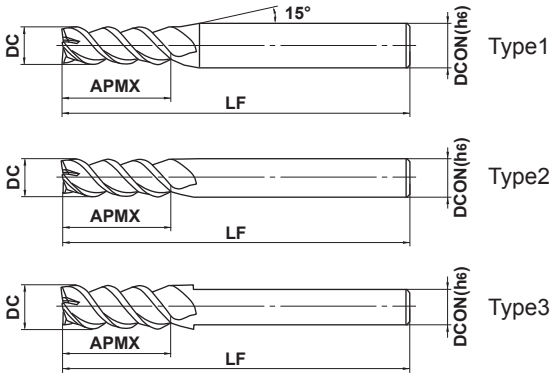
1) The cutting conditions above are a guide only to milling within the standard depth of cut.
2) Ductile cast iron milling has the same cutting conditions as carbon steel and alloy steel. (180—280HB)
3) When drilling, please set the feed rate at 1/3 or below of the values above.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MSMHZD

Slotting, Medium cut length, 3 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		◎	○		





DC≤12	DC>12			
0 - 0.020	0 - 0.030			
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

● A single end mill for both plunging and slotting.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MSMHZDD0100	1	2	45	4	3	●	1
MSMHZDD0150	1.5	3	45	4	3	●	1
MSMHZDD0200	2	4	50	6	3	●	1
MSMHZDD0250	2.5	5	50	6	3	●	1
MSMHZDD0300	3	6	50	6	3	●	1
MSMHZDD0350	3.5	8	50	6	3	●	1
MSMHZDD0400	4	8	50	6	3	●	1
MSMHZDD0450	4.5	10	50	6	3	●	1
MSMHZDD0500	5	10	50	6	3	●	1
MSMHZDD0550	5.5	13	50	6	3	●	1
MSMHZDD0600	6	13	60	6	3	●	2
MSMHZDD0650	6.5	16	60	8	3	●	1
MSMHZDD0700	7	16	60	8	3	●	1
MSMHZDD0750	7.5	16	60	8	3	●	1
MSMHZDD0800	8	19	70	8	3	●	2
MSMHZDD0850	8.5	19	70	10	3	●	1
MSMHZDD0900	9	19	70	10	3	●	1
MSMHZDD0950	9.5	19	70	10	3	●	1
MSMHZDD1000	10	22	80	10	3	●	2
MSMHZDD1100	11	22	80	12	3	●	1
MSMHZDD1200	12	26	90	12	3	●	2
MSMHZDD1300	13	26	90	12	3	●	3
MSMHZDD1400	14	26	90	12	3	●	3
MSMHZDD1500	15	26	110	16	3	●	1
MSMHZDD1600	16	30	110	16	3	●	2
MSMHZDD2000	20	32	140	20	3	●	2

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	19000	600	13000	310	10000	200	9500	65
1.5	14000	600	9000	310	7500	210	6400	75
2	11000	600	7200	310	6000	210	4800	75
3	8500	770	5300	380	4400	220	3200	100
4	7200	850	4400	480	3700	250	2400	130
6	5300	940	3200	490	2700	270	1600	130
8	4000	1010	2400	560	2000	280	1200	120
10	3200	1000	1900	480	1600	300	950	110
12	2700	950	1600	440	1300	300	800	90
16	2000	720	1200	350	1000	260	600	70
20	1600	600	1000	290	800	240	480	60
Depth of cut	≤0.2DC (DC>ϕ3) ≤0.1DC (DC≤ϕ3) ≤1.5DC		≤0.2DC (DC>ϕ3) ≤0.1DC (DC≤ϕ3) ≤1.5DC				0.05DC 1.5DC	

DC:Dia.

Plunging

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	13000	80	10000	50	6000	10
1.5	12000	120	8000	80	6000	20
2	11000	200	7200	140	6000	30
3	8500	250	5300	180	4200	50
4	7200	300	4400	210	3300	60
6	5300	300	3200	210	2200	70
8	4000	320	2400	220	1600	80
10	3200	340	1900	240	1300	70
12	2700	320	1600	220	1100	70
16	2000	250	1200	180	800	55
20	1600	200	1000	140	640	55
Depth of cut	≤1DC (DC≥ϕ2) ≤0.5DC (DC<ϕ2)		≤0.5DC (DC≥ϕ2) ≤0.2DC (DC<ϕ2)			

DC:Dia.

Slotting

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	13000	130	10000	80	6000	30	5700	25
1.5	12000	250	8000	150	6000	60	3800	30
2	11000	500	7200	260	6000	130	2800	35
3	8500	640	5300	320	4200	130	1900	50
4	7200	650	4400	370	3300	140	1400	70
6	5300	720	3200	380	2200	140	950	70
8	4000	780	2400	430	1600	140	720	60
10	3200	770	1900	370	1300	150	570	50
12	2700	730	1600	340	1100	150	480	40
16	2000	600	1200	290	800	130	360	30
20	1600	500	1000	240	640	120	290	25
Depth of cut	DC ≤1DC (DC≥ϕ2) ≤0.5DC (DC<ϕ2)		DC ≤0.5DC (DC≥ϕ2) ≤0.2DC (DC<ϕ2)				DC 0.2DC	

DC:Dia.

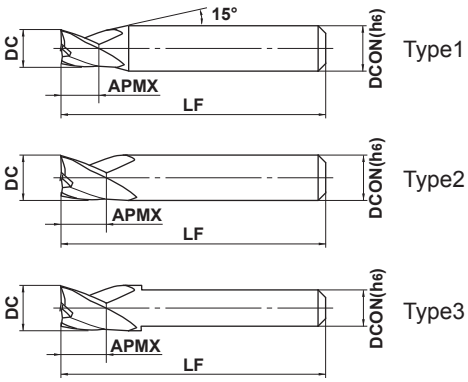
1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MS3ES

End mill, 3 flute, For small automatic lathes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		





h6	3≤DC≤12				
	0 - 0.020				
	4≤DCON≤6	7≤DCON≤10			
	0 - 0.008	0 - 0.009			

● 3 flute end mill.

Overall length 35mm

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS3ESD0300L35S04	3	3	35	4	3	●	1
MS3ES**D0350L35S04**	3.5	3.5	35	4	3	●	1
MS3ES**D0400L35S04**	4	4	35	4	3	●	2
MS3ES**D0500L35S05**	5	5	35	5	3	●	2
MS3ES**D0500L35S06**	5	5	35	6	3	●	1
MS3ES**D0600L35S05**	6	6	35	5	3	●	3
MS3ES**D0600L35S06**	6	6	35	6	3	●	2
MS3ES**D0700L35S07**	7	6	35	7	3	●	2
MS3ES**D0800L35S07**	8	6	35	7	3	●	3
MS3ES**D0800L35S08**	8	6	35	8	3	●	2
MS3ES**D1000L35S07**	10	6	35	7	3	●	3
MS3ES**D1000L35S10**	10	6	35	10	3	●	2
MS3ES**D1200L35S10**	12	6	35	10	3	●	3

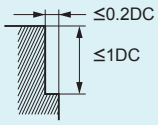
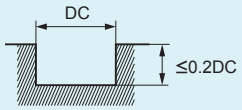
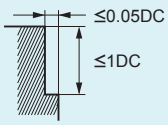
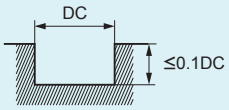
Overall length 45mm

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS3ESD0300L45S04	3	3	45	4	3	●	1
MS3ES**D0350L45S04**	3.5	3.5	45	4	3	●	1
MS3ES**D0400L45S04**	4	4	45	4	3	●	2
MS3ES**D0500L45S06**	5	5	45	6	3	●	1
MS3ES**D0600L45S06**	6	6	45	6	3	●	2
MS3ES**D0700L45S07**	7	7	45	7	3	●	2
MS3ES**D0800L45S07**	8	8	45	7	3	●	3
MS3ES**D0800L45S08**	8	8	45	8	3	●	2
MS3ES**D1000L45S07**	10	10	45	7	3	●	3
MS3ES**D1000L45S10**	10	10	45	10	3	●	2
MS3ES**D1200L45S10**	12	12	45	10	3	●	3

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	10000	600	7000	400	6000	300	5000	120
4	7500	600	5200	400	4500	300	4000	120
5	6000	600	4200	400	3600	300	3200	120
6	5000	600	3500	400	3000	300	2700	120
7	4500	560	3000	360	2700	280	2300	110
8	4000	520	2800	350	2400	260	2000	110
10	3200	450	2200	300	1900	230	1600	100
12	2700	410	1900	270	1600	210	1300	100
Depth of cut	 				 			

DC:Dia.

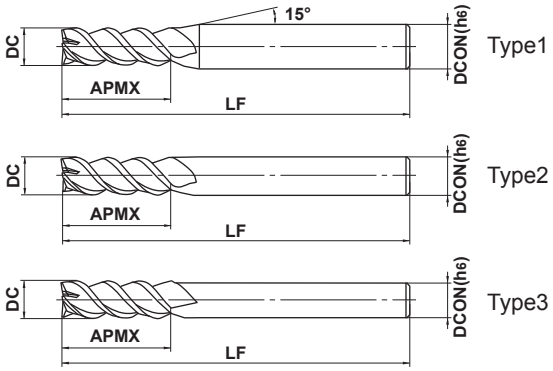
1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) When drilling, please set the feed rate at 1/3 or below the values above.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VQMHZV

End mill, Medium cutting length, 3 flute for drilling and slotting

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	





DC≤12	DC>12			
0 - 0.02	0 - 0.03			
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

- A single end mill for both plunging and slotting.
- Irregular helical geometry controls the vibration.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VQMHZVD0100	1	2	45	4	3	●	1
VQMHZV**D0110**	1.1	2.2	45	4	3	●	1
VQMHZV**D0120**	1.2	2.4	45	4	3	●	1
VQMHZV**D0130**	1.3	2.6	45	4	3	●	1
VQMHZV**D0140**	1.4	2.8	45	4	3	●	1
VQMHZV**D0150**	1.5	3	45	4	3	●	1
VQMHZV**D0160**	1.6	3.2	45	4	3	●	1
VQMHZV**D0170**	1.7	3.4	45	4	3	●	1
VQMHZV**D0180**	1.8	3.6	45	4	3	●	1
VQMHZV**D0190**	1.9	3.8	45	4	3	●	1
VQMHZV**D0200**	2	4	50	6	3	●	1
VQMHZV**D0210**	2.1	4.2	50	6	3	●	1
VQMHZV**D0220**	2.2	4.4	50	6	3	●	1
VQMHZV**D0230**	2.3	4.6	50	6	3	●	1
VQMHZV**D0240**	2.4	4.8	50	6	3	●	1
VQMHZV**D0250**	2.5	5	50	6	3	●	1
VQMHZV**D0260**	2.6	5.2	50	6	3	●	1
VQMHZV**D0270**	2.7	5.4	50	6	3	●	1
VQMHZV**D0280**	2.8	5.6	50	6	3	●	1
VQMHZV**D0290**	2.9	5.8	50	6	3	●	1
VQMHZV**D0300**	3	6	50	6	3	●	1
VQMHZV**D0310**	3.1	7	50	6	3	●	1
VQMHZV**D0320**	3.2	7	50	6	3	●	1
VQMHZV**D0330**	3.3	7	50	6	3	●	1
VQMHZV**D0340**	3.4	7	50	6	3	●	1
VQMHZV**D0350**	3.5	8	50	6	3	●	1
VQMHZV**D0360**	3.6	8	50	6	3	●	1
VQMHZV**D0370**	3.7	8	50	6	3	●	1
VQMHZV**D0380**	3.8	8	50	6	3	●	1
VQMHZV**D0390**	3.9	8	50	6	3	●	1
VQMHZV**D0400**	4	8	50	6	3	●	1
VQMHZV**D0450**	4.5	10	50	6	3	●	1

Note) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VQMHZVD0500	5	10	50	6	3	●	1
VQMHZVD0550	5.5	13	50	6	3	●	1
VQMHZVD0600	6	13	60	6	3	●	2
VQMHZVD0650	6.5	16	60	8	3	●	1
VQMHZVD0700	7	16	60	8	3	●	1
VQMHZVD0750	7.5	16	60	8	3	●	1
VQMHZVD0800	8	19	70	8	3	●	2
VQMHZVD0850	8.5	19	70	10	3	●	1
VQMHZVD0900	9	19	70	10	3	●	1
VQMHZVD0950	9.5	19	70	10	3	●	1
VQMHZVD1000	10	22	80	10	3	●	2
VQMHZVD1100	11	22	80	12	3	●	1
VQMHZVD1200	12	26	90	12	3	●	2
VQMHZVD1300	13	26	90	12	3	●	3
VQMHZVD1400	14	26	90	12	3	●	3
VQMHZVD1500	15	26	110	16	3	●	1
VQMHZVD1600	16	30	110	16	3	●	2
VQMHZVD2000	20	32	140	20	3	●	2

Note) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used.
An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.

VQMHZV

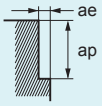
End mill, Medium cutting length, 3 flute for drilling and slotting

RECOMMENDED CUTTING CONDITIONS

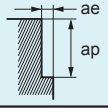
Side milling

The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.
The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V					Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH, 17-4PH				
Dia. DC (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
1	100	32000	720	1.5	0.2	80	25000	530	1.5	0.2	60	19000	430	1.5	0.2	50	16000	340	1.5	0.1
1.5	130	28000	1300	2.25	0.3	100	21000	630	2.25	0.3	85	18000	540	2.25	0.3	65	14000	420	2.25	0.15
2	150	24000	1800	3	0.6	120	19000	860	3	0.6	100	16000	620	3	0.6	75	12000	540	3	0.4
3	150	16000	1900	4.5	0.9	120	13000	940	4.5	0.9	100	11000	660	4.5	0.9	75	8000	580	4.5	0.6
4	150	12000	2000	6	1.2	120	9500	940	6	1.2	100	8000	670	6	1.2	75	6000	590	6	0.8
5	150	9500	1900	7.5	1.5	120	7600	960	7.5	1.5	100	6400	670	7.5	1.5	75	4800	600	7.5	1
6	150	8000	1900	9	1.8	120	6400	960	9	1.8	100	5300	830	9	1.8	75	4000	600	9	1.2
8	150	6000	1900	12	2.4	120	4800	1000	12	2.4	100	4000	900	12	2.4	75	3000	630	12	1.6
10	150	4800	1700	15	3	120	3800	910	15	3	100	3200	960	15	3	75	2400	580	15	2
12	150	4000	1400	18	3.6	120	3200	860	18	3.6	100	2700	890	18	3.6	75	2000	540	18	2.4
16	150	3000	1200	24	4.8	120	2400	720	24	4.8	100	2000	720	24	4.8	75	1500	450	24	3.2
20	150	2400	970	30	6	120	1900	570	30	6	100	1600	580	30	6	75	1200	360	30	4
Depth of cut																				

General-purpose conditions

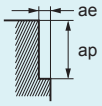
Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V					Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH, 17-4PH				
Dia. DC (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
1	100	32000	480	1.5	0.2	80	25000	350	1.5	0.2	60	19000	280	1.5	0.2	50	16000	220	1.5	0.1
1.5	120	25000	740	2.25	0.3	100	21000	420	2.25	0.3	80	17000	340	2.25	0.3	65	14000	280	2.25	0.15
2	120	19000	940	3	0.6	100	16000	480	3	0.6	80	13000	340	3	0.6	70	11000	330	3	0.4
3	120	13000	1000	4.5	0.9	100	11000	520	4.5	0.9	80	8500	340	4.5	0.9	70	7400	350	4.5	0.6
4	120	9500	1000	6	1.2	100	8000	520	6	1.2	80	6400	350	6	1.2	70	5600	370	6	0.8
5	120	7600	980	7.5	1.5	100	6400	530	7.5	1.5	80	5100	350	7.5	1.5	70	4500	370	7.5	1
6	120	6400	1000	9	1.8	100	5300	540	9	1.8	80	4200	400	9	1.8	70	3700	370	9	1.2
8	120	4800	1000	12	2.4	100	4000	550	12	2.4	80	3200	430	12	2.4	70	2800	390	12	1.6
10	120	3800	900	15	3	100	3200	510	15	3	80	2500	450	15	3	70	2200	350	15	2
12	120	3200	760	18	3.6	100	2700	480	18	3.6	80	2100	420	18	3.6	70	1900	340	18	2.4
16	120	2400	640	24	4.8	100	2000	400	24	4.8	80	1600	340	24	4.8	70	1400	280	24	3.2
20	120	1900	510	30	6	100	1600	320	30	6	80	1300	270	30	6	70	1100	220	30	4
Depth of cut																				

1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
3) Chattering can still occur if the machine rigidity and clamping method are insufficient. In these cases the feed and speed should be reduced proportionately.
4) When the depth of cut is smaller than shown the feed rate can be increased.

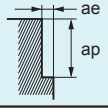
Side milling

The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.
The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency cutting conditions

Work material	Copper, Copper alloy					Heat resistant alloys Inconel718				
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
1	120	38000	860	1.5	0.2	40	13000	160	1.5	0.05
1.5	150	32000	1400	2.25	0.3	40	8500	170	2.25	0.08
2	180	29000	2200	3	0.6	40	6400	170	3	0.2
3	180	19000	2300	4.5	0.9	40	4200	180	4.5	0.3
4	180	14000	2300	6	1.2	40	3200	180	6	0.4
5	180	11000	2300	7.5	1.5	40	2500	180	7.5	0.5
6	180	9500	2300	9	1.8	40	2100	190	9	0.6
8	180	7200	2300	12	2.4	40	1600	190	12	0.8
10	180	5700	2100	15	3	40	1300	220	15	1
12	180	4800	1700	18	3.6	40	1100	210	18	1.2
16	180	3600	1500	24	4.8	40	800	150	24	1.6
20	180	2900	1200	30	6	40	640	120	30	2
Depth of cut										

General-purpose conditions

Work material	Copper, Copper alloy					Heat resistant alloys Inconel718				
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
1	120	38000	560	1.5	0.2	30	9500	75	1.5	0.05
1.5	140	30000	890	2.25	0.3	30	6400	82	2.25	0.07
2	140	22000	1100	3	0.6	30	4800	86	3	0.2
3	140	15000	1200	4.5	0.9	30	3200	89	4.5	0.3
4	140	11000	1200	6	1.2	30	2400	90	6	0.4
5	140	8900	1200	7.5	1.5	30	1900	90	7.5	0.5
6	140	7400	1200	9	1.8	30	1600	95	9	0.6
8	140	5600	1200	12	2.4	30	1200	95	12	0.8
10	140	4500	1100	15	3	30	950	110	15	1
12	140	3700	880	18	3.6	30	800	100	18	1.2
16	140	2800	750	24	4.8	30	600	76	24	1.6
20	140	2200	590	30	6	30	480	61	30	2
Depth of cut										

1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used.
   An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
3) Chattering can still occur if the machine rigidity and clamping method are insufficient.
   In these cases the feed and speed should be reduced proportionately.
4) When the depth of cut is smaller than shown the revolution and feed rate can be increased.

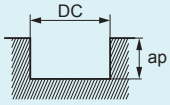
VQMHZV

End mill, Medium cutting length, 3 flute for drilling and slotting

Slotting

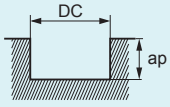
The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.
The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT				Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V				Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH, 17-4PH				Copper, Copper alloy				Heat resistant alloys Inconel718			
Dia. DC (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
1	100	32000	380	0.5	80	25000	150	0.5	60	19000	100	0.5	45	14000	80	0.3	120	38000	460	0.5	30	9500	60	0.2
1.5	130	28000	590	0.75	100	21000	250	0.75	85	18000	220	0.75	60	12000	140	0.4	150	32000	670	0.75	30	6400	80	0.3
2	150	24000	940	2	120	19000	460	2	100	16000	480	2	60	9500	230	1	180	29000	1100	2	30	4800	100	0.6
3	150	16000	1100	3	120	13000	550	3	100	11000	500	3	60	6400	270	1.5	180	19000	1300	3	30	3200	120	0.9
4	150	12000	1400	4	120	9500	680	4	100	8000	530	4	60	4800	350	2	180	14000	1700	4	30	2400	130	1.2
5	150	9500	1400	5	120	7600	680	5	100	6400	540	5	60	3800	350	2.5	180	11000	1700	5	30	1900	130	1.5
6	150	8000	1400	6	120	6400	770	6	100	5300	560	6	60	3200	380	3	180	9500	1700	6	30	1600	130	1.8
8	150	6000	1300	8	120	4800	720	8	100	4000	600	8	60	2400	360	4	180	7200	1500	8	30	1200	140	2.4
10	150	4800	1200	10	120	3800	630	10	100	3200	670	10	60	1900	310	5	180	5700	1400	10	30	950	160	3
12	150	4000	960	12	120	3200	580	12	100	2700	650	12	60	1600	290	6	180	4800	1200	12	30	800	150	3.6
16	150	3000	810	12	120	2400	500	12	100	2000	480	12	60	1200	250	8	180	3600	970	12	30	600	120	4.8
20	150	2400	650	12	120	1900	400	12	100	1600	380	12	60	950	200	10	180	2900	780	12	30	480	90	6
Depth of cut																								

DC:Dia.

General-purpose conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT				Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V				Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH, 17-4PH				Copper, Copper alloy				Heat resistant alloys Inconel718			
Dia. DC (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
1	100	32000	250	0.5	80	25000	99	0.5	60	19000	80	0.5	45	14000	60	0.3	120	38000	300	0.5	25	8000	30	0.2
1.5	100	21000	290	0.75	80	17000	130	0.75	60	13000	100	0.75	50	11000	87	0.4	120	25000	350	0.75	25	5300	40	0.3
2	100	16000	410	2	80	13000	210	2	60	9500	190	2	50	8000	130	1	120	19000	490	2	25	4000	55	0.6
3	100	11000	500	3	80	8500	240	3	60	6400	190	3	50	5300	150	1.5	120	13000	590	3	25	2700	64	0.9
4	100	8000	630	4	80	6400	300	4	60	4800	210	4	50	4000	190	2	120	9500	750	4	25	2000	70	1.2
5	100	6400	630	5	80	5100	300	5	60	3800	210	5	50	3200	190	2.5	120	7600	750	5	25	1600	71	1.5
6	100	5300	630	6	80	4200	330	6	60	3200	220	6	50	2700	210	3	120	6400	760	6	25	1300	72	1.8
8	100	4000	550	8	80	3200	320	8	60	2400	240	8	50	2000	200	4	120	4800	670	8	25	990	78	2.4
10	100	3200	510	10	80	2500	270	10	60	1900	260	10	50	1600	170	5	120	3800	600	10	25	800	89	3
12	100	2700	430	12	80	2100	250	12	60	1600	250	12	50	1300	150	6	120	3200	510	12	25	660	84	3.6
16	100	2000	360	12	80	1600	220	12	60	1200	190	12	50	990	140	8	120	2400	430	12	25	500	63	4.8
20	100	1600	290	12	80	1300	180	12	60	950	150	12	50	800	110	10	120	1900	340	12	25	400	50	6
Depth of cut																								

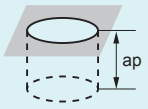
DC:Dia.

1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used.
   An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
3) Chattering can still occur if the machine rigidity and clamping method are insufficient.
   In these cases the feed and speed should be reduced proportionately.
4) When the depth of cut is smaller than shown the feed rate can be increased.

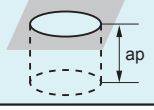
Plunging

The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.
The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V					Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH, 17-4PH					Copper, Copper alloy				
Dia. **DC** (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)
1	65	20000	160	0.5	0.1	50	16000	100	0.5	0.1	50	16000	50	0.5	0.05	30	9500	30	0.5	0.05	75	24000	190	0.5	0.1
1.5	85	18000	270	0.75	0.3	60	13000	120	0.75	0.3	60	13000	80	0.75	0.1	35	7400	40	0.75	0.1	100	21000	320	0.75	0.3
2	100	16000	480	2	0.5	70	11000	200	2	0.4	60	9500	90	1	0.15	40	6400	60	1	0.1	120	19000	570	2	0.5
3	100	11000	660	3	1	70	7400	270	3	0.6	60	6400	100	1.5	0.2	40	4200	60	1.5	0.2	120	13000	780	3	1.0
4	100	8000	800	4	2	70	5600	340	4	0.8	60	4800	100	2	0.4	40	3200	60	2	0.4	120	9500	950	4	2
5	100	6400	960	5	2.5	70	4500	410	5	1	60	3800	100	2.5	0.5	40	2500	60	2.5	0.5	120	7600	1100	5	2.5
6	100	5300	950	6	3	70	3700	440	6	1.2	60	3200	100	3	0.6	40	2100	60	3	0.6	120	6400	1200	6	3
8	100	4000	720	8	4	70	2800	340	8	1.6	60	2400	70	4	0.6	40	1600	50	4	0.6	120	4800	860	8	4
10	100	3200	580	10	5	70	2200	260	10	2.5	60	1900	60	5	0.6	40	1300	40	5	0.6	120	3800	680	10	5
12	100	2700	490	12	5	70	1900	230	12	3	60	1600	50	6	0.6	40	1100	30	6	0.6	120	3200	580	12	5
16	100	2000	360	16	5	70	1400	170	16	4	60	1200	40	8	0.6	40	800	20	8	0.6	120	2400	430	16	5
20	100	1600	290	20	5	70	1100	130	20	5	60	950	30	10	0.6	40	640	20	10	0.6	120	1900	340	20	5
Depth of cut																									

General-purpose conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V					Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH, 17-4PH					Copper, Copper alloy				
Dia. **DC** (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)
1	65	20000	160	0.5	0.05	50	16000	100	0.5	0.05	50	16000	50	0.5	0.05	30	9500	30	0.5	0.05	75	24000	190	0.5	0.05
1.5	85	18000	270	0.75	0.15	60	13000	120	0.75	0.1	60	13000	80	0.75	0.05	35	7400	40	0.75	0.05	100	21000	320	0.75	0.15
2	100	16000	480	2	0.25	70	11000	200	2	0.2	60	9500	90	1	0.05	40	6400	60	1	0.05	120	19000	570	2	0.25
3	100	11000	660	3	0.3	70	7400	270	3	0.3	60	6400	100	1.5	0.1	40	4200	60	1.5	0.1	120	13000	780	3	0.3
4	100	8000	800	4	0.4	70	5600	340	4	0.4	60	4800	100	2	0.2	40	3200	60	2	0.2	120	9500	950	4	0.4
5	100	6400	960	5	0.5	70	4500	410	5	0.5	60	3800	100	2.5	0.25	40	2500	60	2.5	0.25	120	7600	1100	5	0.5
6	100	5300	950	6	0.6	70	3700	440	6	0.6	60	3200	100	3	0.3	40	2100	60	3	0.3	120	6400	1200	6	0.6
8	100	4000	720	8	0.7	70	2800	340	8	0.7	60	2400	70	4	0.3	40	1600	50	4	0.3	120	4800	860	8	0.7
10	100	3200	580	10	0.75	70	2200	260	10	0.75	60	1900	60	5	0.3	40	1300	40	5	0.3	120	3800	680	10	0.75
12	100	2700	490	12	0.75	70	1900	230	12	0.75	60	1600	50	6	0.3	40	1100	30	6	0.3	120	3200	580	12	0.75
16	100	2000	360	16	0.75	70	1400	170	16	0.75	60	1200	40	8	0.3	40	800	20	8	0.3	120	2400	430	16	0.75
20	100	1600	290	20	0.75	70	1100	130	20	0.75	60	950	30	10	0.3	40	640	20	10	0.3	120	1900	340	20	0.75
Depth of cut																									

1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used.
   An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
3) Chattering can still occur if the machine rigidity and clamping method are insufficient.
   In these cases the feed and speed should be reduced proportionately.

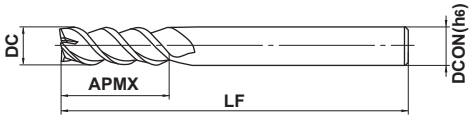
SMART MIRACLE END MILLS

VQMHZVOH

End mill, Medium cutting length, 3 flute for drilling and slotting with internal through coolant holes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	





Type1

DC≤12	DC=16			
0 - 0.02	0 - 0.03			
DCON=6	8≤DCON≤10	12≤DCON≤16		
0 - 0.008	0 - 0.009	0 - 0.011		

- A single end mill for both plunging and slotting.
- Excellent peformance in slotting and pocketing with oil supply from the end cutting edge.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VQMHZVOHD0600	6	13	60	6	3	●	1
VQMHZVOH**D0800**	8	19	70	8	3	●	1
VQMHZVOH**D1000**	10	22	80	10	3	●	1
VQMHZVOH**D1200**	12	26	90	12	3	●	1
VQMHZVOH**D1600**	16	30	110	16	3	●	1

Note) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.

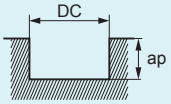
● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Slotting

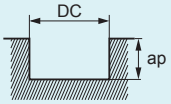
The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.
The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT				Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V				Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH, 17-4PH				Copper, Copper alloy				Heat resistant alloys Inconel718			
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
6	150	8000	1400	6	120	6400	770	6	100	5300	560	6	60	3200	380	3	180	9500	1700	6	30	1600	130	1.8
8	150	6000	1300	8	120	4800	720	8	100	4000	600	8	60	2400	360	4	180	7200	1500	8	30	1200	140	2.4
10	150	4800	1200	10	120	3800	630	10	100	3200	670	10	60	1900	310	5	180	5700	1400	10	30	950	160	3
12	150	4000	960	12	120	3200	580	12	100	2700	650	12	60	1600	290	6	180	4800	1200	12	30	800	150	3.6
16	150	3000	810	12	120	2400	500	12	100	2000	480	12	60	1200	250	8	180	3600	970	12	30	600	120	4.8
Depth of cut																								

DC:Dia.

General-purpose conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT				Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V				Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH, 17-4PH				Copper, Copper alloy				Heat resistant alloys Inconel718			
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
6	100	5300	630	6	80	4200	330	6	60	3200	220	6	50	2700	210	3	120	6400	760	6	25	1300	72	1.8
8	100	4000	550	8	80	3200	320	8	60	2400	240	8	50	2000	200	4	120	4800	670	8	25	990	78	2.4
10	100	3200	510	10	80	2500	270	10	60	1900	260	10	50	1600	170	5	120	3800	600	10	25	800	89	3
12	100	2700	430	12	80	2100	250	12	60	1600	250	12	50	1300	150	6	120	3200	510	12	25	660	84	3.6
16	100	2000	360	12	80	1600	220	12	60	1200	190	12	50	990	140	8	120	2400	430	12	25	500	63	4.8
Depth of cut																								

DC:Dia.

1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used.
   An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
3) Chattering can still occur if the machine rigidity and clamping method are insufficient.
   In these cases the feed and speed should be reduced proportionately.
4) When the depth of cut is smaller than shown the feed rate can be increased.

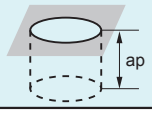
VQMHZVOH

End mill, Medium cutting length, 3 flute for drilling and slotting with internal through coolant holes

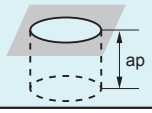
Plunging

The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.
The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V					Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH, 17-4PH					Copper, Copper alloy				
Dia. DC (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)
6	100	5300	950	9	3	70	3700	440	9	1.2	60	3200	100	6	0.6	40	2100	60	6	0.6	120	6400	1200	9	3
8	100	4000	720	12	4	70	2800	340	12	1.6	60	2400	70	8	0.6	40	1600	50	8	0.6	120	4800	860	12	4
10	100	3200	580	15	5	70	2200	260	15	2.5	60	1900	60	10	0.6	40	1300	40	10	0.6	120	3800	680	15	5
12	100	2700	490	18	5	70	1900	230	18	3	60	1600	50	12	0.6	40	1100	30	12	0.6	120	3200	580	18	5
16	100	2000	360	24	5	70	1400	170	24	4	60	1200	40	16	0.6	40	800	20	16	0.6	120	2400	430	24	5
Depth of cut																									

General-purpose conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V					Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH, 17-4PH					Copper, Copper alloy				
Dia. DC (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Step (mm)
6	100	5300	950	9	0.6	70	3700	440	9	0.6	60	3200	100	6	0.3	40	2100	60	6	0.3	120	6400	1200	9	0.6
8	100	4000	720	12	0.7	70	2800	340	12	0.7	60	2400	70	8	0.3	40	1600	50	8	0.3	120	4800	860	12	0.7
10	100	3200	580	15	0.75	70	2200	260	15	0.75	60	1900	60	10	0.3	40	1300	40	10	0.3	120	3800	680	15	0.75
12	100	2700	490	18	0.75	70	1900	230	18	0.75	60	1600	50	12	0.3	40	1100	30	12	0.3	120	3200	580	18	0.75
16	100	2000	360	24	0.75	70	1400	170	24	0.75	60	1200	40	16	0.3	40	800	20	16	0.3	120	2400	430	24	0.75
Depth of cut																									

1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
3) When the depth of cut is smaller than shown the revolution and feed rate can be increased.

MIRACLE END MILL FOR DIFFICULT TO CUT MATERIALS

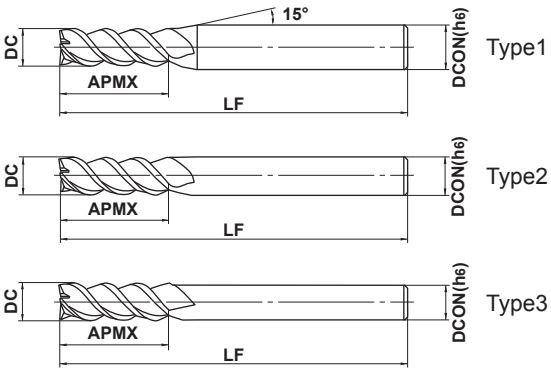
VCMH

End mill, Medium cut length, 3—4 flute, High helix angle

DC≤18 DC≥20

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	○		◎	◎		





h6

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=6	8≤DCON≤10	12≤DCON≤16	20≤DCON≤25	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

● 3—4 flute end mill for milling difficult-to-cut and soft materials.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VCMHD0300	3	8	45	6	3	●	1
VCMH**D0400**	4	11	45	6	3	●	1
VCMH**D0500**	5	13	50	6	3	●	1
VCMH**D0600**	6	13	50	6	3	●	2
VCMH**D0700**	7	16	60	8	3	●	1
VCMH**D0800**	8	19	60	8	3	●	2
VCMH**D0900**	9	19	70	10	3	●	1
VCMH**D1000**	10	22	70	10	3	●	2
VCMH**D1100**	11	22	75	12	3	●	1
VCMH**D1200**	12	26	75	12	3	●	2
VCMH**D1300**	13	26	75	12	3	●	3
VCMH**D1400**	14	26	75	12	3	●	3
VCMH**D1500**	15	30	80	16	3	●	1
VCMH**D1600**	16	32	90	16	3	●	2
VCMH**D1800**	18	32	90	16	3	●	3
VCMH**D2000**	20	38	100	20	4	●	2
VCMH**D2500**	25	45	120	25	4	●	2

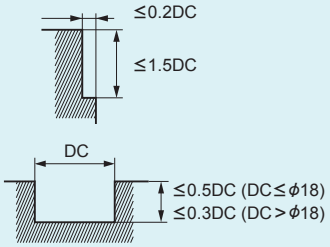
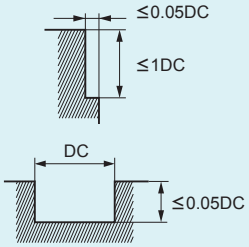
● : Inventory maintained in Japan.

MIRACLE END MILL FOR DIFFICULT TO CUT MATERIALS

VCMH

End mill, Medium cut length, 3—4 flute, High helix angle

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45—55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	5300	130	4400	100	2400	50	1500	25
4	4400	220	3700	160	2000	80	1300	40
5	3600	260	3000	190	1700	100	1100	50
6	3200	280	2700	200	1500	100	1000	50
8	2400	300	2000	210	1200	110	800	45
10	1900	290	1600	210	960	115	640	45
12	1600	250	1300	170	800	95	530	40
16	1200	180	1000	130	600	70	400	30
18	1100	170	900	120	530	65	350	25
20	960	190	800	140	480	75	320	25
25	760	150	640	110	380	60	260	20
Depth of cut								

DC:Dia.

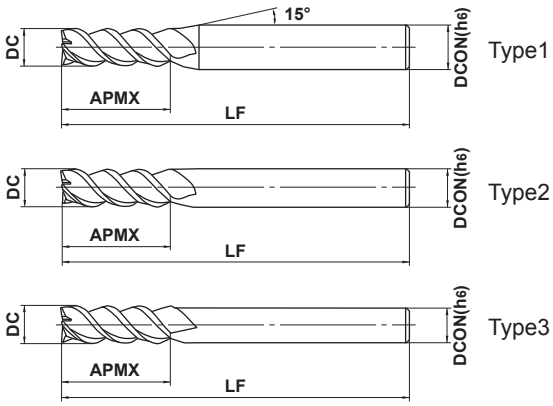
1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) The above table shows cutting conditions for side milling. For slotting, please set the revolution at 80—100% and the feed rate at 60—80% of the table figure. Please set the revolution rate at 60% and the feed rate at 40% when slotting austenitic stainless steels.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

CMH

End mill, Medium cut length, 3 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎			○	○		○





h6

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=6	**8≤DCON≤10**	**12≤DCON≤16**		
0 - 0.008	0 - 0.009	0 - 0.011		

● 3 flute ultra micro-grain uncoated carbide end mill for general use and cast iron milling.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
CMHD0600	6	13	50	6	3	●	2
CMH**D0700**	7	16	60	8	3	●	1
CMH**D0800**	8	19	60	8	3	●	2
CMH**D0900**	9	19	70	10	3	●	1
CMH**D1000**	10	22	70	10	3	●	2
CMH**D1100**	11	22	75	12	3	●	1
CMH**D1200**	12	26	75	12	3	●	2
CMH**D1300**	13	26	75	12	3	●	3
CMH**D1400**	14	26	75	12	3	●	3
CMH**D1500**	15	30	80	16	3	●	1
CMH**D1600**	16	32	90	16	3	●	2

● : Inventory maintained in Japan.

MIRACLE END ALIMASTER

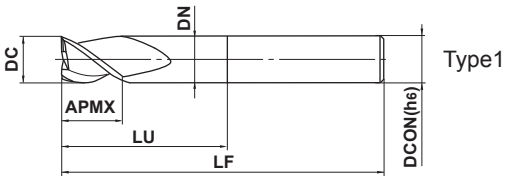
C3SA

End mill, Short cut length, 3 flute, For aluminium alloy

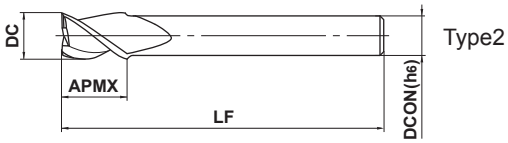


Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
						○	◎





Type1



Type2

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
8≤DCON≤10	12≤DCON≤16	20≤DCON≤25		
0 - 0.009	0 - 0.011	0 - 0.013		

h6

● High efficiency machining for aluminium alloys.

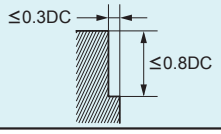
Unit : mm

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type	Center cutting edge
C3SAD1000A100S08	10	12	—	—	100	8	3	●	2	○
C3SAD1000N300	10	12	30	9.4	75	10	3	●	1	—
C3SAD1000N350	10	12	35	9.4	100	10	3	●	1	—
C3SAD1200A150S10	12	15	—	—	150	10	3	●	2	○
C3SAD1200N300	12	15	30	11.4	75	12	3	●	1	—
C3SAD1200N350	12	15	35	11.4	100	12	3	●	1	—
C3SAD1200N400	12	15	40	11.4	125	12	3	●	1	—
C3SAD1600A200S14	16	15	—	—	200	14	3	●	2	○
C3SAD1600N300	16	15	30	15.4	75	16	3	●	1	—
C3SAD1600N400	16	15	40	15.4	100	16	3	●	1	—
C3SAD1600N450	16	15	45	15.4	125	16	3	●	1	—
C3SAD1700A150S16	17	18	—	—	150	16	3	●	2	○
C3SAD1800A200S16	18	18	—	—	200	16	3	●	2	○
C3SAD2000A200S18	20	20	—	—	200	18	3	●	2	○
C3SAD2000N400	20	20	40	18	100	20	3	●	1	—
C3SAD2000N600	20	20	60	18	125	20	3	●	1	—
C3SAD2000N850	20	20	85	18	150	20	3	●	1	—
C3SAD2500N500	25	20	50	23	100	25	3	●	1	—
C3SAD2500N650	25	20	65	23	125	25	3	●	1	—
C3SAD2500N900	25	20	90	23	150	25	3	●	1	—
C3SAD2600A200S25	26	20	—	—	200	25	3	●	2	○

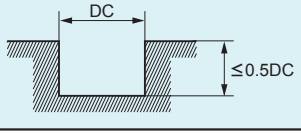
● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Aluminium alloy	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)
12	13000	5400
16	10000	5400
18	9000	5000
20	8000	5000
25	6000	4500
Depth of cut	 DC:Dia.	

Slotting

Work material	Aluminium alloy	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)
12	13000	3200
16	10000	3200
18	9000	3000
20	8000	3000
25	6000	2800
Depth of cut	 DC:Dia.	

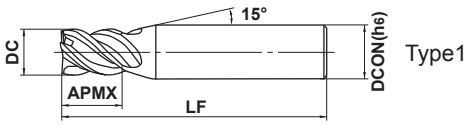
1) Water-soluble cutting fluid is recommended.
2) Climb cutting is recommended for side milling.
3) This table shows the cutting condition with less than 4D overhang length. If more than 4D, spindle speed, feed rate and depth of cut should be reduced.
4) These end mills do not have a centre cutting edge, therefore when entering a workpiece use a ramping process rather than vertical feed.
5) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately, or set the depth of cut smaller.

MSSHD

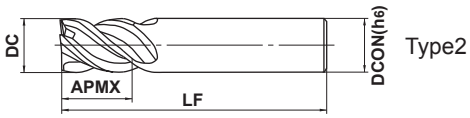
High power, Short cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		◎	○		

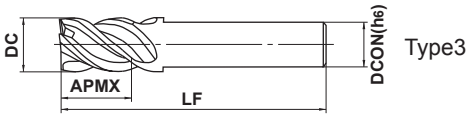




Type1



Type2



Type3

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

● 4 flute high power end mill.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MSSHDD0300	3	4.5	45	6	4	●	1
MSSHD**D0350**	3.5	5.3	45	6	4	●	1
MSSHD**D0400**	4	6	45	6	4	●	1
MSSHD**D0450**	4.5	6.8	45	6	4	●	1
MSSHD**D0500**	5	7.5	50	6	4	●	1
MSSHD**D0550**	5.5	8.3	50	6	4	●	1
MSSHD**D0600**	6	9	50	6	4	●	2
MSSHD**D0650**	6.5	9.8	60	8	4	●	1
MSSHD**D0700**	7	10.5	60	8	4	●	1
MSSHD**D0750**	7.5	11.3	60	8	4	●	1
MSSHD**D0800**	8	12	60	8	4	●	2
MSSHD**D0850**	8.5	12.8	70	10	4	●	1
MSSHD**D0900**	9	13.5	70	10	4	●	1
MSSHD**D0950**	9.5	14.3	70	10	4	●	1
MSSHD**D1000**	10	15	70	10	4	●	2
MSSHD**D1100**	11	16.5	75	12	4	●	1
MSSHD**D1200**	12	18	75	12	4	●	2
MSSHD**D1300**	13	19.5	75	12	4	●	3
MSSHD**D1400**	14	21	90	16	4	●	1
MSSHD**D1500**	15	22.5	90	16	4	●	1
MSSHD**D1600**	16	24	90	16	4	●	2
MSSHD**D1700**	17	25.5	100	16	4	●	3
MSSHD**D1800**	18	27	100	16	4	●	3
MSSHD**D1900**	19	28.5	110	20	4	●	1
MSSHD**D2000**	20	30	110	20	4	●	2

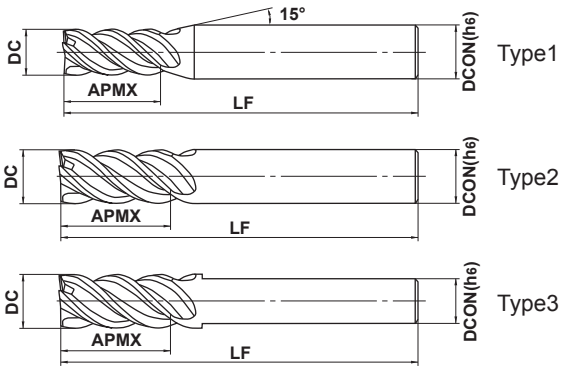
● : Inventory maintained in Japan.

MSMHD

High power, Medium cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		◎	◎		





DC≤12	DC>12			
0 - 0.020	0 - 0.030			
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	20≤DCON≤25	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

- 4 flute high power end mill.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MSMHDD0200	2	4	45	4	4	●	1
MSMHD**D0210**	2.1	5	45	4	4	●	1
MSMHD**D0220**	2.2	5	45	4	4	●	1
MSMHD**D0230**	2.3	5	45	4	4	●	1
MSMHD**D0240**	2.4	5	45	4	4	●	1
MSMHD**D0250**	2.5	5	45	4	4	●	1
MSMHD**D0260**	2.6	6	45	4	4	●	1
MSMHD**D0270**	2.7	6	45	4	4	●	1
MSMHD**D0280**	2.8	6	45	4	4	●	1
MSMHD**D0290**	2.9	6	45	4	4	●	1
MSMHD**D0300**	3	8	45	6	4	●	1
MSMHD**D0310**	3.1	8	45	6	4	●	1
MSMHD**D0320**	3.2	8	45	6	4	●	1
MSMHD**D0330**	3.3	8	45	6	4	●	1
MSMHD**D0340**	3.4	8	45	6	4	●	1
MSMHD**D0350**	3.5	8	45	6	4	●	1
MSMHD**D0360**	3.6	11	45	6	4	●	1
MSMHD**D0370**	3.7	11	45	6	4	●	1
MSMHD**D0380**	3.8	11	45	6	4	●	1
MSMHD**D0390**	3.9	11	45	6	4	●	1
MSMHD**D0400**	4	11	45	6	4	●	1
MSMHD**D0410**	4.1	12	45	6	4	●	1
MSMHD**D0420**	4.2	12	45	6	4	●	1
MSMHD**D0430**	4.3	12	45	6	4	●	1
MSMHD**D0440**	4.4	12	45	6	4	●	1
MSMHD**D0450**	4.5	12	45	6	4	●	1
MSMHD**D0460**	4.6	13	50	6	4	●	1
MSMHD**D0470**	4.7	13	50	6	4	●	1
MSMHD**D0480**	4.8	13	50	6	4	●	1
MSMHD**D0490**	4.9	13	50	6	4	●	1
MSMHD**D0500**	5	13	50	6	4	●	1
MSMHD**D0510**	5.1	13	50	6	4	●	1
MSMHD**D0520**	5.2	13	50	6	4	●	1
MSMHD**D0530**	5.3	13	50	6	4	●	1

MSMHD

High power, Medium cut length, 4 flute

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MSMHDD0540	5.4	13	50	6	4	●	1
MSMHDD0550	5.5	13	50	6	4	●	1
MSMHDD0560	5.6	13	50	6	4	●	1
MSMHDD0570	5.7	13	50	6	4	●	1
MSMHDD0580	5.8	13	50	6	4	●	1
MSMHDD0590	5.9	13	50	6	4	●	1
MSMHDD0600	6	13	50	6	4	●	2
MSMHDD0650	6.5	16	60	8	4	●	1
MSMHDD0700	7	19	60	8	4	●	1
MSMHDD0750	7.5	19	60	8	4	●	1
MSMHDD0800	8	19	60	8	4	●	2
MSMHDD0850	8.5	19	70	10	4	●	1
MSMHDD0900	9	22	70	10	4	●	1
MSMHDD0950	9.5	22	70	10	4	●	1
MSMHDD1000	10	22	70	10	4	●	2
MSMHDD1100	11	26	75	12	4	●	1
MSMHDD1200S10	12	26	75	10	4	●	3
MSMHDD1200	12	26	75	12	4	●	2
MSMHDD1300	13	26	75	12	4	●	3
MSMHDD1400	14	30	90	16	4	●	1
MSMHDD1500	15	35	90	16	4	●	1
MSMHDD1600	16	35	90	16	4	●	2
MSMHDD1700	17	35	100	16	4	●	3
MSMHDD1800	18	40	100	16	4	●	3
MSMHDD1900	19	40	110	20	4	●	1
MSMHDD2000	20	45	110	20	4	●	2
MSMHDD2200	22	50	125	20	4	●	3
MSMHDD2500	25	55	125	25	4	●	2

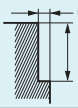
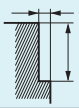
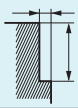
● : Inventory maintained in Japan.

MSSHD
High power, Short cut length, 4 flute

MSMHD
High power, Medium cut length, 4 flute

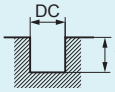
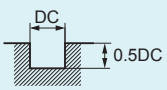
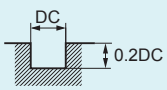
RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	15000	550	10000	340	10000	320	6400	160	4800	100
3	11000	800	7400	500	7400	480	4800	250	4000	170
4	8000	900	5600	540	5600	520	3600	270	3200	240
5	6400	1000	4500	600	4500	580	2900	300	2600	240
6	5800	1100	3700	640	3700	600	2400	320	2100	230
8	4400	1100	2800	660	2800	600	1800	330	1600	220
10	3500	1000	2200	640	2200	560	1400	320	1300	200
12	2900	1000	1900	640	1900	530	1200	320	1100	170
16	2200	800	1400	500	1400	450	900	250	800	130
20	1800	750	1100	460	1100	440	720	230	640	100
25	1400	600	900	400	900	380	570	200	510	80
Depth of cut										

DC:Dia.

Slotting

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	12000	400	7000	200	7000	100	4200	80	2300	40
3	9000	600	5300	300	5300	150	3200	130	1900	70
4	7200	720	4000	360	4000	180	2400	140	1400	95
5	5800	720	3200	360	3200	180	1900	150	1100	95
6	5000	800	2700	400	2700	200	1600	160	950	95
8	3700	800	2000	400	2000	200	1200	170	720	90
10	3000	720	1600	360	1600	180	960	160	570	80
12	2500	720	1300	360	1300	180	800	160	480	70
16	2000	600	1000	280	1000	150	600	130	360	50
20	1600	540	800	250	800	130	480	120	290	40
25	1300	480	640	220	640	120	380	100	230	35
Depth of cut										

DC:Dia.

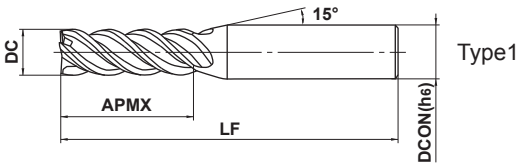
1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MSJHD

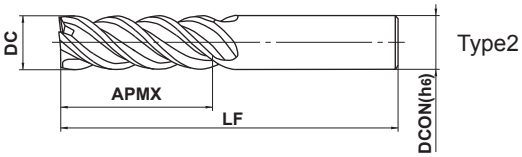
High power, Semi long cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		◎	◎		





Type1



Type2

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

- 4 flute high power end mill.

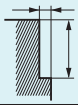
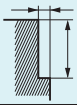
Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MSJHDD0200	2	8	60	6	4	●	1
MSJHD**D0250**	2.5	10	60	6	4	●	1
MSJHD**D0300**	3	12	60	6	4	●	1
MSJHD**D0350**	3.5	14	60	6	4	●	1
MSJHD**D0400**	4	16	60	6	4	●	1
MSJHD**D0450**	4.5	18	60	6	4	●	1
MSJHD**D0500**	5	20	60	6	4	●	1
MSJHD**D0600**	6	24	60	6	4	●	2
MSJHD**D0700**	7	25	80	8	4	●	1
MSJHD**D0800**	8	28	80	8	4	●	2
MSJHD**D0900**	9	32	90	10	4	●	1
MSJHD**D1000**	10	35	90	10	4	●	2
MSJHD**D1100**	11	35	100	12	4	●	1
MSJHD**D1200**	12	36	100	12	4	●	2
MSJHD**D1400**	14	42	110	16	4	●	1
MSJHD**D1500**	15	45	110	16	4	●	1
MSJHD**D1600**	16	48	125	16	4	●	2
MSJHD**D2000**	20	55	140	20	4	●	2

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	11000	370	7000	230	7000	210	5000	100	3800	55
3	8000	550	5100	320	5100	300	3800	190	2500	80
4	6200	620	4000	350	4000	340	3000	210	1900	110
5	5000	670	3200	370	3200	360	2400	220	1500	110
6	4200	750	2600	400	2600	390	2000	220	1300	110
8	3200	780	2000	420	2000	400	1500	230	960	100
10	2500	690	1600	410	1600	380	1200	210	760	100
12	2100	670	1300	380	1300	340	1000	190	640	80
16	1600	570	1000	320	1000	280	750	170	480	65
20	1200	470	800	290	800	260	600	150	380	50
Depth of cut										

DC:Dia.

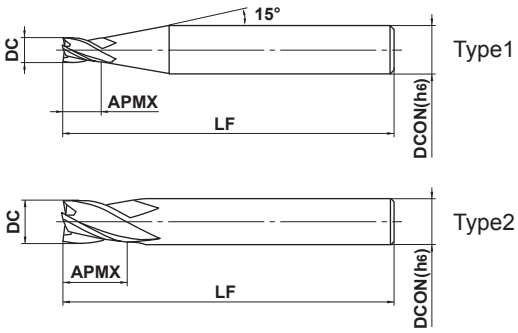
1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MS4SC

End mill, Short cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		





1≤DC≤12				
0 - 0.020				
4≤DCON≤6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

h6

● 4 flute end mill for general use.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS4SCD0100	1	1.5	40	4	4	●	1
MS4SCD0150	1.5	2.3	40	4	4	●	1
MS4SCD0200	2	3	40	4	4	●	1
MS4SCD0250	2.5	3.8	40	4	4	●	1
MS4SCD0300	3	4.5	50	6	4	●	1
MS4SCD0400	4	6	50	6	4	●	1
MS4SCD0500	5	7.5	50	6	4	●	1
MS4SCD0600	6	9	50	6	4	●	2
MS4SCD0800	8	12	60	8	4	●	2
MS4SCD1000	10	15	70	10	4	●	2
MS4SCD1200	12	18	75	12	4	●	2

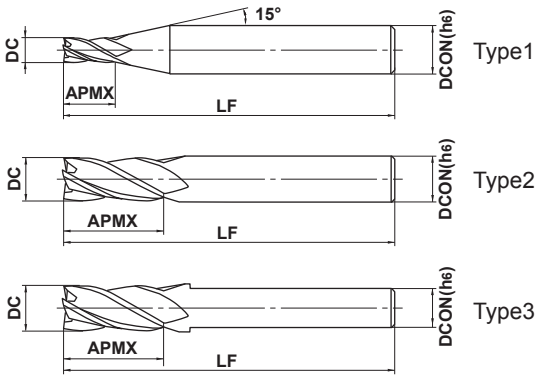
● : Inventory maintained in Japan.

MS4MC

End mill, Medium cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		





h6				
DC≤12	DC>12			
0 - 0.020	0 - 0.030			
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

4 flute end mill for general use.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS4MCD0100	1	2.5	40	4	4	●	1
MS4MCD0150	1.5	3.8	40	4	4	●	1
MS4MCD0200	2	5	40	4	4	●	1
MS4MCD0250	2.5	6.3	40	4	4	●	1
MS4MCD0300	3	7.5	50	6	4	●	1
MS4MCD0350	3.5	9	50	6	4	●	1
MS4MCD0400	4	10	50	6	4	●	1
MS4MCD0450	4.5	11.5	50	6	4	●	1
MS4MCD0500	5	12.5	50	6	4	●	1
MS4MCD0550	5.5	14	50	6	4	●	1
MS4MCD0600	6	15	50	6	4	●	2
MS4MCD0650	6.5	16.5	60	8	4	●	1
MS4MCD0700	7	17.5	60	8	4	●	1
MS4MCD0750	7.5	19	60	8	4	●	1
MS4MCD0800	8	20	60	8	4	●	2
MS4MCD0850	8.5	21.5	70	10	4	●	1
MS4MCD0900	9	22.5	70	10	4	●	1
MS4MCD0950	9.5	24	70	10	4	●	1
MS4MCD1000	10	25	70	10	4	●	2
MS4MCD1100	11	27.5	75	12	4	●	1
MS4MCD1200	12	30	90	12	4	●	2
MS4MCD1400	14	35	90	12	4	●	3
MS4MCD1600	16	40	100	16	4	●	2
MS4MCD1800	18	45	100	16	4	●	3
MS4MCD2000	20	50	110	20	4	●	2

MS4SC
End mill, Short cut length, 4 flute

MS4MC
End mill, Medium cut length, 4 flute

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45—55HRC) AISI H13		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
1	40000	3000	0.06	32000	2400	0.06
1.5	40000	4500	0.12	32000	3600	0.08
2	30000	4500	0.18	24000	3600	0.10
2.5	24000	3900	0.25	19000	3000	0.13
3	20000	3500	0.30	16000	2700	0.15
4	15000	3000	0.40	12000	2400	0.20
5	12000	2400	0.50	9000	1800	0.25
6	10000	2100	0.60	7000	1500	0.30
8	8000	1500	0.80	5600	1100	0.40
10	6400	1400	1.00	4500	950	0.50
12	5400	1200	1.00	3800	860	0.50
16	2400	550	3.00	1200	120	0.80
20	1900	480	4.00	1000	100	1.00
Depth of cut	≤Please refer to the list above for depth of cut. ≤1DC DC ≤Please refer to the list above for depth of cut. DC:Dia.					

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) When slotting with end mills with ϕ3 or larger, reduce the revolution to 50—70% and the feed rate to 40—60%.
3) When drilling, please set the feed rate at 1/3 or below the values above.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

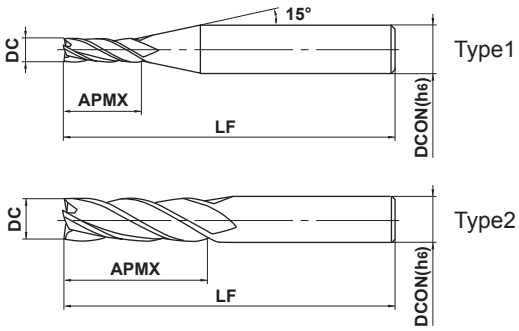
MS4JC

End mill, Semi long cut length, 4 flute

DC<3 DC≥3 DC≥3 DC<3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		





1≤DC≤12				
0 - 0.020				
4≤DCON≤6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

h6

4 flute end mill for general use.

Unit : mm

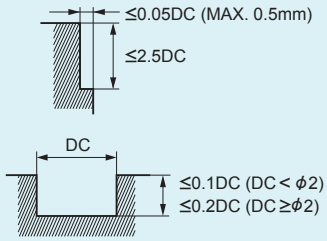
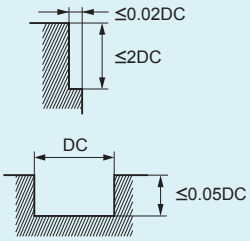
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS4JCD0100	1	4	40	4	4	●	1
MS4JC**D0150**	1.5	6	40	4	4	●	1
MS4JC**D0200**	2	8	40	4	4	●	1
MS4JC**D0250**	2.5	10	50	4	4	●	1
MS4JC**D0300**	3	12	50	6	4	●	1
MS4JC**D0400**	4	16	50	6	4	●	1
MS4JC**D0500**	5	20	60	6	4	●	1
MS4JC**D0600**	6	24	60	6	4	●	2
MS4JC**D0800**	8	32	70	8	4	●	2
MS4JC**D1000**	10	40	90	10	4	●	2
MS4JC**D1200**	12	48	110	12	4	●	2

● : Inventory maintained in Japan.

MS4JC

End mill, Semi long cut length, 4 flute

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	11100	85	9500	65	8000	50	6400	35
1.5	7400	85	6400	90	5300	50	4200	35
2	5600	85	4800	90	4000	50	3200	35
2.5	4500	85	3800	90	3200	55	2500	35
3	3700	90	3400	90	2600	60	2100	35
4	3000	110	2700	90	2100	70	1700	50
5	2600	140	2300	110	1800	85	1500	55
6	2300	170	2000	140	1500	110	1300	70
8	1700	180	1500	140	1200	110	1000	70
10	1400	180	1300	140	950	110	800	70
12	1200	170	1100	140	800	110	670	70
Depth of cut								

DC:Dia.

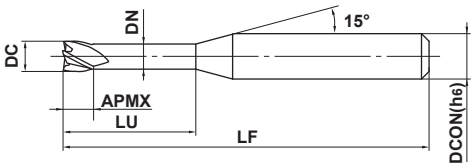
1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) When drilling, please set the feed rate at 1/3 or below the values above.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MS4XL

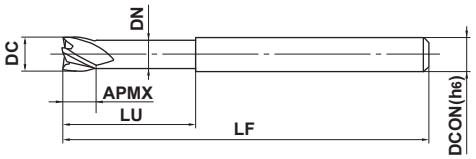
End mill, Short cut length, 4 flute, Long neck

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		





Type1



Type2

h6	1≤DC≤10				
	0 - 0.020				
	4≤DCON≤6	8≤DCON≤10			
	0 - 0.008	0 - 0.009			

4 flute long neck end mill.

Unit : mm

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
MS4XLD0100N040	1	1	4	0.94	50	4	4	●	1
MS4XLD0100N060	1	1	6	0.94	50	4	4	●	1
MS4XLD0100N080	1	1	8	0.94	50	4	4	●	1
MS4XLD0100N100	1	1	10	0.94	50	4	4	●	1
MS4XLD0100N120	1	1	12	0.94	50	4	4	●	1
MS4XLD0100N160	1	1	16	0.94	60	4	4	●	1
MS4XLD0110N060	1.1	1.1	6	1.04	50	4	4	●	1
MS4XLD0110N100	1.1	1.1	10	1.04	50	4	4	●	1
MS4XLD0110N160	1.1	1.1	16	1.04	60	4	4	●	1
MS4XLD0120N060	1.2	1.2	6	1.14	50	4	4	●	1
MS4XLD0120N080	1.2	1.2	8	1.14	50	4	4	●	1
MS4XLD0120N100	1.2	1.2	10	1.14	50	4	4	●	1
MS4XLD0120N120	1.2	1.2	12	1.14	50	4	4	●	1
MS4XLD0120N160	1.2	1.2	16	1.14	60	4	4	●	1
MS4XLD0130N060	1.3	1.3	6	1.24	50	4	4	●	1
MS4XLD0130N120	1.3	1.3	12	1.24	50	4	4	●	1
MS4XLD0130N180	1.3	1.3	18	1.24	60	4	4	●	1
MS4XLD0140N060	1.4	1.4	6	1.34	50	4	4	●	1
MS4XLD0140N080	1.4	1.4	8	1.34	50	4	4	●	1
MS4XLD0140N100	1.4	1.4	10	1.34	50	4	4	●	1
MS4XLD0140N120	1.4	1.4	12	1.34	50	4	4	●	1
MS4XLD0140N140	1.4	1.4	14	1.34	60	4	4	●	1
MS4XLD0140N160	1.4	1.4	16	1.34	60	4	4	●	1
MS4XLD0140N220	1.4	1.4	22	1.34	60	4	4	●	1
MS4XLD0150N060	1.5	1.5	6	1.44	50	4	4	●	1
MS4XLD0150N080	1.5	1.5	8	1.44	50	4	4	●	1
MS4XLD0150N100	1.5	1.5	10	1.44	50	4	4	●	1
MS4XLD0150N120	1.5	1.5	12	1.44	50	4	4	●	1
MS4XLD0150N140	1.5	1.5	14	1.44	60	4	4	●	1
MS4XLD0150N160	1.5	1.5	16	1.44	60	4	4	●	1
MS4XLD0150N180	1.5	1.5	18	1.44	60	4	4	●	1
MS4XLD0150N200	1.5	1.5	20	1.44	60	4	4	●	1
MS4XLD0160N060	1.6	1.6	6	1.54	50	4	4	●	1
MS4XLD0160N080	1.6	1.6	8	1.54	50	4	4	●	1

● : Inventory maintained in Japan.

MS4XL

End mill, Short cut length, 4 flute, Long neck

Unit : mm

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
MS4XLD0160N100	1.6	1.6	10	1.54	50	4	4	●	1
MS4XLD0160N120	1.6	1.6	12	1.54	50	4	4	●	1
MS4XLD0160N140	1.6	1.6	14	1.54	60	4	4	●	1
MS4XLD0160N160	1.6	1.6	16	1.54	60	4	4	●	1
MS4XLD0160N180	1.6	1.6	18	1.54	60	4	4	●	1
MS4XLD0160N200	1.6	1.6	20	1.54	60	4	4	●	1
MS4XLD0160N260	1.6	1.6	26	1.54	70	4	4	●	1
MS4XLD0170N060	1.7	1.7	6	1.64	50	4	4	●	1
MS4XLD0170N140	1.7	1.7	14	1.64	60	4	4	●	1
MS4XLD0170N240	1.7	1.7	24	1.64	70	4	4	●	1
MS4XLD0180N060	1.8	1.8	6	1.74	50	4	4	●	1
MS4XLD0180N080	1.8	1.8	8	1.74	50	4	4	●	1
MS4XLD0180N100	1.8	1.8	10	1.74	50	4	4	●	1
MS4XLD0180N120	1.8	1.8	12	1.74	50	4	4	●	1
MS4XLD0180N140	1.8	1.8	14	1.74	60	4	4	●	1
MS4XLD0180N160	1.8	1.8	16	1.74	60	4	4	●	1
MS4XLD0180N180	1.8	1.8	18	1.74	60	4	4	●	1
MS4XLD0180N200	1.8	1.8	20	1.74	60	4	4	●	1
MS4XLD0180N250	1.8	1.8	25	1.74	70	4	4	●	1
MS4XLD0190N060	1.9	1.9	6	1.84	50	4	4	●	1
MS4XLD0190N160	1.9	1.9	16	1.84	60	4	4	●	1
MS4XLD0190N280	1.9	1.9	28	1.84	70	4	4	●	1
MS4XLD0200N060	2	2	6	1.9	50	4	4	●	1
MS4XLD0200N080	2	2	8	1.9	50	4	4	●	1
MS4XLD0200N100	2	2	10	1.9	50	4	4	●	1
MS4XLD0200N120	2	2	12	1.9	50	4	4	●	1
MS4XLD0200N140	2	2	14	1.9	60	4	4	●	1
MS4XLD0200N160	2	2	16	1.9	60	4	4	●	1
MS4XLD0200N180	2	2	18	1.9	60	4	4	●	1
MS4XLD0200N200	2	2	20	1.9	60	4	4	●	1
MS4XLD0200N250	2	2	25	1.9	70	4	4	●	1
MS4XLD0200N300	2	2	30	1.9	70	4	4	●	1
MS4XLD0250N080	2.5	2.5	8	2.4	50	4	4	●	1
MS4XLD0250N120	2.5	2.5	12	2.4	50	4	4	●	1
MS4XLD0250N160	2.5	2.5	16	2.4	60	4	4	●	1
MS4XLD0250N200	2.5	2.5	20	2.4	60	4	4	●	1
MS4XLD0250N250	2.5	2.5	25	2.4	70	4	4	●	1
MS4XLD0300N080	3	3	8	2.9	50	6	4	●	1
MS4XLD0300N120	3	3	12	2.9	50	6	4	●	1
MS4XLD0300N160	3	3	16	2.9	60	6	4	●	1
MS4XLD0300N200	3	3	20	2.9	60	6	4	●	1
MS4XLD0300N250	3	3	25	2.9	70	6	4	●	1
MS4XLD0300N300	3	3	30	2.9	70	6	4	●	1
MS4XLD0350N150	3.5	3.5	15	3.4	60	6	4	●	1
MS4XLD0350N250	3.5	3.5	25	3.4	70	6	4	●	1
MS4XLD0350N350	3.5	3.5	35	3.4	80	6	4	●	1
MS4XLD0400N120	4	4	12	3.9	50	6	4	●	1
MS4XLD0400N160	4	4	16	3.9	60	6	4	●	1
MS4XLD0400N200	4	4	20	3.9	60	6	4	●	1
MS4XLD0400N250	4	4	25	3.9	70	6	4	●	1
MS4XLD0400N300	4	4	30	3.9	70	6	4	●	1
MS4XLD0400N350	4	4	35	3.9	80	6	4	●	1

● : Inventory maintained in Japan.

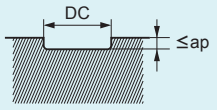
Unit : mm

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
MS4XLD0400N400	4	4	40	3.9	90	6	4	●	1
MS4XLD0400N450	4	4	45	3.9	90	6	4	●	1
MS4XLD0400N500	4	4	50	3.9	100	6	4	●	1
MS4XLD0500N160	5	5	16	4.9	60	6	4	●	1
MS4XLD0500N250	5	5	25	4.9	70	6	4	●	1
MS4XLD0500N350	5	5	35	4.9	80	6	4	●	1
MS4XLD0500N500	5	5	50	4.9	110	6	4	●	1
MS4XLD0600N200	6	6	20	5.85	80	6	4	●	2
MS4XLD0600N300	6	6	30	5.85	90	6	4	●	2
MS4XLD0600N400	6	6	40	5.85	100	6	4	●	2
MS4XLD0600N500	6	6	50	5.85	110	6	4	●	2
MS4XLD0800N300	8	8	30	7.85	90	8	4	●	2
MS4XLD0800N500	8	8	50	7.85	110	8	4	●	2
MS4XLD0800N700	8	8	70	7.85	130	8	4	●	2
MS4XLD1000N400	10	10	40	9.7	100	10	4	●	2
MS4XLD1000N600	10	10	60	9.7	120	10	4	●	2
MS4XLD1000N800	10	10	80	9.7	140	10	4	●	2

MS4XL

End mill, Short cut length, 4 flute, Long neck

RECOMMENDED CUTTING CONDITIONS

Work material		Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21		
Dia. **DC** (mm)	Neck length **LU** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
1	**4**	40000	3000	0.04
	8	36000	2400	0.03
	12	20000	1000	0.02
	16	10000	500	0.005
1.2	**6**	40000	3000	0.05
	10	36000	2400	0.04
	12	20000	1200	0.03
	16	12000	600	0.01
1.5	**6**	40000	3200	0.06
	12	32000	2400	0.05
	16	16000	1100	0.03
	20	10000	600	0.01
1.8	**6**	40000	3600	0.08
	12	32000	2800	0.06
	20	12000	1000	0.02
	25	7000	600	0.01
2	**6**	40000	4000	0.1
	12	32000	3200	0.07
	16	24000	2400	0.05
	20	12000	1200	0.03
	30	5000	500	0.01
2.5	**8**	32000	4000	0.2
	25	9000	1100	0.04
	50	2500	300	0.005
3	**8**	25000	3600	0.4
	16	18000	2500	0.2
	25	12000	1700	0.1
	30	7000	800	0.05
3.5	**15**	20000	3000	0.6
	25	11000	1600	0.15
	35	5500	800	0.06
4	**12**	18000	3000	1
	20	12000	2000	0.5
	30	8000	1300	0.2
	40	4200	700	0.08
	50	2400	400	0.03
5	**16**	14000	2700	1
	25	9500	1800	0.5
	35	6400	1200	0.2
	50	3200	600	0.05
6	**20**	11000	2200	1.2
	30	8000	1600	0.6
	40	5400	1100	0.25
	50	3200	640	0.15
8	**30**	8000	1600	1.6
	50	4000	800	0.5
	70	2000	400	0.2
10	**40**	6400	1300	2
	60	3200	640	0.6
	80	1600	320	0.3
Depth of cut				

DC:Dia.
ap:Depth of Cut in the Axial Direction

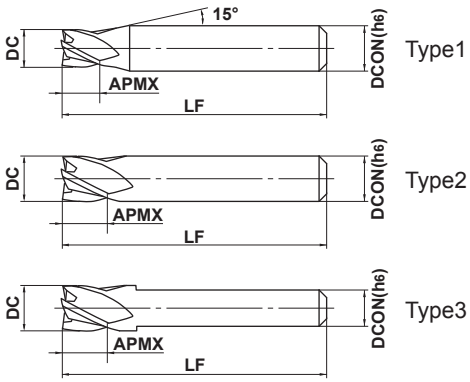
1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

MS4EC

End mill, 4 flute, For small automatic lathes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		





DC≤12	DC>12			
0 - 0.020	0 - 0.030			
4≤DCON≤6	7≤DCON≤10			
0 - 0.008	0 - 0.009			

h6

● 4 flute end mill.

Overall length 35mm

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS4ECD0300L35S04	3	3	35	4	4	●	1
MS4ECD0350L35S04	3.5	3.5	35	4	4	●	1
MS4ECD0400L35S04	4	4	35	4	4	●	2
MS4ECD0500L35S05	5	5	35	5	4	●	2
MS4ECD0500L35S06	5	5	35	6	4	●	1
MS4ECD0600L35S05	6	6	35	5	4	●	3
MS4ECD0600L35S06	6	6	35	6	4	●	2
MS4ECD0700L35S07	7	6	35	7	4	●	2
MS4ECD0800L35S07	8	6	35	7	4	●	3
MS4ECD0800L35S08	8	6	35	8	4	●	2
MS4ECD1000L35S07	10	6	35	7	4	●	3
MS4ECD1000L35S10	10	6	35	10	4	●	2
MS4ECD1200L35S10	12	6	35	10	4	●	3

Overall length 45mm

Unit : mm

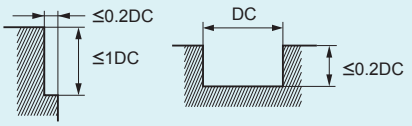
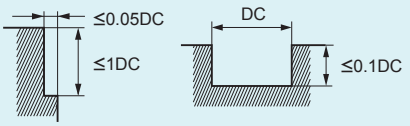
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS4ECD0300L45S04	3	3	45	4	4	●	1
MS4ECD0350L45S04	3.5	3.5	45	4	4	●	1
MS4ECD0400L45S04	4	4	45	4	4	●	2
MS4ECD0500L45S06	5	5	45	6	4	●	1
MS4ECD0600L45S06	6	6	45	6	4	●	2
MS4ECD0700L45S07	7	7	45	7	4	●	2
MS4ECD0800L45S07	8	8	45	7	4	●	3
MS4ECD0800L45S08	8	8	45	8	4	●	2
MS4ECD1000L45S07	10	10	45	7	4	●	3
MS4ECD1000L45S10	10	10	45	10	4	●	2
MS4ECD1200L45S10	12	12	45	10	4	●	3
MS4ECD1400L45S10	14	14	45	10	4	●	3

● : Inventory maintained in Japan.

MS4EC

End mill, 4 flute, For small automatic lathes

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	10000	900	7000	600	6000	450	5000	180
4	7500	900	5200	600	4500	450	4000	180
5	6000	900	4200	600	3600	450	3200	180
6	5000	900	3500	600	3000	450	2700	180
7	4500	840	3000	540	2700	420	2300	160
8	4000	780	2800	520	2400	390	2000	160
10	3200	680	2200	450	1900	340	1600	140
12	2700	620	1900	410	1600	310	1300	120
14	2300	550	1600	350	1400	280	1200	120
Depth of cut								

DC:Dia.

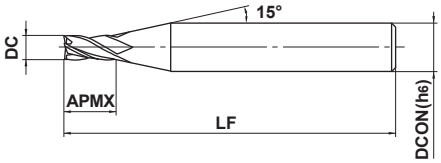
1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) When drilling, please set the feed rate at 1/3 or below the values above.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VF4MD

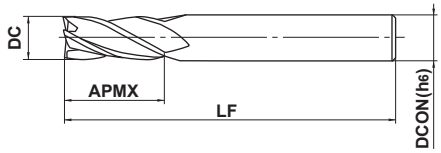
End mill, Medium cut length, 4 flute, For hardened materials

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎				





Type1



Type2

h6

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

4 flute end mill suitable for high-speed machining of hardened steel.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VF4MDD0100	1	2.5	40	4	4	●	1
VF4MD**D0150**	1.5	3.8	40	4	4	●	1
VF4MD**D0200**	2	5	40	4	4	●	1
VF4MD**D0250**	2.5	6.3	40	4	4	●	1
VF4MD**D0300**	3	7.5	50	6	4	●	1
VF4MD**D0400**	4	10	50	6	4	●	1
VF4MD**D0500**	5	12.5	50	6	4	●	1
VF4MD**D0600**	6	15	50	6	4	●	2
VF4MD**D0800**	8	20	60	8	4	●	2
VF4MD**D1000**	10	25	70	10	4	●	2
VF4MD**D1200**	12	30	90	12	4	●	2
VF4MD**D1600**	16	40	100	16	4	●	2
VF4MD**D2000**	20	50	110	20	4	●	2

● : Inventory maintained in Japan.

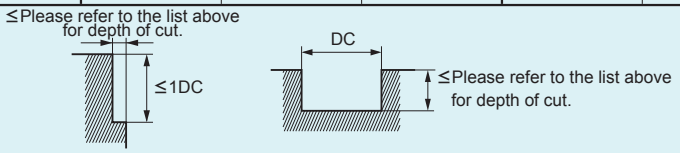
VF4MD

End mill, Medium cut length, 4 flute, For hardened materials

RECOMMENDED CUTTING CONDITIONS

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			Hardened steel (45－55HRC) AISI H13			Hardened steel (55－62HRC) AISI D2		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
1	40000	3000	0.06	32000	2400	0.06	16000	710	0.05
1.5	40000	4500	0.12	32000	3600	0.08	10600	650	0.08
2	30000	4500	0.18	24000	3600	0.10	8100	520	0.10
2.5	24000	3900	0.25	19000	3000	0.13	6400	450	0.13
3	20000	3500	0.30	16000	2700	0.15	5400	390	0.15
4	15000	3000	0.40	12000	2400	0.20	4000	450	0.20
5	12000	2400	0.50	9000	1800	0.25	3200	380	0.20
6	10000	2100	0.60	7000	1400	0.30	2700	320	0.20
8	8000	1500	0.80	5600	1100	0.40	2000	240	0.20
10	6400	1400	1.00	4500	950	0.50	1600	210	0.30
12	5400	1200	1.00	3800	860	0.50	1300	160	0.30
16	2400	550	3.00	1200	280	0.80	1000	130	0.30
20	1900	480	4.00	1000	240	1.00	800	100	0.30

Depth of cut



DC:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) When drilling, please set the feed rate at 1/3 or below the values above.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

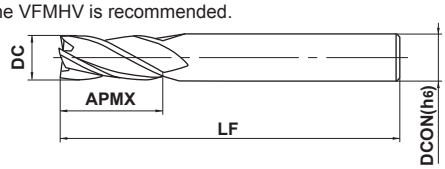
VF4MV

End mill, Medium cut length, 4 flute, For hardened materials

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎				



* For austenitic stainless steels, titanium and heat-resistant alloys, the VFMHV is recommended.



Type1

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

An irregular helix 4 flute square end mill suitable for high-speed machining of hardened steel.

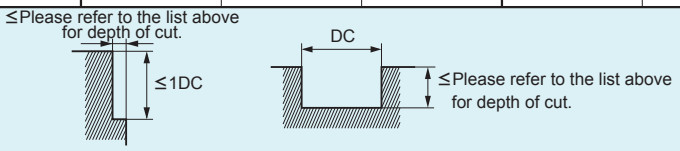
Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VF4MVD0600	6	15	50	6	4	●	1
VF4MVD0800	8	20	60	8	4	●	1
VF4MVD1000	10	25	70	10	4	●	1
VF4MVD1200	12	30	90	12	4	●	1
VF4MVD1600	16	40	100	16	4	●	1
VF4MVD2000	20	50	110	20	4	●	1

RECOMMENDED CUTTING CONDITIONS

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			Hardened steel (45−55HRC) AISI H13			Hardened steel (55−62HRC) AISI D2		
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
6	10000	2100	0.60	7000	1400	0.30	2700	320	0.20
8	8000	1500	0.80	5600	1100	0.40	2000	240	0.20
10	6400	1400	1.00	4500	950	0.50	1600	210	0.30
12	5400	1200	1.00	3800	860	0.50	1300	160	0.30
16	2400	550	3.00	1200	280	0.80	1000	130	0.30
20	1900	480	4.00	1000	240	1.00	800	100	0.30

Depth of cut



DC:Dia.

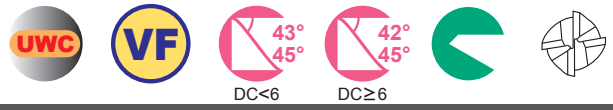
1) When slotting, reduce the revolutions by 50−70% and the feed rate by 40−60%.
2) For austenitic stainless steels, titanium and heat-resistant alloys, the VFMHV is recommended.
3) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

● : Inventory maintained in Japan.

IMPACT MIRACLE END MILL FOR DIFFICULT TO CUT MATERIALS, IRREGULAR HELIX

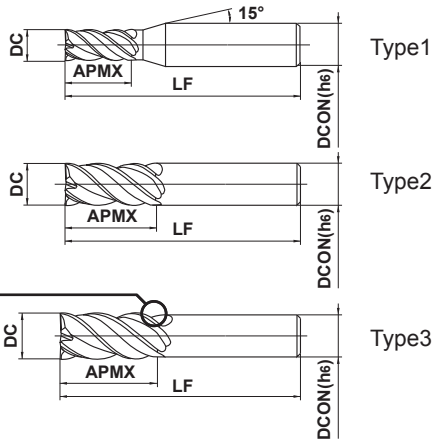
VFMHV

End mill, Medium cut length, Irregular helix flutes



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○	○		◎	◎		





DC≤12	DC>12			
0 - 0.020	0 - 0.030			
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

Vibration control end mill achieving stable machining of difficult-to-cut materials and for long overhang applications.

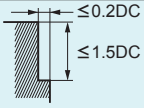
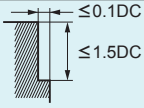
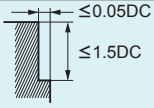
Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VFMHVD0200	2	4	45	4	4	●	1
VFMHV**D0250**	2.5	5	45	4	4	●	1
VFMHV**D0300**	3	8	45	6	4	●	1
VFMHV**D0350**	3.5	8	45	6	4	●	1
VFMHV**D0400**	4	11	45	6	4	●	1
VFMHV**D0500**	5	13	50	6	4	●	1
VFMHV**D0600**	6	13	50	6	4	●	2
VFMHV**D0600A070**	6	13	70	6	4	●	2
VFMHV**D0700**	7	19	60	8	4	●	1
VFMHV**D0800**	8	19	60	8	4	●	2
VFMHV**D0800A080**	8	19	80	8	4	●	2
VFMHV**D0900**	9	22	70	10	4	●	1
VFMHV**D1000A100S08**	10	22	100	8	4	●	3
VFMHV**D1000**	10	22	70	10	4	●	2
VFMHV**D1000A100**	10	22	100	10	4	●	2
VFMHV**D1100**	11	26	100	10	4	●	3
VFMHV**D1200A110S10**	12	26	110	10	4	●	3
VFMHV**D1200**	12	26	75	12	4	●	2
VFMHV**D1200A110**	12	26	110	12	4	●	2
VFMHV**D1300**	13	26	110	12	4	●	3
VFMHV**D1400A130S12**	14	32	130	12	4	●	3
VFMHV**D1600**	16	35	90	16	4	●	2
VFMHV**D1800A150S16**	18	42	150	16	4	●	3
VFMHV**D2000**	20	45	110	20	4	●	2

● : Inventory maintained in Japan.

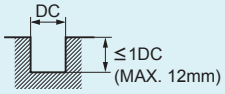
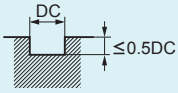
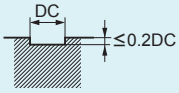
RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	21000	1100	21000	1100	14000	560	9600	310	4800	130
3	15000	1250	15000	1250	10600	850	7400	380	4200	200
4	11000	1400	11000	1400	8000	960	5600	400	3200	220
5	9600	1920	9600	1920	6400	1020	4500	430	2500	250
6	8000	2240	8000	2240	5300	1060	3700	440	2100	250
7	6800	1900	6800	1900	4500	1010	3200	450	1800	260
8	6000	1680	6000	1680	4000	960	2800	450	1600	260
9	5300	1480	5300	1480	3500	840	2500	450	1400	220
10	4800	1440	4800	1440	3200	770	2200	440	1300	210
11	4400	1350	4400	1350	2900	760	2000	400	1200	190
12	4000	1250	4000	1250	2700	760	1900	380	1100	180
13	3700	1180	3700	1180	2500	700	1700	360	1000	160
14	3400	1160	3400	1160	2300	640	1600	350	900	140
16	3000	1140	3000	1140	2000	560	1400	340	800	130
18	2700	970	2700	970	1800	550	1200	340	700	110
20	2400	860	2400	860	1600	510	1100	330	600	100
Depth of cut										

DC:Dia.

Slotting

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	17000	680	10000	400	9600	310	4800	130	3200	80
3	12000	720	6900	410	7400	380	3200	140	2700	110
4	9200	810	5600	490	5600	400	2400	150	2000	120
5	7600	1060	4500	630	4500	410	1900	170	1600	130
6	6400	1280	3700	740	3700	440	1600	190	1300	160
7	5500	1210	3200	700	3200	410	1400	190	1100	140
8	4800	1150	2800	670	2800	390	1200	190	1000	130
9	4200	1010	2500	600	2500	350	1100	180	900	130
10	3800	910	2200	530	2200	350	1000	160	800	130
11	3500	900	2000	530	2000	320	900	160	720	120
12	3200	900	1900	530	1900	300	800	160	660	110
13	2900	810	1700	480	1700	290	730	150	610	100
14	2700	760	1600	450	1600	290	680	140	570	90
16	2400	670	1400	390	1400	280	600	120	500	80
18	2100	670	1200	380	1200	270	530	120	440	70
20	1900	610	1100	350	1100	260	480	120	400	60
Depth of cut										

DC:Dia.

1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

IMPACT MIRACLE END MILL FOR DIFFICULT TO CUT MATERIALS, IRREGULAR HELIX

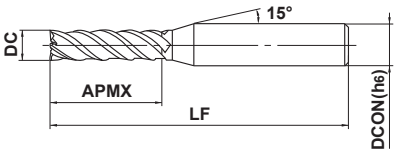
VFJHV

End mill, Semi long cut length, Irregular helix flutes

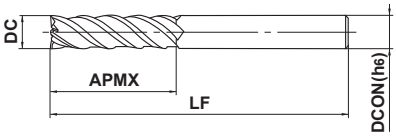
DC≤6 DC>6

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○	○		◎	◎		





Type1



Type2

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

Impact Miracle end mill with irregular helix flutes ensures stable machining of difficult-to-cut materials.
Suitable for deep machining with long axial depth of cut.

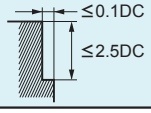
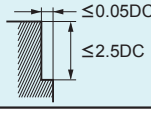
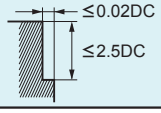
Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VFJHVD0200	2	8	60	6	4	●	1
VFJHV**D0300**	3	12	60	6	4	●	1
VFJHV**D0400**	4	16	60	6	4	●	1
VFJHV**D0500**	5	20	60	6	4	●	1
VFJHV**D0600**	6	24	60	6	4	●	2
VFJHV**D0800**	8	28	80	8	4	●	2
VFJHV**D1000**	10	35	90	10	4	●	2
VFJHV**D1200**	12	40	100	12	4	●	2
VFJHV**D1600**	16	55	125	16	4	●	2
VFJHV**D2000**	20	60	140	20	4	●	2

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	16000	530	10000	320	10000	300	7400	140	3800	55
3	12000	820	7600	470	7600	440	5600	280	2500	80
4	9500	950	6000	520	6000	510	4500	310	1900	110
5	7600	1000	4800	550	4800	540	3600	330	1500	110
6	6300	1100	4000	610	4000	600	3000	330	1300	110
8	4700	1100	3000	630	3000	600	2200	330	960	100
10	3800	1000	2400	610	2400	570	1800	310	760	100
12	3100	980	2000	580	2000	520	1500	280	640	80
16	2300	810	1500	480	1500	420	1100	240	480	65
20	1900	740	1200	430	1200	390	900	220	380	50
Depth of cut										

DC:Dia.

1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

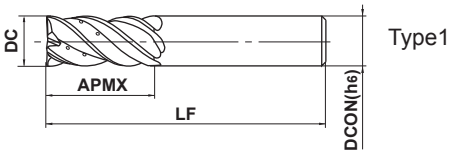
VFMHVCH

End mill, Medium cut length, 4 flute, Irregular helix flutes, with multiple internal through coolant holes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
				◎	◎		

CoolStar
END MILLS





Type1

16≤DC≤20				
0 - 0.03				
DCON=16	DCON=20			
0 - 0.011	0 - 0.013			

h6

Vibration control end mill with multiple internal through coolant holes ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VFMHVCHD1600	16	35	90	16	4	●	1
VFMHVCHD2000	20	45	110	20	4	●	1

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
16	2000	560	800	110
20	1600	510	600	100
Depth of cut	≤0.1DC, 0.5DC−1.5DC		≤0.05DC, 0.5DC−1.5DC	

DC:Dia.

Slotting

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)
16	1400	170
20	1100	130
Depth of cut	DC, 0.5DC−1.5DC	

DC:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

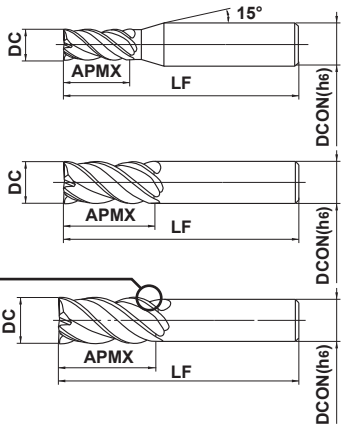
● : Inventory maintained in Japan.

VQMHV

End mill, Medium cutting length, 4 flute, Irregular helix flutes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	





DC≤12	DC>12			
0 - 0.020	0 - 0.030			
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	20≤DCON≤25	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

- Smart Miracle vibration control end mill achieving stable machining of difficult-to-cut materials and for long overhang applications.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VQMHVD0200	2	4	45	4	4	●	1
VQMHVD0250	2.5	5	45	4	4	●	1
VQMHVD0300	3	8	45	6	4	●	1
VQMHVD0350	3.5	8	45	6	4	●	1
VQMHVD0400	4	11	45	6	4	●	1
VQMHVD0500	5	13	50	6	4	●	1
VQMHVD0600	6	13	50	6	4	●	2
VQMHVD0700	7	19	60	8	4	●	1
VQMHVD0800	8	19	60	8	4	●	2
VQMHVD0900	9	22	70	10	4	●	1
NEW VQMHVD0900S08	9	22	75	8	4	●	3
VQMHVD1000	10	22	70	10	4	●	2
NEW VQMHVD1000S08	10	22	100	8	4	●	3
VQMHVD1100	11	26	75	12	4	●	1
NEW VQMHVD1100S10	11	26	100	10	4	●	3
VQMHVD1200	12	26	75	12	4	●	2
NEW VQMHVD1200S10	12	26	110	10	4	●	3
VQMHVD1300	13	26	75	12	4	●	3
NEW VQMHVD1300S12	13	26	110	12	4	●	3
VQMHVD1400	14	30	90	16	4	●	1
NEW VQMHVD1400S12	14	32	130	12	4	●	3
VQMHVD1600	16	35	90	16	4	●	2
VQMHVD1800	18	40	100	16	4	●	3
NEW VQMHVD1800S16	18	42	150	16	4	●	3
VQMHVD2000	20	45	110	20	4	●	2
VQMHVD2500	25	55	125	25	4	●	2

Note) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.

VQMHV

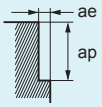
End mill, Medium length of cut, 4 flute, Irregular helix flutes

RECOMMENDED CUTTING CONDITIONS

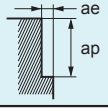
Side milling

The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.
The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V					Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH,17-4PH				
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
2	150	24000	2400	3	0.6	120	19000	1100	3	0.6	100	16000	830	3	0.6	75	12000	720	3	0.4
3	150	16000	2600	4.5	0.9	120	13000	1200	4.5	0.9	100	11000	880	4.5	0.9	75	8000	770	4.5	0.6
4	150	12000	2600	6	1.2	120	9500	1300	6	1.2	100	8000	900	6	1.2	75	6000	790	6	0.8
5	150	9500	2600	7.5	1.5	120	7600	1300	7.5	1.5	100	6400	900	7.5	1.5	75	4800	810	7.5	1
6	150	8000	2600	9	1.8	120	6400	1300	9	1.8	100	5300	1100	9	1.8	75	4000	810	9	1.2
8	150	6000	2500	12	2.4	120	4800	1300	12	2.4	100	4000	1200	12	2.4	75	3000	840	12	1.6
10	150	4800	2300	15	3	120	3800	1200	15	3	100	3200	1300	15	3	75	2400	770	15	2
12	150	4000	1900	18	3.6	120	3200	1200	18	3.6	100	2700	1200	18	3.6	75	2000	720	18	2.4
16	150	3000	1600	24	4.8	120	2400	960	24	4.8	100	2000	960	24	4.8	75	1500	600	24	3.2
20	150	2400	1300	30	6	120	1900	760	30	6	100	1600	770	30	6	75	1200	480	30	4
25	150	1900	1100	37.5	7.5	120	1500	600	37.5	7.5	100	1300	620	37.5	7.5	75	950	380	37.5	5
Depth of cut																				

General-purpose conditions

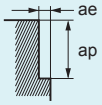
Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V					Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH,17-4PH				
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
2	120	19000	1300	3	0.6	100	16000	630	3	0.6	80	13000	450	1.5	0.2	70	11000	440	3	0.4
3	120	13000	1400	4.5	0.9	100	11000	700	4.5	0.9	80	8500	450	2.2	0.3	70	7400	470	4.5	0.6
4	120	9500	1400	6	1.2	100	8000	700	6	1.2	80	6400	470	3	0.6	70	5600	490	6	0.8
5	120	7600	1400	7.5	1.5	100	6400	710	7.5	1.5	80	5100	470	4.5	0.9	70	4500	500	7.5	1
6	120	6400	1400	9	1.8	100	5300	710	9	1.8	80	4200	580	6	1.2	70	3700	500	9	1.2
8	120	4800	1300	12	2.4	100	4000	740	12	2.4	80	3200	630	7.5	1.5	70	2800	520	12	1.6
10	120	3800	1200	15	3	100	3200	680	15	3	80	2500	660	9	1.8	70	2200	460	15	2
12	120	3200	1000	18	3.6	100	2700	640	18	3.6	80	2100	610	12	2.4	70	1900	450	18	2.4
16	120	2400	860	24	4.8	100	2000	530	24	4.8	80	1600	510	15	3	70	1400	370	24	3.2
20	120	1900	680	30	6	100	1600	420	30	6	80	1300	410	18	3.6	70	1100	290	30	4
25	120	1500	390	37.5	7.5	100	1300	340	37.5	7.5	80	1000	210	24	4.8	70	890	230	37.5	5
Depth of cut																				

1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used.
   An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
3) Chattering can still occur if the machine rigidity and clamping method are insufficient.
   In these cases the feed and speed should be reduced proportionately.
4) When the depth of cut is smaller than shown the revolution and feed rate can be increased.

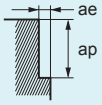
Side milling

The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.
The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Copper, Copper alloy					Heat resistant alloys Inconel718				
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
2	180	29000	2900	3	0.6	40	6400	230	3	0.2
3	180	19000	3000	4.5	0.9	40	4200	240	4.5	0.3
4	180	14000	3000	6	1.2	40	3200	240	6	0.4
5	180	11000	3000	7.5	1.5	40	2500	240	7.5	0.5
6	180	9500	3000	9	1.8	40	2100	250	9	0.6
8	180	7200	3000	12	2.4	40	1600	260	12	0.8
10	180	5700	2700	15	3	40	1300	290	15	1
12	180	4800	2300	18	3.6	40	1100	280	18	1.2
16	180	3600	1900	24	4.8	40	800	200	24	1.6
20	180	2900	1600	30	6	40	640	160	30	2
25	180	2300	1300	37	7.5	40	510	130	37.5	2.5
Depth of cut										

General-purpose conditions

Work material	Copper, Copper alloy					Heat resistant alloys Inconel718				
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
2	140	22000	1500	3	0.6	30	4800	110	3	0.2
3	140	15000	1600	4.5	0.9	30	3200	120	4.5	0.3
4	140	11000	1600	6	1.2	30	2400	120	6	0.4
5	140	8900	1600	7.5	1.5	30	1900	120	7.5	0.5
6	140	7400	1600	9	1.8	30	1600	130	9	0.6
8	140	5600	1600	12	2.4	30	1200	130	12	0.8
10	140	4500	1400	15	3	30	950	140	15	1
12	140	3700	1200	18	3.6	30	800	140	18	1.2
16	140	2800	1000	24	4.8	30	600	100	24	1.6
20	140	2200	780	30	6	30	480	81	30	2
25	140	1800	670	37.5	7.5	30	380	64	37.5	2.5
Depth of cut										

1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used.
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4) When the depth of cut is smaller than shown the revolution and feed rate can be increased.

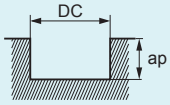
VQMHV

End mill, Medium length of cut, 4 flute, Irregular helix flutes

Slotting

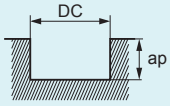
The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.
The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT				Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V				Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH, 17-4PH				Copper, Copper alloy				Heat resistant alloys Inconel718			
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
2	150	24000	1200	2	120	19000	610	2	100	16000	640	2	60	9500	300	1	180	29000	1500	2	30	4800	130	0.6
3	150	16000	1500	3	120	13000	730	3	100	11000	660	3	60	6400	360	1.5	180	19000	1700	3	30	3200	150	0.9
4	150	12000	1900	4	120	9500	910	4	100	8000	700	4	60	4800	460	2	180	14000	2200	4	30	2400	170	1.2
5	150	9500	1900	5	120	7600	910	5	100	6400	720	5	60	3800	460	2.5	180	11000	2200	5	30	1900	170	1.5
6	150	8000	1900	6	120	6400	1000	6	100	5300	740	6	60	3200	510	3	180	9500	2300	6	30	1600	180	1.8
8	150	6000	1700	8	120	4800	960	8	100	4000	800	8	60	2400	480	4	180	7200	2000	8	30	1200	190	2.4
10	150	4800	1500	10	120	3800	840	10	100	3200	900	10	60	1900	420	5	180	5700	1800	10	30	950	210	3
12	150	4000	1300	12	120	3200	770	12	100	2700	860	12	60	1600	380	6	180	4800	1500	12	30	800	200	3.6
16	150	3000	1100	12	120	2400	670	12	100	2000	640	12	60	1200	340	8	180	3600	1300	12	30	600	150	4.8
20	150	2400	860	12	120	1900	530	12	100	1600	510	12	60	950	270	10	180	2900	1000	12	30	480	120	6
25	150	1900	760	12	120	1500	420	12	100	1300	420	12	60	760	210	12	180	2300	920	12	30	380	100	7.5
Depth of cut																								

DC:Dia.

General-purpose conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT				Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V				Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH, 17-4PH				Copper, Copper alloy				Heat resistant alloys Inconel718			
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
2	100	16000	550	2	80	13000	270	2	60	9500	250	2	50	8000	170	1	120	19000	650	2	25	4000	74	0.6
3	100	11000	670	3	80	8500	310	3	60	6400	250	3	50	5300	200	1.5	120	13000	790	3	25	2700	86	0.9
4	100	8000	840	4	80	6400	410	4	60	4800	280	4	50	4000	250	2	120	9500	1000	4	25	2000	93	1.2
5	100	6400	840	5	80	5100	410	5	60	3800	280	5	50	3200	250	2.5	120	7600	1000	5	25	1600	95	1.5
6	100	5300	840	6	80	4200	440	6	60	3200	300	6	50	2700	290	3	120	6400	1000	6	25	1300	96	1.8
8	100	4000	740	8	80	3200	420	8	60	2400	320	8	50	2000	260	4	120	4800	890	8	25	990	100	2.4
10	100	3200	680	10	80	2500	360	10	60	1900	350	10	50	1600	230	5	120	3800	800	10	25	800	120	3
12	100	2700	570	12	80	2100	330	12	60	1600	340	12	50	1300	210	6	120	3200	680	12	25	660	110	3.6
16	100	2000	480	12	80	1600	300	12	60	1200	250	12	50	990	180	8	120	2400	570	12	25	500	84	4.8
20	100	1600	380	12	80	1300	240	12	60	950	200	12	50	800	150	10	120	1900	450	12	25	400	68	6
25	100	1300	340	12	80	1000	180	12	60	760	160	12	50	640	120	12	120	1500	400	12	25	320	50	7.5
Depth of cut																								

DC:Dia.

1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used.
   An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
3) Chattering can still occur if the machine rigidity and clamping method are insufficient.
   In these cases the feed and speed should be reduced proportionately.
4) When the depth of cut is smaller than shown the feed rate can be increased.

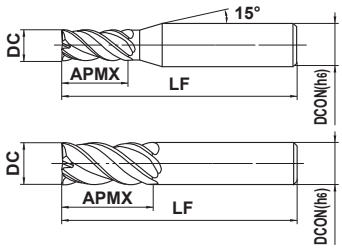
VQJHV NEW

End mill, Medium cut length, 4 flute, Irregular helix flutes

UWC VQ 38° 40° DC≤6 37.5° 40° DC>6

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	





DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

- Smart Miracle vibration control end mill achieving stable machining of difficult-to-cut materials and for long overhang applications.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VQJHVD0200	2	8	60	6	4	●	1
VQJHV**D0250**	2.5	10	60	6	4	●	1
VQJHV**D0300**	3	12	60	6	4	●	1
VQJHV**D0350**	3.5	14	60	6	4	●	1
VQJHV**D0400**	4	16	60	6	4	●	1
VQJHV**D0450**	4.5	18	60	6	4	●	1
VQJHV**D0500**	5	20	60	6	4	●	1
VQJHV**D0600**	6	24	60	6	4	●	2
VQJHV**D0700**	7	25	80	8	4	●	1
VQJHV**D0800**	8	28	80	8	4	●	2
VQJHV**D0900**	9	32	90	10	4	●	1
VQJHV**D1000**	10	35	90	10	4	●	2
VQJHV**D1200**	12	40	100	12	4	●	2
VQJHV**D1600**	16	55	125	16	4	●	2
VQJHV**D2000**	20	70	140	20	4	●	2

Note) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.

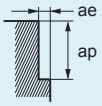
● : Inventory maintained in Japan.

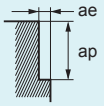
VQJHV NEW

End mill, Medium cut length, 4 flute, Irregular helix flutes

RECOMMENDED CUTTING CONDITIONS

Side milling

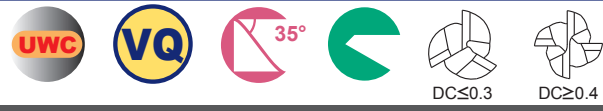
Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340					Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 306, Ti-6Al-4V					Hardened stainless steels, Cobaly chromium alloy SUS630, SUS631, 15-5PH, 17-4PH				
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
2	130	21000	700	5	0.2	100	16000	510	5	0.2	80	13000	390	5	0.1	75	12000	360	5	0.1
3	130	14000	960	7.5	0.3	100	11000	680	7.5	0.3	80	8500	490	7.5	0.15	75	8000	460	7.5	0.15
4	130	10000	1000	10	0.4	100	8000	690	10	0.4	80	6400	540	10	0.2	75	6000	510	10	0.2
5	130	8300	1100	12.5	0.5	100	6400	730	12.5	0.5	80	5100	570	12.5	0.25	75	4800	540	12.5	0.25
6	130	6900	1200	15	0.6	100	5300	810	15	0.6	80	4200	630	15	0.3	75	4000	600	15	0.3
8	130	5200	1200	20	0.8	100	4000	840	20	0.8	80	3200	640	20	0.4	75	3000	600	20	0.4
10	130	4100	1100	25	1	100	3200	810	25	1	80	2500	590	25	0.5	75	2400	570	25	0.5
12	130	3400	1100	30	1.2	100	2700	780	30	1.2	80	2100	550	30	0.6	75	2000	520	30	0.6
16	130	2600	920	40	1.6	100	2000	640	40	1.6	80	1600	450	40	0.8	75	1500	420	40	0.8
20	130	2100	820	50	2	100	1600	570	50	2	80	1300	420	50	1	75	1200	390	50	1
Depth of cut																				

Work material	Copper, Copper alloy					Heat resistant alloys Inconel718				
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
2	160	25000	830	5	0.2	40	6400	90	5	0.04
3	160	17000	1200	7.5	0.3	40	4200	130	7.5	0.06
4	160	13000	1300	10	0.4	40	3200	190	10	0.08
5	160	10000	1300	12.5	0.5	40	2500	180	12.5	0.1
6	160	8500	1500	15	0.6	40	2100	180	15	0.12
8	160	6400	1500	20	0.8	40	1600	170	20	0.16
10	160	5100	1300	25	1	40	1300	170	25	0.2
12	160	4200	1300	30	1.2	40	1100	140	30	0.24
16	160	3200	1100	40	1.6	40	800	110	40	0.32
20	160	2500	970	50	2	40	640	80	50	0.4
Depth of cut										

1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used.
   An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
3) Chattering can still occur if the machine rigidity and clamping method are insufficient.
   In these cases the feed and speed should be reduced proportionately.
4) When the depth of cut is smaller than shown the revolution and feed rate can be increased.

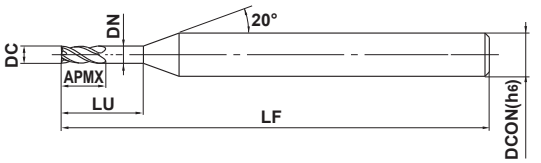
VQXL NEW

End mill, Short cut length, 4 flute, Long neck



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	





Type1

DC≤1				
0 - 0.010				
DCON=4				
0 - 0.005				

- The use of SMART MIRACLE Coating improves chip discharge dramatically.
- Multi-cutters at a small diameter of ϕ1 is realized.

Unit : mm

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VQXLD0020N006	0.2	0.3	0.6	0.18	40	4	3	●	1
VQXL**D0030N009**	0.3	0.5	0.9	0.28	40	4	3	●	1
VQXL**D0030N015**	0.3	0.5	1.5	0.28	40	4	3	●	1
VQXL**D0040N010**	0.4	0.6	1	0.37	40	4	4	●	1
VQXL**D0040N018**	0.4	0.6	1.8	0.37	40	4	4	●	1
VQXL**D0050N015**	0.5	0.7	1.5	0.47	40	4	4	●	1
VQXL**D0050N025**	0.5	0.7	2.5	0.47	40	4	4	●	1
VQXL**D0050N030**	0.5	0.7	3	0.47	40	4	4	●	1
VQXL**D0060N030**	0.6	0.9	3	0.57	40	4	4	●	1
VQXL**D0070N035**	0.7	1	3.5	0.67	40	4	4	●	1
VQXL**D0080N024**	0.8	1.2	2.4	0.77	40	4	4	●	1
VQXL**D0080N030**	0.8	1.2	3	0.77	40	4	4	●	1
VQXL**D0080N040**	0.8	1.2	4	0.77	40	4	4	●	1
VQXL**D0100N050**	1	1.5	5	0.96	40	4	4	●	1

Note) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.

Torque chart

Order Number	ISO 10664 Torque type
VQXLD0020N006	T4
VQXL**D0030N009**	T6
VQXL**D0030N015**	
VQXL**D0040N010**	T8
VQXL**D0040N018**	
VQXL**D0050N015**	T15
VQXL**D0050N025**	
VQXL**D0050N030**	
VQXL**D0080N024**	TS25
VQXL**D0080N040**	
VQXL**D0100N050**	T40

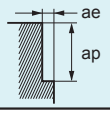
● : Inventory maintained in Japan.

VOXL NEW

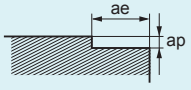
End mill, Short cut length, 4 flute, Long neck

RECOMMENDED CUTTING CONDITIONS

Side milling

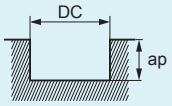
Work material		Carbon steel, Alloy steel, Austenitic stainless steels, Titanium alloys Cobaly chromium alloy, Copper, Copper alloy AISI 1045, AISI 4140, AISI 4340, AISI 304, AISI 316, AISI 304LN, AISI 316LN, Ti-6Al-4V					Heat resistant alloys, Pre-hardened steel, Hardened steel Inconel718, AISI P21, AISI P20, AISI H13, AISI L6, AISI 431, AISI 420				
Dia. **DC** (mm)	Neck Length **LU** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
0.2	**0.6**	25	40000	360	0.03	0.01	20	32000	290	0.03	0.01
0.3	**0.9**	40	40000	480	0.045	0.015	20	21000	250	0.045	0.015
0.3	**1.5**	40	40000	360	0.045	0.015	20	21000	190	0.045	0.015
0.4	**1.2**	50	40000	800	0.06	0.02	20	16000	320	0.06	0.02
0.4	**2**	50	40000	560	0.06	0.02	20	16000	220	0.06	0.025
0.5	**1.5**	60	38000	910	0.075	0.025	20	13000	310	0.075	0.025
0.5	**2.5**	60	38000	610	0.075	0.025	20	13000	210	0.075	0.025
0.5	**3**	60	38000	550	0.075	0.025	20	13000	180	0.075	0.025
0.6	**3**	60	32000	640	0.09	0.03	20	10500	210	0.09	0.03
0.7	**3.5**	60	27000	650	0.11	0.035	20	9100	200	0.11	0.035
0.8	**2.4**	60	24000	960	0.12	0.04	20	8000	260	0.12	0.04
0.8	**3**	60	24000	860	0.12	0.04	20	8000	230	0.12	0.04
0.8	**4**	60	24000	670	0.12	0.04	20	8000	190	0.12	0.04
1	**5**	60	20000	800	0.15	0.05	20	6500	210	0.15	0.05
Depth of cut											

Bottom face milling

Work material		Carbon steel, Alloy steel, Austenitic stainless steels, Titanium alloys Cobaly chromium alloy, Copper, Copper alloy AISI 1045, AISI 4140, AISI 4340, AISI 304, AISI 316, AISI 304LN, AISI 316LN, Ti-6Al-4V					Heat resistant alloys, Pre-hardened steel, Hardened steel Inconel718, AISI P21, AISI P20, AISI H13, AISI L6, AISI 431, AISI 420				
Dia. **DC** (mm)	Neck Length **LU** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
0.2	**0.6**	25	40000	360	0.015	≤0.2	20	32000	290	0.015	≤0.1
0.3	**0.9**	40	40000	480	0.025	≤0.3	20	21000	250	0.025	≤0.15
0.3	**1.5**	40	40000	360	0.02	≤0.3	20	21000	190	0.02	≤0.15
0.4	**1.2**	50	40000	800	0.03	≤0.4	20	16000	320	0.03	≤0.2
0.4	**2**	50	40000	560	0.02	≤0.4	20	16000	220	0.02	≤0.2
0.5	**1.5**	60	38000	910	0.04	≤0.5	20	13000	310	0.04	≤0.25
0.5	**2.5**	60	38000	610	0.03	≤0.5	20	13000	210	0.03	≤0.25
0.5	**3**	60	38000	550	0.03	≤0.5	20	13000	180	0.03	≤0.25
0.6	**3**	60	32000	640	0.035	≤0.6	20	10500	210	0.035	≤0.3
0.7	**3.5**	60	27000	640	0.035	≤0.7	20	9100	190	0.035	≤0.35
0.8	**2.4**	60	24000	960	0.06	≤0.8	20	8000	260	0.06	≤0.4
0.8	**3**	60	24000	840	0.05	≤0.8	20	8000	230	0.05	≤0.4
0.8	**4**	60	24000	670	0.04	≤0.8	20	8000	190	0.04	≤0.4
1	**5**	60	20000	800	0.05	≤1	20	6500	210	0.05	≤0.5
Depth of cut											

1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
3) When the depth of cut is smaller than shown the revolution and feed rate can be increased.

Slotting

Work material		Carbon steel, Alloy steel, Austenitic stainless steels, Titanium alloys Cobaly chromium alloy, Copper, Copper alloy AISI 1045, AISI 4140, AISI 4340, AISI 304, AISI 306, AISI 304LN, AISI 316LN, Ti-6Al-4V				Heat resistant alloys, Pre-hardened steel, Hardened steel Inconel718, AISI P21, AISI P20, AISI H13, AISI L6, AISI 431, AISI 420			
Dia. **DC** (mm)	Neck Length **LU** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
0.2	**0.6**	20	30000	270	0.03	15	24000	220	0.03
0.3	**0.9**	30	30000	360	0.045	14	15000	180	0.045
0.3	**1.5**	30	30000	270	0.045	14	15000	140	0.045
0.4	**1.2**	40	30000	600	0.06	15	12000	240	0.06
0.4	**2**	40	30000	420	0.06	15	12000	170	0.06
0.5	**1.5**	45	28000	670	0.075	15	9500	230	0.075
0.5	**2.5**	45	28000	450	0.075	15	9500	150	0.075
0.5	**3**	45	28000	390	0.075	15	9500	130	0.075
0.6	**3**	45	24000	480	0.09	15	7800	160	0.09
0.7	**3.5**	45	20000	480	0.11	15	6800	140	0.11
0.8	**2.4**	45	18000	720	0.12	15	6000	190	0.12
0.8	**3**	45	18000	650	0.12	15	6000	170	0.12
0.8	**4**	45	18000	500	0.12	15	6000	140	0.12
1	**5**	45	15000	600	0.15	15	4800	150	0.15
Depth of cut									

DC:Dia.

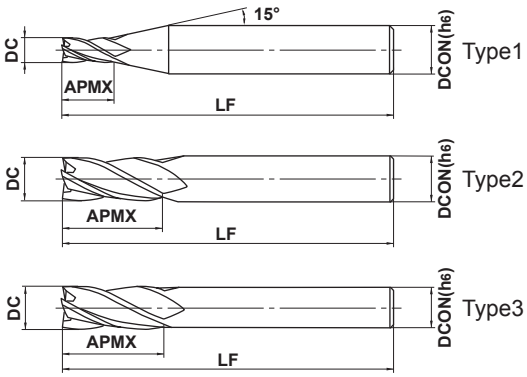
1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
3) When the depth of cut is small, the feed rate can be increased.

VC4MC

End mill, Medium cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	○	○	○		





DC≤12	DC>12			
0 - 0.020	0 - 0.030			
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	20≤DCON≤25	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

● 4 flute end mill for general use.

Unit : mm

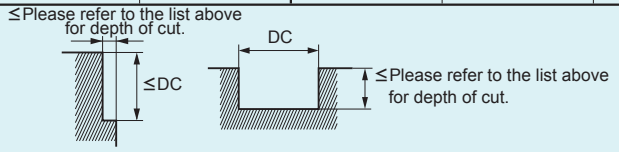
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VC4MCD0200	2	6	40	4	4	●	1
VC4MCD0250	2.5	8	40	4	4	●	1
VC4MCD0300	3	8	45	6	4	●	1
VC4MCD0350	3.5	10	45	6	4	●	1
VC4MCD0400	4	11	45	6	4	●	1
VC4MCD0450	4.5	11	45	6	4	●	1
VC4MCD0500	5	13	50	6	4	●	1
VC4MCD0550	5.5	13	50	6	4	●	1
VC4MCD0600	6	13	50	6	4	●	2
VC4MCD0650	6.5	16	60	8	4	●	1
VC4MCD0700	7	16	60	8	4	●	1
VC4MCD0750	7.5	16	60	8	4	●	1
VC4MCD0800	8	19	60	8	4	●	2
VC4MCD0850	8.5	19	70	10	4	●	1
VC4MCD0900	9	19	70	10	4	●	1
VC4MCD0950	9.5	19	70	10	4	●	1
VC4MCD1000	10	22	70	10	4	●	2
VC4MCD1050	10.5	22	75	12	4	●	1
VC4MCD1100	11	22	75	12	4	●	1
VC4MCD1150	11.5	22	75	12	4	●	1
VC4MCD1200	12	26	75	12	4	●	2
VC4MCD1250	12.5	26	75	12	4	●	3
VC4MCD1300	13	26	75	12	4	●	3
VC4MCD1400	14	26	75	12	4	●	3
VC4MCD1500	15	30	80	16	4	●	1
VC4MCD1600	16	32	90	16	4	●	2
VC4MCD1700	17	32	90	16	4	●	3
VC4MCD1800	18	32	90	16	4	●	3
VC4MCD1900	19	32	100	20	4	●	1
VC4MCD2000	20	38	100	20	4	●	2
VC4MCD2200	22	38	100	20	4	●	3
VC4MCD2400	24	45	120	25	4	●	1
VC4MCD2500	25	45	120	25	4	●	2

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45—55HRC) AISI H13		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
2	30000	4500	0.18	24000	3600	0.10
2.5	24000	3900	0.25	19000	3000	0.13
3	20000	3500	0.30	16000	2700	0.15
4	15000	3000	0.40	12000	2400	0.20
5	12000	2400	0.50	9000	1800	0.25
6	10000	2100	0.60	7000	1470	0.30
8	8000	1500	0.80	5600	1050	0.40
10	6400	1400	1.00	4500	950	0.50
12	5400	1200	1.00	3800	860	0.50
16	2400	550	2.00	1200	120	0.80
20	1900	480	3.00	1000	100	1.00

Depth of cut



DC:Dia.

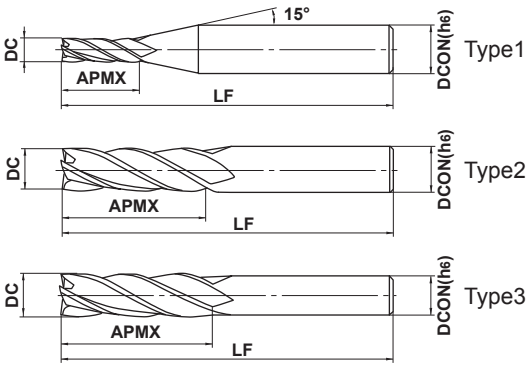
1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) When slotting with end mills with ϕ3 or larger, reduce the revolution to 50—70% and the feed rate to 40—60%.
3) When drilling, please set the feed rate at 1/3 or below the values above.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VC4JC

End mill, Semi long cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	○	○	○		





DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=6	8≤DCON≤10	12≤DCON≤16	20≤DCON≤25	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

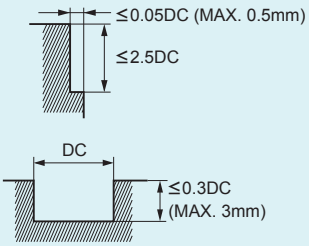
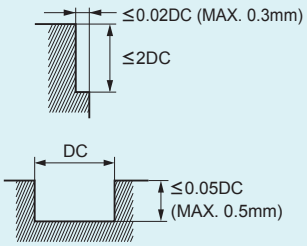
● 4 flute end mill for general use.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VC4JCD0300	3	12	50	6	4	●	1
VC4JCD0350	3.5	15	50	6	4	●	1
VC4JCD0400	4	15	50	6	4	●	1
VC4JCD0450	4.5	15	50	6	4	●	1
VC4JCD0500	5	20	60	6	4	●	1
VC4JCD0550	5.5	20	60	6	4	●	1
VC4JCD0600	6	20	60	6	4	●	2
VC4JCD0650	6.5	25	70	8	4	●	1
VC4JCD0700	7	25	70	8	4	●	1
VC4JCD0750	7.5	25	70	8	4	●	1
VC4JCD0800	8	25	70	8	4	●	2
VC4JCD0850	8.5	25	90	10	4	●	1
VC4JCD0900	9	25	90	10	4	●	1
VC4JCD0950	9.5	25	90	10	4	●	1
VC4JCD1000	10	30	90	10	4	●	2
VC4JCD1050	10.5	30	90	12	4	●	1
VC4JCD1100	11	30	90	12	4	●	1
VC4JCD1150	11.5	30	90	12	4	●	1
VC4JCD1200	12	30	90	12	4	●	2
VC4JCD1300	13	35	90	12	4	●	3
VC4JCD1400	14	40	110	16	4	●	1
VC4JCD1500	15	40	110	16	4	●	1
VC4JCD1600	16	50	110	16	4	●	2
VC4JCD1700	17	50	110	20	4	●	1
VC4JCD1800	18	50	110	20	4	●	1
VC4JCD1900	19	55	110	20	4	●	1
VC4JCD2000	20	55	110	20	4	●	2
VC4JCD2200	22	65	140	25	4	●	1
VC4JCD2400	24	75	140	25	4	●	1
VC4JCD2500	25	75	140	25	4	●	2

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	4200	110	3400	95	2600	70	2100	50
4	3400	140	2700	110	2100	85	1700	60
5	2900	170	2300	140	1800	100	1500	70
6	2500	200	2000	170	1500	130	1300	85
8	1900	220	1500	170	1200	150	1000	85
10	1600	220	1300	170	950	130	800	85
12	1300	170	1100	150	800	100	670	70
16	1000	140	820	110	600	80	500	50
20	800	110	650	85	480	70	400	40
25	650	85	520	70	380	50	320	35
Depth of cut								

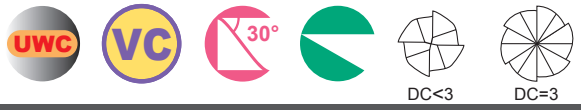
DC:Dia.

1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) The above table shows cutting conditions for standard side milling. For slotting, please reduce the feed rate only to 50% of the table figure. Please set the revolution rate at 60% and the feed rate at 40% when slotting austenitic stainless steels.
4) When drilling, please set the feed rate at 1/3 or below the values above.
5) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MIRACLE END MILL FOR HIGH HARDNESS STEEL

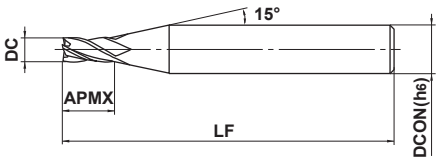
VCMDSC

End mill, Medium cut length, 4—6 flute



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎				





Type1

h6	0.5≤DC≤3				
	0 - 0.020				
	DCON=6				
	0 - 0.008				

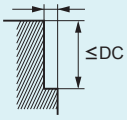
● Ideal for tool steel and hardened materials machining

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VCMDSCD0050	0.5	1	45	6	4	●	1
VCMDSCD0100	1	2.5	45	6	4	●	1
VCMDSCD0150	1.5	4	45	6	4	●	1
VCMDSCD0200	2	6	45	6	4	●	1
VCMDSCD0250	2.5	8	45	6	4	●	1
VCMDSCD0300	3	8	45	6	6	●	1

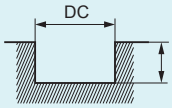
● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material	Hardened steel (45－55HRC) AISI H13			Hardened steel (55－62HRC) AISI D2		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
0.5	40000	2000	0.03	30000	600	0.02
1	40000	3000	0.05	20000	900	0.03
1.5	40000	5000	0.08	18000	1100	0.05
2	40000	5600	0.10	16000	1300	0.06
3	34000	5600	0.15	13000	1600	0.09
Depth of cut	≤Please refer to the list above for depth of cut.  DC:Dia.					

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) The above condition are for shoulder milling. For slotting ϕ3 or larger diameters, set the revolution, feed rate and depth of cut at 20－40% of the table figures.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

Slot milling with small diameter tools

Work material	Hardened steel (45－55HRC) AISI H13			Hardened steel (55－62HRC) AISI D2		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
0.5	20000	200	0.05	15000	90	0.03
1	15000	300	0.1	11000	110	0.05
1.5	10000	280	0.15	7500	150	0.07
2	8000	320	0.2	6000	190	0.1
Depth of cut	 Please refer to the list above for depth of cut. DC:Dia.					

1) Air blow or oil mist is recommended for good chip evacuation.

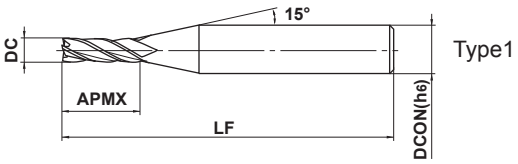
MIRACLE END CRN

CRN4JC

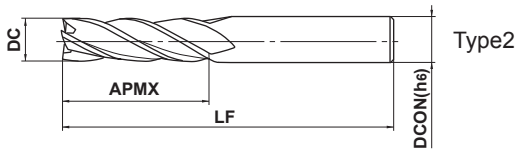
End mill, Semi long cut length, 4 flute, For copper electrodes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
						◎	○





Type1



Type2

3≤DC≤12				
0 - 0.02				
DCON=6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

h6

● 4 flute end mill with CRN coating for copper electrode machining.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
CRN4JCD0300	3	12	50	6	4	●	1
CRN4JC**D0400**	4	15	50	6	4	●	1
CRN4JC**D0500**	5	20	60	6	4	●	1
CRN4JC**D0600**	6	20	60	6	4	●	2
CRN4JC**D0800**	8	25	70	8	4	●	2
CRN4JC**D1000**	10	30	90	10	4	●	2
CRN4JC**D1200**	12	30	90	12	4	●	2

RECOMMENDED CUTTING CONDITIONS

Work material	Copper, Copper alloys	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)
3	10600	280
4	8000	330
5	6400	380
6	5300	420
8	4000	460
10	3200	460
12	2700	460
Depth of cut	≤0.05DC (MAX. 0.5mm) ≤2.5DC DC:Dia.	

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Water-soluble cutting fluid is recommended.
3) When drilling, please set the feed rate at 1/3 or below of the table value.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

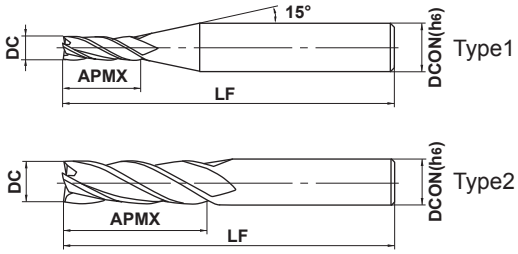
● : Inventory maintained in Japan.

DF4JC

End mill, Semi long cut length, 4 flute, For graphite

Aluminium Alloy	Copper Alloy	Graphite	GFRP CFRP	Machineable Ceramics
○	◎	◎	○	○





3≤DC≤12				
0 -0.02				
DCON=6	8≤DCON≤10	DCON=12		
0 -0.008	0 -0.009	0 -0.011		

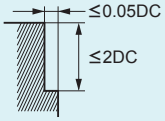
h6

- 4 flute end mill with original diamond coating for graphite machining.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
DF4JCD0300	3	12	60	6	4	●	1
DF4JC**D0400**	4	16	60	6	4	●	1
DF4JC**D0600**	6	24	60	6	4	●	2
DF4JC**D0800**	8	28	70	8	4	●	2
DF4JC**D1000**	10	35	90	10	4	●	2
DF4JC**D1200**	12	36	110	12	4	●	2

RECOMMENDED CUTTING CONDITIONS

Work material	Graphite				Copper, Copper alloys			
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut (mm)	Cutting Width (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut (mm)	Cutting Width (mm)
3	22000	2500	6	0.15	10600	280	6	0.15
4	18000	2900	8	0.2	8000	330	8	0.2
6	14000	3200	12	0.3	6400	380	12	0.3
8	10500	2900	16	0.4	4000	420	16	0.4
10	8700	2600	20	0.5	3200	460	20	0.5
12	7200	2200	24	0.6	2700	460	24	0.6
Depth of cut	 ≤0.05DC ≤2DC DC:Dia.							

1) When high machining accuracy is needed, or the workpiece becomes chipped, we recommend lowering the feed rate.
2) Use a milling machine dedicated for graphite.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

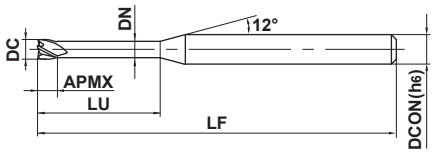
DF4XL

End mill, Long neck, 4 flute, For graphite

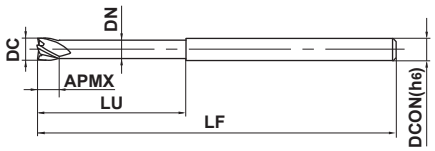
UWC DF 30° DC<3 DC=3

Aluminium Alloy	Copper Alloy	Graphite	GFRP CFRP	Machineable Ceramics
○	◎	◎	○	○





Type1



Type2

1≤DC≤12				
0 - 0.02				
4≤DCON≤6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

h6

● 4 flute long neck end mill with original diamond coating for graphite machining.

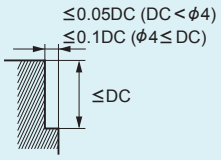
Unit : mm

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
DF4XLD0100N060	1	1.5	6	0.94	50	4	4	●	1
DF4XLD0100N080	1	1.5	8	0.94	50	4	4	●	1
DF4XLD0100N100	1	1.5	10	0.94	50	4	4	●	1
DF4XLD0150N100	1.5	2.3	10	1.44	60	4	4	●	1
DF4XLD0150N160	1.5	2.3	16	1.44	60	4	4	●	1
DF4XLD0200N100	2	3	10	1.9	60	4	4	●	1
DF4XLD0200N160	2	3	16	1.9	60	4	4	●	1
DF4XLD0200N200	2	3	20	1.9	60	4	4	●	1
DF4XLD0300N160	3	4.5	16	2.9	70	4	4	●	1
DF4XLD0300N200	3	4.5	20	2.9	70	4	4	●	1
DF4XLD0300N300	3	4.5	30	2.9	70	4	4	●	1
DF4XLD0400N200	4	6	20	3.9	80	4	4	●	2
DF4XLD0400N400	4	6	40	3.9	80	4	4	●	2
DF4XLD0600N300	6	9	30	5.85	70	6	4	●	2
DF4XLD0800N300	8	12	30	7.85	90	8	4	●	2
DF4XLD1000N300	10	15	30	9.7	90	10	4	●	2
DF4XLD1200N300	12	18	30	11.7	110	12	4	●	2

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Side milling

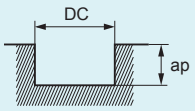
Work material		Graphite				Copper, Copper alloys			
Dia. **DC** (mm)	Neck length **LU** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut (mm)	Cutting Width (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut (mm)	Cutting Width (mm)
1	**6**	30000	1300	1	0.05	30000	1300	1	0.05
	8	25000	1000	1	0.05	25000	1000	1	0.05
	10	22000	700	1	0.05	22000	700	1	0.05
1.5	**10**	25000	1200	1.5	0.075	21000	1000	1.5	0.075
	16	18000	800	1.5	0.075	18000	800	1.5	0.075
2	**10**	22000	1500	2	0.1	16000	1100	2	0.1
	16	19000	1100	2	0.1	16000	930	2	0.1
	20	16000	800	2	0.1	16000	800	2	0.1
3	**16**	21000	1900	3	0.15	10600	960	3	0.15
	20	18000	1500	3	0.15	10600	890	3	0.15
	30	14000	1000	3	0.15	10600	760	3	0.15
4	**20**	18000	2400	4	0.4	8000	1100	4	0.4
	40	13000	1500	4	0.4	8000	920	4	0.4
6	**30**	14000	3200	6	0.6	5300	1200	6	0.6
8	**30**	10500	2900	8	0.8	4000	1100	8	0.8
10	**30**	8700	2600	10	1.0	3200	960	10	1.0
12	**30**	7200	2200	12	1.2	2650	800	12	1.2
Depth of cut		 DC:Dia.							

1) When high machining accuracy is needed, or the workpiece becomes chipped, we recommend lowering the feed rate.
2) Use a milling machine dedicated for graphite.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

DF4XL

End mill, Long neck, 4 flute, For graphite

Slotting

Work material		Graphite			Copper, Copper alloys		
Dia. **DC** (mm)	Neck length **LU** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of Cut (mm)
1	**6**	30000	1000	0.1	30000	980	0.1
	8	25000	700	0.08	25000	700	0.08
	10	22000	500	0.06	22000	500	0.06
1.5	**10**	25000	1100	0.14	21000	750	0.14
	16	18000	600	0.1	18000	600	0.1
2	**10**	22000	1200	0.2	16000	820	0.2
	16	19000	800	0.16	16000	700	0.16
	20	16000	600	0.12	16000	600	0.12
3	**16**	21000	1400	0.3	10600	720	0.3
	20	18000	1100	0.25	10600	670	0.25
	30	14000	700	0.2	10600	570	0.2
4	**20**	18000	1800	0.5	8000	820	0.5
	40	13000	900	0.4	8000	690	0.4
6	**30**	14000	2300	1.2	5300	900	1.2
8	**30**	10500	2000	2.0	4000	820	2.0
10	**30**	8700	1900	3.0	3200	720	3.0
12	**30**	7200	1700	4.0	2650	600	4.0
Depth of cut		 DC:Dia.					

1) When high machining accuracy is needed, or the workpiece becomes chipped, we recommend lowering the feed rate.
2) Use a milling machine dedicated for graphite.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

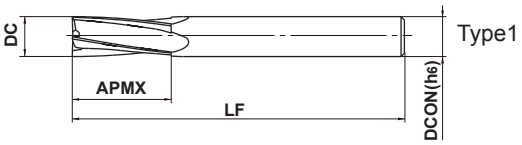
DFC4JC

Diamond coating endmill, 4 flute

CFRP

◎





6≤DC≤12				
0 - 0.03				
DCON=6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

h6

● 4 flute end mill with original CVD diamond coating for CFRP machining.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
DFC4JCD0600	6	20	70	6	4	●	1
DFC4JC**D0800**	8	30	80	8	4	●	1
DFC4JC**D1000**	10	30	90	10	4	●	1
DFC4JC**D1200**	12	30	100	12	4	●	1

Note) Please contact Mitsubishi Materials for geometries and through coolant types that are non-standard.

RECOMMENDED CUTTING CONDITIONS

Work material	CFRP	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)
6	11000	950
8	8000	780
10	6400	700
12	5300	650

1) Cutting conditions may differ considerably due to the kind of CFRP, the rigidity of the machine, or the clamping and geometry of the workpiece. Please use the above table as a guideline.
2) When high machining accuracy is needed or if large burrs or delamination occur, we recommend reducing the feed rate.
3) When the depth of cut is greater than 0.8DC, we recommend reducing the feed rate.
4) Please take precautions against dust.

● : **Inventory maintained in Japan.**

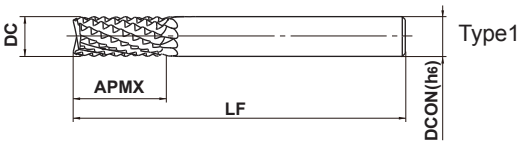
DFCJRT

Diamond coating endmill with cross-nick

CFRP

◎





h6

DCON=6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

Cross-nick type end mill with original CVD diamond coating for CFRP machining.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
DFCJRTD0600	6	20	70	6	10	●	1
DFCJRT**D0800**	8	30	80	8	10	●	1
DFCJRT**D1000**	10	30	90	10	12	●	1
DFCJRT**D1200**	12	30	100	12	12	●	1

Note) Please contact Mitsubishi Materials for geometries and through coolant types that are non-standard.

RECOMMENDED CUTTING CONDITIONS

Work material	CFRP	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)
6	11000	1200
8	8000	1000
10	6400	900
12	5300	850

1) Cutting conditions may differ considerably due to the kind of CFRP, the rigidity of the machine, or the clamping and geometry of the workpiece. Please use the above table as a guideline.
2) When high machining accuracy is needed or if large burrs or delamination occur, we recommend reducing the feed rate.
3) When the depth of cut is greater than 0.8DC, we recommend reducing the feed rate.
4) Please take precautions against dust.

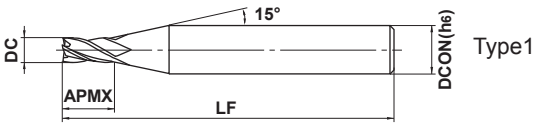
● : Inventory maintained in Japan.

C4MC

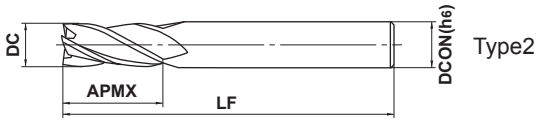
End mill, Medium cut length, 4 flute, Center cutting

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○			○	○	○	○

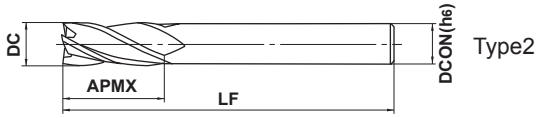




Type1



Type2



Type2

h6

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

● 4 flute uncoated center cutting end mill for general use.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
C4MCD0300	3	8	45	6	4	●	1
C4MC**D0350**	3.5	10	45	6	4	●	1
C4MC**D0400**	4	11	45	6	4	●	1
C4MC**D0450**	4.5	11	45	6	4	●	1
C4MC**D0500**	5	13	50	6	4	●	1
C4MC**D0550**	5.5	13	50	6	4	●	1
C4MC**D0600**	6	13	50	6	4	●	2
C4MC**D0650**	6.5	16	60	8	4	●	1
C4MC**D0700**	7	16	60	8	4	●	1
C4MC**D0750**	7.5	16	60	8	4	●	1
C4MC**D0800**	8	19	60	8	4	●	2
C4MC**D0850**	8.5	19	70	10	4	●	1
C4MC**D0900**	9	19	70	10	4	●	1
C4MC**D0950**	9.5	19	70	10	4	●	1
C4MC**D1000**	10	22	70	10	4	●	2
C4MC**D1050**	10.5	22	75	12	4	●	1
C4MC**D1100**	11	22	75	12	4	●	1
C4MC**D1150**	11.5	22	75	12	4	●	1
C4MC**D1200**	12	26	75	12	4	●	2
C4MC**D1250**	12.5	26	75	12	4	●	3
C4MC**D1300**	13	26	75	12	4	●	3
C4MC**D1400**	14	26	75	12	4	●	3
C4MC**D1500**	15	30	80	16	4	●	1
C4MC**D1600**	16	32	90	16	4	●	2
C4MC**D1700**	17	32	90	16	4	●	3
C4MC**D1800**	18	32	90	16	4	●	3
C4MC**D1900**	19	32	100	20	4	●	1
C4MC**D2000**	20	38	100	20	4	●	2

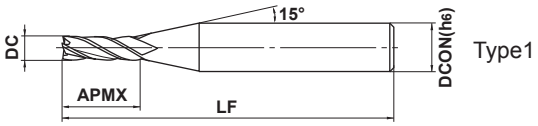
CARBIDE END MILLS

C4JC

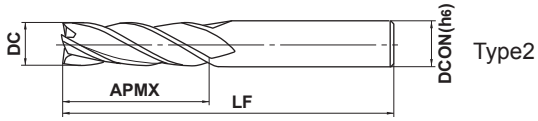
End mill, Semi long cut length, 4 flute, Center cutting

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○			○	○	○	○

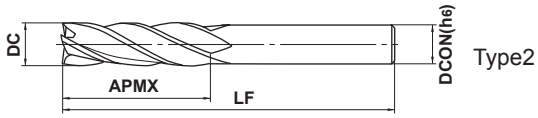




Type1



Type2



Type2

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=6	8≤DCON≤10	12≤DCON≤16	20≤DCON≤25	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

● 4 flute uncoated end mill for general use.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
C4JCD0300	3	12	50	6	4	●	1
C4JCD0350	3.5	15	50	6	4	●	1
C4JCD0400	4	15	50	6	4	●	1
C4JCD0450	4.5	15	50	6	4	●	1
C4JCD0500	5	20	60	6	4	●	1
C4JCD0550	5.5	20	60	6	4	●	1
C4JCD0600	6	20	60	6	4	●	2
C4JCD0650	6.5	25	70	8	4	●	1
C4JCD0700	7	25	70	8	4	●	1
C4JCD0750	7.5	25	70	8	4	●	1
C4JCD0800	8	25	70	8	4	●	2
C4JCD0850	8.5	25	90	10	4	●	1
C4JCD0900	9	25	90	10	4	●	1
C4JCD0950	9.5	25	90	10	4	●	1
C4JCD1000	10	30	90	10	4	●	2
C4JCD1050	10.5	30	90	12	4	●	1
C4JCD1100	11	30	90	12	4	●	1
C4JCD1150	11.5	30	90	12	4	●	1
C4JCD1200	12	30	90	12	4	●	2
C4JCD1300	13	35	90	12	4	●	3
C4JCD1400	14	40	110	16	4	●	1
C4JCD1500	15	40	110	16	4	●	1
C4JCD1600	16	50	110	16	4	●	2
C4JCD1700	17	50	110	20	4	●	1
C4JCD1800	18	50	110	20	4	●	1
C4JCD1900	19	55	110	20	4	●	1
C4JCD2000	20	55	110	20	4	●	2
C4JCD2200	22	65	140	25	4	●	1
C4JCD2400	24	75	140	25	4	●	1
C4JCD2500	25	75	140	25	4	●	2

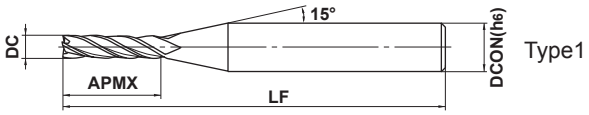
● : Inventory maintained in Japan.

C4LC

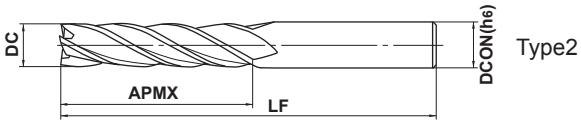
End mill, Long cut length, 4 flute, Center cutting

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○			○	○	○	○

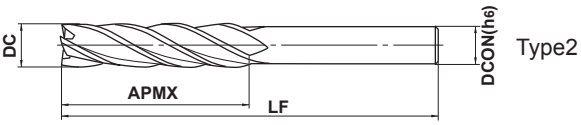




Type1



Type2



Type2

h6

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

● 4 flute end mill with longer cut length than standard.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
C4LCD0300	3	20	60	6	4	●	1
C4LC**D0350**	3.5	22	60	6	4	●	1
C4LC**D0400**	4	25	60	6	4	●	1
C4LC**D0450**	4.5	25	60	6	4	●	1
C4LC**D0500**	5	30	70	6	4	●	1
C4LC**D0550**	5.5	30	70	6	4	●	1
C4LC**D0600**	6	30	70	6	4	●	2
C4LC**D0650**	6.5	30	90	8	4	●	1
C4LC**D0700**	7	40	90	8	4	●	1
C4LC**D0750**	7.5	40	90	8	4	●	1
C4LC**D0800**	8	40	90	8	4	●	2
C4LC**D0850**	8.5	40	100	10	4	●	1
C4LC**D0900**	9	40	100	10	4	●	1
C4LC**D0950**	9.5	40	100	10	4	●	1
C4LC**D1000**	10	50	100	10	4	●	2
C4LC**D1050**	10.5	50	110	12	4	●	1
C4LC**D1100**	11	50	110	12	4	●	1
C4LC**D1150**	11.5	50	110	12	4	●	1
C4LC**D1200**	12	50	110	12	4	●	2
C4LC**D1250**	12.5	50	120	12	4	●	3
C4LC**D1300**	13	50	120	12	4	●	3
C4LC**D1400**	14	70	130	16	4	●	1
C4LC**D1500**	15	70	130	16	4	●	1
C4LC**D1600**	16	70	130	16	4	●	2
C4LC**D1700**	17	70	140	20	4	●	1
C4LC**D1800**	18	70	140	20	4	●	1
C4LC**D1900**	19	70	140	20	4	●	1
C4LC**D2000**	20	70	140	20	4	●	2

CARBIDE END MILLS

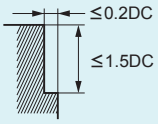
End mill, Medium cut length, 4 flute, Center cutting **C4MC**

End mill, Semi long cut length, 4 flute, Center cutting **C4JC** 1)

End mill, Long cut length, 4 flute, Center cutting **C4LC** 2)

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1050, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—45HRC) AISI P20, AISI H13, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 316	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	4100	150	3500	130	2800	100	2300	90
4	3400	260	2900	210	2200	140	1900	120
5	2900	290	2400	230	1800	150	1500	135
6	2500	300	2100	260	1600	170	1300	140
8	1900	300	1600	260	1200	160	1000	150
10	1500	270	1250	230	950	140	800	135
12	1250	230	1050	200	800	120	660	110
16	940	170	800	140	600	90	500	80
20	750	140	640	120	480	75	400	70
Depth of cut	(C4MC)  ≤0.2DC ≤1.5DC DC:Dia.							

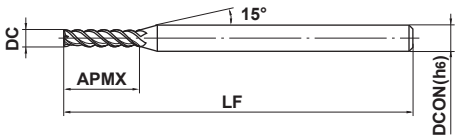
1) Decrease the feed rate by 20—30% for C4JC.
2) Decrease the revolution by 20—30% and the feed rate by 40—50% for C4LC.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

SEE4L

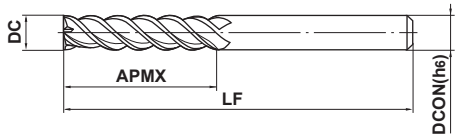
End mill, Long cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○





Type1



Type2

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=6	8≤DCON≤10	12≤DCON≤16	20≤DCON≤25	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

4 flute high helix end mill.

Unit : mm

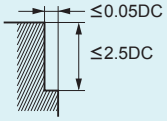
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
SEE4030L	3	15	55	6	4	●	1
SEE**4040L**	4	20	60	6	4	●	1
SEE**4050L**	5	25	65	6	4	●	1
SEE**4060L**	6	25	65	6	4	●	2
SEE**4070L**	7	35	80	8	4	●	1
SEE**4080L**	8	35	80	8	4	●	2
SEE**4090L**	9	45	90	10	4	●	1
SEE**4100L**	10	45	95	10	4	●	2
SEE**4110L**	11	55	105	12	4	●	1
SEE**4120L**	12	55	105	12	4	●	2
SEE**4140L**	14	70	125	16	4	●	1
SEE**4150L**	15	70	125	16	4	●	1
SEE**4160L**	16	70	125	16	4	●	2
SEE**4180L**	18	70	125	20	4	●	1
SEE**4200L**	20	75	140	20	4	●	2
SEE**4250L**	25	85	160	25	4	●	2

● : Inventory maintained in Japan.

SEE4L

End mill, Long cut length, 4 flute

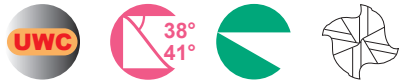
RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Alloy steel (180−280HB) AISI 1045, AISI P20		Carbon steel, Alloy steel (280−380HB) AISI 1045, AISI P20		Pre-hardened steel (35−45HRC)		Stainless steel (270HB≥) AISI 420		Cast iron (Tensile Strength 350MPa≥) AISI No 35 B	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	3400	150	3000	60	2100	30	2600	60	5500	240
4	2400	170	2200	90	1600	50	1900	80	4200	270
5	2000	180	1800	90	1300	60	1500	80	3300	300
6	1600	180	1500	90	1000	60	1300	80	2800	320
8	1200	170	1100	90	800	60	960	80	2100	320
10	1000	150	880	90	640	60	760	80	1600	320
12	800	150	760	110	520	60	640	90	1400	320
14	720	150	640	110	480	60	560	110	1200	320
16	600	140	560	110	400	60	480	110	1000	330
18	560	140	480	120	360	60	440	110	960	330
20	480	120	440	120	320	60	400	110	840	350
25	400	120	360	110	240	50	320	90	680	330
Depth of cut	 DC:Dia.									

1) The cutting conditions above are a guide only to milling within the standard depth of cut.
2) Ductile cast iron milling has the same cutting conditions as carbon steel and alloy steel. (180−280HB)
3) When drilling, please set the feed rate at 1/3 or below of the values above.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

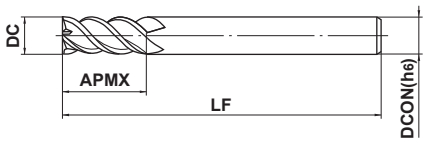
SEG4SA

End mill, Medium cut length, 4 flute, Irregular spiral helix angle, For aluminium alloy



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
						○	◎





Type1

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=6	8≤DCON≤10	12≤DCON≤16	20≤DCON≤25	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

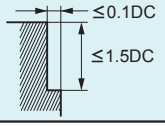
● 4 flute end mill with irregular helix angle for aluminium alloy.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
SEG4060SA	6	14	50	6	4	●	1
SEG4080SA	8	19	60	8	4	●	1
SEG4100SA	10	24	70	10	4	●	1
SEG4120SA	12	29	75	12	4	●	1
SEG4160SA	16	38	90	16	4	●	1
SEG4200SA	20	48	110	20	4	●	1
SEG4250SA	25	59	125	25	4	●	1

RECOMMENDED CUTTING CONDITIONS

Side milling

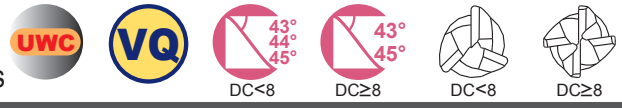
Work material	Aluminium alloy Plastics		Pure copper	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
6	9600	1700	4800	840
8	7200	1800	3600	900
10	5800	1800	2900	910
12	4800	2000	2400	980
16	3600	2000	1800	980
20	2900	2400	1400	1100
25	2300	2400	1100	1100
Depth of cut				

1) The cutting conditions above are a guide only to milling within the standard depth of cut.
2) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

● : **Inventory maintained in Japan.**

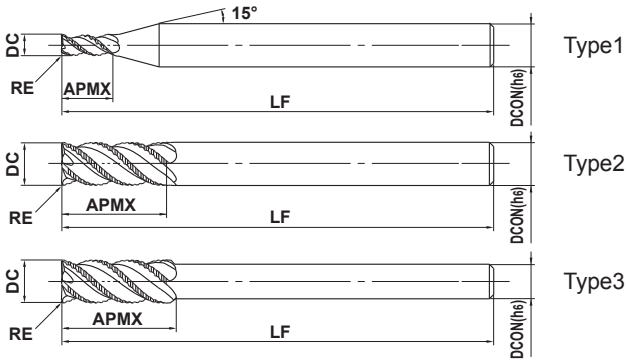
VQSVR NEW

Roughing end mill, Short cut length, 4 flute, Irregular helix flutes



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	





h6

DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

- Achieving an excellent vibration resistance due to the adoption of irregular helix.
- Use of an asymmetric chip breaker improves fracture resistance substantially. (Compared to a conventional roughing end mill)

Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
VQSVRD0300	3	0.2	6	60	6	3	●	1
VQSVR**D0400**	4	0.2	8	60	6	3	●	1
VQSVR**D0500**	5	0.3	10	60	6	3	●	1
VQSVR**D0600**	6	0.3	12	70	6	3	●	2
VQSVR**D0700**	7	0.3	17	80	8	3	●	1
VQSVR**D0800**	8	0.5	17	80	8	4	●	2
VQSVR**D0900**	9	0.5	22	90	10	4	●	1
VQSVR**D1000S08**	10	0.5	22	90	8	4	●	3
VQSVR**D1000**	10	0.5	22	90	10	4	●	2
VQSVR**D1200S10**	12	0.5	27	100	10	4	●	3
VQSVR**D1200**	12	0.5	27	100	12	4	●	2
VQSVR**D1400**	14	0.5	27	130	12	4	●	3
VQSVR**D1600**	16	0.5	33	125	16	4	●	2
VQSVR**D1800**	18	0.5	33	150	16	4	●	3
VQSVR**D2000**	20	0.5	38	140	20	4	●	2

Note) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.

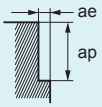
● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

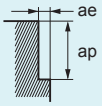
Side milling

The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.
The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340					Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V					Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH					Copper, Copper alloy				
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Hole Depth ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Hole Depth ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Hole Depth ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Hole Depth ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Hole Depth ae (mm)
3	150	16000	960	4.5	1.5	120	13000	640	4.5	1.5	100	11000	450	4.5	1.5	75	8000	330	4.5	0.9	180	19000	1100	4.5	1.5
4	150	12000	960	6	2	120	9500	640	6	2	100	8000	430	6	2	75	6000	330	6	1.2	180	14000	1100	6	2
5	150	9500	960	7.5	2.5	120	7600	640	7.5	2.5	100	6400	440	7.5	2.5	75	4800	330	7.5	1.5	180	11000	1100	7.5	2.5
6	150	8000	960	9	3	120	6400	680	9	3	100	5300	480	9	3	75	4000	360	9	1.8	180	9500	1100	9	3
7	150	6800	950	10.5	3.5	120	5500	700	10.5	3.5	100	4500	500	10.5	3.5	75	3400	380	10.5	2.1	180	8200	1100	10.5	3.5
8	150	6000	1100	12	4	120	4800	800	12	4	100	4000	570	12	4	75	3000	430	12	2.4	180	7200	1300	12	4
9	150	5300	1100	13.5	4.5	120	4200	760	13.5	4.5	100	3500	570	13.5	4.5	75	2700	430	13.5	2.7	180	6400	1300	13.5	4.5
10	150	4800	1100	15	5	120	3800	760	15	5	100	3200	570	15	5	75	2400	430	15	3	180	5700	1200	15	5
12	150	4000	960	18	6	120	3200	700	18	6	100	2700	540	18	6	75	2000	400	18	3.6	180	4800	1200	18	6
14	150	3400	880	21	7	120	2700	650	21	7	100	2300	510	21	7	75	1700	380	21	4.2	180	4100	1100	21	7
16	150	3000	840	24	8	120	2400	620	24	8	100	2000	500	24	8	75	1500	380	24	4.8	180	3600	1000	24	8
18	150	2700	810	27	9	120	2100	590	27	9	100	1800	500	27	9	75	1300	360	27	5.4	180	3200	960	27	9
20	150	2400	760	30	10	120	1900	560	30	10	100	1600	500	30	10	75	1200	360	30	6	180	2900	920	30	10
Depth of cut																									

General-purpose conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340					Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 306, Ti-6Al-4V					Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH					Copper, Copper alloy				
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Hole Depth ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Hole Depth ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Hole Depth ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Hole Depth ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Hole Depth ap (mm)	Hole Depth ae (mm)
3	120	13000	610	4.5	1.5	100	11000	430	4.5	1.5	80	8500	280	4.5	1.5	70	7400	240	4.5	0.9	140	15000	700	4.5	1.5
4	120	9500	610	6	2	100	8000	430	6	2	80	6400	280	6	2	70	5600	240	6	1.2	140	11000	700	6	2
5	120	7600	610	7.5	2.5	100	6400	430	7.5	2.5	80	5100	280	7.5	2.5	70	4500	250	7.5	1.5	140	8900	720	7.5	2.5
6	120	6400	610	9	3	100	5300	450	9	3	80	4200	300	9	3	70	3700	270	9	1.8	140	7400	720	9	3
7	120	5500	620	10.5	3.5	100	4500	480	10.5	3.5	80	3600	320	10.5	3.5	70	3200	290	10.5	2.1	140	6400	720	10.5	3.5
8	120	4800	720	12	4	100	4000	570	12	4	80	3200	380	12	4	70	2800	340	12	2.4	140	5600	840	12	4
9	120	4200	670	13.5	4.5	100	3500	510	13.5	4.5	80	2800	360	13.5	4.5	70	2500	320	13.5	2.7	140	5000	800	13.5	4.5
10	120	3800	670	15	5	100	3200	510	15	5	80	2500	360	15	5	70	2200	310	15	3	140	4500	790	15	5
12	120	3200	610	18	6	100	2700	470	18	6	80	2100	340	18	6	70	1900	300	18	3.6	140	3700	710	18	6
14	120	2700	560	21	7	100	2300	440	21	7	80	1800	320	21	7	70	1600	280	21	4.2	140	3200	670	21	7
16	120	2400	540	24	8	100	2000	410	24	8	80	1600	320	24	8	70	1400	280	24	4.8	140	2800	630	24	8
18	120	2100	500	27	9	100	1800	400	27	9	80	1400	310	27	9	70	1200	270	27	5.4	140	2500	600	27	9
20	120	1900	480	30	10	100	1600	380	30	10	80	1300	310	30	10	70	1100	270	30	6	140	2200	560	30	10
Depth of cut																									

1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used.
   An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
3) Chattering can still occur if the machine rigidity and clamping method are insufficient.
   In these cases the feed and speed should be reduced proportionately.
4) When the depth of cut is smaller than shown the revolution and feed rate can be increased.

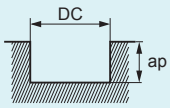
VQSVR NEW

Roughing end mill, Short cut length, 4 flute, Irregular helix flutes

Slotting

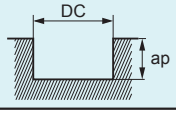
The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.
The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340				Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 306, Ti-6Al-4V				Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH				Copper, Copper alloy			
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
3	120	13000	720	3	100	11000	440	3	80	8500	340	3	60	6400	250	1.5	150	16000	890	3
4	120	9500	720	4	100	8000	450	4	80	6400	340	4	60	4800	250	2	150	12000	900	4
5	120	7600	720	5	100	6400	460	5	80	5100	300	5	60	3800	230	2.5	150	9500	900	5
6	120	6400	720	6	100	5300	460	6	80	4200	310	6	60	3200	240	3	150	8000	900	6
7	120	5500	730	7	100	4500	470	7	80	3600	330	7	60	2700	250	3.5	150	6800	950	7
8	120	4800	840	8	100	4000	560	8	80	3200	400	8	60	2400	300	4	150	6000	1100	8
9	120	4200	810	9	100	3500	540	9	80	2800	350	9	60	2100	260	4.5	150	5300	1000	9
10	120	3800	800	10	100	3200	520	10	80	2500	340	10	60	1900	260	5	150	4800	1000	10
12	120	3200	750	12	100	2700	480	12	80	2100	340	12	60	1600	260	6	150	4000	940	12
14	120	2700	670	14	100	2300	420	14	80	1800	300	14	60	1400	240	7	150	3400	840	14
16	120	2400	620	16	100	2000	380	16	80	1600	290	16	60	1200	220	8	150	3000	780	16
18	120	2100	570	18	100	1800	380	18	80	1400	260	18	60	1100	210	9	150	2700	730	18
20	120	1900	540	20	100	1600	350	20	80	1300	260	20	60	950	190	10	150	2400	680	20
Depth of cut																				

DC:Dia.

General-purpose conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340				Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 306, Ti-6Al-4V				Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH				Copper, Copper alloy			
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
3	100	11000	490	3	80	8500	300	3	60	6400	200	3	50	5300	170	1.5	120	13000	580	3
4	100	8000	490	4	80	6400	310	4	60	4800	200	4	50	4000	170	2	120	9500	580	4
5	100	6400	490	5	80	5100	310	5	60	3800	200	5	50	3200	170	2.5	120	7600	580	5
6	100	5300	490	6	80	4200	310	6	60	3200	200	6	50	2700	170	3	120	6400	580	6
7	100	4500	500	7	80	3600	320	7	60	2700	200	7	50	2300	170	3.5	120	5500	620	7
8	100	4000	600	8	80	3200	380	8	60	2400	240	8	50	2000	200	4	120	4800	720	8
9	100	3500	540	9	80	2800	330	9	60	2100	210	9	50	1800	180	4.5	120	4200	650	9
10	100	3200	540	10	80	2500	330	10	60	1900	210	10	50	1600	180	5	120	3800	640	10
12	100	2700	510	12	80	2100	320	12	60	1600	210	12	50	1300	170	6	120	3200	600	12
14	100	2300	460	14	80	1800	300	14	60	1400	190	14	50	1100	150	7	120	2700	540	14
16	100	2000	410	16	80	1600	290	16	60	1200	170	16	50	990	140	8	120	2400	500	16
18	100	1800	390	18	80	1400	260	18	60	1100	170	18	50	880	130	9	120	2100	460	18
20	100	1600	360	20	80	1300	260	20	60	950	150	20	50	800	130	10	120	1900	430	20
Depth of cut																				

DC:Dia.

1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
3) Chattering can still occur if the machine rigidity and clamping method are insufficient. In these cases the feed and speed should be reduced proportionately.
4) Finishing at a faster feedrate is possible when the depth of cut is small.

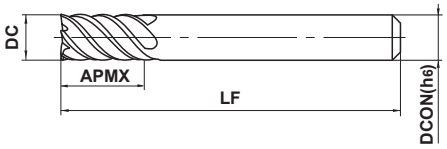
VF6MHV

End mill, Medium cut length, 6 flute, Irregular helix flutes



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○	○		◎	◎		





Type1

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

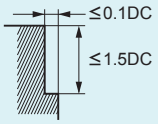
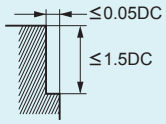
- Newly developed irregular helix 6 flute geometry reduces vibrations and achieves high efficiency machining. Suitable for machining of difficult-to-cut materials such as stainless steel, titanium alloy and inconel.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VF6MHVD0600	6	13	50	6	6	●	1
VF6MHVD0800	8	19	60	8	6	●	1
VF6MHVD1000	10	22	70	10	6	●	1
VF6MHVD1200	12	26	75	12	6	●	1
VF6MHVD1600	16	32	90	16	6	●	1
VF6MHVD2000	20	38	100	20	6	●	1

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
6	10600	2900	8000	2000	2100	320
8	8000	2900	6000	2000	1600	300
10	6400	2700	4800	2000	1300	260
12	5300	2700	4000	2000	1100	230
16	4000	2200	3000	1600	800	180
20	3200	1900	2400	1400	640	150
Depth of cut	 ≤0.1DC, ≤1.5DC				 ≤0.05DC, ≤1.5DC	

DC:Dia.

1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

IMPACT MIRACLE END MILLS

VFSD

End mill, Short cut length, For hardened materials







DC<3

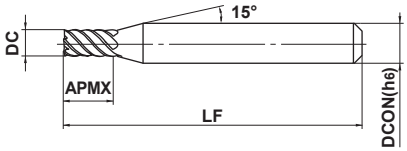

DC≥3


DC<3

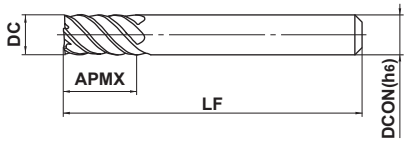
DC≥3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎				





Type1



Type2

1≤DC≤12				
0 - 0.02				
DCON=6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

h6

End mill with Impact Miracle coating for high hardened materials.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VFSDD0100	1	2	45	6	4	●	1
VFSD**D0150**	1.5	3	45	6	4	●	1
VFSD**D0200**	2	4	45	6	4	●	1
VFSD**D0250**	2.5	5	45	6	4	●	1
VFSD**D0300**	3	6	45	6	6	●	1
VFSD**D0350**	3.5	7	45	6	6	●	1
VFSD**D0400**	4	8	45	6	6	●	1
VFSD**D0500**	5	10	50	6	6	●	1
VFSD**D0600**	6	12	50	6	6	●	2
VFSD**D0800**	8	16	60	8	6	●	2
VFSD**D1000**	10	20	70	10	6	●	2
VFSD**D1200**	12	24	75	12	6	●	2

● : Inventory maintained in Japan.

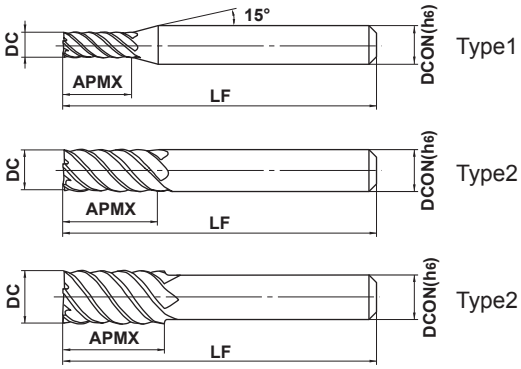
VFMD

End mill, Medium cut length, For hardened materials



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎				





h6

DC≤12	DC>12			
0 - 0.02	0 - 0.03			
DCON=6	8≤DCON≤10	12≤DCON≤16	20≤DCON≤25	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

● End mill with Impact Miracle coating for high hardened materials.

Unit : mm

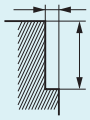
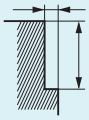
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VFMDD0100	1	3.5	60	6	4	●	1
VFMD**D0150**	1.5	5	60	6	4	●	1
VFMD**D0200**	2	7	60	6	4	●	1
VFMD**D0250**	2.5	8	60	6	4	●	1
VFMD**D0300**	3	10	60	6	6	●	1
VFMD**D0400**	4	12	60	6	6	●	1
VFMD**D0500**	5	15	60	6	6	●	1
VFMD**D0600**	6	15	60	6	6	●	2
VFMD**D0800**	8	20	75	8	6	●	2
VFMD**D1000**	10	25	80	10	6	●	2
VFMD**D1200**	12	30	100	12	6	●	2
VFMD**D1400**	14	35	105	12	6	●	3
VFMD**D1500**	15	40	110	16	6	●	1
VFMD**D1600**	16	40	110	16	6	●	2
VFMD**D1800**	18	40	120	16	6	●	3
VFMD**D2000**	20	45	125	20	6	●	2
VFMD**D2200**	22	45	135	20	6	●	3
VFMD**D2500**	25	60	160	25	6	●	2

IMPACT MIRACLE END MILLS

VFSD
End mill, Short cut length, For hardened materials

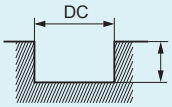
VFMD
End mill, Medium cut length, For hardened materials

RECOMMENDED CUTTING CONDITIONS

Work material	Hardened steel (45－55HRC) AISI H13			Hardened steel (55－62HRC) AISI D2			Hardened steel (62－70HRC) AISI W1, AISI M2		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
1	40000	1200	0.05	40000	800	0.03	32000	500	0.02
2	40000	2000	0.1	24000	1000	0.05	16000	600	0.05
3	32000	3800	0.2	16000	1900	0.1	11000	1200	0.05
4	24000	4400	0.2	12000	2200	0.1	8000	1300	0.05
6	16000	5800	0.3	8000	2900	0.2	5300	1800	0.1
8	12000	5800	0.4	6000	2900	0.2	4000	1800	0.1
10	9600	5800	0.5	4800	2900	0.3	3200	1800	0.2
12	8000	4800	0.6	4000	2400	0.3	2700	1500	0.2
16	6000	3600	0.8	3000	1800	0.5	2000	1100	0.3
20	4800	2900	1.0	2400	1400	0.5	1600	880	0.3
25	3800	2300	1.0	1900	1100	0.5	1300	720	0.3
Depth of cut	 Please refer to the list above for depth of cut. ≤1.5DC			 Please refer to the list above for depth of cut. ≤1.0DC					

DC:Dia.

Slot milling with small diameter tools

Work material	Hardened steel (45－55HRC) AISI H13			Hardened steel (55－62HRC) AISI D2		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
1	15000	300	0.1	9500	110	0.05
2	8000	320	0.2	4800	190	0.1
Depth of cut	 Please refer to the list above for depth of cut. DC:Dia.					

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

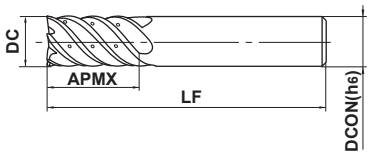
VF6MHVCH

End mill, Medium cut length, Irregular helix flutes, with multiple internal through coolant holes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
				◎	◎		

CoolStar
END MILLS





Type1

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=10	DCON=12	DCON=16	DCON=20	
0 - 0.009	0 - 0.011	0 - 0.011	0 - 0.013	

h6

- Vibration control end mill with multiple internal through coolant holes ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VF6MHVCHD1000	10	22	70	10	6	●	1
VF6MHVCHD1200	12	26	75	12	6	●	1
VF6MHVCHD1600	16	32	90	16	6	●	1
VF6MHVCHD2000	20	38	100	20	6	●	1

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
10	4800	2000	1300	260
12	4000	2000	1100	230
16	3000	1600	800	180
20	2400	1400	640	150
Depth of cut	≤0.1DC 0.5DC—1.5DC		≤0.05DC 0.5DC—1.5DC	

DC:Dia.

Trochoidal slotting

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)
10	4800	1400
12	4000	1200
16	3000	1100
20	2400	900
Depth of cut	1.5DC≤ ≤0.1DC 0.5DC—1.5DC	

DC:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

● : Inventory maintained in Japan.

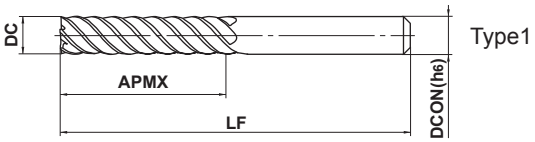
MIRACLE END MILL FOR HIGH HARDNESS STEEL

VCLD

End mill, Long cut length, 6 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎				





Type1

h6

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=6	8≤DCON≤10	12≤DCON≤16	20≤DCON≤25	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

Ideal for tool steel and hardened materials machining

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VCLDD0600	6	26	70	6	6	●	1
VCLD**D0800**	8	36	90	8	6	●	1
VCLD**D1000**	10	46	100	10	6	●	1
VCLD**D1200**	12	56	110	12	6	●	1
VCLD**D1600**	16	66	130	16	6	●	1
VCLD**D2000**	20	76	140	20	6	●	1
VCLD**D2500**	25	92	180	25	6	●	1

RECOMMENDED CUTTING CONDITIONS

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Hardened steel (45—55HRC) AISI H13		Hardened steel (55—62HRC) AISI D2		Hardened steel (62—70HRC) AISI W1, AISI M2	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
6	2100	450	1600	330	1300	240	1100	190
8	1600	430	1200	310	1000	230	800	170
10	1300	420	960	290	800	220	640	150
12	1100	380	800	260	660	200	530	140
16	800	310	600	220	500	160	400	120
20	640	270	480	190	400	140	320	110
25	510	230	380	160	320	120	260	90
Depth of cut	≤0.01DC, 3DC—4DC				≤0.005DC, 3DC—4DC			

DC:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

● : Inventory maintained in Japan.

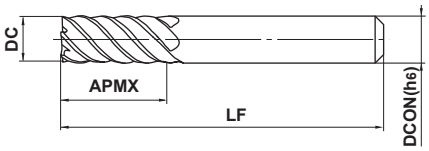
MIRACLE END MILL FOR DIFFICULT TO CUT MATERIALS

VC6MH

End mill, Medium cut length, 6 flute, High helix angle

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		◎	◎		





Type1

DC≤12	DC>12			
0 - 0.02	0 - 0.03			
DCON=6	**8≤DCON≤10**	**12≤DCON≤16**	**20≤DCON≤25**	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

● 6 flute end mill for milling difficult-to-cut and soft materials.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VC6MHD0600	6	13	50	6	6	●	1
VC6MH**D0800**	8	19	60	8	6	●	1
VC6MH**D1000**	10	22	70	10	6	●	1
VC6MH**D1200**	12	26	75	12	6	●	1
VC6MH**D1600**	16	32	90	16	6	●	1
VC6MH**D2000**	20	38	100	20	6	●	1
VC6MH**D2500**	25	45	120	25	6	●	1

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
6	10600	2900	8000	2000	4200	900	2100	320
8	8000	2900	6000	2000	3200	900	1600	300
10	6400	2700	4800	2000	2500	870	1300	260
12	5300	2700	4000	2000	2100	830	1100	230
16	4000	2200	3000	1600	1600	740	800	180
20	3200	1900	2400	1400	1300	710	640	150
25	2500	1600	1900	1200	1000	560	510	120
Depth of cut	≤0.1DC ≤1DC		≤0.05DC ≤1DC					

DC:Dia.

1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

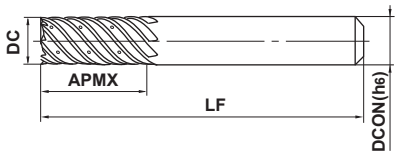
VF8MHVCH

End mill, Medium cut length, Irregular helix flutes, with multiple internal through coolant holes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
				◎	◎		

CoolStar
END MILLS





Type1

16≤DC≤20				
0 - 0.03				
DCON=16	DCON=20			
0 - 0.011	0 - 0.013			

h6

● Vibration control end mill with multiple internal through coolant holes ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VF8MHVCHD1600	16	32	90	16	8	●	1
VF8MHVCHD2000	20	38	100	20	8	●	1

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
16	3000	2100	800	240
20	2400	1900	640	200
Depth of cut	≤0.08DC 0.5DC—1.5DC		≤0.05DC 0.5DC—1.5DC	

DC:Dia.

Trochoidal slotting

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)
16	3000	1400
20	2400	1200
Depth of cut	1.5DC≤ ≤0.08DC 0.5DC—1.5DC	

DC:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

● : Inventory maintained in Japan.

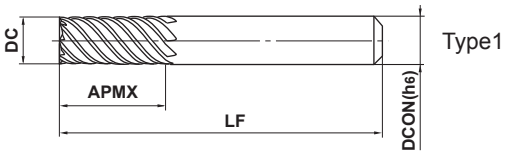
MIRACLE END MILL FOR DIFFICULT TO CUT MATERIALS

VC8MH

End mill, Medium cut length, 8 flute, High helix angle

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		◎	◎		





Type1

20≤DC≤25					
0 - 0.03					
20≤DCON≤25					
0 - 0.013					

h6

- 8 flute end mill for milling difficult-to-cut and soft materials.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VC8MHD2000	20	38	100	20	8	●	1
VC8MHD2500	25	45	120	25	8	●	1

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
6	10600	2900	8000	2000	4200	900	2100	320
8	8000	2900	6000	2000	3200	900	1600	300
10	6400	2700	4800	2000	2500	870	1300	260
12	5300	2700	4000	2000	2100	830	1100	230
16	4000	2200	3000	1600	1600	740	800	180
20	3200	1900	2400	1400	1300	710	640	150
25	2500	1600	1900	1200	1000	560	510	120
Depth of cut	≤0.1DC, ≤1DC		≤0.05DC, ≤1DC					

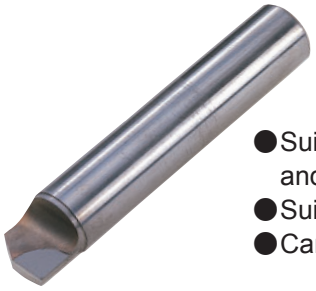
DC:Dia.

1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

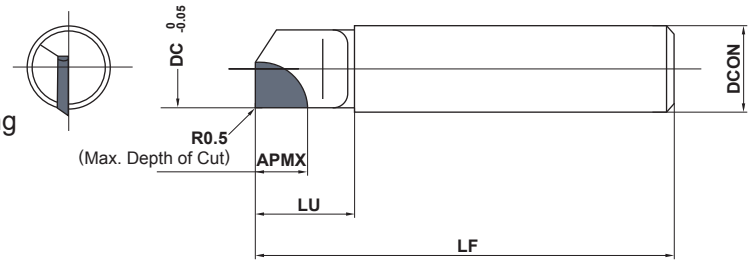
GBE

CBN end mill, Single flute

Light Alloy	Cast Iron	Carbon Steel • Alloy Steel	Stainless Steel	Hardened Steel
				◎



- Suitable for shoulder milling and die machining.
- Suitable for re-grinding.
- Carbon shank.



Right hand tool holder only.

Order Number	Number of Flutes	Stock	Dimensions (mm)				
		MB730	DC	LF	DCON	LU	APMX
GBE06S0640	1	●	6	40	6	8	3.5
GBE08S0845	1	●	8	45	8	13	6
GBE10S1050	1	●	10	50	10	13	6
GBE12S1255	1	●	12	55	12	13	6

RECOMMENDED CUTTING CONDITIONS FOR GBE TYPE

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)
H	Hardened Steel	45–68HRC	MB730	140 (80–200)	0.08 (0.02–0.15)	≤0.5
	Hardened Steel	45–68HRC	MB730	100 (60–150)	0.06 (0.02–0.10)	≤0.5

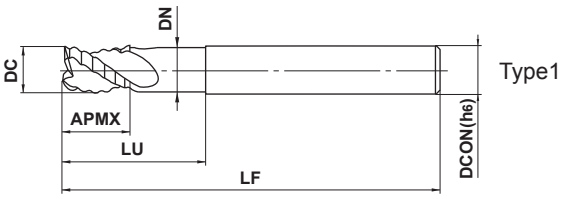
● : Inventory maintained in Japan.

CSRA

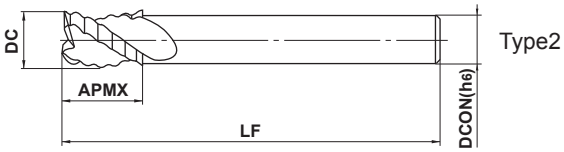
Roughing end mill, Short cut length, 3 flute, For aluminium alloy

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎





Type1



Type2

h6

DCON=10	12≤DCON≤16	20≤DCON≤25		
0 - 0.009	0 - 0.011	0 - 0.013		

● 3 flute uncoated end mill for roughing aluminium alloy.

Unit : mm

Order Number	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
CSRAD1000	10	12	25	9.4	75	10	3	●	1
CSRA**D1200**	12	15	30	11.4	75	12	3	●	1
CSRA**D1600**	16	18	35	15.4	100	16	3	●	1
CSRA**D1800**	18	22	—	—	100	16	3	●	2
CSRA**D2000**	20	25	50	18.0	125	20	3	●	1
CSRA**D2200**	22	25	—	—	125	20	3	●	2
CSRA**D2500**	25	30	60	23.0	125	25	3	●	1

CSRA

Roughing end mill, Short cut length, 3 flute, For aluminium alloy

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Aluminium alloy		Aluminium cast	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
10	19000	8600	9500	3400
12	16000	8200	8000	3200
16	12000	7600	6000	3100
18	10500	7200	5300	2900
20	9500	7100	4800	2900
22	8500	6900	4300	2800
25	7500	6800	3800	2700
Depth of cut	≤0.5DC, ≤1DC, DC:Dia.			

Slotting

Work material	Aluminium alloy		Aluminium cast	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
10	19000	6800	9500	2700
12	16000	6500	8000	2600
16	12000	6100	6000	2400
18	10500	5800	5300	2400
20	9500	5700	4800	2300
22	8500	5500	4300	2200
25	7500	5400	3800	2200
Depth of cut	DC, ≤1DC, DC:Dia.			

1) Water-soluble cutting fluid is recommended.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) Climb cutting is recommended for side milling.
4) These end mills do not have a centre cutting edge, therefore when entering a workpiece use a ramping process rather than vertical feed.
5) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately, or set the depth of cut smaller.

Using a high-speed and high-rigidity machining center

Side milling

Work material	Aluminium alloy		Aluminium cast	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
10	30000	11000	19000	5400
12	30000	12000	16000	5300
16	24000	12000	12000	4900
18	21000	12000	10500	4700
20	19000	11000	9500	4600
22	17000	11000	8500	4300
25	15000	11000	7500	4300
Depth of cut	≤0.5DC, ≤1DC, DC:Dia.			

Slotting

Work material	Aluminium alloy		Aluminium cast	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
10	30000	8600	19000	4300
12	30000	9900	16000	4300
16	24000	9700	12000	4000
18	21000	9500	10500	3800
20	19000	9100	9500	3700
22	17000	8700	8500	3400
25	15000	8600	7500	3400
Depth of cut	DC, ≤0.75DC, DC:Dia.			

1) Water-soluble cutting fluid is recommended.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) Climb cutting is recommended for side milling.
4) These end mills do not have a centre cutting edge, therefore when entering a workpiece use a ramping process rather than vertical feed.
5) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately, or set the depth of cut smaller.

CMRA

Roughing end mill, Medium cut length, 3 flute, For aluminium alloy

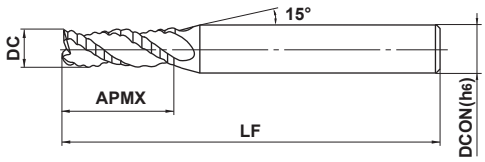




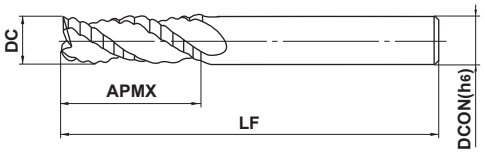


Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎





Type1



Type2

h6

DCON=6	8≤DCON≤10	12≤DCON≤16	20≤DCON≤25
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

● 3 flute uncoated end mill for roughing aluminium alloy.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
CMRAD0300	3	8	50	6	3	●	1
CMRA**D0400**	4	11	50	6	3	●	1
CMRA**D0500**	5	13	50	6	3	●	1
CMRA**D0600**	6	13	50	6	3	●	2
CMRA**D0800**	8	19	60	8	3	●	2
CMRA**D1000**	10	22	75	10	3	●	2
CMRA**D1200**	12	26	75	12	3	●	2
CMRA**D1600**	16	32	100	16	3	●	2
CMRA**D2000**	20	38	125	20	3	●	2
CMRA**D2500**	25	45	125	25	3	●	2

● : Inventory maintained in Japan.

CMRA

Roughing end mill, Medium cut length, 3 flute, For aluminium alloy

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Aluminium alloy		Aluminium cast	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	40000	2700	25000	1100
4	36000	2700	20000	1100
5	30000	5400	16000	2200
6	27000	6100	13000	2300
8	20000	6000	10000	2400
10	16000	5800	8000	2300
12	13000	5300	6500	2100
16	10000	5100	5000	2000
20	8000	4800	4000	1900
25	6400	4600	3200	1800
Depth of cut	≤0.25DC, ≤1.5DC, DC:Dia.			

Slotting

Work material	Aluminium alloy		Aluminium cast	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	30000	1800	16000	700
4	24000	2200	12000	900
5	19000	2300	10000	900
6	16000	2400	8000	1000
8	12000	2500	6000	1000
10	9500	2600	5000	1100
12	8000	2300	4000	900
16	6000	2100	3000	800
20	4800	2000	2400	800
25	3800	2000	1900	700
DCepth of cut	DC, ≤1DC, DC:Dia.			

1) Water-soluble cutting fluid is recommended.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) Climb cutting is recommended for side milling.
4) These end mills do not have a centre cutting edge, therefore when entering a workpiece use a ramping process rather than vertical feed.
5) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately, or set the depth of cut smaller.

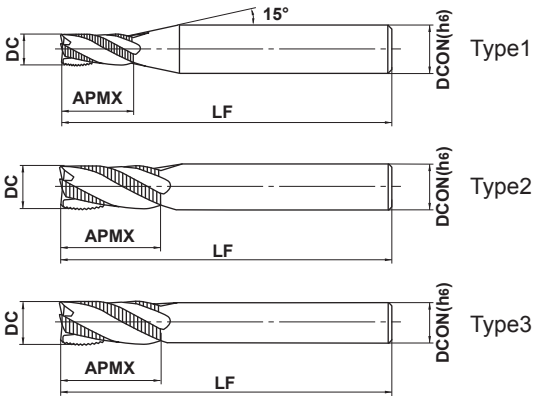
VFSFPR

Roughing end mill, Short cut length, 3—4 flute



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		◎	◎		





h6

DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

Impact Miracle roughing end mills for a wide range of work materials from carbon and alloy steel through to hardened steel and difficult-to-cut materials.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VFSFPRD0300	3	6	50	6	3	●	1
VFSFPR**D0400**	4	8	50	6	3	●	1
VFSFPR**D0500**	5	10	50	6	3	●	1
VFSFPR**D0600**	6	12	50	6	3	●	2
VFSFPR**D0700**	7	17	60	8	3	●	1
VFSFPR**D0800**	8	17	60	8	4	●	2
VFSFPR**D0900**	9	22	70	10	4	●	1
VFSFPR**D1000S08**	10	22	90	8	4	●	3
VFSFPR**D1000**	10	22	70	10	4	●	2
VFSFPR**D1200S10**	12	27	100	10	4	●	3
VFSFPR**D1200**	12	27	75	12	4	●	2
VFSFPR**D1400**	14	27	75	12	4	●	3
VFSFPR**D1600**	16	33	90	16	4	●	2
VFSFPR**D1800**	18	33	90	16	4	●	3
VFSFPR**D2000**	20	38	100	20	4	●	2

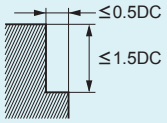
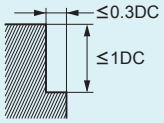
● : Inventory maintained in Japan.

VFSFPR

Roughing end mill, Short cut length, 3—4 flute

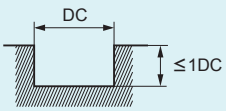
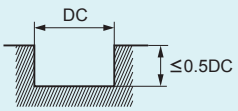
RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45—55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	16000	960	13000	640	6400	260	5300	320	4200	70
4	12000	960	9500	640	4800	260	4000	320	3200	70
5	9500	960	7600	640	3800	260	3200	320	2500	70
6	8000	960	6400	680	3200	290	2700	340	2100	75
8	6000	1050	4800	760	2400	340	2000	400	1600	95
10	4800	1050	3800	760	1900	340	1600	400	1300	105
12	4000	960	3200	700	1600	320	1300	400	1100	110
16	3000	840	2400	620	1200	300	1000	360	800	110
20	2400	760	1900	560	1000	300	800	320	600	100
Depth of cut										

DC:Dia.

Slotting

Work material	Carbon steel, Cast iron, Alloy steel (—30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45—55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	13000	720	11000	480	4800	190	3200	190	2100	25
4	9500	720	8000	480	3600	190	2400	190	1600	25
5	7600	720	6400	480	3200	190	1900	190	1300	25
6	6400	720	5300	480	2700	200	1600	200	1100	30
8	4800	800	4000	520	2000	220	1200	220	800	35
10	3800	800	3200	520	1600	220	1000	220	600	35
12	3200	750	2700	520	1300	210	800	210	500	40
16	2400	620	2000	450	1000	180	600	180	400	45
20	1900	540	1600	400	800	160	500	160	300	40
Depth of cut										

DC:Dia.

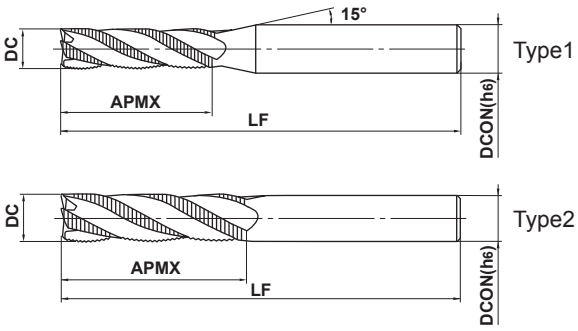
1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VFMFPR

Roughing end mill, Medium cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		◎	◎		





h6

DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

● Impact Miracle roughing end mills suitable for the machining of deep walled components.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VFMFPRD0500	5	15	60	6	4	●	1
VFMFPR**D0600**	6	17	60	6	4	●	2
VFMFPR**D0700**	7	22	75	8	4	●	1
VFMFPR**D0800**	8	28	75	8	4	●	2
VFMFPR**D0900**	9	28	100	10	4	●	1
VFMFPR**D1000**	10	34	100	10	4	●	2
VFMFPR**D1200**	12	40	110	12	4	●	2
VFMFPR**D1600**	16	48	125	16	4	●	2
VFMFPR**D2000**	20	57	140	20	4	●	2

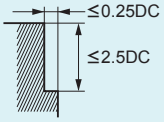
● : Inventory maintained in Japan.

VFMFPR

Roughing end mill, Medium cut length, 4 flute

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	3800	360	3200	290	2500	150	2500	150	1900	50
6	3200	360	2700	290	2100	160	2100	160	1600	60
8	2400	450	2000	360	1600	160	1600	160	1200	70
10	1900	450	1600	360	1300	180	1300	180	1000	75
12	1600	400	1300	320	1100	180	1100	180	800	80
16	1200	360	1000	290	800	160	800	160	600	80
20	1000	340	800	270	600	150	600	150	500	80
Depth of cut	 DC:Dia.									

1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

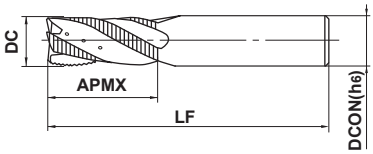
VFSFPRCH

Roughing end mill, Short cut length, 4 flute, with multiple internal through coolant holes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
				◎	◎		

CoolStar
END MILLS





Type1

h6	DCON=16	DCON=20			
	0 - 0.011	0 - 0.013			

● Roughing end mill with multiple internal through coolant holes suitable for difficult-to-cut materials.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VFSFPRCHD1600	16	33	90	16	4	●	1
VFSFPRCH**D2000**	20	38	100	20	4	●	1

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
16	1200	300	800	110
20	1000	300	600	100
Depth of cut	≤0.5DC 0.5DC—1.5DC		≤0.3DC 0.5DC—1.0DC	

DC:Dia.

Slotting

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)
16	800	100
20	600	80
Depth of cut	DC 0.5DC—1.0DC	

DC:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

● : Inventory maintained in Japan.

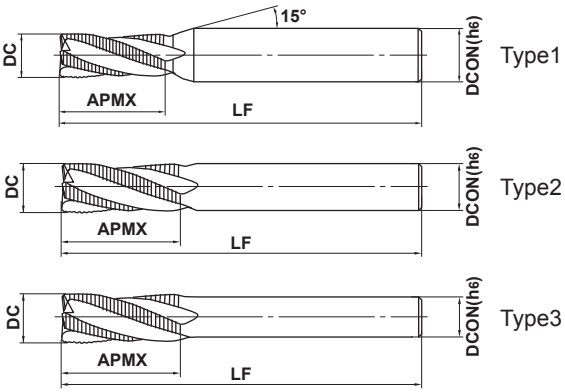
VCSFPR

Roughing end mill, Short cut length, 3—4 flute



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		◎	◎		





h6	DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

3—4 flute roughing end mill for carbon and alloy steel through to difficult-to-cut and hardened materials.

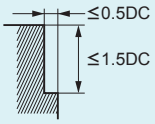
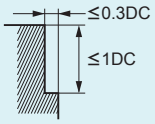
Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VCSFPRD0300	3	6	50	6	3	●	1
VCSFPR**D0400**	4	8	50	6	3	●	1
VCSFPR**D0500**	5	10	50	6	3	●	1
VCSFPR**D0600**	6	12	50	6	3	●	2
VCSFPR**D0700**	7	17	60	8	3	●	1
VCSFPR**D0800**	8	17	60	8	4	●	2
VCSFPR**D0900**	9	22	70	10	4	●	1
VCSFPR**D1000S08**	10	22	90	8	4	●	3
VCSFPR**D1000**	10	22	70	10	4	●	2
VCSFPR**D1200S10**	12	27	100	10	4	●	3
VCSFPR**D1200**	12	27	75	12	4	●	2
VCSFPR**D1400**	14	27	75	12	4	●	3
VCSFPR**D1600**	16	33	90	16	4	●	2
VCSFPR**D1800**	18	33	90	16	4	●	3
VCSFPR**D2000**	20	38	100	20	4	●	2

● : Inventory maintained in Japan.

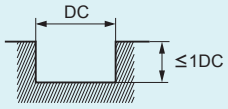
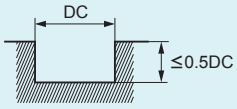
RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	16000	960	13000	640	6400	260	5300	100	4200	70
4	12000	960	9500	640	4800	260	4000	100	3200	70
5	9500	960	7600	640	3800	260	3200	100	2500	70
6	8000	960	6400	680	3200	290	2700	110	2100	75
8	6000	1050	4800	760	2400	340	2000	140	1600	95
10	4800	1050	3800	760	1900	340	1600	150	1300	105
12	4000	960	3200	700	1600	320	1300	150	1100	110
16	3000	840	2400	620	1200	300	1000	150	800	110
20	2400	760	1900	560	1000	300	800	140	600	100
Depth of cut										

DC:Dia.

Slotting

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	13000	720	11000	480	4800	190	3200	50	2100	25
4	9500	720	8000	480	3600	190	2400	50	1600	25
5	7600	720	6400	480	3200	190	1900	50	1300	25
6	6400	720	5300	480	2700	200	1600	55	1100	30
8	4800	800	4000	520	2000	220	1200	70	800	35
10	3800	800	3200	520	1600	220	1000	70	600	35
12	3200	750	2700	520	1300	210	800	75	500	40
16	2400	620	2000	450	1000	180	600	75	400	45
20	1900	540	1600	400	800	160	500	70	300	40
Depth of cut										

DC:Dia.

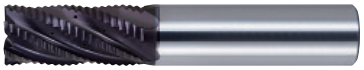
1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

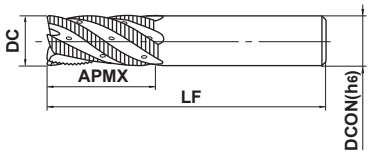
VF6SVRCH

Roughing end mill, Short cut length, 6 flute, Irregular helix flutes, with multiple internal through coolant holes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
				◎	◎		

CoolStar
END MILLS





Type1

h6

DCON=16	DCON=20			
0 - 0.011	0 - 0.013			

Roughing end mill with multiple internal through coolant holes suitable for difficult-to-cut materials.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VF6SVRCHD1600	16	33	90	16	6	●	1
VF6SVRCHD2000	20	38	100	20	6	●	1

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
16	2400	1200	800	160
20	2000	1000	640	140
Depth of cut	≤0.3DC 0.5DC—1.5DC		≤0.2DC 0.5DC—1.5DC	

DC:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

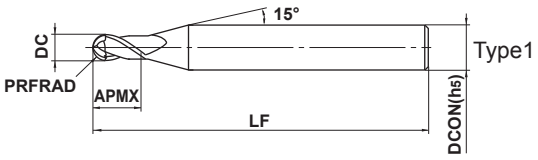
● : Inventory maintained in Japan.

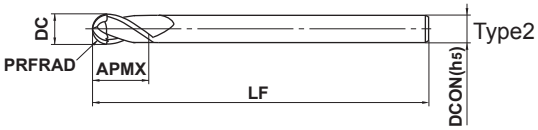
MP2SSB

Ball nose, Short cut length, 2 flute, Short shank

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎		○	○	○	







R					
0.1≤PRFRAD≤6					
±0.005					
h5					
4≤DCON≤6	8≤DCON≤10	DCON=12			
0 - 0.005	0 - 0.006	0 - 0.008			

2-flute ball nose end mills with short cutting edge length for general purpose. Excellent performance for a wide range of workpiece materials such as carbon steel, alloy steel and hardened steel.

Unit : mm

Order Number	PRFRAD	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MP2SSBR0010	0.1	0.2	0.2	40	4	2	●	1
MP2SSB**R0020**	0.2	0.4	0.4	40	4	2	●	1
MP2SSB**R0030**	0.3	0.6	0.6	40	4	2	●	1
MP2SSB**R0040**	0.4	0.8	0.8	40	4	2	●	1
MP2SSB**R0050**	0.5	1	1	40	4	2	●	1
MP2SSB**R0050S06**	0.5	1	1	40	6	2	●	1
MP2SSB**R0075**	0.75	1.5	1.5	40	4	2	●	1
MP2SSB**R0075S06**	0.75	1.5	1.5	40	6	2	●	1
MP2SSB**R0100**	1	2	2	45	6	2	●	1
MP2SSB**R0150**	1.5	3	3	45	6	2	●	1
MP2SSB**R0200**	2	4	4	45	6	2	●	1
MP2SSB**R0250**	2.5	5	5	50	6	2	●	1
MP2SSB**R0300**	3	6	6	50	6	2	●	2
MP2SSB**R0400**	4	8	8	60	8	2	●	2
MP2SSB**R0500**	5	10	10	70	10	2	●	2
MP2SSB**R0600**	6	12	12	75	12	2	●	2

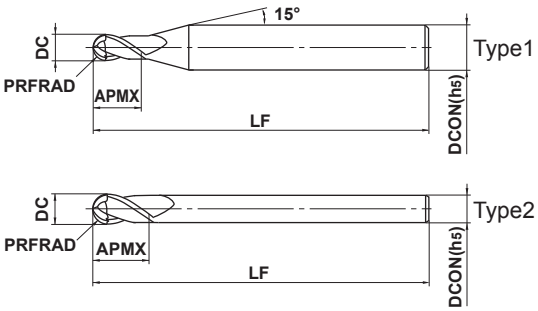
MS PLUS END MILLS

MP2SB

Ball nose, Short cut length, 2 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎		○	○	○	





R	0.1≤PRFRAD≤6				
	±0.005				
h5	4≤DCON≤6	8≤DCON≤10	DCON=12		
	0 - 0.005	0 - 0.006	0 - 0.008		

2-flute ball nose end mills with short cutting edge length for general purpose. Excellent performance for a wide range of workpiece materials such as carbon steel, alloy steel and hardened steel.

Unit : mm

Order Number	PRFRAD	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MP2SBR0010	0.1	0.2	0.3	45	4	2	●	1
MP2SBR0015	0.15	0.3	0.5	45	4	2	●	1
MP2SBR0020	0.2	0.4	0.6	45	4	2	●	1
NEW MP2SBR0020S06	0.2	0.4	0.6	50	6	2	●	1
MP2SBR0025	0.25	0.5	0.8	45	4	2	●	1
MP2SBR0030	0.3	0.6	0.9	45	4	2	●	1
NEW MP2SBR0030S06	0.3	0.6	0.9	50	6	2	●	1
MP2SBR0035	0.35	0.7	1.1	45	4	2	●	1
MP2SBR0040	0.4	0.8	1.2	45	4	2	●	1
NEW MP2SBR0040S06	0.4	0.8	1.2	50	6	2	●	1
MP2SBR0045	0.45	0.9	1.4	45	4	2	●	1
MP2SBR0050	0.5	1	1.5	45	4	2	●	1
NEW MP2SBR0050S06	0.5	1	1.5	50	6	2	●	1
MP2SBR0060	0.6	1.2	1.8	45	4	2	●	1
MP2SBR0070	0.7	1.4	2.1	45	4	2	●	1
MP2SBR0075	0.75	1.5	2.3	45	4	2	●	1
NEW MP2SBR0075S06	0.75	1.5	2.3	50	6	2	●	1
MP2SBR0080	0.8	1.6	2.4	45	4	2	●	1
MP2SBR0090	0.9	1.8	2.7	45	4	2	●	1
MP2SBR0100	1	2	3	50	4	2	●	1
NEW MP2SBR0100S06	1	2	3	50	6	2	●	1
MP2SBR0125	1.25	2.5	3.8	50	4	2	●	1
MP2SBR0150	1.5	3	4.5	70	6	2	●	1
MP2SBR0200	2	4	6	70	6	2	●	1
MP2SBR0250	2.5	5	7.5	80	6	2	●	1
MP2SBR0300	3	6	9	80	6	2	●	2
MP2SBR0400	4	8	12	90	8	2	●	2
MP2SBR0500	5	10	15	100	10	2	●	2
MP2SBR0600	6	12	18	110	12	2	●	2

● : Inventory maintained in Japan.

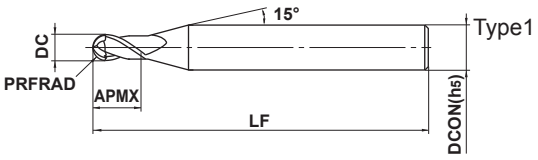
MP2MB

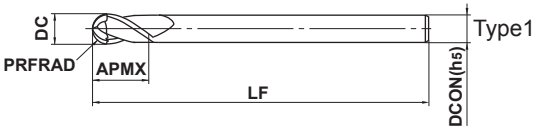
Ball nose, Medium cutting length, 2 flute



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎		○	○	○	







R

0.25≤PRFRAD≤6				
±0.005				

h5

4≤DCON≤6	8≤DCON≤10	DCON=12		
0 - 0.005	0 - 0.006	0 - 0.008		

2-flute ball nose end mills with medium cutting edge length for general purpose. Excellent performance for a wide range of workpiece materials such as carbon steel, alloy steel and hardened steel.

Unit : mm

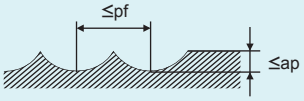
Order Number	PRFRAD	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MP2MBR0025	0.25	0.5	1	45	4	2	●	1
MP2MB**R0030**	0.3	0.6	1.2	45	4	2	●	1
MP2MB**R0040**	0.4	0.8	1.6	45	4	2	●	1
MP2MB**R0050**	0.5	1	2.5	45	4	2	●	1
MP2MB**R0060**	0.6	1.2	2.5	45	4	2	●	1
MP2MB**R0070**	0.7	1.4	3	45	4	2	●	1
MP2MB**R0075**	0.75	1.5	4	45	4	2	●	1
MP2MB**R0080**	0.8	1.6	4	45	4	2	●	1
MP2MB**R0090**	0.9	1.8	5	45	4	2	●	1
MP2MB**R0100**	1	2	6	50	4	2	●	1
MP2MB**R0125**	1.25	2.5	6	50	4	2	●	1
MP2MB**R0150S03**	1.5	3	8	70	3	2	●	2
MP2MB**R0150**	1.5	3	8	70	6	2	●	1
MP2MB**R0175**	1.75	3.5	8	70	6	2	●	1
MP2MB**R0200S04**	2	4	8	70	4	2	●	2
MP2MB**R0200**	2	4	8	70	6	2	●	1
MP2MB**R0250**	2.5	5	12	80	6	2	●	1
MP2MB**R0300**	3	6	12	80	6	2	●	2
MP2MB**R0400**	4	8	14	90	8	2	●	2
MP2MB**R0500**	5	10	18	100	10	2	●	2
MP2MB**R0600**	6	12	22	110	12	2	●	2

MS PLUS END MILLS

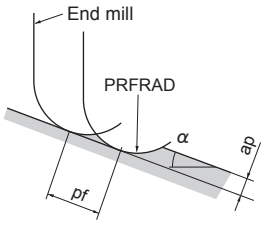
Ball nose, Short cut length, 2 flute, Short shank **MP2SSB**

Ball nose, Short cut length, 2 flute **MP2SB** Ball nose, Medium cutting length, 2 flute **MP2MB**

RECOMMENDED CUTTING CONDITIONS

Work material	Mild Steel,Carbon steel,Alloy steel,Pre-hardened steel, Hardened steel (−45HRC) AISI 1050, AISI P21, AISI H13						Hardened steel (45−55HRC) AISI 420, AISI H13						Copper, Copper alloys					
R **PRFRAD** (mm)	α≤15°		α>15°		Depth of cut ap (mm)	Pick feed pf (mm)	α≤15°		α>15°		Depth of cut ap (mm)	Pick feed pf (mm)	α≤15°		α>15°		Depth of cut ap (mm)	Pick feed pf (mm)
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)			Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)			Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)		
R0.1	40000	300	40000	250	0.003	0.02	40000	300	40000	250	0.003	0.02	40000	300	40000	250	0.003	0.02
R0.15	40000	500	40000	350	0.007	0.03	40000	500	40000	350	0.007	0.03	40000	500	40000	350	0.007	0.03
R0.2	40000	1600	40000	1200	0.02	0.04	40000	1300	40000	950	0.015	0.04	40000	1300	40000	950	0.015	0.04
R0.25	40000	2400	40000	1400	0.025	0.05	40000	1900	40000	1100	0.02	0.05	40000	1900	40000	1100	0.02	0.05
R0.3	40000	3200	40000	1600	0.03	0.06	40000	2500	40000	1300	0.025	0.06	40000	2500	40000	1300	0.025	0.06
R0.4	40000	4800	40000	2400	0.05	0.08	40000	4000	40000	1900	0.04	0.08	40000	4000	40000	1900	0.04	0.08
R0.5	40000	5600	40000	3200	0.06	0.1	40000	5600	40000	3000	0.05	0.1	40000	5600	40000	3000	0.05	0.1
R0.75	40000	6500	40000	4000	0.09	0.15	40000	6500	32000	3200	0.08	0.15	40000	6500	32000	3200	0.08	0.15
R1	40000	6500	39000	4700	0.11	0.2	40000	6500	31000	3500	0.11	0.2	40000	6500	31000	3500	0.11	0.2
R1.25	40000	7000	33000	4500	0.12	0.25	36000	6500	26000	3500	0.12	0.25	36000	6500	26000	3500	0.12	0.25
R1.5	40000	7500	27000	4300	0.13	0.3	32000	6000	22000	3400	0.13	0.3	32000	6000	22000	3400	0.13	0.3
R2	32000	7500	20000	3600	0.15	0.4	25000	6000	16000	2700	0.15	0.4	25000	6000	16000	2700	0.15	0.6
R2.5	25000	6000	16000	2900	0.2	0.5	20000	5400	13000	2300	0.2	0.5	20000	5400	13000	2300	0.2	0.75
R3	21000	5800	13000	2600	0.25	0.6	17000	4700	10000	2000	0.25	0.6	17000	4700	10000	2000	0.25	0.9
R4	16000	4500	10000	2000	0.3	0.8	13000	3600	8000	1500	0.3	0.8	13000	3600	8000	1500	0.3	1.6
R5	13000	3600	8000	1700	0.5	1.0	10000	2900	6400	1200	0.5	1.0	10000	2900	6400	1200	0.5	2.0
R6	9000	2500	6000	1300	0.5	1.2	7200	2000	4800	1000	0.5	1.2	8500	2300	5300	1100	0.5	2.4
Depth of cut																		

1) α is the inclination angle of the machined surface.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.
4) Standard cutting conditions of austenitic stainless steel and titanium alloy, please reduce to 60% revolution and 45% feedrate. (Hardened steel (45−55HRC) table above)



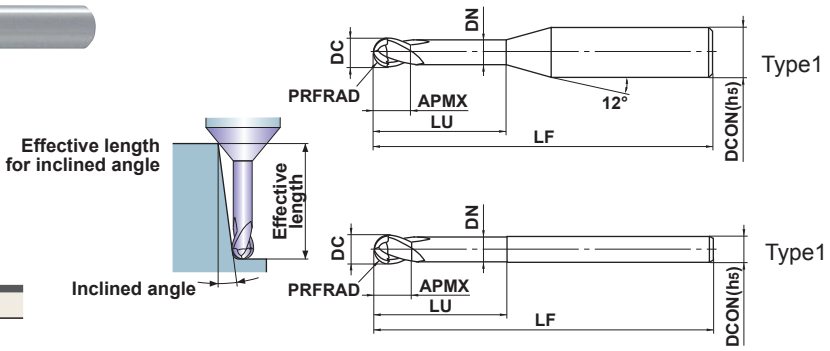
MP2XLB

End mill, Short cut length, 2 flute, Long neck



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎		○	○	○	





R	0.05≤PRFRAD≤3			
	±0.005			
h5	4≤DCON≤6			
	0 - 0.005			

2-flute long neck ball nose end mills. Excellent performance for a wide range of workpiece materials such as carbon steel, alloy steel and hardened steel.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
											30'	1°	2°	3°
MP2XLBR0005N003	0.05	0.1	0.08	0.3	0.085	50	4	2	●	1	0.3	0.3	0.4	0.4
MP2XLBR0005N005	0.05	0.1	0.08	0.5	0.085	50	4	2	●	1	0.5	0.5	0.6	0.7
MP2XLBR0010N005	0.1	0.2	0.15	0.5	0.18	50	4	2	●	1	0.5	0.5	0.6	0.7
MP2XLBR0010N008	0.1	0.2	0.15	0.75	0.18	50	4	2	●	1	0.8	0.8	0.9	1.0
MP2XLBR0010N010	0.1	0.2	0.15	1	0.18	50	4	2	●	1	1.0	1.1	1.2	1.3
MP2XLBR0010N013	0.1	0.2	0.15	1.25	0.18	50	4	2	●	1	1.3	1.4	1.5	1.7
MP2XLBR0010N015	0.1	0.2	0.15	1.5	0.18	50	4	2	●	1	1.6	1.6	1.8	2.0
MP2XLBR0010N018	0.1	0.2	0.15	1.75	0.18	50	4	2	●	1	1.8	1.9	2.1	2.3
MP2XLBR0010N020	0.1	0.2	0.15	2	0.18	50	4	2	●	1	2.1	2.2	2.4	2.6
MP2XLBR0010N025	0.1	0.2	0.15	2.5	0.18	50	4	2	●	1	2.6	2.7	3.0	3.3
MP2XLBR0015N005	0.15	0.3	0.24	0.5	0.28	50	4	2	●	1	0.5	0.5	0.6	0.6
MP2XLBR0015N008	0.15	0.3	0.24	0.75	0.28	50	4	2	●	1	0.8	0.8	0.9	1.0
MP2XLBR0015N010	0.15	0.3	0.24	1	0.28	50	4	2	●	1	1.0	1.1	1.2	1.3
MP2XLBR0015N010S06	0.15	0.3	0.24	1	0.28	50	6	2	●	1	1.0	1.1	1.2	1.3
MP2XLBR0015N013	0.15	0.3	0.24	1.25	0.28	50	4	2	●	1	1.3	1.4	1.5	1.6
MP2XLBR0015N013S06	0.15	0.3	0.24	1.25	0.28	50	6	2	●	1	1.3	1.4	1.5	1.6
MP2XLBR0015N015	0.15	0.3	0.24	1.5	0.28	50	4	2	●	1	1.6	1.6	1.8	2.0
MP2XLBR0015N015S06	0.15	0.3	0.24	1.5	0.28	50	6	2	●	1	1.6	1.6	1.8	2.0
MP2XLBR0015N018	0.15	0.3	0.24	1.75	0.28	50	4	2	●	1	1.8	1.9	2.1	2.3
MP2XLBR0015N020	0.15	0.3	0.24	2	0.28	50	4	2	●	1	2.1	2.2	2.4	2.6
MP2XLBR0015N025	0.15	0.3	0.24	2.5	0.28	50	4	2	●	1	2.6	2.7	3.0	3.3
MP2XLBR0015N030	0.15	0.3	0.24	3	0.28	50	4	2	●	1	3.1	3.3	3.6	4.0
MP2XLBR0015N035	0.15	0.3	0.24	3.5	0.28	50	4	2	●	1	3.7	3.8	4.2	4.6
MP2XLBR0015N040	0.15	0.3	0.24	4	0.28	50	4	2	●	1	4.2	4.4	4.8	5.3
MP2XLBR0020N005	0.2	0.4	0.3	0.5	0.37	50	4	2	●	1	0.5	0.5	0.5	0.6
MP2XLBR0020N008	0.2	0.4	0.3	0.75	0.37	50	4	2	●	1	0.7	0.8	0.9	0.9
MP2XLBR0020N010	0.2	0.4	0.3	1	0.37	50	4	2	●	1	1.0	1.1	1.2	1.3
MP2XLBR0020N010S06	0.2	0.4	0.3	1	0.37	50	6	2	●	1	1.0	1.1	1.2	1.3
MP2XLBR0020N015	0.2	0.4	0.3	1.5	0.37	50	4	2	●	1	1.5	1.6	1.7	1.9
MP2XLBR0020N020	0.2	0.4	0.3	2	0.37	50	4	2	●	1	2.1	2.2	2.3	2.6
MP2XLBR0020N020S06	0.2	0.4	0.3	2	0.37	50	6	2	●	1	2.1	2.2	2.3	2.6
MP2XLBR0020N025	0.2	0.4	0.3	2.5	0.37	50	4	2	●	1	2.6	2.7	2.9	3.3
MP2XLBR0020N030	0.2	0.4	0.3	3	0.37	50	4	2	●	1	3.1	3.2	3.5	3.9
MP2XLBR0020N035	0.2	0.4	0.3	3.5	0.37	50	4	2	●	1	3.6	3.8	4.1	4.6

● : Inventory maintained in Japan.

MP2XLB

End mill, Short cut length, 2 flute, Long neck

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
											30'	1°	2°	3°
MP2XLBR0020N040	0.2	0.4	0.3	4	0.37	50	4	2	●	1	4.2	4.3	4.7	5.2
MP2XLBR0020N045	0.2	0.4	0.3	4.5	0.37	50	4	2	●	1	4.7	4.9	5.3	5.9
MP2XLBR0020N050	0.2	0.4	0.3	5	0.37	50	4	2	●	1	5.2	5.4	5.9	6.6
MP2XLBR0020N055	0.2	0.4	0.3	5.5	0.37	50	4	2	●	1	5.7	6.0	6.5	7.2
MP2XLBR0020N060	0.2	0.4	0.3	6	0.37	50	4	2	●	1	6.2	6.5	7.1	7.9
MP2XLBR0025N010	0.25	0.5	0.37	1	0.47	50	4	2	●	1	1.0	1.0	1.1	1.2
MP2XLBR0025N015	0.25	0.5	0.37	1.5	0.47	50	4	2	●	1	1.5	1.6	1.7	1.9
MP2XLBR0025N015S06	0.25	0.5	0.37	1.5	0.47	50	6	2	●	1	1.5	1.6	1.7	1.9
MP2XLBR0025N020	0.25	0.5	0.37	2	0.47	50	4	2	●	1	2.1	2.1	2.3	2.6
MP2XLBR0025N020S06	0.25	0.5	0.37	2	0.47	50	6	2	●	1	2.1	2.1	2.3	2.6
MP2XLBR0025N025	0.25	0.5	0.37	2.5	0.47	50	4	2	●	1	2.6	2.7	2.9	3.2
MP2XLBR0025N025S06	0.25	0.5	0.37	2.5	0.47	50	6	2	●	1	2.6	2.7	2.9	3.2
MP2XLBR0025N030	0.25	0.5	0.37	3	0.47	50	4	2	●	1	3.1	3.2	3.5	3.9
MP2XLBR0025N030S06	0.25	0.5	0.37	3	0.47	50	6	2	●	1	3.1	3.2	3.5	3.9
MP2XLBR0025N035	0.25	0.5	0.37	3.5	0.47	50	4	2	●	1	3.6	3.8	4.1	4.6
MP2XLBR0025N040	0.25	0.5	0.37	4	0.47	50	4	2	●	1	4.1	4.3	4.7	5.2
MP2XLBR0025N045	0.25	0.5	0.37	4.5	0.47	50	4	2	●	1	4.7	4.9	5.3	5.9
MP2XLBR0025N050	0.25	0.5	0.37	5	0.47	50	4	2	●	1	5.2	5.4	5.9	6.6
MP2XLBR0025N055	0.25	0.5	0.37	5.5	0.47	50	4	2	●	1	5.7	6.0	6.5	7.2
MP2XLBR0025N060	0.25	0.5	0.37	6	0.47	50	4	2	●	1	6.2	6.5	7.1	7.9
MP2XLBR0025N070	0.25	0.5	0.37	7	0.47	50	4	2	●	1	7.3	7.6	8.3	9.2
MP2XLBR0025N080	0.25	0.5	0.37	8	0.47	50	4	2	●	1	8.3	8.7	9.5	10.5
MP2XLBR0025N090	0.25	0.5	0.37	9	0.47	50	4	2	●	1	9.4	9.8	10.7	11.9
MP2XLBR0025N100	0.25	0.5	0.37	10	0.47	50	4	2	●	1	10.4	10.9	11.9	13.2
MP2XLBR0030N015	0.3	0.6	0.45	1.5	0.57	50	4	2	●	1	1.5	1.6	1.8	2.0
MP2XLBR0030N015S06	0.3	0.6	0.45	1.5	0.57	50	6	2	●	1	1.5	1.6	1.8	2.0
MP2XLBR0030N020	0.3	0.6	0.45	2	0.57	50	4	2	●	1	2.1	2.2	2.4	2.6
MP2XLBR0030N020S06	0.3	0.6	0.45	2	0.57	50	6	2	●	1	2.1	2.2	2.4	2.6
MP2XLBR0030N025	0.3	0.6	0.45	2.5	0.57	50	4	2	●	1	2.6	2.7	3.0	3.3
MP2XLBR0030N030	0.3	0.6	0.45	3	0.57	50	4	2	●	1	3.1	3.3	3.6	4.0
MP2XLBR0030N030S06	0.3	0.6	0.45	3	0.57	50	6	2	●	1	3.1	3.3	3.6	4.0
MP2XLBR0030N035	0.3	0.6	0.45	3.5	0.57	50	4	2	●	1	3.7	3.8	4.2	4.6
MP2XLBR0030N040	0.3	0.6	0.45	4	0.57	50	4	2	●	1	4.2	4.4	4.8	5.3
MP2XLBR0030N040S06	0.3	0.6	0.45	4	0.57	50	6	2	●	1	4.2	4.4	4.8	5.3
MP2XLBR0030N045	0.3	0.6	0.45	4.5	0.57	50	4	2	●	1	4.7	4.9	5.4	5.9
MP2XLBR0030N050	0.3	0.6	0.45	5	0.57	50	4	2	●	1	5.2	5.5	6.0	6.6
MP2XLBR0030N050S06	0.3	0.6	0.45	5	0.57	50	6	2	●	1	5.2	5.5	6.0	6.6
MP2XLBR0030N055	0.3	0.6	0.45	5.5	0.57	50	4	2	●	1	5.8	6.0	6.6	7.3
MP2XLBR0030N060	0.3	0.6	0.45	6	0.57	50	4	2	●	1	6.3	6.6	7.2	7.9
MP2XLBR0030N060S06	0.3	0.6	0.45	6	0.57	50	6	2	●	1	6.3	6.6	7.2	7.9
MP2XLBR0030N065	0.3	0.6	0.45	6.5	0.57	50	4	2	●	1	6.8	7.1	7.8	8.6
MP2XLBR0030N070	0.3	0.6	0.45	7	0.57	50	4	2	●	1	7.3	7.6	8.4	9.3
MP2XLBR0030N080	0.3	0.6	0.45	8	0.57	50	4	2	●	1	8.4	8.7	9.6	10.6
MP2XLBR0030N080S06	0.3	0.6	0.45	8	0.57	50	6	2	●	1	8.4	8.7	9.6	10.6
MP2XLBR0030N085	0.3	0.6	0.45	8.5	0.57	50	4	2	●	1	8.9	9.3	10.2	11.3
MP2XLBR0030N090	0.3	0.6	0.45	9	0.57	50	4	2	●	1	9.4	9.8	10.8	11.9
MP2XLBR0030N095	0.3	0.6	0.45	9.5	0.57	50	4	2	●	1	9.9	10.4	11.4	12.6
MP2XLBR0030N100	0.3	0.6	0.45	10	0.57	50	4	2	●	1	10.5	10.9	12.0	13.2
MP2XLBR0030N110	0.3	0.6	0.45	11	0.57	50	4	2	●	1	11.5	12.0	13.2	14.6
MP2XLBR0030N120	0.3	0.6	0.45	12	0.57	50	4	2	●	1	12.5	13.1	14.4	15.9
MP2XLBR0040N020	0.4	0.8	0.6	2	0.77	50	4	2	●	1	2.1	2.2	2.4	2.6
MP2XLBR0040N020S06	0.4	0.8	0.6	2	0.77	50	6	2	●	1	2.1	2.2	2.4	2.6

● : Inventory maintained in Japan.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
											30'	1°	2°	3°
MP2XLBR0040N024S06	0.4	0.8	0.6	2.4	0.77	50	6	2	●	1	2.5	2.6	2.8	3.1
MP2XLBR0040N030	0.4	0.8	0.6	3	0.77	50	4	2	●	1	3.1	3.3	3.6	3.9
MP2XLBR0040N030S06	0.4	0.8	0.6	3	0.77	50	6	2	●	1	3.1	3.3	3.6	3.9
MP2XLBR0040N040	0.4	0.8	0.6	4	0.77	50	4	2	●	1	4.2	4.4	4.8	5.2
MP2XLBR0040N040S06	0.4	0.8	0.6	4	0.77	50	6	2	●	1	4.2	4.4	4.8	5.2
MP2XLBR0040N050	0.4	0.8	0.6	5	0.77	50	4	2	●	1	5.2	5.5	6.0	6.6
MP2XLBR0040N060	0.4	0.8	0.6	6	0.77	50	4	2	●	1	6.3	6.5	7.2	7.9
MP2XLBR0040N070	0.4	0.8	0.6	7	0.77	50	4	2	●	1	7.3	7.6	8.4	9.2
MP2XLBR0040N080	0.4	0.8	0.6	8	0.77	50	4	2	●	1	8.4	8.7	9.5	10.6
MP2XLBR0040N090	0.4	0.8	0.6	9	0.77	50	4	2	●	1	9.4	9.8	10.7	11.9
MP2XLBR0040N100	0.4	0.8	0.6	10	0.77	50	4	2	●	1	10.5	10.9	11.9	13.2
MP2XLBR0040N120	0.4	0.8	0.6	12	0.77	50	4	2	●	1	12.5	13.1	14.3	15.9
MP2XLBR0050N030	0.5	1	0.75	3	0.96	50	4	2	●	1	3.2	3.4	3.7	4.1
MP2XLBR0050N030S06	0.5	1	0.75	3	0.96	50	6	2	●	1	3.2	3.4	3.7	4.1
MP2XLBR0050N040	0.5	1	0.75	4	0.96	50	4	2	●	1	4.3	4.5	4.9	5.4
MP2XLBR0050N040S06	0.5	1	0.75	4	0.96	50	6	2	●	1	4.3	4.5	4.9	5.4
MP2XLBR0050N050	0.5	1	0.75	5	0.96	50	4	2	●	1	5.3	5.6	6.1	6.7
MP2XLBR0050N050S06	0.5	1	0.75	5	0.96	50	6	2	●	1	5.3	5.6	6.1	6.7
MP2XLBR0050N060	0.5	1	0.75	6	0.96	50	4	2	●	1	6.4	6.7	7.3	8.1
MP2XLBR0050N060S06	0.5	1	0.75	6	0.96	50	6	2	●	1	6.4	6.7	7.3	8.1
MP2XLBR0050N070	0.5	1	0.75	7	0.96	50	4	2	●	1	7.4	7.8	8.5	9.4
MP2XLBR0050N080	0.5	1	0.75	8	0.96	50	4	2	●	1	8.5	8.9	9.7	10.7
MP2XLBR0050N080S06	0.5	1	0.75	8	0.96	50	6	2	●	1	8.5	8.9	9.7	10.7
MP2XLBR0050N090	0.5	1	0.75	9	0.96	50	4	2	●	1	9.5	10.0	10.9	12.0
MP2XLBR0050N100	0.5	1	0.75	10	0.96	50	4	2	●	1	10.6	11.1	12.1	13.4
MP2XLBR0050N100S06	0.5	1	0.75	10	0.96	60	6	2	●	1	10.6	11.1	12.1	13.4
MP2XLBR0050N120	0.5	1	0.75	12	0.96	50	4	2	●	1	12.7	13.2	14.5	16.0
MP2XLBR0050N120S06	0.5	1	0.75	12	0.96	60	6	2	●	1	12.7	13.2	14.5	16.0
MP2XLBR0050N140	0.5	1	0.75	14	0.96	55	4	2	●	1	14.8	15.4	16.9	18.7
MP2XLBR0050N160	0.5	1	0.75	16	0.96	55	4	2	●	1	16.9	17.6	19.3	21.3
MP2XLBR0050N160S06	0.5	1	0.75	16	0.96	65	6	2	●	1	16.9	17.6	19.3	21.3
MP2XLBR0050N180	0.5	1	0.75	18	0.96	55	4	2	●	1	18.9	19.8	21.7	24.0
MP2XLBR0050N200	0.5	1	0.75	20	0.96	55	4	2	●	1	21.0	22.0	24.1	26.6
MP2XLBR0050N200S06	0.5	1	0.75	20	0.96	65	6	2	●	1	21.0	22.0	24.1	26.6
MP2XLBR0060N060	0.6	1.2	0.9	6	1.16	50	4	2	●	1	6.4	6.7	7.3	8.0
MP2XLBR0060N060S06	0.6	1.2	0.9	6	1.16	55	6	2	●	1	6.4	6.7	7.3	8.0
MP2XLBR0060N080	0.6	1.2	0.9	8	1.16	50	4	2	●	1	8.5	8.9	9.7	10.7
MP2XLBR0060N080S06	0.6	1.2	0.9	8	1.16	55	6	2	●	1	8.5	8.9	9.7	10.7
MP2XLBR0060N100	0.6	1.2	0.9	10	1.16	50	4	2	●	1	10.6	11.0	12.1	13.3
MP2XLBR0060N100S06	0.6	1.2	0.9	10	1.16	55	6	2	●	1	10.6	11.0	12.1	13.3
MP2XLBR0060N120	0.6	1.2	0.9	12	1.16	50	4	2	●	1	12.7	13.2	14.5	16.0
MP2XLBR0060N120S06	0.6	1.2	0.9	12	1.16	65	6	2	●	1	12.7	13.2	14.5	16.0
MP2XLBR0060N140	0.6	1.2	0.9	14	1.16	55	4	2	●	1	14.8	15.4	16.9	18.7
MP2XLBR0060N160	0.6	1.2	0.9	16	1.16	55	4	2	●	1	16.9	17.6	19.3	21.3
MP2XLBR0060N160S06	0.6	1.2	0.9	16	1.16	65	6	2	●	1	16.9	17.6	19.3	21.3
MP2XLBR0060N180	0.6	1.2	0.9	18	1.16	60	4	2	●	1	18.9	19.8	21.7	24.0
MP2XLBR0060N200	0.6	1.2	0.9	20	1.16	60	4	2	●	1	21.0	21.9	24.0	26.6
MP2XLBR0060N240	0.6	1.2	0.9	24	1.16	60	4	2	●	1	25.2	26.3	28.8	*
MP2XLBR0070N080	0.7	1.4	1.05	8	1.34	50	4	2	●	1	8.4	8.8	9.6	10.6
MP2XLBR0070N120	0.7	1.4	1.05	12	1.34	50	4	2	●	1	12.6	13.1	14.4	15.9
MP2XLBR0070N160	0.7	1.4	1.05	16	1.34	50	4	2	●	1	16.8	17.5	19.2	21.2
MP2XLBR0075N030	0.75	1.5	1.1	3	1.44	50	4	2	●	1	3.1	3.3	3.6	3.9

* No interference

MP2XLB

End mill, Short cut length, 2 flute, Long neck

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
											30'	1°	2°	3°
MP2XLBR0075N040	0.75	1.5	1.1	4	1.44	50	4	2	●	1	4.2	4.4	4.8	5.2
MP2XLBR0075N060	0.75	1.5	1.1	6	1.44	50	4	2	●	1	6.3	6.6	7.2	7.9
MP2XLBR0075N060S06	0.75	1.5	1.1	6	1.44	50	6	2	●	1	6.3	6.6	7.2	7.9
MP2XLBR0075N080	0.75	1.5	1.1	8	1.44	50	4	2	●	1	8.4	8.8	9.6	10.6
MP2XLBR0075N080S06	0.75	1.5	1.1	8	1.44	60	6	2	●	1	8.4	8.8	9.6	10.6
MP2XLBR0075N100	0.75	1.5	1.1	10	1.44	50	4	2	●	1	10.5	11.0	12.0	13.2
MP2XLBR0075N100S06	0.75	1.5	1.1	10	1.44	60	6	2	●	1	10.5	11.0	12.0	13.2
MP2XLBR0075N120	0.75	1.5	1.1	12	1.44	50	4	2	●	1	12.6	13.1	14.4	15.9
MP2XLBR0075N120S06	0.75	1.5	1.1	12	1.44	60	6	2	●	1	12.6	13.1	14.4	15.9
MP2XLBR0075N140	0.75	1.5	1.1	14	1.44	55	4	2	●	1	14.7	15.3	16.8	18.5
MP2XLBR0075N160	0.75	1.5	1.1	16	1.44	55	4	2	●	1	16.8	17.5	19.2	21.2
MP2XLBR0075N160S06	0.75	1.5	1.1	16	1.44	60	6	2	●	1	16.8	17.5	19.2	21.2
MP2XLBR0075N180	0.75	1.5	1.1	18	1.44	60	4	2	●	1	18.9	19.7	21.6	23.8
MP2XLBR0075N200	0.75	1.5	1.1	20	1.44	60	4	2	●	1	21.0	21.9	23.9	*
MP2XLBR0075N220	0.75	1.5	1.1	22	1.44	60	4	2	●	1	23.0	24.0	26.3	*
MP2XLBR0080N080	0.8	1.6	1.2	8	1.54	55	4	2	●	1	8.4	8.8	9.6	10.5
MP2XLBR0080N120	0.8	1.6	1.2	12	1.54	55	4	2	●	1	12.6	13.1	14.4	15.9
MP2XLBR0080N160	0.8	1.6	1.2	16	1.54	55	4	2	●	1	16.8	17.5	19.1	21.2
MP2XLBR0080N200	0.8	1.6	1.2	20	1.54	55	4	2	●	1	21.0	21.9	23.9	*
MP2XLBR0090N080	0.9	1.8	1.4	8	1.74	55	4	2	●	1	8.4	8.8	9.6	10.5
MP2XLBR0090N120	0.9	1.8	1.4	12	1.74	55	4	2	●	1	12.6	13.1	14.3	15.8
MP2XLBR0090N160	0.9	1.8	1.4	16	1.74	55	4	2	●	1	16.8	17.5	19.1	21.1
MP2XLBR0090N200	0.9	1.8	1.4	20	1.74	55	4	2	●	1	20.9	21.8	23.9	*
MP2XLBR0100N040	1	2	1.5	4	1.94	50	4	2	●	1	4.2	4.4	4.7	5.2
MP2XLBR0100N040S06	1	2	1.5	4	1.94	50	6	2	●	1	4.2	4.4	4.7	5.2
MP2XLBR0100N060	1	2	1.5	6	1.94	50	4	2	●	1	6.3	6.6	7.1	7.8
MP2XLBR0100N060S06	1	2	1.5	6	1.94	50	6	2	●	1	6.3	6.6	7.1	7.8
MP2XLBR0100N080	1	2	1.5	8	1.94	50	4	2	●	1	8.4	8.8	9.5	10.5
MP2XLBR0100N080S06	1	2	1.5	8	1.94	50	6	2	●	1	8.4	8.8	9.5	10.5
MP2XLBR0100N100	1	2	1.5	10	1.94	50	4	2	●	1	10.5	10.9	11.9	13.1
MP2XLBR0100N100S06	1	2	1.5	10	1.94	50	6	2	●	1	10.5	10.9	11.9	13.1
MP2XLBR0100N120	1	2	1.5	12	1.94	50	4	2	●	1	12.6	13.1	14.3	15.8
MP2XLBR0100N120S06	1	2	1.5	12	1.94	60	6	2	●	1	12.6	13.1	14.3	15.8
MP2XLBR0100N140	1	2	1.5	14	1.94	55	4	2	●	1	14.7	15.3	16.7	18.4
MP2XLBR0100N140S06	1	2	1.5	14	1.94	60	6	2	●	1	14.7	15.3	16.7	18.4
MP2XLBR0100N160	1	2	1.5	16	1.94	55	4	2	●	1	16.8	17.5	19.1	*
MP2XLBR0100N160S06	1	2	1.5	16	1.94	65	6	2	●	1	16.8	17.5	19.1	21.1
MP2XLBR0100N180	1	2	1.5	18	1.94	55	4	2	●	1	18.9	19.7	21.5	*
MP2XLBR0100N180S06	1	2	1.5	18	1.94	65	6	2	●	1	18.9	19.7	21.5	23.8
MP2XLBR0100N200	1	2	1.5	20	1.94	65	4	2	●	1	20.9	21.8	23.9	*
MP2XLBR0100N200S06	1	2	1.5	20	1.94	65	6	2	●	1	20.9	21.8	23.9	26.4
MP2XLBR0100N220	1	2	1.5	22	1.94	65	4	2	●	1	23.0	24.0	26.3	*
MP2XLBR0100N250	1	2	1.5	25	1.94	65	4	2	●	1	26.2	27.3	*	*
MP2XLBR0100N250S06	1	2	1.5	25	1.94	90	6	2	●	1	26.2	27.3	29.9	33.0
MP2XLBR0100N300	1	2	1.5	30	1.94	80	4	2	●	1	31.4	32.7	*	*
MP2XLBR0100N300S06	1	2	1.5	30	1.94	90	6	2	●	1	31.4	32.7	35.9	*
MP2XLBR0100N350	1	2	1.5	35	1.94	80	4	2	●	1	36.6	38.2	*	*
MP2XLBR0100N350S06	1	2	1.5	35	1.94	90	6	2	●	1	36.6	38.2	41.8	*
MP2XLBR0100N400	1	2	1.5	40	1.94	80	4	2	●	1	41.8	43.6	*	*
MP2XLBR0100N400S06	1	2	1.5	40	1.94	90	6	2	●	1	41.8	43.6	47.8	*
MP2XLBR0125N100	1.25	2.5	1.9	10	2.4	55	4	2	●	1	10.4	10.8	11.8	12.9
MP2XLBR0125N150	1.25	2.5	1.9	15	2.4	55	4	2	●	1	15.6	16.3	17.8	*

* No interference

● : Inventory maintained in Japan.

Unit : mm

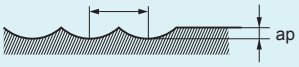
Order Number	PRFRAD	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
											30'	1°	2°	3°
MP2XLBR0125N200	1.25	2.5	1.9	20	2.4	55	4	2	●	1	20.8	21.7	*	*
MP2XLB**R0125N250**	1.25	2.5	1.9	25	2.4	70	4	2	●	1	26.1	27.2	*	*
MP2XLB**R0125N300**	1.25	2.5	1.9	30	2.4	70	4	2	●	1	31.3	32.6	*	*
MP2XLB**R0125N350**	1.25	2.5	1.9	35	2.4	70	4	2	●	1	36.5	38.1	*	*
MP2XLB**R0150N060S03**	1.5	3	2.3	6	2.9	60	3	2	●	1	*	*	*	*
MP2XLB**R0150N080**	1.5	3	2.3	8	2.9	60	6	2	●	1	8.3	8.6	9.3	10.2
MP2XLB**R0150N100**	1.5	3	2.3	10	2.9	60	6	2	●	1	10.4	10.8	11.7	12.9
MP2XLB**R0150N120**	1.5	3	2.3	12	2.9	60	6	2	●	1	12.5	13.0	14.1	15.5
MP2XLB**R0150N140**	1.5	3	2.3	14	2.9	60	6	2	●	1	14.6	15.2	16.5	18.2
MP2XLB**R0150N160**	1.5	3	2.3	16	2.9	70	6	2	●	1	16.7	17.3	18.9	20.8
MP2XLB**R0150N200**	1.5	3	2.3	20	2.9	70	6	2	●	1	20.8	21.7	23.7	26.1
MP2XLB**R0150N250**	1.5	3	2.3	25	2.9	70	6	2	●	1	26.1	27.2	29.7	*
MP2XLB**R0150N300**	1.5	3	2.3	30	2.9	70	6	2	●	1	31.3	32.6	35.7	*
MP2XLB**R0150N350**	1.5	3	2.3	35	2.9	90	6	2	●	1	36.5	38.0	41.7	*
MP2XLB**R0150N400**	1.5	3	2.3	40	2.9	90	6	2	●	1	41.7	43.5	*	*
MP2XLB**R0175N150**	1.75	3.5	2.6	15	3.4	65	6	2	●	1	15.6	16.2	17.7	19.4
MP2XLB**R0175N250**	1.75	3.5	2.6	25	3.4	65	6	2	●	1	26.0	27.1	29.6	*
MP2XLB**R0175N350**	1.75	3.5	2.6	35	3.4	90	6	2	●	1	36.5	38.0	*	*
MP2XLB**R0175N450**	1.75	3.5	2.6	45	3.4	90	6	2	●	1	46.9	48.9	*	*
MP2XLB**R0200N080S04**	2	4	3	8	3.9	65	4	2	●	1	*	*	*	*
MP2XLB**R0200N100**	2	4	3	10	3.9	65	6	2	●	1	10.4	10.8	11.6	12.7
MP2XLB**R0200N120**	2	4	3	12	3.9	65	6	2	●	1	12.5	12.9	14.0	15.4
MP2XLB**R0200N140**	2	4	3	14	3.9	65	6	2	●	1	14.6	15.1	16.4	18.0
MP2XLB**R0200N160**	2	4	3	16	3.9	70	6	2	●	1	16.6	17.3	18.8	20.7
MP2XLB**R0200N200**	2	4	3	20	3.9	70	6	2	●	1	20.8	21.7	23.6	*
MP2XLB**R0200N250**	2	4	3	25	3.9	70	6	2	●	1	26.0	27.1	29.6	*
MP2XLB**R0200N300**	2	4	3	30	3.9	80	6	2	●	1	31.2	32.6	*	*
MP2XLB**R0200N350**	2	4	3	35	3.9	80	6	2	●	1	36.5	38.0	*	*
MP2XLB**R0200N400**	2	4	3	40	3.9	90	6	2	●	1	41.7	43.5	*	*
MP2XLB**R0200N450**	2	4	3	45	3.9	90	6	2	●	1	46.9	48.9	*	*
MP2XLB**R0200N500**	2	4	3	50	3.9	100	6	2	●	1	52.1	54.3	*	*
MP2XLB**R0250N150**	2.5	5	3.8	15	4.9	70	6	2	●	1	15.6	16.2	*	*
MP2XLB**R0250N200**	2.5	5	3.8	20	4.9	70	6	2	●	1	20.8	21.6	*	*
MP2XLB**R0250N250**	2.5	5	3.8	25	4.9	70	6	2	●	1	26.0	27.1	*	*
MP2XLB**R0250N300**	2.5	5	3.8	30	4.9	80	6	2	●	1	31.2	*	*	*
MP2XLB**R0250N350**	2.5	5	3.8	35	4.9	80	6	2	●	1	36.4	*	*	*
MP2XLB**R0250N400**	2.5	5	3.8	40	4.9	90	6	2	●	1	41.7	*	*	*
MP2XLB**R0300N200**	3	6	6	20	5.85	70	6	2	●	2	*	*	*	*
MP2XLB**R0300N250**	3	6	6	25	5.85	70	6	2	●	2	*	*	*	*
MP2XLB**R0300N300**	3	6	6	30	5.85	80	6	2	●	2	*	*	*	*
MP2XLB**R0300N400**	3	6	6	40	5.85	90	6	2	●	2	*	*	*	*
MP2XLB**R0300N500**	3	6	6	50	5.85	100	6	2	●	2	*	*	*	*

* No interference

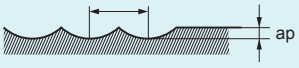
MP2XLB

End mill, Short cut length, 2 flute, Long neck

RECOMMENDED CUTTING CONDITIONS

Work material		Carbon steel,Alloy steel,Alloy Tool Steel, Pre-hardened steel, Precipitation hardeningstainless steel AISI 1055, AISI P21, ASTM 630			Hardened steel (−45HRC) Hardened steell (−52HRC) AISI H13, AISI 420, AISI 431			Copper, Copper alloys		
R PRFRAD (mm)	Neck length LU (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
R0.05	0.3	50000	200	0.002	50000	200	0.002	50000	200	0.004
	0.5	50000	200	0.001	50000	200	0.002	50000	200	0.002
R0.1	0.5	50000	400	0.003	50000	320	0.003	50000	320	0.006
	1	50000	400	0.002	50000	320	0.002	50000	320	0.004
	1.5	40000	300	0.001	40000	240	0.001	40000	240	0.002
	2	40000	200	0.001	40000	160	0.001	40000	160	0.002
	2.5	40000	100	0.001	40000	80	0.001	40000	80	0.002
R0.15	1	50000	600	0.007	50000	480	0.007	50000	480	0.014
	1.5	50000	600	0.005	50000	480	0.005	50000	480	0.01
	2	50000	600	0.003	50000	480	0.003	50000	480	0.006
	2.5	40000	400	0.003	40000	320	0.003	40000	320	0.006
	3	40000	300	0.002	40000	240	0.002	40000	240	0.004
	3.5	30000	250	0.002	30000	200	0.002	30000	200	0.004
	4	30000	200	0.002	30000	160	0.002	30000	160	0.004
R0.2	1	50000	1800	0.015	50000	1400	0.015	50000	1400	0.03
	2	50000	1300	0.01	50000	1000	0.01	50000	1000	0.02
	3	50000	900	0.005	50000	700	0.005	50000	700	0.01
	4	40000	600	0.004	40000	480	0.004	40000	480	0.008
	5	40000	400	0.003	40000	320	0.003	40000	320	0.006
	6	30000	200	0.002	30000	160	0.002	30000	160	0.004
R0.25	2	50000	2500	0.02	50000	2000	0.02	50000	2000	0.04
	3	50000	1500	0.015	50000	1200	0.015	50000	1200	0.03
	4	45000	1200	0.01	45000	950	0.01	45000	950	0.02
	5	45000	900	0.007	45000	700	0.007	45000	700	0.014
	6	36000	600	0.006	36000	480	0.006	36000	480	0.012
	7	32000	400	0.005	32000	320	0.005	32000	320	0.01
	8	32000	300	0.003	32000	240	0.003	32000	240	0.006
	10	26000	200	0.002	26000	160	0.002	26000	160	0.004
R0.3	2	50000	3500	0.03	50000	2800	0.03	50000	2800	0.06
	3	50000	3500	0.03	50000	2800	0.03	50000	2800	0.06
	4	44000	2500	0.02	44000	2000	0.02	44000	2000	0.04
	5	37000	1200	0.01	37000	950	0.01	37000	950	0.02
	6	37000	1000	0.008	37000	800	0.008	37000	800	0.016
	7	35000	750	0.008	35000	600	0.008	35000	600	0.016
	8	35000	600	0.006	35000	480	0.006	35000	480	0.012
	9	30000	500	0.004	30000	400	0.004	30000	400	0.008
	10	30000	500	0.003	30000	400	0.003	30000	400	0.006
	11	22000	300	0.002	22000	240	0.002	22000	240	0.004
	12	22000	200	0.002	22000	160	0.002	22000	160	0.004
Depth ofcut		≤0.1PRFRAD (PRFRAD≤1) ≤0.2PRFRAD (PRFRAD>1)  PRFRAD:Radius								

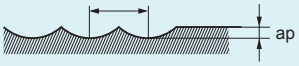
1) When the inclination angle of machined surface is large, or machining with large cutting load such as corner area, reduce the revolution and feed rate.
2) The use of oil mist is recommended when machining with small diameter.
3) The revolution and feed rate can increase for the small depth of cut (ap).
4) Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.
5) For hardened steel over 55HRC, use VF2XLB.
6) Standard cutting conditions of austenitic stainless steel and titanium alloy, please reduce to 60% revolution and 45% feedrate. (Hardened steel (45−55HRC) table above)

Work material		Carbon steel,Alloy steel,Alloy Tool Steel, Pre-hardened steel, Precipitation hardeningstainless steel AISI 1055, AISI P21, ASTM 630			Hardened steel (−45HRC) Hardened steell (−52HRC) AISI H13, AISI 420, AISI 431			Copper, Copper alloys		
R **PRFRAD** (mm)	Neck length **LU** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
R0.4	**2**	50000	4400	0.04	50000	3500	0.04	50000	3500	0.08
	3	50000	4000	0.04	50000	3200	0.04	50000	3200	0.08
	4	50000	4000	0.02	50000	3200	0.02	50000	3200	0.04
	5	35000	2400	0.02	35000	1900	0.02	35000	1900	0.04
	6	35000	2400	0.02	35000	1900	0.02	35000	1900	0.04
	7	30000	1500	0.015	30000	1200	0.015	30000	1200	0.03
	8	30000	1500	0.01	30000	1200	0.01	30000	1200	0.02
	10	30000	700	0.008	30000	560	0.008	30000	560	0.016
	12	22000	500	0.006	22000	400	0.006	22000	400	0.012
R0.5	**3**	40000	4000	0.05	40000	3200	0.05	40000	3200	0.1
	4	40000	4000	0.05	40000	3200	0.05	40000	3200	0.1
	6	35000	3000	0.03	35000	2400	0.03	35000	2400	0.06
	8	30000	2000	0.02	30000	1600	0.02	30000	1600	0.04
	10	20000	1000	0.01	20000	800	0.01	20000	800	0.02
	12	20000	1000	0.01	20000	800	0.01	20000	800	0.02
	14	18000	600	0.008	18000	480	0.008	18000	480	0.016
	16	18000	500	0.008	18000	400	0.008	18000	400	0.016
	18	13000	300	0.005	13000	240	0.005	13000	240	0.01
	20	13000	250	0.005	13000	200	0.005	13000	200	0.01
R0.6	**6**	40000	4400	0.04	40000	3500	0.04	40000	3500	0.08
	8	40000	4000	0.04	40000	3200	0.04	40000	3200	0.08
	10	27000	1900	0.02	27000	1500	0.02	27000	1500	0.04
	12	16000	1400	0.02	16000	1100	0.02	16000	1100	0.04
	18	15000	700	0.008	15000	560	0.008	15000	560	0.016
	24	11000	300	0.006	11000	240	0.006	11000	240	0.012
R0.7	**8**	40000	4000	0.05	40000	3200	0.05	40000	2560	0.1
	12	26000	2000	0.04	26000	1600	0.04	26000	1280	0.08
	16	17000	1400	0.03	17000	1120	0.03	17000	896	0.06
R0.75	**6**	40000	6000	0.07	36000	4300	0.07	36000	4300	0.14
	8	40000	6000	0.07	36000	4300	0.07	36000	4300	0.14
	10	40000	5000	0.06	36000	3600	0.06	36000	3600	0.12
	12	32000	3400	0.04	29000	2400	0.04	29000	2400	0.08
	16	15000	1400	0.03	15000	1100	0.03	15000	1100	0.06
	20	12000	900	0.02	12000	720	0.02	12000	720	0.04
	22	9000	400	0.01	9000	320	0.01	9000	320	0.02
R0.8	**8**	40000	6000	0.08	32000	3800	0.08	32000	3800	0.16
	12	36000	4500	0.06	29000	2800	0.06	29000	2800	0.12
	16	14000	1400	0.04	14000	1100	0.04	14000	1100	0.08
	20	12000	1000	0.03	12000	800	0.03	12000	800	0.06
R0.9	**8**	40000	6600	0.09	32000	4200	0.09	32000	4200	0.18
	12	40000	5000	0.07	32000	3200	0.07	32000	3200	0.14
	16	28000	2800	0.04	22000	1800	0.04	22000	1800	0.08
	20	10000	800	0.03	10000	640	0.03	10000	640	0.06
Depth ofcut		≤0.1PRFRAD (PRFRAD ≤1) ≤0.2PRFRAD (PRFRAD> 1)  PRFRAD:Radius								

1) When the inclination angle of machined surface is large, or machining with large cutting load such as corner area, reduce the revolution and feed rate.
2) The use of oil mist is recommended when machining with small diameter.
3) The revolution and feed rate can increase for the small depth of cut (ap).
4) Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.
5) For hardened steel over 55HRC, use VF2XLB.
6) Standard cutting conditions of austenitic stainless steel and titanium alloy, please reduce to 60% revolution and 45% feedrate. (Hardened steel (45−55HRC) table above)

MP2XLB

End mill, Short cut length, 2 flute, Long neck

Work material		Carbon steel,Alloy steel,Pre-hardened steel, Hardened steel (—45HRC) AISI 1055, AISI P21			Hardened steell (—52HRC) AISI H13, AISI 420			Copper, Copper alloys		
R PRFRAD (mm)	Neck length LU (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
R1	4	40000	8000	0.1	32000	5000	0.1	32000	5000	0.2
	6	40000	8000	0.1	32000	5000	0.1	32000	5000	0.2
	8	40000	6000	0.1	32000	3800	0.1	32000	3800	0.2
	10	40000	5000	0.08	32000	3200	0.08	32000	3200	0.16
	12	40000	5000	0.08	32000	3200	0.08	32000	3200	0.16
	16	32000	3500	0.05	26000	2200	0.05	26000	2200	0.1
	20	10000	1000	0.04	10000	800	0.04	10000	800	0.08
	25	10000	1000	0.04	10000	800	0.04	10000	800	0.08
	30	10000	800	0.02	10000	640	0.02	10000	640	0.04
	35	10000	600	0.02	10000	480	0.02	10000	480	0.04
	40	8000	400	0.01	8000	320	0.01	8000	320	0.02
R1.25	10	36000	6000	0.12	29000	3800	0.12	29000	3800	0.24
	15	32000	4500	0.1	26000	2900	0.1	26000	2900	0.2
	20	26000	3200	0.07	21000	2000	0.07	21000	2000	0.14
	25	12000	1400	0.06	8000	720	0.06	8000	720	0.12
	30	8000	900	0.04	8000	700	0.04	8000	700	0.08
	35	8000	800	0.02	8000	640	0.02	8000	510	0.04
R1.5	6	32000	7000	0.15	26000	4500	0.15	22000	3800	0.3
	10	32000	7000	0.15	26000	4500	0.15	22000	3800	0.3
	16	32000	5000	0.1	26000	3200	0.1	22000	2700	0.2
	20	27000	3800	0.1	22000	2400	0.1	22000	2400	0.2
	25	21000	2700	0.08	17000	1700	0.08	17000	1700	0.16
	30	10000	700	0.08	6000	560	0.08	6000	560	0.16
	35	6000	700	0.06	6000	560	0.06	6000	560	0.12
	40	6000	600	0.04	6000	480	0.04	6000	480	0.08
R1.75	15	27500	4400	0.13	22000	2800	0.13	18000	2300	0.26
	25	23000	3600	0.1	18000	2200	0.1	18000	2200	0.2
	35	10000	1400	0.08	10000	1100	0.08	10000	1100	0.16
	45	7500	900	0.04	7500	720	0.04	7500	720	0.08
R2	10	24000	6000	0.2	19000	3800	0.2	16000	3200	0.4
	20	24000	3800	0.15	19000	2400	0.15	16000	2000	0.3
	30	20000	3000	0.1	16000	1900	0.1	16000	1900	0.2
	40	12000	1700	0.1	12000	1400	0.1	12000	1400	0.2
	50	8000	1000	0.05	8000	800	0.05	8000	800	0.1
R2.5	20	22000	6000	0.2	18000	3800	0.2	13000	2800	0.4
	25	22000	4400	0.2	18000	2800	0.2	13000	2000	0.4
	30	22000	3800	0.15	18000	2400	0.15	13000	1700	0.3
	40	22000	3600	0.1	18000	2300	0.1	13000	1600	0.2
R3	20	20000	6000	0.2	16000	3800	0.2	11000	2600	0.4
	30	20000	6000	0.2	16000	3800	0.2	11000	2600	0.4
	40	20000	4500	0.15	16000	2800	0.15	11000	2000	0.3
	50	20000	3000	0.15	16000	1900	0.15	11000	1300	0.3
Depth ofcut		≤0.1PRFRAD (PRFRAD ≤1) ≤0.2PRFRAD (PRFRAD> 1)  PRFRAD:Radius								

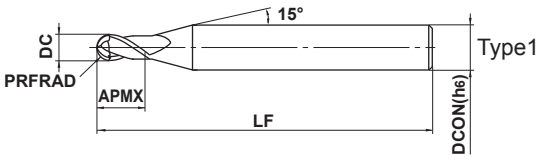
1) When the inclination angle of machined surface is large, or machining with large cutting load such as corner area, reduce the revolution and feed rate.
2) The use of oil mist is recommended when machining with small diameter.
3) The revolution and feed rate can increase for the small depth of cut (ap).
4) Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.
5) For hardened steel over 55HRC, use VF2XLB.
6) Standard cutting conditions of austenitic stainless steel and titanium alloy, please reduce to 60% revolution and 45% feedrate. (Hardened steel (45—55HRC) table above)

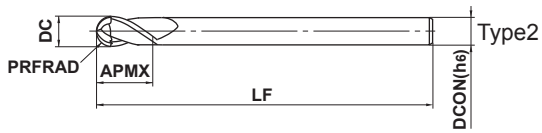
MS2SB

Ball nose end mill, Short cut length, 2 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		







R

0.1≤PRFRAD≤3	4≤PRFRAD≤6			
±0.005	±0.007			

0.2≤DC≤12				
0 - 0.020				

h6

4≤DCON≤6	8≤DCON≤10	DCON=12		
0 - 0.005	0 - 0.006	0 - 0.008		

● 2 flute ball nose end mill for general use.

Unit : mm

Order Number	PRFRAD	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS2SBR0010S04	0.1	0.2	0.3	45	4	2	●	1
MS2SB**R0010S06**	0.1	0.2	0.3	50	6	2	●	1
MS2SB**R0015S04**	0.15	0.3	0.5	45	4	2	●	1
MS2SB**R0015S06**	0.15	0.3	0.5	50	6	2	●	1
MS2SB**R0020S04**	0.2	0.4	0.6	45	4	2	●	1
MS2SB**R0020S06**	0.2	0.4	0.6	50	6	2	●	1
MS2SB**R0025S04**	0.25	0.5	0.8	45	4	2	●	1
MS2SB**R0025S06**	0.25	0.5	0.8	50	6	2	●	1
MS2SB**R0030S04**	0.3	0.6	0.9	45	4	2	●	1
MS2SB**R0030S06**	0.3	0.6	0.9	50	6	2	●	1
MS2SB**R0035S04**	0.35	0.7	1.1	45	4	2	●	1
MS2SB**R0040S04**	0.4	0.8	1.2	45	4	2	●	1
MS2SB**R0040S06**	0.4	0.8	1.2	50	6	2	●	1
MS2SB**R0045S04**	0.45	0.9	1.4	45	4	2	●	1
MS2SB**R0050S04**	0.5	1	1.5	45	4	2	●	1
MS2SB**R0050S06**	0.5	1	1.5	50	6	2	●	1
MS2SB**R0060S04**	0.6	1.2	1.8	45	4	2	●	1
MS2SB**R0060S06**	0.6	1.2	1.8	50	6	2	●	1
MS2SB**R0070S04**	0.7	1.4	2.1	45	4	2	●	1
MS2SB**R0070S06**	0.7	1.4	2.1	50	6	2	●	1
MS2SB**R0075S04**	0.75	1.5	2.3	45	4	2	●	1
MS2SB**R0075S06**	0.75	1.5	2.3	50	6	2	●	1
MS2SB**R0080S04**	0.8	1.6	2.4	45	4	2	●	1
MS2SB**R0080S06**	0.8	1.6	2.4	50	6	2	●	1
MS2SB**R0090S04**	0.9	1.8	2.7	45	4	2	●	1
MS2SB**R0090S06**	0.9	1.8	2.7	50	6	2	●	1
MS2SB**R0100S04**	1	2	3	50	4	2	●	1
MS2SB**R0100S06**	1	2	3	50	6	2	●	1
MS2SB**R0125S04**	1.25	2.5	3.8	50	4	2	●	1
MS2SB**R0125S06**	1.25	2.5	3.8	50	6	2	●	1
MS2SB**R0150S06**	1.5	3	4.5	70	6	2	●	1
MS2SB**R0200S06**	2	4	6	70	6	2	●	1
MS2SB**R0250S06**	2.5	5	7.5	80	6	2	●	1
MS2SB**R0300S06**	3	6	9	80	6	2	●	2

● : Inventory maintained in Japan.

MS2SB

Ball nose end mill, Short cut length, 2 flute

Unit : mm

Order Number	PRFRAD	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS2SBR0400S08	4	8	12	90	8	2	●	2
MS2SBR0500S10	5	10	15	100	10	2	●	2
MS2SBR0600S12	6	12	18	110	12	2	●	2

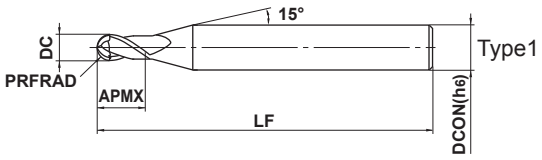
● : Inventory maintained in Japan.

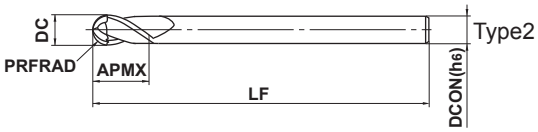
MS2MB

Ball nose end mill, Medium cut length, 2 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		







R	0.25≤PRFRAD≤3	4≤PRFRAD≤6			
	±0.005	±0.007			
	0.5≤DC≤12				
	0 - 0.020				
h6	4≤DCON≤6	8≤DCON≤10	DCON=12		
	0 - 0.005	0 - 0.006	0 - 0.008		

2 flute ball nose end mill for general use.

Unit : mm

Order Number	PRFRAD	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MS2MBR0025	0.25	0.5	1	45	4	2	●	1
MS2MBR0030	0.3	0.6	1.2	45	4	2	●	1
MS2MBR0040	0.4	0.8	1.6	45	4	2	●	1
MS2MBR0050	0.5	1	2.5	45	4	2	●	1
MS2MBR0060	0.6	1.2	2.5	45	4	2	●	1
MS2MBR0070	0.7	1.4	3	45	4	2	●	1
MS2MBR0075	0.75	1.5	4	45	4	2	●	1
MS2MBR0080	0.8	1.6	4	45	4	2	●	1
MS2MBR0090	0.9	1.8	5	45	4	2	●	1
MS2MBR0100	1	2	6	50	4	2	●	1
MS2MBR0125	1.25	2.5	6	50	4	2	●	1
MS2MBR0150S03	1.5	3	8	70	3	2	●	2
MS2MBR0150	1.5	3	8	70	6	2	●	1
MS2MBR0175	1.75	3.5	8	70	6	2	●	1
MS2MBR0200S04	2	4	8	70	4	2	●	2
MS2MBR0200	2	4	8	70	6	2	●	1
MS2MBR0250	2.5	5	12	80	6	2	●	1
MS2MBR0300	3	6	12	80	6	2	●	2
MS2MBR0400	4	8	14	90	8	2	●	2
MS2MBR0500	5	10	18	100	10	2	●	2
MS2MBR0600	6	12	22	110	12	2	●	2

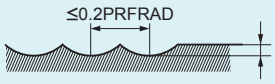
MS2SB
Ball nose end mill, Short cut length, 2 flute

MS2MB
Ball nose end mill, Medium cut length, 2 flute

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21					Hardened steel (45－55HRC) AISI H13				
R **PRFRAD** (mm)	α≤15°		α>15°		Depth of cut (mm)	α≤15°		α>15°		Depth of cut (mm)
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)		Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	
R 0.1	40000	300	40000	250	0.003	40000	300	40000	250	0.003
R 0.15	40000	500	40000	350	0.007	40000	500	40000	350	0.007
R 0.2	40000	1600	40000	1200	0.02	40000	1300	40000	950	0.015
R 0.25	40000	2400	40000	1400	0.025	40000	1900	40000	1100	0.020
R 0.3	40000	3200	40000	1600	0.03	40000	2500	40000	1300	0.025
R 0.4	40000	4800	40000	2400	0.05	40000	4000	40000	1900	0.04
R 0.5	40000	5600	40000	3200	0.06	40000	5600	40000	3000	0.05
R 0.75	40000	6500	40000	4000	0.09	40000	6500	32000	3200	0.08
R 1	40000	6500	39000	4700	0.11	40000	6500	31000	3500	0.11
R 1.25	40000	7000	33000	4500	0.12	36000	6500	26000	3500	0.12
R 1.5	40000	7500	27000	4300	0.13	32000	6000	22000	3400	0.13
R 2	32000	7500	20000	3600	0.15	25000	6000	16000	2700	0.15
R 2.5	25000	6000	16000	2900	0.20	20000	5400	13000	2300	0.20
R 3	21000	5800	13000	2600	0.25	17000	4700	10000	2000	0.25
R 4	16000	4500	10000	2000	0.30	13000	3600	8000	1500	0.30
R 5	13000	3600	8000	1700	0.50	10000	2900	6400	1200	0.50
R 6	9000	2500	6000	1300	0.50	7200	2000	4800	1000	0.50

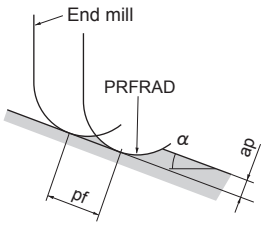
Depth of cut



≤Please refer to the list above for depth of cut.

PRFRAD:Radius

1) α is the inclination angle of the machined surface.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

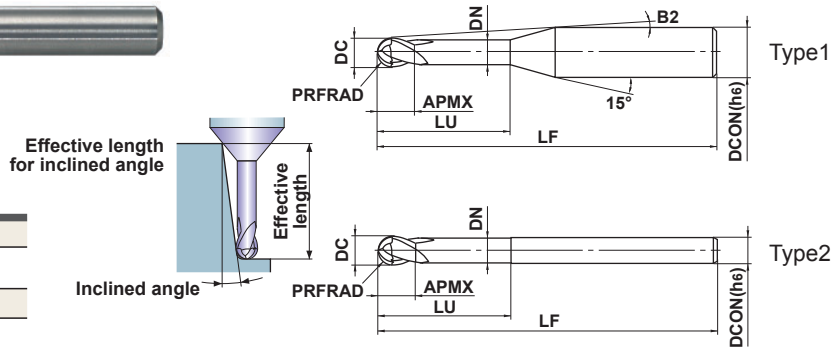


MS2XLB

Ball nose end mill, Short cut length, 2 flute, Long neck

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		





R			
0.1≤PRFRAD≤3			
±0.005			
0.2≤DC≤6			
0 - 0.020			
4≤DCON≤6			
0 - 0.005			

h6

● 2 flute long neck ball nose end mill.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
												30'	1°	2°	3°
MS2XLBR0010N005	0.1	0.2	0.2	0.5	0.17	14.1°	50	4	2	●	1	0.5	0.5	0.6	0.6
MS2XLB**R0010N005S06**	0.1	0.2	0.2	0.5	0.17	14.4°	50	6	2	●	1	0.5	0.5	0.6	0.6
MS2XLB**R0010N008S06**	0.1	0.2	0.2	0.8	0.17	14.1°	50	6	2	●	1	0.8	0.8	0.9	1
MS2XLB**R0010N010**	0.1	0.2	0.2	1	0.17	13.3°	50	4	2	●	1	1	1.1	1.2	1.3
MS2XLB**R0010N010S06**	0.1	0.2	0.2	1	0.17	13.8°	50	6	2	●	1	1	1.1	1.2	1.3
MS2XLB**R0010N013**	0.1	0.2	0.2	1.25	0.17	12.9°	50	4	2	●	1	1.3	1.3	1.5	1.6
MS2XLB**R0010N013S06**	0.1	0.2	0.2	1.25	0.17	13.6°	50	6	2	●	1	1.3	1.3	1.5	1.6
MS2XLB**R0010N015**	0.1	0.2	0.2	1.5	0.17	12.5°	50	4	2	●	1	1.5	1.6	1.7	1.9
MS2XLB**R0010N015S06**	0.1	0.2	0.2	1.5	0.17	13.3°	50	6	2	●	1	1.5	1.6	1.7	1.9
MS2XLB**R0010N018**	0.1	0.2	0.2	1.75	0.17	12.2°	50	4	2	●	1	1.8	1.9	2	2.2
MS2XLB**R0010N018S06**	0.1	0.2	0.2	1.75	0.17	13.1°	50	6	2	●	1	1.8	1.9	2	2.2
MS2XLB**R0010N020**	0.1	0.2	0.2	2	0.17	11.9°	50	4	2	●	1	2.1	2.2	2.3	2.5
MS2XLB**R0010N020S06**	0.1	0.2	0.2	2	0.17	12.8°	50	6	2	●	1	2.1	2.2	2.3	2.5
MS2XLB**R0010N025**	0.1	0.2	0.2	2.5	0.17	11.3°	50	4	2	●	1	2.6	2.7	2.9	3.1
MS2XLB**R0010N030**	0.1	0.2	0.2	3	0.17	10.7°	50	4	2	●	1	3.1	3.2	3.5	3.7
MS2XLB**R0015N008S06**	0.15	0.3	0.3	0.8	0.27	14.1°	50	6	2	●	1	0.8	0.8	0.9	1
MS2XLB**R0015N010**	0.15	0.3	0.3	1	0.27	13.3°	50	4	2	●	1	1	1.1	1.2	1.3
MS2XLB**R0015N010S06**	0.15	0.3	0.3	1	0.27	13.9°	50	6	2	●	1	1	1.1	1.2	1.3
MS2XLB**R0015N012S06**	0.15	0.3	0.3	1.2	0.27	13.7°	50	6	2	●	1	1.2	1.3	1.4	1.5
MS2XLB**R0015N015**	0.15	0.3	0.3	1.5	0.27	12.5°	50	4	2	●	1	1.5	1.6	1.7	1.9
MS2XLB**R0015N015S06**	0.15	0.3	0.3	1.5	0.27	13.3°	50	6	2	●	1	1.5	1.6	1.7	1.9
MS2XLB**R0015N020**	0.15	0.3	0.3	2	0.27	11.9°	50	4	2	●	1	2.1	2.2	2.3	2.5
MS2XLB**R0015N020S06**	0.15	0.3	0.3	2	0.27	12.8°	50	6	2	●	1	2.1	2.2	2.3	2.5
MS2XLB**R0015N025**	0.15	0.3	0.3	2.5	0.27	11.2°	50	4	2	●	1	2.6	2.7	2.9	3.1
MS2XLB**R0015N030**	0.15	0.3	0.3	3	0.27	10.7°	50	4	2	●	1	3.1	3.2	3.5	3.7
MS2XLB**R0015N040**	0.15	0.3	0.3	4	0.27	9.7°	50	4	2	●	1	4.2	4.3	4.6	5
MS2XLB**R0020N010**	0.2	0.4	0.4	1	0.36	13.4°	50	4	2	●	1	1	1	1.1	1.2
MS2XLB**R0020N010S06**	0.2	0.4	0.4	1	0.36	13.9°	50	6	2	●	1	1	1	1.1	1.2
MS2XLB**R0020N012S06**	0.2	0.4	0.4	1.2	0.36	13.7°	50	6	2	●	1	1.2	1.3	1.4	1.5
MS2XLB**R0020N015**	0.2	0.4	0.4	1.5	0.36	12.6°	50	4	2	●	1	1.5	1.6	1.7	1.8
MS2XLB**R0020N015S06**	0.2	0.4	0.4	1.5	0.36	13.4°	50	6	2	●	1	1.5	1.6	1.7	1.8
MS2XLB**R0020N020**	0.2	0.4	0.4	2	0.36	11.9°	50	4	2	●	1	2	2.1	2.3	2.5
MS2XLB**R0020N020S06**	0.2	0.4	0.4	2	0.36	12.8°	50	6	2	●	1	2	2.1	2.3	2.5
MS2XLB**R0020N025**	0.2	0.4	0.4	2.5	0.36	11.2°	50	4	2	●	1	2.6	2.7	2.9	3.1

● : Inventory maintained in Japan.

MS2XLB

Ball nose end mill, Short cut length, 2 flute, Long neck

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
												30'	1°	2°	3°
MS2XLBR0020N025S06	0.2	0.4	0.4	2.5	0.36	12.4°	50	6	2	●	1	2.6	2.7	2.9	3.1
MS2XLBR0020N030	0.2	0.4	0.4	3	0.36	10.7°	50	4	2	●	1	3.1	3.2	3.4	3.7
MS2XLBR0020N030S06	0.2	0.4	0.4	3	0.36	11.9°	50	6	2	●	1	3.1	3.2	3.4	3.7
MS2XLBR0020N035	0.2	0.4	0.4	3.5	0.36	10.2°	50	4	2	●	1	3.6	3.7	4	4.3
MS2XLBR0020N040	0.2	0.4	0.4	4	0.36	9.7°	50	4	2	●	1	4.1	4.3	4.6	4.9
MS2XLBR0020N045	0.2	0.4	0.4	4.5	0.36	9.3°	50	4	2	●	1	4.7	4.8	5.2	5.6
MS2XLBR0020N050	0.2	0.4	0.4	5	0.36	8.9°	50	4	2	●	1	5.2	5.3	5.7	6.2
MS2XLBR0020N055	0.2	0.4	0.4	5.5	0.36	8.5°	50	4	2	●	1	5.7	5.9	6.3	6.8
MS2XLBR0020N060	0.2	0.4	0.4	6	0.36	8.2°	50	4	2	●	1	6.2	6.4	6.9	7.4
MS2XLBR0025N015	0.25	0.5	0.5	1.5	0.46	12.6°	50	4	2	●	1	1.5	1.6	1.7	1.8
MS2XLBR0025N015S06	0.25	0.5	0.5	1.5	0.46	13.4°	50	6	2	●	1	1.5	1.6	1.7	1.8
MS2XLBR0025N020	0.25	0.5	0.5	2	0.46	11.9°	50	4	2	●	1	2	2.1	2.3	2.4
MS2XLBR0025N020S06	0.25	0.5	0.5	2	0.46	12.9°	50	6	2	●	1	2	2.1	2.3	2.4
MS2XLBR0025N025	0.25	0.5	0.5	2.5	0.46	11.2°	50	4	2	●	1	2.6	2.7	2.9	3.1
MS2XLBR0025N025S06	0.25	0.5	0.5	2.5	0.46	12.4°	50	6	2	●	1	2.6	2.7	2.9	3.1
MS2XLBR0025N030	0.25	0.5	0.5	3	0.46	10.6°	50	4	2	●	1	3.1	3.2	3.4	3.7
MS2XLBR0025N030S06	0.25	0.5	0.5	3	0.46	11.9°	50	6	2	●	1	3.1	3.2	3.4	3.7
MS2XLBR0025N035	0.25	0.5	0.5	3.5	0.46	10.1°	50	4	2	●	1	3.6	3.7	4	4.3
MS2XLBR0025N035S06	0.25	0.5	0.5	3.5	0.46	11.5°	50	6	2	●	1	3.6	3.7	4	4.3
MS2XLBR0025N040	0.25	0.5	0.5	4	0.46	9.6°	50	4	2	●	1	4.1	4.3	4.6	4.9
MS2XLBR0025N040S06	0.25	0.5	0.5	4	0.46	11.1°	50	6	2	●	1	4.1	4.3	4.6	4.9
MS2XLBR0025N045	0.25	0.5	0.5	4.5	0.46	9.2°	50	4	2	●	1	4.6	4.8	5.2	5.6
MS2XLBR0025N045S06	0.25	0.5	0.5	4.5	0.46	10.7°	50	6	2	●	1	4.6	4.8	5.2	5.6
MS2XLBR0025N050	0.25	0.5	0.5	5	0.46	8.8°	50	4	2	●	1	5.2	5.3	5.7	6.2
MS2XLBR0025N050S06	0.25	0.5	0.5	5	0.46	10.4°	50	6	2	●	1	5.2	5.3	5.7	6.2
MS2XLBR0025N055	0.25	0.5	0.5	5.5	0.46	8.4°	50	4	2	●	1	5.7	5.9	6.3	6.8
MS2XLBR0025N055S06	0.25	0.5	0.5	5.5	0.46	10.1°	50	6	2	●	1	5.7	5.9	6.3	6.8
MS2XLBR0025N060	0.25	0.5	0.5	6	0.46	8.1°	50	4	2	●	1	6.2	6.4	6.9	7.4
MS2XLBR0025N060S06	0.25	0.5	0.5	6	0.46	9.7°	50	6	2	●	1	6.2	6.4	6.9	7.4
MS2XLBR0025N070	0.25	0.5	0.5	7	0.46	7.5°	50	4	2	●	1	7.2	7.5	8	8.7
MS2XLBR0025N070S06	0.25	0.5	0.5	7	0.46	9.2°	50	6	2	●	1	7.2	7.5	8	8.7
MS2XLBR0025N080	0.25	0.5	0.5	8	0.46	7°	50	4	2	●	1	8.3	8.5	9.2	9.9
MS2XLBR0025N080S06	0.25	0.5	0.5	8	0.46	8.7°	50	6	2	●	1	8.3	8.5	9.2	9.9
MS2XLBR0025N100	0.25	0.5	0.5	10	0.46	6.2°	50	4	2	●	1	10.3	10.7	11.5	12.4
MS2XLBR0025N100S06	0.25	0.5	0.5	10	0.46	7.8°	50	6	2	●	1	10.3	10.7	11.5	12.4
MS2XLBR0030N018S06	0.3	0.6	0.6	1.8	0.56	13°	50	6	2	●	1	1.9	1.9	2.1	2.3
MS2XLBR0030N020	0.3	0.6	0.6	2	0.56	11.8°	50	4	2	●	1	2.1	2.2	2.3	2.5
MS2XLBR0030N020S06	0.3	0.6	0.6	2	0.56	12.8°	50	6	2	●	1	2.1	2.2	2.3	2.5
MS2XLBR0030N025	0.3	0.6	0.6	2.5	0.56	11.1°	50	4	2	●	1	2.6	2.7	2.9	3.1
MS2XLBR0030N025S06	0.3	0.6	0.6	2.5	0.56	12.3°	50	6	2	●	1	2.6	2.7	2.9	3.1
MS2XLBR0030N030	0.3	0.6	0.6	3	0.56	10.5°	50	4	2	●	1	3.1	3.3	3.5	3.8
MS2XLBR0030N030S06	0.3	0.6	0.6	3	0.56	11.8°	50	6	2	●	1	3.1	3.3	3.5	3.8
MS2XLBR0030N035	0.3	0.6	0.6	3.5	0.56	10°	50	4	2	●	1	3.6	3.8	4.1	4.4
MS2XLBR0030N035S06	0.3	0.6	0.6	3.5	0.56	11.4°	50	6	2	●	1	3.6	3.8	4.1	4.4
MS2XLBR0030N040	0.3	0.6	0.6	4	0.56	9.5°	50	4	2	●	1	4.2	4.3	4.6	5
MS2XLBR0030N040S06	0.3	0.6	0.6	4	0.56	11°	50	6	2	●	1	4.2	4.3	4.6	5
MS2XLBR0030N045	0.3	0.6	0.6	4.5	0.56	9.1°	50	4	2	●	1	4.7	4.9	5.2	5.6
MS2XLBR0030N045S06	0.3	0.6	0.6	4.5	0.56	10.6°	50	6	2	●	1	4.7	4.9	5.2	5.6
MS2XLBR0030N050	0.3	0.6	0.6	5	0.56	8.7°	50	4	2	●	1	5.2	5.4	5.8	6.2
MS2XLBR0030N050S06	0.3	0.6	0.6	5	0.56	10.3°	50	6	2	●	1	5.2	5.4	5.8	6.2
MS2XLBR0030N060	0.3	0.6	0.6	6	0.56	8°	50	4	2	●	1	6.3	6.5	6.9	7.5
MS2XLBR0030N060S06	0.3	0.6	0.6	6	0.56	9.7°	50	6	2	●	1	6.3	6.5	6.9	7.5

● : Inventory maintained in Japan.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
												30'	1°	2°	3°
MS2XLBR0030N070	0.3	0.6	0.6	7	0.56	7.4°	50	4	2	●	1	7.3	7.5	8.1	8.7
MS2XLBR0030N080	0.3	0.6	0.6	8	0.56	6.9°	50	4	2	●	1	8.3	8.6	9.2	10
MS2XLBR0030N080S06	0.3	0.6	0.6	8	0.56	8.6°	50	6	2	●	1	8.3	8.6	9.2	10
MS2XLBR0030N090	0.3	0.6	0.6	9	0.56	6.4°	50	4	2	●	1	9.4	9.7	10.4	11.2
MS2XLBR0030N100	0.3	0.6	0.6	10	0.56	6°	50	4	2	●	1	10.4	10.8	11.5	12.5
MS2XLBR0030N100S06	0.3	0.6	0.6	10	0.56	7.8°	50	6	2	●	1	10.4	10.8	11.5	12.5
MS2XLBR0030N110	0.3	0.6	0.6	11	0.56	5.7°	50	4	2	●	1	11.4	11.8	12.7	13.7
MS2XLBR0030N120	0.3	0.6	0.6	12	0.56	5.4°	50	4	2	●	1	12.5	12.9	13.8	15
MS2XLBR0040N020	0.4	0.8	0.8	2	0.76	11.7°	50	4	2	●	1	2.1	2.2	2.3	2.5
MS2XLBR0040N020S06	0.4	0.8	0.8	2	0.76	12.8°	50	6	2	●	1	2.1	2.2	2.3	2.5
MS2XLBR0040N024S06	0.4	0.8	0.8	2.4	0.76	12.4°	50	6	2	●	1	2.5	2.6	2.8	3
MS2XLBR0040N030	0.4	0.8	0.8	3	0.76	10.4°	50	4	2	●	1	3.1	3.3	3.5	3.7
MS2XLBR0040N030S06	0.4	0.8	0.8	3	0.76	11.8°	50	6	2	●	1	3.1	3.3	3.5	3.7
MS2XLBR0040N040	0.4	0.8	0.8	4	0.76	9.4°	50	4	2	●	1	4.2	4.3	4.6	5
MS2XLBR0040N040S06	0.4	0.8	0.8	4	0.76	11°	50	6	2	●	1	4.2	4.3	4.6	5
MS2XLBR0040N050	0.4	0.8	0.8	5	0.76	8.5°	50	4	2	●	1	5.2	5.4	5.8	6.2
MS2XLBR0040N060	0.4	0.8	0.8	6	0.76	7.8°	50	4	2	●	1	6.3	6.5	6.9	7.5
MS2XLBR0040N060S06	0.4	0.8	0.8	6	0.76	9.6°	50	6	2	●	1	6.3	6.5	6.9	7.5
MS2XLBR0040N070	0.4	0.8	0.8	7	0.76	7.2°	50	4	2	●	1	7.3	7.5	8.1	8.7
MS2XLBR0040N080	0.4	0.8	0.8	8	0.76	6.7°	50	4	2	●	1	8.3	8.6	9.2	10
MS2XLBR0040N080S06	0.4	0.8	0.8	8	0.76	8.5°	50	6	2	●	1	8.3	8.6	9.2	10
MS2XLBR0040N100	0.4	0.8	0.8	10	0.76	5.9°	50	4	2	●	1	10.4	10.8	11.5	12.4
MS2XLBR0040N100S06	0.4	0.8	0.8	10	0.76	7.7°	50	6	2	●	1	10.4	10.8	11.5	12.4
MS2XLBR0040N120	0.4	0.8	0.8	12	0.76	5.2°	50	4	2	●	1	12.5	12.9	13.8	14.9
MS2XLBR0050N030	0.5	1	1	3	0.94	10.1°	50	4	2	●	1	3.2	3.3	3.6	3.9
MS2XLBR0050N030S06	0.5	1	1	3	0.94	11.6°	50	6	2	●	1	3.2	3.3	3.6	3.9
MS2XLBR0050N040	0.5	1	1	4	0.94	9.1°	50	4	2	●	1	4.2	4.4	4.8	5.2
MS2XLBR0050N040S06	0.5	1	1	4	0.94	10.8°	50	6	2	●	1	4.2	4.4	4.8	5.2
MS2XLBR0050N050	0.5	1	1	5	0.94	8.2°	50	4	2	●	1	5.3	5.5	6	6.4
MS2XLBR0050N050S06	0.5	1	1	5	0.94	10.1°	50	6	2	●	1	5.3	5.5	6	6.4
MS2XLBR0050N060	0.5	1	1	6	0.94	7.5°	50	4	2	●	1	6.3	6.6	7.1	7.7
MS2XLBR0050N060S06	0.5	1	1	6	0.94	9.4°	50	6	2	●	1	6.3	6.6	7.1	7.7
MS2XLBR0050N070	0.5	1	1	7	0.94	6.9°	50	4	2	●	1	7.4	7.7	8.3	8.9
MS2XLBR0050N080	0.5	1	1	8	0.94	6.4°	50	4	2	●	1	8.4	8.8	9.4	10.2
MS2XLBR0050N080S06	0.5	1	1	8	0.94	8.3°	50	6	2	●	1	8.4	8.8	9.4	10.2
MS2XLBR0050N090	0.5	1	1	9	0.94	6°	50	4	2	●	1	9.5	9.9	10.6	11.4
MS2XLBR0050N100	0.5	1	1	10	0.94	5.6°	50	4	2	●	1	10.5	10.9	11.7	12.6
MS2XLBR0050N100S06	0.5	1	1	10	0.94	7.5°	50	6	2	●	1	10.5	10.9	11.7	12.6
MS2XLBR0050N120	0.5	1	1	12	0.94	5°	50	4	2	●	1	12.6	13.1	14	15.1
MS2XLBR0050N120S06	0.5	1	1	12	0.94	6.8°	55	6	2	●	1	12.6	13.1	14	15.1
MS2XLBR0050N140	0.5	1	1	14	0.94	4.5°	50	4	2	●	1	14.7	15.2	16.3	17.6
MS2XLBR0050N160	0.5	1	1	16	0.94	4.1°	55	4	2	●	1	16.8	17.4	18.6	20.1
MS2XLBR0050N160S06	0.5	1	1	16	0.94	5.7°	60	6	2	●	1	16.8	17.4	18.6	20.1
MS2XLBR0050N180	0.5	1	1	18	0.94	3.7°	55	4	2	●	1	18.9	19.5	20.9	22.6
MS2XLBR0050N200	0.5	1	1	20	0.94	3.4°	55	4	2	●	1	20.9	21.6	23.2	25.1
MS2XLBR0050N200S06	0.5	1	1	20	0.94	5°	60	6	2	●	1	20.9	21.6	23.2	25.1
MS2XLBR0060N036S06	0.6	1.2	1.2	3.6	1.14	11.1°	50	6	2	●	1	3.8	4	4.3	4.7
MS2XLBR0060N060	0.6	1.2	1.2	6	1.14	7.3°	50	4	2	●	1	6.3	6.6	7.1	7.6
MS2XLBR0060N060S06	0.6	1.2	1.2	6	1.14	9.3°	50	6	2	●	1	6.3	6.6	7.1	7.6
MS2XLBR0060N080	0.6	1.2	1.2	8	1.14	6.2°	50	4	2	●	1	8.4	8.8	9.4	10.1
MS2XLBR0060N080S06	0.6	1.2	1.2	8	1.14	8.2°	50	6	2	●	1	8.4	8.8	9.4	10.1
MS2XLBR0060N100	0.6	1.2	1.2	10	1.14	5.4°	50	4	2	●	1	10.5	10.9	11.7	12.6

MS2XLB

Ball nose end mill, Short cut length, 2 flute, Long neck

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
												30'	1°	2°	3°
MS2XLBR0060N100S06	0.6	1.2	1.2	10	1.14	7.4°	50	6	2	●	1	10.5	10.9	11.7	12.6
MS2XLBR0060N120	0.6	1.2	1.2	12	1.14	4.8°	50	4	2	●	1	12.6	13.1	14	15.1
MS2XLBR0060N120S06	0.6	1.2	1.2	12	1.14	6.7°	55	6	2	●	1	12.6	13.1	14	15.1
MS2XLBR0060N140	0.6	1.2	1.2	14	1.14	4.3°	50	4	2	●	1	14.7	15.2	16.3	17.6
MS2XLBR0060N160	0.6	1.2	1.2	16	1.14	3.9°	55	4	2	●	1	16.8	17.3	18.6	20.1
MS2XLBR0060N160S06	0.6	1.2	1.2	16	1.14	5.6°	60	6	2	●	1	16.8	17.3	18.6	20.1
MS2XLBR0060N180	0.6	1.2	1.2	18	1.14	3.5°	55	4	2	●	1	18.8	19.5	20.9	22.6
MS2XLBR0060N240	0.6	1.2	1.2	24	1.14	2.8°	65	4	2	●	1	25.1	25.9	27.8	*
MS2XLBR0070N080	0.7	1.4	1.4	8	1.34	6°	50	4	2	●	1	8.4	8.8	9.4	10.1
MS2XLBR0070N120	0.7	1.4	1.4	12	1.34	4.6°	50	4	2	●	1	12.6	13.1	14	15.1
MS2XLBR0070N160	0.7	1.4	1.4	16	1.34	3.7°	55	4	2	●	1	16.8	17.3	18.6	20.1
MS2XLBR0075N045S06	0.75	1.5	1.5	4.5	1.44	10.2°	50	6	2	●	1	4.7	5	5.4	5.7
MS2XLBR0075N060	0.75	1.5	1.5	6	1.44	7°	50	4	2	●	1	6.3	6.6	7.1	7.6
MS2XLBR0075N060S06	0.75	1.5	1.5	6	1.44	9.2°	50	6	2	●	1	6.3	6.6	7.1	7.6
MS2XLBR0075N075S06	0.75	1.5	1.5	7.5	1.44	8.3°	50	6	2	●	1	7.9	8.2	8.8	9.5
MS2XLBR0075N080	0.75	1.5	1.5	8	1.44	5.9°	50	4	2	●	1	8.4	8.8	9.4	10.1
MS2XLBR0075N080S06	0.75	1.5	1.5	8	1.44	8.1°	50	6	2	●	1	8.4	8.8	9.4	10.1
MS2XLBR0075N100	0.75	1.5	1.5	10	1.44	5.1°	50	4	2	●	1	10.5	10.9	11.7	12.6
MS2XLBR0075N100S06	0.75	1.5	1.5	10	1.44	7.2°	50	6	2	●	1	10.5	10.9	11.7	12.6
MS2XLBR0075N120	0.75	1.5	1.5	12	1.44	4.4°	50	4	2	●	1	12.6	13.1	14	15.1
MS2XLBR0075N120S06	0.75	1.5	1.5	12	1.44	6.5°	55	6	2	●	1	12.6	13.1	14	15.1
MS2XLBR0075N140	0.75	1.5	1.5	14	1.44	4°	50	4	2	●	1	14.7	15.2	16.3	17.6
MS2XLBR0075N140S06	0.75	1.5	1.5	14	1.44	5.9°	55	6	2	●	1	14.7	15.2	16.3	17.6
MS2XLBR0075N160	0.75	1.5	1.5	16	1.44	3.6°	55	4	2	●	1	16.8	17.3	18.6	20
MS2XLBR0075N160S06	0.75	1.5	1.5	16	1.44	5.4°	60	6	2	●	1	16.8	17.3	18.6	20
MS2XLBR0075N180	0.75	1.5	1.5	18	1.44	3.3°	55	4	2	●	1	18.8	19.5	20.9	22.5
MS2XLBR0075N200	0.75	1.5	1.5	20	1.44	3°	55	4	2	●	1	20.9	21.6	23.2	*
MS2XLBR0075N200S06	0.75	1.5	1.5	20	1.44	4.6°	60	6	2	●	1	20.9	21.6	23.2	25
MS2XLBR0075N220	0.75	1.5	1.5	22	1.44	2.8°	60	4	2	●	1	23	23.8	25.5	*
MS2XLBR0075N300	0.75	1.5	1.5	30	1.44	2.1°	70	4	2	●	1	31.2	32.3	34.7	*
MS2XLBR0080N080	0.8	1.6	1.6	8	1.54	5.8°	50	4	2	●	1	8.4	8.8	9.4	10.1
MS2XLBR0080N120	0.8	1.6	1.6	12	1.54	4.3°	50	4	2	●	1	12.6	13.1	14	15.1
MS2XLBR0080N160	0.8	1.6	1.6	16	1.54	3.5°	55	4	2	●	1	16.8	17.3	18.6	20
MS2XLBR0080N200	0.8	1.6	1.6	20	1.54	2.9°	55	4	2	●	1	20.9	21.6	23.2	*
MS2XLBR0090N080	0.9	1.8	1.8	8	1.74	5.5°	50	4	2	●	1	8.4	8.8	9.4	10.1
MS2XLBR0090N120	0.9	1.8	1.8	12	1.74	4.1°	50	4	2	●	1	12.6	13	14	15
MS2XLBR0090N160	0.9	1.8	1.8	16	1.74	3.3°	55	4	2	●	1	16.8	17.3	18.6	20
MS2XLBR0090N200	0.9	1.8	1.8	20	1.74	2.7°	55	4	2	●	1	20.9	21.6	23.2	*
MS2XLBR0100N040	1	2	2	4	1.9	8.2°	50	4	2	●	1	4.1	4.3	4.6	4.9
MS2XLBR0100N040S06	1	2	2	4	1.9	10.6°	50	6	2	●	1	4.1	4.3	4.6	4.9
MS2XLBR0100N060	1	2	2	6	1.9	6.4°	50	4	2	●	1	6.2	6.5	6.9	7.4
MS2XLBR0100N060S06	1	2	2	6	1.9	9°	50	6	2	●	1	6.2	6.5	6.9	7.4
MS2XLBR0100N080	1	2	2	8	1.9	5.3°	50	4	2	●	1	8.3	8.7	9.2	9.9
MS2XLBR0100N080S06	1	2	2	8	1.9	7.8°	50	6	2	●	1	8.3	8.7	9.2	9.9
MS2XLBR0100N100	1	2	2	10	1.9	4.5°	50	4	2	●	1	10.4	10.8	11.5	12.4
MS2XLBR0100N100S06	1	2	2	10	1.9	6.9°	50	6	2	●	1	10.4	10.8	11.5	12.4
MS2XLBR0100N120	1	2	2	12	1.9	3.9°	50	4	2	●	1	12.5	12.9	13.8	14.9
MS2XLBR0100N120S06	1	2	2	12	1.9	6.1°	55	6	2	●	1	12.5	12.9	13.8	14.9
MS2XLBR0100N140	1	2	2	14	1.9	3.4°	50	4	2	●	1	14.6	15.1	16.1	17.4
MS2XLBR0100N140S06	1	2	2	14	1.9	5.6°	55	6	2	●	1	14.6	15.1	16.1	17.4
MS2XLBR0100N160	1	2	2	16	1.9	3.1°	55	4	2	●	1	16.7	17.2	18.4	19.9
MS2XLBR0100N160S06	1	2	2	16	1.9	5.1°	60	6	2	●	1	16.7	17.2	18.4	19.9

* No interference

● : Inventory maintained in Japan.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
												30'	1°	2°	3°
MS2XLBR0100N180	1	2	2	18	1.9	2.8°	55	4	2	●	1	18.7	19.4	20.7	*
MS2XLB**R0100N180S06**	1	2	2	18	1.9	4.7°	60	6	2	●	1	18.7	19.4	20.7	22.3
MS2XLB**R0100N200**	1	2	2	20	1.9	2.5°	60	4	2	●	1	20.8	21.5	23	*
MS2XLB**R0100N200S06**	1	2	2	20	1.9	4.3°	60	6	2	●	1	20.8	21.5	23	24.8
MS2XLB**R0100N220**	1	2	2	22	1.9	2.3°	60	4	2	●	1	22.9	23.6	25.3	*
MS2XLB**R0100N250**	1	2	2	25	1.9	2.1°	65	4	2	●	1	26	26.8	28.8	*
MS2XLB**R0100N250S06**	1	2	2	25	1.9	3.7°	65	6	2	●	1	26	26.8	28.8	31
MS2XLB**R0100N300**	1	2	2	30	1.9	1.8°	70	4	2	●	1	31.1	32.2	*	*
MS2XLB**R0100N300S06**	1	2	2	30	1.9	3.2°	70	6	2	●	1	31.1	32.2	34.5	37.3
MS2XLB**R0100N350**	1	2	2	35	1.9	1.6°	70	4	2	●	1	36.3	37.5	*	*
MS2XLB**R0100N350S06**	1	2	2	35	1.9	2.8°	80	6	2	●	1	36.3	37.5	40.3	*
MS2XLB**R0125N060S06**	1.25	2.5	2.5	6	2.4	8.6°	50	6	2	●	1	6.2	6.5	6.9	7.4
MS2XLB**R0125N075S06**	1.25	2.5	2.5	7.5	2.4	7.7°	50	6	2	●	1	7.8	8.1	8.6	9.2
MS2XLB**R0125N100S06**	1.25	2.5	2.5	10	2.4	6.5°	50	6	2	●	1	10.4	10.8	11.5	12.3
MS2XLB**R0125N125S06**	1.25	2.5	2.5	12.5	2.4	5.6°	50	6	2	●	1	13	13.5	14.4	15.4
MS2XLB**R0125N160S06**	1.25	2.5	2.5	16	2.4	4.7°	60	6	2	●	1	16.7	17.2	18.4	19.8
MS2XLB**R0125N200S06**	1.25	2.5	2.5	20	2.4	4°	60	6	2	●	1	20.8	21.5	23	24.8
MS2XLB**R0125N250S06**	1.25	2.5	2.5	25	2.4	3.3°	65	6	2	●	1	26	26.8	28.7	31
MS2XLB**R0125N300S06**	1.25	2.5	2.5	30	2.4	2.9°	70	6	2	●	1	31.1	32.2	34.5	*
MS2XLB**R0125N350S06**	1.25	2.5	2.5	35	2.4	2.5°	80	6	2	●	1	36.3	37.5	40.2	*
MS2XLB**R0150N080**	1.5	3	3	8	2.9	7°	60	6	2	●	1	8.3	8.6	9.2	9.8
MS2XLB**R0150N100**	1.5	3	3	10	2.9	6°	60	6	2	●	1	10.4	10.8	11.5	12.3
MS2XLB**R0150N120**	1.5	3	3	12	2.9	5.3°	60	6	2	●	1	12.5	12.9	13.8	14.8
MS2XLB**R0150N140**	1.5	3	3	14	2.9	4.7°	60	6	2	●	1	14.6	15	16.1	17.3
MS2XLB**R0150N160**	1.5	3	3	16	2.9	4.3°	60	6	2	●	1	16.6	17.2	18.4	19.7
MS2XLB**R0150N200**	1.5	3	3	20	2.9	3.6°	70	6	2	●	1	20.8	21.5	23	24.7
MS2XLB**R0150N250**	1.5	3	3	25	2.9	3°	70	6	2	●	1	26	26.8	28.7	*
MS2XLB**R0150N300**	1.5	3	3	30	2.9	2.6°	70	6	2	●	1	31.1	32.2	34.5	*
MS2XLB**R0150N350**	1.5	3	3	35	2.9	2.2°	80	6	2	●	1	36.3	37.5	40.2	*
MS2XLB**R0150N400**	1.5	3	3	40	2.9	2°	90	6	2	●	1	41.5	42.9	*	*
MS2XLB**R0200N100**	2	4	4	10	3.9	4.8°	70	6	2	●	1	10.4	10.7	11.4	12.2
MS2XLB**R0200N120**	2	4	4	12	3.9	4.1°	70	6	2	●	1	12.5	12.9	13.7	14.6
MS2XLB**R0200N140**	2	4	4	14	3.9	3.6°	70	6	2	●	1	14.6	15	16	17.1
MS2XLB**R0200N160**	2	4	4	16	3.9	3.2°	70	6	2	●	1	16.6	17.1	18.3	19.6
MS2XLB**R0200N200**	2	4	4	20	3.9	2.7°	70	6	2	●	1	20.8	21.4	22.9	*
MS2XLB**R0200N250**	2	4	4	25	3.9	2.2°	70	6	2	●	1	25.9	26.8	28.6	*
MS2XLB**R0200N300**	2	4	4	30	3.9	1.8°	70	6	2	●	1	31.1	32.1	*	*
MS2XLB**R0200N350**	2	4	4	35	3.9	1.6°	80	6	2	●	1	36.3	37.5	*	*
MS2XLB**R0200N400**	2	4	4	40	3.9	1.4°	90	6	2	●	1	41.4	42.8	*	*
MS2XLB**R0200N450**	2	4	4	45	3.9	1.3°	90	6	2	●	1	46.6	48.2	*	*
MS2XLB**R0200N500**	2	4	4	50	3.9	1.2°	100	6	2	●	1	51.8	53.5	*	*
MS2XLB**R0250N200**	2.5	5	5	20	4.9	1.5°	70	6	2	●	1	20.7	21.4	*	*
MS2XLB**R0250N250**	2.5	5	5	25	4.9	1.2°	70	6	2	●	1	25.9	26.7	*	*
MS2XLB**R0250N300**	2.5	5	5	30	4.9	1°	80	6	2	●	1	31.1	*	*	*
MS2XLB**R0250N350**	2.5	5	5	35	4.9	0.9°	80	6	2	●	1	36.3	*	*	*
MS2XLB**R0300N300**	3	6	6	30	5.85	—	80	6	2	●	2	*	*	*	*
MS2XLB**R0300N500**	3	6	6	50	5.85	—	120	6	2	●	2	*	*	*	*

* No interference

MS2XLB

Ball nose end mill, Short cut length, 2 flute, Long neck

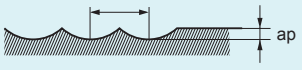
RECOMMENDED CUTTING CONDITIONS

Work material		Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45－55HRC) AISI H13		
R PRFRAD (mm)	Neck length LU (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
R 0.1	0.5	50000	400	0.003	50000	320	0.003
	1	50000	400	0.002	50000	320	0.002
	1.5	40000	300	0.001	40000	240	0.001
	2	40000	200	0.001	40000	160	0.001
	2.5	40000	100	0.001	40000	80	0.001
	3	30000	50	0.001	30000	40	0.001
R 0.15	1	50000	600	0.007	50000	480	0.007
	1.5	50000	600	0.005	50000	480	0.005
	2	50000	600	0.003	50000	480	0.003
	2.5	40000	400	0.003	40000	320	0.003
	3	40000	300	0.002	40000	240	0.002
	4	30000	200	0.002	30000	160	0.002
R 0.2	1	50000	1800	0.015	50000	1400	0.015
	2	50000	1300	0.01	50000	1000	0.01
	3	50000	900	0.005	50000	700	0.005
	4	40000	600	0.004	40000	480	0.004
	5	40000	400	0.003	40000	320	0.003
	6	30000	200	0.002	30000	160	0.002
R 0.25	2	50000	2500	0.02	50000	2000	0.02
	3	50000	1500	0.015	50000	1200	0.015
	4	45000	1200	0.01	45000	950	0.01
	5	45000	900	0.007	45000	700	0.007
	6	36000	600	0.006	36000	480	0.006
	7	32000	400	0.005	32000	320	0.005
	8	32000	300	0.003	32000	240	0.003
	10	26000	200	0.002	26000	160	0.002
R 0.3	2	50000	3500	0.03	50000	2800	0.03
	3	50000	3500	0.03	50000	2800	0.03
	4	44000	2500	0.02	44000	2000	0.02
	5	37000	1200	0.01	37000	950	0.01
	6	37000	1000	0.008	37000	800	0.008
	7	35000	750	0.008	35000	600	0.008
	8	35000	600	0.006	35000	480	0.006
	9	30000	500	0.004	30000	400	0.004
	10	30000	500	0.003	30000	400	0.003
	11	22000	300	0.002	22000	240	0.002
	12	22000	200	0.002	22000	160	0.002
R 0.4	2	50000	4400	0.04	50000	3500	0.04
	3	50000	4000	0.04	50000	3200	0.04
	4	50000	4000	0.02	50000	3200	0.02
	5	35000	2400	0.02	35000	1900	0.02
	6	35000	2400	0.02	35000	1900	0.02
	7	30000	1500	0.015	30000	1200	0.015
	8	30000	1500	0.01	30000	1200	0.01
	10	30000	700	0.008	30000	560	0.008
	12	22000	500	0.006	22000	400	0.006
R 0.5	3	40000	4000	0.05	40000	3200	0.05
	4	40000	4000	0.05	40000	3200	0.05
	6	35000	3000	0.03	35000	2400	0.03
	8	30000	2000	0.02	30000	1600	0.02

Work material		Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45－55HRC) AISI H13		
R PRFRAD (mm)	Neck length LU (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
R 0.5	10	20000	1000	0.01	20000	800	0.01
	12	20000	1000	0.01	20000	800	0.01
	14	18000	600	0.008	18000	480	0.008
	16	18000	500	0.008	18000	400	0.008
	18	13000	300	0.005	13000	240	0.005
	20	13000	250	0.005	13000	200	0.005
R 0.6	3.6	40000	4400	0.06	40000	3500	0.06
	6	40000	4400	0.04	40000	3500	0.04
	8	40000	4000	0.04	40000	3200	0.04
	10	27000	1900	0.02	27000	1500	0.02
	12	16000	1400	0.02	16000	1100	0.02
	18	15000	700	0.008	15000	560	0.008
	24	11000	300	0.006	11000	240	0.006
R 0.75	6	40000	6000	0.07	36000	4300	0.07
	8	40000	6000	0.07	36000	4300	0.07
	10	40000	5000	0.06	36000	3600	0.06
	12	32000	3400	0.04	29000	2400	0.04
	16	15000	1400	0.03	15000	1100	0.03
	20	12000	900	0.02	12000	720	0.02
	30	9000	400	0.01	9000	320	0.01
R 1	4	40000	8000	0.1	32000	5000	0.1
	6	40000	8000	0.1	32000	5000	0.1
	8	40000	6000	0.1	32000	3800	0.1
	10	40000	5000	0.08	32000	3200	0.08
	12	40000	5000	0.08	32000	3200	0.08
	16	32000	3500	0.05	26000	2200	0.05
	20	10000	1000	0.04	10000	800	0.04
	25	10000	1000	0.04	10000	800	0.04
	30	10000	800	0.02	10000	640	0.02
	35	10000	600	0.02	10000	480	0.02
R 1.5	8	32000	7000	0.15	26000	4500	0.15
	10	32000	7000	0.15	26000	4500	0.15
	16	32000	5000	0.1	26000	3200	0.1
	20	27000	3800	0.1	22000	2400	0.1
	25	21000	2700	0.08	17000	1700	0.08
	30	6000	700	0.08	6000	560	0.08
	35	6000	700	0.06	6000	560	0.06
	40	6000	600	0.04	6000	480	0.04
R 2	10	24000	6000	0.2	19000	3800	0.2
	20	24000	3800	0.15	19000	2400	0.15
	30	20000	3000	0.1	16000	1900	0.1
	40	12000	1700	0.1	12000	1400	0.1
	50	8000	1000	0.05	8000	800	0.05
R 2.5	20	22000	6000	0.2	18000	3800	0.2
	25	22000	4400	0.2	18000	2800	0.2
	30	22000	3800	0.15	18000	2400	0.15
	35	22000	3600	0.1	18000	2300	0.1
R 3	30	20000	6000	0.2	16000	3800	0.2
	50	20000	3000	0.15	16000	1900	0.15

Depth of cut

≤0.1PRFRAD (PRFRAD≤1)
≤0.2PRFRAD (PRFRAD> 1)



PRFRAD:Radius

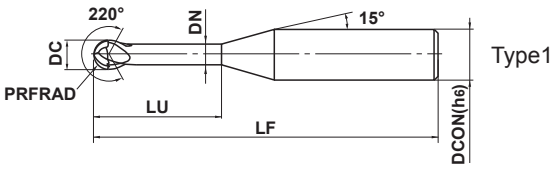
1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

VF2WB

Wide ball nose, Medium cut length, 2 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	○		◎	◎		





Type1

R	1≤PRFRAD≤3				
	±0.01				
h6	DCON=6				
	0 - 0.008				

● Ball nose end mill suitable for machining of undercut geometries and complex geometries using a 5-axis machine.

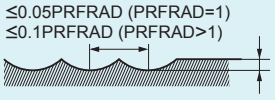
Unit : mm

Order Number	PRFRAD	DC	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VF2WBR0100N060	1	2	6	1.6	60	6	2	●	1
VF2WBR0150N080	1.5	3	8	2.4	60	6	2	●	1
VF2WBR0200N100	2	4	10	3.2	60	6	2	●	1
VF2WBR0300N120	3	6	12	4.8	80	6	2	●	1

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V			Hardened steel (45−55HRC) AISI H13		
R PRFRAD (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
R1	40000	5000	0.07	40000	5000	0.06	32000	2500	0.05	32000	3000	0.03
R1.5	32000	5000	0.12	32000	5000	0.11	26000	2500	0.10	26000	3000	0.07
R2	24000	3800	0.15	24000	3800	0.13	20000	2000	0.12	20000	2800	0.10
R3	16000	2800	0.20	16000	2800	0.18	13000	1500	0.15	13000	2100	0.12

Depth of cut



≤Please refer to the list above for depth of cut.

PRFRAD:Radius

1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.

● : Inventory maintained in Japan.

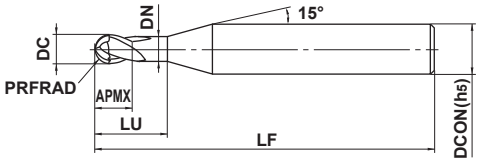
IMPACT MIRACLE END MILLS

VF2SSB

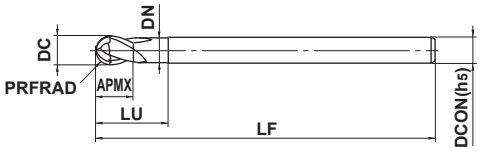
Ball nose, Short cut length, 2 flute, Short shank

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎	○	○		





Type1



Type2

R

0.5≤PRFRAD≤6				
±0.005				
1≤DC≤12				
0 - 0.01				
4≤DCON≤6	8≤DCON≤10	DCON=12		
0 - 0.005	0 - 0.006	0 - 0.008		

h5

2 flute ball nose end mill with Impact Miracle coating for high hardened materials.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VF2SSBR0050S04	0.5	1	1	2	0.94	40	4	2	●	1
VF2SSB**R0050**	0.5	1	1	2	0.94	40	6	2	●	1
VF2SSB**R0075S04**	0.75	1.5	1.5	3	1.44	40	4	2	●	1
VF2SSB**R0075**	0.75	1.5	1.5	3	1.44	40	6	2	●	1
VF2SSB**R0100**	1	2	2	4	1.9	45	6	2	●	1
VF2SSB**R0150**	1.5	3	3	6	2.9	45	6	2	●	1
VF2SSB**R0200**	2	4	4	8	3.9	45	6	2	●	1
VF2SSB**R0250**	2.5	5	5	10	4.9	50	6	2	●	1
VF2SSB**R0300**	3	6	6	12	5.85	50	6	2	●	2
VF2SSB**R0400**	4	8	8	14	7.85	60	8	2	●	2
VF2SSB**R0500**	5	10	10	18	9.7	70	10	2	●	2
VF2SSB**R0600**	6	12	12	22	11.7	75	12	2	●	2

● : Inventory maintained in Japan.

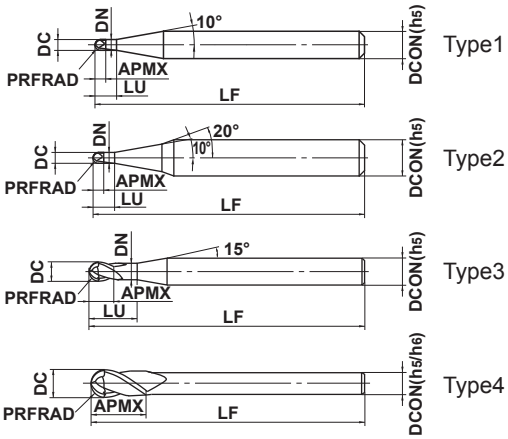
VF2SB

Ball nose, Short cut length, 2 flute, For hardened materials

UWC VF 0° 30° PRFRAD<0.3 PRFRAD≥0.3 PRFRAD<0.3 PRFRAD≥0.3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎	○	○		





R	PRFRAD≤6	PRFRAD>6			
	±0.005	±0.010			
	DC≤12	DC>12			
	0 - 0.01	0 - 0.02			
h5 DCON≤12	DCON=3	4≤DCON≤6	8≤DCON≤10		
	0 - 0.004	0 - 0.005	0 - 0.006		
h6 DCON>12	DCON=12	DCON=16	DCON=20		
	0 - 0.008	0 - 0.011	0 - 0.013		

● 2 flute ball nose end mill with Impact Miracle coating for high hardened materials.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VF2SBR0010S04	0.1	0.2	0.2	0.4	0.17	45	4	2	●	1
VF2SB**R0010S06**	0.1	0.2	0.2	0.4	0.17	50	6	2	●	2
VF2SB**R0015S04**	0.15	0.3	0.3	0.6	0.27	45	4	2	●	1
VF2SB**R0015S06**	0.15	0.3	0.3	0.6	0.27	50	6	2	●	2
VF2SB**R0020S04**	0.2	0.4	0.4	0.8	0.36	45	4	2	●	1
VF2SB**R0020S06**	0.2	0.4	0.4	0.8	0.36	50	6	2	●	2
VF2SB**R0030S04**	0.3	0.6	0.6	1.2	0.56	45	4	2	●	3
VF2SB**R0030S06**	0.3	0.6	0.6	1.2	0.56	50	6	2	●	3
VF2SB**R0040S04**	0.4	0.8	0.8	1.6	0.76	45	4	2	●	3
VF2SB**R0040S06**	0.4	0.8	0.8	1.6	0.76	50	6	2	●	3
VF2SB**R0050S04**	0.5	1	1	2	0.94	45	4	2	●	3
VF2SB**R0050S06**	0.5	1	1	2	0.94	50	6	2	●	3
VF2SB**R0060S04**	0.6	1.2	1.2	2.4	1.14	45	4	2	●	3
VF2SB**R0060S06**	0.6	1.2	1.2	2.4	1.14	50	6	2	●	3
VF2SB**R0070S04**	0.7	1.4	1.4	2.8	1.34	45	4	2	●	3
VF2SB**R0070S06**	0.7	1.4	1.4	2.8	1.34	50	6	2	●	3
VF2SB**R0075S04**	0.75	1.5	1.5	3	1.44	45	4	2	●	3
VF2SB**R0075S06**	0.75	1.5	1.5	3	1.44	50	6	2	●	3
VF2SB**R0080S04**	0.8	1.6	1.6	3.2	1.54	45	4	2	●	3
VF2SB**R0080S06**	0.8	1.6	1.6	3.2	1.54	50	6	2	●	3
VF2SB**R0090S04**	0.9	1.8	1.8	3.6	1.74	45	4	2	●	3
VF2SB**R0090S06**	0.9	1.8	1.8	3.6	1.74	50	6	2	●	3
VF2SB**R0100S04**	1	2	2	4	1.9	50	4	2	●	3
VF2SB**R0100S06**	1	2	2	4	1.9	60	6	2	●	3
VF2SB**R0125S06**	1.25	2.5	2.5	5	2.4	60	6	2	●	3
VF2SB**R0150S03**	1.5	3	3	—	—	60	3	2	●	4
VF2SB**R0150S06**	1.5	3	3	6	2.9	70	6	2	●	3
VF2SB**R0200S04**	2	4	4	—	—	60	4	2	●	4
VF2SB**R0200S06**	2	4	4	8	3.9	70	6	2	●	3
VF2SB**R0250S06**	2.5	5	5	10	4.9	80	6	2	●	3
VF2SB**R0300S06**	3	6	12	—	—	80	6	2	●	4
VF2SB**R0400S08**	4	8	14	—	—	90	8	2	●	4
VF2SB**R0500S10**	5	10	18	—	—	100	10	2	●	4
VF2SB**R0600S12**	6	12	22	—	—	110	12	2	●	4

VF2SB

Ball nose, Short cut length, 2 flute, For hardened materials

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VF2SBR0800S16	8	16	30	—	—	140	16	2	●	4
VF2SBR1000S20	10	20	38	—	—	160	20	2	●	4

● : Inventory maintained in Japan.

VF2SSB
Ball nose, Short cut length, 2 flute, Short shank

VF2SB
Ball nose, Short cut length, 2 flute, For hardened materials

RECOMMENDED CUTTING CONDITIONS

Work material	Hardened steel (45－55HRC) AISI H13					Hardened steel (55－62HRC) AISI D2					Hardened steel (62－70HRC) AISI W1, AISI M2				
R PRFRAD (mm)	α≤15°		α>15°		Depth of cut ap(mm)	α≤15°		α>15°		Depth of cut ap(mm)	α≤15°		α>15°		Depth of cut ap(mm)
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)		Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)		Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	
R 0.1	40000	320	40000	240	0.003	40000	320	40000	160	0.003	40000	320	40000	160	0.002
R 0.15	40000	640	40000	560	0.01	40000	640	40000	400	0.007	40000	640	40000	400	0.005
R 0.2	40000	1600	40000	1200	0.02	40000	1400	40000	1000	0.015	40000	1200	40000	1000	0.01
R 0.3	40000	3200	40000	1600	0.03	40000	2800	40000	1200	0.025	40000	2000	40000	1200	0.02
R 0.4	40000	6400	40000	2400	0.05	40000	4000	40000	1600	0.04	40000	2800	40000	1600	0.03
R 0.5	40000	8000	40000	3200	0.06	40000	5600	40000	2400	0.05	40000	3600	32000	1300	0.04
R 0.75	40000	9600	40000	4000	0.09	40000	7200	32000	2500	0.075	32000	4500	21000	1200	0.05
R 1	40000	9600	39000	4700	0.11	40000	8000	24000	2400	0.1	24000	3800	16000	1000	0.07
R 1.25	40000	10400	32000	4500	0.12	37000	8100	19000	2300	0.11	19000	3400	13000	1000	0.08
R 1.5	40000	12000	27000	4300	0.13	32000	7700	16000	2200	0.12	16000	3200	11000	880	0.09
R 2	32000	10880	20000	3600	0.15	24000	6200	12000	1900	0.13	12000	2400	8000	800	0.1
R 2.5	25000	9000	16000	2900	0.2	19000	5300	9600	1700	0.15	9600	2100	6000	600	0.1
R 3	21000	8400	13000	2600	0.25	16000	4800	8000	1600	0.2	8000	1700	5000	600	0.11
R 4	16000	6400	10000	2000	0.3	12000	3600	6000	1200	0.2	6000	1400	4000	480	0.11
R 5	13000	5200	8000	1700	0.5	10000	3200	4800	960	0.2	4800	1100	3000	420	0.12
R 6	9000	3600	6000	1300	0.5	7000	2200	3600	720	0.3	3600	860	2200	310	0.12
R 8	6000	2400	4000	1000	0.5	5000	1600	2500	500	0.3	2500	650	1500	240	0.15
R10	4500	1800	3000	780	0.5	4000	1300	1800	360	0.3	1800	470	1000	160	0.15

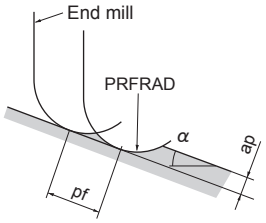
Depth of cut



≤Please refer to the list above for depth of cut.

PRFRAD:Radius

1) α is the inclination angle of the machined surface.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.



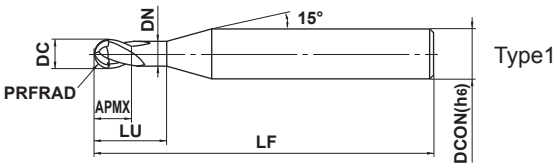
IMPACT MIRACLE BALL NOSE HIGH POWER END MILL

VF2SDB

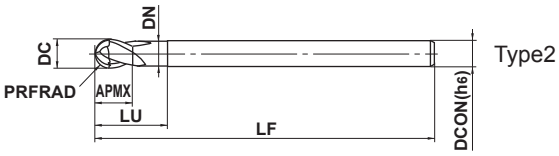
Ball nose, Short cut length, 2 flute, Strong geometry type

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	○				





Type1



Type2

R	PRFRAD≤6.5	PRFRAD>6.5			
	±0.01	±0.02			
	DC≤12	DC>12			
	0 - 0.02	0 - 0.03			
h6	DCON=3	4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	DCON=20
	0 - 0.006	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

- 2 flute ball nose end mill with Impact Miracle coating for high hardness materials and achieves excellent fracture resistance.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VF2SDBR0050	0.5	1	1	2	0.94	45	4	2	●	1
VF2SDB**R0100S04**	1	2	2	4	1.9	50	4	2	●	1
VF2SDB**R0100**	1	2	2	4	1.9	60	6	2	●	1
VF2SDB**R0150S03**	1.5	3	3	6	2.9	60	3	2	●	2
VF2SDB**R0150**	1.5	3	3	6	2.9	70	6	2	●	1
VF2SDB**R0200S04**	2	4	4	8	3.9	60	4	2	●	2
VF2SDB**R0200**	2	4	4	8	3.9	70	6	2	●	1
VF2SDB**R0250**	2.5	5	5	10	4.9	80	6	2	●	1
VF2SDB**R0300**	3	6	12	22	5.85	80	6	2	●	2
VF2SDB**R0400**	4	8	14	27	7.85	90	8	2	●	2
VF2SDB**R0500**	5	10	18	31	9.7	100	10	2	●	2
VF2SDB**R0600**	6	12	22	35	11.7	110	12	2	●	2
VF2SDB**R0800**	8	16	30	50	15.5	140	16	2	●	2
VF2SDB**R1000**	10	20	38	58	19.5	160	20	2	●	2

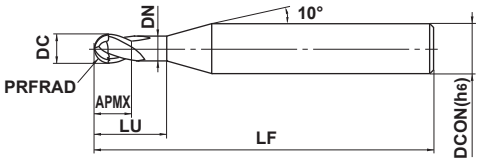
● : Inventory maintained in Japan.

VF2SDBL

Ball nose, Short cut length, 2 flute, Strong geometry type, Long shank

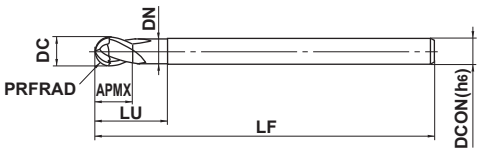
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	○				





Type1

R	PRFRAD≤6.5	PRFRAD>6.5			
	±0.01	±0.02			
	DC≤12	DC>12			
	0 - 0.02	0 - 0.03			
h6	DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20	
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	



Type2

● 2 flute end mill with long shank for general use.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VF2SDBLR0050	0.5	1	1	2	0.94	60	6	2	●	1
VF2SDBL**R0100**	1	2	2	4	1.9	80	6	2	●	1
VF2SDBL**R0150**	1.5	3	3	6	2.9	90	6	2	●	1
VF2SDBL**R0200**	2	4	4	8	3.9	90	6	2	●	1
VF2SDBL**R0250**	2.5	5	5	10	4.9	110	8	2	●	1
VF2SDBL**R0300**	3	6	12	22	5.85	120	6	2	●	2
VF2SDBL**R0400**	4	8	14	27	7.85	130	8	2	●	2
VF2SDBL**R0500**	5	10	18	31	9.7	140	10	2	●	2
VF2SDBL**R0600**	6	12	22	35	11.7	140	12	2	●	2
VF2SDBL**R0800**	8	16	30	50	15.5	200	16	2	●	2
VF2SDBL**R1000**	10	20	38	58	19.5	200	20	2	●	2

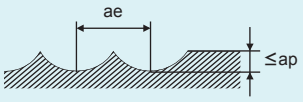
IMPACT MIRACLE BALL NOSE HIGH POWER END MILL

VF2SDB
Ball nose, Short cut length, 2 flute, Strong geometry type

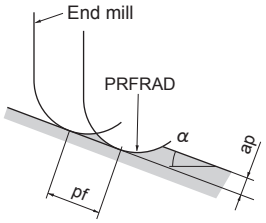
VF2SDBL
Ball nose, Short cut length, 2 flute, Strong geometry type, Long shank

RECOMMENDED CUTTING CONDITIONS

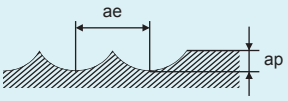
Overhang below 5D (D:Dia.)

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21						Hardened steel (45－55HRC) AISI H13						Hardened steel (55－62HRC) AISI D2					
R **PRFRAD** (mm)	α≤15°		α>15°		Depth of cut ap (mm)	Depth of cut ae (mm)	α≤15°		α>15°		Depth of cut ap (mm)	Depth of cut ae (mm)	α≤15°		α>15°		Depth of cut ap (mm)	Depth of cut ae (mm)
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)			Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)			Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)		
R 0.5	40000	5200	36000	2300	0.10	0.25	40000	5200	36000	2300	0.10	0.25	40000	5000	40000	2400	0.05	0.10
R 1	40000	6000	36000	3500	0.20	0.50	40000	6000	36000	3500	0.20	0.50	36000	5000	24000	2400	0.10	0.20
R 1.5x3	29000	4600	19000	2400	0.20	0.50	25000	4000	16000	2000	0.20	0.50	17000	2400	11000	1000	0.12	0.30
R 1.5	37000	7000	24000	3000	0.30	0.75	37000	7000	24000	3000	0.30	0.75	25000	6000	16000	2200	0.12	0.30
R 2x4	24000	4300	15000	2200	0.25	0.70	19000	3400	13000	1700	0.25	0.70	12000	1900	8200	900	0.13	0.40
R 2	30000	6500	19000	2800	0.40	1.00	28000	6000	19000	2600	0.40	1.00	18000	4800	12000	2000	0.13	0.40
R 2.5	25000	6000	16000	2600	0.50	1.30	22000	5000	16000	2300	0.50	1.25	15000	4200	9500	1700	0.15	0.50
R 3	22000	6000	14000	2400	0.60	1.80	18000	4500	12000	1900	0.60	1.50	12000	3500	8000	1600	0.20	0.60
R 4	19000	5200	12000	2200	0.80	2.40	15000	3800	9500	1700	0.80	2.00	9800	3000	6500	1300	0.20	0.80
R 5	15000	4300	9500	2000	1.00	3.00	11000	3000	7000	1500	1.00	2.50	7500	2400	5000	1000	0.20	1.00
R 6	12000	3400	8000	1800	1.20	3.60	9000	2400	6000	1400	1.20	3.00	6000	1900	4000	800	0.30	1.20
R 8	9000	2600	6000	1500	1.60	4.80	7000	1900	4500	1100	1.60	4.00	4500	1500	3000	600	0.30	1.60
R10	7500	2200	4800	1200	2.00	6.00	5500	1500	3600	900	2.00	5.00	3600	1200	2500	500	0.30	2.00
Depth of cut																		

1) α is the inclination angle of the machined surface.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.



Overhang 7D (D:Dia.)

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Hardened steel (45－55HRC) AISI H13			
R PRFRAD (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
R 1.5x3	16000	2000	0.10	0.30	13000	1500	0.10	0.30
R 2x4	13000	2000	0.15	0.50	10000	1500	0.15	0.50
R 3	10000	2000	0.20	1.00	8000	1600	0.20	0.80
R 4	8000	1800	0.30	1.50	6400	1400	0.40	1.20
R 5	6000	1600	0.40	2.00	4800	1200	0.40	1.60
R 6	5000	1300	0.45	2.40	4000	1000	0.45	2.00
R 8	3800	1000	0.60	3.00	3100	800	0.60	2.50
R10	3000	800	0.80	4.00	2500	650	0.80	3.00
Depth of cut								

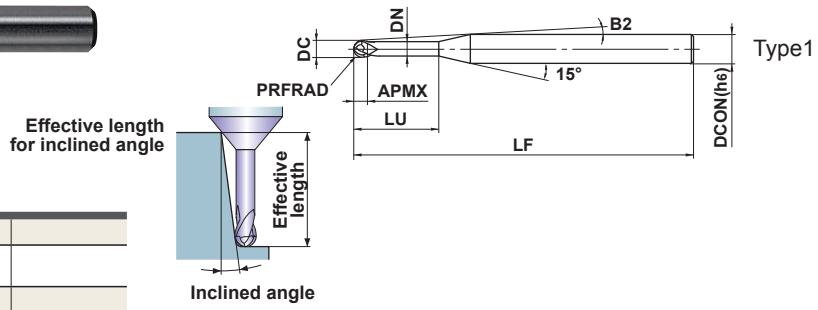
1) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VF2XLBS

IMPACT MIRACLE, Ball nose, 2 flute, Long neck

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎		○		





R	0.2≤PRFRAD≤1				
	±0.007				
	0.4≤DC≤2				
	0 - 0.02				
h6	DCON=4				
	0 - 0.008				

- 2 flute long neck ball nose end mill for high-speed machining of hardened steel.
- Short shank type suitable for use with a shrink fit holder.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
												30'	1°	2°	3°
VF2XLBSR0020N010	0.2	0.4	0.32	1	0.36	13.4°	40	4	2	●	1	1.0	1.0	1.1	1.2
VF2XLBS**R0020N020**	0.2	0.4	0.32	2	0.36	11.9°	40	4	2	●	1	2.0	2.1	2.3	2.5
VF2XLBS**R0020N030**	0.2	0.4	0.32	3	0.36	10.7°	40	4	2	●	1	3.1	3.2	3.4	3.7
VF2XLBS**R0020N040**	0.2	0.4	0.32	4	0.36	9.7°	40	4	2	●	1	4.1	4.3	4.6	4.9
VF2XLBS**R0025N040**	0.25	0.5	0.4	4	0.46	9.6°	40	4	2	●	1	4.1	4.3	4.6	4.9
VF2XLBS**R0025N060**	0.25	0.5	0.4	6	0.46	8.1°	40	4	2	●	1	6.2	6.4	6.9	7.4
VF2XLBS**R0030N020**	0.3	0.6	0.48	2	0.56	11.8°	40	4	2	●	1	2.1	2.2	2.3	2.5
VF2XLBS**R0030N030**	0.3	0.6	0.48	3	0.56	10.5°	40	4	2	●	1	3.1	3.3	3.5	3.8
VF2XLBS**R0030N040**	0.3	0.6	0.48	4	0.56	9.5°	40	4	2	●	1	4.2	4.3	4.6	5.0
VF2XLBS**R0030N060**	0.3	0.6	0.48	6	0.56	8.0°	40	4	2	●	1	6.3	6.5	6.9	7.5
VF2XLBS**R0040N040**	0.4	0.8	0.64	4	0.76	9.4°	40	4	2	●	1	4.2	4.3	4.6	5.0
VF2XLBS**R0040N060**	0.4	0.8	0.64	6	0.76	7.8°	40	4	2	●	1	6.3	6.5	6.9	7.5
VF2XLBS**R0050N030**	0.5	1	0.8	3	0.94	10.1°	40	4	2	●	1	3.2	3.3	3.6	3.9
VF2XLBS**R0050N040**	0.5	1	0.8	4	0.94	9.1°	40	4	2	●	1	4.2	4.4	4.8	5.2
VF2XLBS**R0050N060**	0.5	1	0.8	6	0.94	7.5°	40	4	2	●	1	6.3	6.6	7.1	7.7
VF2XLBS**R0050N080**	0.5	1	0.8	8	0.94	6.4°	40	4	2	●	1	8.4	8.8	9.4	10.2
VF2XLBS**R0100N060**	1	2	1.6	6	1.9	6.4°	40	4	2	●	1	6.2	6.5	6.9	7.4
VF2XLBS**R0100N080**	1	2	1.6	8	1.9	5.3°	40	4	2	●	1	8.3	8.7	9.2	9.9
VF2XLBS**R0100N100**	1	2	1.6	10	1.9	4.5°	40	4	2	●	1	10.4	10.8	11.5	12.4

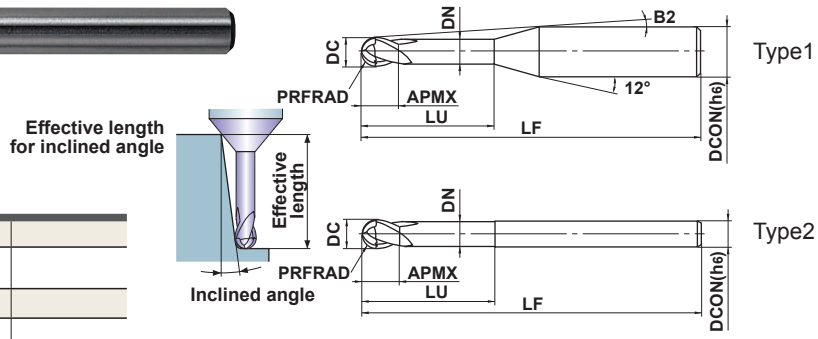
● : Inventory maintained in Japan.

VF2XLB

IMPACT MIRACLE, Ball nose, 2 flute, Long neck

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎		○		





R	PRFRAD≤1	PRFRAD>1			
	±0.007	±0.010			
	0.2≤DC≤6				
	0 -0.02				
h6	4≤DCON≤6				
	0 -0.008				

2 flute long neck ball nose end mill with Impact Miracle coating for high hardened materials.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
												30'	1°	2°	3°
VF2XLBR0010N005S04	0.1	0.2	0.16	0.5	0.17	11.5°	50	4	2	●	1	0.5	0.5	0.6	0.6
VF2XLB**R0010N005S06**	0.1	0.2	0.16	0.5	0.17	11.7°	50	6	2	●	1	0.5	0.5	0.6	0.6
VF2XLB**R0010N008S04**	0.1	0.2	0.16	0.75	0.17	11.2°	50	4	2	●	1	0.7	0.8	0.9	1.0
VF2XLB**R0010N010S04**	0.1	0.2	0.16	1	0.17	10.9°	50	4	2	●	1	1.0	1.1	1.2	1.3
VF2XLB**R0010N010S06**	0.1	0.2	0.16	1	0.17	11.3°	50	6	2	●	1	1.0	1.1	1.2	1.3
VF2XLB**R0010N013S04**	0.1	0.2	0.16	1.25	0.17	10.7°	50	4	2	●	1	1.3	1.3	1.5	1.6
VF2XLB**R0010N015S04**	0.1	0.2	0.16	1.5	0.17	10.4°	50	4	2	●	1	1.5	1.6	1.8	2.0
VF2XLB**R0010N015S06**	0.1	0.2	0.16	1.5	0.17	10.9°	50	6	2	●	1	1.5	1.6	1.8	2.0
VF2XLB**R0010N018S04**	0.1	0.2	0.16	1.75	0.17	10.2°	50	4	2	●	1	1.8	1.9	2.1	2.3
VF2XLB**R0010N020S04**	0.1	0.2	0.16	2	0.17	10°	50	4	2	●	1	2.1	2.2	2.4	2.6
VF2XLB**R0010N025S04**	0.1	0.2	0.16	2.5	0.17	9.5°	50	4	2	●	1	2.6	2.7	3.0	3.3
VF2XLB**R0015N010S04**	0.15	0.3	0.24	1	0.27	11°	50	4	2	●	1	1.0	1.1	1.2	1.3
VF2XLB**R0015N010S06**	0.15	0.3	0.24	1	0.27	11.3°	50	6	2	●	1	1.0	1.1	1.2	1.3
VF2XLB**R0015N013S04**	0.15	0.3	0.24	1.25	0.27	10.7°	50	4	2	●	1	1.3	1.3	1.5	1.6
VF2XLB**R0015N015S04**	0.15	0.3	0.24	1.5	0.27	10.4°	50	4	2	●	1	1.5	1.6	1.8	1.9
VF2XLB**R0015N015S06**	0.15	0.3	0.24	1.5	0.27	10.9°	50	6	2	●	1	1.5	1.6	1.8	1.9
VF2XLB**R0015N018S04**	0.15	0.3	0.24	1.75	0.27	10.2°	50	4	2	●	1	1.8	1.9	2.1	2.3
VF2XLB**R0015N020S04**	0.15	0.3	0.24	2	0.27	9.9°	50	4	2	●	1	2.1	2.2	2.4	2.6
VF2XLB**R0015N020S06**	0.15	0.3	0.24	2	0.27	10.6°	50	6	2	●	1	2.1	2.2	2.4	2.6
VF2XLB**R0015N025S04**	0.15	0.3	0.24	2.5	0.27	9.5°	50	4	2	●	1	2.6	2.7	3.0	3.3
VF2XLB**R0015N030S04**	0.15	0.3	0.24	3	0.27	9.1°	50	4	2	●	1	3.1	3.2	3.6	3.9
VF2XLB**R0015N040S04**	0.15	0.3	0.24	4	0.27	8.4°	50	4	2	●	1	4.2	4.3	4.8	5.3
VF2XLB**R0020N010S04**	0.2	0.4	0.32	1	0.36	11°	50	4	2	●	1	1.0	1.0	1.1	1.2
VF2XLB**R0020N010S06**	0.2	0.4	0.32	1	0.36	11.3°	50	6	2	●	1	1.0	1.0	1.1	1.2
VF2XLB**R0020N015S04**	0.2	0.4	0.32	1.5	0.36	10.4°	50	4	2	●	1	1.5	1.6	1.7	1.9
VF2XLB**R0020N015S06**	0.2	0.4	0.32	1.5	0.36	11°	50	6	2	●	1	1.5	1.6	1.7	1.9
VF2XLB**R0020N020S04**	0.2	0.4	0.32	2	0.36	10°	50	4	2	●	1	2.0	2.1	2.3	2.6
VF2XLB**R0020N020S06**	0.2	0.4	0.32	2	0.36	10.6°	50	6	2	●	1	2.0	2.1	2.3	2.6
VF2XLB**R0020N025S04**	0.2	0.4	0.32	2.5	0.36	9.5°	50	4	2	●	1	2.6	2.7	2.9	3.2
VF2XLB**R0020N025S06**	0.2	0.4	0.32	2.5	0.36	10.3°	50	6	2	●	1	2.6	2.7	2.9	3.2
VF2XLB**R0020N030S04**	0.2	0.4	0.32	3	0.36	9.1°	50	4	2	●	1	3.1	3.2	3.5	3.9
VF2XLB**R0020N030S06**	0.2	0.4	0.32	3	0.36	10°	50	6	2	●	1	3.1	3.2	3.5	3.9
VF2XLB**R0020N040S04**	0.2	0.4	0.32	4	0.36	8.4°	50	4	2	●	1	4.1	4.3	4.7	5.2
VF2XLB**R0020N050S04**	0.2	0.4	0.32	5	0.36	7.8°	50	4	2	●	1	5.2	5.4	5.9	6.6

VF2XLB

IMPACT MIRACLE, Ball nose, 2 flute, Long neck

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
												30'	1°	2°	3°
VF2XLBR0025N015S04	0.25	0.5	0.4	1.5	0.46	10.5°	50	4	2	●	1	1.5	1.6	1.7	1.9
VF2XLBR0025N015S06	0.25	0.5	0.4	1.5	0.46	11°	50	6	2	●	1	1.5	1.6	1.7	1.9
VF2XLBR0025N020S04	0.25	0.5	0.4	2	0.46	10°	50	4	2	●	1	2.0	2.1	2.3	2.6
VF2XLBR0025N020S06	0.25	0.5	0.4	2	0.46	10.6°	50	6	2	●	1	2.0	2.1	2.3	2.6
VF2XLBR0025N025S04	0.25	0.5	0.4	2.5	0.46	9.5°	50	4	2	●	1	2.6	2.7	2.9	3.2
VF2XLBR0025N030S04	0.25	0.5	0.4	3	0.46	9.1°	50	4	2	●	1	3.1	3.2	3.5	3.9
VF2XLBR0025N030S06	0.25	0.5	0.4	3	0.46	10°	50	6	2	●	1	3.1	3.2	3.5	3.9
VF2XLBR0025N035S04	0.25	0.5	0.4	3.5	0.46	8.7°	50	4	2	●	1	3.6	3.8	4.1	4.5
VF2XLBR0025N040S04	0.25	0.5	0.4	4	0.46	8.3°	50	4	2	●	1	4.1	4.3	4.7	5.2
VF2XLBR0025N040S06	0.25	0.5	0.4	4	0.46	9.4°	50	6	2	●	1	4.1	4.3	4.7	5.2
VF2XLBR0025N050S04	0.25	0.5	0.4	5	0.46	7.7°	50	4	2	●	1	5.2	5.4	5.9	6.5
VF2XLBR0025N050S06	0.25	0.5	0.4	5	0.46	8.9°	50	6	2	●	1	5.2	5.4	5.9	6.5
VF2XLBR0025N060S04	0.25	0.5	0.4	6	0.46	7.2°	50	4	2	●	1	6.2	6.5	7.1	7.9
VF2XLBR0025N060S06	0.25	0.5	0.4	6	0.46	8.4°	60	6	2	●	1	6.2	6.5	7.1	7.9
VF2XLBR0030N020S04	0.3	0.6	0.48	2	0.56	9.9°	50	4	2	●	1	2.1	2.2	2.4	2.6
VF2XLBR0030N020S06	0.3	0.6	0.48	2	0.56	10.6°	50	6	2	●	1	2.1	2.2	2.4	2.6
VF2XLBR0030N025S04	0.3	0.6	0.48	2.5	0.56	9.4°	50	4	2	●	1	2.6	2.7	3.0	3.3
VF2XLBR0030N030S04	0.3	0.6	0.48	3	0.56	9°	50	4	2	●	1	3.1	3.3	3.6	3.9
VF2XLBR0030N030S06	0.3	0.6	0.48	3	0.56	9.9°	50	6	2	●	1	3.1	3.3	3.6	3.9
VF2XLBR0030N035S04	0.3	0.6	0.48	3.5	0.56	8.6°	50	4	2	●	1	3.6	3.8	4.2	4.6
VF2XLBR0030N040S04	0.3	0.6	0.48	4	0.56	8.3°	50	4	2	●	1	4.2	4.4	4.8	5.2
VF2XLBR0030N040S06	0.3	0.6	0.48	4	0.56	9.3°	50	6	2	●	1	4.2	4.4	4.8	5.2
VF2XLBR0030N050S04	0.3	0.6	0.48	5	0.56	7.6°	50	4	2	●	1	5.2	5.4	6.0	6.6
VF2XLBR0030N050S06	0.3	0.6	0.48	5	0.56	8.8°	50	6	2	●	1	5.2	5.4	6.0	6.6
VF2XLBR0030N060S04	0.3	0.6	0.48	6	0.56	7.1°	50	4	2	●	1	6.3	6.5	7.1	7.9
VF2XLBR0030N060S06	0.3	0.6	0.48	6	0.56	8.4°	50	6	2	●	1	6.3	6.5	7.1	7.9
VF2XLBR0030N070S04	0.3	0.6	0.48	7	0.56	6.6°	50	4	2	●	1	7.3	7.6	8.3	9.2
VF2XLBR0030N080S04	0.3	0.6	0.48	8	0.56	6.2°	50	4	2	●	1	8.3	8.7	9.5	10.6
VF2XLBR0030N080S06	0.3	0.6	0.48	8	0.56	7.6°	60	6	2	●	1	8.3	8.7	9.5	10.6
VF2XLBR0040N020S04	0.4	0.8	0.64	2	0.76	9.9°	50	4	2	●	1	2.1	2.2	2.3	2.6
VF2XLBR0040N020S06	0.4	0.8	0.64	2	0.76	10.6°	50	6	2	●	1	2.1	2.2	2.3	2.6
VF2XLBR0040N030S04	0.4	0.8	0.64	3	0.76	8.9°	50	4	2	●	1	3.1	3.3	3.5	3.9
VF2XLBR0040N030S06	0.4	0.8	0.64	3	0.76	9.9°	50	6	2	●	1	3.1	3.3	3.5	3.9
VF2XLBR0040N040S04	0.4	0.8	0.64	4	0.76	8.2°	50	4	2	●	1	4.2	4.3	4.7	5.2
VF2XLBR0040N040S06	0.4	0.8	0.64	4	0.76	9.3°	50	6	2	●	1	4.2	4.3	4.7	5.2
VF2XLBR0040N050S04	0.4	0.8	0.64	5	0.76	7.5°	50	4	2	●	1	5.2	5.4	5.9	6.5
VF2XLBR0040N060S04	0.4	0.8	0.64	6	0.76	7°	50	4	2	●	1	6.3	6.5	7.1	7.9
VF2XLBR0040N060S06	0.4	0.8	0.64	6	0.76	8.3°	50	6	2	●	1	6.3	6.5	7.1	7.9
VF2XLBR0040N070S04	0.4	0.8	0.64	7	0.76	6.5°	50	4	2	●	1	7.3	7.6	8.3	9.2
VF2XLBR0040N080S04	0.4	0.8	0.64	8	0.76	6.1°	50	4	2	●	1	8.3	8.7	9.5	10.5
VF2XLBR0040N080S06	0.4	0.8	0.64	8	0.76	7.5°	50	6	2	●	1	8.3	8.7	9.5	10.5
VF2XLBR0040N100S04	0.4	0.8	0.64	10	0.76	5.4°	50	4	2	●	1	10.4	10.9	11.9	13.2
VF2XLBR0040N100S06	0.4	0.8	0.64	10	0.76	6.8°	60	6	2	●	1	10.4	10.9	11.9	13.2
VF2XLBR0050N030S04	0.5	1	0.8	3	0.94	8.8°	50	4	2	●	1	3.2	3.3	3.6	4.0
VF2XLBR0050N030S06	0.5	1	0.8	3	0.94	9.8°	50	6	2	●	1	3.2	3.3	3.6	4.0
VF2XLBR0050N040S04	0.5	1	0.8	4	0.94	8°	50	4	2	●	1	4.2	4.4	4.8	5.3
VF2XLBR0050N040S06	0.5	1	0.8	4	0.94	9.2°	50	6	2	●	1	4.2	4.4	4.8	5.3
VF2XLBR0050N050S04	0.5	1	0.8	5	0.94	7.3°	50	4	2	●	1	5.3	5.5	6.0	6.7
VF2XLBR0050N050S06	0.5	1	0.8	5	0.94	8.7°	50	6	2	●	1	5.3	5.5	6.0	6.7
VF2XLBR0050N060S04	0.5	1	0.8	6	0.94	6.8°	50	4	2	●	1	6.3	6.6	7.2	8.0
VF2XLBR0050N060S06	0.5	1	0.8	6	0.94	8.2°	50	6	2	●	1	6.3	6.6	7.2	8.0
VF2XLBR0050N070S04	0.5	1	0.8	7	0.94	6.3°	50	4	2	●	1	7.4	7.7	8.4	9.3

● : Inventory maintained in Japan.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
												30'	1°	2°	3°
VF2XLBR0050N080S04	0.5	1	0.8	8	0.94	5.9°	50	4	2	●	1	8.4	8.8	9.6	10.6
VF2XLBR0050N080S06	0.5	1	0.8	8	0.94	7.4°	50	6	2	●	1	8.4	8.8	9.6	10.6
VF2XLBR0050N090S04	0.5	1	0.8	9	0.94	5.5°	50	4	2	●	1	9.5	9.9	10.8	12.0
VF2XLBR0050N100S04	0.5	1	0.8	10	0.94	5.2°	50	4	2	●	1	10.5	11.0	12.0	13.3
VF2XLBR0050N100S06	0.5	1	0.8	10	0.94	6.7°	50	6	2	●	1	10.5	11.0	12.0	13.3
VF2XLBR0050N120S04	0.5	1	0.8	12	0.94	4.6°	50	4	2	●	1	12.6	13.2	14.4	15.9
VF2XLBR0050N120S06	0.5	1	0.8	12	0.94	6.1°	60	6	2	●	1	12.6	13.2	14.4	15.9
VF2XLBR0050N140S04	0.5	1	0.8	14	0.94	4.2°	60	4	2	●	1	14.7	15.3	16.8	18.6
VF2XLBR0050N160S04	0.5	1	0.8	16	0.94	3.8°	60	4	2	●	1	16.8	17.5	19.2	21.3
VF2XLBR0050N160S06	0.5	1	0.8	16	0.94	5.3°	70	6	2	●	1	16.8	17.5	19.2	21.3
VF2XLBR0050N180S04	0.5	1	0.8	18	0.94	3.5°	60	4	2	●	1	18.9	19.7	21.6	23.9
VF2XLBR0050N200S04	0.5	1	0.8	20	0.94	3.3°	60	4	2	●	1	21.0	21.9	24.0	26.6
VF2XLBR0050N200S06	0.5	1	0.8	20	0.94	4.6°	70	6	2	●	1	21.0	21.9	24.0	26.6
VF2XLBR0060N060S04	0.6	1.2	0.96	6	1.14	6.6°	50	4	2	●	1	6.3	6.6	7.2	8.0
VF2XLBR0060N060S06	0.6	1.2	0.96	6	1.14	8.1°	50	6	2	●	1	6.3	6.6	7.2	8.0
VF2XLBR0060N080S04	0.6	1.2	0.96	8	1.14	5.7°	50	4	2	●	1	8.4	8.8	9.6	10.6
VF2XLBR0060N080S06	0.6	1.2	0.96	8	1.14	7.3°	50	6	2	●	1	8.4	8.8	9.6	10.6
VF2XLBR0060N100S04	0.6	1.2	0.96	10	1.14	5°	50	4	2	●	1	10.5	11.0	12.0	13.3
VF2XLBR0060N100S06	0.6	1.2	0.96	10	1.14	6.6°	50	6	2	●	1	10.5	11.0	12.0	13.3
VF2XLBR0060N120S04	0.6	1.2	0.96	12	1.14	4.5°	50	4	2	●	1	12.6	13.2	14.4	15.9
VF2XLBR0060N120S06	0.6	1.2	0.96	12	1.14	6°	50	6	2	●	1	12.6	13.2	14.4	15.9
VF2XLBR0060N140S04	0.6	1.2	0.96	14	1.14	4°	60	4	2	●	1	14.7	15.3	16.8	18.6
VF2XLBR0060N160S04	0.6	1.2	0.96	16	1.14	3.7°	60	4	2	●	1	16.8	17.5	19.2	21.2
VF2XLBR0060N160S06	0.6	1.2	0.96	16	1.14	5.2°	70	6	2	●	1	16.8	17.5	19.2	21.2
VF2XLBR0070N080S04	0.7	1.4	1.12	8	1.34	5.5°	50	4	2	●	1	8.4	8.8	9.6	10.6
VF2XLBR0070N120S04	0.7	1.4	1.12	12	1.34	4.3°	50	4	2	●	1	12.6	13.1	14.4	15.9
VF2XLBR0070N160S04	0.7	1.4	1.12	16	1.34	3.5°	60	4	2	●	1	16.8	17.5	19.2	21.2
VF2XLBR0075N060S04	0.75	1.5	1.2	6	1.44	6.3°	50	4	2	●	1	6.3	6.6	7.2	7.9
VF2XLBR0075N060S06	0.75	1.5	1.2	6	1.44	8°	50	6	2	●	1	6.3	6.6	7.2	7.9
VF2XLBR0075N080S04	0.75	1.5	1.2	8	1.44	5.4°	50	4	2	●	1	8.4	8.8	9.6	10.6
VF2XLBR0075N080S06	0.75	1.5	1.2	8	1.44	7.2°	50	6	2	●	1	8.4	8.8	9.6	10.6
VF2XLBR0075N100S04	0.75	1.5	1.2	10	1.44	4.7°	50	4	2	●	1	10.5	11.0	12.0	13.2
VF2XLBR0075N100S06	0.75	1.5	1.2	10	1.44	6.5°	50	6	2	●	1	10.5	11.0	12.0	13.2
VF2XLBR0075N120S04	0.75	1.5	1.2	12	1.44	4.2°	50	4	2	●	1	12.6	13.1	14.4	15.9
VF2XLBR0075N120S06	0.75	1.5	1.2	12	1.44	5.9°	50	6	2	●	1	12.6	13.1	14.4	15.9
VF2XLBR0075N140S04	0.75	1.5	1.2	14	1.44	3.8°	50	4	2	●	1	14.7	15.3	16.8	18.5
VF2XLBR0075N140S06	0.75	1.5	1.2	14	1.44	5.4°	50	6	2	●	1	14.7	15.3	16.8	18.5
VF2XLBR0075N160S04	0.75	1.5	1.2	16	1.44	3.4°	60	4	2	●	1	16.8	17.5	19.2	21.2
VF2XLBR0075N160S06	0.75	1.5	1.2	16	1.44	5°	60	6	2	●	1	16.8	17.5	19.2	21.2
VF2XLBR0075N180S04	0.75	1.5	1.2	18	1.44	3.1°	60	4	2	●	1	18.9	19.7	21.6	23.8
VF2XLBR0075N200S04	0.75	1.5	1.2	20	1.44	2.9°	60	4	2	●	1	21.0	21.9	23.9	*
VF2XLBR0075N200S06	0.75	1.5	1.2	20	1.44	4.3°	70	6	2	●	1	21.0	21.9	23.9	26.5
VF2XLBR0080N080S04	0.8	1.6	1.28	8	1.54	5.3°	50	4	2	●	1	8.4	8.8	9.6	10.5
VF2XLBR0080N120S04	0.8	1.6	1.28	12	1.54	4.1°	50	4	2	●	1	12.6	13.1	14.4	15.9
VF2XLBR0080N160S04	0.8	1.6	1.28	16	1.54	3.3°	60	4	2	●	1	16.8	17.5	19.1	21.2
VF2XLBR0080N200S04	0.8	1.6	1.28	20	1.54	2.8°	60	4	2	●	1	21.0	21.9	23.9	*
VF2XLBR0090N080S04	0.9	1.8	1.44	8	1.74	5.1°	50	4	2	●	1	8.4	8.8	9.6	10.5
VF2XLBR0090N120S04	0.9	1.8	1.44	12	1.74	3.9°	50	4	2	●	1	12.6	13.1	14.3	15.8
VF2XLBR0090N160S04	0.9	1.8	1.44	16	1.74	3.1°	60	4	2	●	1	16.8	17.5	19.1	21.1
VF2XLBR0090N200S04	0.9	1.8	1.44	20	1.74	2.6°	60	4	2	●	1	20.9	21.8	23.9	*
VF2XLBR0100N060S04	1	2	1.6	6	1.9	5.8°	50	4	2	●	1	6.2	6.5	7.0	7.7
VF2XLBR0100N060S06	1	2	1.6	6	1.9	7.9°	50	6	2	●	1	6.2	6.5	7.0	7.7

* No interference

VF2XLB

IMPACT MIRACLE, Ball nose, 2 flute, Long neck

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
												30'	1°	2°	3°
VF2XLBR0100N080S04	1	2	1.6	8	1.9	4.9°	50	4	2	●	1	8.3	8.7	9.4	10.4
VF2XLBR0100N080S06	1	2	1.6	8	1.9	6.9°	50	6	2	●	1	8.3	8.7	9.4	10.4
VF2XLBR0100N100S04	1	2	1.6	10	1.9	4.2°	50	4	2	●	1	10.4	10.9	11.8	13.0
VF2XLBR0100N100S06	1	2	1.6	10	1.9	6.2°	50	6	2	●	1	10.4	10.9	11.8	13.0
VF2XLBR0100N120S04	1	2	1.6	12	1.9	3.7°	50	4	2	●	1	12.5	13.0	14.2	15.7
VF2XLBR0100N120S06	1	2	1.6	12	1.9	5.6°	50	6	2	●	1	12.5	13.0	14.2	15.7
VF2XLBR0100N140S04	1	2	1.6	14	1.9	3.3°	50	4	2	●	1	14.6	15.2	16.6	18.3
VF2XLBR0100N140S06	1	2	1.6	14	1.9	5.1°	50	6	2	●	1	14.6	15.2	16.6	18.3
VF2XLBR0100N160S04	1	2	1.6	16	1.9	2.9°	60	4	2	●	1	16.7	17.4	19.0	*
VF2XLBR0100N160S06	1	2	1.6	16	1.9	4.7°	60	6	2	●	1	16.7	17.4	19.0	21.0
VF2XLBR0100N180S04	1	2	1.6	18	1.9	2.7°	60	4	2	●	1	18.8	19.6	21.4	*
VF2XLBR0100N180S06	1	2	1.6	18	1.9	4.4°	60	6	2	●	1	18.8	19.6	21.4	23.6
VF2XLBR0100N200S04	1	2	1.6	20	1.9	2.5°	60	4	2	●	1	20.9	21.8	23.8	*
VF2XLBR0100N200S06	1	2	1.6	20	1.9	4.1°	60	6	2	●	1	20.9	21.8	23.8	26.3
VF2XLBR0100N220S04	1	2	1.6	22	1.9	2.3°	60	4	2	●	1	22.9	23.9	26.2	*
VF2XLBR0100N250S04	1	2	1.6	25	1.9	2°	70	4	2	●	1	26.1	27.2	*	*
VF2XLBR0100N250S06	1	2	1.6	25	1.9	3.5°	70	6	2	●	1	26.1	27.2	29.8	32.9
VF2XLBR0100N300S04	1	2	1.6	30	1.9	1.7°	70	4	2	●	1	31.3	32.6	*	*
VF2XLBR0100N300S06	1	2	1.6	30	1.9	3°	80	6	2	●	1	31.3	32.6	35.8	*
VF2XLBR0100N350S04	1	2	1.6	35	1.9	1.5°	80	4	2	●	1	36.5	38.1	*	*
VF2XLBR0125N100S06	1.25	2.5	2	10	2.4	5.9°	60	6	2	●	1	10.4	10.8	11.8	12.9
VF2XLBR0125N150S06	1.25	2.5	2	15	2.4	4.6°	60	6	2	●	1	15.6	16.3	17.8	19.6
VF2XLBR0125N200S06	1.25	2.5	2	20	2.4	3.7°	70	6	2	●	1	20.8	21.7	23.8	26.2
VF2XLBR0125N250S06	1.25	2.5	2	25	2.4	3.2°	70	6	2	●	1	26.1	27.2	29.7	32.9
VF2XLBR0125N300S06	1.25	2.5	2	30	2.4	2.8°	80	6	2	●	1	31.3	32.6	35.7	*
VF2XLBR0125N350S06	1.25	2.5	2	35	2.4	2.4°	80	6	2	●	1	36.5	38.1	41.7	*
VF2XLBR0150N080S06	1.5	3	2.4	8	2.9	6.3°	60	6	2	●	1	8.3	8.6	9.3	10.2
VF2XLBR0150N100S06	1.5	3	2.4	10	2.9	5.5°	60	6	2	●	1	10.4	10.8	11.7	12.9
VF2XLBR0150N120S06	1.5	3	2.4	12	2.9	4.9°	60	6	2	●	1	12.5	13.0	14.1	15.5
VF2XLBR0150N140S06	1.5	3	2.4	14	2.9	4.4°	60	6	2	●	1	14.6	15.2	16.5	18.2
VF2XLBR0150N160S06	1.5	3	2.4	16	2.9	4°	60	6	2	●	1	16.7	17.3	18.9	20.8
VF2XLBR0150N200S06	1.5	3	2.4	20	2.9	3.4°	70	6	2	●	1	20.8	21.7	23.7	26.1
VF2XLBR0150N250S06	1.5	3	2.4	25	2.9	2.8°	70	6	2	●	1	26.1	27.2	29.7	*
VF2XLBR0150N300S06	1.5	3	2.4	30	2.9	2.5°	70	6	2	●	1	31.3	32.6	35.7	*
VF2XLBR0150N350S06	1.5	3	2.4	35	2.9	2.2°	80	6	2	●	1	36.5	38.0	41.7	*
VF2XLBR0150N400S06	1.5	3	2.4	40	2.9	1.9°	90	6	2	●	1	41.7	43.5	*	*
VF2XLBR0175N160S06	1.75	3.5	2.8	16	3.4	3.6°	60	6	2	●	1	16.7	17.3	18.9	20.8
VF2XLBR0175N200S06	1.75	3.5	2.8	20	3.4	3°	70	6	2	●	1	20.8	21.7	23.7	*
VF2XLBR0175N250S06	1.75	3.5	2.8	25	3.4	2.5°	70	6	2	●	1	26.0	27.1	29.6	*
VF2XLBR0175N300S06	1.75	3.5	2.8	30	3.4	2.1°	80	6	2	●	1	31.3	32.6	35.6	*
VF2XLBR0175N350S06	1.75	3.5	2.8	35	3.4	1.9°	80	6	2	●	1	36.5	38.0	*	*
VF2XLBR0175N400S06	1.75	3.5	2.8	40	3.4	1.7°	90	6	2	●	1	41.7	43.5	*	*
VF2XLBR0200N100S06	2	4	3.2	10	3.9	4.5°	70	6	2	●	1	10.4	10.8	11.6	12.7
VF2XLBR0200N120S06	2	4	3.2	12	3.9	3.9°	70	6	2	●	1	12.5	12.9	14.0	15.4
VF2XLBR0200N140S06	2	4	3.2	14	3.9	3.4°	70	6	2	●	1	14.6	15.1	16.4	18.0
VF2XLBR0200N160S06	2	4	3.2	16	3.9	3.1°	70	6	2	●	1	16.6	17.3	18.8	20.7
VF2XLBR0200N200S06	2	4	3.2	20	3.9	2.6°	70	6	2	●	1	20.8	21.7	23.6	*
VF2XLBR0200N250S06	2	4	3.2	25	3.9	2.1°	70	6	2	●	1	26.0	27.1	29.6	*
VF2XLBR0200N300S06	2	4	3.2	30	3.9	1.8°	70	6	2	●	1	31.2	32.6	*	*
VF2XLBR0200N350S06	2	4	3.2	35	3.9	1.6°	80	6	2	●	1	36.5	38.0	*	*
VF2XLBR0200N400S06	2	4	3.2	40	3.9	1.4°	90	6	2	●	1	41.7	43.5	*	*
VF2XLBR0200N450S06	2	4	3.2	45	3.9	1.2°	90	6	2	●	1	46.9	48.9	*	*

* No interference

● : Inventory maintained in Japan.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
												30'	1°	2°	3°
VF2XLBR0200N500S06	2	4	3.2	50	3.9	1.1°	100	6	2	●	1	52.1	54.3	*	*
VF2XLB**R0250N200S06**	2.5	5	4	20	4.9	1.5°	70	6	2	●	1	20.8	21.6	*	*
VF2XLB**R0250N250S06**	2.5	5	4	25	4.9	1.2°	70	6	2	●	1	26.0	27.1	*	*
VF2XLB**R0250N300S06**	2.5	5	4	30	4.9	1°	80	6	2	●	1	31.2	*	*	*
VF2XLB**R0250N350S06**	2.5	5	4	35	4.9	0.9°	80	6	2	●	1	36.4	*	*	*
VF2XLB**R0300N300S06**	3	6	4.8	30	5.85	—	80	6	2	●	2	*	*	*	*
VF2XLB**R0300N400S06**	3	6	4.8	40	5.85	—	90	6	2	●	2	*	*	*	*
VF2XLB**R0300N500S06**	3	6	4.8	50	5.85	—	100	6	2	●	2	*	*	*	*

* No interference

VF2XLBS

Ball nose, Medium cut length, 2 flute, Short shank

VF2XLB

IMPACT MIRACLE, Ball nose, 2 flute, Long neck

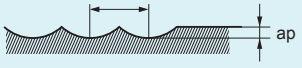
RECOMMENDED CUTTING CONDITIONS

Work material		Hardened steel (45−55HRC) AISI H13			Hardened steel (55−62HRC) AISI D2		
R PRFRAD (mm)	Neck length LU (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
R 0.1	0.5	40000	300	0.003	40000	300	0.002
	1	40000	300	0.002	40000	300	0.002
	1.5	40000	300	0.001	40000	200	0.001
	2	40000	200	0.001	40000	100	0.001
	2.5	40000	100	0.001	40000	60	0.001
R 0.15	1	40000	500	0.007	40000	500	0.005
	1.5	40000	500	0.005	40000	500	0.003
	2	40000	500	0.003	40000	500	0.002
	2.5	40000	400	0.003	40000	400	0.002
	3	40000	300	0.002	40000	300	0.001
	4	30000	200	0.002	30000	200	0.001
R 0.2	1	40000	1400	0.015	40000	1400	0.01
	1.5	40000	1000	0.01	40000	1000	0.006
	2	40000	1000	0.01	40000	1000	0.006
	2.5	40000	700	0.005	40000	700	0.003
	3	40000	700	0.005	40000	700	0.003
	4	40000	600	0.004	40000	500	0.003
	5	40000	400	0.003	40000	300	0.002
R 0.25	1.5	40000	2000	0.02	40000	2000	0.015
	2	40000	2000	0.02	40000	2000	0.015
	3	40000	1200	0.015	40000	1200	0.01
	4	36000	900	0.01	36000	900	0.007
	5	36000	700	0.007	36000	600	0.005
	6	36000	600	0.006	36000	500	0.004
R 0.3	2	40000	2800	0.03	40000	2800	0.02
	3	40000	2800	0.03	40000	2800	0.02
	4	35000	2000	0.02	35000	2000	0.015
	5	30000	1000	0.01	30000	1000	0.007
	6	30000	800	0.008	30000	800	0.005
	7	30000	600	0.008	30000	600	0.005
	8	25000	400	0.006	25000	400	0.004
R 0.4	2	40000	3500	0.04	40000	3500	0.03
	3	40000	3000	0.04	40000	3000	0.03
	4	40000	3000	0.02	40000	3000	0.015
	6	30000	1600	0.02	30000	1600	0.01
	8	25000	1000	0.01	25000	1000	0.007
	10	25000	600	0.008	25000	600	0.005
R 0.5	3	40000	4000	0.05	40000	4000	0.04
	4	40000	4000	0.05	40000	4000	0.04
	5	40000	3000	0.03	40000	3000	0.02
	6	35000	2000	0.03	35000	2000	0.02
	8	30000	1600	0.02	30000	1600	0.01
	10	20000	1000	0.01	20000	1000	0.01
	12	20000	1000	0.01	18000	800	0.008
	14	18000	600	0.008	18000	480	0.008
	16	18000	500	0.008	18000	400	0.006
	18	13000	300	0.005	13000	240	0.004
	20	13000	250	0.005	13000	200	0.004
R 0.6	6	40000	4000	0.05	35000	3500	0.04
	8	40000	3000	0.05	27000	2000	0.04
	10	27000	1900	0.03	24000	1700	0.02
	12	16000	1100	0.02	16000	1000	0.01
	14	16000	850	0.01	16000	780	0.01
	16	15000	500	0.01	14000	400	0.006
R 0.7	8	40000	4500	0.06	28000	3200	0.05
	12	32000	3000	0.03	19000	1800	0.02
	16	15000	1000	0.02	14000	800	0.01
R 0.75	6	40000	5000	0.07	32000	4000	0.06
	8	40000	5000	0.07	28000	3500	0.06
	10	40000	4500	0.06	21000	2400	0.04
	12	32000	3400	0.04	19000	2000	0.03
	14	16000	1500	0.04	13000	1200	0.03
	16	13000	1200	0.03	13000	1200	0.02

Work material		Hardened steel (45−55HRC) AISI H13			Hardened steel (55−62HRC) AISI D2		
R PRFRAD (mm)	Neck length LU (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
R 0.75	18	13000	1100	0.02	10000	800	0.02
	20	12000	900	0.02	9000	700	0.01
R 0.8	8	40000	5000	0.08	26000	3200	0.07
	12	35000	3800	0.05	20000	2100	0.03
	16	13000	1200	0.04	12000	1100	0.02
	20	10000	750	0.02	8000	600	0.01
R 0.9	8	40000	5000	0.09	25000	3100	0.08
	12	36000	3800	0.06	18000	1900	0.04
	16	25000	2500	0.04	14000	1300	0.025
	20	10000	1000	0.03	8000	800	0.02
R 1	6	40000	6000	0.1	24000	3400	0.1
	8	40000	5000	0.1	24000	3000	0.1
	10	40000	5000	0.08	24000	3000	0.07
	12	40000	5000	0.08	24000	2600	0.05
	14	40000	5000	0.06	21000	2300	0.05
	16	32000	3500	0.05	16000	1700	0.03
	18	24000	2400	0.04	13000	1300	0.03
	20	10000	1000	0.04	10000	1000	0.03
	22	10000	1000	0.04	10000	1000	0.02
	25	10000	1000	0.04	8000	800	0.02
	30	10000	800	0.02	8000	800	0.015
	35	10000	500	0.02	8000	400	0.01
R 1.25	10	36000	5000	0.12	20000	2600	0.11
	15	36000	4600	0.08	18000	2000	0.075
	20	26000	3000	0.07	13000	1400	0.05
	25	10000	1100	0.06	8000	800	0.04
	30	8000	800	0.05	7000	700	0.03
	35	8000	500	0.03	5000	400	0.03
R 1.5	8	32000	6400	0.15	16000	3000	0.15
	10	32000	5100	0.15	16000	2200	0.15
	12	32000	5100	0.13	16000	2200	0.13
	14	32000	4500	0.13	16000	2200	0.1
	16	32000	4500	0.1	16000	1800	0.1
	20	27000	3800	0.1	14000	1600	0.06
	25	21000	2700	0.08	11000	1200	0.06
	30	9000	1000	0.08	7000	700	0.05
	35	6000	700	0.06	6000	600	0.04
	40	6000	600	0.04	5000	400	0.03
R 1.75	16	28000	4200	0.13	14000	1600	0.13
	20	26000	3800	0.13	13000	1600	0.11
	25	23000	3300	0.12	11000	1200	0.08
	30	13000	1900	0.09	9000	1000	0.07
	35	9000	1200	0.08	6000	600	0.06
	40	8500	1100	0.07	5500	500	0.04
R 2	10	24000	4800	0.2	12000	2200	0.2
	12	24000	4800	0.2	12000	2200	0.2
	14	24000	3800	0.15	12000	1500	0.15
	16	24000	3800	0.15	12000	1500	0.15
	20	24000	3800	0.15	12000	1500	0.15
	25	24000	3800	0.15	10000	1100	0.1
	30	20000	3000	0.1	10000	1100	0.08
	35	12000	1700	0.1	8000	900	0.08
	40	11000	1500	0.1	5000	500	0.06
	45	10000	1300	0.08	5000	500	0.05
	50	8000	1000	0.05	4000	400	0.04
R 2.5	20	19000	3400	0.2	10000	1400	0.2
	25	19000	3400	0.2	10000	1400	0.2
	30	19000	3200	0.15	8000	1000	0.15
	35	16000	2700	0.1	8000	900	0.1
R 3	30	16000	3500	0.2	8000	1000	0.2
	40	16000	3000	0.15	8000	800	0.15
	50	16000	2700	0.15	6000	500	0.15

Depth of cut

≤0.1PRFRAD (PRFRAD≤1)
≤0.2PRFRAD (PRFRAD>1)



PRFRAD:Radius

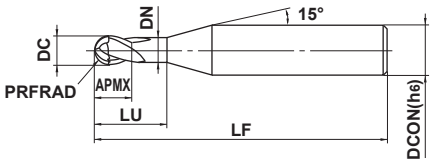
1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

VC2ESB

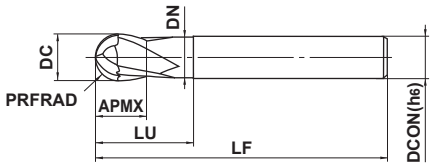
Ball nose, Extra short cut length, 2 flute, Short shank

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	○	○	○		





Type2



Type2

R

0.15≤PRFRAD≤6				
±0.01				

0.3≤DC≤12				
0 - 0.020				

h6

4≤DCON≤6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

● 2 flute ball nose end mill for high rigidity.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VC2ESBR0015N006	0.15	0.3	0.3	0.6	0.27	30	4	2	●	1
VC2ESBR0020N008	0.2	0.4	0.4	0.8	0.36	30	4	2	●	1
VC2ESBR0030N012	0.3	0.6	0.6	1.2	0.56	30	4	2	●	1
VC2ESBR0040N016	0.4	0.8	0.8	1.6	0.76	30	4	2	●	1
VC2ESBR0050	0.5	1	1	—	—	30	4	2	●	1
VC2ESBR0050N025	0.5	1	1	2.5	0.94	30	4	2	●	1
VC2ESBR0075	0.75	1.5	1.5	—	—	30	4	2	●	1
VC2ESBR0075N040	0.75	1.5	1.5	4	1.44	30	4	2	●	1
VC2ESBR0100	1	2	2	—	—	40	6	2	●	1
VC2ESBR0100N060	1	2	2	6	1.9	40	6	2	●	1
VC2ESBR0150	1.5	3	3	—	—	40	6	2	●	1
VC2ESBR0150N080	1.5	3	3	8	2.9	40	6	2	●	1
VC2ESBR0200	2	4	4	—	—	40	6	2	●	1
VC2ESBR0200N080	2	4	4	8	3.9	40	6	2	●	1
VC2ESBR0250	2.5	5	5	—	—	40	6	2	●	1
VC2ESBR0250N120	2.5	5	5	12	4.9	40	6	2	●	1
VC2ESBR0300	3	6	6	—	—	40	6	2	●	2
VC2ESBR0300N130	3	6	6	13	5.85	40	6	2	●	2
VC2ESBR0350	3.5	7	7	—	—	50	8	2	●	1
VC2ESBR0400	4	8	8	—	—	50	8	2	●	2
VC2ESBR0500	5	10	10	—	—	60	10	2	●	2
VC2ESBR0600	6	12	12	—	—	65	12	2	●	2

● : Inventory maintained in Japan.

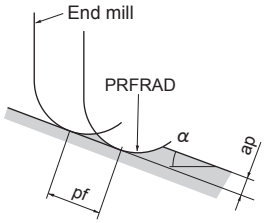
VC2ESB

Ball nose, Extra short cut length, 2 flute, Short shank

RECOMMENDED CUTTING CONDITIONS

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21					Hardened steel (45－55HRC) AISI H13				
R **PRFRAD** (mm)	α≤15°		α>15°		Depth of cut (mm)	α≤15°		α>15°		Depth of cut (mm)
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)		Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	
R 0.5	40000	5600	40000	3200	0.06	40000	5600	40000	3000	0.06
R 0.75	40000	6500	40000	3200	0.09	40000	6500	32000	3200	0.09
R 1	40000	6500	39000	3800	0.11	40000	6500	31000	3500	0.11
R 1.5	40000	7500	27000	4300	0.13	32000	6000	22000	3400	0.13
R 2	32000	7500	20000	3600	0.15	25000	6000	16000	2700	0.15
R 2.5	25000	6000	16000	2900	0.20	20000	5400	13000	2300	0.20
R 3	21000	5800	13000	2600	0.25	17000	4700	10000	2000	0.25
R 4	16000	4500	10000	2000	0.30	13000	3600	8000	1500	0.30
R 5	13000	3600	8000	1700	0.50	10000	2900	6400	1200	0.50
R 6	9000	2500	6000	1300	0.50	7200	2000	4800	1000	0.50
Depth of cut	≤0.2PRFRAD ≤Please refer to the list above for depth of cut. PRFRAD:Radius									

1) α is the inclination angle of the machined surface.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.



Using general machining center or NC milling machine.

Work material	Roughing (Depth of cut ≤ 0.8R) Carbon steel, Cast iron, Alloy steel (－30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21	
R **PRFRAD** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
R 0.5	—	—	—	—
R 1	8800	150	7000	110
R 2	5800	280	4400	230
R 3	4200	340	3100	240
R 4	3200	360	2400	280
R 5	2500	340	1900	260
R 6	2100	300	1600	220
R 8	1500	210	1200	170
R10	1200	170	960	130
R12.5	950	130	770	110

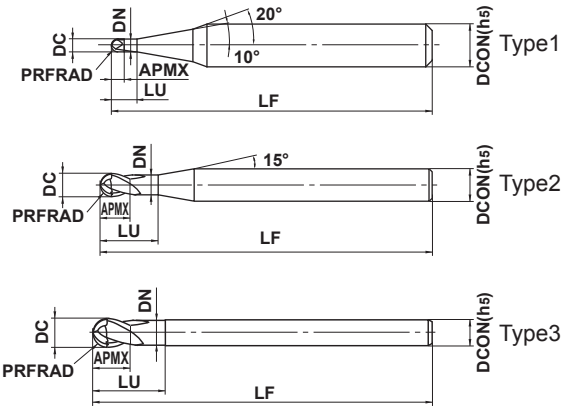
VC2PSB MIRACLE NOVA

Ball nose end mill, Short cut length, 2 flute, High precision

UWC VC 0° 30° PRFRAD<0.5 PRFRAD≥0.5 PRFRAD<0.5 PRFRAD≥0.5

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎		○	○		





R					
0.05≤PRFRAD≤6					
±0.005					
0.1≤DC≤12					
0 - 0.01					
h5	DCON=6	8≤DCON≤10	DCON=12		
	0 - 0.005	0 - 0.006	0 - 0.008		

2 flute ball nose end mill with high precision radial tolerance ±0.005mm.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VC2PSBR0005	0.05	0.1	0.2	—	—	50	6	2	●	1
VC2PSBR0010	0.1	0.2	0.2	0.5	0.17	50	6	2	●	1
VC2PSBR0015	0.15	0.3	0.3	0.8	0.27	50	6	2	●	1
VC2PSBR0020	0.2	0.4	0.4	1	0.36	50	6	2	●	1
VC2PSBR0025	0.25	0.5	0.5	1.3	0.46	50	6	2	●	1
VC2PSBR0030	0.3	0.6	0.6	1.5	0.56	50	6	2	●	1
VC2PSBR0035	0.35	0.7	0.7	1.8	0.66	50	6	2	●	1
VC2PSBR0040	0.4	0.8	0.8	2	0.76	50	6	2	●	1
VC2PSBR0045	0.45	0.9	0.9	2.3	0.86	50	6	2	●	1
VC2PSBR0050	0.5	1	1.5	2.5	0.94	50	6	2	●	2
VC2PSBR0060	0.6	1.2	1.8	3	1.14	50	6	2	●	2
VC2PSBR0070	0.7	1.4	2.1	3.5	1.34	50	6	2	●	2
VC2PSBR0075	0.75	1.5	2.3	3.8	1.44	50	6	2	●	2
VC2PSBR0080	0.8	1.6	2.4	4	1.54	50	6	2	●	2
VC2PSBR0090	0.9	1.8	2.7	4.5	1.74	50	6	2	●	2
VC2PSBR0100	1	2	3	5	1.90	50	6	2	●	2
VC2PSBR0150	1.5	3	4.5	7.5	2.90	70	6	2	●	2
VC2PSBR0200	2	4	6	10	3.90	70	6	2	●	2
VC2PSBR0250	2.5	5	7.5	12.5	4.90	80	6	2	●	2
VC2PSBR0300	3	6	9	15	5.85	80	6	2	●	3
VC2PSBR0400	4	8	12	20	7.85	90	8	2	●	3
VC2PSBR0500	5	10	15	25	9.70	100	10	2	●	3
VC2PSBR0600	6	12	18	30	11.70	110	12	2	●	3

● : Inventory maintained in Japan.

MIRACLE END MILLS

VC2PSBP MIRACLE NOVA

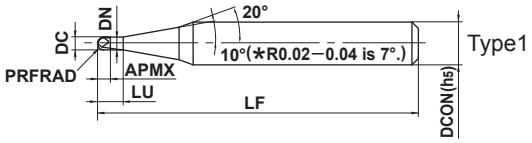
Ball nose end mill, Short cut length, 2 flute, Ultra high precision

UWC VC 0° 30° PRFRAD<0.5 PRFRAD≥0.5 PRFRAD<0.5 PRFRAD≥0.5

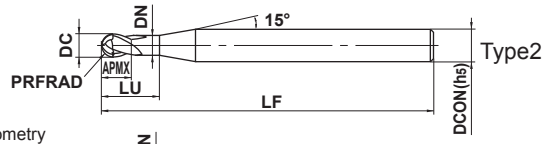
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎		○	○		



Inspection reports regarding the R accuracy of the VC2PSBP are supplied with the tool.

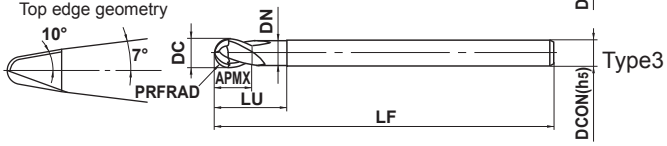


Type1



Type2

R0.02−0.04
Top edge geometry



Type3

R	0.02≤PRFRAD≤6				
	±0.002				
	0.1≤DC≤12				
	0 - 0.01				
h5	DCON=6	8≤DCON≤10	DCON=12		
	0 - 0.005	0 - 0.006	0 - 0.008		

2 flute ball nose end mill with ultra high precision radial tolerance ±0.002mm.

Unit : mm

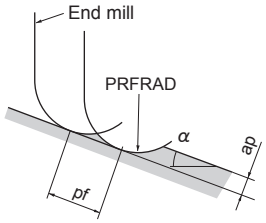
Order Number	PRFRAD	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VC2PSBPR0002	0.02	—	0.06	—	—	50	6	2	□	1
VC2PSBPR0003	0.03	—	0.09	—	—	50	6	2	□	1
VC2PSBPR0004	0.04	—	0.12	—	—	50	6	2	□	1
VC2PSBPR0005	0.05	0.1	0.2	—	—	50	6	2	●	1
VC2PSBPR0010	0.1	0.2	0.2	0.5	0.17	50	6	2	●	1
VC2PSBPR0015	0.15	0.3	0.3	0.8	0.27	50	6	2	●	1
VC2PSBPR0020	0.2	0.4	0.4	1	0.36	50	6	2	●	1
VC2PSBPR0025	0.25	0.5	0.5	1.3	0.46	50	6	2	●	1
VC2PSBPR0030	0.3	0.6	0.6	1.5	0.56	50	6	2	●	1
VC2PSBPR0035	0.35	0.7	0.7	1.8	0.66	50	6	2	●	1
VC2PSBPR0040	0.4	0.8	0.8	2	0.76	50	6	2	●	1
VC2PSBPR0045	0.45	0.9	0.9	2.3	0.86	50	6	2	●	1
VC2PSBPR0050	0.5	1	1.5	2.5	0.94	50	6	2	●	2
VC2PSBPR0060	0.6	1.2	1.8	3	1.14	50	6	2	●	2
VC2PSBPR0070	0.7	1.4	2.1	3.5	1.34	50	6	2	●	2
VC2PSBPR0075	0.75	1.5	2.3	3.8	1.44	50	6	2	●	2
VC2PSBPR0080	0.8	1.6	2.4	4	1.54	50	6	2	●	2
VC2PSBPR0090	0.9	1.8	2.7	4.5	1.74	50	6	2	●	2
VC2PSBPR0100	1	2	3	5	1.9	50	6	2	●	2
VC2PSBPR0150	1.5	3	4.5	7.5	2.9	70	6	2	●	2
VC2PSBPR0200	2	4	6	10	3.9	70	6	2	●	2
VC2PSBPR0250	2.5	5	7.5	12.5	4.9	80	6	2	●	2
VC2PSBPR0300	3	6	9	15	5.85	80	6	2	●	3
VC2PSBPR0400	4	8	12	20	7.85	90	8	2	●	3
VC2PSBPR0500	5	10	15	25	9.7	100	10	2	●	3
VC2PSBPR0600	6	12	18	30	11.7	110	12	2	●	3

ULTRA HIGH PRECISION [±0.002mm]

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

RECOMMENDED CUTTING CONDITIONS

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Hardened steel (45－55HRC) AISI H13			
R **PRFRAD** (mm)	α≤15°		α>15°		α≤15°		α>15°	
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
R0.05	40000	200	—	—	40000	170	—	—
R0.1	40000	600	40000	400	40000	600	40000	400
R0.15	40000	900	40000	600	40000	900	40000	600
R0.2	40000	1000	40000	700	40000	1000	40000	700
R0.25	40000	1500	40000	1000	40000	1500	40000	1000
R0.3	40000	2000	40000	1500	40000	2000	40000	1500
R0.35	40000	2800	40000	2100	40000	2800	37000	1800
R0.4	40000	2800	40000	2100	40000	2800	35000	1800
R0.45	40000	3200	38000	2200	38000	3000	32000	1800
R0.5	40000	3200	35000	2200	35000	3000	30000	1800
R0.75	40000	3600	30000	2300	32000	3000	25000	1800
R1	35000	3500	25000	2200	28000	2800	20000	1700
R1.5	30000	3400	23000	2200	24000	2600	16000	1500
R2	25000	3400	20000	2200	20000	2600	14000	1500
R2.5	23000	3400	17000	2200	18000	2600	12000	1500
R3	20000	3400	15000	2200	16000	2600	10000	1400
R4	15000	3000	12500	2000	10000	2000	7500	1200
R5	12000	3000	10000	2000	8000	2000	6000	1200
R6	10000	2600	8300	1800	6600	1700	5000	1100
Depth of cut	≤0.1PRFRAD ≤0.06PRFRAD PRFRAD:Radius							



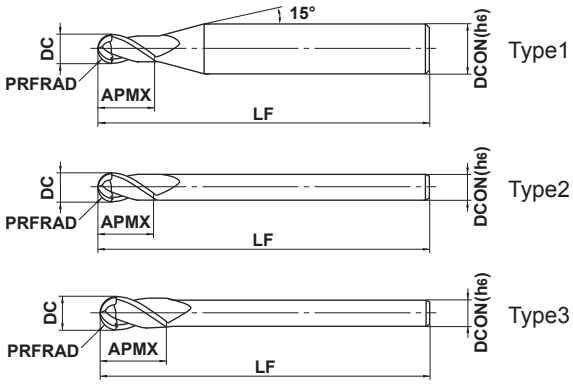
1) α is the inclination angle of the machined surface.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VC2MB

Ball nose end mill, Medium cut length, 2 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	○	○	○		





R	PRFRAD≤6.5	PRFRAD>6.5			
	±0.01	±0.02			
	DC≤12	DC>12			
	0 - 0.020	0 - 0.030			
h6	DCON=3	4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	20≤DCON≤25
	0 - 0.006	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

● 2 flute end mill for general use.

Unit : mm

Order Number	PRFRAD	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VC2MBR0020	0.2	0.4	0.8	38	3	2	●	1
VC2MBR0025	0.25	0.5	1	38	3	2	●	1
VC2MBR0030	0.3	0.6	1.2	38	3	2	●	1
VC2MBR0040	0.4	0.8	1.6	38	3	2	●	1
VC2MBR0050	0.5	1	2.5	40	4	2	●	1
VC2MBR0060	0.6	1.2	3	40	4	2	●	1
VC2MBR0070	0.7	1.4	3	40	4	2	●	1
VC2MBR0075	0.75	1.5	4	40	4	2	●	1
VC2MBR0080	0.8	1.6	4	40	4	2	●	1
VC2MBR0090	0.9	1.8	5	40	4	2	●	1
VC2MBR0100	1	2	6	60	6	2	●	1
VC2MBR0150	1.5	3	8	70	6	2	●	1
VC2MBR0200	2	4	8	70	6	2	●	1
VC2MBR0250	2.5	5	12	80	6	2	●	1
VC2MBR0300	3	6	12	80	6	2	●	2
VC2MBR0350	3.5	7	14	90	8	2	●	1
VC2MBR0400	4	8	14	90	8	2	●	2
VC2MBR0450	4.5	9	18	100	10	2	●	1
VC2MBR0500	5	10	18	100	10	2	●	2
VC2MBR0600	6	12	22	110	12	2	●	2
VC2MBR0700	7	14	26	120	12	2	●	3
VC2MBR0750	7.5	15	30	140	16	2	●	1
VC2MBR0800	8	16	30	140	16	2	●	2
VC2MBR0900	9	18	34	140	16	2	●	3
VC2MBR1000	10	20	38	160	20	2	●	2
VC2MBR1250	12.5	25	55	180	25	2	●	2

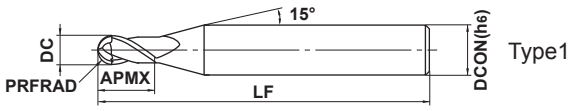
● : Inventory maintained in Japan.

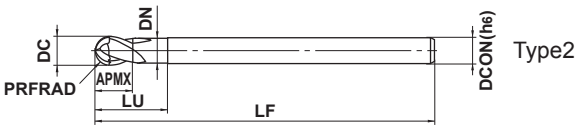
VC2MDB

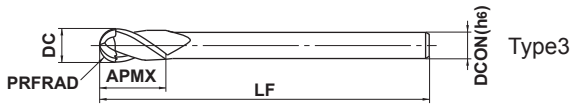
Ball nose, Medium cut length, 2 flute, Strong geometry type

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	○	○	○		









R

PRFRAD≤6.5	PRFRAD>6.5			
±0.01	±0.02			

DC

DC≤12	DC>12			
0 - 0.020	0 - 0.030			

h6

DCON=3	4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	20≤DCON≤25
0 - 0.006	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

● 2 flute ball nose end mill with high edge strength resistant to chipping.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VC2MDBR0150S03	1.5	3	8	14	2.9	70	3	2	●	2
VC2MDB**R0150**	1.5	3	8	—	—	70	6	2	●	1
VC2MDB**R0200S04**	2	4	8	14	3.9	70	4	2	●	2
VC2MDB**R0200**	2	4	8	—	—	70	6	2	●	1
VC2MDB**R0250**	2.5	5	12	—	—	80	6	2	●	1
VC2MDB**R0300**	3	6	12	22	5.85	80	6	2	●	2
VC2MDB**R0350**	3.5	7	14	—	—	90	8	2	●	1
VC2MDB**R0400**	4	8	14	27	7.85	90	8	2	●	2
VC2MDB**R0500**	5	10	18	31	9.7	100	10	2	●	2
VC2MDB**R0600**	6	12	22	35	11.7	110	12	2	●	2
VC2MDB**R0700**	7	14	26	—	—	120	12	2	●	3
VC2MDB**R0800**	8	16	30	50	15.5	140	16	2	●	2
VC2MDB**R0900**	9	18	34	—	—	140	16	2	●	3
VC2MDB**R1000**	10	20	38	58	19.5	160	20	2	●	2
VC2MDB**R1250**	12.5	25	55	75	24.5	180	25	2	●	2

VC2MB

Ball nose end mill, Medium cut length, 2 flute

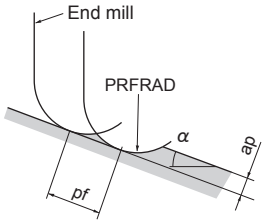
VC2MDB

Ball nose, Medium cut length, 2 flute, Strong geometry type

RECOMMENDED CUTTING CONDITIONS

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21					Hardened steel (45－55HRC) AISI H13				
R **PRFRAD** (mm)	α≤15°		α>15°		Depth of cut (mm)	α≤15°		α>15°		Depth of cut (mm)
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)		Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	
R 0.5	40000	5600	40000	3200	0.06	40000	5600	40000	3000	0.06
R 0.75	40000	6500	40000	3200	0.09	40000	6500	32000	3200	0.09
R 1	40000	6500	39000	3800	0.11	40000	6500	31000	3500	0.11
R 1.5	40000	7500	27000	4300	0.13	32000	6000	22000	3400	0.13
R 2	32000	7500	20000	3600	0.15	25000	6000	16000	2700	0.15
R 2.5	25000	6000	16000	2900	0.20	20000	5400	13000	2300	0.20
R 3	21000	5800	13000	2600	0.25	17000	4700	10000	2000	0.25
R 4	16000	4500	10000	2000	0.30	13000	3600	8000	1500	0.30
R 5	13000	3600	8000	1700	0.50	10000	2900	6400	1200	0.50
R 6	9000	2500	6000	1300	0.50	7200	2000	4800	1000	0.50
Depth of cut	≤0.2PRFRAD ≤Please refer to the list above for depth of cut. PRFRAD:Radius									

1) α is the inclination angle of the machined surface.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.



Using general machining center or NC milling machine.

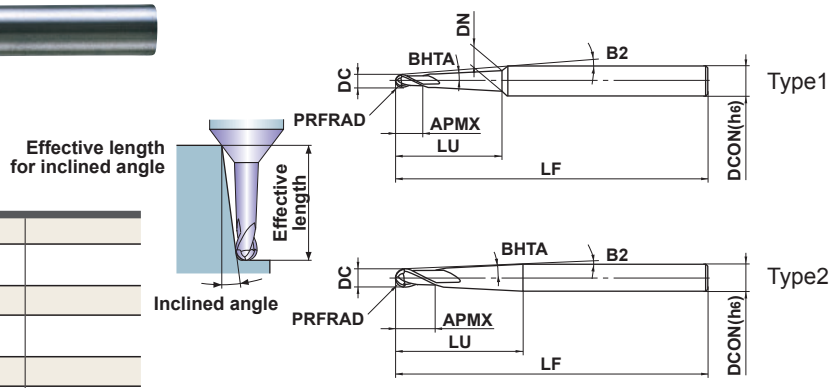
	Roughing (Depth of cut ≤ 0.8R)			
Work material	Carbon steel, Cast iron, Alloy steel (－30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21	
R **PRFRAD** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
R 0.5	—	—	—	—
R 1	8800	150	7000	110
R 2	5800	280	4400	230
R 3	4200	340	3100	240
R 4	3200	360	2400	280
R 5	2500	340	1900	260
R 6	2100	300	1600	220
R 8	1500	210	1200	170
R10	1200	170	960	130
R12.5	950	130	770	110

VCXB

Ball nose taper end mill, Medium cut length, Taper neck

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	○	○	○		





R	0.5≤PRFRAD≤6				
	±0.01				
	1≤DC≤12				
	0 - 0.020				
h6	DCON=6	8≤DCON≤10	12≤DCON≤16		
	0 - 0.008	0 - 0.009	0 - 0.011		

● 2 flute taper end mill with taper neck.

Unit : mm

Order Number	PRFRAD	DC	BHTA	APMX	LU	B2	DN	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle 1°	2°	3°
VCXBR0050T0100L016	0.5	1	1°	2	16	6.6°	1.38	50	6	2	●	1	16.2	17	18
VCXB**R0050T0100L021**	0.5	1	1°	2	21	5.4°	1.56	60	6	2	●	1	21.2	22.3	23.5
VCXB**R0050T0100L026**	0.5	1	1°	2	26	4.6°	1.73	70	6	2	●	1	26.2	27.6	29.1
VCXB**R0050T0130**	0.5	1	1°30'	2	23	5.1°	1.97	60	6	2	●	1	—	23.9	25.2
VCXB**R0050T0300**	0.5	1	3°	2	42	3.4°	5.08	80	6	2	●	1	—	—	42.4
VCXB**R0050T0500**	0.5	1	5°	2	23	5.8°	4.46	60	6	2	●	1	—	—	—
VCXB**R0100T0100L021**	1	2	1°	4	21	4.6°	2.43	50	6	2	●	1	21.3	22.4	23.6
VCXB**R0100T0100L031**	1	2	1°	4	31	3.4°	2.78	60	6	2	●	1	31.3	33	34.8
VCXB**R0100T0100L041**	1	2	1°	4	41	2.7°	3.13	70	6	2	●	1	41.3	43.5	*
VCXB**R0100T0130**	1	2	1°30'	4	23	4.4°	2.8	60	6	2	●	1	—	24.1	25.4
VCXB**R0100T0300**	1	2	3°	4	41	2.9°	5.71	80	6	2	●	1	—	—	*
VCXB**R0100T0500**	1	2	5°	4	23	4.9°	5.02	60	6	2	●	1	—	—	—
VCXB**R0150T0100L031**	1.5	3	1°	6	31	2.7°	3.71	60	6	2	●	1	31.4	33	*
VCXB**R0150T0100L041**	1.5	3	1°	6	41	2.1°	4.06	70	6	2	●	1	41.4	43.5	*
VCXB**R0150T0100L051**	1.5	3	1°	6	51	1.7°	4.41	80	6	2	●	1	51.4	*	*
VCXB**R0150T0130**	1.5	3	1°30'	6	52	1.7°	5.21	90	6	2	●	1	—	*	*
VCXB**R0150T0300**	1.5	3	3°	6	32	2.8°	5.56	70	6	2	●	1	—	—	*
VCXB**R0200T0100L036**	2	4	1°	8	36	1.7°	4.81	70	6	2	●	1	36.5	*	*
VCXB**R0200T0100L046**	2	4	1°	8	46	1.3°	5.16	80	6	2	●	1	46.5	*	*
VCXB**R0200T0100L060**	2	4	1°	8	60	1°	5.65	90	6	2	●	1	60.5	*	*
VCXB**R0200T0130**	2	4	1°30'	8	49	1.3°	5.95	90	6	2	●	1	—	*	*
VCXB**R0200T0300**	2	4	3°	8	28	2.2°	—	70	6	2	●	2	—	—	*
VCXB**R0250T0100L036**	2.5	5	1°	10	36	0.9°	5.71	80	6	2	●	1	*	*	*
VCXB**R0250T0100L065**	2.5	5	1°	10	65	1.4°	6.72	110	8	2	●	1	65.6	*	*
VCXB**R0250T0130**	2.5	5	1°30'	10	61	1.5°	7.42	110	8	2	●	1	—	*	*
VCXB**R0250T0300**	2.5	5	3°	10	41	2.3°	—	90	8	2	●	2	—	—	*
VCXB**R0300T0100L051**	3	6	1°	12	51	1.2°	7.11	90	8	2	●	1	51.8	*	*
VCXB**R0300T0100L065**	3	6	1°	12	65	1°	7.6	110	8	2	●	1	65.8	*	*
VCXB**R0300T0100L092**	3	6	1°	12	92	1.3°	8.54	140	10	2	●	1	92.8	*	*
VCXB**R0300T0130**	3	6	1°30'	12	53	1.2°	7.85	110	8	2	●	1	—	*	*
VCXB**R0300T0300**	3	6	3°	12	34	1.9°	—	90	8	2	●	2	—	—	*
VCXB**R0400T0100L068**	4	8	1°	14	68	0.9°	9.64	110	10	2	●	1	*	*	*
VCXB**R0400T0100L092**	4	8	1°	14	92	1.3°	10.47	140	12	2	●	1	92.8	*	*
VCXB**R0400T0130**	4	8	1°30'	14	55	1.2°	9.85	120	10	2	●	1	—	*	*

* No interference

● : Inventory maintained in Japan.

VCXB

Ball nose taper end mill, Medium cut length, Taper neck

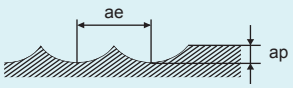
Unit : mm

Order Number	PRFRAD	DC	BHTA	APMX	LU	B2	DN	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle		
													1°	2°	3°
VCXBR0400T0300	4	8	3°	14	36	1.8°	—	100	10	2	●	2	—	—	*
VCXBR0500T0100L070	5	10	1°	18	70	0.9°	11.76	130	12	2	●	1	*	*	*
VCXBR0500T0100L100	5	10	1°	18	100	1.8°	12.8	160	16	2	●	1	100.7	*	*
VCXBR0500T0130	5	10	1°30'	18	59	1.1°	—	130	12	2	●	2	—	*	*
VCXBR0500T0300	5	10	3°	18	40	1.7°	—	110	12	2	●	2	—	—	*
VCXBR0600T0100L070	6	12	1°	22	70	1.8°	13.62	140	16	2	●	1	70.9	*	*
VCXBR0600T0100L100	6	12	1°	22	100	1.2°	14.66	160	16	2	●	1	100.9	*	*
VCXBR0600T0130	6	12	1°30'	22	83	1.5°	15.08	160	16	2	●	1	—	*	*
VCXBR0600T0300	6	12	3°	22	63	2.1°	—	140	16	2	●	2	—	—	*

* No interference

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material					Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Hardened steel (45—55HRC) AISI H13	
R **PRFRAD** (mm)	Taper angle one side **DN**	Neck length **LU** (mm)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
R0.5	**1°**	**16**	**0.02**	**0.1**	22000	530	12000	230
	1°	**21**	**0.01**					
	1°	**26**	**0.01**					
	1°30'	**23**	**0.02**					
	3°	**42**	**0.05**					
	5°	**23**	**0.05**					
R1	**1°**	**21**	**0.05**	**0.2**	18000	570	10000	260
	1°	**31**	**0.04**					
	1°	**41**	**0.03**					
	1°30'	**23**	**0.1**					
	3°	**41**	**0.1**					
	5°	**23**	**0.1**					
R2	**1°**	**36**	**0.2**	**0.8**	14000	670	6000	200
	1°	**46**	**0.15**					
	1°	**60**	**0.1**					
	1°30'	**49**	**0.2**					
	3°	**28**	**0.2**					
R3	**1°**	**51**	**0.3**	**1.2**	10000	840	5000	220
	1°	**65**	**0.2**					
	1°	**92**	**0.1**					
	1°30'	**53**	**0.3**					
	3°	**34**	**0.3**					
R4	**1°30'**	**55**	**0.4**	**1.6**	8000	840	4000	270
	3°	**36**	**0.4**					
R5	**1°**	**70**	**0.4**	**2**	6000	840	3000	310
	1°	**100**	**0.3**					
	1°30'	**59**	**0.5**					
	3°	**40**	**0.5**					
R6	**1°**	**70**	**0.6**	**2.4**	5000	900	2500	340
	1°	**100**	**0.4**					
	1°30'	**83**	**0.6**					
	3°	**63**	**0.6**					
Depth of cut								

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

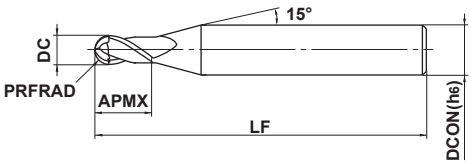
CRN END MILLS

CRN2MB

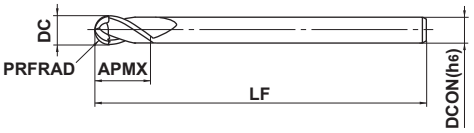
Ball nose, Medium cut length, 2 flute, For copper electrodes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
						◎	○





Type1



Type2

R

0.2≤PRFRAD≤6				
±0.01				

0.4≤DC≤12				
0 - 0.02				

h6

DCON=3	4≤DCON≤6	8≤DCON≤10	DCON=12	
0 - 0.006	0 - 0.008	0 - 0.009	0 - 0.011	

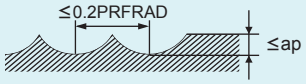
● 2 flute ball nose end mill with CRN coating for copper electrode machining.

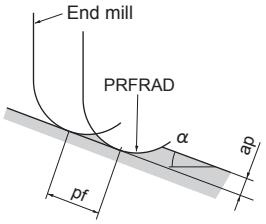
Unit : mm

Order Number	PRFRAD	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
CRN2MBR0020S04	0.2	0.4	0.8	45	4	2	●	1
CRN2MB**R0020S06**	0.2	0.4	0.8	50	6	2	●	1
CRN2MB**R0030S04**	0.3	0.6	1.2	45	4	2	●	1
CRN2MB**R0030S06**	0.3	0.6	1.2	50	6	2	●	1
CRN2MB**R0040S04**	0.4	0.8	1.6	45	4	2	●	1
CRN2MB**R0040S06**	0.4	0.8	1.6	50	6	2	●	1
CRN2MB**R0050S04**	0.5	1	2.5	45	4	2	●	1
CRN2MB**R0050S06**	0.5	1	2.5	50	6	2	●	1
CRN2MB**R0075S04**	0.75	1.5	4	45	4	2	●	1
CRN2MB**R0075S06**	0.75	1.5	4	50	6	2	●	1
CRN2MB**R0100S06**	1	2	6	50	6	2	●	1
CRN2MB**R0125S06**	1.25	2.5	6	50	6	2	●	1
CRN2MB**R0150S03**	1.5	3	8	70	3	2	●	2
CRN2MB**R0150S06**	1.5	3	8	70	6	2	●	1
CRN2MB**R0175S06**	1.75	3.5	8	70	6	2	●	1
CRN2MB**R0200S04**	2	4	8	70	4	2	●	2
CRN2MB**R0200S06**	2	4	8	70	6	2	●	1
CRN2MB**R0250S06**	2.5	5	12	80	6	2	●	1
CRN2MB**R0300S06**	3	6	12	80	6	2	●	2
CRN2MB**R0400S08**	4	8	14	90	8	2	●	2
CRN2MB**R0500S10**	5	10	18	100	10	2	●	2
CRN2MB**R0600S12**	6	12	22	110	12	2	●	2

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material	Copper, Copper alloys				
R **PRFRAD** (mm)	$\alpha \leq 15°$		$\alpha > 15°$		Depth of cut ap(mm)
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	
R0.2	40000	1600	40000	1200	0.02
R0.3	40000	3200	40000	1600	0.03
R0.4	40000	6400	40000	2400	0.05
R0.5	40000	8000	40000	3200	0.06
R0.75	40000	9600	40000	4000	0.09
R1	40000	9600	39000	4700	0.11
R1.25	40000	12000	30000	4500	0.12
R1.5	40000	12000	27000	4300	0.13
R2	32000	11000	20000	3600	0.15
R2.5	25000	9000	16000	2900	0.20
R3	21000	8400	13000	2600	0.25
R4	16000	6400	10000	2000	0.30
R5	13000	5200	8000	1700	0.50
R6	9000	3600	6000	1300	0.50
Depth of cut	 PRFRAD:Radius				



1) α is the inclination angle of the machined surface.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) Water-soluble cutting fluid is recommended.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

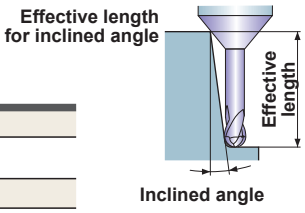
CRN COATED END MILLS

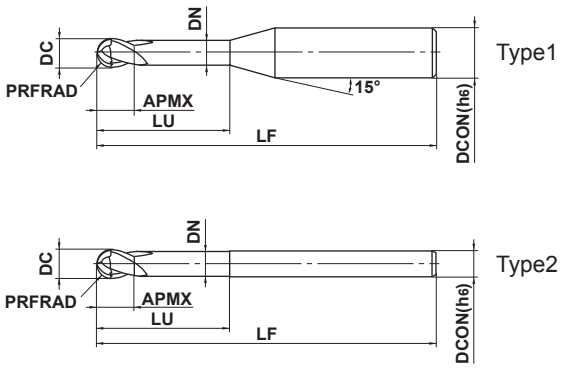
CRN2XLB

Ball nose, Medium cut length, 2 flute, Long neck, For copper electrodes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
						◎	○







R			
0.1≤PRFRAD≤3			
±0.01			
0.2≤DC≤6			
0 - 0.02			
4≤DCON≤6			
0 - 0.008			

● 2 flute long neck ball nose end mill with CRN coating for copper electrode machining.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
											30'	1°	2°	3°
CRN2XLBR0010N005S04	0.1	0.2	0.2	0.5	0.17	50	4	2	●	1	0.5	0.5	0.6	0.6
CRN2XLBR0010N005S06	0.1	0.2	0.2	0.5	0.17	50	6	2	●	1	0.5	0.5	0.6	0.6
CRN2XLBR0010N010S04	0.1	0.2	0.2	1	0.17	50	4	2	●	1	1	1.1	1.2	1.3
CRN2XLBR0010N010S06	0.1	0.2	0.2	1	0.17	50	6	2	●	1	1	1.1	1.2	1.3
CRN2XLBR0010N015S04	0.1	0.2	0.2	1.5	0.17	50	4	2	●	1	1.5	1.6	1.7	1.9
CRN2XLBR0010N015S06	0.1	0.2	0.2	1.5	0.17	50	6	2	●	1	1.5	1.6	1.7	1.9
CRN2XLBR0015N010S04	0.15	0.3	0.3	1	0.27	50	4	2	●	1	1	1.1	1.2	1.3
CRN2XLBR0015N010S06	0.15	0.3	0.3	1	0.27	50	6	2	●	1	1	1.1	1.2	1.3
CRN2XLBR0015N015S04	0.15	0.3	0.3	1.5	0.27	50	4	2	●	1	1.5	1.6	1.7	1.9
CRN2XLBR0015N015S06	0.15	0.3	0.3	1.5	0.27	50	6	2	●	1	1.5	1.6	1.7	1.9
CRN2XLBR0015N020S04	0.15	0.3	0.3	2	0.27	50	4	2	●	1	2.1	2.2	2.3	2.5
CRN2XLBR0015N020S06	0.15	0.3	0.3	2	0.27	50	6	2	●	1	2.1	2.2	2.3	2.5
CRN2XLBR0020N010S04	0.2	0.4	0.4	1	0.36	50	4	2	●	1	1	1	1.1	1.2
CRN2XLBR0020N010S06	0.2	0.4	0.4	1	0.36	50	6	2	●	1	1	1	1.1	1.2
CRN2XLBR0020N015S04	0.2	0.4	0.4	1.5	0.36	50	4	2	●	1	1.5	1.6	1.7	1.8
CRN2XLBR0020N015S06	0.2	0.4	0.4	1.5	0.36	50	6	2	●	1	1.5	1.6	1.7	1.8
CRN2XLBR0020N020S04	0.2	0.4	0.4	2	0.36	50	4	2	●	1	2	2.1	2.3	2.5
CRN2XLBR0020N020S06	0.2	0.4	0.4	2	0.36	50	6	2	●	1	2	2.1	2.3	2.5
CRN2XLBR0020N030S04	0.2	0.4	0.4	3	0.36	50	4	2	●	1	3.1	3.2	3.4	3.7
CRN2XLBR0020N030S06	0.2	0.4	0.4	3	0.36	50	6	2	●	1	3.1	3.2	3.4	3.7
CRN2XLBR0025N015S04	0.25	0.5	0.5	1.5	0.46	50	4	2	●	1	1.5	1.6	1.7	1.8
CRN2XLBR0025N015S06	0.25	0.5	0.5	1.5	0.46	50	6	2	●	1	1.5	1.6	1.7	1.8
CRN2XLBR0025N020S04	0.25	0.5	0.5	2	0.46	50	4	2	●	1	2	2.1	2.3	2.4
CRN2XLBR0025N020S06	0.25	0.5	0.5	2	0.46	50	6	2	●	1	2	2.1	2.3	2.4
CRN2XLBR0025N030S04	0.25	0.5	0.5	3	0.46	50	4	2	●	1	3.1	3.2	3.4	3.7
CRN2XLBR0025N030S06	0.25	0.5	0.5	3	0.46	50	6	2	●	1	3.1	3.2	3.4	3.7
CRN2XLBR0025N040S04	0.25	0.5	0.5	4	0.46	50	4	2	●	1	4.1	4.3	4.6	4.9
CRN2XLBR0025N040S06	0.25	0.5	0.5	4	0.46	50	6	2	●	1	4.1	4.3	4.6	4.9
CRN2XLBR0025N060S04	0.25	0.5	0.5	6	0.46	50	4	2	●	1	6.2	6.4	6.9	7.4
CRN2XLBR0025N060S06	0.25	0.5	0.5	6	0.46	50	6	2	●	1	6.2	6.4	6.9	7.4
CRN2XLBR0025N080S04	0.25	0.5	0.5	8	0.46	50	4	2	●	1	8.3	8.5	9.2	9.9
CRN2XLBR0025N080S06	0.25	0.5	0.5	8	0.46	50	6	2	●	1	8.3	8.5	9.2	9.9
CRN2XLBR0025N100S04	0.25	0.5	0.5	10	0.46	50	4	2	●	1	10.3	10.7	11.5	12.4
CRN2XLBR0025N100S06	0.25	0.5	0.5	10	0.46	50	6	2	●	1	10.3	10.7	11.5	12.4

● : Inventory maintained in Japan.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
											30'	1°	2°	3°
CRN2XLBR0030N020S04	0.3	0.6	0.6	2	0.56	50	4	2	●	1	2.1	2.2	2.3	2.5
CRN2XLBR0030N020S06	0.3	0.6	0.6	2	0.56	50	6	2	●	1	2.1	2.2	2.3	2.5
CRN2XLBR0030N040S04	0.3	0.6	0.6	4	0.56	50	4	2	●	1	4.2	4.3	4.6	5
CRN2XLBR0030N040S06	0.3	0.6	0.6	4	0.56	50	6	2	●	1	4.2	4.3	4.6	5
CRN2XLBR0030N060S04	0.3	0.6	0.6	6	0.56	50	4	2	●	1	6.3	6.5	6.9	7.5
CRN2XLBR0030N060S06	0.3	0.6	0.6	6	0.56	50	6	2	●	1	6.3	6.5	6.9	7.5
CRN2XLBR0030N080S04	0.3	0.6	0.6	8	0.56	50	4	2	●	1	8.3	8.6	9.2	10
CRN2XLBR0030N080S06	0.3	0.6	0.6	8	0.56	50	6	2	●	1	8.3	8.6	9.2	10
CRN2XLBR0030N100S04	0.3	0.6	0.6	10	0.56	50	4	2	●	1	10.4	10.8	11.5	12.5
CRN2XLBR0030N100S06	0.3	0.6	0.6	10	0.56	50	6	2	●	1	10.4	10.8	11.5	12.5
CRN2XLBR0040N020S04	0.4	0.8	0.8	2	0.76	50	4	2	●	1	2.1	2.2	2.3	2.5
CRN2XLBR0040N020S06	0.4	0.8	0.8	2	0.76	50	6	2	●	1	2.1	2.2	2.3	2.5
CRN2XLBR0040N040S04	0.4	0.8	0.8	4	0.76	50	4	2	●	1	4.2	4.3	4.6	5
CRN2XLBR0040N040S06	0.4	0.8	0.8	4	0.76	50	6	2	●	1	4.2	4.3	4.6	5
CRN2XLBR0040N060S04	0.4	0.8	0.8	6	0.76	50	4	2	●	1	6.3	6.5	6.9	7.5
CRN2XLBR0040N060S06	0.4	0.8	0.8	6	0.76	50	6	2	●	1	6.3	6.5	6.9	7.5
CRN2XLBR0040N080S04	0.4	0.8	0.8	8	0.76	50	4	2	●	1	8.3	8.6	9.2	10
CRN2XLBR0040N080S06	0.4	0.8	0.8	8	0.76	50	6	2	●	1	8.3	8.6	9.2	10
CRN2XLBR0040N100S04	0.4	0.8	0.8	10	0.76	50	4	2	●	1	10.4	10.8	11.5	12.4
CRN2XLBR0040N100S06	0.4	0.8	0.8	10	0.76	50	6	2	●	1	10.4	10.8	11.5	12.4
CRN2XLBR0050N030S04	0.5	1	1	3	0.94	50	4	2	●	1	3.2	3.3	3.6	3.9
CRN2XLBR0050N030S06	0.5	1	1	3	0.94	50	6	2	●	1	3.2	3.3	3.6	3.9
CRN2XLBR0050N040S04	0.5	1	1	4	0.94	50	4	2	●	1	4.2	4.4	4.8	5.2
CRN2XLBR0050N040S06	0.5	1	1	4	0.94	50	6	2	●	1	4.2	4.4	4.8	5.2
CRN2XLBR0050N050S04	0.5	1	1	5	0.94	50	4	2	●	1	5.3	5.5	6	6.4
CRN2XLBR0050N050S06	0.5	1	1	5	0.94	50	6	2	●	1	5.3	5.5	6	6.4
CRN2XLBR0050N060S04	0.5	1	1	6	0.94	50	4	2	●	1	6.3	6.6	7.1	7.7
CRN2XLBR0050N060S06	0.5	1	1	6	0.94	50	6	2	●	1	6.3	6.6	7.1	7.7
CRN2XLBR0050N070S04	0.5	1	1	7	0.94	50	4	2	●	1	7.4	7.7	8.3	8.9
CRN2XLBR0050N070S06	0.5	1	1	7	0.94	50	6	2	●	1	7.4	7.7	8.3	8.9
CRN2XLBR0050N080S04	0.5	1	1	8	0.94	50	4	2	●	1	8.4	8.8	9.4	10.2
CRN2XLBR0050N080S06	0.5	1	1	8	0.94	50	6	2	●	1	8.4	8.8	9.4	10.2
CRN2XLBR0050N100S04	0.5	1	1	10	0.94	50	4	2	●	1	10.5	10.9	11.7	12.6
CRN2XLBR0050N100S06	0.5	1	1	10	0.94	50	6	2	●	1	10.5	10.9	11.7	12.6
CRN2XLBR0050N120S04	0.5	1	1	12	0.94	50	4	2	●	1	12.6	13.1	14	15.1
CRN2XLBR0050N120S06	0.5	1	1	12	0.94	50	6	2	●	1	12.6	13.1	14	15.1
CRN2XLBR0050N140S04	0.5	1	1	14	0.94	50	4	2	●	1	14.7	15.2	16.3	17.6
CRN2XLBR0050N140S06	0.5	1	1	14	0.94	55	6	2	●	1	14.7	15.2	16.3	17.6
CRN2XLBR0050N160S04	0.5	1	1	16	0.94	55	4	2	●	1	16.8	17.4	18.6	20.1
CRN2XLBR0050N160S06	0.5	1	1	16	0.94	55	6	2	●	1	16.8	17.4	18.6	20.1
CRN2XLBR0050N180S04	0.5	1	1	18	0.94	55	4	2	●	1	18.9	19.5	20.9	22.6
CRN2XLBR0050N180S06	0.5	1	1	18	0.94	60	6	2	●	1	18.9	19.5	20.9	22.6
CRN2XLBR0050N200S04	0.5	1	1	20	0.94	55	4	2	●	1	20.9	21.6	23.2	25.1
CRN2XLBR0050N200S06	0.5	1	1	20	0.94	60	6	2	●	1	20.9	21.6	23.2	25.1
CRN2XLBR0075N080S04	0.75	1.5	1.5	8	1.44	50	4	2	●	1	8.4	8.8	9.4	10.1
CRN2XLBR0075N080S06	0.75	1.5	1.5	8	1.44	50	6	2	●	1	8.4	8.8	9.4	10.1
CRN2XLBR0075N100S04	0.75	1.5	1.5	10	1.44	50	4	2	●	1	10.5	10.9	11.7	12.6
CRN2XLBR0075N100S06	0.75	1.5	1.5	10	1.44	50	6	2	●	1	10.5	10.9	11.7	12.6
CRN2XLBR0075N120S04	0.75	1.5	1.5	12	1.44	50	4	2	●	1	12.6	13.1	14	15.1
CRN2XLBR0075N120S06	0.75	1.5	1.5	12	1.44	50	6	2	●	1	12.6	13.1	14	15.1
CRN2XLBR0075N140S04	0.75	1.5	1.5	14	1.44	50	4	2	●	1	14.7	15.2	16.3	17.6
CRN2XLBR0075N140S06	0.75	1.5	1.5	14	1.44	55	6	2	●	1	14.7	15.2	16.3	17.6

CRN COATED END MILLS

CRN2XLB

Ball nose, Medium cut length, 2 flute, Long neck, For copper electrodes

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
											30'	1°	2°	3°
CRN2XLBR0075N160S04	0.75	1.5	1.5	16	1.44	55	4	2	●	1	16.8	17.3	18.6	20
CRN2XLBR0075N160S06	0.75	1.5	1.5	16	1.44	55	6	2	●	1	16.8	17.3	18.6	20
CRN2XLBR0075N180S04	0.75	1.5	1.5	18	1.44	55	4	2	●	1	18.8	19.5	20.9	22.5
CRN2XLBR0075N180S06	0.75	1.5	1.5	18	1.44	60	6	2	●	1	18.8	19.5	20.9	22.5
CRN2XLBR0075N200S04	0.75	1.5	1.5	20	1.44	55	4	2	●	1	20.9	21.6	23.2	*
CRN2XLBR0075N200S06	0.75	1.5	1.5	20	1.44	60	6	2	●	1	20.9	21.6	23.2	25
CRN2XLBR0100N080S04	1	2	2	8	1.90	50	4	2	●	1	8.3	8.7	9.2	9.9
CRN2XLBR0100N080S06	1	2	2	8	1.90	50	6	2	●	1	8.3	8.7	9.2	9.9
CRN2XLBR0100N100S04	1	2	2	10	1.90	50	4	2	●	1	10.4	10.8	11.5	12.4
CRN2XLBR0100N100S06	1	2	2	10	1.90	50	6	2	●	1	10.4	10.8	11.5	12.4
CRN2XLBR0100N120S04	1	2	2	12	1.90	50	4	2	●	1	12.5	12.9	13.8	14.9
CRN2XLBR0100N120S06	1	2	2	12	1.90	50	6	2	●	1	12.5	12.9	13.8	14.9
CRN2XLBR0100N140S04	1	2	2	14	1.90	50	4	2	●	1	14.6	15.1	16.1	17.4
CRN2XLBR0100N140S06	1	2	2	14	1.90	55	6	2	●	1	14.6	15.1	16.1	17.4
CRN2XLBR0100N160S04	1	2	2	16	1.90	55	4	2	●	1	16.7	17.2	18.4	19.9
CRN2XLBR0100N160S06	1	2	2	16	1.90	55	6	2	●	1	16.7	17.2	18.4	19.9
CRN2XLBR0100N200S04	1	2	2	20	1.90	60	4	2	●	1	20.8	21.5	23	*
CRN2XLBR0100N200S06	1	2	2	20	1.90	60	6	2	●	1	20.8	21.5	23	24.8
CRN2XLBR0100N250S06	1	2	2	25	1.90	65	6	2	●	1	26	26.8	28.8	31
CRN2XLBR0100N300S06	1	2	2	30	1.90	70	6	2	●	1	31.1	32.2	34.5	37.3
CRN2XLBR0150N160S06	1.5	3	3	16	2.90	60	6	2	●	1	16.6	17.2	18.4	19.7
CRN2XLBR0150N250S06	1.5	3	3	25	2.90	70	6	2	●	1	26	26.8	28.7	*
CRN2XLBR0150N350S06	1.5	3	3	35	2.90	80	6	2	●	1	36.3	37.5	40.2	*
CRN2XLBR0200N160S06	2	4	4	16	3.90	70	6	2	●	1	16.6	17.1	18.3	19.6
CRN2XLBR0200N200S06	2	4	4	20	3.90	70	6	2	●	1	20.8	21.4	22.9	*
CRN2XLBR0200N300S06	2	4	4	30	3.90	70	6	2	●	1	31.1	32.1	*	*
CRN2XLBR0200N400S06	2	4	4	40	3.90	90	6	2	●	1	41.4	42.8	*	*
CRN2XLBR0200N500S06	2	4	4	50	3.90	100	6	2	●	1	51.8	53.5	*	*
CRN2XLBR0250N200S06	2.5	5	5	20	4.90	70	6	2	●	1	20.7	21.4	*	*
CRN2XLBR0250N300S06	2.5	5	5	30	4.90	80	6	2	●	1	31.1	*	*	*
CRN2XLBR0300N300S06	3	6	6	30	5.85	80	6	2	●	1	*	*	*	*
CRN2XLBR0300N500S06	3	6	6	50	5.85	100	6	2	●	1	*	*	*	*

* No interference

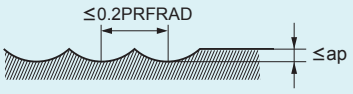
● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material		Copper, Copper alloys		
R PRFRAD (mm)	Neck length LU (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
R0.1	0.5	40000	800	0.003
	1.0	40000	600	0.002
	1.5	40000	400	0.001
R0.15	1	40000	1200	0.007
	2	40000	800	0.003
R0.2	1	40000	2000	0.015
	2	40000	1300	0.01
	3	40000	800	0.005
R0.25	2	40000	2000	0.02
	4	40000	1200	0.01
	6	36000	600	0.006
	10	26000	200	0.002
R0.3	2	40000	3200	0.03
	6	40000	1200	0.008
	10	30000	500	0.003
R0.4	4	40000	4000	0.02
	6	40000	2500	0.02
	10	30000	700	0.008
R0.5	4	40000	6400	0.05
	6	40000	4800	0.03
	8	40000	3000	0.02
	10	33000	2000	0.01
	16	18000	500	0.008
	20	13000	250	0.005

Work material		Copper, Copper alloys		
R PRFRAD (mm)	Neck length LU (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap(mm)
R0.75	8	40000	8000	0.07
	12	35000	4500	0.04
	16	20000	2000	0.03
	20	12000	900	0.02
R1	8	40000	9600	0.10
	10	40000	6400	0.08
	12	40000	6000	0.08
	16	30000	3000	0.05
	20	20000	2000	0.04
	30	10000	800	0.02
R1.5	16	40000	12000	0.10
	25	25000	6000	0.08
	35	6000	700	0.06
R2	16	32000	11000	0.15
	20	32000	9000	0.15
	30	20000	4500	0.10
	40	15000	3000	0.08
	50	8000	1000	0.05
R2.5	20	25000	9500	0.20
	30	20000	3300	0.15
R3	30	21000	8400	0.20
	50	20000	3000	0.15

Depth of cut



PRFRAD:Radius

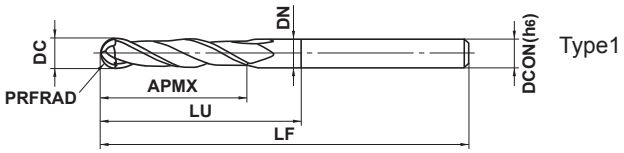
1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Water-soluble cutting fluid is recommended.
3) Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

DF2MB

Ball nose, Medium cut length, 2 flute, For graphite

Aluminium Alloy	Copper Alloy	Graphite	GFRP CFRP	Machineable Ceramics
○	◎	◎	○	○





Type1

R	3≤PRFRAD≤6				
	±0.01				
h6	DCON=6	8≤DCON≤10	DCON=12		
	0 - 0.008	0 - 0.009	0 - 0.011		

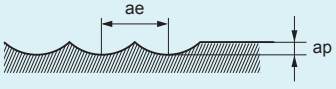
● 2 flute ball nose end mill with original diamond coating for graphite machining.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
DF2MBR0300A100	3	6	30	50	5.85	100	6	2	●	1
DF2MB**R0300A150**	3	6	30	50	5.85	150	6	2	●	1
DF2MB**R0400A110**	4	8	40	60	7.85	110	8	2	●	1
DF2MB**R0400A150**	4	8	40	60	7.85	150	8	2	●	1
DF2MB**R0500A120**	5	10	50	70	9.7	120	10	2	●	1
DF2MB**R0500A180**	5	10	50	70	9.7	180	10	2	●	1
DF2MB**R0600A130**	6	12	55	75	11.7	130	12	2	●	1
DF2MB**R0600A200**	6	12	55	75	11.7	200	12	2	●	1

(Effective Coating Length : 1-1.5DC)

RECOMMENDED CUTTING CONDITIONS

Work material		Graphite				Copper, Copper alloys			
R PRFRAD (mm)	Overall Length LF (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
R3	**100**	16000	1900	0.6	1.5	16000	1500	0.6	1.5
	150	12000	1200	0.4	1.2	12000	960	0.4	1.2
R4	**110**	12000	2000	0.8	2.0	12000	1600	0.8	2.0
	150	9200	1400	0.6	1.6	9200	1100	0.6	1.6
R5	**120**	9500	2200	1.0	2.5	9500	1800	1.0	2.5
	180	7300	1500	0.8	2.0	7300	1200	0.8	2.0
R6	**130**	8000	1800	1.2	3.0	8000	1400	1.2	3.0
	200	6100	1200	1.0	2.5	6100	960	1.0	2.5
Depth of cut									

1) When high machining accuracy is needed, or the workpiece becomes chipped, we recommend lowering the feed rate.
2) Use a milling machine dedicated for graphite.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

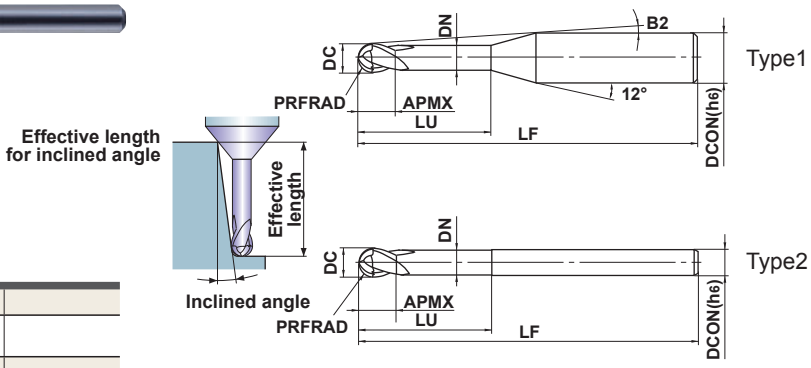
● : **Inventory maintained in Japan.**

DF2XLB

Ball nose, Medium cut length, 2 flute, Long neck, For graphite

Aluminium Alloy	Copper Alloy	Graphite	GFRP CFRP	Machineable Ceramics
○	◎	◎	○	○





R	0.1≤PRFRAD≤3				
	±0.01				
h6	DCON=4,6				
	0 -0.008				

2 flute long neck ball nose end mill with Mitsubishi's unique diamond coating for graphite machining.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle 30'	1°	2°	3°
NEW DF2XLBR0010N005	0.1	0.2	0.2	0.5	0.18	11.5°	50	4	2	●	1	0.5	0.5	0.6	0.7
NEW DF2XLBR0015N020	0.15	0.3	0.3	2	0.27	9.9°	50	4	2	●	1	2.1	2.2	2.4	2.6
NEW DF2XLBR0015N030	0.15	0.3	0.3	3	0.27	9.1°	50	4	2	●	1	3.1	3.2	3.6	3.9
DF2XLBR0020N010	0.2	0.4	0.6	1	0.36	11°	50	4	2	●	1	1.0	1.0	1.1	1.2
DF2XLBR0020N020	0.2	0.4	0.6	2	0.36	10°	50	4	2	●	1	2.0	2.1	2.3	2.6
DF2XLBR0020N030	0.2	0.4	0.6	3	0.36	9.1°	50	4	2	●	1	3.1	3.2	3.5	3.9
DF2XLBR0020N040	0.2	0.4	0.6	4	0.36	8.4°	60	4	2	●	1	4.1	4.3	4.7	5.2
DF2XLBR0020N080	0.2	0.4	0.6	8	0.36	6.4°	60	4	2	●	1	8.3	8.7	9.5	10.5
DF2XLBR0020N120	0.2	0.4	0.6	12	0.36	5.1°	60	4	2	●	1	12.5	13.0	14.3	15.8
DF2XLBR0025N040	0.25	0.5	0.6	4	0.46	8.3°	60	4	2	●	1	4.1	4.3	4.7	5.2
NEW DF2XLBR0025N050	0.25	0.5	0.6	5	0.46	7.7°	60	4	2	●	1	5.2	5.4	5.9	6.5
NEW DF2XLBR0025N080	0.25	0.5	0.6	8	0.46	6.3°	60	4	2	●	1	8.3	8.7	9.5	10.5
DF2XLBR0030N020	0.3	0.6	0.9	2	0.56	9.9°	60	4	2	●	1	2.1	2.2	2.4	2.6
DF2XLBR0030N040	0.3	0.6	0.9	4	0.56	8.3°	60	4	2	●	1	4.2	4.4	4.8	5.2
NEW DF2XLBR0030N050	0.3	0.6	0.9	5	0.56	7.6°	60	4	2	●	1	5.2	5.4	6.0	6.6
DF2XLBR0030N060	0.3	0.6	0.9	6	0.56	7.1°	60	4	2	●	1	6.3	6.5	7.1	7.9
NEW DF2XLBR0030N080	0.3	0.6	0.9	8	0.56	6.2°	60	4	2	●	1	8.3	8.7	9.5	10.6
DF2XLBR0030N100	0.3	0.6	0.9	10	0.56	5.5°	60	4	2	●	1	10.4	10.9	11.9	13.2
DF2XLBR0030N160	0.3	0.6	0.9	16	0.56	4.1°	60	4	2	●	1	16.7	17.4	19.1	21.2
DF2XLBR0040N060	0.4	0.8	1.2	6	0.76	7°	60	4	2	●	1	6.3	6.5	7.1	7.9
DF2XLBR0040N080	0.4	0.8	1.2	8	0.76	6.1°	60	4	2	●	1	8.3	8.7	9.5	10.5
DF2XLBR0050N040	0.5	1	1.5	4	0.94	8°	60	4	2	●	1	4.2	4.4	4.8	5.3
DF2XLBR0050N060	0.5	1	1.5	6	0.94	6.8°	60	4	2	●	1	6.3	6.6	7.2	8.0
DF2XLBR0050N080	0.5	1	1.5	8	0.94	5.9°	60	4	2	●	1	8.4	8.8	9.6	10.6
DF2XLBR0050N100	0.5	1	1.5	10	0.94	5.2°	60	4	2	●	1	10.5	11.0	12.0	13.3
DF2XLBR0050N120	0.5	1	1.5	12	0.94	4.6°	60	4	2	●	1	12.6	13.2	14.4	15.9
DF2XLBR0050N200	0.5	1	1.5	20	0.94	3.3°	80	4	2	●	1	21.0	21.9	24.0	26.6
DF2XLBR0050N300	0.5	1	1.5	30	0.94	2.4°	80	4	2	●	1	31.4	32.8	36.0	*
DF2XLBR0050N400	0.5	1	1.5	40	0.94	1.9°	80	4	2	●	1	41.8	43.7	*	*
DF2XLBR0075N080	0.75	1.5	2.3	8	1.44	5.4°	60	4	2	●	1	8.4	8.8	9.6	10.6
DF2XLBR0075N100	0.75	1.5	2.3	10	1.44	4.7°	60	4	2	●	1	10.5	11.0	12.0	13.2
DF2XLBR0075N160	0.75	1.5	2.3	16	1.44	3.4°	80	4	2	●	1	16.8	17.5	19.2	21.2
DF2XLBR0075N300	0.75	1.5	2.3	30	1.44	2.1°	80	4	2	●	1	31.4	32.8	35.9	*
DF2XLBR0100N080	1	2	3	8	1.9	4.9°	60	4	2	●	1	8.3	8.7	9.4	10.4

* No interference

DF2XLB

Ball nose, Medium cut length, 2 flute, Long neck, For graphite

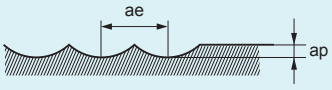
Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
												30'	1°	2°	3°
DF2XLBR0100N100	1	2	3	10	1.9	4.2°	60	4	2	●	1	10.4	10.9	11.8	13.0
DF2XLB**R0100N120**	1	2	3	12	1.9	3.7°	60	4	2	●	1	12.5	13.0	14.2	15.7
DF2XLB**R0100N160**	1	2	3	16	1.9	2.9°	80	4	2	●	1	16.7	17.4	19.0	*
DF2XLB**R0100N200**	1	2	3	20	1.9	2.5°	80	4	2	●	1	20.9	21.8	23.8	*
DF2XLB**R0100N250**	1	2	3	25	1.9	2°	80	4	2	●	1	26.1	27.2	*	*
DF2XLB**R0100N400**	1	2	3	40	1.9	1.4°	100	4	2	●	1	41.7	43.5	*	*
DF2XLB**R0100N600**	1	2	3	60	1.9	0.9°	100	4	2	●	1	62.6	*	*	*
DF2XLB**R0150N160**	1.5	3	4.5	16	2.9	1.7°	80	4	2	●	1	16.7	17.3	*	*
DF2XLB**R0150N250**	1.5	3	4.5	25	2.9	1.2°	80	4	2	●	1	26.1	27.2	*	*
DF2XLB**R0150N400**	1.5	3	4.5	40	2.9	0.7°	100	4	2	●	1	41.7	*	*	*
DF2XLB**R0150N600**	1.5	3	4.5	60	2.9	0.5°	100	4	2	●	1	*	*	*	*
NEW DF2XLB**R0200N080**	2	4	6	8	3.9	—	80	4	2	●	2	*	*	*	*
DF2XLB**R0200N200**	2	4	6	20	3.9	—	80	4	2	●	2	*	*	*	*
DF2XLB**R0200N300**	2	4	6	30	3.9	—	80	4	2	●	2	*	*	*	*
DF2XLB**R0200N400**	2	4	6	40	3.9	—	100	4	2	●	2	*	*	*	*
DF2XLB**R0200N600**	2	4	6	60	3.9	—	100	4	2	●	2	*	*	*	*
NEW DF2XLB**R0300N120**	3	6	9	12	5.85	—	100	6	2	●	2	*	*	*	*

* No interference

● : Inventory maintained in Japan.

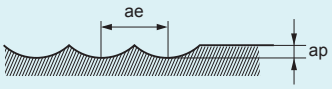
RECOMMENDED CUTTING CONDITIONS

Work material		Graphite				Copper, Copper alloys			
R PRFRAD (mm)	Neck length LU (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
R0.1	**0.5**	40000	800	0.01	0.03	40000	800	0.003	0.02
R0.15	**2**	40000	1200	0.03	0.08	40000	800	0.003	0.03
	3	40000	1200	0.03	0.08	40000	600	0.002	0.03
R0.2	**1**	40000	1500	0.05	0.15	40000	2000	0.015	0.04
	2	40000	1500	0.05	0.12	40000	1300	0.01	0.04
	3	40000	1300	0.04	0.12	40000	800	0.005	0.04
	4	40000	1300	0.04	0.1	32000	600	0.004	0.04
	8	30000	800	0.03	0.1	—	—	—	—
	12	20000	450	0.03	0.08	—	—	—	—
R0.25	**4**	40000	1500	0.05	0.15	40000	800	0.01	0.05
	5	38000	1300	0.05	0.15	36000	700	0.008	0.05
	8	30000	1000	0.04	0.12	28000	500	0.002	0.05
R0.3	**2**	40000	1800	0.07	0.2	40000	1500	0.03	0.06
	4	40000	1500	0.06	0.18	40000	1200	0.02	0.06
	5	40000	1500	0.06	0.17	40000	1100	0.015	0.06
	6	40000	1500	0.06	0.15	40000	1000	0.008	0.06
	8	37000	1200	0.05	0.15	35000	800	0.005	0.06
	10	35000	1000	0.05	0.15	—	—	—	—
	16	22000	530	0.04	0.12	—	—	—	—
R0.4	**6**	40000	1700	0.08	0.2	40000	1500	0.02	0.08
	8	40000	1700	0.08	0.15	30000	1200	0.008	0.08
R0.5	**4**	40000	2500	0.12	0.3	40000	2000	0.05	0.1
	6	40000	2500	0.1	0.3	40000	2000	0.03	0.1
	8	40000	2000	0.1	0.25	40000	1800	0.02	0.1
	10	40000	2000	0.1	0.2	33000	1400	0.01	0.1
	12	40000	2000	0.1	0.2	30000	1000	0.007	0.1
	20	30000	1100	0.08	0.2	—	—	—	—
	30	20000	600	0.06	0.15	—	—	—	—
	40	15000	400	0.04	0.12	—	—	—	—
Depth of cut									

1) When high machining accuracy is needed, or the workpiece becomes chipped, we recommend lowering the feed rate.
2) Use a milling machine dedicated for graphite.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

DF2XLB

Ball nose, Medium cut length, 2 flute, Long neck, For graphite

Work material		Graphite				Copper, Copper alloys			
R PRFRAD (mm)	Neck length LU (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
R0.75	8	40000	2800	0.15	0.45	40000	2400	0.07	0.15
	10	40000	2800	0.15	0.45	32000	1800	0.05	0.15
	16	35000	2000	0.15	0.3	20000	900	0.03	0.15
	30	27000	1000	0.1	0.3	—	—	—	—
R1	8	40000	3000	0.23	0.7	40000	3000	0.1	0.2
	10	40000	3000	0.2	0.6	40000	2800	0.08	0.2
	12	35000	2500	0.2	0.6	35000	2300	0.08	0.2
	16	30000	2000	0.2	0.5	30000	1800	0.05	0.2
	20	30000	2000	0.2	0.5	20000	1200	0.04	0.2
	25	25000	1500	0.18	0.45	20000	1000	0.03	0.2
	40	20000	1000	0.15	0.4	—	—	—	—
	60	15000	500	0.1	0.3	—	—	—	—
R1.5	16	28000	3000	0.3	0.9	28000	3000	0.3	0.3
	25	20000	2000	0.25	0.75	20000	2000	0.25	0.3
	40	16000	1500	0.2	0.6	16000	1500	0.2	0.3
	60	14000	1000	0.17	0.45	—	—	—	—
R2	8	24000	3800	0.5	1.5	24000	3800	0.5	0.4
	20	21000	3300	0.5	1.5	21000	3300	0.4	0.4
	30	15000	2000	0.4	1.2	15000	2000	0.3	0.4
	40	13000	1600	0.35	1.0	13000	1600	0.25	0.4
	60	12000	1400	0.3	0.9	12000	1400	0.2	0.4
R3	12	17000	2800	0.6	2.0	17000	2800	0.6	0.6
Depth of cut									

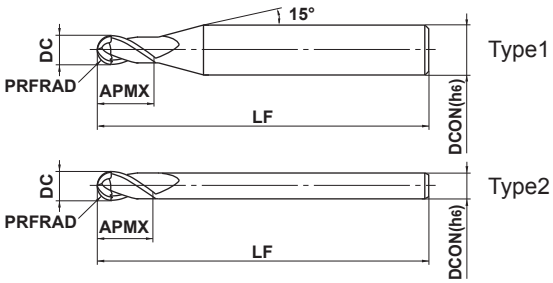
1) When high machining accuracy is needed, or the workpiece becomes chipped, we recommend lowering the feed rate.
2) Use a milling machine dedicated for graphite.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

DLC2MB

Ball nose, Medium cut length, 2 flute

Copper Alloy	Aluminium Alloy	Graphite	GFRP CFRP	Machineable Ceramics
○	◎	○	○	





R				
PRFRAD≤6	PRFRAD>6			
±0.01	±0.02			
DC≤12	DC>12			
0 - 0.020	0 - 0.030			
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

2 flute ball nose end mill with new high welding resistance DLC coating, ideal for machining non-ferrous materials.

Unit : mm

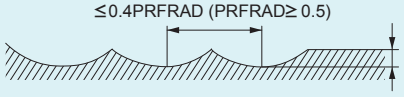
Order Number	PRFRAD	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
DLC2MBR0010	0.1	0.2	0.4	40	4	2	●	1
DLC2MBR0015	0.15	0.3	0.6	40	4	2	●	1
DLC2MBR0020	0.2	0.4	0.8	40	4	2	●	1
DLC2MBR0025	0.25	0.5	1	40	4	2	●	1
DLC2MBR0030	0.3	0.6	1.2	40	4	2	●	1
DLC2MBR0040	0.4	0.8	1.6	40	4	2	●	1
DLC2MBR0050	0.5	1	2.5	40	4	2	●	1
DLC2MBR0075	0.75	1.5	4	40	4	2	●	1
DLC2MBR0100	1	2	6	60	6	2	●	1
DLC2MBR0125	1.25	2.5	6	60	6	2	●	1
DLC2MBR0150	1.5	3	8	70	6	2	●	1
DLC2MBR0200	2	4	8	70	6	2	●	1
DLC2MBR0250	2.5	5	12	80	6	2	●	1
DLC2MBR0300	3	6	12	80	6	2	●	2
DLC2MBR0400	4	8	14	90	8	2	●	2
DLC2MBR0500	5	10	18	100	10	2	●	2
DLC2MBR0600	6	12	22	110	12	2	●	2
DLC2MBR0800	8	16	30	140	16	2	●	2
DLC2MBR1000	10	20	38	160	20	2	●	2

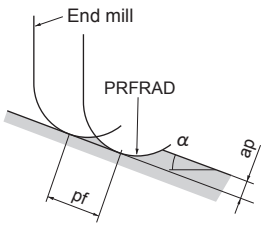
● : Inventory maintained in Japan.

DLC2MB

Ball nose, Medium cut length, 2 flute

RECOMMENDED CUTTING CONDITIONS

Work material	Aluminium alloy				Aluminium cast, Copper, Copper alloys			
R PRFRAD (mm)	α≤15°		α>15°		α≤15°		α>15°	
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
R 0.1	40000	350	40000	260	40000	280	40000	210
R 0.15	40000	480	40000	360	40000	380	40000	290
R 0.2	40000	600	40000	450	40000	480	40000	360
R 0.25	40000	800	40000	600	40000	640	40000	480
R 0.3	40000	1000	40000	750	40000	800	40000	600
R 0.4	40000	1500	40000	1100	40000	1200	40000	880
R 0.5	40000	2000	40000	1500	40000	1600	40000	1200
R 0.75	40000	2200	40000	1600	40000	1800	40000	1300
R 1	40000	2800	40000	2200	40000	2200	32000	1400
R 1.25	40000	3200	38000	2200	32000	2000	30000	1400
R 1.5	40000	4000	32000	2600	32000	2600	26000	1700
R 2	30000	4200	24000	2800	24000	2700	19000	1800
R 2.5	24000	4400	19000	2800	19000	2800	15000	1800
R 3	20000	4000	16000	2800	16000	2600	13000	1800
R 4	15000	3600	12000	2400	12000	2300	9600	1500
R 5	12000	3600	9500	2000	9600	2300	7600	1300
R 6	10000	3200	8000	2200	8000	2000	6400	1400
R 8	7500	2800	6000	1800	6000	1800	4800	1200
R10	6000	2500	4800	1600	4800	1600	3800	1000
Depth of cut	≤0.2PRFRAD (PRFRAD< 0.5) ≤0.4PRFRAD (PRFRAD≥ 0.5)  ≤0.2PRFRAD PRFRAD:Radius							



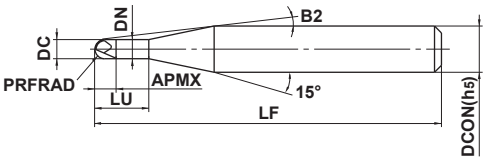
1) α is the inclination angle of the machined surface.
2) When cutting a very hard workpiece, reduce the feed rate.
3) If the depth of cut is shallow, the revolution and feed rate can be increased.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

CBN2XLB

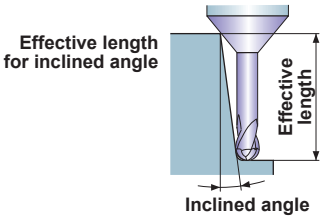
Ball nose, Short cut length, 2 flute, Long neck

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎				





Type1



R	0.2≤PRFRAD≤1				
	±0.005				
h5	4≤DCON≤6				
	0 - 0.005				

● Solid CBN ball nose. A wide variation of neck lengths available.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle 30'	1°	2°	3°
CBN2XLBR0020N010S04	0.2	0.4	0.3	1	0.36	13.4°	51	4	2	●	1	1	1	1.1	1.2
CBN2XLBR0020N010S06	0.2	0.4	0.3	1	0.36	13.9°	51	6	2	●	1	1	1	1.1	1.2
CBN2XLBR0020N016S04	0.2	0.4	0.3	1.6	0.36	12.4°	51	4	2	●	1	1.6	1.7	1.8	2
CBN2XLBR0020N016S06	0.2	0.4	0.3	1.6	0.36	13.3°	51	6	2	●	1	1.6	1.7	1.8	2
* CBN2XLBR0030N009S06	0.3	0.6	0.4	0.9	0.56	14.1°	62	6	2	●	1	0.9	0.9	1	1.1
CBN2XLBR0030N015S04	0.3	0.6	0.5	1.5	0.56	12.6°	51	4	2	●	1	1.5	1.6	1.7	1.8
CBN2XLBR0030N015S06	0.3	0.6	0.5	1.5	0.56	13.4°	51	6	2	●	1	1.5	1.6	1.7	1.8
CBN2XLBR0030N024S04	0.3	0.6	0.5	2.4	0.56	11.3°	51	4	2	●	1	2.5	2.6	2.7	2.9
CBN2XLBR0030N024S06	0.3	0.6	0.5	2.4	0.56	12.5°	51	6	2	●	1	2.5	2.6	2.7	2.9
* CBN2XLBR0040N010S06	0.4	0.8	0.5	1	0.76	14.1°	62	6	2	●	1	1	1	1.1	1.2
CBN2XLBR0040N020S04	0.4	0.8	0.6	2	0.76	11.8°	51	4	2	●	1	2	2.1	2.3	2.4
CBN2XLBR0040N020S06	0.4	0.8	0.6	2	0.76	12.9°	51	6	2	●	1	2	2.1	2.3	2.4
CBN2XLBR0040N032S04	0.4	0.8	0.6	3.2	0.76	10.3°	51	4	2	●	1	3.3	3.4	3.6	3.9
CBN2XLBR0040N032S06	0.4	0.8	0.6	3.2	0.76	11.7°	51	6	2	●	1	3.3	3.4	3.6	3.9
* CBN2XLBR0050N011S06	0.5	1	0.6	1.1	0.94	14.1°	62	6	2	●	1	1.1	1.1	1.2	1.2
CBN2XLBR0050N025S04	0.5	1	0.8	2.5	0.94	11°	51	4	2	●	1	2.6	2.7	2.8	3
CBN2XLBR0050N025S06	0.5	1	0.8	2.5	0.94	12.3°	51	6	2	●	1	2.6	2.7	2.8	3
CBN2XLBR0050N040S04	0.5	1	0.8	4	0.94	9.3°	51	4	2	●	1	4.1	4.3	4.6	4.9
CBN2XLBR0050N040S06	0.5	1	0.8	4	0.94	11°	51	6	2	●	1	4.1	4.3	4.6	4.9
CBN2XLBR0075N038S04	0.75	1.5	1.1	3.8	1.44	9.1°	52	4	2	●	1	3.9	4.1	4.3	4.6
CBN2XLBR0075N038S06	0.75	1.5	1.1	3.8	1.44	11°	52	6	2	●	1	3.9	4.1	4.3	4.6
CBN2XLBR0075N060S04	0.75	1.5	1.1	6	1.44	7.1°	52	4	2	●	1	6.2	6.4	6.8	7.3
CBN2XLBR0075N060S06	0.75	1.5	1.1	6	1.44	9.3°	52	6	2	●	1	6.2	6.4	6.8	7.3
* CBN2XLBR0100N017S06	1	2	1.2	1.7	1.9	13.6°	62	6	2	●	1	1.7	1.7	1.8	1.9
CBN2XLBR0100N050S04	1	2	1.5	5	1.9	7.3°	52	4	2	●	1	5.1	5.3	5.6	6
CBN2XLBR0100N050S06	1	2	1.5	5	1.9	9.8°	52	6	2	●	1	5.1	5.3	5.6	6
CBN2XLBR0100N080S04	1	2	1.5	8	1.9	5.3°	52	4	2	●	1	8.2	8.5	9	9.7
CBN2XLBR0100N080S06	1	2	1.5	8	1.9	7.9°	52	6	2	●	1	8.2	8.5	9	9.7

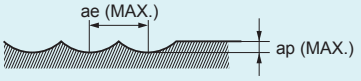
* Designed with short cutting edge and neck lengths for high rigidity.

● : Inventory maintained in Japan.

CBN2XLB

Ball nose, Short cut length, 2 flute, Long neck

RECOMMENDED CUTTING CONDITIONS

Work material	Hardened steel (45−55HRC) AISI H13				Hardened steel (55−62HRC) AISI D2				Hardened steel (62−70HRC) AISI W1, AISI M2			
R PRFRAD (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
R0.2	50000	1500	0.006	0.01	50000	1200	0.006	0.01	50000	1200	0.004	0.008
R0.3	50000	2000	0.01	0.02	50000	1500	0.01	0.02	50000	1500	0.008	0.015
R0.4	50000	3000	0.02	0.05	50000	2000	0.02	0.04	50000	2000	0.015	0.03
R0.5	50000	3000	0.03	0.06	50000	2000	0.03	0.05	50000	2000	0.02	0.03
R0.75	50000	3500	0.04	0.08	50000	2500	0.03	0.06	50000	2500	0.02	0.04
R1	50000	4000	0.05	0.1	50000	3000	0.04	0.07	50000	3000	0.03	0.05
Depth of cut												

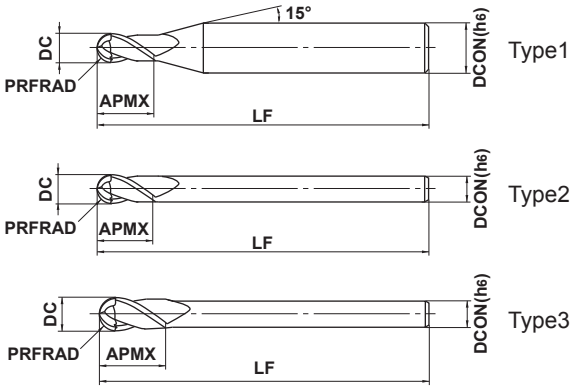
1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Oil mist coolant is recommended.
3) Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

C2MB

Ball nose end mill, Medium cut length, 2 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○	○	○





R	PRFRAD≤6.5	PRFRAD>6.5			
	±0.01	±0.02			
	DC≤12	DC>12			
	0 - 0.020	0 - 0.030			
h6	4≤DCON≤6	8≤DCON≤10	12≤DCON≤16		
	0 - 0.008	0 - 0.009	0 - 0.011		

2 flute ultra micro-grain carbide end mill for contour milling of alloy and hardened steels.

Unit : mm

Order Number	PRFRAD	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
C2MBR0050	0.5	1	2.5	40	4	2	●	1
C2MBR0075	0.75	1.5	4	40	4	2	●	1
C2MBR0100	1	2	6	60	6	2	●	1
C2MBR0150	1.5	3	8	70	6	2	●	1
C2MBR0200	2	4	8	70	6	2	●	1
C2MBR0250	2.5	5	12	80	6	2	●	1
C2MBR0300	3	6	12	80	6	2	●	2
C2MBR0400	4	8	14	90	8	2	●	2
C2MBR0500	5	10	18	100	10	2	●	2
C2MBR0550	5.5	11	22	110	12	2	●	1
C2MBR0650	6.5	13	26	120	12	2	●	3
C2MBR0700	7	14	26	120	12	2	●	3
C2MBR0750	7.5	15	30	140	16	2	●	1

● : Inventory maintained in Japan.

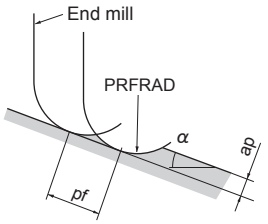
C2MB

Ball nose end mill, Medium cut length, 2 flute

RECOMMENDED CUTTING CONDITIONS

	Roughing (Large depth of cut ≤0.8R)				Finishing (Depth of cut 0.05R)							
Work material	Carbon steel, Alloy steel (−30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30−45HRC) AISI H13, AISI P21		Carbon steel, Alloy steel (−30HRC) AISI 1055, AISI P20				Alloy steel, Tool steel, Pre-hardened steel (30−45HRC) AISI H13, AISI D2, AISI P21			
					α≤15°		α>15°		α≤15°		α>15°	
R **PRFRAD** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
R 0.5	—	—	—	—	14000	180	10000	120	12000	150	7000	80
R 1	4100	70	2800	40	10500	350	7300	210	8400	220	5500	130
R 2	2600	120	1650	85	7200	500	5100	300	5900	360	4300	210
R 3	1900	150	1200	95	5200	560	3600	350	4200	410	2900	240
R 4	1400	160	900	105	4000	640	2700	380	3100	440	2200	240
R 5	1100	140	710	95	3200	700	2200	380	2500	460	1750	250
R 6	940	130	600	85	2600	640	1750	350	2100	430	1450	250
R 8	700	100	450	60	1900	620	1300	330	1550	430	1100	250
R10	560	80	360	50	1500	590	1000	310	1250	410	860	250

1) α is the inclination angle of the machined surface.
2) Cutting conditions may differ considerably due to the overhang (milling depth and neck length), depth of cut, and machine tool conditions. Please see the above table as a standard starting point.
3) If the depth of cut is shallow, the revolution and feed rate can be increased.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately. Please reduce the feed rate when the surface finish is important.

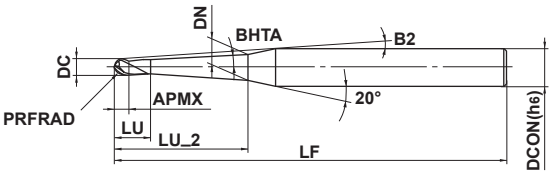


VF3XB

Ball nose, Medium cut length, 3 flute, Taper neck

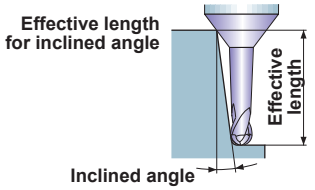
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎	○	○		





Type1

R	0.4≤PRFRAD≤2.5				
	±0.01				
	0.8≤DC≤5				
	0 - 0.02				
h6	4≤DCON≤6	DCON=8			
	0 - 0.008	0 - 0.009			



● 3 flute ball end mill, high rigidity taper neck type.

Unit : mm

Order Number	PRFRAD	DC	BHTA	APMX	LU_2	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle 30'	1°	2°	3°
VF3XBR0040T0024L006	0.4	0.8	0.4°	0.5	6	1.5	0.82	8.9°	60	4	3	●	1	6.3	6.6	6.9	7.3
VF3XBR0040T0024L008	0.4	0.8	0.4°	0.5	8	1.5	0.85	7.5°	60	4	3	●	1	8.4	8.6	9.1	9.5
VF3XBR0040T0024L012	0.4	0.8	0.4°	0.5	12	1.5	0.91	5.7°	60	4	3	●	1	12.4	12.7	13.4	14.1
VF3XBR0040T0054L008	0.4	0.8	0.9°	0.5	8	1.5	0.96	7.6°	60	4	3	●	1	—	8.4	8.9	9.3
VF3XBR0040T0054L012	0.4	0.8	0.9°	0.5	12	1.5	1.09	5.8°	60	4	3	●	1	—	12.4	13.1	13.8
VF3XBR0040T0054L016	0.4	0.8	0.9°	0.5	16	1.5	1.22	4.7°	60	4	3	●	1	—	16.5	17.3	18.3
VF3XBR0050T0024L008	0.5	1	0.4°	0.8	8	2.3	1.02	9.6°	60	6	3	●	1	8.5	8.8	9.3	9.8
VF3XBR0050T0024L010	0.5	1	0.4°	0.8	10	2.3	1.05	8.5°	60	6	3	●	1	10.5	10.9	11.4	12.1
VF3XBR0050T0024L012	0.5	1	0.4°	0.8	12	2.3	1.08	7.6°	60	6	3	●	1	12.6	13.0	13.6	14.4
VF3XBR0050T0024L016	0.5	1	0.4°	0.8	16	2.3	1.13	6.3°	70	6	3	●	1	16.6	17.1	18.0	18.9
VF3XBR0050T0024L020	0.5	1	0.4°	0.8	20	2.3	1.19	5.4°	70	6	3	●	1	20.6	21.2	22.3	23.5
VF3XBR0050T0024L025	0.5	1	0.4°	0.8	25	2.3	1.26	4.6°	70	6	3	●	1	25.7	26.3	27.7	29.3
VF3XBR0050T0024L030	0.5	1	0.4°	0.8	30	2.3	1.33	4.0°	80	6	3	●	1	30.7	31.5	33.1	35.0
VF3XBR0050T0024L035	0.5	1	0.4°	0.8	35	2.3	1.40	3.5°	80	6	3	●	1	35.7	36.6	38.6	40.7
VF3XBR0050T0054L008	0.5	1	0.9°	0.8	8	2.3	1.12	9.7°	60	6	3	●	1	—	8.6	9.1	9.6
VF3XBR0050T0054L012	0.5	1	0.9°	0.8	12	2.3	1.24	7.7°	60	6	3	●	1	—	12.6	13.3	14.1
VF3XBR0050T0054L016	0.5	1	0.9°	0.8	16	2.3	1.37	6.4°	70	6	3	●	1	—	16.7	17.6	18.5
VF3XBR0050T0054L020	0.5	1	0.9°	0.8	20	2.3	1.50	5.5°	70	6	3	●	1	—	20.7	21.8	23.0
VF3XBR0050T0054L025	0.5	1	0.9°	0.8	25	2.3	1.65	4.7°	70	6	3	●	1	—	25.7	27.1	28.6
VF3XBR0050T0054L030	0.5	1	0.9°	0.8	30	2.3	1.81	4.0°	80	6	3	●	1	—	30.8	32.4	34.2
VF3XBR0050T0054L035	0.5	1	0.9°	0.8	35	2.3	1.97	3.6°	80	6	3	●	1	—	35.8	37.7	39.8
VF3XBR0050T0054L040	0.5	1	0.9°	0.8	40	2.3	2.12	3.2°	80	6	3	●	1	—	40.8	43.0	45.4
VF3XBR0050T0054L050	0.5	1	0.9°	0.8	50	2.3	2.44	2.7°	110	6	3	●	1	—	50.9	53.6	*
VF3XBR0050T0054L060	0.5	1	0.9°	0.8	60	2.3	2.75	2.3°	110	6	3	●	1	—	60.9	64.1	*
VF3XBR0050T0054L070	0.5	1	0.9°	0.8	70	2.3	3.07	2.0°	110	6	3	●	1	—	71.0	74.7	*
VF3XBR0050T0130L012	0.5	1	1.5°	0.8	12	2.3	1.45	7.9°	60	6	3	●	1	—	—	13.0	13.7
VF3XBR0050T0130L016	0.5	1	1.5°	0.8	16	2.3	1.66	6.5°	70	6	3	●	1	—	—	17.1	18.0
VF3XBR0050T0130L020	0.5	1	1.5°	0.8	20	2.3	1.87	5.6°	70	6	3	●	1	—	—	21.2	22.4
VF3XBR0050T0130L025	0.5	1	1.5°	0.8	25	2.3	2.13	4.8°	70	6	3	●	1	—	—	26.3	27.8
VF3XBR0050T0130L030	0.5	1	1.5°	0.8	30	2.3	2.39	4.1°	80	6	3	●	1	—	—	31.5	33.2
VF3XBR0050T0130L035	0.5	1	1.5°	0.8	35	2.3	2.65	3.7°	80	6	3	●	1	—	—	36.6	38.6
VF3XBR0075T0024L010	0.75	1.5	0.4°	1.3	10	2.8	1.54	8.1°	60	6	3	●	1	10.6	10.9	11.4	12.0
VF3XBR0075T0024L015	0.75	1.5	0.4°	1.3	15	2.8	1.61	6.2°	60	6	3	●	1	15.6	16.0	16.9	17.8
VF3XBR0075T0024L020	0.75	1.5	0.4°	1.3	20	2.8	1.68	5.0°	70	6	3	●	1	20.6	21.2	22.3	23.5

* No interference

● : Inventory maintained in Japan.

VF3XB

Ball nose, Medium cut length, 3 flute, Taper neck

Unit : mm

Order Number	PRFRAD	DC	BHTA	APMX	LU_2	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
														30'	1°	2°	3°
VF3XBR0075T0024L030	0.75	1.5	0.4°	1.3	30	2.8	1.82	3.7°	80	6	3	●	1	30.7	31.5	33.1	35.0
VF3XBR0075T0054L015	0.75	1.5	0.9°	1.3	15	2.8	1.82	6.3°	60	6	3	●	1	—	15.7	16.5	17.4
VF3XBR0075T0054L020	0.75	1.5	0.9°	1.3	20	2.8	1.98	5.1°	70	6	3	●	1	—	20.7	21.8	23.0
VF3XBR0075T0054L030	0.75	1.5	0.9°	1.3	30	2.8	2.29	3.7°	80	6	3	●	1	—	30.8	32.4	34.2
VF3XBR0075T0054L040	0.75	1.5	0.9°	1.3	40	2.8	2.61	3.0°	80	6	3	●	1	—	40.8	43.0	45.3
VF3XBR0075T0130L015	0.75	1.5	1.5°	1.3	15	2.8	2.08	6.4°	60	6	3	●	1	—	—	16.1	17.0
VF3XBR0075T0130L020	0.75	1.5	1.5°	1.3	20	2.8	2.34	5.2°	70	6	3	●	1	—	—	21.2	22.4
VF3XBR0075T0130L030	0.75	1.5	1.5°	1.3	30	2.8	2.86	3.8°	80	6	3	●	1	—	—	31.5	33.2
VF3XBR0100T0024L016	1	2	0.4°	1.6	16	3.6	2.07	5.5°	70	6	3	●	1	16.7	17.1	18.0	19.0
VF3XBR0100T0024L020	1	2	0.4°	1.6	20	3.6	2.13	4.6°	70	6	3	●	1	20.7	21.3	22.3	23.5
VF3XBR0100T0024L025	1	2	0.4°	1.6	25	3.6	2.20	3.9°	70	6	3	●	1	25.8	26.4	27.8	29.3
VF3XBR0100T0024L030	1	2	0.4°	1.6	30	3.6	2.27	3.4°	80	6	3	●	1	30.8	31.6	33.2	35.0
VF3XBR0100T0024L035	1	2	0.4°	1.6	35	3.6	2.34	2.9°	80	6	3	●	1	35.8	36.7	38.6	*
VF3XBR0100T0024L040	1	2	0.4°	1.6	40	3.6	2.41	2.6°	80	6	3	●	1	40.8	41.9	44.0	*
VF3XBR0100T0054L020	1	2	0.9°	1.6	20	3.6	2.42	4.7°	70	6	3	●	1	—	20.8	21.9	23.0
VF3XBR0100T0054L025	1	2	0.9°	1.6	25	3.6	2.57	4.0°	70	6	3	●	1	—	25.8	27.2	28.6
VF3XBR0100T0054L030	1	2	0.9°	1.6	30	3.6	2.73	3.4°	80	6	3	●	1	—	30.9	32.5	34.2
VF3XBR0100T0054L035	1	2	0.9°	1.6	35	3.6	2.89	3.0°	80	6	3	●	1	—	35.9	37.7	39.8
VF3XBR0100T0054L040	1	2	0.9°	1.6	40	3.6	3.04	2.7°	80	6	3	●	1	—	40.9	43.0	*
VF3XBR0100T0054L050	1	2	0.9°	1.6	50	3.6	3.36	2.2°	110	6	3	●	1	—	51.0	53.6	*
VF3XBR0100T0054L060	1	2	0.9°	1.6	60	3.6	3.67	1.9°	110	6	3	●	1	—	61.0	*	*
VF3XBR0100T0054L070	1	2	0.9°	1.6	70	3.6	3.99	1.6°	110	6	3	●	1	—	71.1	*	*
VF3XBR0100T0130L025	1	2	1.5°	1.6	25	3.6	3.02	4.1°	70	6	3	●	1	—	—	26.4	27.9
VF3XBR0100T0130L030	1	2	1.5°	1.6	30	3.6	3.28	3.5°	80	6	3	●	1	—	—	31.6	33.3
VF3XBR0100T0130L035	1	2	1.5°	1.6	35	3.6	3.54	3.1°	80	6	3	●	1	—	—	36.7	38.7
VF3XBR0100T0130L040	1	2	1.5°	1.6	40	3.6	3.81	2.7°	80	6	3	●	1	—	—	41.8	*
VF3XBR0125T0054L020	1.25	2.5	0.9°	2	20	4.5	2.89	4.3°	60	6	3	●	1	—	20.8	21.9	23.1
VF3XBR0125T0054L030	1.25	2.5	0.9°	2	30	4.5	3.20	3.1°	80	6	3	●	1	—	30.9	32.5	34.2
VF3XBR0125T0054L040	1.25	2.5	0.9°	2	40	4.5	3.52	2.4°	80	6	3	●	1	—	40.9	43.1	*
VF3XBR0125T0130L020	1.25	2.5	1.5°	2	20	4.5	3.21	4.4°	60	6	3	●	1	—	—	21.4	22.5
VF3XBR0125T0130L030	1.25	2.5	1.5°	2	30	4.5	3.74	3.1°	80	6	3	●	1	—	—	31.6	33.3
VF3XBR0125T0130L040	1.25	2.5	1.5°	2	40	4.5	4.26	2.5°	80	6	3	●	1	—	—	41.9	*
VF3XBR0150T0024L020	1.5	3	0.4°	2	20	5	3.11	3.8°	60	6	3	●	1	20.7	21.3	22.3	23.5
VF3XBR0150T0024L025	1.5	3	0.4°	2	25	5	3.18	3.1°	80	6	3	●	1	25.8	26.4	27.7	29.2
VF3XBR0150T0024L030	1.5	3	0.4°	2	30	5	3.25	2.7°	80	6	3	●	1	30.8	31.6	33.2	*
VF3XBR0150T0024L040	1.5	3	0.4°	2	40	5	3.39	2.1°	80	6	3	●	1	40.9	41.9	44.0	*
VF3XBR0150T0024L050	1.5	3	0.4°	2	50	5	3.53	1.7°	100	6	3	●	1	50.9	52.2	*	*
VF3XBR0150T0054L020	1.5	3	0.9°	2	20	5	3.37	3.8°	60	6	3	●	1	—	20.9	21.9	23.0
VF3XBR0150T0054L030	1.5	3	0.9°	2	30	5	3.69	2.7°	80	6	3	●	1	—	30.9	32.5	*
VF3XBR0150T0054L040	1.5	3	0.9°	2	40	5	4.00	2.1°	80	6	3	●	1	—	41.0	43.1	*
VF3XBR0150T0054L050	1.5	3	0.9°	2	50	5	4.31	1.7°	100	6	3	●	1	—	51.0	*	*
VF3XBR0150T0054L060	1.5	3	0.9°	2	60	5	4.63	2.3°	110	8	3	●	1	—	61.1	64.2	*
VF3XBR0150T0054L070	1.5	3	0.9°	2	70	5	4.94	2.0°	120	8	3	●	1	—	71.1	74.8	*
VF3XBR0150T0130L040	1.5	3	1.5°	2	40	5	4.73	2.2°	80	6	3	●	1	—	—	41.9	*
VF3XBR0150T0130L050	1.5	3	1.5°	2	50	5	5.26	2.8°	110	8	3	●	1	—	—	52.2	*
VF3XBR0150T0130L060	1.5	3	1.5°	2	60	5	5.78	2.4°	110	8	3	●	1	—	—	62.4	*
VF3XBR0150T0130L070	1.5	3	1.5°	2	70	5	6.30	2.1°	120	8	3	●	1	—	—	72.7	*
VF3XBR0200T0054L030	2	4	0.9°	3	30	6	4.65	3.5°	90	8	3	●	1	—	30.9	32.5	34.2
VF3XBR0200T0054L040	2	4	0.9°	3	40	6	4.97	2.7°	90	8	3	●	1	—	41.0	43.0	*
VF3XBR0200T0054L050	2	4	0.9°	3	50	6	5.28	2.2°	110	8	3	●	1	—	51.0	53.6	*
VF3XBR0200T0054L060	2	4	0.9°	3	60	6	5.60	1.9°	110	8	3	●	1	—	61.1	*	*
VF3XBR0250T0054L035	2.5	5	0.9°	3.5	35	6.5	5.80	2.4°	90	8	3	●	1	—	35.9	37.7	*

* No interference

● : Inventory maintained in Japan.

Unit : mm

Order Number	PRFRAD	DC	BHTA	APMX	LU_2	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
														30'	1°	2°	3°
VF3XBR0250T0054L040	2.5	5	0.9°	3.5	40	6.5	5.95	2.2°	90	8	3	●	1	—	41.0	43.0	*
VF3XBR0250T0054L050	2.5	5	0.9°	3.5	50	6.5	6.27	1.8°	110	8	3	●	1	—	51.0	*	*
VF3XBR0250T0054L060	2.5	5	0.9°	3.5	60	6.5	6.58	1.5°	110	8	3	●	1	—	61.1	*	*

* No interference

VF3XB

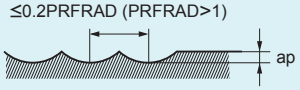
Ball nose, Medium cut length, 3 flute, Taper neck

RECOMMENDED CUTTING CONDITIONS

Work material			Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			Hardened steel (45−55HRC) AISI H13			Hardened steel (55−62HRC) AISI D2		
R PRFRAD (mm)	Taper angle one side BHTA	Neck length LU_2 (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
R0.4	0.4°	6	34000	2700	0.03	31000	2200	0.025	24000	1700	0.02	19000	1400	0.015
		8	31000	2100	0.02	29000	1700	0.02	22000	1300	0.015	18000	1000	0.01
		12	28000	2000	0.015	26000	1600	0.01	20000	1200	0.01	16000	960	0.007
	0.9°	8	31000	2200	0.02	29000	1800	0.02	22000	1400	0.015	18000	1100	0.01
		12	28000	2100	0.015	26000	1700	0.01	20000	1300	0.01	16000	1000	0.007
		16	25000	1100	0.01	23000	910	0.01	18000	700	0.008	14000	560	0.006
R0.5	0.4°	8	27000	2700	0.04	25000	2200	0.04	19000	1700	0.03	15000	1400	0.02
		10	24000	2200	0.03	22000	1800	0.025	17000	1400	0.02	14000	1100	0.015
		12	24000	2200	0.03	22000	1800	0.025	17000	1400	0.02	14000	1100	0.015
		16	22000	2100	0.03	21000	1700	0.025	16000	1300	0.02	13000	1000	0.015
		20	20000	1400	0.015	18000	1200	0.01	14000	900	0.01	11000	720	0.007
		25	18000	1300	0.015	17000	1000	0.01	13000	800	0.009	10000	640	0.006
		30	15000	960	0.01	14000	780	0.01	11000	600	0.008	8800	480	0.006
		35	14000	800	0.008	13000	650	0.007	10000	500	0.006	8000	400	0.004
	0.9°	8	27000	2900	0.04	25000	2300	0.04	19000	1800	0.03	15000	1400	0.02
		12	24000	2400	0.03	22000	2000	0.025	17000	1500	0.02	14000	1200	0.015
		16	22000	2200	0.03	21000	1800	0.025	16000	1400	0.02	13000	1100	0.015
		20	20000	1600	0.015	18000	1300	0.01	14000	1000	0.01	11000	800	0.007
		25	18000	1400	0.015	17000	1200	0.01	13000	900	0.009	10000	720	0.006
		30	15000	1100	0.01	14000	910	0.009	11000	700	0.008	8800	560	0.006
		35	14000	960	0.008	13000	780	0.007	10000	600	0.006	8000	480	0.004
		40	11000	800	0.007	11000	650	0.006	8000	500	0.005	6400	400	0.003
		50	8400	610	0.006	7800	490	0.005	6000	380	0.004	4800	300	0.003
		60	7000	510	0.004	6500	400	0.004	5000	320	0.003	4000	260	0.002
		70	7000	480	0.003	6500	390	0.002	5000	300	0.002	4000	240	0.001
	1.5°	12	24000	2600	0.03	22000	2100	0.025	17000	1600	0.02	14000	1300	0.015
		16	22000	2400	0.03	21000	2000	0.025	16000	1500	0.02	13000	1200	0.015
		20	20000	1800	0.015	18000	1400	0.01	14000	1100	0.01	11000	880	0.007
		25	18000	1600	0.015	17000	1300	0.01	13000	1000	0.009	11000	800	0.006
		30	15000	1300	0.01	14000	1000	0.01	11000	800	0.008	8800	640	0.006
		35	14000	1100	0.008	13000	910	0.007	10000	700	0.006	8000	560	0.004
R0.75	0.4°	10	18000	2700	0.06	17000	2200	0.05	13000	1700	0.04	10000	1400	0.03
		15	17000	2200	0.04	16000	1800	0.04	12000	1400	0.03	9600	1100	0.02
		20	17000	2100	0.03	16000	1700	0.025	12000	1300	0.02	9600	1000	0.015
		30	14000	1600	0.015	13000	1300	0.01	10000	1000	0.01	8000	800	0.007
	0.9°	15	17000	2400	0.04	16000	2000	0.04	12000	1500	0.03	9600	1200	0.02
		20	17000	2200	0.03	16000	1800	0.025	12000	1400	0.02	9600	1100	0.015
		30	14000	1800	0.015	13000	1400	0.01	10000	1100	0.01	8000	880	0.007
		40	13000	1300	0.01	12000	1000	0.01	9000	800	0.008	7200	640	0.006
	1.5°	15	17000	2600	0.04	16000	2100	0.04	12000	1600	0.03	9600	1300	0.02
		20	17000	2400	0.03	16000	2000	0.025	12000	1500	0.02	9600	1200	0.015
		30	14000	2000	0.015	13000	1600	0.01	10000	1200	0.01	8000	960	0.007

Depth of cut

≤0.1PRFRAD (PRFRAD≤1)
≤0.2PRFRAD (PRFRAD>1)



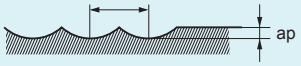
PRFRAD:Radius

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

Work material			Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			Hardened steel (45−55HRC) AISI H13			Hardened steel (55−62HRC) AISI D2		
R **PRFRAD** (mm)	Taper angle one side **BHTA**	Neck length **LU_2** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
R1	**0.4°**	**16**	15000	3200	0.07	14000	2600	0.06	11000	2000	0.05	8800	1600	0.03
		20	14000	2400	0.06	13000	2000	0.05	10000	1500	0.04	8000	1200	0.03
		25	14000	2100	0.04	13000	1700	0.04	10000	1300	0.03	8000	1000	0.02
		30	13000	1800	0.03	12000	1400	0.03	9000	1100	0.025	7200	880	0.02
		35	13000	1600	0.03	12000	1300	0.025	9000	1000	0.02	7200	800	0.015
		40	12000	1400	0.015	11000	1200	0.01	8500	900	0.01	6800	720	0.007
	0.9°	**20**	14000	2600	0.06	13000	2100	0.05	10000	1600	0.04	8000	1300	0.03
		25	14000	2200	0.05	13000	1800	0.04	10000	1400	0.03	8000	1100	0.025
		30	13000	1900	0.04	12000	1600	0.04	9000	1200	0.03	7200	960	0.02
		35	13000	1800	0.04	12000	1400	0.03	9000	1100	0.025	7200	880	0.02
		40	12000	1600	0.03	11000	1300	0.025	8500	1000	0.02	6800	800	0.015
		50	11000	1400	0.015	10000	1200	0.01	8000	900	0.01	6400	720	0.007
		60	9800	1100	0.007	9100	910	0.006	7000	700	0.005	5600	560	0.003
		70	8400	960	0.004	7800	780	0.004	6000	600	0.003	4800	480	0.002
	1.5°	**25**	14000	2400	0.05	13000	2000	0.04	10000	1500	0.03	8000	1200	0.025
		30	12600	2100	0.04	12000	1700	0.04	9000	1300	0.03	7200	1000	0.02
		35	13000	1900	0.04	12000	1600	0.03	9000	1200	0.025	7200	960	0.02
		40	12000	1800	0.03	11000	1400	0.025	8500	1100	0.02	6800	880	0.015
R1.25	**0.9°**	**20**	13000	2900	0.06	12000	2300	0.05	9000	1800	0.04	7200	1400	0.03
		30	12000	2600	0.05	11000	2100	0.04	8500	1600	0.03	6800	1300	0.025
		40	11000	2200	0.04	9800	1800	0.04	7500	1400	0.03	6000	1100	0.02
	1.5°	**20**	13000	3000	0.06	12000	2500	0.05	9000	1900	0.04	7200	1500	0.03
		30	12000	2700	0.05	11050	2200	0.04	8500	1700	0.03	6800	1400	0.025
		40	11000	2400	0.04	9800	2000	0.04	7500	1500	0.03	6000	1200	0.02
R1.5	**0.4°**	**20**	12000	3700	0.13	11000	3000	0.1	8500	2300	0.09	6800	1800	0.06
		30	11000	2900	0.07	10000	2300	0.06	8000	1800	0.05	6400	1400	0.03
		40	11000	2400	0.06	10000	2000	0.05	8000	1500	0.04	6400	1200	0.03
		50	11000	2000	0.04	9800	1600	0.04	7500	1200	0.03	6000	960	0.02
	0.9°	**20**	12000	3800	0.13	11000	3100	0.1	8500	2400	0.09	6800	1900	0.06
		30	11000	3000	0.07	10000	2500	0.06	8000	1900	0.05	6400	1500	0.03
		40	11000	2600	0.06	10000	2100	0.05	8000	1600	0.04	6400	1300	0.03
		50	11000	2100	0.04	9800	1700	0.04	7500	1300	0.03	6000	1000	0.02
		60	9800	2000	0.03	9100	1600	0.025	7000	1200	0.02	5600	960	0.015
		70	9800	1800	0.015	9100	1400	0.01	7000	1100	0.01	5600	880	0.007
	1.5°	**50**	11000	2200	0.04	9800	1800	0.04	7500	1400	0.03	6000	1100	0.02
		60	9800	2100	0.03	9100	1700	0.025	7000	1300	0.02	5600	1000	0.015
		70	9800	2000	0.015	9100	1600	0.01	7000	1200	0.01	5600	960	0.007
R2	**0.9°**	**30**	10000	3200	0.3	9400	2600	0.25	7200	2000	0.2	5800	1600	0.15
		40	9500	2400	0.15	8800	2000	0.12	6800	1500	0.1	5400	1200	0.07
		50	9500	2100	0.1	8800	1700	0.1	6800	1300	0.08	5400	1000	0.06
		60	9000	1900	0.07	8300	1600	0.06	6400	1200	0.05	5100	960	0.03
R2.5	**0.9°**	**35**	8000	3500	0.3	7400	2900	0.25	5700	2200	0.2	4600	1800	0.15
		40	8000	3200	0.2	7400	2600	0.18	5700	2000	0.15	4600	1600	0.1
		60	7600	2400	0.15	7000	2000	0.12	5400	1500	0.1	4300	1200	0.07

Depth of cut

≤0.1PRFRAD (PRFRAD≤1)
≤0.2PRFRAD (PRFRAD>1)



PRFRAD:Radius

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

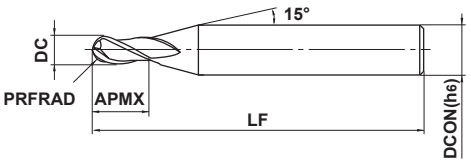
MIRACLE END MILLS

VC3MB

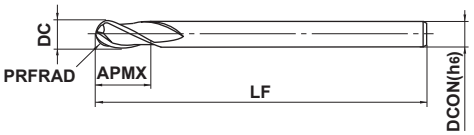
Ball nose end mill, Medium cut length, 3 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	○	○	○		





Type1



Type2

R

PRFRAD≤6	PRFRAD≤8			
±0.01	±0.02			

DC≤12	DC>12			
0 - 0.020	0 - 0.030			

h6

DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

● 3 flute ball nose end mill for efficient machining.

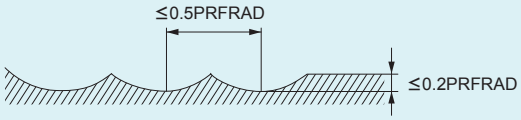
Unit : mm

Order Number	PRFRAD	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VC3MBR0100	1	2	6	60	6	3	●	1
VC3MB**R0150**	1.5	3	8	70	6	3	●	1
VC3MB**R0200**	2	4	8	70	6	3	●	1
VC3MB**R0250**	2.5	5	12	80	6	3	●	1
VC3MB**R0300**	3	6	12	80	6	3	●	2
VC3MB**R0400**	4	8	14	90	8	3	●	2
VC3MB**R0500**	5	10	18	100	10	3	●	2
VC3MB**R0600**	6	12	22	110	12	3	●	2
VC3MB**R0800**	8	16	30	140	16	3	●	2
VC3MB**R1000**	10	20	38	160	20	3	●	2

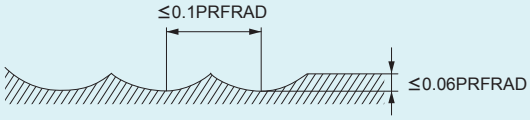
● : Inventory maintained in Japan.

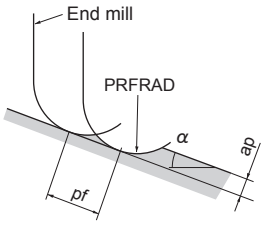
RECOMMENDED CUTTING CONDITIONS

Roughing

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21				Hardened steel (45－55HRC) AISI H13			
R **PRFRAD** (mm)	α≤15°		α>15°		α≤15°		α>15°	
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
R 1	32000	3000	25000	1170	18000	1440	16000	640
R 2	18500	3700	14500	1460	11000	1760	9200	740
R 3	13000	4000	10000	1500	7700	1920	6400	800
R 4	10000	5000	8000	2000	6000	2300	4800	920
R 5	8000	5000	6500	2000	4800	2200	3800	870
R 6	6600	4600	5300	1800	4000	2100	3200	840
R 8	5000	4000	4000	1600	3000	1700	2400	680
R10	4000	3600	3200	1440	2400	1400	1900	550
Depth of cut	 PRFRAD:Radius							

Finishing

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21				Hardened steel (45－55HRC) AISI H13			
R **PRFRAD** (mm)	α≤15°		α>15°		α≤15°		α>15°	
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
R 1	32000	3200	32000	1500	25000	2000	20000	800
R 2	25500	5000	20000	2000	17000	2700	13000	1000
R 3	20000	6100	15000	2200	13000	3200	10000	1200
R 4	15000	7500	11000	2700	10000	3800	7500	1400
R 5	12000	7500	9000	2700	8000	3700	6000	1400
R 6	10000	7000	7500	2500	6600	3500	5000	1300
R 8	7500	6000	5600	2200	5000	2800	3700	1000
R10	6000	5400	4500	2000	4000	2300	3000	900
Depth of cut	 PRFRAD:Radius							



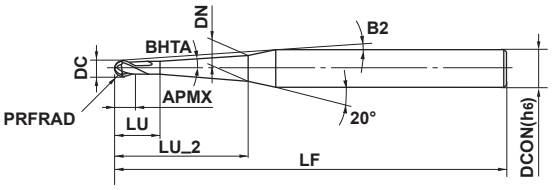
1) α is the inclination angle of the machined surface.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

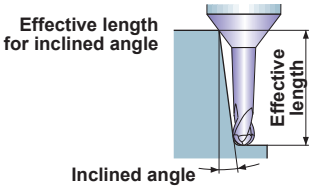
DF3XB

Ball nose, Medium cut length, 3 flute, Taper neck, For graphite

Aluminium Alloy	Copper Alloy	Graphite	GFRP CFRP	Machineable Ceramics
○	◎	◎	○	○







R	0.5≤PRFRAD≤2				
	±0.01				
h6	DCON=6				
	0 - 0.008				

Ball nose taper end mill with Mitsubishi's unique diamond coating for graphite machining.

Unit : mm

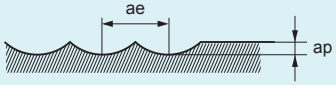
Order Number	PRFRAD	DC	BHTA	APMX	LU_2	LU	B2	DN	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle 30'	1°	2°	3°
DF3XBR0050L030	0.5	1	0.5°	1.5	30	3	4.0°	1.42	100	6	3	●	1	30.4	32.1	32.8	34.6
DF3XB**R0050L040**	0.5	1	0.5°	1.5	40	3	3.2°	1.60	100	6	3	●	1	40.4	41.4	43.6	46.0
DF3XB**R0050L050**	0.5	1	0.5°	1.5	50	3	2.6°	1.77	100	6	3	●	1	50.4	51.7	54.4	*
DF3XB**R0100L040**	1	2	0.5°	3	40	5	2.6°	2.52	100	6	3	●	1	40.7	41.7	43.9	*
DF3XB**R0100L060**	1	2	0.5°	3	60	5	1.8°	2.86	130	6	3	●	1	60.7	62.2	*	*
DF3XB**R0100L080**	1	2	0.5°	3	80	5	1.4°	3.21	130	6	3	●	1	80.7	82.7	*	*
DF3XB**R0150L060**	1.5	3	0.5°	4.5	60	7.5	1.4°	3.82	130	6	3	●	1	60.8	62.2	*	*
DF3XB**R0150L080**	1.5	3	0.5°	4.5	80	7.5	1.1°	4.17	130	6	3	●	1	80.8	82.8	*	*
DF3XB**R0200L100**	2	4	0.5°	6	100	9	0.6°	5.49	160	6	3	●	1	100.8	*	*	*

* No interference

RECOMMENDED CUTTING CONDITIONS

Work material		Graphite				Copper, Copper alloys			
R PRFRAD (mm)	Neck length LU_2 (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
R0.5	**30**	20000	1100	0.05	0.13	16000	700	0.04	0.13
	40	15000	750	0.04	0.11	12000	480	0.03	0.11
	50	12000	500	0.03	0.10	9600	320	0.02	0.10
R1	**40**	20000	1800	0.13	0.40	16000	1100	0.10	0.40
	60	15000	900	0.09	0.27	12000	580	0.07	0.27
	80	12000	600	0.07	0.20	9600	380	0.06	0.20
R1.5	**60**	14000	1700	0.15	0.45	11000	1100	0.12	0.45
	80	12000	1200	0.12	0.35	9600	770	0.10	0.35
R2	**100**	10000	1100	0.20	0.50	8000	700	0.16	0.50

Depth of cut



PRFRAD:Radius

1) When high machining accuracy is needed, or the workpiece becomes chipped, we recommend lowering the feed rate.
2) Use a milling machine dedicated for graphite.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

● : Inventory maintained in Japan.

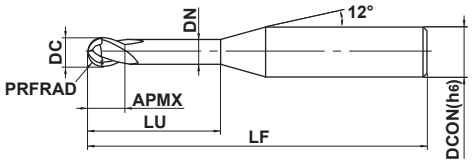
IMPACT MIRACLE END MILL FOR DIFFICULT TO CUT MATERIALS, IRREGULAR HELIX

VF4SVB

Ball nose, Short cut length, 4 flute,Variable curve

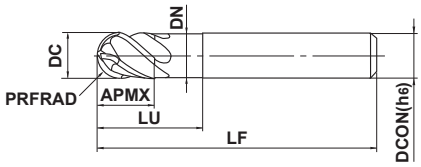
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○			◎	◎		





Type1

R	PRFRAD≤6	PRFRAD>6		
	±0.01	±0.02		
	DC≤12	DC>12		
	0 - 0.02	0 - 0.03		
h6	DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013



Type2

- Impact Miracle ball nose end mill with variable curve ensures stable machining of difficult-to-cut materials.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VF4SVBR0100	1	2	3	5	1.9	50	6	4	●	1
VF4SVBR0150	1.5	3	4.5	7.5	2.9	50	6	4	●	1
VF4SVBR0200	2	4	6	10	3.9	50	6	4	●	1
VF4SVBR0250	2.5	5	7.5	12.5	4.9	50	6	4	●	1
VF4SVBR0300	3	6	9	15	5.85	50	6	4	●	2
VF4SVBR0400	4	8	12	20	7.85	60	8	4	●	2
VF4SVBR0500	5	10	15	25	9.7	70	10	4	●	2
VF4SVBR0600	6	12	18	30	11.7	75	12	4	●	2
VF4SVBR0800	8	16	24	40	15.5	90	16	4	●	2
VF4SVBR1000	10	20	30	50	19.5	100	20	4	●	2

IMPACT MIRACLE END MILL FOR DIFFICULT TO CUT MATERIALS, IRREGULAR HELIX

VF4SVB

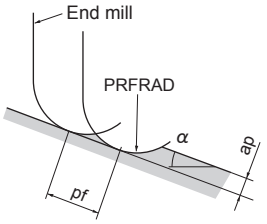
Ball nose, Short cut length, 4 flute,Variable curve

RECOMMENDED CUTTING CONDITIONS

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21						Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V						Heat resistant alloys Inconel718					
R **PRFRAD** (mm)	α≤15°		α>15°		Depth of cut ap (mm)	Pick feed pf (mm)	α≤15°		α>15°		Depth of cut ap (mm)	Pick feed pf (mm)	α≤15°		α>15°		Depth of cut ap (mm)	Pick feed pf (mm)
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)			Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)			Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)		
R 1	40000	8000	32000	3800	0.17	≤0.5	36000	6500	24000	2900	0.17	≤0.5	9600	960	6400	510	0.08	≤0.2
R 1.5	32000	7700	21000	3200	0.25	≤0.75	24000	4800	16000	1900	0.25	≤0.75	6400	640	4200	340	0.13	≤0.3
R 2	24000	5800	16000	2800	0.33	≤1	18000	4000	12000	1700	0.33	≤1	4800	580	3200	260	0.17	≤0.4
R 2.5	19000	5300	12700	2600	0.42	≤1.25	14400	3500	9600	1500	0.42	≤1.25	3800	530	2500	250	0.21	≤0.5
R 3	16000	4800	10600	2100	0.5	≤1.5	12000	3200	8000	1400	0.5	≤1.5	3200	500	2100	210	0.25	≤0.6
R 4	12000	4300	8000	1900	0.8	≤2	9000	3200	6000	1400	0.8	≤2	2400	430	1600	190	0.4	≤0.8
R 5	9600	4100	6400	1800	1	≤2.5	7200	3000	4800	1300	1	≤2.5	2000	420	1300	180	0.5	≤1
R 6	8000	4000	5300	1800	1.2	≤3	6000	3000	4000	1300	1.2	≤3	1700	350	1100	150	0.6	≤1.2
R 8	6000	3200	4000	1400	1.6	≤4	4500	2500	3000	1100	1.6	≤4	1200	300	800	130	0.8	≤1.6
R10	4800	3000	3200	1300	2	≤5	3600	2300	2400	1000	2	≤5	1000	250	640	100	1	≤2
Depth of cut	≤0.5PRFRAD, ≤ap												≤0.2PRFRAD, ≤ap					

PRFRAD:Radius

1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
4) α is the inclination angle of the machined surface.

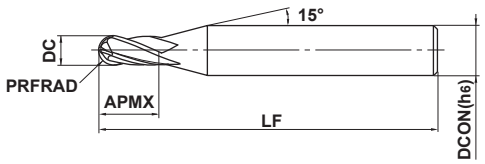


VF4MB

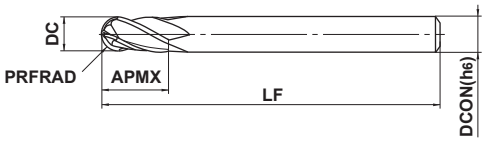
Ball nose, Medium cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
	◎	◎	◎	○	○		





Type1



Type2

R

h6

0.5≤PRFRAD≤6				
±0.01				
1≤DC≤12				
0 - 0.020				
DCON=6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

4 flute ball nose end mill for high-speed machining of hardened steel.

Unit : mm

Order Number	PRFRAD	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VF4MBR0050	0.5	1	2.5	50	6	4	●	1
VF4MB**R0100**	1	2	6	60	6	4	●	1
VF4MB**R0150**	1.5	3	8	70	6	4	●	1
VF4MB**R0200**	2	4	8	70	6	4	●	1
VF4MB**R0250**	2.5	5	12	80	6	4	●	1
VF4MB**R0300**	3	6	12	80	6	4	●	2
VF4MB**R0400**	4	8	14	90	8	4	●	2
VF4MB**R0500**	5	10	18	100	10	4	●	2
VF4MB**R0600**	6	12	22	110	12	4	●	2

● : Inventory maintained in Japan.

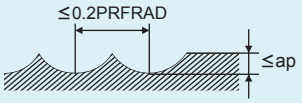
VF4MB

Ball nose, Medium cut length, 4 flute

RECOMMENDED CUTTING CONDITIONS

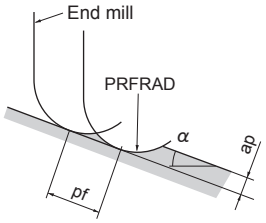
Work material	Hardened steel (45−55HRC) AISI H13					Hardened steel (55−62HRC) AISI D2					Hardened steel (62−70HRC) AISI W1, AISI M2				
R PRFRAD (mm)	α≤15°		α>15°		Depth of cut ap(mm)	α≤15°		α>15°		Depth of cut ap(mm)	α≤15°		α>15°		Depth of cut ap(mm)
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)		Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)		Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	
R0.5	40000	8000	40000	3800	0.06	40000	5600	40000	3100	0.05	40000	4700	32000	1700	0.03
R1	40000	9600	40000	5600	0.11	40000	8000	28000	3100	0.10	24000	5000	16000	1200	0.06
R1.5	40000	12000	32000	5600	0.13	32000	7700	19000	2900	0.12	16000	4200	11000	1100	0.07
R2	32000	11000	24000	4700	0.15	24000	6200	14000	2500	0.13	12000	3100	8000	1000	0.08
R2.5	25000	9000	19000	3800	0.20	19000	5300	12000	2200	0.15	9600	2700	6000	780	0.08
R3	21000	8400	15000	3400	0.25	16000	4800	9600	2000	0.20	8000	2300	5000	780	0.09
R4	16000	6400	12000	2600	0.30	12000	3600	7200	1600	0.20	6000	1900	4000	620	0.09
R5	13000	5200	9600	2200	0.50	10000	3200	5800	1300	0.20	4800	1500	3000	550	0.10
R6	9000	3600	7200	1700	0.50	7000	2200	4300	940	0.30	3600	1100	2200	400	0.10

Depth of cut



PRFRAD:Radius

1) α is the inclination angle of the machined surface.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

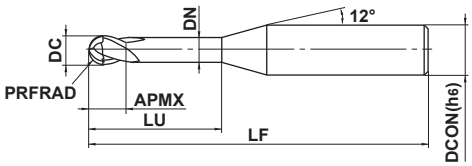


VQ4SVB

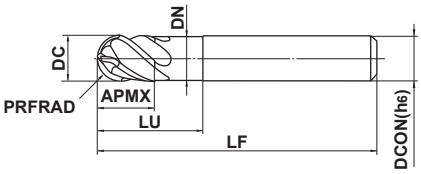
Ball nose, Medium cutting length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○			◎	◎	○	





Type1



Type2

R					
1≤PRFRAD≤6					
±0.01					
DC≤12					
0 - 0.02					
DCON=6	8≤DCON≤10	DCON=12			
0 - 0.008	0 - 0.009	0 - 0.011			

h6

- 4 flute ball nose end mill
- With the special substrate, suitable for finishing of heat resistance alloy, etc.

Unit : mm

Order Number	PRFRAD	DC	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VQ4SVBR0100	1	2	3	5	1.9	50	6	4	●	1
VQ4SVBR0150	1.5	3	4.5	7.5	2.9	50	6	4	●	1
VQ4SVBR0200	2	4	6	10	3.9	50	6	4	●	1
VQ4SVBR0250	2.5	5	7.5	12.5	4.9	50	6	4	●	1
VQ4SVBR0300	3	6	9	15	5.85	50	6	4	●	2
VQ4SVBR0400	4	8	12	20	7.85	60	8	4	●	2
VQ4SVBR0500	5	10	15	25	9.7	70	10	4	●	2
VQ4SVBR0600	6	12	18	30	11.7	75	12	4	●	2

Note) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.

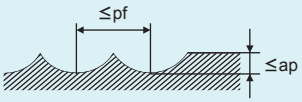
● : Inventory maintained in Japan.

VQ4SVB

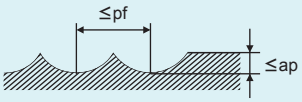
Ball nose, Medium cutting length, 4 flute

RECOMMENDED CUTTING CONDITIONS

Shoulder milling(Slotting)

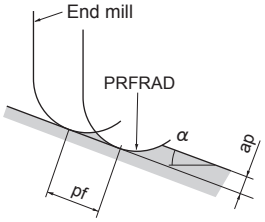
Work material	Carbon steel, Alloy steel, Mild steel, Pre-hardened steel AISI 1045, AISI 4140, ASTM A36, AISI 1010, AISI P21, AISI P20, AISI 4340								Austenitic stainless steel, Titanium alloy, Precipitation hardeningstainless steel, Cobalt chromium alloy, Ferritic, Precipitation hardeningstainless steel AISI 304, AISI 316, Ti-6Al-4V, AISI 630, AISI 631, 15-5PH, 17-4PH, AISI 431, AISI 420							
R **PRFRAD** (mm)	α≤15°			α>15°			Depth of cut ap (mm)	Pick feed pf (mm)	α≤15°			α>15°			Depth of cut ap (mm)	Pick feed pf (mm)
	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)			Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)		
R 1	250	40000	8000	200	32000	3800	0.17	0.5	230	36000	6500	150	24000	2900	0.17	0.5
R 1.5	300	32000	7700	200	21000	3200	0.25	0.75	230	24000	4800	150	16000	1900	0.25	0.75
R 2	300	24000	5800	200	16000	2800	0.33	1	230	18000	4000	150	12000	1700	0.33	1
R 2.5	300	19000	5300	200	12700	2600	0.42	1.25	230	14400	3500	150	9600	1500	0.42	1.25
R 3	300	16000	4800	200	10600	2100	0.5	1.5	230	12000	3200	150	8000	1400	0.5	1.5
R 4	300	12000	4300	200	8000	1900	0.8	2	230	9000	3200	150	6000	1400	0.8	2
R 5	300	9600	4100	200	6400	1800	1	2.5	230	7200	3000	150	4800	1300	1	2.5
R 6	300	8000	4000	200	5300	1800	1.2	3	230	6000	3000	150	4000	1300	1.2	3
Depth of cut																

PRFRAD:Radius

Work material	Copper, Copper alloy								Heat Resistant Alloy Inconel718							
R **PRFRAD** (mm)	α≤15°			α>15°			Depth of cut ap (mm)	Pick feed pf (mm)	α≤15°			α>15°			Depth of cut ap (mm)	Pick feed pf (mm)
	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)			Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)		
R 1	250	40000	8000	240	38000	4500	0.17	0.5	60	9600	960	40	6400	510	0.08	0.2
R 1.5	360	38000	9100	240	25000	3800	0.25	0.7	60	6400	640	40	4200	340	0.13	0.3
R 2	360	29000	7000	240	19000	3300	0.33	1	60	4800	580	40	3200	260	0.17	0.4
R 2.5	360	23000	6400	240	15000	3100	0.42	1.2	60	3800	530	39	2500	250	0.21	0.5
R 3	360	19000	5700	240	13000	2600	0.5	1.5	60	3200	500	40	2100	210	0.25	0.6
R 4	360	14000	5000	240	9600	2300	0.8	2	60	2400	430	40	1600	190	0.4	0.8
R 5	360	12000	5100	240	7700	2200	1	2.5	63	2000	420	41	1300	180	0.5	1
R 6	360	9600	4800	240	6400	2200	1.2	3	64	1700	350	41	1100	150	0.6	1.2
Depth of cut																

PRFRAD:Radius

1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
2) For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
3) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
4) If the depth of cut is shallow, the revolution and feed rate can be increased.
5) α is the inclination angle of the machined surface.



MIRACLE END MILL FOR HIGH HARDNESS STEEL

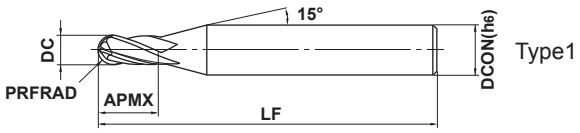
VC4MB

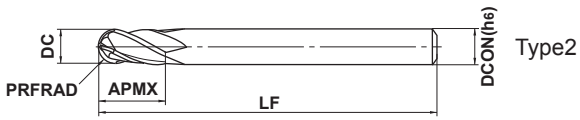
Ball nose end mill, Medium cut length, 4 flute

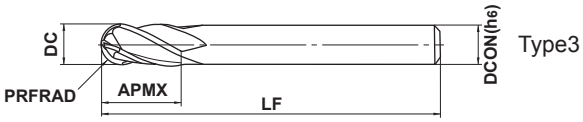
PRFRAD<3 PRFRAD≥3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎	○	○		









R

PRFRAD≤6	PRFRAD≥7			
±0.01	±0.02			

DC≤12	DC>12			
0 - 0.020	0 - 0.030			

h6

DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

● 4 flute ball nose end mill with high durability for hardened steels.

Unit : mm

Order Number	PRFRAD	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VC4MBR0050	0.5	1	2.5	50	6	4	●	1
VC4MB**R0075**	0.75	1.5	4	50	6	4	●	1
VC4MB**R0100**	1	2	6	60	6	4	●	1
VC4MB**R0150**	1.5	3	8	70	6	4	●	1
VC4MB**R0200**	2	4	8	70	6	4	●	1
VC4MB**R0250**	2.5	5	12	80	6	4	●	1
VC4MB**R0300**	3	6	12	80	6	4	●	2
VC4MB**R0400**	4	8	14	90	8	4	●	2
VC4MB**R0500**	5	10	18	100	10	4	●	2
VC4MB**R0600**	6	12	22	110	12	4	●	2
VC4MB**R0700**	7	14	26	120	12	4	●	3
VC4MB**R0800**	8	16	30	140	16	4	●	2
VC4MB**R0900**	9	18	34	140	16	4	●	3
VC4MB**R1000**	10	20	38	160	20	4	●	2

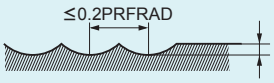
● : Inventory maintained in Japan.

MIRACLE END MILL FOR HIGH HARDNESS STEEL

VC4MB

Ball nose end mill, Medium cut length, 4 flute

RECOMMENDED CUTTING CONDITIONS

Work material	Alloy steel, Tool steel, Pre-hardened steel, Hardened steel (−55HRC) AISI H13, AISI W1-10, AISI P21					Hardened steel (55−62HRC) AISI D2				
R **PRFRAD** (mm)	α≤15°		α>15°		Depth of cut (mm)	α≤15°		α>15°		Depth of cut (mm)
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)		Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	
R 0.5	40000	8000	40000	3800	0.06	40000	5600	40000	3100	0.05
R 0.75	40000	9600	40000	4800	0.09	40000	7200	38000	4200	0.08
R 1	40000	9600	40000	5600	0.11	40000	8000	28000	3100	0.10
R 1.5	40000	12000	32000	5600	0.13	32000	7700	19000	2900	0.12
R 2	32000	11000	24000	4700	0.15	24000	6200	14000	2500	0.13
R 2.5	25000	9000	19000	3800	0.20	19000	5300	12000	2200	0.15
R 3	21000	8400	15000	3400	0.25	16000	4800	9600	2000	0.20
R 4	16000	6400	12000	2600	0.30	12000	3600	7200	1600	0.20
R 5	13000	5200	9600	2200	0.50	10000	3200	5800	1300	0.20
R 6	9000	3600	7200	1700	0.50	7000	2200	4300	940	0.30
Depth of cut	 ≤Please refer to the list above for depth of cut. PRFRAD:Radius									

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

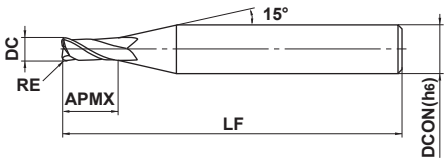
MS2MRB

Corner radius end mill, Medium cut length, 2 flute

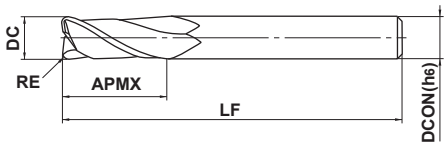


Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		





Type1



Type2

1≤DC≤12				
0 - 0.020				
4≤DCON≤6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

h6

● 2 flute corner radius end mill for general use.

Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
MS2MRBD0100R010	1	0.1	2	40	4	2	●	1
MS2MRBD0100R020	1	0.2	2	40	4	2	●	1
MS2MRBD0100R030	1	0.3	2	40	4	2	●	1
MS2MRBD0150R010	1.5	0.1	3	40	4	2	●	1
MS2MRBD0150R020	1.5	0.2	3	40	4	2	●	1
MS2MRBD0150R030	1.5	0.3	3	40	4	2	●	1
MS2MRBD0150R050	1.5	0.5	3	40	4	2	●	1
MS2MRBD0200R010	2	0.1	4	40	4	2	●	1
MS2MRBD0200R020	2	0.2	4	40	4	2	●	1
MS2MRBD0200R030	2	0.3	4	40	4	2	●	1
MS2MRBD0200R050	2	0.5	4	40	4	2	●	1
MS2MRBD0250R010	2.5	0.1	5	40	4	2	●	1
MS2MRBD0250R020	2.5	0.2	5	40	4	2	●	1
MS2MRBD0250R030	2.5	0.3	5	40	4	2	●	1
MS2MRBD0250R050	2.5	0.5	5	40	4	2	●	1
MS2MRBD0300R010	3	0.1	6	50	6	2	●	1
MS2MRBD0300R020	3	0.2	6	50	6	2	●	1
MS2MRBD0300R030	3	0.3	6	50	6	2	●	1
MS2MRBD0300R050	3	0.5	6	50	6	2	●	1
MS2MRBD0300R100	3	1	6	50	6	2	●	1
MS2MRBD0400R010	4	0.1	8	50	6	2	●	1
MS2MRBD0400R020	4	0.2	8	50	6	2	●	1
MS2MRBD0400R030	4	0.3	8	50	6	2	●	1
MS2MRBD0400R050	4	0.5	8	50	6	2	●	1
MS2MRBD0400R100	4	1	8	50	6	2	●	1
MS2MRBD0500R010	5	0.1	10	50	6	2	●	1
MS2MRBD0500R020	5	0.2	10	50	6	2	●	1
MS2MRBD0500R030	5	0.3	10	50	6	2	●	1
MS2MRBD0500R050	5	0.5	10	50	6	2	●	1
MS2MRBD0500R100	5	1	10	50	6	2	●	1
MS2MRBD0600R010	6	0.1	12	50	6	2	●	2
MS2MRBD0600R020	6	0.2	12	50	6	2	●	2
MS2MRBD0600R030	6	0.3	12	50	6	2	●	2
MS2MRBD0600R050	6	0.5	12	50	6	2	●	2

● : Inventory maintained in Japan.

MS2MRB

Corner radius end mill, Medium cut length, 2 flute

Unit : mm

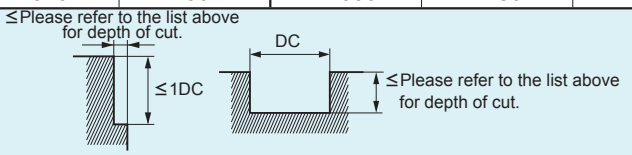
Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
MS2MRBD0600R100	6	1	12	50	6	2	●	2
MS2MRBD0600R150	6	1.5	12	50	6	2	●	2
MS2MRBD0600R200	6	2	12	50	6	2	●	2
MS2MRBD0800R020	8	0.2	16	60	8	2	●	2
MS2MRBD0800R030	8	0.3	16	60	8	2	●	2
MS2MRBD0800R050	8	0.5	16	60	8	2	●	2
MS2MRBD0800R100	8	1	16	60	8	2	●	2
MS2MRBD0800R150	8	1.5	16	60	8	2	●	2
MS2MRBD0800R200	8	2	16	60	8	2	●	2
MS2MRBD0800R250	8	2.5	16	60	8	2	●	2
MS2MRBD0800R300	8	3	16	60	8	2	●	2
MS2MRBD1000R020	10	0.2	20	70	10	2	●	2
MS2MRBD1000R030	10	0.3	20	70	10	2	●	2
MS2MRBD1000R050	10	0.5	20	70	10	2	●	2
MS2MRBD1000R100	10	1	20	70	10	2	●	2
MS2MRBD1000R150	10	1.5	20	70	10	2	●	2
MS2MRBD1000R200	10	2	20	70	10	2	●	2
MS2MRBD1000R250	10	2.5	20	70	10	2	●	2
MS2MRBD1000R300	10	3	20	70	10	2	●	2
MS2MRBD1200R020	12	0.2	24	75	12	2	●	2
MS2MRBD1200R030	12	0.3	24	75	12	2	●	2
MS2MRBD1200R050	12	0.5	24	75	12	2	●	2
MS2MRBD1200R100	12	1	24	75	12	2	●	2
MS2MRBD1200R150	12	1.5	24	75	12	2	●	2
MS2MRBD1200R200	12	2	24	75	12	2	●	2
MS2MRBD1200R250	12	2.5	24	75	12	2	●	2
MS2MRBD1200R300	12	3	24	75	12	2	●	2

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45—55HRC) AISI H13		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
0.1	40000	40	0.001	40000	40	0.001
0.2	40000	100	0.002	40000	100	0.002
0.3	40000	200	0.005	40000	200	0.005
0.4	40000	600	0.01	40000	600	0.01
0.5	40000	1000	0.015	40000	960	0.015
0.6	40000	1200	0.02	40000	1200	0.02
0.7	40000	1400	0.02	40000	1400	0.02
0.8	40000	1600	0.03	40000	1600	0.03
0.9	40000	1800	0.04	40000	1600	0.04
1	40000	2000	0.06	32000	1600	0.06
1.5	40000	3000	0.12	32000	1900	0.08
2	30000	3000	0.18	24000	1900	0.10
2.5	24000	2600	0.25	19000	1600	0.13
3	20000	2300	0.30	16000	1400	0.15
4	15000	2000	0.40	12000	1200	0.20
5	12000	1600	0.50	9000	900	0.25
6	10000	1400	0.60	7000	700	0.30
8	8000	1000	0.80	5600	550	0.40
10	6400	900	1.00	4500	500	0.50
12	5400	820	1.00	3800	450	0.50
16	2400	380	3.00	1200	100	0.80
20	1900	320	4.00	1000	80	1.00

Depth of cut



DC:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) When slotting with end mills with ϕ3 or larger, reduce the revolution to 50—70% and the feed rate to 40—60%.
3) When drilling, please set the feed rate at 1/3 or below the values above.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

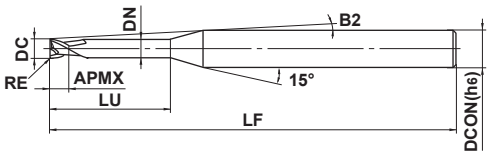
MS2XLRB

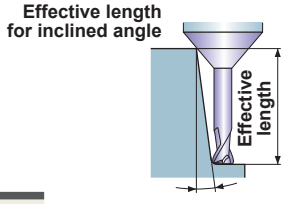
Corner radius end mill, Short cut length, 2 flute, Long neck

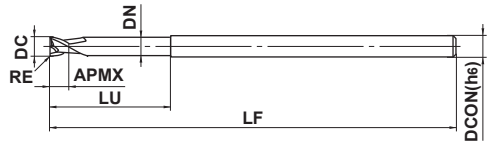


Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		











1≤DC≤6			
0 - 0.020			
DCON=6			
0 - 0.008			

2 flute long neck corner radius end mill.

Unit : mm

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
												30'	1°	2°	3°
MS2XLRBD0100R010N020	1	0.1	1	2	0.94	12.3°	60	6	2	●	1	2.1	2.3	2.4	2.8
MS2XLRBD0100R010N050	1	0.1	1	5	0.94	9.8°	60	6	2	●	1	5.3	5.6	6.0	6.5
MS2XLRBD0200R010N040	2	0.1	2	4	1.90	9.9°	60	6	2	●	1	4.2	4.4	4.8	5.2
MS2XLRBD0200R010N100	2	0.1	2	10	1.90	6.5°	60	6	2	●	1	10.5	10.9	11.7	12.6
MS2XLRBD0200R030N040	2	0.3	2	4	1.90	10°	60	6	2	●	1	4.2	4.4	4.7	5.1
MS2XLRBD0200R030N100	2	0.3	2	10	1.90	6.6°	60	6	2	●	1	10.5	10.8	11.6	12.6
MS2XLRBD0300R010N060	3	0.1	3	6	2.90	7.4°	50	6	2	●	1	6.3	6.6	7.1	7.6
MS2XLRBD0300R010N150	3	0.1	3	15	2.90	4.2°	60	6	2	●	1	15.7	16.2	17.4	18.8
MS2XLRBD0300R030N060	3	0.3	3	6	2.90	7.5°	50	6	2	●	1	6.3	6.6	7.0	7.6
MS2XLRBD0300R030N150	3	0.3	3	15	2.90	4.2°	60	6	2	●	1	15.7	16.2	17.4	18.8
MS2XLRBD0400R010N080	4	0.1	4	8	3.90	4.9°	50	6	2	●	1	8.4	8.7	9.4	10.1
MS2XLRBD0400R010N200	4	0.1	4	20	3.90	2.5°	60	6	2	●	1	20.8	21.6	23.2	*
MS2XLRBD0400R030N080	4	0.3	4	8	3.90	5°	50	6	2	●	1	8.4	8.7	9.3	10.1
MS2XLRBD0400R030N200	4	0.3	4	20	3.90	2.5°	60	6	2	●	1	20.8	21.5	23.1	*
MS2XLRBD0400R050N080	4	0.5	4	8	3.90	5°	50	6	2	●	1	8.4	8.7	9.3	10.0
MS2XLRBD0400R050N200	4	0.5	4	20	3.90	2.5°	60	6	2	●	1	20.8	21.5	23.1	*
MS2XLRBD0600R010N120	6	0.1	6	12	5.85	—	50	6	2	●	1	*	*	*	*
MS2XLRBD0600R010N300	6	0.1	6	30	5.85	—	70	6	2	●	1	*	*	*	*
MS2XLRBD0600R030N120	6	0.3	6	12	5.85	—	50	6	2	●	1	*	*	*	*
MS2XLRBD0600R030N300	6	0.3	6	30	5.85	—	70	6	2	●	1	*	*	*	*
MS2XLRBD0600R050N120	6	0.5	6	12	5.85	—	50	6	2	●	2	*	*	*	*
MS2XLRBD0600R050N300	6	0.5	6	30	5.85	—	70	6	2	●	2	*	*	*	*

* No interference

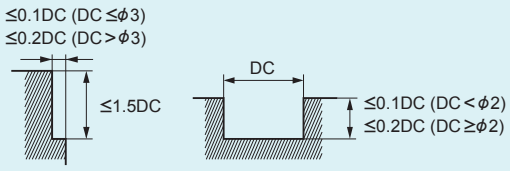
● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

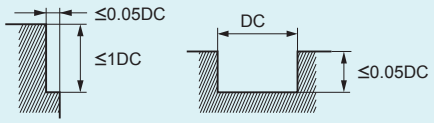
Work material			Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13	
Dia. **DC** (mm)	Neck length **LU** (mm)		Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	**2**		30000	600	20000	400	18000	300	15000	120
2	**4**		15000	600	10000	400	9100	300	8000	120
3	**6**	(**2D**)	10000	600	7000	400	6000	300	5000	120
4	**8**		7500	600	5200	400	4500	300	4000	120
6	**12**		5000	600	3500	400	3000	300	2700	120
1	**5**		22000	350	17000	280	14000	200	12000	100
2	**10**		11000	350	8800	280	7200	200	6400	100
3	**15**	(**5D**)	7400	350	5800	280	4800	200	4200	100
4	**20**		5600	350	4400	280	3600	200	3200	100
6	**30**		3700	350	2900	280	2400	200	2100	100

Depth of cut

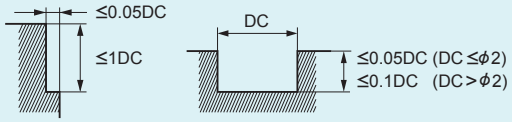
(Neck length=2D)



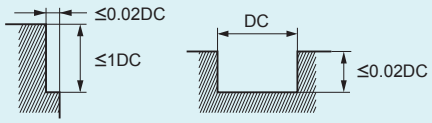
(Neck length=5D)



(Neck length=2D)



(Neck length=5D)



DC:Dia.

1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.

MIRACLE END MILLS

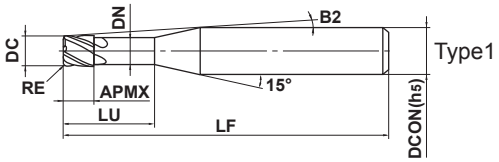
VCPSRB MIRACLE ORBIT

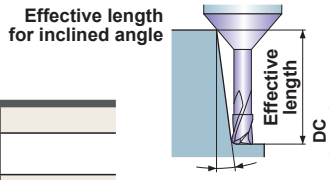
Corner radius end mill, Short cut length, 2—4 flute, High precision

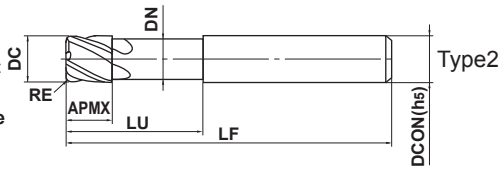
UWC VC 30° DC≤1.5 DC≥2

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎	◎	○	○		









R					
	0.05≤RE≤5				
	±0.01				
	0.6≤DC≤12				
	0 - 0.01				
h5	DCON=6	8≤DCON≤10	DCON=12		
	0 - 0.005	0 - 0.006	0 - 0.008		

●±0.01mm corner radius tolerance, 0—-0.01mm outer diameter tolerance.
End mill with corner radius for precise and efficient machining.

Unit : mm

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle 30'	1°	2°	3°
VCPSRBD0060N02R005	0.6	0.05	0.6	2	0.56	12.6°	50	6	2	●	1	2.1	2.2	2.4	2.6
VCPSRBD0060N02R01	0.6	0.1	0.6	2	0.56	12.6°	50	6	2	●	1	2.1	2.2	2.3	2.6
VCPSRBD0060N02R02	0.6	0.2	0.6	2	0.56	12.7°	50	6	2	●	1	2.1	2.2	2.2	2.5
VCPSRBD0060N04R01	0.6	0.1	0.6	4	0.56	10.9°	50	6	2	●	1	4.2	4.4	4.7	5.1
VCPSRBD0060N04R02	0.6	0.2	0.6	4	0.56	11°	50	6	2	●	1	4.2	4.3	4.7	5
VCPSRBD0080N04R005	0.8	0.05	0.8	4	0.76	10.7°	50	6	2	●	1	4.2	4.4	4.7	5.1
VCPSRBD0080N04R01	0.8	0.1	0.8	4	0.76	10.8°	50	6	2	●	1	4.2	4.4	4.7	5.1
VCPSRBD0080N04R02	0.8	0.2	0.8	4	0.76	10.8°	50	6	2	●	1	4.2	4.3	4.7	5
VCPSRBD0080N04R03	0.8	0.3	0.8	4	0.76	10.9°	50	6	2	●	1	4.2	4.3	4.6	5
VCPSRBD0080N06R01	0.8	0.1	0.8	6	0.76	9.4°	50	6	2	●	1	6.3	6.5	7	7.5
VCPSRBD0080N06R02	0.8	0.2	0.8	6	0.76	9.5°	50	6	2	●	1	6.3	6.5	7	7.5
VCPSRBD0080N06R03	0.8	0.3	0.8	6	0.76	9.5°	50	6	2	●	1	6.3	6.5	6.9	7.5
VCPSRBD0080N08R03	0.8	0.3	0.8	8	0.76	8.5°	50	6	2	●	1	8.3	8.6	9.2	10
VCPSRBD0100N04R005	1	0.05	1	4	0.94	10.5°	50	6	2	●	1	4.2	4.5	4.8	5.3
VCPSRBD0100N04R01	1	0.1	1	4	0.94	10.5°	50	6	2	●	1	4.2	4.5	4.8	5.3
VCPSRBD0100N04R02	1	0.2	1	4	0.94	10.6°	50	6	2	●	1	4.2	4.5	4.7	5.3
VCPSRBD0100N04R03	1	0.3	1	4	0.94	10.6°	50	6	2	●	1	4.2	4.5	4.6	5.2
VCPSRBD0100N04R04	1	0.4	1	4	0.94	10.7°	50	6	2	●	1	4.2	4.5	4.4	5.2
VCPSRBD0100N06R01	1	0.1	1	6	0.94	9.2°	50	6	2	●	1	6.4	6.7	7.2	7.8
VCPSRBD0100N06R02	1	0.2	1	6	0.94	9.2°	50	6	2	●	1	6.4	6.7	7.2	7.7
VCPSRBD0100N06R03	1	0.3	1	6	0.94	9.3°	50	6	2	●	1	6.3	6.6	7.2	7.7
VCPSRBD0100N06R04	1	0.4	1	6	0.94	9.4°	50	6	2	●	1	6.3	6.6	7.1	7.7
VCPSRBD0100N10R03	1	0.3	1	10	0.94	7.4°	50	6	2	●	1	10.5	10.9	11.8	12.7
VCPSRBD0100N10R04	1	0.4	1	10	0.94	7.4°	50	6	2	●	1	10.5	10.9	11.7	12.7
VCPSRBD0120N06R05	1.2	0.5	1.2	6	1.14	9.3°	50	6	2	●	1	6.3	6.6	7.1	7.7
VCPSRBD0120N10R05	1.2	0.5	1.2	10	1.14	7.3°	50	6	2	●	1	10.5	10.9	11.7	12.6
VCPSRBD0120N15R05	1.2	0.5	1.2	15	1.14	5.8°	50	6	2	●	1	15.7	16.3	17.5	18.9
VCPSRBD0150N04R01	1.5	0.1	1.5	4	1.44	10.2°	50	6	2	●	1	4.2	4.5	4.8	5.3
VCPSRBD0150N04R02	1.5	0.2	1.5	4	1.44	10.2°	50	6	2	●	1	4.2	4.5	4.7	5.3
VCPSRBD0150N04R03	1.5	0.3	1.5	4	1.44	10.3°	50	6	2	●	1	4.2	4.5	4.6	5.2
VCPSRBD0150N04R05	1.5	0.5	1.5	4	1.44	10.5°	50	6	2	●	1	4.2	4.4	4.3	5.2
VCPSRBD0150N06R01	1.5	0.1	1.5	6	1.44	8.8°	50	6	2	●	1	6.4	6.7	7.2	7.8
VCPSRBD0150N06R02	1.5	0.2	1.5	6	1.44	8.9°	50	6	2	●	1	6.4	6.7	7.2	7.7
VCPSRBD0150N06R03	1.5	0.3	1.5	6	1.44	8.9°	50	6	2	●	1	6.3	6.6	7.2	7.7

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
												30'	1°	2°	3°
VCPSRBD0150N06R05	1.5	0.5	1.5	6	1.44	9°	50	6	2	●	1	6.3	6.6	7.1	7.7
VCPSRBD0150N10R01	1.5	0.1	1.5	10	1.44	6.9°	50	6	2	●	1	10.6	11	11.8	12.7
VCPSRBD0150N10R02	1.5	0.2	1.5	10	1.44	7°	50	6	2	●	1	10.5	11	11.8	12.7
VCPSRBD0150N10R03	1.5	0.3	1.5	10	1.44	7°	50	6	2	●	1	10.5	10.9	11.8	12.7
VCPSRBD0150N10R05	1.5	0.5	1.5	10	1.44	7.1°	50	6	2	●	1	10.5	10.9	11.7	12.6
VCPSRBD0150N15R01	1.5	0.1	1.5	15	1.44	5.5°	50	6	2	●	1	15.8	16.3	17.5	18.9
VCPSRBD0150N15R02	1.5	0.2	1.5	15	1.44	5.5°	50	6	2	●	1	15.8	16.3	17.5	18.9
VCPSRBD0150N15R03	1.5	0.3	1.5	15	1.44	5.5°	50	6	2	●	1	15.7	16.3	17.5	18.9
VCPSRBD0150N15R05	1.5	0.5	1.5	15	1.44	5.7°	50	6	2	●	1	15.7	16.3	17.4	18.6
VCPSRBD0150N20R03	1.5	0.3	1.5	20	1.44	4.7°	60	6	2	●	1	20.9	21.6	22.9	24.5
VCPSRBD0150N20R05	1.5	0.5	1.5	20	1.44	4.8°	60	6	2	●	1	20.9	21.5	22.8	24.2
VCPSRBD0200N06R01	2	0.1	2	6	1.9	9.4°	50	6	4	●	1	6.3	6.6	6.9	7.5
VCPSRBD0200N06R02	2	0.2	2	6	1.9	9.7°	50	6	4	●	1	6.3	6.6	6.8	7.4
VCPSRBD0200N06R03	2	0.3	2	6	1.9	10°	50	6	4	●	1	6.3	6.6	6.7	7.4
VCPSRBD0200N06R05	2	0.5	2	6	1.9	10.3°	50	6	4	●	1	6.3	6.5	6.5	7.4
VCPSRBD0200N10R01	2	0.1	2	10	1.9	7.6°	50	6	4	●	1	10.5	10.9	11.4	12
VCPSRBD0200N10R02	2	0.2	2	10	1.9	7.7°	50	6	4	●	1	10.5	10.8	11.2	12
VCPSRBD0200N10R03	2	0.3	2	10	1.9	7.8°	50	6	4	●	1	10.5	10.8	11.1	11.9
VCPSRBD0200N10R05	2	0.5	2	10	1.9	8°	50	6	4	●	1	10.5	10.8	10.9	11.9
VCPSRBD0200N15R01	2	0.1	2	15	1.9	5.9°	50	6	4	●	1	15.7	16.1	16.8	17.5
VCPSRBD0200N15R02	2	0.2	2	15	1.9	5.9°	50	6	4	●	1	15.7	16.1	16.7	17.5
VCPSRBD0200N15R03	2	0.3	2	15	1.9	6°	50	6	4	●	1	15.7	16.1	16.6	17.4
VCPSRBD0200N15R05	2	0.5	2	15	1.9	6.1°	50	6	4	●	1	15.6	16.1	16.3	17.4
VCPSRBD0200N20R03	2	0.3	2	20	1.9	4.8°	60	6	4	●	1	20.8	21.4	21.9	22.9
VCPSRBD0200N20R05	2	0.5	2	20	1.9	4.9°	60	6	4	●	1	20.8	21.4	21.7	22.9
VCPSRBD0200N25R03	2	0.3	2	25	1.9	4°	60	6	4	●	1	26	26.6	27.5	28.3
VCPSRBD0200N25R05	2	0.5	2	25	1.9	4°	60	6	4	●	1	26	26.6	27	28.2
VCPSRBD0250N08R01	2.5	0.1	2.5	8	2.4	8.6°	50	6	4	●	1	8.4	8.7	9.2	9.9
VCPSRBD0250N08R02	2.5	0.2	2.5	8	2.4	8.7°	50	6	4	●	1	8.4	8.7	9	9.9
VCPSRBD0250N08R03	2.5	0.3	2.5	8	2.4	8.8°	50	6	4	●	1	8.4	8.7	8.9	9.9
VCPSRBD0250N08R05	2.5	0.5	2.5	8	2.4	9°	50	6	4	●	1	8.4	8.7	8.7	9.9
VCPSRBD0250N08R10	2.5	1	2.5	8	2.4	9.4°	50	6	4	●	1	8.3	8.7	8.2	9.9
VCPSRBD0250N15R03	2.5	0.3	2.5	15	2.4	5.5°	50	6	4	●	1	15.7	16.1	16.6	17.5
VCPSRBD0250N15R05	2.5	0.5	2.5	15	2.4	5.6°	50	6	4	●	1	15.6	16.1	16.3	17.5
VCPSRBD0250N15R10	2.5	1	2.5	15	2.4	5.7°	50	6	4	●	1	15.6	16.1	15.8	17.5
VCPSRBD0300N10R01	3	0.1	3	10	2.9	6.6°	60	6	4	●	1	10.5	10.9	11.4	12.3
VCPSRBD0300N10R02	3	0.2	3	10	2.9	6.6°	60	6	4	●	1	10.5	10.8	11.2	12.3
VCPSRBD0300N10R03	3	0.3	3	10	2.9	6.6°	60	6	4	●	1	10.5	10.8	11.1	12.3
VCPSRBD0300N10R05	3	0.5	3	10	2.9	6.7°	60	6	4	●	1	10.5	10.8	10.9	12.4
VCPSRBD0300N10R10	3	1	3	10	2.9	7°	60	6	4	●	1	10.4	10.8	10.4	12.4
VCPSRBD0300N15R01	3	0.1	3	15	2.9	4.8°	60	6	4	●	1	15.7	16.1	16.8	17.7
VCPSRBD0300N15R02	3	0.2	3	15	2.9	4.8°	60	6	4	●	1	15.7	16.1	16.7	17.8
VCPSRBD0300N15R03	3	0.3	3	15	2.9	4.8°	60	6	4	●	1	15.7	16.1	16.6	17.8
VCPSRBD0300N15R05	3	0.5	3	15	2.9	4.8°	60	6	4	●	1	15.6	16.1	16.3	17.8
VCPSRBD0300N15R10	3	1	3	15	2.9	5°	60	6	4	●	1	15.6	16.1	15.8	17.8
VCPSRBD0300N20R01	3	0.1	3	20	2.9	3.7°	60	6	4	●	1	20.8	21.4	22.1	23.1
VCPSRBD0300N20R02	3	0.2	3	20	2.9	3.7°	60	6	4	●	1	20.8	21.4	22	23.1
VCPSRBD0300N20R03	3	0.3	3	20	2.9	3.8°	60	6	4	●	1	20.8	21.4	21.9	23.2
VCPSRBD0300N20R05	3	0.5	3	20	2.9	3.8°	60	6	4	●	1	20.8	21.4	21.7	23.2
VCPSRBD0300N20R10	3	1	3	20	2.9	3.9°	60	6	4	●	1	20.8	21.3	21.2	23.2
VCPSRBD0300N30R03	3	0.3	3	30	2.9	2.6°	70	6	4	●	1	31.1	31.8	32.5	*
VCPSRBD0300N30R05	3	0.5	3	30	2.9	2.6°	70	6	4	●	1	31.1	31.8	32.2	*

* No interference

VCPSRB MIRACLE ORBIT

Corner radius end mill, Short cut length, 2—4 flute, High precision

Unit : mm

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
												30'	1°	2°	3°
VCPSRBD0400N12R01	4	0.1	4	12	3.9	3.8°	60	6	4	●	1	12.5	13	13.5	15.1
VCPSRBD0400N12R02	4	0.2	4	12	3.9	3.8°	60	6	4	●	1	12.5	13	13.4	15.2
VCPSRBD0400N12R03	4	0.3	4	12	3.9	3.8°	60	6	4	●	1	12.5	13	13.3	15.2
VCPSRBD0400N12R05	4	0.5	4	12	3.9	3.9°	60	6	4	●	1	12.5	13	13.1	15.3
VCPSRBD0400N12R10	4	1	4	12	3.9	4°	60	6	4	●	1	12.5	12.9	12.6	15.3
VCPSRBD0400N20R01	4	0.1	4	20	3.9	2.5°	60	6	4	●	1	20.8	21.4	22.1	*
VCPSRBD0400N20R02	4	0.2	4	20	3.9	2.5°	60	6	4	●	1	20.8	21.4	22	*
VCPSRBD0400N20R03	4	0.3	4	20	3.9	2.5°	60	6	4	●	1	20.8	21.4	21.9	*
VCPSRBD0400N20R05	4	0.5	4	20	3.9	2.5°	60	6	4	●	1	20.8	21.4	21.7	*
VCPSRBD0400N20R10	4	1	4	20	3.9	2.6°	60	6	4	●	1	20.8	21.3	21.2	*
VCPSRBD0400N30R03	4	0.3	4	30	3.9	1.8°	70	6	4	●	1	31.1	31.8	*	*
VCPSRBD0400N30R05	4	0.5	4	30	3.9	1.8°	70	6	4	●	1	31.1	31.8	*	*
VCPSRBD0400N30R10	4	1	4	30	3.9	1.8°	70	6	4	●	1	31.1	31.8	*	*
VCPSRBD0500N15R05	5	0.5	5	15	4.9	1.6°	60	6	4	●	1	15.6	16.1	*	*
VCPSRBD0500N15R10	5	1	5	15	4.9	1.6°	60	6	4	●	1	15.6	16.1	*	*
VCPSRBD0500N30R05	5	0.5	5	30	4.9	0.9°	70	6	4	●	1	31.1	*	*	*
VCPSRBD0500N30R10	5	1	5	30	4.9	0.9°	70	6	4	●	1	31.1	*	*	*
VCPSRBD0600N18R01	6	0.1	6	18	5.85	—	70	6	4	●	2	*	*	*	*
VCPSRBD0600N18R02	6	0.2	6	18	5.85	—	70	6	4	●	2	*	*	*	*
VCPSRBD0600N18R03	6	0.3	6	18	5.85	—	70	6	4	●	2	*	*	*	*
VCPSRBD0600N18R05	6	0.5	6	18	5.85	—	70	6	4	●	2	*	*	*	*
VCPSRBD0600N18R10	6	1	6	18	5.85	—	70	6	4	●	2	*	*	*	*
VCPSRBD0600N18R20	6	2	6	18	5.85	—	70	6	4	●	2	*	*	*	*
VCPSRBD0600N41R05	6	0.5	6	41	5.85	—	90	6	4	●	2	*	*	*	*
VCPSRBD0600N50R10	6	1	6	50	5.85	—	90	6	4	●	2	*	*	*	*
VCPSRBD0800N24R01	8	0.1	8	24	7.85	—	90	8	4	●	2	*	*	*	*
VCPSRBD0800N24R02	8	0.2	8	24	7.85	—	90	8	4	●	2	*	*	*	*
VCPSRBD0800N24R03	8	0.3	8	24	7.85	—	90	8	4	●	2	*	*	*	*
VCPSRBD0800N24R05	8	0.5	8	24	7.85	—	90	8	4	●	2	*	*	*	*
VCPSRBD0800N24R10	8	1	8	24	7.85	—	90	8	4	●	2	*	*	*	*
VCPSRBD0800N24R20	8	2	8	24	7.85	—	90	8	4	●	2	*	*	*	*
VCPSRBD0800N24R30	8	3	8	24	7.85	—	90	8	4	●	2	*	*	*	*
VCPSRBD0800N50R10	8	1	8	50	7.85	—	90	8	4	●	2	*	*	*	*
VCPSRBD0800N50R30	8	3	8	50	7.85	—	90	8	4	●	2	*	*	*	*
VCPSRBD1000N30R03	10	0.3	10	30	9.7	—	100	10	4	●	2	*	*	*	*
VCPSRBD1000N30R05	10	0.5	10	30	9.7	—	100	10	4	●	2	*	*	*	*
VCPSRBD1000N30R10	10	1	10	30	9.7	—	100	10	4	●	2	*	*	*	*
VCPSRBD1000N30R20	10	2	10	30	9.7	—	100	10	4	●	2	*	*	*	*
VCPSRBD1000N30R30	10	3	10	30	9.7	—	100	10	4	●	2	*	*	*	*
VCPSRBD1000N30R40	10	4	10	30	9.7	—	100	10	4	●	2	*	*	*	*
VCPSRBD1000N50R10	10	1	10	50	9.7	—	100	10	4	●	2	*	*	*	*
VCPSRBD1000N50R30	10	3	10	50	9.7	—	100	10	4	●	2	*	*	*	*
VCPSRBD1200N36R03	12	0.3	12	36	11.7	—	110	12	4	●	2	*	*	*	*
VCPSRBD1200N36R05	12	0.5	12	36	11.7	—	110	12	4	●	2	*	*	*	*
VCPSRBD1200N36R10	12	1	12	36	11.7	—	110	12	4	●	2	*	*	*	*
VCPSRBD1200N36R20	12	2	12	36	11.7	—	110	12	4	●	2	*	*	*	*
VCPSRBD1200N36R30	12	3	12	36	11.7	—	110	12	4	●	2	*	*	*	*
VCPSRBD1200N36R40	12	4	12	36	11.7	—	110	12	4	●	2	*	*	*	*
VCPSRBD1200N36R50	12	5	12	36	11.7	—	110	12	4	●	2	*	*	*	*

* No interference

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Hardened steel (45－55HRC) AISI H13		Hardened steel (55－62HRC) AISI D2	
Dia. **DC** (mm)	Neck length **LU** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
0.6	**2**	48000	200－ 600	40000	160－ 500	22000	80－ 250
	4	48000	160－ 500	40000	100－ 300	22000	50－ 150
0.8	**4**	48000	240－ 750	32000	160－ 500	19000	80－ 250
	6	38000	190－ 600	26000	130－ 400	16000	70－ 200
	8	29000	150－ 450	19000	100－ 300	12000	50－ 150
1	**4**	48000	270－ 900	32000	180－ 600	19000	90－ 300
	6	38000	220－ 720	26000	150－ 480	16000	70－ 240
	10	29000	160－ 540	19000	110－ 360	12000	60－ 180
1.2	**6**	48000	300－ 900	32000	200－ 600	19000	100－ 300
	10	38000	240－ 720	26000	160－ 480	15000	80－ 240
	15	29000	180－ 540	19000	120－ 360	12000	60－ 180
1.5	**4**	41000	300－ 900	27000	200－ 600	16000	100－ 300
	6	32000	240－ 720	22000	160－ 480	13000	80－ 240
	10	24000	180－ 540	16000	120－ 360	10000	60－ 180
2	**6**	36000	600－2000	24000	400－1300	14000	200－ 650
	10	29000	480－1600	19000	320－1000	12000	160－ 520
	15	22000	360－1200	14000	240－ 780	9000	120－ 390
2.5	**8**	33000	750－2400	22000	500－1600	13000	250－ 800
	15	20000	450－1400	13000	300－ 960	8000	150－ 480
3	**10**	30000	900－3000	20000	600－2000	12000	300－1000
	15	24000	720－2400	16000	480－1600	10000	240－ 800
	20	18000	540－1800	12000	360－1200	7000	180－ 600
4	**12**	26000	1200－4500	17000	800－3000	10000	400－1500
	20	20000	960－2000	14000	640－2000	8000	320－2000
	30	15000	720－1000	10000	480－1000	6000	240－1000
5	**15**	20000	1200－4800	13000	780－3120	10000	520－2000
	30	12000	720－1900	8000	480－1600	7000	360－1120
6	**18**	20000	1600－7500	13000	1100－5000	8000	550－2500
	41	15000	900－2400	12000	720－1600	10000	600－1200
	50	10000	600－1200	8000	480－ 800	6000	360－ 530
8	**24**	15000	1900－7500	10000	1300－5000	6000	650－2500
	50	10000	1300－2400	8000	1000－2200	3000	320－ 600
10	**30**	12000	1600－7500	8000	1100－5000	5000	550－2500
	50	10000	1300－3200	7000	950－2200	2500	280－ 600
12	**36**	10000	1500－7500	7000	1000－5000	4000	500－2500
Depth of cut		≤0.2RE (DC≤ϕ2) ≤0.4RE (DC＞ϕ2) ≤0.1mm (DC≤ϕ1.5) ≤0.2mm (DC≤ϕ4) ≤0.5mm (DC≤ϕ6)				≤0.1RE (DC≤ϕ2) ≤0.2RE (DC＞ϕ2) ≤0.05mm (DC≤ϕ1.5) ≤0.1mm (DC≤ϕ4) ≤0.3mm (DC≤ϕ6)	

DC:Dia.

1) The cutting conditions above are a guide only to machining with cutting edges with a corner radius. When machining with peripheral cutting edges, use the minimum feed rate as a guide.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) For profile machining such as moulds, machining conditions may differ considerably depending on the workpiece geometry, machining methods and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MIRACLE END MILLS

VCPSRB MIRACLE ORBIT

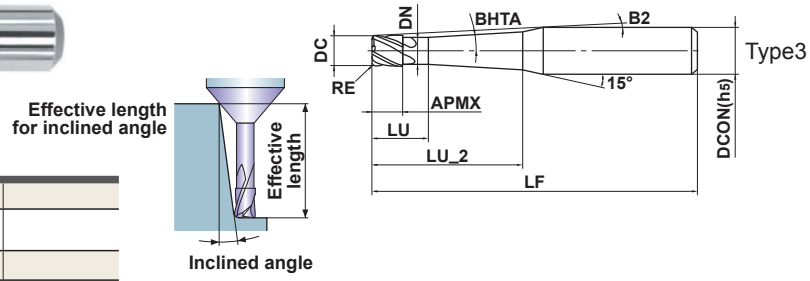
Corner radius end mill, Short cut length, 2−4 flute, High precision



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎	◎	○	○		

Taper neck type





R					
	0.5≤RE≤3				
	±0.01				
	1.5≤DC≤12				
	0 - 0.01				
h5	DCON=6	8≤DCON≤10	12≤DCON≤16		
	0 - 0.005	0 - 0.006	0 - 0.008		

●±0.01mm corner radius tolerance, 0−-0.01mm outer diameter tolerance.
End mill with corner radius for precise and efficient machining.

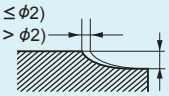
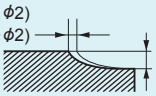
Unit : mm

Order Number	DC	RE	BHTA	APMX	LU_2	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle 1°	2°	3°
VCPSRBD0150N03L06R05	1.5	0.5	1° 30'	1.5	6	3	1.44	9°	50	6	2	●	3	—	7.1	7.7
VCPSRBD0150N03L10R05	1.5	0.5	1° 30'	1.5	10	3	1.44	7.2°	50	6	2	●	3	—	11.3	12.2
VCPSRBD0200N04L10R05	2	0.5	1° 30'	2	10	4	1.9	6.7°	60	6	4	●	3	—	11.5	12.4
VCPSRBD0200N04L15R05	2	0.5	1° 30'	2	15	4	1.9	5.3°	60	6	4	●	3	—	16.7	18
VCPSRBD0250N05L12R10	2.5	1	1° 30'	2.5	12	5	2.4	5.6°	60	6	4	●	3	—	14.2	15.3
VCPSRBD0250N05L20R10	2.5	1	1° 30'	2.5	20	5	2.4	4°	60	6	4	●	3	—	22.5	24.2
VCPSRBD0300N06L15R05	3	0.5	1° 30'	3	15	6	2.9	4.4°	60	6	4	●	3	—	16.9	18.2
VCPSRBD0300N06L20R05	3	0.5	1° 30'	3	20	6	2.9	3.6°	60	6	4	●	3	—	22.1	23.8
VCPSRBD0300N06L15R10	3	1	1° 30'	3	15	6	2.9	4.4°	60	6	4	●	3	—	17.4	18.7
VCPSRBD0300N06L20R10	3	1	1° 30'	3	20	6	2.9	3.6°	60	6	4	●	3	—	22.6	24.4
VCPSRBD0400N08L20R10	4	1	1° 30'	4	20	8	3.9	2.6°	60	6	4	●	3	—	22.8	*
VCPSRBD0400N08L30R10	4	1	1° 30'	4	30	8	3.9	1.9°	70	6	4	●	3	—	*	*
VCPSRBD0500N08L40R05	5	0.5	1°	5	40	8	4.9	2°	90	8	4	●	3	41.2	*	*
VCPSRBD0500N08L60R05	5	0.5	1°	5	60	8	4.9	1.4°	110	8	4	●	3	61.2	*	*
VCPSRBD0500N08L40R10	5	1	1°	5	40	8	4.9	2°	90	8	4	●	3	41.7	*	*
VCPSRBD0500N08L60R10	5	1	1°	5	60	8	4.9	1.4°	110	8	4	●	3	61.7	*	*
VCPSRBD0600N08L40R20	6	2	1°	6	40	8	5.85	1.4°	70	8	4	●	3	42.8	*	*
VCPSRBD0600N08L60R20	6	2	1°	6	60	8	5.85	1°	100	8	4	●	3	*	*	*
VCPSRBD0800N10L53R20	8	2	1°	8	53	10	7.85	1.1°	90	10	4	●	3	55.9	*	*
VCPSRBD0800N10L70R20	8	2	1°	8	70	10	7.85	1.6°	130	12	4	●	3	72.9	*	*
VCPSRBD1000N12L55R30	10	3	1°	10	55	12	9.7	1.1°	100	12	4	●	3	59.4	*	*
VCPSRBD1000N12L70R30	10	3	1°	10	70	12	9.7	0.9°	130	12	4	●	3	*	*	*
VCPSRBD1200N24L70R30	12	3	1°	12	70	24	11.7	1.6°	130	16	4	●	3	75.2	*	*

* No interference

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Hardened steel (45－55HRC) AISI H13		Hardened steel (55－62HRC) AISI D2	
Dia. **DC** (mm)	Taper angle one side **DHTA**	Neck length **LU_2** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1.5	**1°30'**	**6**	36000	270－ 810	24000	180－ 540	15000	90－ 270
	1°30'	**10**	28000	210－ 630	19000	140－ 420	11000	70－ 210
2	**1°30'**	**10**	32000	540－1800	22000	360－1200	13000	180－ 590
	1°30'	**15**	25000	420－1400	17000	280－ 910	10000	140－ 460
2.5	**1°30'**	**12**	26000	600－1900	18000	400－1300	11000	200－ 640
	1°30'	**20**	20000	450－ 140	13000	300－ 960	8000	150－ 480
3	**1°30'**	**15**	27000	810－2700	18000	540－1800	11000	270－ 900
	1°30'	**20**	21000	630－2100	14000	420－1400	8000	210－ 700
4	**1°30'**	**20**	23000	1080－3000	15000	720－3000	9000	360－3000
	1°30'	**30**	18000	840－1500	12000	560－1500	7000	280－1500
5	**1°**	**40**	10000	520－1400	7000	420－ 840	5000	260－ 600
	1°	**60**	7000	360－ 840	5000	300－ 500	4000	210－ 400
6	**1°**	**40**	20000	1650－4500	13000	1100－3000	8000	550－1500
8	**1°**	**53**	15000	1950－4500	10000	1300－3000	6000	650－1500
10	**1°**	**55**	12000	1650－4500	8000	1100－3000	5000	550－1500
Depth of cut			≤0.2RE (DC≤ϕ2) ≤0.4RE (DC＞ϕ2)  ≤0.1mm (DC≤ϕ1.5) ≤0.2mm (DC≤ϕ4) ≤0.5mm (DC≤ϕ6)		≤0.1RE (DC≤ϕ2) ≤0.2RE (DC＞ϕ2)  ≤0.05mm (DC≤ϕ1.5) ≤0.1mm (DC≤ϕ4) ≤0.3mm (DC≤ϕ6)		

DC:Dia.

1) The cutting conditions above are a guide only to machining with cutting edges with a corner radius. When machining with peripheral cutting edges, use the minimum feed rate as a guide.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) For profile machining such as moulds, machining conditions may differ considerably depending on the workpiece geometry, machining methods and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

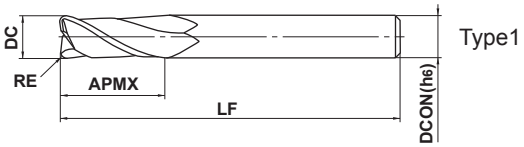
CRN END MILLS

CRN2MRB

Corner radius, Medium cut length, 2 flute, For copper electrodes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
						◎	○





Type1

6≤DC≤12				
0 - 0.02				
DCON=6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

h6

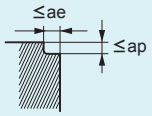
● 2 flute corner radius end mill with CRN coating for copper electrode machining.

Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
CRN2MRBD0600R020	6	0.2	13	50	6	2	●	1
CRN2MRB**D0600R030**	6	0.3	13	50	6	2	●	1
CRN2MRB**D0600R050**	6	0.5	13	50	6	2	●	1
CRN2MRB**D0600R100**	6	1	13	50	6	2	●	1
CRN2MRB**D0800R030**	8	0.3	19	60	8	2	●	1
CRN2MRB**D0800R050**	8	0.5	19	60	8	2	●	1
CRN2MRB**D0800R100**	8	1	19	60	8	2	●	1
CRN2MRB**D1000R030**	10	0.3	22	70	10	2	●	1
CRN2MRB**D1000R050**	10	0.5	22	70	10	2	●	1
CRN2MRB**D1000R100**	10	1	22	70	10	2	●	1
CRN2MRB**D1200R030**	12	0.3	26	75	12	2	●	1
CRN2MRB**D1200R050**	12	0.5	26	75	12	2	●	1
CRN2MRB**D1200R100**	12	1	26	75	12	2	●	1

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material		Copper, Copper alloys			
Dia. **DC** (mm)	Corner radius **RE** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
6	**R0.2, R0.3, R0.5**	10000	1400	6	0.6
	R1	10000	1700	6	0.6
8	**R0.3, R0.5**	8000	1000	8	0.8
	R1	8000	1200	8	0.8
10	**R0.3, R0.5**	6400	900	10	1.0
	R1	6400	1100	10	1.0
12	**R0.3, R0.5**	5400	800	12	1.0
	R1	5400	1000	12	1.0
Depth of cut		 DC:Dia.			

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Water-soluble cutting fluid is recommended.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

CRN END MILLS

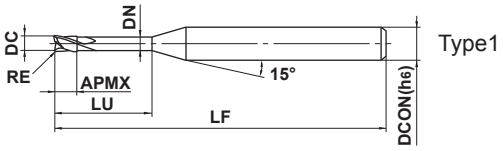
CRN2XLRB

Corner radius, Medium cut length, 2 flute, For copper electrodes

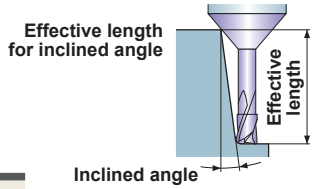
UWC CRN 30° DC<3 DC≥3

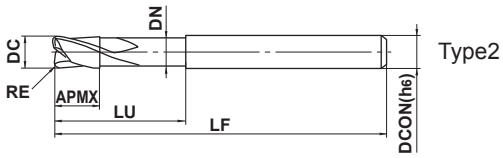
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
						◎	○





Type1





Type2

0.5≤DC≤6			
0 - 0.02			
4≤DCON≤6			
0 - 0.008			

h6

● 2 flute long neck corner radius end mill with CRN coating for copper electrode machining.

Unit : mm

Order Number	DC	RE	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle 30'	1°	2°	3°
CRN2XLRBD0050R005N04	0.5	0.05	0.5	4	0.46	50	4	2	●	1	4.1	4.3	4.6	5
CRN2XLRBD0050R010N04	0.5	0.1	0.5	4	0.46	50	4	2	●	1	4.1	4.3	4.6	5
CRN2XLRBD0050R005N06	0.5	0.05	0.5	6	0.46	50	4	2	●	1	6.2	6.4	6.9	7.5
CRN2XLRBD0050R010N06	0.5	0.1	0.5	6	0.46	50	4	2	●	1	6.2	6.4	6.9	7.5
CRN2XLRBD0080R005N06	0.8	0.05	0.8	6	0.76	50	4	2	●	1	6.3	6.5	7	7.6
CRN2XLRBD0080R010N06	0.8	0.1	0.8	6	0.76	50	4	2	●	1	6.3	6.5	7	7.5
CRN2XLRBD0080R005N08	0.8	0.05	0.8	8	0.76	50	4	2	●	1	8.3	8.6	9.3	10
CRN2XLRBD0080R010N08	0.8	0.1	0.8	8	0.76	50	4	2	●	1	8.3	8.6	9.3	10
CRN2XLRBD0100R010N08	1	0.1	1	8	0.94	50	4	2	●	1	8.5	8.8	9.5	10.2
CRN2XLRBD0100R030N08	1	0.3	1	8	0.94	50	4	2	●	1	8.5	8.8	9.5	10.2
CRN2XLRBD0100R010N10	1	0.1	1	10	0.94	55	4	2	●	1	10.6	11	11.8	12.7
CRN2XLRBD0100R030N10	1	0.3	1	10	0.94	55	4	2	●	1	10.5	10.9	11.8	12.7
CRN2XLRBD0100R010N12	1	0.1	1	12	0.94	55	4	2	●	1	12.6	13.1	14.1	15.2
CRN2XLRBD0100R030N12	1	0.3	1	12	0.94	55	4	2	●	1	12.6	13.1	14.1	15.2
CRN2XLRBD0150R010N12	1.5	0.1	1.5	12	1.44	55	4	2	●	1	12.6	13.1	14.1	15.2
CRN2XLRBD0150R020N12	1.5	0.2	1.5	12	1.44	55	4	2	●	1	12.6	13.1	14.1	15.2
CRN2XLRBD0150R030N12	1.5	0.3	1.5	12	1.44	55	4	2	●	1	12.6	13.1	14.1	15.2
CRN2XLRBD0150R010N20	1.5	0.1	1.5	20	1.44	60	4	2	●	1	20.9	21.7	23.3	*
CRN2XLRBD0150R020N20	1.5	0.2	1.5	20	1.44	60	4	2	●	1	20.9	21.7	23.3	*
CRN2XLRBD0150R030N20	1.5	0.3	1.5	20	1.44	60	4	2	●	1	20.9	21.6	23.3	*
CRN2XLRBD0200R010N12	2	0.1	2	12	1.9	55	4	2	●	1	12.5	13	14	15.1
CRN2XLRBD0200R020N12	2	0.2	2	12	1.9	55	4	2	●	1	12.5	13	14	15.1
CRN2XLRBD0200R030N12	2	0.3	2	12	1.9	55	4	2	●	1	12.5	13	13.9	15
CRN2XLRBD0200R050N12	2	0.5	2	12	1.9	55	4	2	●	1	12.5	13	13.9	15
CRN2XLRBD0200R010N16	2	0.1	2	16	1.9	55	4	2	●	1	16.7	17.3	18.6	*
CRN2XLRBD0200R020N16	2	0.2	2	16	1.9	55	4	2	●	1	16.7	17.3	18.6	*
CRN2XLRBD0200R030N16	2	0.3	2	16	1.9	55	4	2	●	1	16.7	17.3	18.5	*
CRN2XLRBD0200R050N16	2	0.5	2	16	1.9	55	4	2	●	1	16.7	17.2	18.5	*
CRN2XLRBD0200R010N20	2	0.1	2	20	1.9	60	4	2	●	1	20.8	21.6	23.2	*
CRN2XLRBD0200R020N20	2	0.2	2	20	1.9	60	4	2	●	1	20.8	21.5	23.2	*
CRN2XLRBD0200R030N20	2	0.3	2	20	1.9	60	4	2	●	1	20.8	21.5	23.1	*
CRN2XLRBD0200R050N20	2	0.5	2	20	1.9	60	4	2	●	1	20.8	21.5	23.1	*
CRN2XLRBD0300R020N20	3	0.2	3	20	2.9	65	6	2	●	1	20.8	21.5	23.2	25
CRN2XLRBD0300R030N20	3	0.3	3	20	2.9	65	6	2	●	1	20.8	21.5	23.1	25

* No interference

● : Inventory maintained in Japan.

Unit : mm

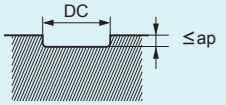
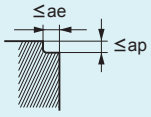
Order Number	DC	RE	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
											30'	1°	2°	3°
CRN2XLRBD0300R050N20	3	0.5	3	20	2.9	65	6	2	●	1	20.8	21.5	23.1	24.9
CRN2XLRBD0400R020N20	4	0.2	4	20	3.9	65	6	2	●	1	20.8	21.5	23.2	*
CRN2XLRBD0400R030N20	4	0.3	4	20	3.9	65	6	2	●	1	20.8	21.5	23.1	*
CRN2XLRBD0400R050N20	4	0.5	4	20	3.9	65	6	2	●	1	20.8	21.5	23.1	*
CRN2XLRBD0500R020N25	5	0.2	5	25	4.9	65	6	2	●	1	26	26.9	*	*
CRN2XLRBD0500R030N25	5	0.3	5	25	4.9	65	6	2	●	1	26	26.9	*	*
CRN2XLRBD0500R050N25	5	0.5	5	25	4.9	65	6	2	●	1	26	26.9	*	*
CRN2XLRBD0600R020N30	6	0.2	6	30	5.85	70	6	2	●	2	*	*	*	*
CRN2XLRBD0600R030N30	6	0.3	6	30	5.85	70	6	2	●	2	*	*	*	*
CRN2XLRBD0600R050N30	6	0.5	6	30	5.85	70	6	2	●	2	*	*	*	*
CRN2XLRBD0600R100N30	6	1	6	30	5.85	70	6	2	●	2	*	*	*	*

* No interference

RECOMMENDED CUTTING CONDITIONS

Slotting

Contour Cutting

Work material			Copper, Copper alloys			Copper, Copper alloys			
								Depth of cut	
Dia. **DC** (mm)	Corner radius **RE** (mm)	Neck length (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	ap (mm)	ae (mm)
0.5	**R0.05, R0.1**	**4**	40000	800	0.005	40000	1500	0.01	0.1
		6	40000	700	0.003	40000	1000	0.005	0.1
0.8	**R0.05, R0.1**	**6**	40000	1200	0.02	40000	2500	0.02	0.15
		8	40000	1200	0.015	40000	1600	0.01	0.15
1	**R0.1, R0.3**	**8**	40000	2000	0.03	40000	3000	0.03	0.2
		10	35000	1600	0.025	35000	2000	0.025	0.2
		12	30000	1200	0.02	30000	1800	0.02	0.2
1.5	**R0.1, R0.2, R0.3**	**12**	30000	1500	0.05	40000	4500	0.04	0.3
		20	20000	1000	0.02	20000	2000	0.02	0.3
2	**R0.1, R0.2 R0.3, R0.5**	**12**	30000	1500	0.1	40000	4500	0.08	0.4
		16	30000	1000	0.06	30000	3000	0.05	0.4
		20	20000	600	0.04	20000	2000	0.04	0.4
3	**R0.2, R0.3**	**20**	20000	2000	0.12	35000	6000	0.1	0.6
	R0.5	**20**	20000	2200	0.12	35000	8000	0.1	0.6
4	**R0.2, R0.3**	**20**	15000	2000	0.25	32000	5000	0.15	0.8
	R0.5	**20**	15000	2200	0.25	32000	7000	0.15	0.8
5	**R0.2, R0.3**	**25**	12000	1500	0.3	22000	5000	0.2	1.0
	R0.5	**25**	12000	1700	0.3	22000	7000	0.2	1.0
6	**R0.2, R0.3, R0.5**	**30**	10000	1200	0.4	20000	5000	0.25	1.2
	R1	**30**	10000	1500	0.4	20000	7000	0.25	1.2
Depth of cut			 DC:Dia.			 DC:Dia.		

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Water-soluble cutting fluid is recommended.
3) Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

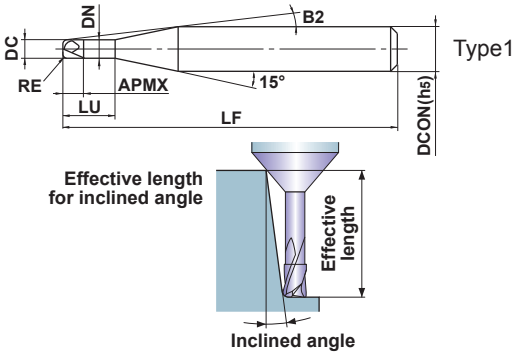
CBN END MILLS

CBN2XLRB

Corner radius end mill, Medium cut length, 2 flute, Long neck

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎				





R	0.05≤RE≤0.5				
	±0.005				
	0.5≤DC≤2				
	0 - 0.010				
h5	DCON=4				
	0 - 0.005				

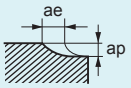
● CBN long neck radius end mill. A wide variation of neck lengths available.

Unit : mm

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
												30'	1°	2°	3°
CBN2XLRBD0050R005N02	0.05	0.5	0.3	2	0.46	11.6°	51	4	2	●	1	2.1	2.1	2.3	2.5
CBN2XLRB**D0050R005N03**	0.05	0.5	0.3	3	0.46	10.4°	51	4	2	●	1	3.1	3.2	3.5	3.7
CBN2XLRB**D0050R010N02**	0.1	0.5	0.3	2	0.46	11.7°	51	4	2	●	1	2.1	2.1	2.3	2.5
CBN2XLRB**D0050R010N03**	0.1	0.5	0.3	3	0.46	10.5°	51	4	2	●	1	3.1	3.2	3.4	3.7
CBN2XLRB**D0100R005N03**	0.05	1	0.6	3	0.94	9.7°	51	4	2	●	1	3.2	3.4	3.7	4
CBN2XLRB**D0100R005N05**	0.05	1	0.6	5	0.94	7.9°	51	4	2	●	1	5.3	5.6	6	6.5
CBN2XLRB**D0100R010N03**	0.1	1	0.6	3	0.94	9.7°	51	4	2	●	1	3.2	3.4	3.6	4
CBN2XLRB**D0100R010N05**	0.1	1	0.6	5	0.94	8°	51	4	2	●	1	5.3	5.6	6	6.5
CBN2XLRB**D0100R020N03**	0.2	1	0.6	3	0.94	9.8°	51	4	2	●	1	3.2	3.4	3.5	4
CBN2XLRB**D0100R020N05**	0.2	1	0.6	5	0.94	8°	51	4	2	●	1	5.3	5.6	6	6.5
CBN2XLRB**D0100R030N03**	0.3	1	0.6	3	0.94	9.9°	51	4	2	●	1	3.2	3.4	3.4	4
CBN2XLRB**D0100R030N05**	0.3	1	0.6	5	0.94	8.1°	51	4	2	●	1	5.3	5.6	6	6.5
CBN2XLRB**D0150R010N05**	0.1	1.5	0.9	5	1.44	7.3°	52	4	2	●	1	5.3	5.6	6	6.5
CBN2XLRB**D0150R010N08**	0.1	1.5	0.9	8	1.44	5.6°	52	4	2	●	1	8.5	8.8	9.5	10.2
CBN2XLRB**D0150R020N05**	0.2	1.5	0.9	5	1.44	7.3°	52	4	2	●	1	5.3	5.6	6	6.5
CBN2XLRB**D0150R020N08**	0.2	1.5	0.9	8	1.44	5.6°	52	4	2	●	1	8.5	8.8	9.5	10.2
CBN2XLRB**D0150R030N05**	0.3	1.5	0.9	5	1.44	7.4°	52	4	2	●	1	5.3	5.6	6	6.5
CBN2XLRB**D0150R030N08**	0.3	1.5	0.9	8	1.44	5.7°	52	4	2	●	1	8.5	8.8	9.5	10.2
CBN2XLRB**D0200R010N06**	0.1	2	1.2	6	1.9	5.9°	52	4	2	●	1	6.3	6.6	7.1	7.6
CBN2XLRB**D0200R010N10**	0.1	2	1.2	10	1.9	4.2°	52	4	2	●	1	10.5	10.9	11.7	12.6
CBN2XLRB**D0200R020N06**	0.2	2	1.2	6	1.9	5.9°	52	4	2	●	1	6.3	6.6	7.1	7.6
CBN2XLRB**D0200R020N10**	0.2	2	1.2	10	1.9	4.2°	52	4	2	●	1	10.5	10.9	11.7	12.6
CBN2XLRB**D0200R030N06**	0.3	2	1.2	6	1.9	6°	52	4	2	●	1	6.3	6.6	7	7.6
CBN2XLRB**D0200R030N10**	0.3	2	1.2	10	1.9	4.2°	52	4	2	●	1	10.5	10.8	11.6	12.6
CBN2XLRB**D0200R050N06**	0.5	2	1.2	6	1.9	6.1°	52	4	2	●	1	6.3	6.5	7	7.5
CBN2XLRB**D0200R050N10**	0.5	2	1.2	10	1.9	4.3°	52	4	2	●	1	10.5	10.8	11.6	12.5

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material	Hardened steel (45—55HRC) AISI H13				Hardened steel (55—62HRC) AISI D2				Hardened steel (62—70HRC) AISI W1, AISI M2			
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
0.5	50000	750	0.01	0.2	50000	600	0.01	0.1	40000	400	0.005	0.06
1	38000	1100	0.02	0.3	38000	760	0.01	0.2	25000	400	0.01	0.1
1.5	25000	900	0.03	0.5	25000	700	0.02	0.4	17000	340	0.02	0.2
2	20000	800	0.04	0.7	20000	600	0.03	0.6	12000	300	0.02	0.3
Depth of cut												

DC:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Oil mist coolant is recommended.
3) Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

CRN END ALIMASTER

C3SARB

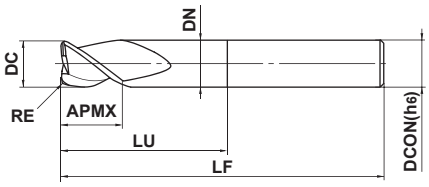
Corner radius, Short cut length, 3 flute, For aluminium alloy



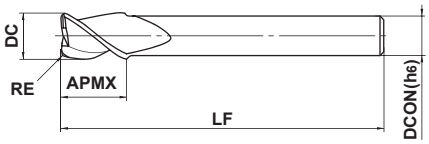



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
						○	◎





Type1



Type2



DC≤12	DC>12			
0 - 0.020	0 - 0.030			
12≤DCON≤16	20≤DCON≤25			
0 - 0.011	0 - 0.013			

● High efficiency machining for aluminium alloys.

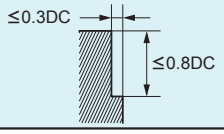
Unit : mm

Order Number	DC	RE	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
C3SARBD1200N0300R100	12	1	15	30	11.4	75	12	3	●	1
C3SARBD1200N0300R320	12	3.2	15	30	11.4	75	12	3	●	1
C3SARBD1200N0400R100	12	1	15	40	11.4	125	12	3	●	1
C3SARBD1200N0400R320	12	3.2	15	40	11.4	125	12	3	●	1
C3SARBD1600N0450R100	16	1	15	45	15.4	125	16	3	●	1
C3SARBD1600N0450R320	16	3.2	15	45	15.4	125	16	3	●	1
C3SARBD1600N0700R100	16	1	15	70	15.4	150	16	3	●	1
C3SARBD1600N0700R320	16	3.2	15	70	15.4	150	16	3	●	1
C3SARBD1800R100	18	1	18	—	—	150	16	3	●	2
C3SARBD1800R320	18	3.2	18	—	—	150	16	3	●	2
C3SARBD2000N0600R100	20	1	20	60	18.0	125	20	3	●	1
C3SARBD2000N0600R320	20	3.2	20	60	18.0	125	20	3	●	1
C3SARBD2000N0600R400	20	4	20	60	18.0	125	20	3	●	1
C3SARBD2000N0850R100	20	1	20	85	18.0	150	20	3	●	1
C3SARBD2000N0850R320	20	3.2	20	85	18.0	150	20	3	●	1
C3SARBD2000N0850R400	20	4	20	85	18.0	150	20	3	●	1
C3SARBD2500N0650R320	25	3.2	20	65	23.0	125	25	3	●	1
C3SARBD2500N0650R400	25	4	20	65	23.0	125	25	3	●	1
C3SARBD2500N0650R500	25	5	20	65	23.0	125	25	3	●	1
C3SARBD2500N0900R320	25	3.2	20	90	23.0	150	25	3	●	1
C3SARBD2500N0900R400	25	4	20	90	23.0	150	25	3	●	1
C3SARBD2500N0900R500	25	5	20	90	23.0	150	25	3	●	1

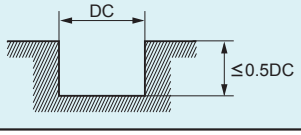
● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Aluminium alloy	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)
12	13000	5400
16	10000	5400
18	9000	5000
20	8000	5000
25	6000	4500
Depth of cut	 DC:Dia.	

Slotting

Work material	Aluminium alloy	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)
12	13000	3200
16	10000	3200
18	9000	3000
20	8000	3000
25	6000	2800
Depth of cut	 DC:Dia.	

1) Water-soluble cutting fluid is recommended.
2) Climb cutting is recommended for side milling.
3) This table shows the cutting condition with less than 4D overhang length. If more than 4D, spindle speed, feed rate and depth of cut should be reduced.
4) These end mills do not have a centre cutting edge, therefore when entering a workpiece use a ramping process rather than vertical feed.
5) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately, or set the depth of cut smaller.

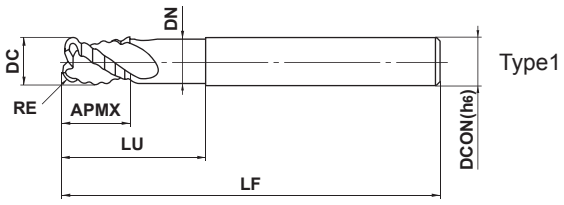
CSRARB

Corner radius roughing end mill, Short cut length, 3 flute, For aluminium alloy



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎





Type1

h6	DCON=10	12≤DCON≤16	20≤DCON≤25		
	0 - 0.009	0 - 0.011	0 - 0.013		

3 flute uncoated end mill for roughing aluminium alloy.

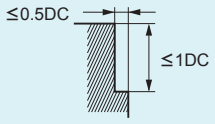
Unit : mm

Order Number	DC	RE	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
CSRARBD1000R100	10	1	12	25	9.4	75	10	3	●	1
CSRARB**D1000R200**	10	2	12	25	9.4	75	10	3	●	1
CSRARB**D1200R100**	12	1	15	30	11.4	75	12	3	●	1
CSRARB**D1200R200**	12	2	15	30	11.4	75	12	3	●	1
CSRARB**D1600R200**	16	2	18	35	15.4	100	16	3	●	1
CSRARB**D1600R300**	16	3	18	35	15.4	100	16	3	●	1
CSRARB**D2000R200**	20	2	25	50	18.0	125	20	3	●	1
CSRARB**D2000R300**	20	3	25	50	18.0	125	20	3	●	1
CSRARB**D2500R300**	25	3	30	60	23.0	125	25	3	●	1
CSRARB**D2500R400**	25	4	30	60	23.0	125	25	3	●	1
CSRARB**D2500R500**	25	5	30	60	23.0	125	25	3	●	1

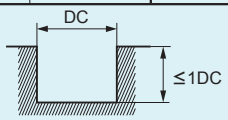
● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Aluminium alloy		Aluminium cast	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
10	19000	8600	9500	3400
12	16000	8200	8000	3200
16	12000	7600	6000	3100
18	10500	7200	5300	2900
20	9500	7100	4800	2900
22	8500	6900	4300	2800
25	7500	6800	3800	2700
Depth of cut	 DC:Dia.			

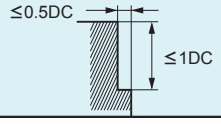
Slotting

Work material	Aluminium alloy		Aluminium cast	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
10	19000	6800	9500	2700
12	16000	6500	8000	2600
16	12000	6100	6000	2400
18	10500	5800	5300	2400
20	9500	5700	4800	2300
22	8500	5500	4300	2200
25	7500	5400	3800	2200
Depth of cut	 DC:Dia.			

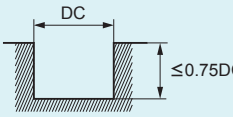
1) Water-soluble cutting fluid is recommended.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) Climb cutting is recommended for side milling.
4) These end mills do not have a centre cutting edge, therefore when entering a workpiece use a ramping process rather than vertical feed.
5) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately, or set the depth of cut smaller.

Using a high-speed and high-rigidity machining center

Side milling

Work material	Aluminium alloy		Aluminium cast	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
10	30000	11000	19000	5400
12	30000	12000	16000	5300
16	24000	12000	12000	4900
18	21000	12000	10500	4700
20	19000	11000	9500	4600
22	17000	11000	8500	4300
25	15000	11000	7500	4300
Depth of cut	 DC:Dia.			

Slotting

Work material	Aluminium alloy		Aluminium cast	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
10	30000	8600	19000	4300
12	30000	9900	16000	4300
16	24000	9700	12000	4000
18	21000	9500	10500	3800
20	19000	9100	9500	3700
22	17000	8700	8500	3400
25	15000	8600	7500	3400
Depth of cut	 DC:Dia.			

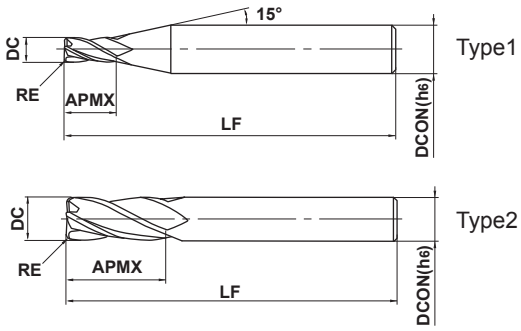
1) Water-soluble cutting fluid is recommended.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) Climb cutting is recommended for side milling.
4) These end mills do not have a centre cutting edge, therefore when entering a workpiece use a ramping process rather than vertical feed.
5) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately, or set the depth of cut smaller.

MS4MRB

Corner radius end mill, Medium cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		





DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

4 flute corner radius end mill for general use.

Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
MS4MRBD0300R010	3	0.1	8	45	6	4	●	1
MS4MRBD0300R020	3	0.2	8	45	6	4	●	1
MS4MRBD0300R030	3	0.3	8	45	6	4	●	1
MS4MRBD0300R050	3	0.5	8	45	6	4	●	1
MS4MRBD0300R100	3	1	8	45	6	4	●	1
MS4MRBD0400R010	4	0.1	11	45	6	4	●	1
MS4MRBD0400R020	4	0.2	11	45	6	4	●	1
MS4MRBD0400R030	4	0.3	11	45	6	4	●	1
MS4MRBD0400R050	4	0.5	11	45	6	4	●	1
MS4MRBD0400R100	4	1	11	45	6	4	●	1
MS4MRBD0500R010	5	0.1	13	50	6	4	●	1
MS4MRBD0500R020	5	0.2	13	50	6	4	●	1
MS4MRBD0500R030	5	0.3	13	50	6	4	●	1
MS4MRBD0500R050	5	0.5	13	50	6	4	●	1
MS4MRBD0500R100	5	1	13	50	6	4	●	1
MS4MRBD0600R010	6	0.1	13	50	6	4	●	2
MS4MRBD0600R020	6	0.2	13	50	6	4	●	2
MS4MRBD0600R030	6	0.3	13	50	6	4	●	2
MS4MRBD0600R050	6	0.5	13	50	6	4	●	2
MS4MRBD0600R100	6	1	13	50	6	4	●	2
MS4MRBD0600R150	6	1.5	13	50	6	4	●	2
MS4MRBD0600R200	6	2	13	50	6	4	●	2
MS4MRBD0800R020	8	0.2	19	60	8	4	●	2
MS4MRBD0800R030	8	0.3	19	60	8	4	●	2
MS4MRBD0800R050	8	0.5	19	60	8	4	●	2
MS4MRBD0800R100	8	1	19	60	8	4	●	2
MS4MRBD0800R150	8	1.5	19	60	8	4	●	2
MS4MRBD0800R200	8	2	19	60	8	4	●	2
MS4MRBD0800R250	8	2.5	19	60	8	4	●	2
MS4MRBD0800R300	8	3	19	60	8	4	●	2
MS4MRBD1000R020	10	0.2	22	70	10	4	●	2
MS4MRBD1000R030	10	0.3	22	70	10	4	●	2
MS4MRBD1000R050	10	0.5	22	70	10	4	●	2
MS4MRBD1000R100	10	1	22	70	10	4	●	2

● : Inventory maintained in Japan.

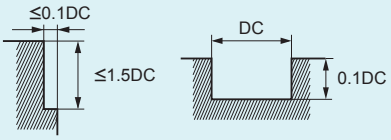
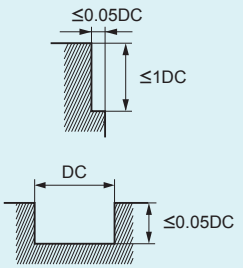
Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
MS4MRBD1000R150	10	1.5	22	70	10	4	●	2
MS4MRBD1000R200	10	2	22	70	10	4	●	2
MS4MRBD1000R250	10	2.5	22	70	10	4	●	2
MS4MRBD1000R300	10	3	22	70	10	4	●	2
MS4MRBD1200R020	12	0.2	26	75	12	4	●	2
MS4MRBD1200R030	12	0.3	26	75	12	4	●	2
MS4MRBD1200R050	12	0.5	26	75	12	4	●	2
MS4MRBD1200R100	12	1	26	75	12	4	●	2
MS4MRBD1200R150	12	1.5	26	75	12	4	●	2
MS4MRBD1200R200	12	2	26	75	12	4	●	2
MS4MRBD1200R250	12	2.5	26	75	12	4	●	2
MS4MRBD1200R300	12	3	26	75	12	4	●	2
MS4MRBD1600R050	16	0.5	32	90	16	4	●	2
MS4MRBD1600R100	16	1	32	90	16	4	●	2
MS4MRBD1600R150	16	1.5	32	90	16	4	●	2
MS4MRBD1600R200	16	2	32	90	16	4	●	2
MS4MRBD1600R250	16	2.5	32	90	16	4	●	2
MS4MRBD1600R300	16	3	32	90	16	4	●	2
MS4MRBD2000R050	20	0.5	38	100	20	4	●	2
MS4MRBD2000R100	20	1	38	100	20	4	●	2
MS4MRBD2000R150	20	1.5	38	100	20	4	●	2
MS4MRBD2000R200	20	2	38	100	20	4	●	2
MS4MRBD2000R250	20	2.5	38	100	20	4	●	2
MS4MRBD2000R300	20	3	38	100	20	4	●	2

MS4MRB

Corner radius end mill, Medium cut length, 4 flute

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	40000	1500	30000	800	22000	480	24000	240
1.5	32000	1500	20000	800	15000	480	16000	240
2	24000	1500	15000	800	11000	480	12000	240
2.5	19000	1500	12000	800	8800	480	9600	240
3	16000	1500	10000	800	7400	480	8000	240
4	12000	1800	8000	1000	5600	600	6000	240
5	9600	1800	6400	1000	4400	600	4800	240
6	8000	1800	5300	1000	3700	600	4000	240
8	6000	1600	4000	900	2800	560	3000	240
10	4800	1400	3200	800	2200	500	2400	240
12	4000	1200	2700	700	1800	430	2000	230
16	3000	960	2000	560	1400	360	1500	190
20	2400	800	1600	480	1100	300	1200	170
Depth of cut								

DC:Dia.

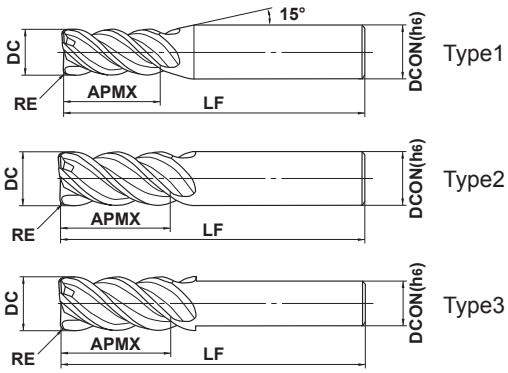
1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) When drilling, please set the feed rate at 1/3 or below the values above.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MSMHDRB

High power, Corner radius, Medium cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		◎	◎		





R					
0.2≤RE≤6.35					
±0.020					
h6	DC≤12	DC>12			
	0 - 0.020	0 - 0.030			
	4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	DCON=20	
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

4 flute high power corner radius end mill.

Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
MSMHDRBD0200R020	2	0.2	4	45	4	4	●	1
MSMHDRBD0200R030	2	0.3	4	45	4	4	●	1
MSMHDRBD0300R020	3	0.2	8	45	6	4	●	1
MSMHDRBD0300R030	3	0.3	8	45	6	4	●	1
MSMHDRBD0300R050	3	0.5	8	45	6	4	●	1
MSMHDRBD0400R020	4	0.2	11	45	6	4	●	1
MSMHDRBD0400R030	4	0.3	11	45	6	4	●	1
MSMHDRBD0400R050	4	0.5	11	45	6	4	●	1
MSMHDRBD0500R020	5	0.2	13	50	6	4	●	1
MSMHDRBD0500R030	5	0.3	13	50	6	4	●	1
MSMHDRBD0500R050	5	0.5	13	50	6	4	●	1
MSMHDRBD0500R100	5	1	13	50	6	4	●	1
MSMHDRBD0600R030	6	0.3	13	50	6	4	●	2
MSMHDRBD0600R050	6	0.5	13	50	6	4	●	2
MSMHDRBD0600R100	6	1	13	50	6	4	●	2
MSMHDRBD0800R030	8	0.3	19	60	8	4	●	2
MSMHDRBD0800R050	8	0.5	19	60	8	4	●	2
MSMHDRBD0800R100	8	1	19	60	8	4	●	2
MSMHDRBD0800R150	8	1.5	19	60	8	4	●	2
MSMHDRBD1000R030	10	0.3	22	70	10	4	●	2
MSMHDRBD1000R050	10	0.5	22	70	10	4	●	2
MSMHDRBD1000R100	10	1	22	70	10	4	●	2
MSMHDRBD1000R150	10	1.5	22	70	10	4	●	2
MSMHDRBD1000R200	10	2	22	70	10	4	●	2
MSMHDRBD1200R050S10	12	0.5	26	75	10	4	●	3
MSMHDRBD1200R100S10	12	1	26	75	10	4	●	3
MSMHDRBD1200R150S10	12	1.5	26	75	10	4	●	3
MSMHDRBD1200R200S10	12	2	26	75	10	4	●	3
MSMHDRBD1200R300S10	12	3	26	75	10	4	●	3
MSMHDRBD1200R050	12	0.5	26	75	12	4	●	2
MSMHDRBD1200R100	12	1	26	75	12	4	●	2
MSMHDRBD1200R150	12	1.5	26	75	12	4	●	2
MSMHDRBD1200R200	12	2	26	75	12	4	●	2
MSMHDRBD1200R300	12	3	26	75	12	4	●	2

● : Inventory maintained in Japan.

MSMHDRB

High power, Corner radius, Medium cut length, 4 flute

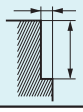
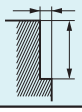
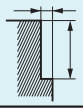
Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
MSMHDRBD1600R100	16	1	35	90	16	4	●	2
MSMHDRBD1600R150	16	1.5	35	90	16	4	●	2
MSMHDRBD1600R200	16	2	35	90	16	4	●	2
MSMHDRBD1600R300	16	3	35	90	16	4	●	2
MSMHDRBD1600R500	16	5	35	90	16	4	●	2
MSMHDRBD1800R100	18	1	40	100	16	4	●	3
MSMHDRBD1800R150	18	1.5	40	100	16	4	●	3
MSMHDRBD1800R200	18	2	40	100	16	4	●	3
MSMHDRBD1800R300	18	3	40	100	16	4	●	3
MSMHDRBD2000R100	20	1	45	110	20	4	●	2
MSMHDRBD2000R150	20	1.5	45	110	20	4	●	2
MSMHDRBD2000R200	20	2	45	110	20	4	●	2
MSMHDRBD2000R300	20	3	45	110	20	4	●	2
MSMHDRBD2000R500	20	5	45	110	20	4	●	2
MSMHDRBD2000R635	20	6.35	45	110	20	4	●	2

● : Inventory maintained in Japan.

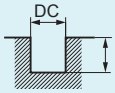
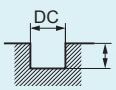
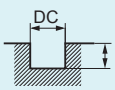
RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	15000	550	10000	340	10000	320	6400	160	4800	100
3	11000	800	7400	500	7400	480	4800	250	4000	170
4	8000	900	5600	540	5600	520	3600	270	3200	240
5	6400	1000	4500	600	4500	580	2900	300	2600	240
6	5900	1100	3700	640	3700	600	2400	320	2100	230
8	4400	1100	2800	660	2800	600	1800	330	1600	220
10	3500	1000	2300	640	2300	560	1400	320	1300	200
12	2900	1000	1900	640	1900	530	1200	320	1100	170
16	2200	800	1400	500	1400	450	900	250	800	130
18	2000	800	1250	480	1250	450	800	240	710	110
20	1800	750	1100	460	1100	440	720	230	650	100
Depth of cut	 ≤0.2DC ≤1.5DC				 ≤0.1DC ≤1.5DC			 ≤0.05DC ≤1.5DC		

DC:Dia.

Slotting

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	12000	400	7000	200	7000	100	4200	80	2300	40
3	9000	600	5300	300	5300	150	3200	130	1900	70
4	7200	720	4000	360	4000	180	2400	140	1400	95
5	5800	720	3200	360	3200	180	1900	150	1100	95
6	5000	800	2700	400	2700	200	1600	160	950	95
8	3700	800	2000	400	2000	200	1200	170	720	90
10	3000	720	1600	360	1600	180	960	160	570	80
12	2500	600	1300	290	1300	150	800	140	480	70
16	2000	480	1000	230	1000	120	600	110	360	50
18	1800	460	900	210	900	110	550	110	320	45
20	1600	430	800	200	800	100	480	100	290	40
Depth of cut	 DC ≤1DC (MAX. 12mm)				 DC ≤0.5DC			 DC ≤0.2DC		

DC:Dia.

1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

IMPACT MIRACLE END MILLS

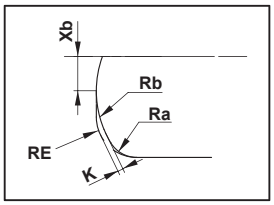
VFFDRB NEW

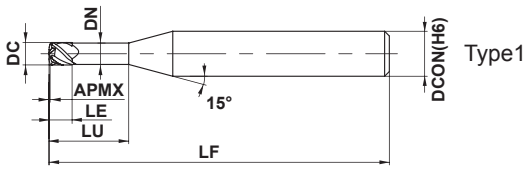
Multi-task corner radius end mill for impact miracle high speed cutting

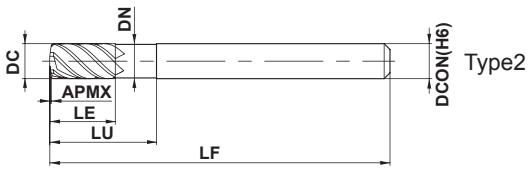
UWC VF 40° DC≤6 DC≥8

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○	◎	◎				









DC≤12				
0 -0.020				
DCON=6	8≤DCON≤10	DCON=12		
0 -0.008	0 -0.009	0 -0.011		

h6

- Multi-task corner radius type allows more efficient high feed.
- Adoption of multiple cuttings realized high feed cutting.

Unit : mm

Order Number	DC	RE *1	APMX	LE *3	LU	DN	LF	DCON	No. of Flutes	Multi-task radius part				RMPX *2	Stock	Type
										K	Xb	Ra	Rb			
VFFDRBD0300	3	0.64	0.18	3	10	2.8	60	6	4	0.08	0.375	0.5	2	2.1°	●	1
VFFDRBD**0400**	4	0.71	0.25	4	12	3.8	60	6	4	0.13	0.5	0.5	3	1.9°	●	1
VFFDRBD**0600**	6	0.92	0.36	9	18	5.6	80	6	4	0.21	0.75	0.6	5	1.7°	●	2
VFFDRBD**0800**	8	1.16	0.44	12	24	7.6	90	8	6	0.22	1.6	0.8	4.5	1.7°	●	2
VFFDRBD**1000**	10	1.47	0.57	15	30	9.4	100	10	6	0.28	2	1	5.5	1.7°	●	2
VFFDRBD**1200**	12	1.77	0.7	18	36	11.4	110	12	6	0.34	2.4	1.2	6.5	1.8°	●	2

*1 RE : Approx. R
*2 RMPX : Max. Ramping Angle
*3 LE : Cutting Edge Effective Length

RECOMMENDED CUTTING CONDITIONS FOR IMPACT MIRACLE END MILLS

Side milling

Work material	Carbon steel, Alloy steel (180—280HB), Alloy tool steel (≤350HB), Mild steel (≤180HB) AISI 1045, AISI 4140, ASTM A36, AISI 1010						Prehardened steel (35—45HRC) AISI P21, AISI P20, AISI 4340					
Dia. DC (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
3	150	16000	0.15	9600	0.12	1.5	135	14000	0.15	8400	0.12	1.5
4	150	12000	0.20	9600	0.16	2.0	135	11000	0.20	8800	0.16	2.0
6	150	8000	0.35	11000	0.24	3.0	135	7200	0.35	10000	0.24	3.0
8	150	6000	0.35	13000	0.32	4.8	135	5400	0.35	11000	0.32	4.8
10	150	4800	0.40	12000	0.40	6.0	135	4300	0.40	10000	0.40	6.0
12	150	4000	0.45	11000	0.48	7.2	135	3600	0.45	9700	0.48	7.2

Work material	Hardened steel (40—55HRC), Ferritic and martensitic stainless steel (>200HB), Precipitation hardening stainless steel (<450HB), AISI H13, L6, AISI 431, AISI 420, 15-5PH, 17-4PH etc.						Hardened steel (55—62HRC) AISI D2 etc.					
Dia. DC (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
3	120	13000	0.15	7800	0.12	1.5	80	8500	0.10	3400	0.12	1.5
4	120	9500	0.21	8000	0.16	2.0	80	6400	0.15	3800	0.16	2.0
6	120	6400	0.35	9000	0.24	3.0	80	4200	0.30	5000	0.24	3.0
8	120	4800	0.35	10000	0.32	4.8	80	3200	0.30	5800	0.32	4.8
10	120	3800	0.40	9100	0.40	6.0	80	2500	0.35	5300	0.40	6.0
12	120	3200	0.45	8600	0.48	7.2	80	2100	0.40	5000	0.48	7.2

1) When ramping process set the feedrate at 50%. A ramping angle of 1° is recommended.
2) Use at a revolution of 70% and feedrate of 50% when the tool overhang exceeds 5D.

DC:Dia.

● : **Inventory maintained in Japan.**

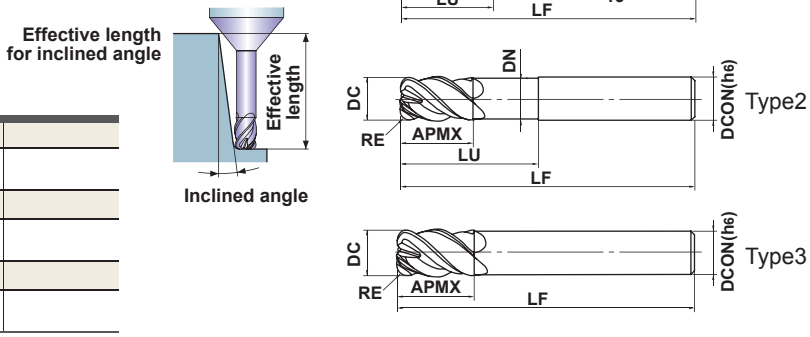
4 FLUTE, CORNER RADIUS, SHORT CUT LENGTH,IRREGULAR HELIX FLUTES

VFHVRB

4 flute, Corner radius, Short cut length,Irregular helix flutes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎	◎	○	○		





R	DC≤10	DC>10			
	±0.007	±0.01			
	DC≤12	DC>12			
	0 - 0.02	0 - 0.03			
h6	DCON=6	8≤DCON≤10	12≤DCON≤16		
	0 - 0.008	0 - 0.009	0 - 0.011		

Impact Miracle corner radius end mill for high feed and efficient machining.

Unit : mm

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle 30'	1°	2°	3°
VFHVRBD0100R02N004	1	0.2	1	4	0.94	10.6°	60	6	4	●	1	4.2	4.5	4.7	5.3
VFHVRB**D0100R02N006**	1	0.2	1	6	0.94	9.2°	60	6	4	●	1	6.4	6.7	7.2	7.7
VFHVRB**D0100R02N008**	1	0.2	1	8	0.94	8.2°	60	6	4	●	1	8.5	8.8	9.5	10.2
VFHVRB**D0100R02N010**	1	0.2	1	10	0.94	7.4°	60	6	4	●	1	10.5	11	11.8	12.7
VFHVRB**D0100R02N015**	1	0.2	1	15	0.94	5.9°	60	6	4	●	1	15.8	16.3	17.5	18.9
VFHVRB**D0100R02N020**	1	0.2	1	20	0.94	4.9°	80	6	4	●	1	20.9	21.7	23.3	25.1
VFHVRB**D0150R03N004**	1.5	0.3	1.5	4	1.44	10.3°	60	6	4	●	1	4.2	4.5	4.6	5.2
VFHVRB**D0150R03N006**	1.5	0.3	1.5	6	1.44	8.9°	60	6	4	●	1	6.3	6.6	7.2	7.7
VFHVRB**D0150R03N010**	1.5	0.3	1.5	10	1.44	7°	60	6	4	●	1	10.5	10.9	11.8	12.7
VFHVRB**D0150R03N015**	1.5	0.3	1.5	15	1.44	5.5°	60	6	4	●	1	15.7	16.3	17.5	18.9
VFHVRB**D0150R03N020**	1.5	0.3	1.5	20	1.44	4.6°	80	6	4	●	1	20.9	21.6	23.3	25.1
VFHVRB**D0150R03N025**	1.5	0.3	1.5	25	1.44	3.9°	80	6	4	●	1	26.1	27	29	31.3
VFHVRB**D0150R03N030**	1.5	0.3	1.5	30	1.44	3.4°	80	6	4	●	1	31.3	32.3	34.7	37.5
VFHVRB**D0200R05N006**	2	0.5	2	6	1.9	8.7°	60	6	4	●	1	6.3	6.5	7	7.5
VFHVRB**D0200R05N010**	2	0.5	2	10	1.9	6.7°	60	6	4	●	1	10.5	10.8	11.6	12.5
VFHVRB**D0200R05N015**	2	0.5	2	15	1.9	5.2°	60	6	4	●	1	15.6	16.2	17.4	18.7
VFHVRB**D0200R05N020**	2	0.5	2	20	1.9	4.3°	80	6	4	●	1	20.8	21.5	23.1	24.9
VFHVRB**D0200R05N025**	2	0.5	2	25	1.9	3.6°	80	6	4	●	1	26	26.9	28.9	31.2
VFHVRB**D0200R05N030**	2	0.5	2	30	1.9	3.1°	80	6	4	●	1	31.2	32.2	34.6	37.4
VFHVRB**D0200R05N035**	2	0.5	2	35	1.9	2.8°	90	6	4	●	1	36.3	37.6	40.4	*
VFHVRB**D0200R05N040**	2	0.5	2	40	1.9	2.5°	90	6	4	●	1	41.5	42.9	46.1	*
VFHVRB**D0300R05N010**	3	0.5	3	10	2.9	5.6°	60	6	4	●	1	10.5	10.8	11.6	12.5
VFHVRB**D0300R05N015**	3	0.5	3	15	2.9	4.3°	60	6	4	●	1	15.6	16.2	17.4	18.7
VFHVRB**D0300R05N020**	3	0.5	3	20	2.9	3.4°	80	6	4	●	1	20.8	21.5	23.1	24.9
VFHVRB**D0300R05N030**	3	0.5	3	30	2.9	2.5°	80	6	4	●	1	31.2	32.2	34.6	*
VFHVRB**D0300R08N010**	3	0.8	3	10	2.9	5.7°	60	6	4	●	1	10.4	10.8	11.6	12.4
VFHVRB**D0300R08N015**	3	0.8	3	15	2.9	4.3°	60	6	4	●	1	15.6	16.2	17.3	18.7
VFHVRB**D0300R08N020**	3	0.8	3	20	2.9	3.5°	80	6	4	●	1	20.8	21.5	23.1	24.9
VFHVRB**D0300R08N030**	3	0.8	3	30	2.9	2.5°	80	6	4	●	1	31.1	32.2	34.6	*
VFHVRB**D0300R08N040**	3	0.8	3	40	2.9	2°	90	6	4	●	1	41.5	42.9	*	*
VFHVRB**D0300R08N050**	3	0.8	3	50	2.9	1.6°	90	6	4	●	1	51.8	53.6	*	*
VFHVRB**D0400R05N012**	4	0.5	4	12	3.9	3.8°	60	6	4	●	1	12.5	13	13.9	15
VFHVRB**D0400R05N020**	4	0.5	4	20	3.9	2.5°	80	6	4	●	1	20.8	21.5	23.1	*
VFHVRB**D0400R05N030**	4	0.5	4	30	3.9	1.8°	80	6	4	●	1	31.2	32.2	*	*

* No interference

4 FLUTE, CORNER RADIUS, SHORT CUT LENGTH,IRREGULAR HELIX FLUTES

VFHVRB

4 flute, Corner radius, Short cut length,Irregular helix flutes

Unit : mm

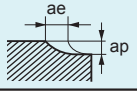
Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
												30'	1°	2°	3°
VFHVRBD0400R05N048	4	0.5	4	48	3.9	1.2°	90	6	4	●	1	49.8	51.5	*	*
VFHVRBD0400R10N012	4	1	4	12	3.9	3.9°	60	6	4	●	1	12.5	12.9	13.8	14.9
VFHVRBD0400R10N020	4	1	4	20	3.9	2.5°	80	6	4	●	1	20.8	21.5	23	*
VFHVRBD0400R10N030	4	1	4	30	3.9	1.8°	80	6	4	●	1	31.1	32.2	*	*
VFHVRBD0600R05N018	6	0.5	9	18	5.85	—	60	6	4	●	2	*	*	*	*
VFHVRBD0600R05N030	6	0.5	9	30	5.85	—	80	6	4	●	2	*	*	*	*
VFHVRBD0600R10N018	6	1	9	18	5.85	—	60	6	4	●	2	*	*	*	*
VFHVRBD0600R10N030	6	1	9	30	5.85	—	80	6	4	●	2	*	*	*	*
VFHVRBD0600R10N054	6	1	9	54	5.85	—	90	6	4	●	2	*	*	*	*
VFHVRBD0600R15N018	6	1.5	9	18	5.85	—	60	6	4	●	2	*	*	*	*
VFHVRBD0600R15N030	6	1.5	9	30	5.85	—	80	6	4	●	2	*	*	*	*
VFHVRBD0600R15N042	6	1.5	9	42	5.85	—	90	6	4	●	2	*	*	*	*
VFHVRBD0600R15N054	6	1.5	9	54	5.85	—	90	6	4	●	2	*	*	*	*
VFHVRBD0600R20N018	6	2	9	18	5.85	—	60	6	4	●	2	*	*	*	*
VFHVRBD0600R20N030	6	2	9	30	5.85	—	80	6	4	●	2	*	*	*	*
VFHVRBD0700R15	7	1.5	11	—	—	—	80	6	4	●	3	*	*	*	*
VFHVRBD0800R05N024	8	0.5	12	24	7.85	—	60	8	4	●	2	*	*	*	*
VFHVRBD0800R05N040	8	0.5	12	40	7.85	—	100	8	4	●	2	*	*	*	*
VFHVRBD0800R10N024	8	1	12	24	7.85	—	60	8	4	●	2	*	*	*	*
VFHVRBD0800R10N040	8	1	12	40	7.85	—	100	8	4	●	2	*	*	*	*
VFHVRBD0800R20N024	8	2	12	24	7.85	—	60	8	4	●	2	*	*	*	*
VFHVRBD0800R20N040	8	2	12	40	7.85	—	100	8	4	●	2	*	*	*	*
VFHVRBD0800R20N056	8	2	12	56	7.85	—	120	8	4	●	2	*	*	*	*
VFHVRBD0800R20N072	8	2	12	72	7.85	—	120	8	4	●	2	*	*	*	*
VFHVRBD0900R20	9	2	13.5	—	—	—	100	8	4	●	3	*	*	*	*
VFHVRBD1000R05N030	10	0.5	15	30	9.7	—	70	10	4	●	2	*	*	*	*
VFHVRBD1000R05N050	10	0.5	15	50	9.7	—	110	10	4	●	2	*	*	*	*
VFHVRBD1000R10N030	10	1	15	30	9.7	—	70	10	4	●	2	*	*	*	*
VFHVRBD1000R10N050	10	1	15	50	9.7	—	110	10	4	●	2	*	*	*	*
VFHVRBD1000R20N030	10	2	15	30	9.7	—	70	10	4	●	2	*	*	*	*
VFHVRBD1000R20N050	10	2	15	50	9.7	—	110	10	4	●	2	*	*	*	*
VFHVRBD1000R20N070	10	2	15	70	9.7	—	150	10	4	●	2	*	*	*	*
VFHVRBD1000R20N090	10	2	15	90	9.7	—	150	10	4	●	2	*	*	*	*
VFHVRBD1100R20	11	2	16.5	—	—	—	110	10	4	●	3	*	*	*	*
VFHVRBD1200R05N036	12	0.5	18	36	11.7	—	80	12	4	●	2	*	*	*	*
VFHVRBD1200R05N060	12	0.5	18	60	11.7	—	120	12	4	●	2	*	*	*	*
VFHVRBD1200R10N036	12	1	18	36	11.7	—	80	12	4	●	2	*	*	*	*
VFHVRBD1200R10N060	12	1	18	60	11.7	—	120	12	4	●	2	*	*	*	*
VFHVRBD1200R20N036	12	2	18	36	11.7	—	80	12	4	●	2	*	*	*	*
VFHVRBD1200R20N060	12	2	18	60	11.7	—	120	12	4	●	2	*	*	*	*
VFHVRBD1200R20N084	12	2	18	84	11.7	—	160	12	4	●	2	*	*	*	*
VFHVRBD1200R20N108	12	2	18	108	11.7	—	160	12	4	●	2	*	*	*	*
VFHVRBD1200R30N036	12	3	18	36	11.7	—	80	12	4	●	2	*	*	*	*
VFHVRBD1200R30N060	12	3	18	60	11.7	—	120	12	4	●	2	*	*	*	*
VFHVRBD1300R30	13	3	19.5	—	—	—	120	12	4	●	3	*	*	*	*
VFHVRBD1600R05N042	16	0.5	24	42	15.5	—	100	16	4	●	2	*	*	*	*
VFHVRBD1600R20N042	16	2	24	42	15.5	—	100	16	4	●	2	*	*	*	*
VFHVRBD1600R30N042	16	3	24	42	15.5	—	100	16	4	●	2	*	*	*	*
VFHVRBD1600R30N080	16	3	24	80	15.5	—	140	16	4	●	2	*	*	*	*
VFHVRBD1600R30N120	16	3	24	120	15.5	—	175	16	4	●	2	*	*	*	*

* No interference

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

High speed milling

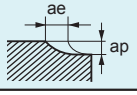
Work material			Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Hardened steel (45−55HRC) AISI H13				Hardened steel (55−62HRC) AISI D2			
Dia. DC (mm)	Corner R RE (mm)	Neck length LU (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
1	**0.2**	**4**	40000	7200	0.04	0.45	33000	5100	0.03	0.45	27000	4100	0.025	0.45	20000	1800	0.013	0.45
1	**0.2**	**6**	40000	6500	0.03	0.45	33000	4600	0.022	0.45	27000	3700	0.018	0.45	20000	1600	0.01	0.45
1	**0.2**	**8**	32000	4500	0.022	0.45	27000	3200	0.018	0.45	21000	2600	0.012	0.45	16000	1100	0.008	0.45
1	**0.2**	**10**	24000	2700	0.015	0.45	20000	1900	0.01	0.45	16000	1500	0.008	0.45	12000	700	0.006	0.45
1	**0.2**	**15**	16000	1200	0.008	0.45	14000	700	0.005	0.45	12000	500	0.003	0.45	10000	400	0.003	0.45
1	**0.2**	**20**	14000	1000	0.005	0.45	12000	600	0.004	0.45	10000	400	0.002	0.45	9000	300	0.002	0.45
1.5	**0.3**	**4**	32000	10000	0.1	0.65	27000	7100	0.08	0.65	21000	5700	0.06	0.65	16000	2500	0.03	0.65
1.5	**0.3**	**6**	32000	7800	0.08	0.65	27000	5500	0.06	0.65	21000	4200	0.05	0.65	16000	2000	0.025	0.65
1.5	**0.3**	**10**	27000	5700	0.05	0.65	22000	4000	0.035	0.65	18000	3000	0.03	0.65	14000	1400	0.014	0.65
1.5	**0.3**	**15**	22000	3200	0.03	0.65	18000	2300	0.025	0.65	15000	1700	0.018	0.65	11000	1000	0.009	0.65
1.5	**0.3**	**20**	16000	1400	0.02	0.65	14000	1200	0.016	0.65	13000	1000	0.012	0.65	9000	700	0.007	0.65
1.5	**0.3**	**25**	13000	1000	0.015	0.65	11000	800	0.012	0.65	10000	700	0.009	0.65	7500	500	0.005	0.65
1.5	**0.3**	**30**	13000	900	0.01	0.65	11000	700	0.008	0.65	10000	600	0.006	0.65	7500	400	0.004	0.65
2	**0.5**	**6**	24000	10000	0.1	0.75	20000	7100	0.08	0.75	16000	5700	0.06	0.75	12000	2500	0.03	0.75
2	**0.5**	**10**	24000	10000	0.08	0.75	20000	7100	0.06	0.75	16000	5700	0.05	0.75	12000	2500	0.025	0.75
2	**0.5**	**15**	20000	7000	0.05	0.75	17000	5000	0.04	0.75	13000	3200	0.03	0.75	10000	1800	0.016	0.75
2	**0.5**	**20**	20000	3600	0.04	0.75	17000	2600	0.03	0.75	13000	1800	0.025	0.75	10000	900	0.012	0.75
2	**0.5**	**25**	16000	1800	0.03	0.75	14000	1400	0.025	0.75	12000	1100	0.02	0.75	9000	720	0.01	0.75
2	**0.5**	**30**	16000	1400	0.025	0.75	14000	1200	0.02	0.75	12000	900	0.016	0.75	9000	650	0.008	0.75
2	**0.5**	**35**	13000	1100	0.02	0.75	11000	800	0.018	0.75	10000	700	0.014	0.75	7000	500	0.007	0.75
2	**0.5**	**40**	13000	1000	0.02	0.75	11000	700	0.015	0.75	10000	600	0.012	0.75	7000	400	0.006	0.75
3	**0.5**	**10**	16000	11000	0.12	1.5	13000	7800	0.09	1.5	11000	6300	0.07	1.5	8000	2800	0.04	1.5
3	**0.5**	**15**	16000	9000	0.11	1.5	13000	6400	0.08	1.5	11000	5100	0.06	1.5	8000	2300	0.04	1.5
3	**0.5**	**20**	13000	7200	0.09	1.5	11000	5100	0.07	1.5	8700	4000	0.05	1.5	6500	1800	0.03	1.5
3	**0.5**	**30**	13000	5700	0.06	1.5	11000	4000	0.05	1.5	8700	3000	0.04	1.5	6500	1400	0.02	1.5
3	**0.8**	**10**	16000	11000	0.24	1	13000	7800	0.19	1	11000	6300	0.14	1	8000	2800	0.07	1
3	**0.8**	**15**	16000	9000	0.22	1	13000	6400	0.17	1	11000	5100	0.13	1	8000	2300	0.07	1
3	**0.8**	**20**	13000	7200	0.19	1	11000	5100	0.15	1	8700	4000	0.11	1	6500	1800	0.06	1
3	**0.8**	**30**	13000	5700	0.12	1	11000	4000	0.09	1	8700	3000	0.07	1	6500	1400	0.04	1
3	**0.8**	**40**	11000	3600	0.08	1	9100	2600	0.06	1	7400	2000	0.05	1	5500	1000	0.025	1
3	**0.8**	**50**	8000	2600	0.07	1	6600	1800	0.05	1	5800	1500	0.04	1	4600	800	0.02	1
4	**0.5**	**12**	8400	6000	0.15	2	7000	4300	0.12	2	5600	3400	0.09	2	4200	1500	0.05	2
4	**0.5**	**20**	8400	6000	0.14	2	7000	4300	0.11	2	5600	3400	0.08	2	4200	1500	0.04	2
4	**0.5**	**30**	6900	4900	0.12	2	5700	3500	0.09	2	4600	2800	0.07	2	3500	1200	0.03	2
4	**0.5**	**48**	5600	2000	0.07	2	4600	1400	0.05	2	3800	1100	0.04	2	2800	500	0.02	2
4	**1**	**12**	12000	12000	0.3	1.5	10000	8500	0.23	1.5	8000	6800	0.18	1.5	6000	3000	0.1	1.5
4	**1**	**20**	12000	12000	0.27	1.5	10000	8500	0.21	1.5	8000	6800	0.16	1.5	6000	3000	0.08	1.5
4	**1**	**30**	10000	9900	0.24	1.5	8300	7000	0.19	1.5	6700	5600	0.14	1.5	5000	2500	0.07	1.5
6	**0.5**	**18**	4000	3900	0.15	3.5	3300	2800	0.12	3.5	2700	2200	0.09	3.5	2000	1000	0.05	3.5
6	**0.5**	**30**	4000	3900	0.14	3.5	3300	2800	0.11	3.5	2700	2200	0.08	3.5	2000	1000	0.04	3.5
6	**1**	**18**	8000	13000	0.5	3	6600	9200	0.4	3	5400	7400	0.3	3	4000	3300	0.15	3
6	**1**	**30**	8000	13000	0.45	3	6600	9200	0.35	3	5400	7400	0.27	3	4000	3300	0.14	3
6	**1**	**54**	6600	11000	0.25	3	5500	7800	0.2	3	4400	6300	0.15	3	3300	2800	0.08	3
6	**1.5**	**18**	8000	13000	0.5	2	6600	9200	0.4	2	5400	7400	0.3	2	4000	3300	0.15	2
6	**1.5**	**30**	8000	13000	0.45	2	6600	9200	0.35	2	5400	7400	0.27	2	4000	3300	0.14	2
6	**1.5**	**42**	6600	11000	0.4	2	5500	7800	0.3	2	4400	6300	0.24	2	3300	2800	0.12	2
6	**1.5**	**54**	6600	11000	0.25	2	5500	7800	0.2	2	4400	6300	0.15	2	3300	2800	0.08	2
6	**2**	**18**	8000	13000	0.5	1.5	6600	9200	0.4	1.5	5400	7400	0.3	1.5	4000	3300	0.15	1.5
6	**2**	**30**	8000	13000	0.45	1.5	6600	9200	0.35	1.5	5400	7400	0.27	1.5	4000	3300	0.14	1.5
Depth of cut																		

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Air blow or oil mist is recommended for good chip evacuation.
3) For profile machining such as moulds, machining conditions may differ considerably depending on the workpiece geometry, machining methods and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece.
4) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

4 FLUTE, CORNER RADIUS, SHORT CUT LENGTH,IRREGULAR HELIX FLUTES

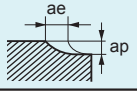
VFHVRB

4 flute, Corner radius, Short cut length,Irregular helix flutes

Work material			Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Hardened steel (45−55HRC) AISI H13				Hardened steel (55−62HRC) AISI D2			
Dia. DC (mm)	Corner R RE (mm)	Neck length LU (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
7	**1.5**	—	6800	13000	0.5	3	5600	9200	0.4	3	4600	7400	0.3	3	3400	3300	0.15	3
8	**0.5**	**24**	3000	3900	0.18	5	2500	2800	0.14	5	2000	2200	0.11	5	1500	1000	0.05	5
8	**0.5**	**40**	3000	3900	0.16	5	2500	2800	0.12	5	2000	2200	0.1	5	1500	1000	0.05	5
8	**1**	**24**	4200	6500	0.3	4.5	3500	4600	0.23	4.5	2800	3700	0.18	4.5	2100	1600	0.09	4.5
8	**1**	**40**	4200	6500	0.27	4.5	3500	4600	0.21	4.5	2800	3700	0.16	4.5	2100	1600	0.08	4.5
8	**2**	**24**	6000	13000	0.6	3	5000	9200	0.46	3	4000	7400	0.36	3	3000	3300	0.18	3
8	**2**	**40**	6000	13000	0.54	3	5000	9200	0.42	3	4000	7400	0.32	3	3000	3300	0.16	3
8	**2**	**56**	5000	11000	0.48	3	4200	7800	0.37	3	3400	6300	0.3	3	2500	2800	0.14	3
8	**2**	**72**	5000	11000	0.3	3	4200	7800	0.23	3	3400	6300	0.2	3	2500	2800	0.09	3
9	**2**	—	5300	13000	0.6	3.5	4400	9200	0.46	3.5	3600	7400	0.36	3.5	2700	3300	0.18	3.5
10	**0.5**	**30**	2400	3900	0.18	6.5	2000	2800	0.14	6.5	1600	2200	0.11	6.5	1200	1000	0.05	6.5
10	**0.5**	**50**	2400	3900	0.16	6.5	2000	2800	0.12	6.5	1600	2200	0.1	6.5	1200	1000	0.05	6.5
10	**1**	**30**	3300	6500	0.3	6	2700	4600	0.23	6	2200	3700	0.18	6	1700	1600	0.09	6
10	**1**	**50**	3300	6500	0.27	6	2700	4600	0.21	6	2200	3700	0.16	6	1700	1600	0.08	6
10	**2**	**30**	4800	13000	0.6	4.5	4000	9200	0.46	4.5	3200	7400	0.36	4.5	2400	3300	0.18	4.5
10	**2**	**50**	4800	13000	0.54	4.5	4000	9200	0.42	4.5	3200	7400	0.32	4.5	2400	3300	0.16	4.5
10	**2**	**70**	4000	11000	0.48	4.5	3300	7800	0.37	4.5	2700	6300	0.3	4.5	2000	2800	0.14	4.5
10	**2**	**90**	4000	11000	0.48	4.5	3300	7800	0.37	4.5	2700	6300	0.3	4.5	2000	2800	0.14	4.5
11	**2**	—	4300	12000	0.6	5	3600	8500	0.46	5	2900	6800	0.36	5	2200	3000	0.18	5
12	**0.5**	**36**	2000	3600	0.27	8	1700	2600	0.21	8	1300	2100	0.14	8	1000	900	0.07	8
12	**0.5**	**60**	2000	3600	0.24	8	1700	2600	0.18	8	1300	2100	0.12	8	1000	900	0.06	8
12	**1**	**36**	2400	4800	0.36	7.5	2000	3400	0.28	7.5	1600	2700	0.18	7.5	1200	1200	0.09	7.5
12	**1**	**60**	2400	4800	0.32	7.5	2000	3400	0.25	7.5	1600	2700	0.16	7.5	1200	1200	0.08	7.5
12	**2**	**36**	4000	12000	0.9	6	3300	8500	0.7	6	2700	6800	0.45	6	2000	3000	0.23	6
12	**2**	**60**	4000	12000	0.8	6	3300	8500	0.6	6	2700	6800	0.4	6	2000	3000	0.2	6
12	**2**	**84**	3300	9900	0.7	6	2700	7000	0.55	6	2200	5600	0.36	6	1700	2500	0.18	6
12	**2**	**108**	3300	9900	0.45	6	2700	7000	0.35	6	2200	5600	0.23	6	1700	2500	0.11	6
12	**3**	**36**	4000	12000	0.9	4.5	3300	8500	0.7	4.5	2700	6800	0.45	4.5	2000	3000	0.23	4.5
12	**3**	**60**	4000	12000	0.8	4.5	3300	8500	0.6	4.5	2700	6800	0.4	4.5	2000	3000	0.2	4.5
13	**3**	—	3700	12000	0.9	5	3100	8500	0.7	5	2500	6800	0.45	5	1900	3000	0.23	5
16	**0.5**	**42**	1500	3000	0.27	11	1200	2100	0.21	11	1000	1700	0.12	11	750	750	0.05	11
16	**2**	**42**	2100	5000	0.45	9	1700	3600	0.35	9	1400	2900	0.2	9	1100	1300	0.08	9
16	**3**	**42**	3000	10000	0.9	7.5	2500	7100	0.7	7.5	2000	5700	0.4	7.5	1500	2500	0.15	7.5
16	**3**	**80**	3000	10000	0.8	7.5	2500	7100	0.6	7.5	2000	5700	0.37	7.5	1500	2500	0.14	7.5
16	**3**	**120**	2500	8300	0.7	7.5	2100	5900	0.55	7.5	1700	4700	0.32	7.5	1300	2100	0.12	7.5
Depth of cut																		

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Air blow or oil mist is recommended for good chip evacuation.
3) For profile machining such as moulds, machining conditions may differ considerably depending on the workpiece geometry, machining methods and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece.
4) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

High depth of cut conditions

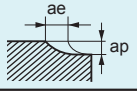
Work material			Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Hardened steel (45−55HRC) AISI H13				Hardened steel (55−62HRC) AISI D2			
Dia. DC (mm)	Corner R RE (mm)	Neck length LU (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
1	**0.2**	**4**	24000	2200	0.08	0.45	20000	1500	0.07	0.45	16000	1200	0.05	0.45	12000	550	0.025	0.45
1	**0.2**	**6**	24000	2000	0.07	0.45	20000	1400	0.05	0.45	16000	1100	0.04	0.45	12000	500	0.02	0.45
1	**0.2**	**8**	19000	1400	0.05	0.45	16000	1000	0.04	0.45	13000	800	0.03	0.45	9500	350	0.016	0.45
1	**0.2**	**10**	14000	800	0.04	0.45	12000	600	0.03	0.45	9000	400	0.025	0.45	7000	200	0.012	0.45
1	**0.2**	**15**	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1	**0.2**	**20**	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1.5	**0.3**	**4**	19000	3000	0.2	0.65	16000	2100	0.16	0.65	13000	1700	0.12	0.65	9500	750	0.06	0.65
1.5	**0.3**	**6**	19000	2300	0.16	0.65	16000	1600	0.13	0.65	13000	1300	0.1	0.65	9500	580	0.05	0.65
1.5	**0.3**	**10**	16000	1700	0.1	0.65	13000	1200	0.07	0.65	11000	1000	0.05	0.65	8000	430	0.03	0.65
1.5	**0.3**	**15**	13000	1000	0.06	0.65	11000	700	0.05	0.65	9000	600	0.04	0.65	6500	250	0.018	0.65
1.5	**0.3**	**20**	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1.5	**0.3**	**25**	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1.5	**0.3**	**30**	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2	**0.5**	**6**	14000	3000	0.2	0.75	12000	2100	0.16	0.75	9400	1700	0.12	0.75	7000	750	0.06	0.75
2	**0.5**	**10**	14000	3000	0.16	0.75	12000	2100	0.13	0.75	9400	1700	0.1	0.75	7000	750	0.05	0.75
2	**0.5**	**15**	12000	2100	0.1	0.75	10000	1500	0.08	0.75	8000	1200	0.06	0.75	6000	530	0.03	0.75
2	**0.5**	**20**	12000	1100	0.08	0.75	10000	800	0.06	0.75	8000	600	0.05	0.75	6000	280	0.025	0.75
2	**0.5**	**25**	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2	**0.5**	**30**	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2	**0.5**	**35**	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2	**0.5**	**40**	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3	**0.5**	**10**	9600	3300	0.24	1.5	8000	2300	0.2	1.5	6400	1800	0.14	1.5	4800	830	0.07	1.5
3	**0.5**	**15**	9600	2700	0.22	1.5	8000	1900	0.17	1.5	6400	1500	0.13	1.5	4800	680	0.06	1.5
3	**0.5**	**20**	7800	2200	0.18	1.5	6500	1500	0.14	1.5	5200	1200	0.11	1.5	3900	550	0.05	1.5
3	**0.5**	**30**	7800	1700	0.12	1.5	6500	1200	0.1	1.5	5200	1000	0.07	1.5	3900	430	0.04	1.5
3	**0.8**	**10**	9600	3300	0.5	1	8000	2300	0.4	1	6400	1800	0.3	1	4800	830	0.14	1
3	**0.8**	**15**	9600	2700	0.5	1	8000	1900	0.35	1	6400	1500	0.25	1	4800	680	0.13	1
3	**0.8**	**20**	7800	2200	0.4	1	6500	1500	0.3	1	5200	1200	0.23	1	3900	550	0.11	1
3	**0.8**	**30**	7800	1700	0.24	1	6500	1200	0.2	1	5200	1000	0.14	1	3900	430	0.05	1
3	**0.8**	**40**	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3	**0.8**	**50**	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4	**0.5**	**12**	5000	1800	0.3	2	4200	1300	0.24	2	3400	1000	0.18	2	2500	450	0.06	2
4	**0.5**	**20**	5000	1800	0.3	2	4200	1300	0.22	2	3400	1000	0.17	2	2500	450	0.06	2
4	**0.5**	**30**	4100	1500	0.24	2	3400	1100	0.19	2	2700	840	0.14	2	2100	380	0.05	2
4	**0.5**	**48**	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4	**1**	**12**	7200	3600	0.6	1.5	6000	2500	0.5	1.5	4800	2000	0.36	1.5	3600	900	0.12	1.5
4	**1**	**20**	7200	3600	0.6	1.5	6000	2500	0.4	1.5	4800	2000	0.32	1.5	3600	900	0.11	1.5
4	**1**	**30**	6000	3000	0.5	1.5	5000	2100	0.4	1.5	4000	1700	0.3	1.5	3000	750	0.1	1.5
6	**0.5**	**18**	2400	1200	0.3	3.5	2000	840	0.24	3.5	1600	670	0.18	3.5	1200	300	0.06	3.5
6	**0.5**	**30**	2400	1200	0.3	3.5	2000	840	0.22	3.5	1600	670	0.17	3.5	1200	300	0.06	3.5
6	**1**	**18**	4800	3900	1	3	4000	2700	0.8	3	3200	2200	0.6	3	2400	980	0.2	3
6	**1**	**30**	4800	3900	0.9	3	4000	2700	0.7	3	3200	2200	0.5	3	2400	980	0.18	3
6	**1**	**54**	4000	3300	0.5	3	3300	2300	0.4	3	2700	1800	0.3	3	2000	830	0.1	3
6	**1.5**	**18**	4800	3900	1	2	4000	2700	0.8	2	3200	2200	0.6	2	2400	980	0.2	2
6	**1.5**	**30**	4800	3900	0.9	2	4000	2700	0.7	2	3200	2200	0.5	2	2400	980	0.18	2
6	**1.5**	**42**	4000	3300	0.8	2	3300	2300	0.6	2	2700	1800	0.5	2	2000	830	0.16	2
6	**1.5**	**54**	4000	3300	0.5	2	3300	2300	0.4	2	2700	1800	0.3	2	2000	830	0.1	2
6	**2**	**18**	4800	3900	1	1.5	4000	2700	0.8	1.5	3200	2200	0.6	1.5	2400	980	0.2	1.5
6	**2**	**30**	4800	3900	0.9	1.5	4000	2700	0.7	1.5	3200	2200	0.5	1.5	2400	980	0.18	1.5
Depth of cut																		

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Air blow or oil mist is recommended for good chip evacuation.
3) For profile machining such as moulds, machining conditions may differ considerably depending on the workpiece geometry, machining methods and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece.
4) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

4 FLUTE, CORNER RADIUS, SHORT CUT LENGTH,IRREGULAR HELIX FLUTES

VFHVRB

4 flute, Corner radius, Short cut length,Irregular helix flutes

Work material			Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Hardened steel (45−55HRC) AISI H13				Hardened steel (55−62HRC) AISI D2			
Dia. DC (mm)	Corner R RE (mm)	Neck length LU (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
7	**1.5**	—	4100	3900	1	3	3400	2700	0.8	3	2700	2200	0.6	3	2100	980	0.2	3
8	**0.5**	**24**	1800	1200	0.35	5	1500	840	0.3	5	1200	670	0.2	5	900	300	0.07	5
8	**0.5**	**40**	1800	1200	0.3	5	1500	840	0.25	5	1200	670	0.2	5	900	300	0.06	5
8	**1**	**24**	2500	2000	0.6	4.5	2100	1400	0.5	4.5	1700	1100	0.4	4.5	1300	500	0.12	4.5
8	**1**	**40**	2500	2000	0.5	4.5	2100	1400	0.4	4.5	1700	1100	0.3	4.5	1300	500	0.11	4.5
8	**2**	**24**	3600	3900	1.2	3	3000	2700	1	3	2400	2200	0.7	3	1800	980	0.24	3
8	**2**	**40**	3600	3900	1.1	3	3000	2700	0.9	3	2400	2200	0.7	3	1800	980	0.22	3
8	**2**	**56**	3000	3300	1	3	2500	2300	0.8	3	2000	1800	0.6	3	1500	830	0.2	3
8	**2**	**72**	3000	3300	0.6	3	2500	2300	0.5	3	2000	1800	0.4	3	1500	830	0.12	3
9	**2**	—	3200	3900	1.2	3.5	2700	2700	1	3.5	2100	2200	0.7	3.5	1600	980	0.24	3.5
10	**0.5**	**30**	1400	1200	0.35	6.5	1200	840	0.3	6.5	940	670	0.2	6.5	700	300	0.07	6.5
10	**0.5**	**50**	1400	1200	0.3	6.5	1200	840	0.25	6.5	940	670	0.2	6.5	700	300	0.06	6.5
10	**1**	**30**	2000	2000	0.6	6	1700	1400	0.5	6	1300	1100	0.4	6	1000	500	0.12	6
10	**1**	**50**	2000	2000	0.5	6	1700	1400	0.4	6	1300	1100	0.3	6	1000	500	0.11	6
10	**2**	**30**	2900	3900	1.2	4.5	2400	2700	1	4.5	1900	2200	0.7	4.5	1500	980	0.24	4.5
10	**2**	**50**	2900	3900	1.1	4.5	2400	2700	0.9	4.5	1900	2200	0.7	4.5	1500	980	0.22	4.5
10	**2**	**70**	2400	3300	1	4.5	2000	2300	0.8	4.5	1600	1800	0.6	4.5	1200	830	0.2	4.5
10	**2**	**90**	2400	3300	1	4.5	2000	2300	0.8	4.5	1600	1800	0.6	4.5	1200	830	0.2	4.5
11	**2**	—	2600	3600	1.2	5	2200	2500	1	5	1700	2000	0.7	5	1300	900	0.24	5
12	**0.5**	**36**	1200	1100	0.5	8	1000	770	0.4	8	800	620	0.3	8	600	280	0.11	8
12	**0.5**	**60**	1200	1100	0.5	8	1000	770	0.4	8	800	620	0.3	8	600	280	0.1	8
12	**1**	**36**	1400	1400	0.7	7.5	1200	1000	0.6	7.5	940	780	0.4	7.5	700	350	0.14	7.5
12	**1**	**60**	1400	1400	0.6	7.5	1200	1000	0.5	7.5	940	780	0.4	7.5	700	350	0.13	7.5
12	**2**	**36**	2400	3600	1.8	6	2000	2500	1.4	6	1600	2000	1.1	6	1200	900	0.4	6
12	**2**	**60**	2400	3600	1.6	6	2000	2500	1.3	6	1600	2000	1	6	1200	900	0.3	6
12	**2**	**84**	2000	3000	1.4	6	1700	2100	1.1	6	1300	1700	0.8	6	1000	750	0.3	6
12	**2**	**108**	2000	3000	0.9	6	1700	2100	0.7	6	1300	1700	0.5	6	1000	750	0.2	6
12	**3**	**36**	2400	3600	1.8	4.5	2000	2500	1.4	4.5	1600	2000	1.1	4.5	1200	900	0.4	4.5
12	**3**	**60**	2400	3600	1.6	4.5	2000	2500	1.3	4.5	1600	2000	1	4.5	1200	900	0.3	4.5
13	**3**	—	2200	3600	1.8	5	1800	2500	1.4	5	1500	2000	1.1	5	1100	900	0.4	5
16	**0.5**	**42**	900	900	0.5	11	750	630	0.4	11	600	500	0.3	11	450	230	0.1	11
16	**2**	**42**	1300	1500	0.9	9	1100	1100	0.7	9	870	840	0.5	9	650	380	0.2	9
16	**3**	**42**	1800	3000	1.8	7.5	1500	2100	1.4	7.5	1200	1700	0.9	7.5	900	750	0.4	7.5
16	**3**	**80**	1800	3000	1.6	7.5	1500	2100	1.3	7.5	1200	1700	0.8	7.5	900	750	0.3	7.5
16	**3**	**120**	1500	2500	1.4	7.5	1200	1800	1.1	7.5	1000	1400	0.7	7.5	750	630	0.3	7.5
Depth of cut																		

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Air blow or oil mist is recommended for good chip evacuation.
3) For profile machining such as moulds, machining conditions may differ considerably depending on the workpiece geometry, machining methods and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece.
4) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

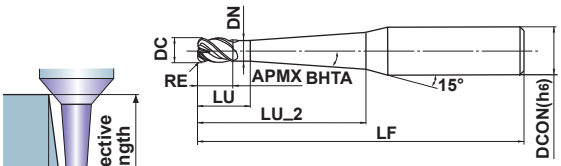
VFHVRB

4 flute, Corner radius, Short cut length,Irregular helix flutes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎	◎	○	○		

Taper neck type





Effective length for inclined angle

R	DC≤10	DC>10			
	±0.007	±0.01			
	DC≤12				
	0 - 0.02				
h6	DCON=6	8≤DCON≤10	12≤DCON≤16		
	0 - 0.008	0 - 0.009	0 - 0.011		

● Impact Miracle corner radius end mill for high feed and efficient machining.

Unit : mm

Order Number	DC	RE	BHTA	APMX	LU_2	LU	DN	LF	DCON	No. of Flutes	Stock	Effective length for inclined angle 30'	1°	2°	3°
VFHVRBD010R02N006T09	1	0.2	0.9°	1	6	2.5	0.94	60	6	4	●	—	6.6	7.1	7.6
VFHVRBD010R02N010T09	1	0.2	0.9°	1	10	2.5	0.94	60	6	4	●	—	10.6	11.4	12.3
VFHVRBD010R02N015T09	1	0.2	0.9°	1	15	2.5	0.94	60	6	4	●	—	15.6	16.8	18.1
VFHVRBD010R02N020T09	1	0.2	0.9°	1	20	2.5	0.94	80	6	4	●	—	20.6	22.1	23.9
VFHVRBD010R02N025T09	1	0.2	0.9°	1	25	2.5	0.94	80	6	4	●	—	25.6	27.5	29.7
VFHVRBD010R02N030T09	1	0.2	0.9°	1	30	2.5	0.94	80	6	4	●	—	30.6	32.9	35.5
VFHVRBD010R02N035T09	1	0.2	0.9°	1	35	2.5	0.94	90	6	4	●	—	35.6	38.3	41.3
VFHVRBD010R02N040T09	1	0.2	0.9°	1	40	2.5	0.94	90	6	4	●	—	40.6	43.6	47.2
VFHVRBD010R02N045T09	1	0.2	0.9°	1	45	2.5	0.94	90	6	4	●	—	45.6	49	*
VFHVRBD010R02N050T09	1	0.2	0.9°	1	50	2.5	0.94	90	6	4	●	—	50.6	54.4	*
VFHVRBD015R03N010T09	1.5	0.3	0.9°	1.5	10	3	1.44	60	6	4	●	—	10.6	11.4	12.3
VFHVRBD015R03N015T09	1.5	0.3	0.9°	1.5	15	3	1.44	60	6	4	●	—	15.6	16.8	18.1
VFHVRBD015R03N020T09	1.5	0.3	0.9°	1.5	20	3	1.44	80	6	4	●	—	20.6	22.2	23.9
VFHVRBD015R03N030T09	1.5	0.3	0.9°	1.5	30	3	1.44	80	6	4	●	—	30.6	32.9	35.6
VFHVRBD015R03N040T09	1.5	0.3	0.9°	1.5	40	3	1.44	90	6	4	●	—	40.6	43.7	*
VFHVRBD015R03N050T09	1.5	0.3	0.9°	1.5	50	3	1.44	90	6	4	●	—	50.6	54.4	*
VFHVRBD020R05N015T04	2	0.5	0.4°	2	15	4	1.9	60	6	4	●	15.6	16.2	17.4	18.7
VFHVRBD020R05N020T04	2	0.5	0.4°	2	20	4	1.9	80	6	4	●	20.6	21.3	22.9	24.7
VFHVRBD020R05N025T04	2	0.5	0.4°	2	25	4	1.9	80	6	4	●	25.6	26.5	28.5	30.8
VFHVRBD020R05N030T04	2	0.5	0.4°	2	30	4	1.9	80	6	4	●	30.6	31.7	34	36.8
VFHVRBD020R05N035T04	2	0.5	0.4°	2	35	4	1.9	80	6	4	●	35.6	36.9	39.6	*
VFHVRBD020R05N040T04	2	0.5	0.4°	2	40	4	1.9	80	6	4	●	40.6	42	45.2	*
VFHVRBD020R05N020T09	2	0.5	0.9°	2	20	4	1.9	80	6	4	●	—	20.8	22.3	24.1
VFHVRBD020R05N025T09	2	0.5	0.9°	2	25	4	1.9	90	6	4	●	—	25.8	27.7	29.9
VFHVRBD020R05N030T09	2	0.5	0.9°	2	30	4	1.9	90	6	4	●	—	30.8	33	35.7
VFHVRBD020R05N035T09	2	0.5	0.9°	2	35	4	1.9	90	6	4	●	—	35.8	38.4	*
VFHVRBD020R05N040T09	2	0.5	0.9°	2	40	4	1.9	90	6	4	●	—	40.8	43.8	*
VFHVRBD020R05N045T09	2	0.5	0.9°	2	45	4	1.9	90	6	4	●	—	45.8	49.2	*
VFHVRBD020R05N050T09	2	0.5	0.9°	2	50	4	1.9	100	6	4	●	—	50.8	54.5	*
VFHVRBD020R05N055T09	2	0.5	0.9°	2	55	4	1.9	100	6	4	●	—	55.8	59.9	*
VFHVRBD020R05N060T09	2	0.5	0.9°	2	60	4	1.9	100	6	4	●	—	60.8	*	*
VFHVRBD030R08N020T09	3	0.8	0.9°	3	20	6	2.9	80	6	4	●	—	20.9	22.4	24.1
VFHVRBD030R08N025T09	3	0.8	0.9°	3	25	6	2.9	80	6	4	●	—	25.9	27.8	30
VFHVRBD030R08N030T09	3	0.8	0.9°	3	30	6	2.9	80	6	4	●	—	30.9	33.1	*

* No interference

● : Inventory maintained in Japan.

4 FLUTE, CORNER RADIUS, SHORT CUT LENGTH,IRREGULAR HELIX FLUTES

VFHVRB

4 flute, Corner radius, Short cut length,Irregular helix flutes

Unit : mm

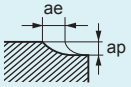
Order Number	DC	RE	BHTA	APMX	LU_2	LU	DN	LF	DCON	No. of Flutes	Stock	Effective length for inclined angle			
												30'	1°	2°	3°
VFHVRBD030R08N040T09	3	0.8	0.9°	3	40	6	2.9	90	6	4	●	—	40.9	43.9	*
VFHVRBD030R08N050T09	3	0.8	0.9°	3	50	6	2.9	90	6	4	●	—	50.9	*	*
VFHVRBD030R08N060T09	3	0.8	0.9°	3	60	6	2.9	100	6	4	●	—	60.9	*	*
VFHVRBD040R10N025T04	4	1	0.4°	4	25	7	3.9	80	6	4	●	25.7	26.6	28.5	*
VFHVRBD040R10N030T04	4	1	0.4°	4	30	7	3.9	80	6	4	●	30.7	31.8	*	*
VFHVRBD040R10N035T04	4	1	0.4°	4	35	7	3.9	80	6	4	●	35.7	36.9	*	*
VFHVRBD040R10N040T04	4	1	0.4°	4	40	7	3.9	80	6	4	●	40.7	42.1	*	*
VFHVRBD040R10N045T04	4	1	0.4°	4	45	7	3.9	90	6	4	●	45.7	47.3	*	*
VFHVRBD040R10N050T04	4	1	0.4°	4	50	7	3.9	90	6	4	●	50.7	52.5	*	*
VFHVRBD040R10N025T09	4	1	0.9°	4	25	7	3.9	90	6	4	●	—	25.9	27.8	*
VFHVRBD040R10N030T09	4	1	0.9°	4	30	7	3.9	90	6	4	●	—	30.9	*	*
VFHVRBD040R10N040T09	4	1	0.9°	4	40	7	3.9	100	6	4	●	—	40.9	*	*
VFHVRBD040R10N050T09	4	1	0.9°	4	50	7	3.9	100	6	4	●	—	50.9	*	*
VFHVRBD040R10N060T09	4	1	0.9°	4	60	7	3.9	100	6	4	●	—	60.9	*	*
VFHVRBD060R15N040T09	6	1.5	0.9°	9	40	12	5.85	110	8	4	●	—	41.4	*	*
VFHVRBD060R15N050T09	6	1.5	0.9°	9	50	12	5.85	110	8	4	●	—	51.4	*	*
VFHVRBD060R15N060T09	6	1.5	0.9°	9	60	12	5.85	110	8	4	●	—	61.4	*	*
VFHVRBD060R15N070T09	6	1.5	0.9°	9	70	12	5.85	110	8	4	●	—	*	*	*
VFHVRBD080R20N060T09	8	2	0.9°	12	60	15	7.85	150	10	4	●	—	61.5	*	*
VFHVRBD080R20N080T09	8	2	0.9°	12	80	15	7.85	150	10	4	●	—	*	*	*
VFHVRBD100R20N080T09	10	2	0.9°	15	80	18	9.7	130	16	4	●	—	82	88	*
VFHVRBD100R20N120T09	10	2	0.9°	15	120	18	9.7	180	16	4	●	—	122	*	*
VFHVRBD120R20N080T09	12	2	0.9°	18	80	21	11.7	130	16	4	●	—	82.2	*	*
VFHVRBD120R20N120T09	12	2	0.9°	18	120	21	11.7	180	16	4	●	—	122.2	*	*

* No interference

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

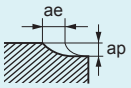
High depth of cut conditions

Work material				Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Hardened steel (45−55HRC) AISI H13				Hardened steel (55−62HRC) AISI D2			
Dia. DC (mm)	Corner R RE (mm)	Taper angle one side BHTA	Neck length LU (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
1	**0.2**	**0.9°**	**6**	40000	6500	0.03	0.45	33000	4600	0.022	0.45	27000	3700	0.018	0.45	20000	1600	0.01	0.45
1	**0.2**	**0.9°**	**10**	24000	2700	0.015	0.45	20000	1900	0.01	0.45	16000	1500	0.008	0.45	12000	700	0.006	0.45
1	**0.2**	**0.9°**	**15**	16000	1200	0.013	0.45	14000	700	0.008	0.45	12000	500	0.007	0.45	10000	400	0.003	0.45
1	**0.2**	**0.9°**	**20**	14000	1000	0.01	0.45	12000	600	0.006	0.45	10000	400	0.005	0.45	9000	300	0.002	0.45
1	**0.2**	**0.9°**	**25**	9500	610	0.008	0.45	8000	440	0.005	0.45	6000	320	0.004	0.45	4800	160	0.002	0.45
1	**0.2**	**0.9°**	**30**	4900	320	0.007	0.45	4100	220	0.004	0.45	3000	160	0.003	0.45	2500	80	0.002	0.45
1	**0.2**	**0.9°**	**35**	4000	260	0.006	0.45	3400	190	0.003	0.45	3000	160	0.003	0.45	2000	70	0.001	0.45
1	**0.2**	**0.9°**	**40**	3500	180	0.005	0.45	2900	130	0.003	0.45	2000	90	0.003	0.45	1700	50	0.001	0.45
1	**0.2**	**0.9°**	**45**	2900	150	0.004	0.45	2400	100	0.002	0.45	2000	90	0.002	0.45	1400	40	0.001	0.45
1	**0.2**	**0.9°**	**50**	2900	110	0.003	0.45	2400	80	0.002	0.45	2000	60	0.002	0.45	1400	30	0.001	0.45
1.5	**0.3**	**0.9°**	**10**	27000	5700	0.05	0.65	22000	4000	0.035	0.65	18000	3000	0.03	0.65	14000	1400	0.014	0.65
1.5	**0.3**	**0.9°**	**15**	22000	3200	0.03	0.65	18000	2300	0.025	0.65	15000	1700	0.018	0.65	11000	1000	0.009	0.65
1.5	**0.3**	**0.9°**	**20**	16000	1400	0.02	0.65	14000	1200	0.016	0.65	13000	1000	0.012	0.65	9000	700	0.007	0.65
1.5	**0.3**	**0.9°**	**30**	13000	900	0.01	0.65	11000	700	0.008	0.65	10000	600	0.006	0.65	7500	400	0.004	0.65
1.5	**0.3**	**0.9°**	**40**	4500	230	0.008	0.65	3700	160	0.007	0.65	3000	120	0.005	0.65	2300	70	0.003	0.65
1.5	**0.3**	**0.9°**	**50**	3700	190	0.007	0.65	3000	130	0.006	0.65	3000	120	0.004	0.65	1900	60	0.002	0.65
2	**0.5**	**0.4°**	**15**	20000	7000	0.05	0.75	17000	5000	0.04	0.75	13000	3200	0.03	0.75	10000	1800	0.016	0.75
2	**0.5**	**0.4°**	**20**	20000	3600	0.04	0.75	17000	2600	0.03	0.75	13000	1800	0.025	0.75	10000	900	0.012	0.75
2	**0.5**	**0.4°**	**25**	16000	1800	0.03	0.75	14000	1400	0.025	0.75	12000	1100	0.02	0.75	9000	720	0.01	0.75
2	**0.5**	**0.4°**	**30**	16000	1400	0.025	0.75	14000	1200	0.02	0.75	12000	900	0.016	0.75	9000	650	0.008	0.75
2	**0.5**	**0.4°**	**35**	13000	1100	0.02	0.75	11000	800	0.018	0.75	10000	700	0.014	0.75	7000	500	0.007	0.75
2	**0.5**	**0.4°**	**40**	13000	1000	0.02	0.75	11000	700	0.015	0.75	10000	600	0.012	0.75	7000	400	0.006	0.75
2	**0.5**	**0.9°**	**20**	20000	3600	0.04	0.75	17000	2600	0.03	0.75	13000	1800	0.025	0.75	10000	900	0.012	0.75
2	**0.5**	**0.9°**	**25**	16000	1800	0.03	0.75	14000	1400	0.025	0.75	12000	1100	0.02	0.75	9000	720	0.01	0.75
2	**0.5**	**0.9°**	**30**	16000	1400	0.025	0.75	14000	1200	0.02	0.75	12000	900	0.016	0.75	9000	650	0.008	0.75
2	**0.5**	**0.9°**	**35**	13000	1100	0.02	0.75	11000	800	0.018	0.75	10000	700	0.014	0.75	7000	500	0.007	0.75
2	**0.5**	**0.9°**	**40**	13000	1000	0.02	0.75	11000	700	0.015	0.75	10000	600	0.012	0.75	7000	400	0.006	0.75
2	**0.5**	**0.9°**	**45**	8000	500	0.016	0.75	6800	360	0.012	0.75	5200	250	0.01	0.75	4000	120	0.005	0.75
2	**0.5**	**0.9°**	**50**	8000	500	0.016	0.75	6800	360	0.012	0.75	5200	250	0.01	0.75	4000	120	0.005	0.75
2	**0.5**	**0.9°**	**55**	4100	230	0.012	0.75	3500	170	0.009	0.75	2700	120	0.008	0.75	2000	60	0.004	0.75
2	**0.5**	**0.9°**	**60**	4100	230	0.012	0.75	3500	170	0.009	0.75	2700	120	0.008	0.75	2000	60	0.004	0.75
3	**0.8**	**0.9°**	**20**	13000	7200	0.19	1	11000	5100	0.15	1	8700	4000	0.11	1	6500	1800	0.06	1
3	**0.8**	**0.9°**	**25**	13000	7200	0.19	1	11000	5100	0.15	1	8700	4000	0.11	1	6500	1800	0.06	1
3	**0.8**	**0.9°**	**30**	13000	5700	0.12	1	11000	4000	0.09	1	8700	3000	0.07	1	6500	1400	0.04	1
3	**0.8**	**0.9°**	**40**	11000	3600	0.08	1	9100	2600	0.06	1	7400	2000	0.05	1	5500	1000	0.025	1
3	**0.8**	**0.9°**	**50**	8000	2600	0.07	1	6600	1800	0.05	1	5800	1500	0.04	1	4600	800	0.02	1
3	**0.8**	**0.9°**	**60**	7800	2480	0.06	1	6600	1740	0.05	1	5000	1250	0.04	1	3900	610	0.02	1
Depth of cut																			

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Air blow or oil mist is recommended for good chip evacuation.
3) For profile machining such as moulds, machining conditions may differ considerably depending on the workpiece geometry, machining methods and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece.
4) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

VFHVRB

4 flute, Corner radius, Short cut length,Irregular helix flutes

Work material				Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Hardened steel (45−55HRC) AISI H13				Hardened steel (55−62HRC) AISI D2			
Dia. DC (mm)	Corner R RE (mm)	Taper angle one side BHTA	Neck length LU (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
4	**1**	**0.4°**	**25**	10000	9900	0.24	1.5	8300	7000	0.19	1.5	6700	5600	0.14	1.5	5000	2500	0.07	1.5
4	**1**	**0.4°**	**30**	10000	9900	0.24	1.5	8300	7000	0.19	1.5	6700	5600	0.14	1.5	5000	2500	0.07	1.5
4	**1**	**0.4°**	**35**	10000	9900	0.15	1.5	8300	7000	0.12	1.5	6700	5600	0.09	1.5	5000	2500	0.04	1.5
4	**1**	**0.4°**	**40**	10000	9900	0.15	1.5	8300	7000	0.12	1.5	6700	5600	0.09	1.5	5000	2500	0.04	1.5
4	**1**	**0.4°**	**45**	10000	9900	0.15	1.5	8300	7000	0.12	1.5	6700	5600	0.09	1.5	5000	2500	0.04	1.5
4	**1**	**0.4°**	**50**	8100	6300	0.14	1.5	6700	4420	0.11	1.5	5400	3500	0.08	1.5	4000	1600	0.04	1.5
4	**1**	**0.9°**	**25**	10000	9900	0.24	1.5	8300	7000	0.19	1.5	6700	5600	0.14	1.5	5000	2500	0.07	1.5
4	**1**	**0.9°**	**30**	10000	9900	0.15	1.5	8300	7000	0.12	1.5	6700	5600	0.09	1.5	5000	2500	0.04	1.5
4	**1**	**0.9°**	**40**	10000	9900	0.15	1.5	8300	7000	0.12	1.5	6700	5600	0.09	1.5	5000	2500	0.04	1.5
4	**1**	**0.9°**	**50**	8100	6300	0.14	1.5	6700	4420	0.11	1.5	5400	3500	0.08	1.5	4000	1600	0.04	1.5
4	**1**	**0.9°**	**60**	8100	6300	0.11	1.5	6700	4420	0.08	1.5	5400	3500	0.06	1.5	4000	1600	0.03	1.5
6	**1.5**	**0.9°**	**40**	6600	11000	0.4	2	5500	7600	0.32	2	4500	6100	0.24	2	3300	2700	0.12	2
6	**1.5**	**0.9°**	**50**	6600	11000	0.4	2	5500	7600	0.32	2	4500	6100	0.24	2	3300	2700	0.12	2
6	**1.5**	**0.9°**	**60**	6600	11000	0.25	2	5500	7600	0.2	2	4500	6100	0.15	2	3300	2700	0.08	2
6	**1.5**	**0.9°**	**70**	5400	8700	0.23	2	4400	6200	0.18	2	3600	5000	0.14	2	2700	2200	0.07	2
8	**2**	**0.9°**	**60**	5000	11000	0.48	3	4200	7600	0.37	3	3300	6100	0.29	3	2500	2700	0.14	3
8	**2**	**0.9°**	**80**	5000	11000	0.3	3	4200	7600	0.23	3	3300	6100	0.18	3	2500	2700	0.09	3
10	**2**	**0.9°**	**80**	4000	11000	0.48	4.5	3300	7600	0.37	4.5	2700	6100	0.29	4.5	2000	2700	0.14	4.5
10	**2**	**0.9°**	**120**	3200	8700	0.27	4.5	2700	6200	0.21	4.5	2100	5000	0.16	4.5	1600	2200	0.08	4.5
12	**2**	**0.9°**	**80**	3300	10000	0.72	6	2700	7100	0.56	6	2200	5600	0.36	6	1700	2500	0.18	6
12	**2**	**0.9°**	**120**	3300	10000	0.45	6	2700	7100	0.35	6	2200	5600	0.23	6	1700	2500	0.12	6
Depth of cut																			

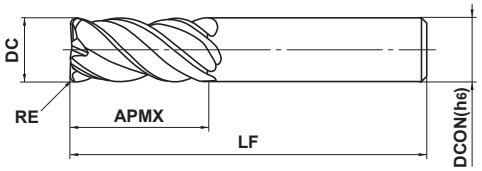
1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Air blow or oil mist is recommended for good chip evacuation.
3) For profile machining such as moulds, machining conditions may differ considerably depending on the workpiece geometry, machining methods and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece.
4) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

VFMHVRB

Corner radius, Medium cut length, Irregular helix flutes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○	○		◎	◎		





Type1

R					
0.5≤RE≤6.35					
±0.015					
h6	DC≤12	DC>12			
	0 - 0.020	0 - 0.030			
	DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20	
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

● Vibration control end mill achieving stable machining of difficult-to-cut materials and for long overhang applications.

Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
VFMHVRBD0600R050	6	0.5	13	50	6	4	●	1
VFMHVRB**D0600R100**	6	1	13	50	6	4	●	1
VFMHVRB**D0800R050**	8	0.5	19	60	8	4	●	1
VFMHVRB**D0800R100**	8	1	19	60	8	4	●	1
VFMHVRB**D1000R050**	10	0.5	22	70	10	4	●	1
VFMHVRB**D1000R100**	10	1	22	70	10	4	●	1
VFMHVRB**D1000R200**	10	2	22	70	10	4	●	1
VFMHVRB**D1200R050**	12	0.5	26	75	12	4	●	1
VFMHVRB**D1200R100**	12	1	26	75	12	4	●	1
VFMHVRB**D1200R200**	12	2	26	75	12	4	●	1
VFMHVRB**D1600R100**	16	1	35	90	16	4	●	1
VFMHVRB**D1600R200**	16	2	35	90	16	4	●	1
VFMHVRB**D1600R300**	16	3	35	90	16	4	●	1
VFMHVRB**D1600R500**	16	5	35	90	16	4	●	1
VFMHVRB**D2000R100**	20	1	45	110	20	4	●	1
VFMHVRB**D2000R200**	20	2	45	110	20	4	●	1
VFMHVRB**D2000R300**	20	3	45	110	20	4	●	1
VFMHVRB**D2000R400**	20	4	45	110	20	4	●	1
VFMHVRB**D2000R500**	20	5	45	110	20	4	●	1
VFMHVRB**D2000R635**	20	6.35	45	110	20	4	●	1

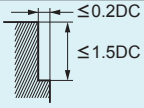
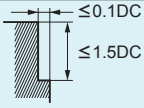
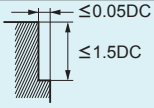
● : Inventory maintained in Japan.

VFMHVRB

Corner radius, Medium cut length, Irregular helix flutes

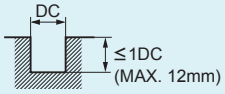
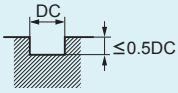
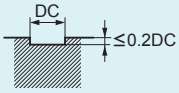
RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	21000	1100	21000	1100	14000	560	9600	310	4800	130
3	15000	1250	15000	1250	10600	850	7400	380	4200	200
4	11000	1400	11000	1400	8000	960	5600	400	3200	220
5	9600	1920	9600	1920	6400	1020	4500	430	2500	250
6	8000	2240	8000	2240	5300	1060	3700	440	2100	250
7	6800	1900	6800	1900	4500	1010	3200	450	1800	260
8	6000	1680	6000	1680	4000	960	2800	450	1600	260
9	5300	1480	5300	1480	3500	840	2500	450	1400	220
10	4800	1440	4800	1440	3200	770	2200	440	1300	210
11	4400	1350	4400	1350	2900	760	2000	400	1200	190
12	4000	1250	4000	1250	2700	760	1900	380	1100	180
13	3700	1180	3700	1180	2500	700	1700	360	1000	160
14	3400	1160	3400	1160	2300	640	1600	350	900	140
16	3000	1140	3000	1140	2000	560	1400	340	800	130
18	2700	970	2700	970	1800	550	1200	340	700	110
20	2400	860	2400	860	1600	510	1100	330	600	100
Depth of cut	 ≤0.2DC ≤1.5DC				 ≤0.1DC ≤1.5DC			 ≤0.05DC ≤1.5DC		

DC:Dia.

Slotting

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	17000	680	10000	400	9600	310	4800	130	3200	80
3	12000	720	6900	410	7400	380	3200	140	2700	110
4	9200	810	5600	490	5600	400	2400	150	2000	120
5	7600	1060	4500	630	4500	410	1900	170	1600	130
6	6400	1280	3700	740	3700	440	1600	190	1300	160
7	5500	1210	3200	700	3200	410	1400	190	1100	140
8	4800	1150	2800	670	2800	390	1200	190	1000	130
9	4200	1010	2500	600	2500	350	1100	180	900	130
10	3800	910	2200	530	2200	350	1000	160	800	130
11	3500	900	2000	530	2000	320	900	160	720	120
12	3200	900	1900	530	1900	300	800	160	660	110
13	2900	810	1700	480	1700	290	730	150	610	100
14	2700	760	1600	450	1600	290	680	140	570	90
16	2400	670	1400	390	1400	280	600	120	500	80
18	2100	670	1200	380	1200	270	530	120	440	70
20	1900	610	1100	350	1100	260	480	120	400	60
Depth of cut	 DC ≤1DC (MAX. 12mm)				 DC ≤0.5DC			 DC ≤0.2DC		

DC:Dia.

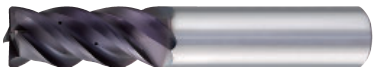
1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

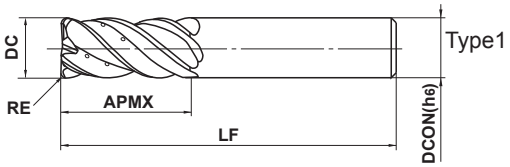
VFMHVRBCH

Corner radius end mill, Medium cut length, 4 flute, Irregular helix flutes, with multiple internal through coolant holes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
				◎	◎		

CoolStar
END MILLS





R					
	1≤RE≤3				
	±0.015				
	16≤DC≤20				
	0 - 0.03				
h6	DCON=16	DCON=20			
	0 - 0.011	0 - 0.013			

Vibration control corner radius end mill with multiple internal through coolant holes ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.

Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
VFMHVRBCHD1600R100	16	1	35	90	16	4	●	1
VFMHVRBCH**D1600R300**	16	3	35	90	16	4	●	1
VFMHVRBCH**D2000R100**	20	1	45	110	20	4	●	1
VFMHVRBCH**D2000R300**	20	3	45	110	20	4	●	1

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
16	2000	560	800	110
20	1600	510	600	100
Depth of cut	≤0.1DC, 0.5DC−1.5DC		≤0.05DC, 0.5DC−1.5DC	

DC:Dia.

Slotting

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)
16	1400	170
20	1100	130
Depth of cut	DC, 0.5DC−1.5DC	

DC:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

● : Inventory maintained in Japan.

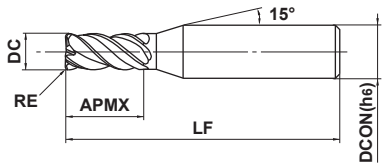
VQMHVRB

Corner radius end mill, Medium cutting length, 4 flute, Irregular helix flutes

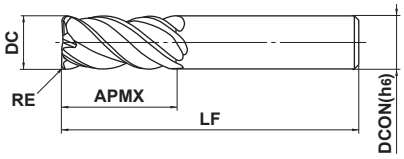


Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	◎	○	





Type1



Type2

R				
0.2≤RE≤6.35				
±0.015				
DC≤12	DC>12			
0 - 0.02	0 - 0.03			
h6	4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	DCON=20
	0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013

Smart Miracle vibration control end mill achieving stable machining of difficult-to-cut materials and for long overhang applications.

Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
VQMHVRBD0200R020	2	0.2	4	45	4	4	●	1
VQMHVRBD0200R030	2	0.3	4	45	4	4	●	1
VQMHVRBD0300R020	3	0.2	8	45	6	4	●	1
VQMHVRBD0300R030	3	0.3	8	45	6	4	●	1
VQMHVRBD0300R050	3	0.5	8	45	6	4	●	1
VQMHVRBD0400R020	4	0.2	11	45	6	4	●	1
VQMHVRBD0400R030	4	0.3	11	45	6	4	●	1
VQMHVRBD0400R050	4	0.5	11	45	6	4	●	1
VQMHVRBD0500R020	5	0.2	13	50	6	4	●	1
VQMHVRBD0500R030	5	0.3	13	50	6	4	●	1
VQMHVRBD0500R050	5	0.5	13	50	6	4	●	1
VQMHVRBD0500R100	5	1	13	50	6	4	●	1
VQMHVRBD0600R030	6	0.3	13	50	6	4	●	2
VQMHVRBD0600R050	6	0.5	13	50	6	4	●	2
VQMHVRBD0600R100	6	1	13	50	6	4	●	2
VQMHVRBD0800R030	8	0.3	19	60	8	4	●	2
VQMHVRBD0800R050	8	0.5	19	60	8	4	●	2
VQMHVRBD0800R100	8	1	19	60	8	4	●	2
VQMHVRBD0800R150	8	1.5	19	60	8	4	●	2
VQMHVRBD1000R030	10	0.3	22	70	10	4	●	2
VQMHVRBD1000R050	10	0.5	22	70	10	4	●	2
VQMHVRBD1000R100	10	1	22	70	10	4	●	2
VQMHVRBD1000R150	10	1.5	22	70	10	4	●	2
VQMHVRBD1000R200	10	2	22	70	10	4	●	2
VQMHVRBD1200R050	12	0.5	26	75	12	4	●	2
VQMHVRBD1200R100	12	1	26	75	12	4	●	2
VQMHVRBD1200R150	12	1.5	26	75	12	4	●	2
VQMHVRBD1200R200	12	2	26	75	12	4	●	2
VQMHVRBD1200R250	12	2.5	26	75	12	4	●	2
VQMHVRBD1200R300	12	3	26	75	12	4	●	2
VQMHVRBD1600R100	16	1	35	90	16	4	●	2
VQMHVRBD1600R150	16	1.5	35	90	16	4	●	2

Note) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
VQMHVRBD1600R200	16	2	35	90	16	4	●	2
VQMHVRBD1600R250	16	2.5	35	90	16	4	●	2
VQMHVRBD1600R300	16	3	35	90	16	4	●	2
VQMHVRBD1600R400	16	4	35	90	16	4	●	2
VQMHVRBD1600R500	16	5	35	90	16	4	●	2
VQMHVRBD2000R100	20	1	45	110	20	4	●	2
VQMHVRBD2000R150	20	1.5	45	110	20	4	●	2
VQMHVRBD2000R200	20	2	45	110	20	4	●	2
VQMHVRBD2000R250	20	2.5	45	110	20	4	●	2
VQMHVRBD2000R300	20	3	45	110	20	4	●	2
VQMHVRBD2000R400	20	4	45	110	20	4	●	2
VQMHVRBD2000R500	20	5	45	110	20	4	●	2
VQMHVRBD2000R635	20	6.35	45	110	20	4	●	2

Note) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used.
An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.

VQMHVRB

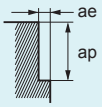
Corner radius end mill, Medium cutting length, 4 flute, Irregular helix flutes

RECOMMENDED CUTTING CONDITIONS

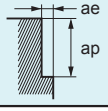
Side milling

The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.
The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V					Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH,17-4PH				
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
2	150	24000	2400	3	0.6	120	19000	1100	3	0.6	100	16000	830	3	0.6	75	12000	720	3	0.4
3	150	16000	2600	4.5	0.9	120	13000	1200	4.5	0.9	100	11000	880	4.5	0.9	75	8000	770	4.5	0.6
4	150	12000	2600	6	1.2	120	9500	1300	6	1.2	100	8000	900	6	1.2	75	6000	790	6	0.8
5	150	9500	2600	7.5	1.5	120	7600	1300	7.5	1.5	100	6400	900	7.5	1.5	75	4800	810	7.5	1
6	150	8000	2600	9	1.8	120	6400	1300	9	1.8	100	5300	1100	9	1.8	75	4000	810	9	1.2
8	150	6000	2500	12	2.4	120	4800	1300	12	2.4	100	4000	1200	12	2.4	75	3000	840	12	1.6
10	150	4800	2300	15	3	120	3800	1200	15	3	100	3200	1300	15	3	75	2400	770	15	2
12	150	4000	1900	18	3.6	120	3200	1200	18	3.6	100	2700	1200	18	3.6	75	2000	720	18	2.4
16	150	3000	1600	24	4.8	120	2400	960	24	4.8	100	2000	960	24	4.8	75	1500	600	24	3.2
20	150	2400	1300	30	6	120	1900	760	30	6	100	1600	770	30	6	75	1200	480	30	4
25	150	1900	1100	37.5	7.5	120	1500	600	37.5	7.5	100	1300	620	37.5	7.5	75	950	380	37.5	5
Depth of cut																				

General-purpose conditions

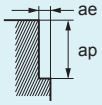
Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V					Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH,17-4PH				
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
2	120	19000	1300	3	0.6	100	16000	630	3	0.6	80	13000	450	1.5	0.2	70	11000	440	3	0.4
3	120	13000	1400	4.5	0.9	100	11000	700	4.5	0.9	80	8500	450	2.2	0.3	70	7400	470	4.5	0.6
4	120	9500	1400	6	1.2	100	8000	700	6	1.2	80	6400	470	3	0.6	70	5600	490	6	0.8
5	120	7600	1400	7.5	1.5	100	6400	710	7.5	1.5	80	5100	470	4.5	0.9	70	4500	500	7.5	1
6	120	6400	1400	9	1.8	100	5300	710	9	1.8	80	4200	580	6	1.2	70	3700	500	9	1.2
8	120	4800	1300	12	2.4	100	4000	740	12	2.4	80	3200	630	7.5	1.5	70	2800	520	12	1.6
10	120	3800	1200	15	3	100	3200	680	15	3	80	2500	660	9	1.8	70	2200	460	15	2
12	120	3200	1000	18	3.6	100	2700	640	18	3.6	80	2100	610	12	2.4	70	1900	450	18	2.4
16	120	2400	860	24	4.8	100	2000	530	24	4.8	80	1600	510	15	3	70	1400	370	24	3.2
20	120	1900	680	30	6	100	1600	420	30	6	80	1300	410	18	3.6	70	1100	290	30	4
25	120	1500	390	37.5	7.5	100	1300	340	37.5	7.5	80	1000	210	24	4.8	70	890	230	37.5	5
Depth of cut																				

1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used.
   An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
3) Chattering can still occur if the machine rigidity and clamping method are insufficient.
   In these cases the feed and speed should be reduced proportionately.
4) When the depth of cut is smaller than shown the revolution and feed rate can be increased.

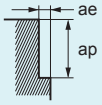
Side milling

The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.
The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Copper, Copper alloy					Heat resistant alloys Inconel718				
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
2	180	29000	2900	3	0.6	40	6400	230	3	0.2
3	180	19000	3000	4.5	0.9	40	4200	240	4.5	0.3
4	180	14000	3000	6	1.2	40	3200	240	6	0.4
5	180	11000	3000	7.5	1.5	40	2500	240	7.5	0.5
6	180	9500	3000	9	1.8	40	2100	250	9	0.6
8	180	7200	3000	12	2.4	40	1600	260	12	0.8
10	180	5700	2700	15	3	40	1300	290	15	1
12	180	4800	2300	18	3.6	40	1100	280	18	1.2
16	180	3600	1900	24	4.8	40	800	200	24	1.6
20	180	2900	1600	30	6	40	640	160	30	2
25	180	2300	1300	37	7.5	40	510	130	37.5	2.5
Depth of cut										

General-purpose conditions

Work material	Copper, Copper alloy					Heat resistant alloys Inconel718				
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
2	140	22000	1500	3	0.6	30	4800	110	3	0.2
3	140	15000	1600	4.5	0.9	30	3200	120	4.5	0.3
4	140	11000	1600	6	1.2	30	2400	120	6	0.4
5	140	8900	1600	7.5	1.5	30	1900	120	7.5	0.5
6	140	7400	1600	9	1.8	30	1600	130	9	0.6
8	140	5600	1600	12	2.4	30	1200	130	12	0.8
10	140	4500	1400	15	3	30	950	140	15	1
12	140	3700	1200	18	3.6	30	800	140	18	1.2
16	140	2800	1000	24	4.8	30	600	100	24	1.6
20	140	2200	780	30	6	30	480	81	30	2
25	140	1800	670	37.5	7.5	30	380	64	37.5	2.5
Depth of cut										

1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used.
   An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
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4) When the depth of cut is smaller than shown the revolution and feed rate can be increased.

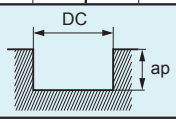
VQMHVRB

Corner radius end mill, Medium cutting length, 4 flute, Irregular helix flutes

Slotting

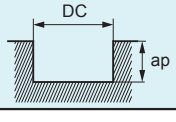
The rigidity of the machine or workpiece and chip discharge are sufficient at high efficiency conditions.
The rigidity of the machine or workpiece or chip discharge is insufficient at general-purpose conditions.

High efficiency conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT				Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V				Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH, 17-4PH				Copper, Copper alloy				Heat resistant alloys Inconel718			
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
2	150	24000	1200	2	120	19000	610	2	100	16000	640	2	60	9500	300	1	180	29000	1500	2	30	4800	130	0.6
3	150	16000	1500	3	120	13000	730	3	100	11000	660	3	60	6400	360	1.5	180	19000	1700	3	30	3200	150	0.9
4	150	12000	1900	4	120	9500	910	4	100	8000	700	4	60	4800	460	2	180	14000	2200	4	30	2400	170	1.2
5	150	9500	1900	5	120	7600	910	5	100	6400	720	5	60	3800	460	2.5	180	11000	2200	5	30	1900	170	1.5
6	150	8000	1900	6	120	6400	1000	6	100	5300	740	6	60	3200	510	3	180	9500	2300	6	30	1600	180	1.8
8	150	6000	1700	8	120	4800	960	8	100	4000	800	8	60	2400	480	4	180	7200	2000	8	30	1200	190	2.4
10	150	4800	1500	10	120	3800	840	10	100	3200	900	10	60	1900	420	5	180	5700	1800	10	30	950	210	3
12	150	4000	1300	12	120	3200	770	12	100	2700	860	12	60	1600	380	6	180	4800	1500	12	30	800	200	3.6
16	150	3000	1100	12	120	2400	670	12	100	2000	640	12	60	1200	340	8	180	3600	1300	12	30	600	150	4.8
20	150	2400	860	12	120	1900	530	12	100	1600	510	12	60	950	270	10	180	2900	1000	12	30	480	120	6
25	150	1900	760	12	120	1500	420	12	100	1300	420	12	60	760	210	12	180	2300	920	12	30	380	100	7.5
Depth of cut																								

DC:Dia.

General-purpose conditions

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT				Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys AISI 304, AISI 316, Ti-6Al-4V				Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631 15-5PH, 17-4PH				Copper, Copper alloy				Heat resistant alloys Inconel718			
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
2	100	16000	550	2	80	13000	270	2	60	9500	250	2	50	8000	170	1	120	19000	650	2	25	4000	74	0.6
3	100	11000	670	3	80	8500	310	3	60	6400	250	3	50	5300	200	1.5	120	13000	790	3	25	2700	86	0.9
4	100	8000	840	4	80	6400	410	4	60	4800	280	4	50	4000	250	2	120	9500	1000	4	25	2000	93	1.2
5	100	6400	840	5	80	5100	410	5	60	3800	280	5	50	3200	250	2.5	120	7600	1000	5	25	1600	95	1.5
6	100	5300	840	6	80	4200	440	6	60	3200	300	6	50	2700	290	3	120	6400	1000	6	25	1300	96	1.8
8	100	4000	740	8	80	3200	420	8	60	2400	320	8	50	2000	260	4	120	4800	890	8	25	990	100	2.4
10	100	3200	680	10	80	2500	360	10	60	1900	350	10	50	1600	230	5	120	3800	800	10	25	800	120	3
12	100	2700	570	12	80	2100	330	12	60	1600	340	12	50	1300	210	6	120	3200	680	12	25	660	110	3.6
16	100	2000	480	12	80	1600	300	12	60	1200	250	12	50	990	180	8	120	2400	570	12	25	500	84	4.8
20	100	1600	380	12	80	1300	240	12	60	950	200	12	50	800	150	10	120	1900	450	12	25	400	68	6
25	100	1300	340	12	80	1000	180	12	60	760	160	12	50	640	120	12	120	1500	400	12	25	320	50	7.5
Depth of cut																								

DC:Dia.

1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used.
   An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
3) Chattering can still occur if the machine rigidity and clamping method are insufficient.
   In these cases the feed and speed should be reduced proportionately.
4) When the depth of cut is smaller than shown the feed rate can be increased.

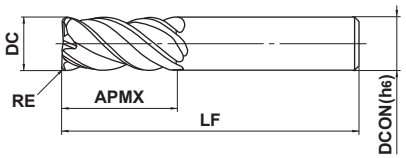
VQMHVRBF

Corner radius end mill, Medium cutting length, 4 flute, Irregular helix flutes (for finishing)

UWC VQ 37° 40°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○			○	◎		





Type1

R					
0.3≤RE≤3					
±0.015					
h6					
DC≤12	DC>12				
0 - 0.02	0 - 0.03				
DCON=6	8≤DCON≤10	12≤DCON≤16			
0 - 0.008	0 - 0.009	0 - 0.011			

- Smart Miracle vibration control end mill achieving stable machining of difficult-to-cut materials.
- With the special substrate, suitable for finishing of heat resistance alloy, etc.

Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
VQMHVRBFD0600R030	6	0.3	13	50	6	4	●	1
VQMHVRBF**D0600R050**	6	0.5	13	50	6	4	●	1
VQMHVRBF**D0600R100**	6	1	13	50	6	4	●	1
VQMHVRBF**D0800R050**	8	0.5	19	60	8	4	●	1
VQMHVRBF**D0800R100**	8	1	19	60	8	4	●	1
VQMHVRBF**D1000R030**	10	0.3	22	70	10	4	●	1
VQMHVRBF**D1000R050**	10	0.5	22	70	10	4	●	1
VQMHVRBF**D1000R100**	10	1	22	70	10	4	●	1
VQMHVRBF**D1000R200**	10	2	22	70	10	4	●	1
VQMHVRBF**D1200R100**	12	1	26	75	12	4	●	1
VQMHVRBF**D1200R200**	12	2	26	75	12	4	●	1
VQMHVRBF**D1200R300**	12	3	26	75	12	4	●	1
VQMHVRBF**D1600R100**	16	1	35	90	16	4	●	1
VQMHVRBF**D1600R200**	16	2	35	90	16	4	●	1

Note) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.

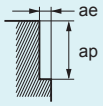
● : Inventory maintained in Japan.

VQMHVRBF

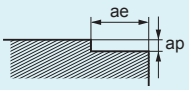
Corner radius end mill, Medium cutting length, 4 flute, Irregular helix flutes (for finishing)

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH					Copper, Copper alloy					Heat resistant alloys Inconel718				
Dia. DC (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
6	150	8000	2600	9	0.3	120	6400	1300	9	0.3	75	4000	800	9	0.3	180	9500	3000	9	0.3	40	2100	250	9	0.18
8	150	6000	2500	12	0.4	120	4800	1300	12	0.4	75	3000	840	12	0.4	180	7200	3000	12	0.4	40	1600	260	12	0.24
10	150	4800	2300	15	0.5	120	3800	1200	15	0.5	75	2400	770	15	0.5	180	5700	2700	15	0.5	41	1300	290	15	0.3
12	150	4000	1900	18	0.6	120	3200	1200	18	0.6	75	2000	720	18	0.6	180	4800	2300	18	0.6	41	1100	280	18	0.36
16	150	3000	1600	24	0.8	120	2400	960	24	0.8	75	1500	600	24	0.8	180	3600	1900	24	0.8	40	800	200	24	0.48
Depth of cut																									

Bottom face milling

Work material	Carbon steel, Alloy steel, Mild steel AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Hardened stainless steels, Cobaly chromium alloy AISI 630, AISI 631, 15-5PH, 17-4PH					Copper, Copper alloy					Heat resistant alloys Inconel718				
Dia. DC (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
6	110	5800	1400	0.3	4.8	90	4800	770	0.3	4.8	55	2900	460	0.3	4.8	130	6900	1700	0.3	4.8	30	1600	180	0.18	4.8
8	110	4400	1200	0.4	6.4	90	3600	720	0.4	6.4	55	2200	440	0.4	6.4	130	5200	1500	0.4	6.4	30	1200	190	0.24	6.4
10	110	3500	1100	0.5	8	90	2900	640	0.5	8	55	1800	400	0.5	8	130	4100	1300	0.5	8	30	950	210	0.3	8
12	110	2900	930	0.6	9.6	90	2400	580	0.6	9.6	55	1500	360	0.6	9.6	130	3400	1100	0.6	9.6	30	800	200	0.36	9.6
16	110	2200	790	0.8	12.8	90	1800	500	0.8	12.8	55	1100	310	0.8	12.8	130	2600	940	0.8	12.8	30	600	150	0.48	12.8
Depth of cut																									

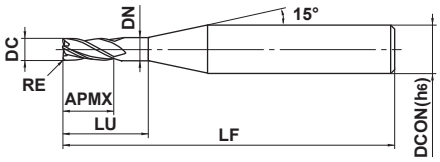
1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
3) Chattering can still occur if the machine rigidity and clamping method are insufficient. In these cases the feed and speed should be reduced proportionately.
4) When the depth of cut is smaller than shown the feed rate can be increased.

VC4SRB

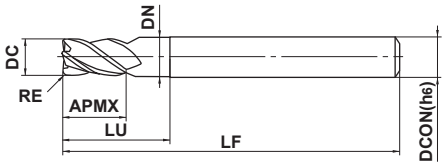
Corner radius end mill, Short cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	○	○	○		





Type1



Type2

4≤DC≤12				
0 - 0.020				
DCON=6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

h6

● 4 flute corner radius end mill with relieved neck for 3×D length of reach.

Unit : mm

Order Number	DC	RE	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VC4SRBD0400R0050	4	0.5	4	12	3.8	45	6	4	●	1
VC4SRB**D0600R0050**	6	0.5	6	18	5.8	50	6	4	●	2
VC4SRB**D0600R0100**	6	1	6	18	5.8	50	6	4	●	2
VC4SRB**D0800R0050**	8	0.5	8	24	7.8	60	8	4	●	2
VC4SRB**D0800R0100**	8	1	8	24	7.8	60	8	4	●	2
VC4SRB**D1000R0100**	10	1	10	30	9.7	70	10	4	●	2
VC4SRB**D1000R0200**	10	2	10	30	9.7	70	10	4	●	2
VC4SRB**D1200R0100**	12	1	12	36	11.7	75	12	4	●	2
VC4SRB**D1200R0200**	12	2	12	36	11.7	75	12	4	●	2

● : Inventory maintained in Japan.

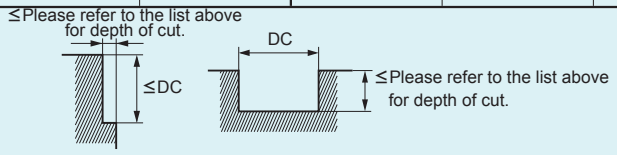
VC4SRB

Corner radius end mill, Short cut length, 4 flute

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45－55HRC) AISI H13		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
2	30000	4500	0.18	24000	3600	0.10
2.5	24000	3900	0.25	19000	3000	0.13
3	20000	3500	0.30	16000	2700	0.15
4	15000	3000	0.40	12000	2400	0.20
5	12000	2400	0.50	9000	1800	0.25
6	10000	2100	0.60	7000	1470	0.30
8	8000	1500	0.80	5600	1050	0.40
10	6400	1400	1.00	4500	950	0.50
12	5400	1200	1.00	3800	860	0.50
16	2400	550	2.00	1200	120	0.80
20	1900	480	3.00	1000	100	1.00

Depth of cut



DC:Dia.

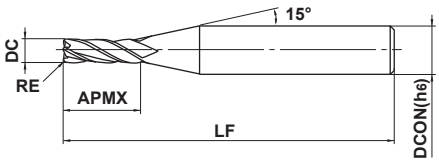
1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) When slotting with end mills with ϕ3 or larger, reduce the revolution to 50－70% and the feed rate to 40－60%.
3) When drilling, please set the feed rate at 1/3 or below the values above.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VC4JRB

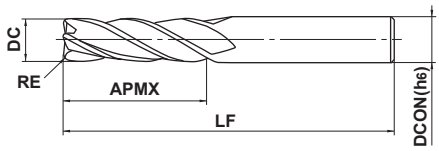
Corner radius end mill, Semi long cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	○	○	○		





Type1



Type2

h6

DC≤12	DC>12			
0 - 0.020	0 - 0.030			
DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

- 4 flute corner radius end mill for general use.
- 4 flute corner radius end mill for longer reach applications.

Unit : mm

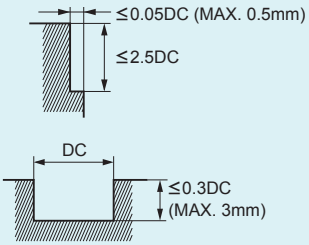
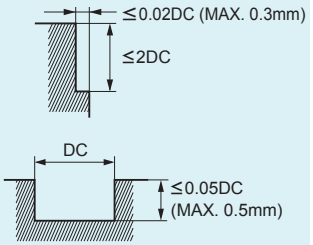
Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
VC4JRBD0300R0030	3	0.3	12	50	6	4	●	1
VC4JRBD0400R0030	4	0.3	15	50	6	4	●	1
VC4JRBD0400R0050	4	0.5	15	50	6	4	●	1
VC4JRBD0500R0030	5	0.3	20	60	6	4	●	1
VC4JRBD0500R0050	5	0.5	20	60	6	4	●	1
VC4JRBD0600R0030	6	0.3	20	60	6	4	●	2
VC4JRBD0600R0050	6	0.5	20	60	6	4	●	2
VC4JRBD0600R0100	6	1	20	60	6	4	●	2
VC4JRBD0800R0030	8	0.3	25	70	8	4	●	2
VC4JRBD0800R0050	8	0.5	25	70	8	4	●	2
VC4JRBD0800R0100	8	1	25	70	8	4	●	2
VC4JRBD0800R0150	8	1.5	25	70	8	4	●	2
VC4JRBD0800R0200	8	2	25	70	8	4	●	2
VC4JRBD1000R0030	10	0.3	30	90	10	4	●	2
VC4JRBD1000R0050	10	0.5	30	90	10	4	●	2
VC4JRBD1000R0100	10	1	30	90	10	4	●	2
VC4JRBD1000R0150	10	1.5	30	90	10	4	●	2
VC4JRBD1000R0200	10	2	30	90	10	4	●	2
VC4JRBD1200R0050	12	0.5	30	90	12	4	●	2
VC4JRBD1200R0100	12	1	30	90	12	4	●	2
VC4JRBD1200R0150	12	1.5	30	90	12	4	●	2
VC4JRBD1200R0200	12	2	30	90	12	4	●	2
VC4JRBD1600R0050	16	0.5	50	110	16	4	●	2
VC4JRBD1600R0100	16	1	50	110	16	4	●	2
VC4JRBD1600R0150	16	1.5	50	110	16	4	●	2
VC4JRBD1600R0200	16	2	50	110	16	4	●	2
VC4JRBD2000R0050	20	0.5	55	110	20	4	●	2
VC4JRBD2000R0100	20	1	55	110	20	4	●	2
VC4JRBD2000R0150	20	1.5	55	110	20	4	●	2
VC4JRBD2000R0200	20	2	55	110	20	4	●	2

● : Inventory maintained in Japan.

VC4JRB

Corner radius end mill, Semi long cut length, 4 flute

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	4200	110	3400	95	2600	70	2100	50
4	3400	140	2700	110	2100	85	1700	60
5	2900	170	2300	140	1800	100	1500	70
6	2500	200	2000	170	1500	130	1300	85
8	1900	220	1500	170	1200	150	1000	85
10	1600	220	1300	170	950	130	800	85
12	1300	170	1100	150	800	100	670	70
16	1000	140	820	110	600	80	500	50
20	800	110	650	85	480	70	400	40
25	650	85	520	70	380	50	320	35
Depth of cut								

DC:Dia.

1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) The above table shows cutting conditions for standard side milling. For slotting, please reduce the feed rate only to 50% of the table figure. Please set the revolution rate at 60% and the feed rate at 40% when slotting austenitic stainless steels.
4) When drilling, please set the feed rate at 1/3 or below the values above.
5) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MIRACLE CORNER RADIUS END MILL FOR HIGH FEED MACHINING

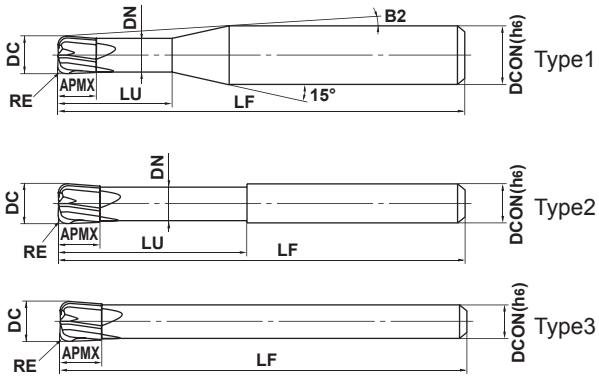
VCHFRB

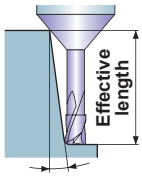
Corner radius, Short flute length, 4 flute, High feed machining

UWC VC 20° DC≤5 10° DC≥6

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎	○		○		







R				
0.5≤RE≤3				
±0.015				
DC≤12	DC>12			
0 - 0.02	0 - 0.03			
h6	DCON=6	8≤DCON≤10	12≤DCON≤16	
	0 - 0.008	0 - 0.009	0 - 0.011	

● Suitable for high feed and efficient machining of die & mould.

Unit : mm

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
												30'	1°	2°	3°
VCHFRBD0200R050N06	2	0.5	2	6	1.9	8.7°	50	6	4	●	1	6.2	6.5	6.9	7.5
VCHFRB**D0200R050N10**	2	0.5	2	10	1.9	6.7°	70	6	4	●	1	10.4	10.8	11.5	12.4
VCHFRB**D0300R075N09**	3	0.75	3	9	2.9	6.2°	50	6	4	●	1	9.4	9.7	10.4	11.1
VCHFRB**D0300R075N15**	3	0.75	3	15	2.9	4.3°	70	6	4	●	1	15.6	16.1	17.3	18.6
VCHFRB**D0400R100N12**	4	1	4	12	3.9	3.9°	50	6	4	●	1	12.4	12.8	13.7	14.7
VCHFRB**D0400R100N20**	4	1	4	20	3.9	2.6°	70	6	4	●	1	20.7	21.4	22.9	*
VCHFRB**D0500R120N15**	5	1.2	5	15	4.9	1.9°	70	6	4	●	1	15.5	16	*	*
VCHFRB**D0600R150N18**	6	1.5	6	18	5.85	—	50	6	4	●	2	*	*	*	*
VCHFRB**D0600R150N30**	6	1.5	6	30	5.85	—	90	6	4	●	2	*	*	*	*
VCHFRB**D0700R150A050**	7	1.5	7	—	—	—	50	6	4	●	3	*	*	*	*
VCHFRB**D0700R150A080**	7	1.5	7	—	—	—	80	6	4	●	3	*	*	*	*
VCHFRB**D0800R200N24**	8	2	8	24	7.85	—	60	8	4	●	2	*	*	*	*
VCHFRB**D0800R200N40**	8	2	8	40	7.85	—	90	8	4	●	2	*	*	*	*
VCHFRB**D0900R200A065**	9	2	9	—	—	—	65	8	4	●	3	*	*	*	*
VCHFRB**D0900R200A100**	9	2	9	—	—	—	100	8	4	●	3	*	*	*	*
VCHFRB**D1000R200N30**	10	2	10	30	9.7	—	70	10	4	●	2	*	*	*	*
VCHFRB**D1000R200N50**	10	2	10	50	9.7	—	100	10	4	●	2	*	*	*	*
VCHFRB**D1100R200A070**	11	2	11	—	—	—	70	10	4	●	3	*	*	*	*
VCHFRB**D1100R200A110**	11	2	11	—	—	—	110	10	4	●	3	*	*	*	*
VCHFRB**D1200R300N36**	12	3	12	36	11.7	—	75	12	4	●	2	*	*	*	*
VCHFRB**D1200R300N60**	12	3	12	60	11.7	—	110	12	4	●	2	*	*	*	*
VCHFRB**D1300R300A075**	13	3	13	—	—	—	75	12	4	●	3	*	*	*	*
VCHFRB**D1300R300A120**	13	3	13	—	—	—	120	12	4	●	3	*	*	*	*
VCHFRB**D1600R300N80**	16	3	16	80	15.5	—	140	16	4	●	2	*	*	*	*

* No interference

● : Inventory maintained in Japan.

MIRACLE CORNER RADIUS END MILL FOR HIGH FEED MACHINING

VCHFRB

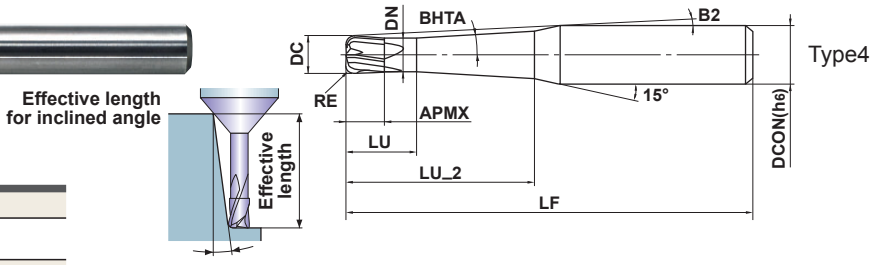
Corner radius, Short flute length, 4 flute, High feed machining

UWC VC 20° DC≤5 10° DC≥6

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎	○		○		

Taper neck type





Type4

R			
0.5≤RE≤3			
±0.015			
DC≤12	DC>12		
0 - 0.02	0 - 0.03		
h6	DCON=6	8≤DCON≤10	12≤DCON≤16
	0 - 0.008	0 - 0.009	0 - 0.011

Suitable for high feed and efficient machining of die & mould.

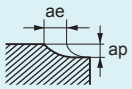
Unit : mm

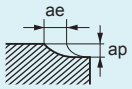
Order Number	DC	RE	BHTA	APMX	LU_2	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle 1°	2°	3°
VCHFRBD0200R050N12	2	0.5	1°	2	12	4	1.9	6°	70	6	4	●	4	12.9	13.9	15
VCHFRBD0200R050N16	2	0.5	1°	2	16	4	1.9	5°	70	6	4	●	4	16.9	18.2	19.6
VCHFRBD0200R050N20	2	0.5	1°	2	20	4	1.9	4.3°	70	6	4	●	4	20.9	22.5	24.3
VCHFRBD0300R075N18	3	0.75	1°	3	18	6	2.9	3.8°	80	6	4	●	4	19.3	20.7	22.3
VCHFRBD0300R075N24	3	0.75	1°	3	24	6	2.9	3°	80	6	4	●	4	25.3	27.2	*
VCHFRBD0300R075N30	3	0.75	1°	3	30	6	2.9	2.6°	80	6	4	●	4	31.3	33.6	*
VCHFRBD0400R100N24	4	1	1°	4	24	8	3.9	2.2°	90	6	4	●	4	25.7	27.6	*
VCHFRBD0400R100N32	4	1	1°	4	32	8	3.9	1.7°	90	6	4	●	4	33.7	*	*
VCHFRBD0400R100N40	4	1	1°	4	40	8	3.9	1.4°	90	6	4	●	4	41.7	*	*
VCHFRBD0500R120N30	5	1.2	1°	5	30	8	4.9	1°	90	6	4	●	4	*	*	*
VCHFRBD0500R120N40	5	1.2	1°	5	40	8	4.9	2°	90	8	4	●	4	41.9	*	*
VCHFRBD0500R120N50	5	1.2	1°	5	50	8	4.9	1.7°	110	8	4	●	4	51.9	*	*
VCHFRBD0600R150N50	6	1.5	1°	6	50	16	5.85	1.2°	110	8	4	●	4	52.9	*	*
VCHFRBD0600R150N67	6	1.5	1°	6	67	16	5.85	0.9°	130	8	4	●	4	*	*	*
VCHFRBD0800R200N70	8	2	1°	8	70	18	7.85	0.9°	120	10	4	●	4	*	*	*
VCHFRBD0800R200N90	8	2	1°	8	90	18	7.85	1.3°	150	12	4	●	4	93.5	*	*
VCHFRBD1000R200N80	10	2	1°	10	80	20	9.7	2°	140	16	4	●	4	83.9	*	*
VCHFRBD1000R200N110	10	2	1°	10	110	20	9.7	1.5°	160	16	4	●	4	113.9	*	*
VCHFRBD1200R300N110	12	3	1°	12	110	24	11.7	1.1°	160	16	4	●	4	115.2	*	*

* No interference

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material		Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			
Dia. **DC** (mm)	Corner radius **RE** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
2	**R 0.5**	33000	10000	0.08	0.8	27000	8400	0.05	0.8
3	**R 0.75**	22000	11000	0.12	1.2	18000	9000	0.08	1.2
4	**R 1**	17000	12000	0.15	1.5	14000	9500	0.12	1.5
5	**R 1.2**	13000	13000	0.20	2.0	11000	11000	0.15	2.0
6	**R 1.5**	11000	13000	0.25	2.5	9000	11000	0.15	2.5
7	**R 1.5**	9400	13000	0.25	3.0	7800	11000	0.15	3.0
8	**R 2**	8200	13000	0.30	3.0	7000	11000	0.20	3.0
9	**R 2**	7300	13000	0.30	4.0	6000	11000	0.20	4.0
10	**R 2**	6500	13000	0.30	4.5	5500	11000	0.20	4.5
11	**R 2**	6000	12000	0.30	5.5	5000	10000	0.20	5.5
12	**R 3**	5500	12000	0.45	4.5	4600	10000	0.30	4.5
13	**R 3**	5000	12000	0.45	5.5	4200	10000	0.30	5.5
16	**R 3**	4100	10000	0.45	7.5	3400	8800	0.30	7.5
Depth of cut									

Work material		Hardened steel (45−55HRC) AISI H13				Hardened steel (55−62HRC) AISI D2			
Dia. **DC** (mm)	Corner radius **RE** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
2	**R 0.5**	24000	7500	0.04	0.8	16000	3000	0.03	0.8
3	**R 0.75**	16000	8500	0.06	1.2	11000	3300	0.05	1.2
4	**R 1**	12000	8800	0.08	1.5	8000	3500	0.07	1.5
5	**R 1.2**	9600	9500	0.10	2.0	6400	3800	0.08	2.0
6	**R 1.5**	8000	9600	0.10	2.5	5300	3800	0.10	2.5
7	**R 1.5**	6900	9600	0.10	3.0	4600	3800	0.10	3.0
8	**R 2**	6000	9600	0.15	3.0	4000	3800	0.13	3.0
9	**R 2**	5300	9500	0.15	4.0	3800	3800	0.13	4.0
10	**R 2**	4800	9500	0.15	4.5	3200	3800	0.13	4.5
11	**R 2**	4500	9000	0.15	5.5	2900	3500	0.13	5.5
12	**R 3**	4100	9000	0.25	4.5	2700	3500	0.20	4.5
13	**R 3**	3700	8900	0.25	5.5	2500	3500	0.20	5.5
16	**R 3**	3000	7800	0.25	7.5	2000	3200	0.20	7.5
Depth of cut									

Coefficients respective of tool overhang

Type	Overhang	Revolution	Feed rate	Depth of cut ap
Straight	L/D≤5	100%	100%	100%
	L/D=6	90%	80%	80%
	L/D=7	80%	70%	70%
Taper neck	L/D=6	100%	100%	100%
	L/D=8	90%	80%	80%
	L/D≥10	80%	70%	70%

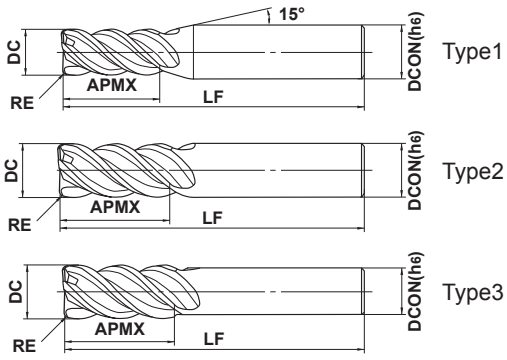
1) The above table shows cutting conditions when machining with the corner radius cutting edge.
2) This table shows the cutting conditions with less than 5D overhang length. In the case of longer overhangs, the revolution and the feed rate should be reduced proportionately.
3) If the depth of cut is shallow, the revolution and feed rate can be increased.
4) Air blow or oil mist is recommended for good chip evacuation.
5) For profile machining such as moulds, machining conditions may differ considerably depending on the workpiece geometry, machining methods and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece.
6) When machining inclinations in the Z direction, set the inclination angle at 2° and reduce the feed rate by 50%.
7) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VCMHDRB

Corner radius end mill, Medium cut length, 4 flute, High helix angle

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	○	◎	◎		





DC≤12	DC>12			
0 - 0.02	0 - 0.03			
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16	20≤DCON≤25	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

- 4 flute corner radius end mill with high helix angle and newly designed corner radius, for milling difficult-to-cut materials.

Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
VCMHDRBD0200R020S04	2	0.2	6	40	4	4	●	1
VCMHDRBD0200R030S04	2	0.3	6	40	4	4	●	1
VCMHDRBD0300R020S06	3	0.2	8	50	6	4	●	1
VCMHDRBD0300R030S06	3	0.3	8	50	6	4	●	1
VCMHDRBD0300R050S06	3	0.5	8	50	6	4	●	1
VCMHDRBD0400R020S06	4	0.2	11	50	6	4	●	1
VCMHDRBD0400R030S06	4	0.3	11	50	6	4	●	1
VCMHDRBD0400R050S06	4	0.5	11	50	6	4	●	1
VCMHDRBD0500R020S06	5	0.2	13	60	6	4	●	1
VCMHDRBD0500R030S06	5	0.3	13	60	6	4	●	1
VCMHDRBD0500R050S06	5	0.5	13	60	6	4	●	1
VCMHDRBD0500R100S06	5	1	13	60	6	4	●	1
VCMHDRBD0600R030S06	6	0.3	13	60	6	4	●	2
VCMHDRBD0600R050S06	6	0.5	13	60	6	4	●	2
VCMHDRBD0600R100S06	6	1	13	60	6	4	●	2
VCMHDRBD0800R030S08	8	0.3	19	70	8	4	●	2
VCMHDRBD0800R050S08	8	0.5	19	70	8	4	●	2
VCMHDRBD0800R100S08	8	1	19	70	8	4	●	2
VCMHDRBD0800R150S08	8	1.5	19	70	8	4	●	2
VCMHDRBD1000R030S08	10	0.3	22	90	8	4	●	3
VCMHDRBD1000R050S08	10	0.5	22	90	8	4	●	3
VCMHDRBD1000R100S08	10	1	22	90	8	4	●	3
VCMHDRBD1000R150S08	10	1.5	22	90	8	4	●	3
VCMHDRBD1000R200S08	10	2	22	90	8	4	●	3
VCMHDRBD1000R030S10	10	0.3	22	90	10	4	●	2
VCMHDRBD1000R050S10	10	0.5	22	90	10	4	●	2
VCMHDRBD1000R100S10	10	1	22	90	10	4	●	2
VCMHDRBD1000R150S10	10	1.5	22	90	10	4	●	2
VCMHDRBD1000R200S10	10	2	22	90	10	4	●	2
VCMHDRBD1200R050S10	12	0.5	26	90	10	4	●	3
VCMHDRBD1200R100S10	12	1	26	90	10	4	●	3
VCMHDRBD1200R150S10	12	1.5	26	90	10	4	●	3
VCMHDRBD1200R200S10	12	2	26	90	10	4	●	3
VCMHDRBD1200R300S10	12	3	26	90	10	4	●	3

● : Inventory maintained in Japan.

Unit : mm

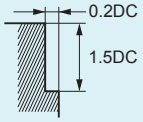
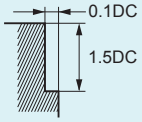
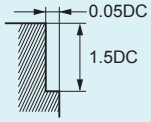
Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
VCMHDRBD1200R050S12	12	0.5	26	90	12	4	●	2
VCMHDRBD1200R100S12	12	1	26	90	12	4	●	2
VCMHDRBD1200R150S12	12	1.5	26	90	12	4	●	2
VCMHDRBD1200R200S12	12	2	26	90	12	4	●	2
VCMHDRBD1200R300S12	12	3	26	90	12	4	●	2
VCMHDRBD1600R100S16	16	1	32	110	16	4	●	2
VCMHDRBD1600R150S16	16	1.5	32	110	16	4	●	2
VCMHDRBD1600R200S16	16	2	32	110	16	4	●	2
VCMHDRBD1600R300S16	16	3	32	110	16	4	●	2
VCMHDRBD1800R100S16	18	1	32	110	16	4	●	3
VCMHDRBD1800R150S16	18	1.5	32	110	16	4	●	3
VCMHDRBD1800R200S16	18	2	32	110	16	4	●	3
VCMHDRBD1800R300S16	18	3	32	110	16	4	●	3
VCMHDRBD2000R100S20	20	1	38	110	20	4	●	2
VCMHDRBD2000R150S20	20	1.5	38	110	20	4	●	2
VCMHDRBD2000R200S20	20	2	38	110	20	4	●	2
VCMHDRBD2000R300S20	20	3	38	110	20	4	●	2
VCMHDRBD2200R100S20	22	1	38	140	20	4	●	3
VCMHDRBD2200R150S20	22	1.5	38	140	20	4	●	3
VCMHDRBD2200R200S20	22	2	38	140	20	4	●	3
VCMHDRBD2200R300S20	22	3	38	140	20	4	●	3
VCMHDRBD2500R100S25	25	1	45	140	25	4	●	2
VCMHDRBD2500R150S25	25	1.5	45	140	25	4	●	2
VCMHDRBD2500R200S25	25	2	45	140	25	4	●	2
VCMHDRBD2500R300S25	25	3	45	140	25	4	●	2

VCMHDRB

Corner radius end mill, Medium cut length, 4 flute, High helix angle

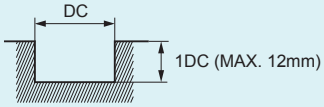
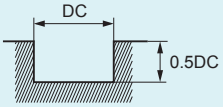
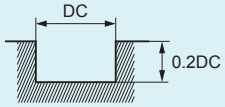
RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	15000	550	10000	340	10000	320	6400	160	4800	100
3	11000	800	7400	500	7400	480	4800	250	4000	170
4	8000	900	5600	540	5600	520	3600	270	3200	240
5	6400	1000	4500	600	4500	580	2900	300	2600	240
6	5900	1100	3700	640	3700	600	2400	320	2100	230
8	4400	1100	2800	660	2800	600	1800	330	1600	220
10	3500	1000	2300	640	2300	560	1400	320	1300	200
12	2900	1000	1900	640	1900	530	1200	320	1100	170
16	2200	800	1400	500	1400	450	900	250	800	130
20	1800	750	1100	460	1100	440	720	230	640	100
25	1400	600	900	400	900	380	570	200	510	80
Depth of cut										

DC:Dia.

Slotting

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	12000	400	7000	200	7000	100	4200	80	2300	40
3	9000	600	5300	300	5300	150	3200	130	1900	70
4	7200	720	4000	360	4000	180	2400	140	1400	95
5	5800	720	3200	360	3200	180	1900	150	1100	95
6	5000	800	2700	400	2700	200	1600	160	950	95
8	3700	800	2000	400	2000	200	1200	170	720	90
10	3000	720	1600	360	1600	180	960	160	570	80
12	2500	720	1300	360	1300	180	800	160	480	70
16	2000	600	1000	280	1000	150	600	130	360	50
20	1600	540	800	250	800	130	480	120	290	40
25	1300	480	640	220	640	120	380	100	230	35
Depth of cut										

DC:Dia.

1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

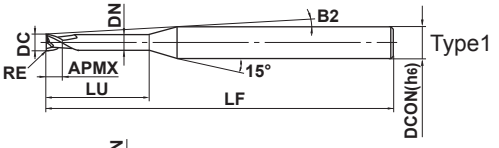
DFPSRB

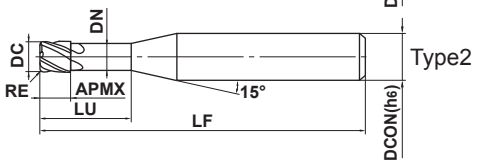
Corner radius end mill, Short cut length, 2−4 flute, High precision, For graphite

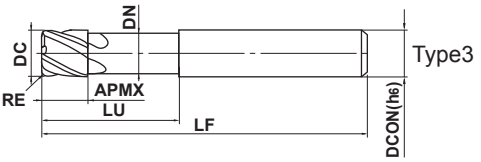
UWC DF 30° DC≤1.5 DC≥2

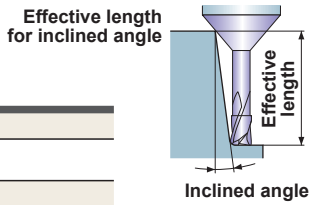
Aluminium Alloy	Copper Alloy	Graphite	GFRP CFRP	Machineable Ceramics
○	◎	◎	○	○











R					
	0.1≤RE≤1				
	±0.01				
	0.5≤DC≤12				
	0 -0.02				
h6	4≤DCON≤6	8≤DCON≤10	DCON=12		
	0 -0.008	0 -0.009	0 -0.011		

●±0.01mm corner radius tolerance, 0−-0.02mm outer diameter tolerance.
Corner radius end mill with original diamond coating for precise and efficient graphite machining.

Unit : mm

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle 30'	1°	2°	3°
DFPSRBD0050R010N04	0.5	0.1	0.75	4	0.46	9.5°	60	4	2	●	1	4.1	4.3	4.6	5.0
DFPSRBD0050R010N05	0.5	0.1	0.75	5	0.46	8.7°	60	4	2	●	1	5.2	5.4	5.7	6.2
DFPSRBD0050R010N06	0.5	0.1	0.75	6	0.46	8.0°	60	4	2	●	1	6.2	6.4	6.9	7.5
DFPSRBD0050R010N10	0.5	0.1	0.75	10	0.46	6.1°	60	4	2	●	1	10.3	10.7	11.5	12.4
DFPSRBD0050R010N15	0.5	0.1	0.75	15	0.46	4.7°	60	4	2	●	1	15.5	16.0	17.2	18.6
DFPSRBD0080R010N06	0.8	0.1	1	6	0.76	7.7°	60	4	2	●	1	6.2	6.4	6.9	7.5
DFPSRBD0080R010N08	0.8	0.1	1	8	0.76	6.6°	60	4	2	●	1	8.3	8.6	9.2	9.9
DFPSRBD0100R010N08	1	0.1	1.5	8	0.94	6.3°	60	4	2	●	1	8.5	8.8	9.5	10.2
DFPSRBD0100R010N12	1	0.1	1.5	12	0.94	4.9°	60	4	2	●	1	12.6	13.1	14.1	15.2
DFPSRBD0100R020N08	1	0.2	1.5	8	0.94	6.3°	60	4	2	●	1	8.5	8.8	9.5	10.2
DFPSRBD0100R020N12	1	0.2	1.5	12	0.94	4.9°	60	4	2	●	1	12.6	13.1	14.1	15.2
DFPSRBD0100R020N16	1	0.2	1.5	16	0.94	4.0°	70	4	2	●	1	16.8	17.4	18.7	20.2
DFPSRBD0100R020N20	1	0.2	1.5	20	0.94	3.4°	70	4	2	●	1	20.9	21.7	23.3	25.1
DFPSRBD0100R020N30	1	0.2	1.5	30	0.94	2.5°	70	4	2	●	1	31.3	32.4	34.8	*
DFPSRBD0150R020N10	1.5	0.2	2.3	10	1.44	4.9°	70	4	2	●	1	10.5	11.0	11.8	12.7
DFPSRBD0150R020N20	1.5	0.2	2.3	20	1.44	2.9°	70	4	2	●	1	20.9	21.7	23.3	*
NEW DFPSRBD0200R010N08	2	0.1	3	8	1.9	4.9°	70	4	4	●	2	8.4	8.7	9.4	10.1
DFPSRBD0200R020N12	2	0.2	3	12	1.9	3.7°	70	4	4	●	2	12.5	13.0	14.0	15.1
DFPSRBD0200R020N16	2	0.2	3	16	1.9	2.9°	70	4	4	●	2	16.7	17.3	18.6	*
DFPSRBD0200R020N20	2	0.2	3	20	1.9	2.5°	80	4	4	●	2	20.8	21.5	23.2	*
DFPSRBD0200R020N30	2	0.2	3	30	1.9	1.7°	80	4	4	●	2	31.2	32.2	*	*
DFPSRBD0200R020N40	2	0.2	3	40	1.9	1.4°	80	4	4	●	2	41.5	42.9	*	*
NEW DFPSRBD0200R030N08	2	0.3	3	8	1.9	5.0°	70	4	4	●	2	8.4	8.7	9.3	10.1
DFPSRBD0300R020N20	3	0.2	4.5	20	2.9	1.4°	80	4	4	●	2	20.8	21.5	*	*
DFPSRBD0300R020N40	3	0.2	4.5	40	2.9	0.7°	80	4	4	●	2	41.5	*	*	*
NEW DFPSRBD0300R030N12	3	0.3	4.5	12	2.9	2.1°	80	4	4	●	2	12.5	13.0	13.9	*
DFPSRBD0300R050N20	3	0.5	4.5	20	2.9	1.4°	80	4	4	●	2	20.8	21.5	*	*
DFPSRBD0400R020N20	4	0.2	6	20	3.9	—	80	4	4	●	3	*	*	*	*
DFPSRBD0400R020N40	4	0.2	6	40	3.9	—	80	4	4	●	3	*	*	*	*
DFPSRBD0400R050N20	4	0.5	6	20	3.9	—	80	4	4	●	3	*	*	*	*
DFPSRBD0400R050N40	4	0.5	6	40	3.9	—	80	4	4	●	3	*	*	*	*
NEW DFPSRBD0600R010N24	6	0.1	9	24	5.85	—	90	6	4	●	3	*	*	*	*
NEW DFPSRBD0600R030N24	6	0.3	9	24	5.85	—	90	6	4	●	3	*	*	*	*

* No interference

● : Inventory maintained in Japan.

DFPSRB

Corner radius end mill, Short cut length, 2—4 flute, High precision, For graphite

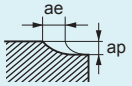
Unit : mm

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No. of Flutes	Stock	Type	Effective length for inclined angle			
												30'	1°	2°	3°
NEW DFPSRBD0600R050N24	6	0.5	9	24	5.85	—	90	6	4	●	3	*	*	*	*
DFPSRBD0600R050N30	6	0.5	9	30	5.85	—	90	6	4	●	3	*	*	*	*
DFPSRBD0600R100N30	6	1	9	30	5.85	—	90	6	4	●	3	*	*	*	*
DFPSRBD0800R050N30	8	0.5	12	30	7.85	—	90	8	4	●	3	*	*	*	*
DFPSRBD0800R100N30	8	1	12	30	7.85	—	90	8	4	●	3	*	*	*	*
DFPSRBD1000R050N40	10	0.5	15	40	9.7	—	130	10	4	●	3	*	*	*	*
DFPSRBD1000R100N40	10	1	15	40	9.7	—	130	10	4	●	3	*	*	*	*
DFPSRBD1200R050N40	12	0.5	18	40	11.7	—	130	12	4	●	3	*	*	*	*

* No interference

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material			Graphite				Copper, Copper alloys			
Dia. **DC** (mm)	Corner radius **RE** (mm)	Neck length **LU** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
0.5	**0.1**	**4**	30000	1100	0.05	0.23	24000	700	0.04	0.23
	0.1	**5**	28000	960	0.05	0.23	22000	600	0.04	0.23
	0.1	**6**	25000	850	0.05	0.23	20000	540	0.04	0.23
	0.1	**10**	22000	600	0.04	0.21	—	—	—	—
	0.1	**15**	20000	500	0.03	0.18	—	—	—	—
0.8	**0.1**	**6**	28000	1300	0.08	0.45	22000	830	0.06	0.45
	0.1	**8**	22000	900	0.08	0.45	18000	580	0.06	0.45
1	**0.1**	**8**	25000	1500	0.1	0.6	20000	960	0.08	0.6
	0.1	**12**	22000	1300	0.1	0.6	18000	830	0.08	0.6
	0.2	**8**	25000	1500	0.1	0.45	20000	960	0.08	0.45
	0.2	**12**	22000	1300	0.1	0.45	18000	830	0.08	0.45
	0.2	**16**	18000	1000	0.08	0.4	14000	640	0.06	0.4
	0.2	**20**	15000	800	0.08	0.4	—	—	—	—
	0.2	**30**	12000	600	0.07	0.35	—	—	—	—
1.5	**0.2**	**10**	18000	1400	0.15	0.8	14000	900	0.12	0.8
	0.2	**20**	12000	900	0.12	0.65	9600	580	0.1	0.65
2	**0.1**	**8**	24000	3300	0.2	1.2	19000	2100	0.16	1.2
	0.2	**12**	22000	3000	0.2	1.2	18000	1900	0.16	1.2
	0.2	**16**	19000	2500	0.2	1.2	15000	1600	0.16	1.2
	0.2	**20**	16000	2000	0.2	1.2	13000	1300	0.16	1.2
	0.2	**30**	13000	1600	0.16	1.0	—	—	—	—
	0.2	**40**	11000	1200	0.14	0.8	—	—	—	—
	0.3	**8**	24000	3300	0.3	1.2	19000	2100	0.24	1.2
3	**0.2**	**20**	18000	3000	0.3	2.0	14000	1900	0.24	2.0
	0.2	**40**	12000	1800	0.25	1.7	9600	1100	0.2	1.7
	0.5	**20**	18000	3000	0.3	1.5	14000	1900	0.24	1.5
	0.3	**12**	20000	4500	0.3	1.5	16000	2900	0.24	1.5
4	**0.2**	**20**	18000	4200	0.4	2.7	14000	2700	0.3	2.7
	0.2	**40**	13000	2800	0.4	2.7	10000	1800	0.3	2.7
	0.5	**20**	18000	4200	0.4	2.3	14000	2700	0.3	2.3
	0.5	**40**	13000	2800	0.4	2.3	10000	1800	0.3	2.3
6	**0.1**	**24**	14000	4600	0.6	3.8	11000	2900	0.5	3.8
	0.3	**24**	14000	4600	0.6	3.8	11000	2900	0.5	3.8
	0.5	**24**	14000	4600	0.6	3.8	11000	2900	0.5	3.8
	0.5	**30**	14000	4600	0.6	3.8	11000	2900	0.5	3.8
	1	**30**	14000	4600	0.6	3.0	11000	2900	0.5	3.0
8	**0.5**	**30**	10500	4000	0.8	5.3	8400	2600	0.6	5.3
	1	**30**	10500	4000	0.8	4.5	8400	2600	0.6	4.5
10	**0.5**	**40**	8700	3500	1.0	6.8	7000	2200	0.8	6.8
	1	**40**	8700	3500	1.0	6.0	7000	2200	0.8	6.0
12	**0.5**	**40**	7200	3000	1.2	8.0	5800	1900	1.0	8.0
Depth of cut										

1) When high machining accuracy is needed, or the workpiece becomes chipped, we recommend lowering the feed rate.
2) Use a milling machine dedicated for graphite.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

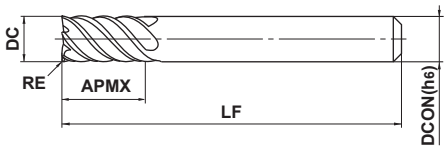
IMPACT MIRACLE END MILL FOR DIFFICULT TO CUT MATERIALS, IRREGULAR HELIX

VF6MHVRB

Corner radius, Medium cut length, 6 flute, Irregular helix flutes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○	○		◎	◎		





Type1

R				
0.5≤RE≤2				
±0.015				
DC≤12	DC>12			
0 - 0.020	0 - 0.030			
h6				
DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

- Newly developed irregular helix 6 flute geometry reduces vibrations and achieves high efficiency machining.
- Suitable for machining of difficult-to-cut materials such as stainless steel, titanium alloy and inconel.

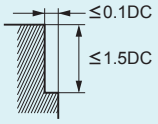
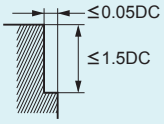
Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
VF6MHVRBD0600R050	6	0.5	13	50	6	6	●	1
VF6MHVRB**D0600R100**	6	1	13	50	6	6	●	1
VF6MHVRB**D0800R050**	8	0.5	19	60	8	6	●	1
VF6MHVRB**D0800R100**	8	1	19	60	8	6	●	1
VF6MHVRB**D1000R050**	10	0.5	22	70	10	6	●	1
VF6MHVRB**D1000R100**	10	1	22	70	10	6	●	1
VF6MHVRB**D1200R050**	12	0.5	26	75	12	6	●	1
VF6MHVRB**D1200R100**	12	1	26	75	12	6	●	1
VF6MHVRB**D1600R100**	16	1	32	90	16	6	●	1
VF6MHVRB**D1600R200**	16	2	32	90	16	6	●	1
VF6MHVRB**D2000R100**	20	1	38	100	20	6	●	1
VF6MHVRB**D2000R200**	20	2	38	100	20	6	●	1

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
6	10600	2900	8000	2000	2100	320
8	8000	2900	6000	2000	1600	300
10	6400	2700	4800	2000	1300	260
12	5300	2700	4000	2000	1100	230
16	4000	2200	3000	1600	800	180
20	3200	1900	2400	1400	640	150
Depth of cut						

DC:Dia.

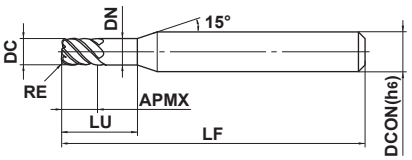
1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

VFSDRB

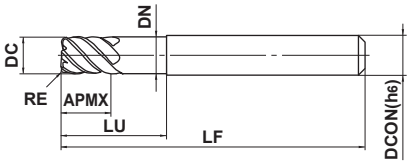
IMPACT MIRACLE Corner radius end mill, 6 flute (S)

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎				





Type1



Type2

3≤DC≤12				
0 - 0.02				
DCON=6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

h6

6 flute end mill with Impact Miracle coating for high hardened materials.

Unit : mm

Order Number	DC	RE	APMX	LU	DN	LF	DCON	No. of Flutes	Stock	Type
VFSDRBD0300R030	3	0.3	3	9	2.9	45	6	6	●	1
VFSDRBD0400R030	4	0.3	4	12	3.9	45	6	6	●	1
VFSDRBD0500R030	5	0.3	5	15	4.9	50	6	6	●	1
VFSDRBD0600R030	6	0.3	6	18	5.85	50	6	6	●	2
VFSDRBD0600R050	6	0.5	6	18	5.85	50	6	6	●	2
VFSDRBD0600R100	6	1	6	18	5.85	50	6	6	●	2
VFSDRBD0800R030	8	0.3	8	24	7.85	60	8	6	●	2
VFSDRBD0800R050	8	0.5	8	24	7.85	60	8	6	●	2
VFSDRBD0800R100	8	1	8	24	7.85	60	8	6	●	2
VFSDRBD1000R050	10	0.5	10	30	9.7	70	10	6	●	2
VFSDRBD1000R100	10	1	10	30	9.7	70	10	6	●	2
VFSDRBD1200R050	12	0.5	12	36	11.7	75	12	6	●	2
VFSDRBD1200R100	12	1	12	36	11.7	75	12	6	●	2

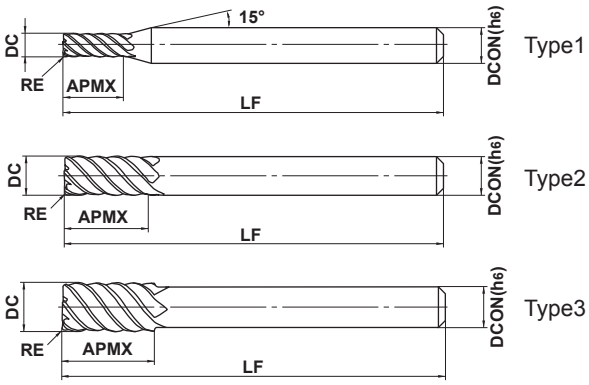
● : Inventory maintained in Japan.

VFMDRB

Corner radius, Medium cut length, 6 flute, For hardened materials

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎				





DC≤12	DC>12			
0 - 0.02	0 - 0.03			
DCON=6	8≤DCON≤10	12≤DCON≤16	DCON=20	
0 - 0.008	0 - 0.009	0 - 0.011	0 - 0.013	

h6

- 6 flute corner radius end mill with Impact Miracle coating for high hardened materials.

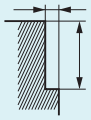
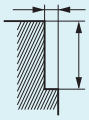
Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
VFMDRBD0300R030	3	0.3	10	60	6	6	●	1
VFMDRBD0400R030	4	0.3	12	60	6	6	●	1
VFMDRBD0500R030	5	0.3	15	60	6	6	●	1
VFMDRBD0600R030	6	0.3	15	60	6	6	●	2
VFMDRBD0600R050	6	0.5	15	60	6	6	●	2
VFMDRBD0600R100	6	1	15	60	6	6	●	2
VFMDRBD0800R030	8	0.3	20	75	8	6	●	2
VFMDRBD0800R050	8	0.5	20	75	8	6	●	2
VFMDRBD0800R100	8	1	20	75	8	6	●	2
VFMDRBD1000R030	10	0.3	25	80	10	6	●	2
VFMDRBD1000R050	10	0.5	25	80	10	6	●	2
VFMDRBD1000R100	10	1	25	80	10	6	●	2
VFMDRBD1200R050	12	0.5	30	100	12	6	●	2
VFMDRBD1200R100	12	1	30	100	12	6	●	2
VFMDRBD1600R100	16	1	40	110	16	6	●	2
VFMDRBD1600R150	16	1.5	40	110	16	6	●	2
VFMDRBD1800R100	18	1	40	120	16	6	●	3
VFMDRBD1800R150	18	1.5	40	120	16	6	●	3
VFMDRBD2000R100	20	1	45	125	20	6	●	2
VFMDRBD2000R150	20	1.5	45	125	20	6	●	2
VFMDRBD2000R200	20	2	45	125	20	6	●	2

VFSDRB
IMPACT MIRACLE Corner radius end mill, 6 flute (S)

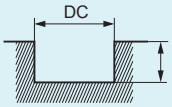
VFMDRB
Corner radius, Medium cut length, 6 flute, For hardened materials

RECOMMENDED CUTTING CONDITIONS

Work material	Hardened steel (45－55HRC) AISI H13			Hardened steel (55－62HRC) AISI D2			Hardened steel (62－70HRC) AISI W1, AISI M2		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
1	40000	1200	0.05	40000	800	0.03	32000	500	0.02
2	40000	2000	0.1	24000	1000	0.05	16000	600	0.05
3	32000	3800	0.2	16000	1900	0.1	11000	1200	0.05
4	24000	4400	0.2	12000	2200	0.1	8000	1300	0.05
6	16000	5800	0.3	8000	2900	0.2	5300	1800	0.1
8	12000	5800	0.4	6000	2900	0.2	4000	1800	0.1
10	9600	5800	0.5	4800	2900	0.3	3200	1800	0.2
12	8000	4800	0.6	4000	2400	0.3	2700	1500	0.2
16	6000	3600	0.8	3000	1800	0.5	2000	1100	0.3
20	4800	2900	1.0	2400	1400	0.5	1600	880	0.3
25	3800	2300	1.0	1900	1100	0.5	1300	720	0.3
Depth of cut	 Please refer to the list above for depth of cut. ≤1.5DC			 Please refer to the list above for depth of cut. ≤1.0DC					

DC:Dia.

Slot milling with small diameter tools

Work material	Hardened steel (45－55HRC) AISI H13			Hardened steel (55－62HRC) AISI D2		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
1	15000	300	0.1	9500	110	0.05
2	8000	320	0.2	4800	190	0.1
Depth of cut	 DC Please refer to the list above for depth of cut. DC:Dia.					

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

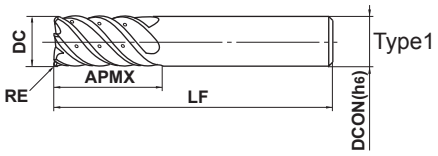
VF6MHVRBCH

Corner radius end mill, Medium cut length, 6 flute, Irregular helix flutes, with multiple internal through coolant holes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
				◎	◎		

CoolStar
END MILLS





R					
0.5≤RE≤3					
±0.015					
h6	DC≤12	DC>12			
	0 - 0.020	0 - 0.030			
	DCON=10	DCON=12	DCON=16	DCON=20	
	0 - 0.009	0 - 0.011	0 - 0.011	0 - 0.013	

Vibration control corner radius end mill with multiple internal through coolant holes ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.

Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
VF6MHVRBCHD1000R050	10	0.5	22	70	10	6	●	1
VF6MHVRBCH**D1000R100**	10	1	22	70	10	6	●	1
VF6MHVRBCH**D1200R050**	12	0.5	26	75	12	6	●	1
VF6MHVRBCH**D1200R100**	12	1	26	75	12	6	●	1
VF6MHVRBCH**D1600R100**	16	1	32	90	16	6	●	1
VF6MHVRBCH**D1600R300**	16	3	32	90	16	6	●	1
VF6MHVRBCH**D2000R100**	20	1	38	100	20	6	●	1
VF6MHVRBCH**D2000R300**	20	3	38	100	20	6	●	1

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
10	4800	2000	1300	260
12	4000	2000	1100	230
16	3000	1600	800	180
20	2400	1400	640	150
Depth of cut	≤0.1DC 0.5DC—1.5DC		≤0.05DC 0.5DC—1.5DC	

DC:Dia.

Trochoidal slotting

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)
10	4800	1400
12	4000	1200
16	3000	1100
20	2400	900
Depth of cut	1.5DC≤ ≤0.1DC 0.5DC—1.5DC	

DC:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

● : Inventory maintained in Japan.

COOL STAR END MILLS

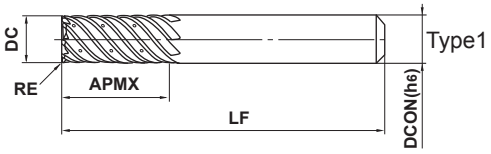
VF8MHVRBCH

Corner radius end mill, Medium cut length, 8 flute, Irregular helix flutes, with multiple internal through coolant holes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
				◎	◎		

CoolStar
END MILLS





R					
1≤RE≤3					
±0.015					
16≤DC≤20					
0 - 0.03					
h6	DCON=16	DCON=20			
	0 - 0.011	0 - 0.013			

Vibration control corner radius end mill with multiple internal through coolant holes ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.

Unit : mm

Order Number	DC	RE	APMX	LF	DCON	No. of Flutes	Stock	Type
VF8MHVRBCHD1600R100	16	1	32	90	16	8	●	1
VF8MHVRBCHD1600R300	16	3	32	90	16	8	●	1
VF8MHVRBCHD2000R100	20	1	38	100	20	8	●	1
VF8MHVRBCHD2000R300	20	3	38	100	20	8	●	1

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Heat resistant alloys Inconel718	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
16	3000	2100	800	240
20	2400	1900	640	200
Depth of cut	≤0.08DC 0.5DC−1.5DC		≤0.05DC 0.5DC−1.5DC	

DC:Dia.

Trochoidal slotting

Work material	Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)
16	3000	1400
20	2400	1200
Depth of cut	1.5DC≤ ≤0.08DC 0.5DC−1.5DC	

DC:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

● : Inventory maintained in Japan.

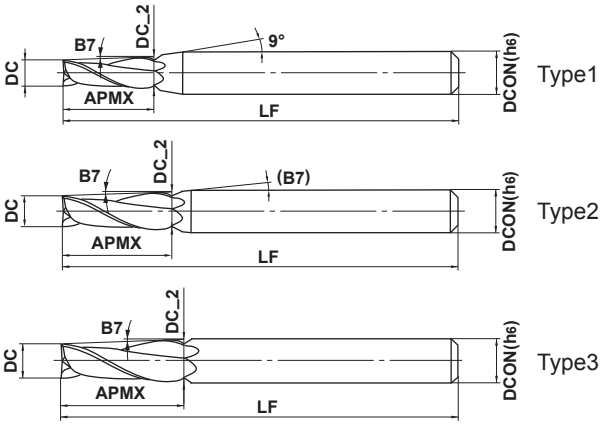
MS2MT

Taper end mill, Medium cut length, 2 flute

DC<0.4 DC≥0.4

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		





DC<0.5	DC≥0.5			
0 - 0.020	0 - 0.030			
±5'				
4≤DCON≤6	8≤DCON≤10	12≤DCON≤16		
0 - 0.008	0 - 0.009	0 - 0.011		

h6

2 flute taper end mill for general use.

Unit : mm

Order Number	DC	B7	APMX	DC_2	LF	DCON	No. of Flutes	Stock	Type
MS2MTD0020T0030	0.2	30'	0.8	0.21	45	4	2	●	1
MS2MTD0020T0100	0.2	1°	0.8	0.23	45	4	2	●	1
MS2MTD0020T0130	0.2	1° 30'	0.8	0.24	45	4	2	●	1
MS2MTD0020T0200	0.2	2°	0.8	0.26	45	4	2	●	1
MS2MTD0020T0300	0.2	3°	0.8	0.28	45	4	2	●	1
MS2MTD0020T0400	0.2	4°	0.8	0.31	45	4	2	●	1
MS2MTD0020T0500	0.2	5°	0.8	0.34	45	4	2	●	1
MS2MTD0020T0700	0.2	7°	0.8	0.4	45	4	2	●	1
MS2MTD0020T1000	0.2	10°	0.8	0.48	45	4	2	●	2
MS2MTD0030T0030	0.3	30'	1.2	0.32	45	4	2	●	1
MS2MTD0030T0100	0.3	1°	1.2	0.34	45	4	2	●	1
MS2MTD0030T0130	0.3	1° 30'	1.2	0.36	45	4	2	●	1
MS2MTD0030T0200	0.3	2°	1.2	0.38	45	4	2	●	1
MS2MTD0030T0300	0.3	3°	1.2	0.43	45	4	2	●	1
MS2MTD0030T0400	0.3	4°	1.2	0.47	45	4	2	●	1
MS2MTD0030T0500	0.3	5°	1.2	0.51	45	4	2	●	1
MS2MTD0030T0700	0.3	7°	1.2	0.59	45	4	2	●	1
MS2MTD0030T1000	0.3	10°	1.2	0.72	45	4	2	●	2
MS2MTD0040T0030	0.4	30'	1.6	0.43	45	4	2	●	1
MS2MTD0040T0100	0.4	1°	1.6	0.46	45	4	2	●	1
MS2MTD0040T0130	0.4	1° 30'	1.6	0.48	45	4	2	●	1
MS2MTD0040T0200	0.4	2°	1.6	0.51	45	4	2	●	1
MS2MTD0040T0300	0.4	3°	1.6	0.57	45	4	2	●	1
MS2MTD0040T0400	0.4	4°	1.6	0.62	45	4	2	●	1
MS2MTD0040T0500	0.4	5°	1.6	0.68	45	4	2	●	1
MS2MTD0040T0700	0.4	7°	1.6	0.79	45	4	2	●	1
MS2MTD0040T1000	0.4	10°	1.6	0.96	45	4	2	●	2
MS2MTD0050T0030	0.5	30'	2	0.53	45	4	2	●	1
MS2MTD0050T0100	0.5	1°	2	0.57	45	4	2	●	1
MS2MTD0050T0130	0.5	1° 30'	2	0.6	45	4	2	●	1
MS2MTD0050T0200	0.5	2°	2	0.64	45	4	2	●	1
MS2MTD0050T0300	0.5	3°	2	0.71	45	4	2	●	1
MS2MTD0050T0400	0.5	4°	2	0.78	45	4	2	●	1
MS2MTD0050T0500	0.5	5°	2	0.85	45	4	2	●	1

MS2MT

Taper end mill, Medium cut length, 2 flute

Unit : mm

Order Number	DC	B7	APMX	DC_2	LF	DCON	No. of Flutes	Stock	Type
MS2MTD0050T0700	0.5	7°	2	0.99	45	4	2	●	1
MS2MTD0050T1000	0.5	10°	2	1.21	45	4	2	●	2
MS2MTD0060T0030	0.6	30'	2	0.63	45	4	2	●	1
MS2MTD0060T0100	0.6	1°	2	0.67	45	4	2	●	1
MS2MTD0060T0130	0.6	1° 30'	2	0.7	45	4	2	●	1
MS2MTD0060T0200	0.6	2°	2	0.74	45	4	2	●	1
MS2MTD0060T0230	0.6	2° 30'	2	0.77	45	4	2	●	1
MS2MTD0060T0300	0.6	3°	2	0.81	45	4	2	●	1
MS2MTD0060T0400	0.6	4°	2	0.88	45	4	2	●	1
MS2MTD0060T0500	0.6	5°	2	0.95	45	4	2	●	1
MS2MTD0060T0700	0.6	7°	2	1.09	45	4	2	●	1
MS2MTD0060T1000	0.6	10°	2	1.31	45	4	2	●	2
MS2MTD0070T0030	0.7	30'	2	0.73	45	4	2	●	1
MS2MTD0070T0100	0.7	1°	2	0.77	45	4	2	●	1
MS2MTD0070T0130	0.7	1° 30'	2	0.8	45	4	2	●	1
MS2MTD0070T0200	0.7	2°	2	0.84	45	4	2	●	1
MS2MTD0070T0300	0.7	3°	2	0.91	45	4	2	●	1
MS2MTD0070T0400	0.7	4°	2	0.98	45	4	2	●	1
MS2MTD0070T0500	0.7	5°	2	1.05	45	4	2	●	1
MS2MTD0070T0700	0.7	7°	2	1.19	45	4	2	●	1
MS2MTD0070T1000	0.7	10°	2	1.41	45	4	2	●	2
MS2MTD0080T0030	0.8	30'	3	0.85	45	4	2	●	1
MS2MTD0080T0100	0.8	1°	3	0.9	45	4	2	●	1
MS2MTD0080T0130	0.8	1° 30'	3	0.96	45	4	2	●	1
MS2MTD0080T0200	0.8	2°	3	1.01	45	4	2	●	1
MS2MTD0080T0230	0.8	2° 30'	3	1.06	45	4	2	●	1
MS2MTD0080T0300	0.8	3°	3	1.11	45	4	2	●	1
MS2MTD0080T0400	0.8	4°	3	1.22	45	4	2	●	1
MS2MTD0080T0500	0.8	5°	3	1.32	45	4	2	●	1
MS2MTD0080T0700	0.8	7°	3	1.54	45	4	2	●	1
MS2MTD0080T1000	0.8	10°	3	1.86	45	4	2	●	2
MS2MTD0090T0030	0.9	30'	3	0.95	45	4	2	●	1
MS2MTD0090T0100	0.9	1°	3	1	45	4	2	●	1
MS2MTD0090T0130	0.9	1° 30'	3	1.06	45	4	2	●	1
MS2MTD0090T0200	0.9	2°	3	1.11	45	4	2	●	1
MS2MTD0090T0300	0.9	3°	3	1.21	45	4	2	●	1
MS2MTD0090T0400	0.9	4°	3	1.32	45	4	2	●	1
MS2MTD0090T0500	0.9	5°	3	1.42	45	4	2	●	1
MS2MTD0090T0700	0.9	7°	3	1.64	45	4	2	●	1
MS2MTD0090T1000	0.9	10°	3	1.96	45	4	2	●	2
MS2MTD0100T0030	1	30'	4	1.07	45	4	2	●	1
MS2MTD0100T0100	1	1°	4	1.14	45	4	2	●	1
MS2MTD0100T0130	1	1° 30'	4	1.21	45	4	2	●	1
MS2MTD0100T0200	1	2°	4	1.28	45	4	2	●	1
MS2MTD0100T0230	1	2° 30'	4	1.35	45	4	2	●	1
MS2MTD0100T0300	1	3°	4	1.42	45	4	2	●	1
MS2MTD0100T0400	1	4°	4	1.56	45	4	2	●	1
MS2MTD0100T0500	1	5°	4	1.7	45	4	2	●	1
MS2MTD0100T0700	1	7°	4	1.98	45	4	2	●	1
MS2MTD0100T1000	1	10°	4	2.41	45	4	2	●	2
MS2MTD0150T0030	1.5	30'	5	1.59	45	4	2	●	1
MS2MTD0150T0100	1.5	1°	5	1.67	45	4	2	●	1

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	B7	APMX	DC_2	LF	DCON	No. of Flutes	Stock	Type
MS2MTD0150T0130	1.5	1° 30'	5	1.76	45	4	2	●	1
MS2MTD0150T0200	1.5	2°	5	1.85	45	4	2	●	1
MS2MTD0150T0230	1.5	2° 30'	5	1.94	45	4	2	●	1
MS2MTD0150T0300	1.5	3°	5	2.02	45	4	2	●	1
MS2MTD0150T0400	1.5	4°	5	2.2	45	4	2	●	1
MS2MTD0150T0500	1.5	5°	5	2.37	45	4	2	●	1
MS2MTD0150T0700	1.5	7°	5	2.73	45	4	2	●	1
MS2MTD0150T1000	1.5	10°	5	3.26	45	4	2	●	2
MS2MTD0200T0030	2	30'	6	2.1	45	4	2	●	1
MS2MTD0200T0100	2	1°	6	2.21	45	4	2	●	1
MS2MTD0200T0130	2	1° 30'	6	2.31	45	4	2	●	1
MS2MTD0200T0200	2	2°	6	2.42	45	4	2	●	1
MS2MTD0200T0230	2	2° 30'	6	2.52	45	4	2	●	1
MS2MTD0200T0300	2	3°	6	2.63	45	4	2	●	1
MS2MTD0200T0400	2	4°	6	2.84	45	4	2	●	1
MS2MTD0200T0500	2	5°	6	3.05	45	4	2	●	1
MS2MTD0200T0700	2	7°	6	3.47	45	4	2	●	2
MS2MTD0200T1000	2	10°	6	4.12	50	6	2	●	2
MS2MTD0250T0030	2.5	30'	8	2.64	45	4	2	●	1
MS2MTD0250T0100	2.5	1°	8	2.78	45	4	2	●	1
MS2MTD0250T0130	2.5	1° 30'	8	2.92	45	4	2	●	1
MS2MTD0250T0200	2.5	2°	8	3.06	45	4	2	●	1
MS2MTD0250T0230	2.5	2° 30'	8	3.2	45	4	2	●	1
MS2MTD0250T0300	2.5	3°	8	3.34	45	4	2	●	1
MS2MTD0250T0400	2.5	4°	8	3.62	45	4	2	●	2
MS2MTD0250T0500	2.5	5°	8	3.9	45	4	2	●	2
MS2MTD0250T0700	2.5	7°	8	4.46	50	4	2	●	3
MS2MTD0250T1000	2.5	10°	8	5.32	50	6	2	●	2
MS2MTD0300T0030	3	30'	10	3.17	50	6	2	●	1
MS2MTD0300T0100	3	1°	10	3.35	50	6	2	●	1
MS2MTD0300T0130	3	1° 30'	10	3.52	50	6	2	●	1
MS2MTD0300T0200	3	2°	10	3.7	50	6	2	●	1
MS2MTD0300T0300	3	3°	10	4.05	50	6	2	●	1
MS2MTD0300T0400	3	4°	10	4.4	50	6	2	●	1
MS2MTD0300T0500	3	5°	10	4.75	50	6	2	●	1
MS2MTD0300T0700	3	7°	10	5.46	50	6	2	●	2
MS2MTD0300T1000	3	10°	10	6.53	50	6	2	●	3
MS2MTD0400T0030	4	30'	15	4.26	50	6	2	●	1
MS2MTD0400T0100	4	1°	15	4.52	50	6	2	●	1
MS2MTD0400T0130	4	1° 30'	15	4.79	50	6	2	●	1
MS2MTD0400T0200	4	2°	15	5.05	50	6	2	●	1
MS2MTD0400T0300	4	3°	15	5.57	50	6	2	●	1
MS2MTD0400T0400	4	4°	15	6.1	55	6	2	●	3
MS2MTD0400T0500	4	5°	15	6.62	55	6	2	●	3
MS2MTD0400T0700	4	7°	15	7.68	55	6	2	●	3
MS2MTD0400T1000	4	10°	15	9.29	60	8	2	●	3
MS2MTD0500T0030	5	30'	20	5.35	55	6	2	●	1
MS2MTD0500T0100	5	1°	20	5.7	55	6	2	●	1
MS2MTD0500T0130	5	1° 30'	20	6.05	55	6	2	●	3
MS2MTD0500T0200	5	2°	20	6.4	55	6	2	●	3
MS2MTD0500T0300	5	3°	20	7.1	55	6	2	●	3
MS2MTD0500T0400	5	4°	20	7.8	60	6	2	●	3

MS2MT

Taper end mill, Medium cut length, 2 flute

Unit : mm

Order Number	DC	B7	APMX	DC_2	LF	DCON	No. of Flutes	Stock	Type
MS2MTD0500T0500	5	5°	20	8.5	60	8	2	●	3
MS2MTD0500T0700	5	7°	20	9.91	70	10	2	●	2
MS2MTD0500T1000	5	10°	20	12.05	80	12	2	●	3
MS2MTD0600T0030	6	30'	20	6.35	60	6	2	●	3
MS2MTD0600T0100	6	1°	20	6.7	60	6	2	●	3
MS2MTD0600T0130	6	1° 30'	20	7.05	60	6	2	●	3
MS2MTD0600T0200	6	2°	20	7.4	60	6	2	●	3
MS2MTD0600T0300	6	3°	20	8.1	65	8	2	●	3
MS2MTD0600T0500	6	5°	20	9.5	70	8	2	●	3
MS2MTD0800T0030	8	30'	25	8.44	70	8	2	●	3
MS2MTD0800T0100	8	1°	25	8.87	70	8	2	●	3
MS2MTD0800T0130	8	1° 30'	25	9.31	70	8	2	●	3
MS2MTD0800T0200	8	2°	25	9.75	70	8	2	●	3
MS2MTD0800T0300	8	3°	25	10.62	75	10	2	●	3
MS2MTD0800T0500	8	5°	25	12.37	95	12	2	●	3
MS2MTD1000T0030	10	30'	35	10.61	90	10	2	●	3
MS2MTD1000T0100	10	1°	35	11.22	90	10	2	●	3
MS2MTD1000T0130	10	1° 30'	35	11.83	90	10	2	●	3
MS2MTD1000T0200	10	2°	35	12.44	95	12	2	●	3
MS2MTD1000T0300	10	3°	35	13.67	95	12	2	●	3
MS2MTD1000T0500	10	5°	35	16.12	95	16	2	●	3

● : Inventory maintained in Japan.

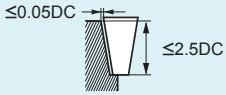
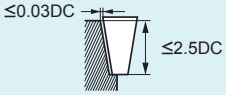
RECOMMENDED CUTTING CONDITIONS

Slotting

Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			Hardened steel (45−55HRC) AISI H13		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
0.2	40000	320	0.005	40000	180	0.004	40000	100	0.002
0.3	40000	400	0.006	40000	220	0.005	35000	130	0.003
0.4	40000	450	0.008	40000	270	0.006	31000	150	0.004
0.5	37000	500	0.010	32000	320	0.008	25000	160	0.005
0.6	32000	530	0.013	26000	340	0.010	21000	170	0.006
0.7	27000	560	0.015	23000	380	0.011	18000	180	0.007
0.8	24000	610	0.018	20000	410	0.013	16000	210	0.008
0.9	21000	610	0.020	18000	450	0.015	14000	210	0.009
1	19000	610	0.025	16000	450	0.020	13000	210	0.010
1.5	13000	720	0.040	11000	540	0.030	8500	270	0.015
Depth of cut	 Please refer to the list above for depth of cut.								

DC:Dia.

Side milling

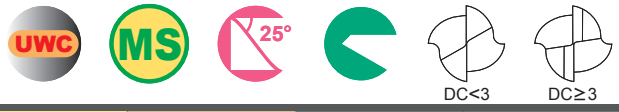
Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Hardened steel (45−55HRC) AISI H13	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	9500	720	8000	540	6400	300
2.5	7800	800	6300	540	5000	300
3	6400	800	5300	540	4200	300
4	4800	800	4000	540	3200	300
5	3800	800	3200	540	2500	300
6	3200	800	2600	540	2100	300
8	2400	700	2000	480	1600	270
10	1900	600	1600	410	1300	240
Depth of cut						

DC:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

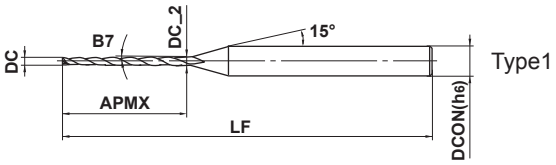
MS4LT

Taper end mill, Long cut length, 4 flute



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○			





Type1

DC<0.5	DC≥0.5			
0 - 0.020	0 - 0.040			
±5'				
DCON=3	4≤DCON≤6			
0 - 0.006	0 - 0.008			

4 flute taper end mill for rib milling.

Unit : mm

Order Number	DC	B7	APMX	DC_2	LF	DCON	No. of Flutes	Stock	Type
MS4LTD0020T0030L02	0.2	30'	2	0.23	40	3	4	●	1
MS4LTD0020T0100L02	0.2	1°	2	0.27	40	3	4	●	1
MS4LTD0020T0130L02	0.2	1° 30'	2	0.3	40	3	4	●	1
MS4LTD0020T0200L02	0.2	2°	2	0.34	40	3	4	●	1
MS4LTD0030T0030L03	0.3	30'	3	0.35	40	3	4	●	1
MS4LTD0030T0100L03	0.3	1°	3	0.4	40	3	4	●	1
MS4LTD0030T0130L03	0.3	1° 30'	3	0.46	40	3	4	●	1
MS4LTD0030T0200L03	0.3	2°	3	0.51	40	3	4	●	1
MS4LTD0040T0030L04	0.4	30'	4	0.47	40	3	4	●	1
MS4LTD0040T0100L04	0.4	1°	4	0.54	40	3	4	●	1
MS4LTD0040T0130L04	0.4	1° 30'	4	0.61	40	3	4	●	1
MS4LTD0040T0200L04	0.4	2°	4	0.68	40	3	4	●	1
MS4LTD0050T0030L04	0.5	30'	4	0.57	40	3	4	●	1
MS4LTD0050T0030L06	0.5	30'	6	0.6	40	3	4	●	1
MS4LTD0050T0100L04	0.5	1°	4	0.64	40	3	4	●	1
MS4LTD0050T0100L06	0.5	1°	6	0.71	40	3	4	●	1
MS4LTD0050T0130L04	0.5	1° 30'	4	0.71	40	3	4	●	1
MS4LTD0050T0130L06	0.5	1° 30'	6	0.81	40	3	4	●	1
MS4LTD0050T0200L04	0.5	2°	4	0.78	40	3	4	●	1
MS4LTD0050T0200L06	0.5	2°	6	0.92	40	3	4	●	1
MS4LTD0060T0030L04	0.6	30'	4	0.67	40	3	4	●	1
MS4LTD0060T0030L06	0.6	30'	6	0.7	40	3	4	●	1
MS4LTD0060T0100L04	0.6	1°	4	0.74	40	3	4	●	1
MS4LTD0060T0100L06	0.6	1°	6	0.81	40	3	4	●	1
MS4LTD0060T0130L04	0.6	1° 30'	4	0.81	40	3	4	●	1
MS4LTD0060T0130L06	0.6	1° 30'	6	0.91	40	3	4	●	1
MS4LTD0060T0200L04	0.6	2°	4	0.88	40	3	4	●	1
MS4LTD0060T0200L06	0.6	2°	6	1.02	40	3	4	●	1
MS4LTD0070T0030L06	0.7	30'	6	0.8	40	3	4	●	1
MS4LTD0070T0030L08	0.7	30'	8	0.84	45	3	4	●	1
MS4LTD0070T0100L06	0.7	1°	6	0.91	40	3	4	●	1
MS4LTD0070T0100L08	0.7	1°	8	0.98	45	3	4	●	1
MS4LTD0070T0130L06	0.7	1° 30'	6	1.01	40	3	4	●	1
MS4LTD0070T0130L08	0.7	1° 30'	8	1.12	45	3	4	●	1

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	B7	APMX	DC_2	LF	DCON	No. of Flutes	Stock	Type
MS4LTD0070T0200L06	0.7	2°	6	1.12	40	3	4	●	1
MS4LTD0070T0200L08	0.7	2°	8	1.26	45	3	4	●	1
MS4LTD0080T0015L04	0.8	15'	4	0.83	45	4	4	●	1
MS4LTD0080T0015L06	0.8	15'	6	0.85	45	4	4	●	1
MS4LTD0080T0015L08	0.8	15'	8	0.87	45	4	4	●	1
MS4LTD0080T0015L10	0.8	15'	10	0.89	45	4	4	●	1
MS4LTD0080T0030L04	0.8	30'	4	0.87	45	4	4	●	1
MS4LTD0080T0030L06	0.8	30'	6	0.9	45	4	4	●	1
MS4LTD0080T0030L08	0.8	30'	8	0.94	45	4	4	●	1
MS4LTD0080T0030L10	0.8	30'	10	0.97	45	4	4	●	1
MS4LTD0080T0030L12	0.8	30'	12	1.01	50	4	4	●	1
MS4LTD0080T0100L04	0.8	1°	4	0.94	45	4	4	●	1
MS4LTD0080T0100L06	0.8	1°	6	1.01	45	4	4	●	1
MS4LTD0080T0100L08	0.8	1°	8	1.08	45	4	4	●	1
MS4LTD0080T0100L10	0.8	1°	10	1.15	45	4	4	●	1
MS4LTD0080T0100L12	0.8	1°	12	1.22	50	4	4	●	1
MS4LTD0080T0130L04	0.8	1° 30'	4	1.01	45	4	4	●	1
MS4LTD0080T0130L06	0.8	1° 30'	6	1.11	45	4	4	●	1
MS4LTD0080T0130L08	0.8	1° 30'	8	1.22	45	4	4	●	1
MS4LTD0080T0130L10	0.8	1° 30'	10	1.32	45	4	4	●	1
MS4LTD0080T0130L12	0.8	1° 30'	12	1.43	50	4	4	●	1
MS4LTD0080T0200L04	0.8	2°	4	1.08	45	4	4	●	1
MS4LTD0080T0200L06	0.8	2°	6	1.22	45	4	4	●	1
MS4LTD0080T0200L08	0.8	2°	8	1.36	45	4	4	●	1
MS4LTD0080T0200L10	0.8	2°	10	1.5	45	4	4	●	1
MS4LTD0080T0200L12	0.8	2°	12	1.64	50	4	4	●	1
MS4LTD0100T0015L06	1	15'	6	1.05	45	4	4	●	1
MS4LTD0100T0015L08	1	15'	8	1.07	45	4	4	●	1
MS4LTD0100T0015L10	1	15'	10	1.09	45	4	4	●	1
MS4LTD0100T0015L12	1	15'	12	1.1	50	4	4	●	1
MS4LTD0100T0030L06	1	30'	6	1.1	45	4	4	●	1
MS4LTD0100T0030L08	1	30'	8	1.14	45	4	4	●	1
MS4LTD0100T0030L10	1	30'	10	1.17	45	4	4	●	1
MS4LTD0100T0030L12	1	30'	12	1.21	50	4	4	●	1
MS4LTD0100T0100L06	1	1°	6	1.21	45	4	4	●	1
MS4LTD0100T0100L08	1	1°	8	1.28	45	4	4	●	1
MS4LTD0100T0100L10	1	1°	10	1.35	45	4	4	●	1
MS4LTD0100T0100L12	1	1°	12	1.42	50	4	4	●	1
MS4LTD0100T0100L16	1	1°	16	1.56	55	4	4	●	1
MS4LTD0100T0130L06	1	1° 30'	6	1.31	45	4	4	●	1
MS4LTD0100T0130L08	1	1° 30'	8	1.42	45	4	4	●	1
MS4LTD0100T0130L10	1	1° 30'	10	1.52	45	4	4	●	1
MS4LTD0100T0130L12	1	1° 30'	12	1.63	50	4	4	●	1
MS4LTD0100T0130L16	1	1° 30'	16	1.84	55	4	4	●	1
MS4LTD0100T0200L06	1	2°	6	1.42	45	4	4	●	1
MS4LTD0100T0200L08	1	2°	8	1.56	45	4	4	●	1
MS4LTD0100T0200L10	1	2°	10	1.7	45	4	4	●	1
MS4LTD0100T0200L12	1	2°	12	1.84	50	4	4	●	1
MS4LTD0100T0200L16	1	2°	16	2.12	55	4	4	●	1
MS4LTD0120T0015L06	1.2	15'	6	1.25	45	4	4	●	1
MS4LTD0120T0015L10	1.2	15'	10	1.29	45	4	4	●	1
MS4LTD0120T0015L12	1.2	15'	12	1.3	50	4	4	●	1

MS4LT

Taper end mill, Long cut length, 4 flute

Unit : mm

Order Number	DC	B7	APMX	DC_2	LF	DCON	No. of Flutes	Stock	Type
MS4LTD0120T0015L16	1.2	15'	16	1.34	55	4	4	●	1
MS4LTD0120T0030L06	1.2	30'	6	1.3	45	4	4	●	1
MS4LTD0120T0030L10	1.2	30'	10	1.37	45	4	4	●	1
MS4LTD0120T0030L12	1.2	30'	12	1.41	50	4	4	●	1
MS4LTD0120T0030L16	1.2	30'	16	1.48	55	4	4	●	1
MS4LTD0120T0100L06	1.2	1°	6	1.41	45	4	4	●	1
MS4LTD0120T0100L10	1.2	1°	10	1.55	45	4	4	●	1
MS4LTD0120T0100L12	1.2	1°	12	1.62	50	4	4	●	1
MS4LTD0120T0100L16	1.2	1°	16	1.76	55	4	4	●	1
MS4LTD0120T0100L20	1.2	1°	20	1.9	55	4	4	●	1
MS4LTD0120T0130L06	1.2	1° 30'	6	1.51	45	4	4	●	1
MS4LTD0120T0130L10	1.2	1° 30'	10	1.72	45	4	4	●	1
MS4LTD0120T0130L12	1.2	1° 30'	12	1.83	50	4	4	●	1
MS4LTD0120T0130L16	1.2	1° 30'	16	2.04	55	4	4	●	1
MS4LTD0120T0130L20	1.2	1° 30'	20	2.25	55	4	4	●	1
MS4LTD0120T0200L06	1.2	2°	6	1.62	45	4	4	●	1
MS4LTD0120T0200L10	1.2	2°	10	1.9	45	4	4	●	1
MS4LTD0120T0200L12	1.2	2°	12	2.04	50	4	4	●	1
MS4LTD0120T0200L16	1.2	2°	16	2.32	55	4	4	●	1
MS4LTD0120T0200L20	1.2	2°	20	2.6	55	4	4	●	1
MS4LTD0130T0030L12	1.3	30'	12	1.51	50	4	4	●	1
MS4LTD0130T0100L12	1.3	1°	12	1.72	50	4	4	●	1
MS4LTD0130T0130L12	1.3	1° 30'	12	1.93	50	4	4	●	1
MS4LTD0130T0200L12	1.3	2°	12	2.14	50	4	4	●	1
MS4LTD0140T0030L12	1.4	30'	12	1.61	50	4	4	●	1
MS4LTD0140T0100L12	1.4	1°	12	1.82	50	4	4	●	1
MS4LTD0140T0130L12	1.4	1° 30'	12	2.03	50	4	4	●	1
MS4LTD0140T0200L12	1.4	2°	12	2.24	50	4	4	●	1
MS4LTD0150T0015L06	1.5	15'	6	1.55	45	4	4	●	1
MS4LTD0150T0015L08	1.5	15'	8	1.57	45	4	4	●	1
MS4LTD0150T0015L10	1.5	15'	10	1.59	45	4	4	●	1
MS4LTD0150T0015L12	1.5	15'	12	1.6	50	4	4	●	1
MS4LTD0150T0015L16	1.5	15'	16	1.64	55	4	4	●	1
MS4LTD0150T0015L20	1.5	15'	20	1.67	55	4	4	●	1
MS4LTD0150T0030L06	1.5	30'	6	1.6	45	4	4	●	1
MS4LTD0150T0030L08	1.5	30'	8	1.64	45	4	4	●	1
MS4LTD0150T0030L10	1.5	30'	10	1.67	45	4	4	●	1
MS4LTD0150T0030L12	1.5	30'	12	1.71	50	4	4	●	1
MS4LTD0150T0030L16	1.5	30'	16	1.78	55	4	4	●	1
MS4LTD0150T0030L20	1.5	30'	20	1.85	55	4	4	●	1
MS4LTD0150T0100L06	1.5	1°	6	1.71	45	4	4	●	1
MS4LTD0150T0100L08	1.5	1°	8	1.78	45	4	4	●	1
MS4LTD0150T0100L10	1.5	1°	10	1.85	45	4	4	●	1
MS4LTD0150T0100L12	1.5	1°	12	1.92	50	4	4	●	1
MS4LTD0150T0100L16	1.5	1°	16	2.06	55	4	4	●	1
MS4LTD0150T0100L20	1.5	1°	20	2.2	55	4	4	●	1
MS4LTD0150T0100L25	1.5	1°	25	2.37	60	4	4	●	1
MS4LTD0150T0130L06	1.5	1° 30'	6	1.81	45	4	4	●	1
MS4LTD0150T0130L08	1.5	1° 30'	8	1.92	45	4	4	●	1
MS4LTD0150T0130L10	1.5	1° 30'	10	2.02	45	4	4	●	1
MS4LTD0150T0130L12	1.5	1° 30'	12	2.13	50	4	4	●	1
MS4LTD0150T0130L16	1.5	1° 30'	16	2.34	55	4	4	●	1

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	B7	APMX	DC_2	LF	DCON	No. of Flutes	Stock	Type
MS4LTD0150T0130L20	1.5	1° 30'	20	2.55	55	4	4	●	1
MS4LTD0150T0130L25	1.5	1° 30'	25	2.81	60	4	4	●	1
MS4LTD0150T0200L06	1.5	2°	6	1.92	45	4	4	●	1
MS4LTD0150T0200L08	1.5	2°	8	2.06	45	4	4	●	1
MS4LTD0150T0200L10	1.5	2°	10	2.2	45	4	4	●	1
MS4LTD0150T0200L12	1.5	2°	12	2.34	50	4	4	●	1
MS4LTD0150T0200L16	1.5	2°	16	2.62	55	4	4	●	1
MS4LTD0150T0200L20	1.5	2°	20	2.9	55	4	4	●	1
MS4LTD0150T0200L25	1.5	2°	25	3.25	60	4	4	●	1
MS4LTD0160T0030L08	1.6	30'	8	1.74	45	4	4	●	1
MS4LTD0160T0030L12	1.6	30'	12	1.81	50	4	4	●	1
MS4LTD0160T0030L16	1.6	30'	16	1.88	55	4	4	●	1
MS4LTD0160T0030L20	1.6	30'	20	1.95	55	4	4	●	1
MS4LTD0160T0100L08	1.6	1°	8	1.88	45	4	4	●	1
MS4LTD0160T0100L12	1.6	1°	12	2.02	50	4	4	●	1
MS4LTD0160T0100L16	1.6	1°	16	2.16	55	4	4	●	1
MS4LTD0160T0100L20	1.6	1°	20	2.3	55	4	4	●	1
MS4LTD0160T0130L08	1.6	1° 30'	8	2.02	45	4	4	●	1
MS4LTD0160T0130L12	1.6	1° 30'	12	2.23	50	4	4	●	1
MS4LTD0160T0130L16	1.6	1° 30'	16	2.44	55	4	4	●	1
MS4LTD0160T0130L20	1.6	1° 30'	20	2.65	55	4	4	●	1
MS4LTD0160T0200L08	1.6	2°	8	2.16	45	4	4	●	1
MS4LTD0160T0200L12	1.6	2°	12	2.44	50	4	4	●	1
MS4LTD0160T0200L16	1.6	2°	16	2.72	55	4	4	●	1
MS4LTD0160T0200L20	1.6	2°	20	3	55	4	4	●	1
MS4LTD0180T0015L08	1.8	15'	8	1.87	45	4	4	●	1
MS4LTD0180T0015L16	1.8	15'	16	1.94	55	4	4	●	1
MS4LTD0180T0015L24	1.8	15'	24	2.01	60	4	4	●	1
MS4LTD0180T0030L08	1.8	30'	8	1.94	45	4	4	●	1
MS4LTD0180T0030L16	1.8	30'	16	2.08	55	4	4	●	1
MS4LTD0180T0030L24	1.8	30'	24	2.22	60	4	4	●	1
MS4LTD0180T0100L08	1.8	1°	8	2.08	45	4	4	●	1
MS4LTD0180T0100L16	1.8	1°	16	2.36	55	4	4	●	1
MS4LTD0180T0100L24	1.8	1°	24	2.64	60	4	4	●	1
MS4LTD0180T0130L08	1.8	1° 30'	8	2.22	45	4	4	●	1
MS4LTD0180T0130L16	1.8	1° 30'	16	2.64	55	4	4	●	1
MS4LTD0180T0130L24	1.8	1° 30'	24	3.06	60	4	4	●	1
MS4LTD0180T0200L08	1.8	2°	8	2.36	45	4	4	●	1
MS4LTD0180T0200L16	1.8	2°	16	2.92	55	4	4	●	1
MS4LTD0180T0200L24	1.8	2°	24	3.48	60	4	4	●	1
MS4LTD0200T0015L08	2	15'	8	2.07	45	4	4	●	1
MS4LTD0200T0015L10	2	15'	10	2.09	45	4	4	●	1
MS4LTD0200T0015L12	2	15'	12	2.1	50	4	4	●	1
MS4LTD0200T0015L16	2	15'	16	2.14	55	4	4	●	1
MS4LTD0200T0015L20	2	15'	20	2.17	55	4	4	●	1
MS4LTD0200T0015L25	2	15'	25	2.22	60	4	4	●	1
MS4LTD0200T0030L08	2	30'	8	2.14	45	4	4	●	1
MS4LTD0200T0030L10	2	30'	10	2.17	45	4	4	●	1
MS4LTD0200T0030L12	2	30'	12	2.21	50	4	4	●	1
MS4LTD0200T0030L16	2	30'	16	2.28	55	4	4	●	1
MS4LTD0200T0030L20	2	30'	20	2.35	55	4	4	●	1
MS4LTD0200T0030L25	2	30'	25	2.44	60	4	4	●	1

MS4LT

Taper end mill, Long cut length, 4 flute

Unit : mm

Order Number	DC	B7	APMX	DC_2	LF	DCON	No. of Flutes	Stock	Type
MS4LTD0200T0030L30	2	30'	30	2.52	65	4	4	●	1
MS4LTD0200T0100L08	2	1°	8	2.28	45	4	4	●	1
MS4LTD0200T0100L10	2	1°	10	2.35	45	4	4	●	1
MS4LTD0200T0100L12	2	1°	12	2.42	50	4	4	●	1
MS4LTD0200T0100L16	2	1°	16	2.56	55	4	4	●	1
MS4LTD0200T0100L20	2	1°	20	2.7	55	4	4	●	1
MS4LTD0200T0100L25	2	1°	25	2.87	60	4	4	●	1
MS4LTD0200T0100L30	2	1°	30	3.05	65	4	4	●	1
MS4LTD0200T0130L08	2	1° 30'	8	2.42	45	4	4	●	1
MS4LTD0200T0130L10	2	1° 30'	10	2.52	45	4	4	●	1
MS4LTD0200T0130L12	2	1° 30'	12	2.63	50	4	4	●	1
MS4LTD0200T0130L16	2	1° 30'	16	2.84	55	4	4	●	1
MS4LTD0200T0130L20	2	1° 30'	20	3.05	55	4	4	●	1
MS4LTD0200T0130L25	2	1° 30'	25	3.31	60	4	4	●	1
MS4LTD0200T0130L30	2	1° 30'	30	3.57	65	4	4	●	1
MS4LTD0200T0200L08	2	2°	8	2.56	45	4	4	●	1
MS4LTD0200T0200L10	2	2°	10	2.7	45	4	4	●	1
MS4LTD0200T0200L12	2	2°	12	2.84	50	4	4	●	1
MS4LTD0200T0200L16	2	2°	16	3.12	55	4	4	●	1
MS4LTD0200T0200L20	2	2°	20	3.4	55	4	4	●	1
MS4LTD0200T0200L25	2	2°	25	3.75	60	4	4	●	1
MS4LTD0200T0200L30	2	2°	30	4.1	65	6	4	●	1
MS4LTD0200T0300L12	2	3°	12	3.26	50	4	4	●	1
MS4LTD0200T0300L16	2	3°	16	3.68	55	4	4	●	1
MS4LTD0200T0300L20	2	3°	20	4.1	55	6	4	●	1
MS4LTD0200T0300L25	2	3°	25	4.62	60	6	4	●	1
MS4LTD0200T0300L30	2	3°	30	5.14	65	6	4	●	1
MS4LTD0250T0030L10	2.5	30'	10	2.67	45	4	4	●	1
MS4LTD0250T0030L16	2.5	30'	16	2.78	50	4	4	●	1
MS4LTD0250T0030L20	2.5	30'	20	2.85	55	4	4	●	1
MS4LTD0250T0030L25	2.5	30'	25	2.94	60	4	4	●	1
MS4LTD0250T0030L30	2.5	30'	30	3.02	65	4	4	●	1
MS4LTD0250T0100L10	2.5	1°	10	2.85	45	4	4	●	1
MS4LTD0250T0100L16	2.5	1°	16	3.06	50	4	4	●	1
MS4LTD0250T0100L20	2.5	1°	20	3.2	55	4	4	●	1
MS4LTD0250T0100L25	2.5	1°	25	3.37	60	4	4	●	1
MS4LTD0250T0100L30	2.5	1°	30	3.55	65	4	4	●	1
MS4LTD0250T0130L10	2.5	1° 30'	10	3.02	45	4	4	●	1
MS4LTD0250T0130L16	2.5	1° 30'	16	3.34	50	4	4	●	1
MS4LTD0250T0130L20	2.5	1° 30'	20	3.55	55	4	4	●	1
MS4LTD0250T0130L25	2.5	1° 30'	25	3.81	60	4	4	●	1
MS4LTD0250T0130L30	2.5	1° 30'	30	4.07	65	6	4	●	1
MS4LTD0250T0200L10	2.5	2°	10	3.2	45	4	4	●	1
MS4LTD0250T0200L16	2.5	2°	16	3.62	50	4	4	●	1
MS4LTD0250T0200L20	2.5	2°	20	3.9	55	4	4	●	1
MS4LTD0250T0200L25	2.5	2°	25	4.25	60	6	4	●	1
MS4LTD0250T0200L30	2.5	2°	30	4.6	65	6	4	●	1
MS4LTD0300T0030L25	3	30'	25	3.44	65	6	4	●	1
MS4LTD0300T0030L40	3	30'	40	3.7	80	6	4	●	1
MS4LTD0300T0100L25	3	1°	25	3.87	65	6	4	●	1
MS4LTD0300T0100L40	3	1°	40	4.4	80	6	4	●	1
MS4LTD0300T0130L25	3	1° 30'	25	4.31	65	6	4	●	1

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	B7	APMX	DC_2	LF	DCON	No. of Flutes	Stock	Type
MS4LTD0300T0130L40	3	1° 30'	40	5.09	80	6	4	●	1
MS4LTD0300T0200L25	3	2°	25	4.75	65	6	4	●	1
MS4LTD0300T0200L40	3	2°	40	5.79	80	6	4	●	1

MS4LT

Taper end mill, Long cut length, 4 flute

RECOMMENDED CUTTING CONDITIONS

Work material		Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45−55HRC) AISI H13		
Dia. **DC** (mm)	Length of cut **APMX** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
0.2	**2**	20000−40000	200−500	0.001	20000−40000	150−300	0.001
0.3	**3**	20000−40000	200−500	0.002	20000−40000	150−300	0.001
0.4	**4**	20000−40000	200−500	0.003	20000−36000	150−300	0.002
0.5	**4**	20000−38000	200−500	0.01	16000−29000	200−400	0.005
	6			0.005			0.003
0.6	**4**	18000−32000	250−600	0.01	13000−24000	200−400	0.005
	6			0.007			0.004
0.7	**6**	16000−27000	250−600	0.015	11000−20000	200−400	0.008
	8			0.01			0.005
0.8	**4**	14000−24000	250−600	0.03	10000−18000	200−400	0.015
	8			0.02			0.01
	12			0.013			0.007
1.0	**6**	11000−19000	300−800	0.03	8000−14000	200−500	0.015
	10			0.02			0.01
	16			0.015			0.008
1.2	**6**	9200−16000	300−800	0.04	6600−12000	200−500	0.02
	10			0.03			0.015
	16			0.02			0.01
	20			0.01			0.007
1.3	**12**	8500−15000	300−800	0.03	6100−11000	200−500	0.015
1.4	**12**	8000−14000	300−800	0.035	5700−10000	200−500	0.018
1.5	**6**	7500−13000	300−800	0.06	5300−9500	200−500	0.03
	10			0.04			0.02
	16			0.03			0.015
	25			0.015			0.008
1.6	**8**	7000−12000	300−800	0.06	5000−9000	200−500	0.03
	12			0.045			0.025
	16			0.035			0.02
	20			0.025			0.015
1.8	**8**	6200−11000	300−800	0.08	4400−8000	200−500	0.04
	16			0.05			0.03
	24			0.03			0.015
2.0	**8**	5500−9500	300−800	0.1	4000−7200	200−500	0.05
	12			0.07			0.04
	20			0.04			0.02
	30			0.02			0.01
2.5	**10**	4400−7600	300−800	0.1	3200−5700	200−500	0.05
	20			0.06			0.03
	30			0.03			0.015
3.0	**25**	3700−6400	300−800	0.08	2700−4800	200−500	0.04
	40			0.04			0.02

ap:Depth of Cut in the Axial Direction

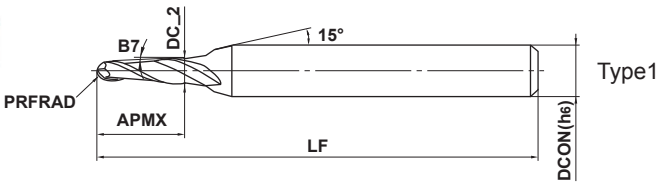
1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MS2MTB

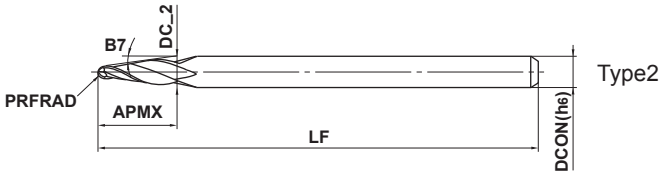
Ball nose taper end mill, Medium cut length, 2 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		





Type1



Type2

R	0.2≤PRFRAD≤1.5				
	±0.01				
	±5'				
h6	4≤DCON≤6				
	0 - 0.008				

2 flute taper ball nose end mill.

Unit : mm

Order Number	PRFRAD	B7	APMX	DC_2	LF	DCON	No. of Flutes	Stock	Type
MS2MTBR0020T0300	0.2	3°	3	0.69	40	4	2	●	1
MS2MTBR0020T0500	0.2	5°	3	0.89	40	4	2	●	1
MS2MTBR0020T0700	0.2	7°	3	1.09	40	4	2	●	1
MS2MTBR0020T1000	0.2	10°	3	1.39	40	4	2	●	1
MS2MTBR0030T0300	0.3	3°	3	0.88	40	4	2	●	1
MS2MTBR0030T0500	0.3	5°	3	1.07	40	4	2	●	1
MS2MTBR0030T0700	0.3	7°	3	1.27	40	4	2	●	1
MS2MTBR0030T1000	0.3	10°	3	1.56	40	4	2	●	1
MS2MTBR0050T0030	0.5	30'	3	1.04	40	4	2	●	1
MS2MTBR0050T0100	0.5	1°	3	1.09	40	4	2	●	1
MS2MTBR0050T0130	0.5	1° 30'	3	1.13	40	4	2	●	1
MS2MTBR0050T0200	0.5	2°	3	1.18	40	4	2	●	1
MS2MTBR0050T0300	0.5	3°	3	1.26	40	4	2	●	1
MS2MTBR0050T0500	0.5	5°	3	1.44	40	4	2	●	1
MS2MTBR0050T0700	0.5	7°	6	2.36	45	4	2	●	1
MS2MTBR0075T0030	0.75	30'	6	1.59	40	4	2	●	1
MS2MTBR0075T0100	0.75	1°	6	1.68	40	4	2	●	1
MS2MTBR0075T0130	0.75	1° 30'	6	1.78	40	4	2	●	1
MS2MTBR0075T0200	0.75	2°	6	1.87	40	4	2	●	1
MS2MTBR0075T0300	0.75	3°	6	2.05	40	4	2	●	1
MS2MTBR0075T0700	0.75	7°	6	2.8	40	4	2	●	1
MS2MTBR0100T0030	1	30'	8	2.12	45	4	2	●	1
MS2MTBR0100T0100	1	1°	8	2.24	45	4	2	●	1
MS2MTBR0100T0130	1	1° 30'	8	2.37	45	4	2	●	1
MS2MTBR0100T0200	1	2°	8	2.49	45	4	2	●	1
MS2MTBR0100T0300	1	3°	8	2.74	45	4	2	●	1
MS2MTBR0100T0400	1	4°	8	2.98	45	4	2	●	1
MS2MTBR0100T0500	1	5°	8	3.23	45	4	2	●	1
MS2MTBR0100T0700	1	7°	8	3.73	50	6	2	●	1
MS2MTBR0125T0030	1.25	30'	10	2.65	45	4	2	●	1
MS2MTBR0125T0100	1.25	1°	10	2.81	45	4	2	●	1
MS2MTBR0125T0130	1.25	1° 30'	10	2.96	45	4	2	●	1
MS2MTBR0125T0200	1.25	2°	10	3.11	45	4	2	●	1
MS2MTBR0125T0300	1.25	3°	10	3.42	45	4	2	●	1

● : Inventory maintained in Japan.

MS2MTB

Ball nose taper end mill, Medium cut length, 2 flute

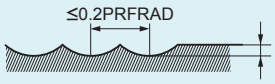
Unit : mm

Order Number	PRFRAD	B7	APMX	DC_2	LF	DCON	No. of Flutes	Stock	Type
MS2MTBR0125T0400	1.25	4°	10	3.73	50	6	2	●	1
MS2MTBR0125T0500	1.25	5°	10	4.04	50	6	2	●	1
MS2MTBR0125T0700	1.25	7°	14.5	5.77	60	6	2	●	2
MS2MTBR0150T0700	1.5	7°	12.5	5.72	60	6	2	●	2

RECOMMENDED CUTTING CONDITIONS

Work material	Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21					Hardened steel (45－55HRC) AISI H13				
R PRFRAD (mm)	α≤15°		α>15°		Depth of cut (mm)	α≤15°		α>15°		Depth of cut (mm)
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)		Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	
R 0.1	40000	300	40000	250	0.003	40000	300	40000	250	0.003
R 0.15	40000	500	40000	350	0.007	40000	500	40000	350	0.007
R 0.2	40000	1600	40000	1200	0.02	40000	1300	40000	950	0.015
R 0.25	40000	2400	40000	1400	0.025	40000	1900	40000	1100	0.020
R 0.3	40000	3200	40000	1600	0.03	40000	2500	40000	1300	0.025
R 0.4	40000	4800	40000	2400	0.05	40000	4000	40000	1900	0.04
R 0.5	40000	5600	40000	3200	0.06	40000	5600	40000	3000	0.05
R 0.75	40000	6500	40000	4000	0.09	40000	6500	32000	3200	0.08
R 1	40000	6500	39000	4700	0.11	40000	6500	31000	3500	0.11
R 1.25	40000	7000	33000	4500	0.12	36000	6500	26000	3500	0.12
R 1.5	40000	7500	27000	4300	0.13	32000	6000	22000	3400	0.13
R 2	32000	7500	20000	3600	0.15	25000	6000	16000	2700	0.15
R 2.5	25000	6000	16000	2900	0.20	20000	5400	13000	2300	0.20
R 3	21000	5800	13000	2600	0.25	17000	4700	10000	2000	0.25
R 4	16000	4500	10000	2000	0.30	13000	3600	8000	1500	0.30
R 5	13000	3600	8000	1700	0.50	10000	2900	6400	1200	0.50
R 6	9000	2500	6000	1300	0.50	7200	2000	4800	1000	0.50

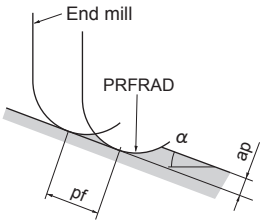
Depth of cut



≤Please refer to the list above for depth of cut.

PRFRAD:Radius

1) α is the inclination angle of the machined surface.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.



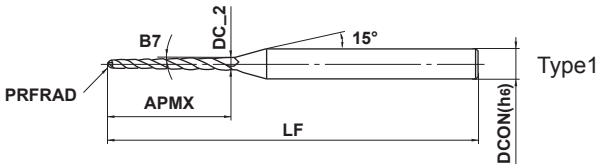
● : Inventory maintained in Japan.

MS4LTB

Ball nose, 4 flute, Taper, For rib milling

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	○		○	○		





Type1

R	0.3≤PRFRAD≤1				
	±0.03				
	±5'				
h6	4≤DCON≤6				
	0 - 0.008				

4 flute taper ball nose end mill for rib milling.

Unit : mm

Order Number	PRFRAD	B7	APMX	DC_2	LF	DCON	No. of Flutes	Stock	Type
MS4LTBR0030T0030L04	0.3	30'	4	0.66	45	4	4	●	1
MS4LTBR0030T0030L06	0.3	30'	6	0.70	45	4	4	●	1
MS4LTBR0030T0100L04	0.3	1°	4	0.73	45	4	4	●	1
MS4LTBR0030T0100L06	0.3	1°	6	0.80	45	4	4	●	1
MS4LTBR0030T0130L04	0.3	1° 30'	4	0.79	45	4	4	●	1
MS4LTBR0030T0130L06	0.3	1° 30'	6	0.90	45	4	4	●	1
MS4LTBR0030T0200L04	0.3	2°	4	0.86	45	4	4	●	1
MS4LTBR0030T0200L06	0.3	2°	6	1.00	45	4	4	●	1
MS4LTBR0040T0030L06	0.4	30'	6	0.90	50	4	4	●	1
MS4LTBR0040T0030L08	0.4	30'	8	0.93	50	4	4	●	1
MS4LTBR0040T0030L10	0.4	30'	10	0.97	50	4	4	●	1
MS4LTBR0040T0100L06	0.4	1°	6	1.00	50	4	4	●	1
MS4LTBR0040T0100L08	0.4	1°	8	1.07	50	4	4	●	1
MS4LTBR0040T0100L10	0.4	1°	10	1.14	50	4	4	●	1
MS4LTBR0040T0130L06	0.4	1° 30'	6	1.09	50	4	4	●	1
MS4LTBR0040T0130L08	0.4	1° 30'	8	1.20	50	4	4	●	1
MS4LTBR0040T0130L10	0.4	1° 30'	10	1.30	50	4	4	●	1
MS4LTBR0040T0200L06	0.4	2°	6	1.19	50	4	4	●	1
MS4LTBR0040T0200L08	0.4	2°	8	1.33	50	4	4	●	1
MS4LTBR0040T0200L10	0.4	2°	10	1.47	50	4	4	●	1
MS4LTBR0050T0030L08	0.5	30'	8	1.13	50	4	4	●	1
MS4LTBR0050T0030L10	0.5	30'	10	1.17	50	4	4	●	1
MS4LTBR0050T0030L12	0.5	30'	12	1.20	50	4	4	●	1
MS4LTBR0050T0030L16	0.5	30'	16	1.27	55	4	4	●	1
MS4LTBR0050T0100L08	0.5	1°	8	1.26	50	4	4	●	1
MS4LTBR0050T0100L10	0.5	1°	10	1.33	50	4	4	●	1
MS4LTBR0050T0100L12	0.5	1°	12	1.40	50	4	4	●	1
MS4LTBR0050T0100L16	0.5	1°	16	1.54	55	4	4	●	1
MS4LTBR0050T0130L08	0.5	1° 30'	8	1.39	50	4	4	●	1
MS4LTBR0050T0130L10	0.5	1° 30'	10	1.50	50	4	4	●	1
MS4LTBR0050T0130L12	0.5	1° 30'	12	1.60	50	4	4	●	1
MS4LTBR0050T0130L16	0.5	1° 30'	16	1.81	55	4	4	●	1
MS4LTBR0050T0200L08	0.5	2°	8	1.52	50	4	4	●	1
MS4LTBR0050T0200L10	0.5	2°	10	1.66	50	4	4	●	1

MS4LTB

Ball nose, 4 flute, Taper, For rib milling

Unit : mm

Order Number	PRFRAD	B7	APMX	DC_2	LF	DCON	No. of Flutes	Stock	Type
MS4LTBR0050T0200L12	0.5	2°	12	1.80	50	4	4	●	1
MS4LTBR0050T0200L16	0.5	2°	16	2.08	55	4	4	●	1
MS4LTBR0060T0030L08	0.6	30'	8	1.33	50	4	4	●	1
MS4LTBR0060T0030L10	0.6	30'	10	1.36	50	4	4	●	1
MS4LTBR0060T0030L12	0.6	30'	12	1.40	50	4	4	●	1
MS4LTBR0060T0030L16	0.6	30'	16	1.47	55	4	4	●	1
MS4LTBR0060T0100L08	0.6	1°	8	1.46	50	4	4	●	1
MS4LTBR0060T0100L10	0.6	1°	10	1.53	50	4	4	●	1
MS4LTBR0060T0100L12	0.6	1°	12	1.60	50	4	4	●	1
MS4LTBR0060T0100L16	0.6	1°	16	1.74	55	4	4	●	1
MS4LTBR0060T0130L08	0.6	1° 30'	8	1.59	50	4	4	●	1
MS4LTBR0060T0130L10	0.6	1° 30'	10	1.69	50	4	4	●	1
MS4LTBR0060T0130L12	0.6	1° 30'	12	1.80	50	4	4	●	1
MS4LTBR0060T0130L16	0.6	1° 30'	16	2.01	55	4	4	●	1
MS4LTBR0060T0200L08	0.6	2°	8	1.72	50	4	4	●	1
MS4LTBR0060T0200L10	0.6	2°	10	1.86	50	4	4	●	1
MS4LTBR0060T0200L12	0.6	2°	12	2.00	50	4	4	●	1
MS4LTBR0060T0200L16	0.6	2°	16	2.28	55	4	4	●	1
MS4LTBR0075T0030L08	0.75	30'	8	1.63	50	4	4	●	1
MS4LTBR0075T0030L10	0.75	30'	10	1.66	50	4	4	●	1
MS4LTBR0075T0030L12	0.75	30'	12	1.70	50	4	4	●	1
MS4LTBR0075T0030L16	0.75	30'	16	1.77	55	4	4	●	1
MS4LTBR0075T0030L20	0.75	30'	20	1.84	60	4	4	●	1
MS4LTBR0075T0100L08	0.75	1°	8	1.75	50	4	4	●	1
MS4LTBR0075T0100L10	0.75	1°	10	1.82	50	4	4	●	1
MS4LTBR0075T0100L12	0.75	1°	12	1.89	50	4	4	●	1
MS4LTBR0075T0100L16	0.75	1°	16	2.03	55	4	4	●	1
MS4LTBR0075T0100L20	0.75	1°	20	2.17	60	4	4	●	1
MS4LTBR0075T0130L08	0.75	1° 30'	8	1.88	50	4	4	●	1
MS4LTBR0075T0130L10	0.75	1° 30'	10	1.98	50	4	4	●	1
MS4LTBR0075T0130L12	0.75	1° 30'	12	2.09	50	4	4	●	1
MS4LTBR0075T0130L16	0.75	1° 30'	16	2.30	55	4	4	●	1
MS4LTBR0075T0130L20	0.75	1° 30'	20	2.51	60	4	4	●	1
MS4LTBR0075T0200L08	0.75	2°	8	2.01	50	4	4	●	1
MS4LTBR0075T0200L10	0.75	2°	10	2.15	50	4	4	●	1
MS4LTBR0075T0200L12	0.75	2°	12	2.29	50	4	4	●	1
MS4LTBR0075T0200L16	0.75	2°	16	2.57	55	4	4	●	1
MS4LTBR0075T0200L20	0.75	2°	20	2.84	60	4	4	●	1
MS4LTBR0090T0030L08	0.9	30'	8	1.92	50	4	4	●	1
MS4LTBR0090T0030L10	0.9	30'	10	1.96	50	4	4	●	1
MS4LTBR0090T0030L12	0.9	30'	12	1.99	50	4	4	●	1
MS4LTBR0090T0030L16	0.9	30'	16	2.06	55	4	4	●	1
MS4LTBR0090T0030L20	0.9	30'	20	2.13	60	4	4	●	1
MS4LTBR0090T0100L08	0.9	1°	8	2.05	50	4	4	●	1
MS4LTBR0090T0100L10	0.9	1°	10	2.12	50	4	4	●	1
MS4LTBR0090T0100L12	0.9	1°	12	2.19	50	4	4	●	1
MS4LTBR0090T0100L16	0.9	1°	16	2.33	55	4	4	●	1
MS4LTBR0090T0100L20	0.9	1°	20	2.47	60	4	4	●	1
MS4LTBR0090T0130L08	0.9	1° 30'	8	2.17	50	4	4	●	1
MS4LTBR0090T0130L10	0.9	1° 30'	10	2.28	50	4	4	●	1
MS4LTBR0090T0130L12	0.9	1° 30'	12	2.38	50	4	4	●	1
MS4LTBR0090T0130L16	0.9	1° 30'	16	2.59	55	4	4	●	1

● : Inventory maintained in Japan.

Unit : mm

Order Number	PRFRAD	B7	APMX	DC_2	LF	DCON	No. of Flutes	Stock	Type
MS4LTBR0090T0130L20	0.9	1° 30'	20	2.80	60	4	4	●	1
MS4LTBR0090T0200L08	0.9	2°	8	2.30	50	4	4	●	1
MS4LTBR0090T0200L10	0.9	2°	10	2.44	50	4	4	●	1
MS4LTBR0090T0200L12	0.9	2°	12	2.58	50	4	4	●	1
MS4LTBR0090T0200L16	0.9	2°	16	2.86	55	4	4	●	1
MS4LTBR0090T0200L20	0.9	2°	20	3.13	60	4	4	●	1
MS4LTBR0100T0030L10	1	30'	10	2.16	50	4	4	●	1
MS4LTBR0100T0030L12	1	30'	12	2.19	50	4	4	●	1
MS4LTBR0100T0030L16	1	30'	16	2.26	55	4	4	●	1
MS4LTBR0100T0030L20	1	30'	20	2.33	60	4	4	●	1
MS4LTBR0100T0030L25	1	30'	25	2.42	65	4	4	●	1
MS4LTBR0100T0030L30	1	30'	30	2.51	65	4	4	●	1
MS4LTBR0100T0100L10	1	1°	10	2.31	50	4	4	●	1
MS4LTBR0100T0100L12	1	1°	12	2.38	50	4	4	●	1
MS4LTBR0100T0100L16	1	1°	16	2.52	55	4	4	●	1
MS4LTBR0100T0100L20	1	1°	20	2.66	60	4	4	●	1
MS4LTBR0100T0100L25	1	1°	25	2.84	65	4	4	●	1
MS4LTBR0100T0100L30	1	1°	30	3.01	65	4	4	●	1
MS4LTBR0100T0130L10	1	1° 30'	10	2.47	50	4	4	●	1
MS4LTBR0100T0130L12	1	1° 30'	12	2.58	50	4	4	●	1
MS4LTBR0100T0130L16	1	1° 30'	16	2.79	55	4	4	●	1
MS4LTBR0100T0130L20	1	1° 30'	20	3.00	60	4	4	●	1
MS4LTBR0100T0130L25	1	1° 30'	25	3.26	65	6	4	●	1
MS4LTBR0100T0130L30	1	1° 30'	30	3.52	65	6	4	●	1
MS4LTBR0100T0200L10	1	2°	10	2.63	50	4	4	●	1
MS4LTBR0100T0200L12	1	2°	12	2.77	50	4	4	●	1
MS4LTBR0100T0200L16	1	2°	16	3.05	55	4	4	●	1
MS4LTBR0100T0200L20	1	2°	20	3.33	60	4	4	●	1
MS4LTBR0100T0200L25	1	2°	25	3.68	65	6	4	●	1
MS4LTBR0100T0200L30	1	2°	30	4.03	65	6	4	●	1

MS4LTB

Ball nose, 4 flute, Taper, For rib milling

RECOMMENDED CUTTING CONDITIONS

Work material		Carbon steel, Cast iron, Alloy steel, Pre-hardened steel AISI 1050, AISI No 35 B, AISI P20, AISI P21			Hardened steel (45－55HRC) AISI H13		
R **PRFRAD** (mm)	Length of cut **APMX** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
R0.3	**4**	18000－32000	250－600	0.01	13000－24000	200－400	0.005
	6			0.007			0.004
R0.4	**6**	14000－24000	250－600	0.025	10000－18000	200－400	0.013
	8			0.02			0.01
	10			0.015			0.008
R0.5	**8**	11000－19000	300－800	0.025	8000－14000	200－500	0.013
	10			0.02			0.01
	12			0.018			0.009
	16			0.015			0.008
R0.6	**8**	9200－16000	300－800	0.035	6600－12000	200－500	0.018
	10			0.03			0.015
	12			0.027			0.013
	16			0.02			0.01
R0.75	**8**	7500－13000	300－800	0.05	5300－9500	200－500	0.025
	10			0.04			0.02
	12			0.035			0.018
	16			0.03			0.015
	20			0.02			0.01
R0.9	**8**	6200－11000	300－800	0.08	4400－8000	200－500	0.04
	10			0.07			0.035
	12			0.06			0.035
	16			0.05			0.03
	20			0.04			0.02
R1	**10**	5500－9500	300－800	0.08	4000－7200	200－500	0.045
	12			0.07			0.04
	16			0.05			0.03
	20			0.04			0.02
	25			0.03			0.015
	30			0.02			0.01

ap:Depth of Cut in the Axial Direction

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.

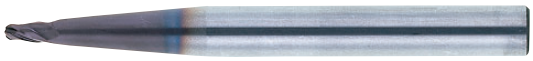
MIRACLE END MILL FOR HIGH HARDNESS STEEL

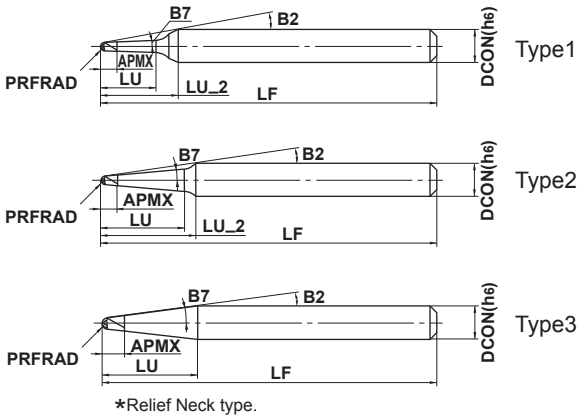
VC4STB

Ball nose taper end mill, Short cut length, 4 flute

UWC VC 30° PRFRAD<0.5 PRFRAD≥0.5

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎	○	○		





*Relief Neck type.

R	0.3≤PRFRAD≤4				
	±0.01				
h6	DCON=6	8≤DCON≤10			
	0 - 0.008	0 - 0.009			

● 4 flute taper end mill with taper neck for maximum rigidity and high performance.

Unit : mm

Order Number	PRFRAD	B7	APMX	LU	LU_2	B2	LF	DCON	No. of Flutes	Stock	Type
VC4STBR0030T0130N05	0.3	1° 30'	1	5	9.0	17.2°	60	6	4	●	1
VC4STBR0030T0200N05	0.3	2°	1	5	9.0	17.2°	60	6	4	●	1
VC4STBR0030T0500N05	0.3	5°	1	5	8.8	17.6°	60	6	4	●	1
VC4STBR0030T1000N15	0.3	10°	1	15	—	10.4°	60	6	4	●	3
VC4STBR0040T0130N10	0.4	1° 30'	2	10	14.0	10.8°	60	6	4	●	1
VC4STBR0040T0130N15	0.4	1° 30'	2	15	19.0	8.0°	60	6	4	●	1
VC4STBR0040T0200N10	0.4	2°	2	10	14.0	10.8°	60	6	4	●	1
VC4STBR0040T0500N10	0.4	5°	2	10	13.5	11.2°	60	6	4	●	1
VC4STBR0040T0700N10	0.4	7°	7	10	12.2	12.4°	60	6	4	●	2
VC4STBR0040T1000N15	0.4	10°	3	15	—	10.1°	60	6	4	●	3
VC4STBR0050T0130N10	0.5	1° 30'	2	10	14.0	10.5°	60	6	4	●	1
VC4STBR0050T0130N15	0.5	1° 30'	2	15	19.0	7.7°	60	6	4	●	1
VC4STBR0050T0130N20	0.5	1° 30'	2	20	24.0	6.1°	60	6	4	●	1
VC4STBR0050T0200N10	0.5	2°	2	10	14.0	10.5°	60	6	4	●	1
VC4STBR0050T0200N15	0.5	2°	2	15	18.9	7.8°	60	6	4	●	1
VC4STBR0050T0200N20	0.5	2°	3	20	24.0	6.1°	60	6	4	●	1
VC4STBR0050T0500N10	0.5	5°	3	10	13.6	10.8°	60	6	4	●	1
VC4STBR0050T0500N15	0.5	5°	3	15	17.2	8.5°	60	6	4	●	2
VC4STBR0050T0500N20	0.5	5°	3	20	21.8	6.7°	60	6	4	●	2
VC4STBR0050T0700N10	0.5	7°	7	10	12.1	12.2°	60	6	4	●	2
VC4STBR0050T0700N15	0.5	7°	7	15	16.6	8.9°	60	6	4	●	2
VC4STBR0050T0700N20	0.5	7°	7	20	—	7.3°	60	6	4	●	3
VC4STBR0050T1000N14	0.5	10°	3	14	—	10.5°	60	6	4	●	3
VC4STBR0075T0200N10	0.75	2°	3	10	14.0	9.6°	60	6	4	●	1
VC4STBR0075T0500N15	0.75	5°	3	15	17.0	7.9°	60	6	4	●	2
VC4STBR0100T0130N10	1	1° 30'	4	10	13.5	9.1°	60	6	4	●	1
VC4STBR0100T0130N15	1	1° 30'	4	15	18.5	6.5°	60	6	4	●	1
VC4STBR0100T0130N20	1	1° 30'	4	20	23.5	5.1°	60	6	4	●	1
VC4STBR0100T0200N06	1	2°	4	6	8.7	14.4°	60	6	4	●	2
VC4STBR0100T0200N10	1	2°	4	10	13.8	8.9°	60	6	4	●	1
VC4STBR0100T0200N15	1	2°	4	15	17.5	6.9°	60	6	4	●	2
VC4STBR0100T0500N10	1	5°	4	10	12.2	10.1°	60	6	4	●	2
VC4STBR0100T0500N15	1	5°	4	15	16.8	7.2°	60	6	4	●	2
VC4STBR0100T0500N23	1	5°	4	23	—	5.2°	60	6	4	●	3

● : Inventory maintained in Japan.

MIRACLE END MILL FOR HIGH HARDNESS STEEL

VC4STB

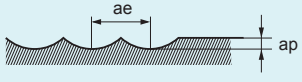
Ball nose taper end mill, Short cut length, 4 flute

Unit : mm

Order Number	PRFRAD	B7	APMX	LU	LU_2	B2	LF	DCON	No. of Flutes	Stock	Type
VC4STBR0100T0700N17	1	7°	7	17	—	7.1°	60	6	4	●	3
VC4STBR0100T1000N12	1	10°	4	12	—	10.3°	60	6	4	●	3
VC4STBR0125T0500N15	1.25	5°	4	15	16.5	6.6°	60	6	4	●	2
VC4STBR0150T0130N15	1.5	1° 30'	4	15	17.3	5.4°	60	6	4	●	2
VC4STBR0150T0130N20	1.5	1° 30'	4	20	22.2	4.2°	60	6	4	●	2
VC4STBR0150T0300N15	1.5	3°	4	15	16.9	5.6°	60	6	4	●	2
VC4STBR0150T0500N10	1.5	5°	4	10	11.7	8.3°	60	6	4	●	2
VC4STBR0150T0500N18	1.5	5°	4	18	—	5.2°	60	6	4	●	3
VC4STBR0175T0500N15	1.75	5°	4	15	—	5.4°	60	6	4	●	3
VC4STBR0200T0130N15	2	1° 30'	5	15	16.8	3.9°	60	6	4	●	2
VC4STBR0200T0130N20	2	1° 30'	5	20	21.6	3.0°	60	6	4	●	2
VC4STBR0200T0300N21	2	3°	4	21	—	3.1°	60	6	4	●	3
VC4STBR0200T0500N13	2	5°	4	13	—	5.2°	60	6	4	●	3
VC4STBR0200T0700N18	2	7°	7	18	—	7.1°	60	8	4	●	3
VC4STBR0300T0130N15	3	1° 30'	6	15	16.8	4.2°	90	8	4	●	2
VC4STBR0300T0130N20	3	1° 30'	6	20	21.7	3.1°	90	8	4	●	2
VC4STBR0300T0300N22	3	3°	6	22	—	3.1°	90	8	4	●	3
VC4STBR0400T0130N15	4	1° 30'	8	15	16.9	4.4°	90	10	4	●	2
VC4STBR0400T0300N22	4	3°	8	22	—	3.2°	90	10	4	●	3

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

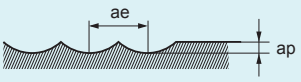
Work material			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Hardened steel (45－55HRC) AISI H13				Hardened steel (55－62HRC) AISI D2			
R **PRFRAD** (mm)	Taper angle one side **B7**	Neck length **LU** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
R 0.3	**1°30'**	**5**	40000	1600	0.08	0.12	40000	1200	0.06	0.10	40000	700	0.04	0.06
	2°	**5**	40000	1600	0.08	0.12	40000	1200	0.06	0.10	40000	700	0.04	0.06
	5°	**5**	40000	1600	0.08	0.12	40000	1200	0.06	0.10	40000	700	0.04	0.06
	10°	**15**	40000	1600	0.05	0.08	40000	1200	0.04	0.06	40000	700	0.03	0.04
R 0.4	**1°30'**	**10**	40000	2000	0.07	0.11	40000	1500	0.06	0.08	30000	700	0.04	0.05
	1°30'	**15**	40000	2000	0.05	0.08	40000	1500	0.04	0.06	30000	800	0.03	0.04
	2°	**10**	40000	2000	0.07	0.11	40000	1500	0.06	0.08	30000	800	0.04	0.05
	5°	**10**	40000	2000	0.07	0.11	40000	1500	0.06	0.08	30000	800	0.04	0.05
	7°	**10**	40000	2000	0.07	0.11	40000	1500	0.06	0.08	30000	800	0.04	0.05
	10°	**15**	40000	2000	0.06	0.09	40000	1500	0.05	0.07	30000	800	0.03	0.05
R 0.5	**1°30**	**10**	38000	2500	0.11	0.16	35000	1600	0.08	0.13	25000	800	0.05	0.08
	1°30'	**15**	38000	2500	0.09	0.14	35000	1600	0.07	0.11	25000	800	0.05	0.07
	1°30'	**20**	38000	2500	0.06	0.09	35000	1600	0.05	0.07	25000	800	0.03	0.05
	2°	**10**	38000	2500	0.11	0.16	35000	1600	0.08	0.13	25000	800	0.05	0.08
	2°	**15**	38000	2500	0.09	0.14	35000	1600	0.07	0.11	25000	800	0.05	0.07
	2°	**20**	38000	2500	0.06	0.09	35000	1600	0.05	0.07	25000	800	0.03	0.05
	5°	**10**	38000	2500	0.12	0.18	35000	1600	0.10	0.14	25000	800	0.06	0.09
	5°	**15**	38000	2500	0.09	0.14	35000	1600	0.07	0.11	25000	800	0.05	0.07
	5°	**20**	38000	2500	0.08	0.11	35000	1600	0.06	0.09	25000	800	0.04	0.06
	7°	**10**	38000	2500	0.12	0.18	35000	1600	0.10	0.14	25000	800	0.06	0.09
	7°	**15**	38000	2500	0.11	0.16	35000	1600	0.08	0.13	25000	800	0.05	0.08
	7°	**20**	38000	2500	0.08	0.11	35000	1600	0.06	0.09	25000	800	0.04	0.06
	10°	**14**	38000	2500	0.11	0.16	35000	1600	0.08	0.13	25000	800	0.05	0.08
R 0.75	**2°**	**10**	38000	2500	0.18	0.27	35000	1600	0.14	0.22	18000	800	0.09	0.14
	5°	**15**	38000	2500	0.16	0.24	35000	1600	0.13	0.19	18000	800	0.08	0.12
R 1	**1°30'**	**10**	35000	2800	0.18	0.27	30000	1800	0.14	0.22	15000	1000	0.09	0.14
	1°30'	**15**	35000	2800	0.16	0.24	30000	1800	0.13	0.19	15000	1000	0.08	0.12
	1°30'	**20**	35000	2800	0.14	0.21	30000	1800	0.11	0.17	15000	1000	0.07	0.11
	2°	**6**	35000	2800	0.20	0.30	30000	1800	0.16	0.24	15000	1000	0.10	0.15
	2°	**10**	35000	2800	0.18	0.27	30000	1800	0.14	0.22	15000	1000	0.09	0.14
	2°	**15**	35000	2800	0.16	0.24	30000	1800	0.13	0.19	15000	1000	0.08	0.12
	5°	**10**	35000	2800	0.18	0.27	30000	1800	0.14	0.22	15000	1000	0.09	0.14
	5°	**15**	35000	2800	0.18	0.27	30000	1800	0.14	0.22	15000	1000	0.09	0.14
	5°	**23**	35000	2800	0.14	0.21	30000	1800	0.11	0.17	15000	1000	0.07	0.11
	7°	**17**	35000	2800	0.16	0.24	30000	1800	0.13	0.19	15000	1000	0.08	0.12
	10°	**12**	35000	2800	0.18	0.27	30000	1800	0.14	0.22	15000	1000	0.09	0.14
R 1.25	**5°**	**15**	35000	2800	0.23	0.34	30000	1800	0.18	0.27	15000	1000	0.11	0.17
R 1.5	**1°30'**	**15**	32000	3000	0.23	0.34	27000	2000	0.18	0.27	16000	1200	0.11	0.17
	1°30'	**20**	32000	3000	0.23	0.34	27000	2000	0.18	0.27	16000	1200	0.11	0.17
	3°	**15**	32000	3000	0.23	0.34	27000	2000	0.18	0.27	16000	1200	0.11	0.17
	5°	**10**	32000	3000	0.25	0.38	27000	2000	0.20	0.30	16000	1200	0.13	0.19
	5°	**18**	32000	3000	0.23	0.34	27000	2000	0.18	0.27	16000	1200	0.11	0.17
R 1.75	**5°**	**15**	27500	3500	0.23	0.34	23000	2500	0.18	0.27	14000	1500	0.11	0.17
Depth of cut			 PRFRAD:Radius											

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MIRACLE END MILL FOR HIGH HARDNESS STEEL

VC4STB

Ball nose taper end mill, Short cut length, 4 flute

Work material			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Hardened steel (45－55HRC) AISI H13				Hardened steel (55－62HRC) AISI D2			
R **PRFRAD** (mm)	Taper angle one side **B7**	Neck length **LU** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
R 2	**1°30'**	**15**	24000	3500	0.23	0.34	20000	2500	0.18	0.27	12000	1500	0.11	0.17
	1°30'	**20**	24000	3500	0.23	0.34	20000	2500	0.18	0.27	12000	1500	0.11	0.17
	3°	**21**	24000	3500	0.23	0.34	20000	2500	0.18	0.27	12000	1500	0.11	0.17
	5°	**13**	24000	3500	0.25	0.38	20000	2500	0.20	0.30	12000	1500	0.13	0.19
	7°	**18**	24000	3500	0.23	0.34	20000	2500	0.18	0.27	12000	1500	0.11	0.17
R 3	**1°30'**	**15**	16000	3500	0.30	0.45	13500	2500	0.24	0.36	8000	1500	0.15	0.23
	1°30'	**20**	16000	3500	0.30	0.45	13500	2500	0.24	0.36	8000	1500	0.15	0.23
	3°	**22**	16000	3500	0.30	0.45	13500	2500	0.24	0.36	8000	1500	0.15	0.23
R 4	**1°30'**	**15**	12000	3500	0.30	0.45	10000	2500	0.24	0.36	6000	1500	0.15	0.23
	3°	**22**	12000	3500	0.30	0.45	10000	2500	0.24	0.36	6000	1500	0.15	0.23
Depth of cut			 PRFRAD:Radius											

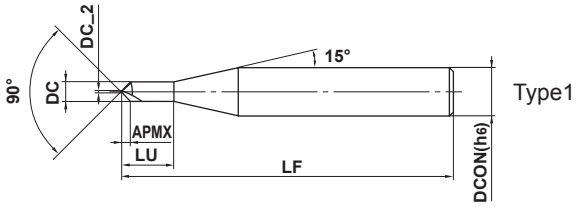
1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VC2C

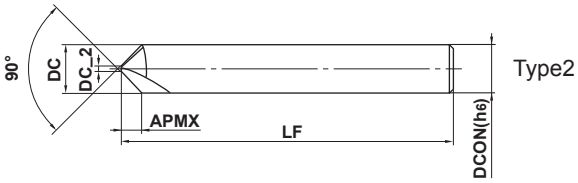
Chamfer cutter, 2 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎	○	◎	◎	○	○





Type1



Type2

±0.02				
DCON=6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

h6

● Chamfering cutters for machining of hardened steel and difficult-to-cut materials.

Unit : mm

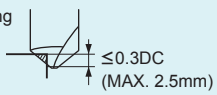
Order Number	DC	DC_2	APMX	LU	LF	DCON	No. of Flutes	Stock	Type
VC2CD0200	2	0.3	0.85	6	50	6	2	●	1
VC2CD0400	4	0.3	1.85	12	50	6	2	●	1
VC2CD0600	6	0.3	2.85	—	50	6	2	●	2
VC2CD0800	8	0.4	3.8	—	60	8	2	●	2
VC2CD1000	10	0.5	4.75	—	70	10	2	●	2
VC2CD1200	12	0.5	5.75	—	75	12	2	●	2

RECOMMENDED CUTTING CONDITIONS

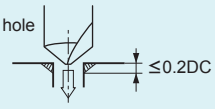
Work material	Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20		Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21		Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		Hardened steel (45−55HRC) AISI H13	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	16000	960	11000	590	9500	460	8000	320
4	8000	480	5600	300	4800	230	4000	160
6	5300	320	3700	200	3200	150	2700	110
8	4000	240	2800	150	2400	120	2000	80
10	3200	190	2200	120	1900	90	1600	60
12	2700	160	1900	100	1600	80	1300	50

Depth of cut

Chamfering



Chamfering of hole



DC:Dia.

1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

● : Inventory maintained in Japan.

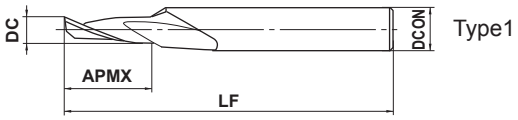
LIGHT ALLOY STEEL END MILLS

1MA

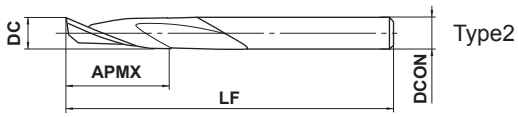
End mill, Medium cut length, 1 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎





Type1



Type2

3≤DC≤8				
0 - 0.050				

● Single flute end mill for aluminium channel and wood working.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
1MAD0300	3	10	60	8	1	●	1
1MAD0400	4	12	60	8	1	●	1
1MAD0500	5	15	65	8	1	●	1
1MAD0600	6	15	65	8	1	●	1
1MAD0800	8	20	75	8	1	●	2

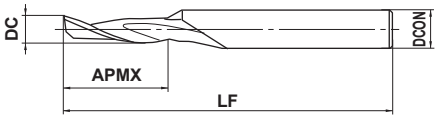
● : Inventory maintained in Japan.

1LA

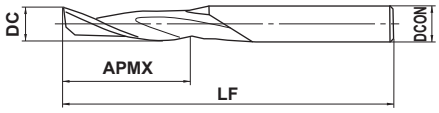
End mill, Long cut length, 1 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎





Type1



Type2

4≤DC≤12				
0 - 0.050				

● Single flute end mill with longer cut length and overall length than standard for deeper machining.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
1LAD0400	4	18	70	8	1	●	1
1LA**D0500**	5	20	70	8	1	●	1
1LA**D0600**	6	20	70	8	1	●	1
1LA**D0800**	8	30	80	8	1	●	2
1LA**D1000**	10	35	90	10	1	●	2
1LA**D1200**	12	45	100	12	1	●	2

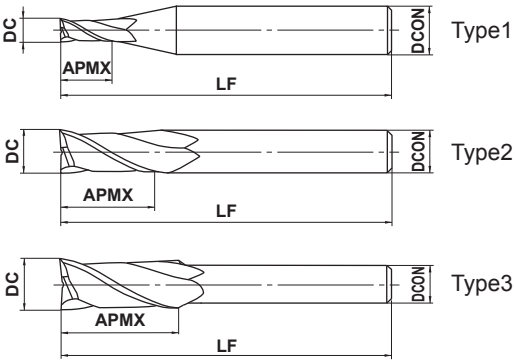
VIOLET END MILLS

VA2SS

End mill, Short cut length, 2 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		





3≤DC≤20				
0 - 0.030				

2 flute end mill with high grade HSS substrate and Violet coating for general use.

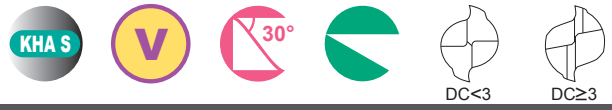
Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VA2SSD0300	3	8	50	6	2	●	1
VA2SS**D0400**	4	8	60	8	2	●	1
VA2SS**D0500**	5	10	60	8	2	●	1
VA2SS**D0600**	6	12	60	8	2	●	1
VA2SS**D0700**	7	15	65	10	2	●	1
VA2SS**D0800**	8	15	65	10	2	●	1
VA2SS**D0900**	9	20	75	10	2	●	1
VA2SS**D1000**	10	20	75	12	2	●	1
VA2SS**D1100**	11	22	85	12	2	●	1
VA2SS**D1200**	12	22	85	12	2	●	2
VA2SS**D1300**	13	26	90	12	2	●	3
VA2SS**D1400**	14	26	95	16	2	●	1
VA2SS**D1500**	15	30	100	16	2	●	1
VA2SS**D1600**	16	32	100	16	2	●	2
VA2SS**D1700**	17	34	100	16	2	●	3
VA2SS**D1800**	18	34	100	16	2	●	3
VA2SS**D1900**	19	38	120	20	2	●	1
VA2SS**D2000**	20	38	120	20	2	●	2

● : Inventory maintained in Japan.

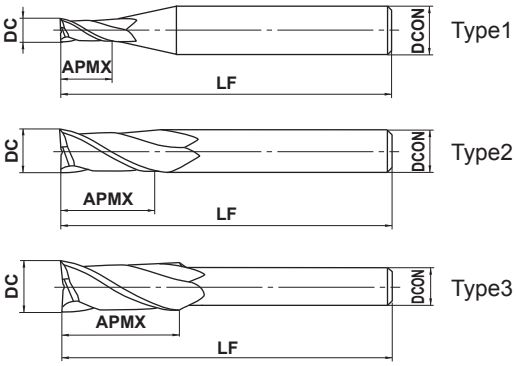
VA2MS

End mill, Medium cut length, 2 flute



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		





DC≤20	DC>20			
0 - 0.030	0 - 0.040			

2 flute end mill with high grade HSS substrate and Violet coating for general use.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VA2MSD0300	3	10	50	6	2	●	1
VA2MS**D0400**	4	12	60	8	2	●	1
VA2MS**D0500**	5	15	60	8	2	●	1
VA2MS**D0600**	6	15	60	8	2	●	1
VA2MS**D0700**	7	20	65	10	2	●	1
VA2MS**D0800**	8	20	65	10	2	●	1
VA2MS**D0900**	9	25	75	10	2	●	1
VA2MS**D1000**	10	25	75	10	2	●	2
VA2MS**D1100**	11	30	85	12	2	●	1
VA2MS**D1200**	12	30	85	12	2	●	2
VA2MS**D1300**	13	35	90	12	2	●	3
VA2MS**D1400**	14	35	95	16	2	●	1
VA2MS**D1500**	15	40	100	16	2	●	1
VA2MS**D1600**	16	40	100	16	2	●	2
VA2MS**D1700**	17	40	100	16	2	●	3
VA2MS**D1800**	18	40	100	16	2	●	3
VA2MS**D1900**	19	45	120	20	2	●	1
VA2MS**D2000**	20	45	120	20	2	●	2
VA2MS**D2200**	22	45	120	20	2	●	3
VA2MS**D2400**	24	50	140	25	2	●	1
VA2MS**D2500**	25	50	140	25	2	●	2
VA2MS**D2600**	26	50	140	25	2	●	3
VA2MS**D2800**	28	55	145	25	2	●	3
VA2MS**D3000**	30	55	145	25	2	●	3
VA2MS**D3200**	32	60	160	32	2	●	2
VA2MS**D3500**	35	60	160	32	2	●	3
VA2MS**D4000**	40	65	165	32	2	●	3

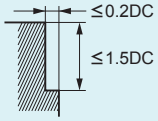
VIOLET END MILLS

VA2SS
End mill, Short cut length, 2 flute

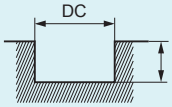
VA2MS
End mill, Medium cut length, 2 flute

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20−30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30−35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35−40HRC) AISI 304, AISI 316	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	5400	170	4000	125	2700	85	2200	65
4	4300	200	3200	150	2100	100	1800	75
5	3600	210	2700	160	1800	105	1500	80
6	3200	220	2400	165	1600	110	1300	85
8	2400	240	1800	180	1200	120	1000	90
10	1900	260	1400	190	950	130	800	100
12	1600	240	1200	180	800	120	660	90
16	1200	210	900	160	600	105	500	80
20	950	180	720	135	480	90	400	70
25	760	150	570	115	380	75	320	60
30	640	130	480	100	320	65	270	50
40	470	100	350	75	240	50	200	40
Depth of cut	 DC:Dia.							

Slotting

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20−30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30−35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35−40HRC) AISI 304, AISI 316	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	3700	110	3000	95	2100	65	1600	50
4	3200	140	2800	130	1800	75	1400	60
5	2900	160	2400	145	1500	80	1200	60
6	2600	170	2100	150	1300	85	1000	70
8	2000	190	1600	160	1000	90	800	70
10	1600	210	1300	180	800	100	640	80
12	1300	190	1100	165	660	90	530	70
16	1000	170	800	140	500	80	400	65
20	720	130	640	120	400	70	320	55
25	570	110	450	90	320	60	230	40
30	480	90	370	75	270	50	190	35
40	360	70	280	60	200	40	140	25
Depth of cut	 DC:Dia.							

1) Supply cutting fluid sufficiently during slotting. When dry cut, slotting decrease the revolution and feed rate by 20−30% proportionately.
2) When drilling, please set the feed rate at 1/3 or below of the values above.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

TWO-FLUTE END MILLS

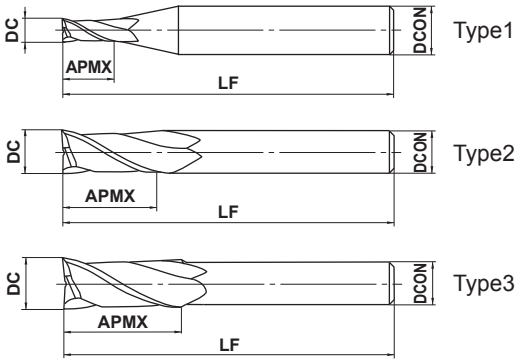
2SS

End mill, Short cut length, 2 flute

CO HSS | 30° | DC<3 | DC≥3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○





DC≤3	DC>3			
0 - 0.020	0 - 0.030			

2 flute HSS end mill with rigid design.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
2SSD0050	0.5	0.8	50	6	2	●	1
2SSD0100	1	2	50	6	2	●	1
2SSD0150	1.5	3.5	50	6	2	●	1
2SSD0200	2	5	50	6	2	●	1
2SSD0250	2.5	6	50	6	2	●	1
2SSD0300	3	8	50	6	2	●	1
2SSD0350	3.5	8	60	8	2	●	1
2SSD0400	4	8	60	8	2	●	1
2SSD0450	4.5	10	60	8	2	●	1
2SSD0500	5	10	60	8	2	●	1
2SSD0550	5.5	12	60	8	2	●	1
2SSD0600	6	12	60	8	2	●	1
2SSD0650	6.5	15	65	10	2	●	1
2SSD0700	7	15	65	10	2	●	1
2SSD0750	7.5	15	65	10	2	●	1
2SSD0800	8	15	65	10	2	●	1
2SSD0850	8.5	20	75	10	2	●	1
2SSD0900	9	20	75	10	2	●	1
2SSD0950S10	9.5	20	75	10	2	●	1
2SSD0950S12	9.5	20	75	12	2	●	1
2SSD1000S10	10	20	75	10	2	●	2
2SSD1000S12	10	20	75	12	2	●	1
2SSD1050	10.5	22	85	12	2	●	1
2SSD1100	11	22	85	12	2	●	1
2SSD1150	11.5	22	85	12	2	●	1
2SSD1200	12	22	85	12	2	●	2
2SSD1250	12.5	26	90	12	2	●	3
2SSD1300	13	26	90	12	2	●	3
2SSD1350	13.5	26	90	16	2	●	1
2SSD1400	14	26	90	16	2	●	1
2SSD1450	14.5	26	100	16	2	●	1
2SSD1500	15	30	100	16	2	●	1
2SSD1550	15.5	32	100	16	2	●	1
2SSD1600	16	32	100	16	2	●	2

● : Inventory maintained in Japan.

TWO-FLUTE END MILLS

2SS

End mill, Short cut length, 2 flute

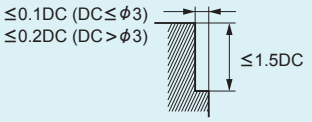
Unit : mm

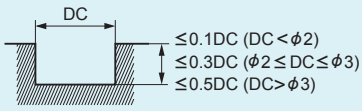
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
2SSD1650	16.5	32	100	16	2	●	3
2SSD1700	17	34	100	16	2	●	3
2SSD1750	17.5	34	100	16	2	●	3
2SSD1800	18	34	100	16	2	●	3
2SSD1850	18.5	38	115	20	2	●	1
2SSD1900	19	38	115	20	2	●	1
2SSD1950	19.5	38	115	20	2	●	1
2SSD2000	20	38	115	20	2	●	2

RECOMMENDED CUTTING CONDITIONS

Work material	Structural steel, Carbon steel AISI 1045, AISI 1050		Carbon steel, Alloy steel (20−30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30−35HRC) AISI H13		Austenitic stainless steel AISI 304, AISI 316		Cast iron AISI No 35 B		Aluminium alloy	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
0.5	8000	60 (50)	7000	40 (35)	4500	30 (25)	3500	25 (20)	7500	65 (55)	16000	120 (100)
1	5300	80 (65)	4200	50 (40)	3000	35 (30)	2400	27 (22)	4500	85 (70)	11000	170 (140)
2	3100	85 (70)	2600	60 (50)	1800	50 (40)	1400	30 (25)	2700	90 (75)	6800	190 (150)
3	2300	90 (75)	1800	65 (55)	1400	55 (45)	1100	35 (30)	2000	95 (80)	4800	240 (190)
4	1800	100 (85)	1400	70 (60)	1100	55 (45)	850	35 (30)	1600	110 (90)	3800	310 (250)
5	1600	110 (95)	1200	90 (75)	900	60 (50)	710	40 (35)	1300	120 (100)	3200	360 (290)
6	1400	120 (100)	1000	90 (75)	780	65 (55)	610	50 (40)	1100	130 (110)	2800	400 (320)
8	1100	130 (110)	800	95 (80)	580	65 (55)	470	50 (40)	850	140 (120)	2200	460 (370)
10	860	140 (120)	640	100 (80)	470	65 (55)	380	55 (45)	700	160 (130)	1800	440 (350)
12	720	130 (110)	530	95 (80)	390	60 (50)	310	50 (40)	580	140 (120)	1600	420 (340)
16	540	110 (95)	400	85 (70)	300	55 (45)	230	40 (35)	440	120 (100)	1200	350 (280)
20	430	100 (80)	320	70 (60)	240	45 (38)	190	35 (30)	350	100 (85)	960	300 (240)

Depth of cut





DC:Dia.

( ) : Indicates standard feed rate for slotting.

1) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

● : Inventory maintained in Japan.

TWO-FLUTE END MILLS

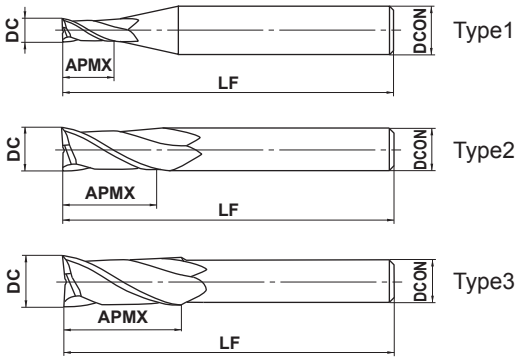
S2MD

End mill, Short cut length, 2 flute, KHA Super

KHA S | 30° | DC<3 | DC≥3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○





DC≤3	3<DC≤20	DC>20		
0 - 0.020	0 - 0.030	0 - 0.040		

2 flute end mill with KHA Super substrate for high speed milling of difficult-to-cut and hard materials.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
S2MDD0050	0.5	0.8	50	6	2	●	1
S2MD**D0100**	1	2	50	6	2	●	1
S2MD**D0150**	1.5	3.5	50	6	2	●	1
S2MD**D0200**	2	5	50	6	2	●	1
S2MD**D0250**	2.5	6	50	6	2	●	1
S2MD**D0300**	3	8	50	6	2	●	1
S2MD**D0350**	3.5	8	60	8	2	●	1
S2MD**D0400**	4	8	60	8	2	●	1
S2MD**D0450**	4.5	10	60	8	2	●	1
S2MD**D0500**	5	10	60	8	2	●	1
S2MD**D0550**	5.5	12	60	8	2	●	1
S2MD**D0600**	6	12	60	8	2	●	1
S2MD**D0650**	6.5	15	65	10	2	●	1
S2MD**D0700**	7	15	65	10	2	●	1
S2MD**D0750**	7.5	15	65	10	2	●	1
S2MD**D0800S08**	8	15	65	8	2	●	2
S2MD**D0800S10**	8	15	65	10	2	●	1
S2MD**D0850**	8.5	20	75	10	2	●	1
S2MD**D0900**	9	20	75	10	2	●	1
S2MD**D0950**	9.5	20	75	12	2	●	1
S2MD**D1000S10**	10	20	75	10	2	●	2
S2MD**D1000S12**	10	20	75	12	2	●	1
S2MD**D1050**	10.5	22	85	12	2	●	1
S2MD**D1100**	11	22	85	12	2	●	1
S2MD**D1150**	11.5	22	85	12	2	●	1
S2MD**D1200**	12	22	85	12	2	●	2
S2MD**D1250**	12.5	26	90	12	2	●	3
S2MD**D1300**	13	26	90	12	2	●	3
S2MD**D1350**	13.5	26	95	16	2	●	1
S2MD**D1400**	14	26	95	16	2	●	1
S2MD**D1450**	14.5	26	100	16	2	●	1
S2MD**D1500**	15	30	100	16	2	●	1
S2MD**D1550**	15.5	32	100	16	2	●	1
S2MD**D1600**	16	32	100	16	2	●	2

TWO-FLUTE END MILLS

S2MD

End mill, Short cut length, 2 flute, KHA Super

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
S2MDD1650	16.5	32	100	16	2	●	3
S2MDD1700	17	34	100	16	2	●	3
S2MDD1750	17.5	34	100	16	2	●	3
S2MDD1800	18	34	100	16	2	●	3
S2MDD1850	18.5	38	120	20	2	●	1
S2MDD1900	19	38	120	20	2	●	1
S2MDD1950	19.5	38	120	20	2	●	1
S2MDD2000	20	38	120	20	2	●	2

RECOMMENDED CUTTING CONDITIONS

Work material	Structural steel, Carbon steel AISI 1045, AISI 1050		Carbon steel, Alloy steel (20−30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30−35HRC) AISI H13		Austenitic stainless steel, Alloy steel, Tool steel (35−40HRC) AISI 304, AISI 316		Cast iron AISI No 35 B		Aluminium alloy	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
0.5	14000	100 (80)	12000	70 (55)	7700	50 (40)	6000	40 (30)	13000	110 (90)	20000	160 (130)
1	9000	140 (110)	7100	85 (70)	5100	60 (50)	4100	45 (35)	7700	145 (115)	19000	290 (230)
2	5300	145 (115)	4400	100 (80)	3100	85 (70)	2400	50 (40)	4600	150 (120)	12000	320 (260)
3	3900	150 (120)	3100	110 (90)	2400	95 (75)	1900	60 (50)	3400	160 (130)	8200	410 (330)
4	3100	170 (135)	2400	120 (95)	1850	95 (75)	1450	60 (50)	2700	190 (150)	6500	530 (420)
5	2700	190 (150)	2000	150 (120)	1500	100 (80)	1200	70 (55)	2200	200 (160)	5400	610 (490)
6	2400	200 (160)	1700	150 (120)	1300	110 (90)	1000	85 (70)	1900	220 (175)	4800	680 (540)
8	1900	220 (175)	1300	160 (130)	990	110 (90)	800	85 (70)	1450	240 (190)	3800	780 (620)
10	1500	240 (190)	1100	180 (145)	800	110 (90)	650	90 (70)	1200	270 (220)	3200	750 (600)
12	1250	220 (175)	900	160 (130)	670	100 (80)	540	85 (70)	990	240 (190)	2700	710 (570)
16	940	190 (150)	680	145 (115)	500	85 (70)	400	70 (55)	760	200 (160)	2000	600 (480)
20	750	170 (135)	540	120 (95)	400	75 (60)	320	60 (50)	600	170 (135)	1600	510 (410)

Depth of cut



DC:Dia.

( ) : Indicates standard feed rate for slotting.

1) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

● : Inventory maintained in Japan.

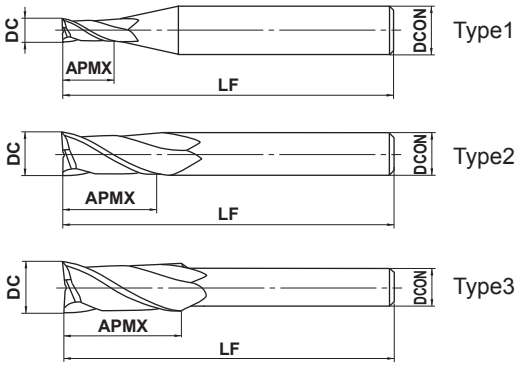
G2MS

End mill, Medium cut length, 2 flute

CO HSS | G | 30° | DC<3 | DC≥3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○





DC≤20	DC>20			
0 - 0.030	0 - 0.040			

2 flute end mill with high grade HSS substrate and TiN coating for general use.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
G2MSD0100	1	3	50	6	2	●	1
G2MS**D0150**	1.5	4.5	50	6	2	●	1
G2MS**D0200**	2	6	50	6	2	●	1
G2MS**D0250**	2.5	7.5	50	6	2	●	1
G2MS**D0300**	3	10	50	6	2	●	1
G2MS**D0350**	3.5	12	50	6	2	●	1
G2MS**D0400**	4	12	50	6	2	●	1
G2MS**D0450**	4.5	15	55	6	2	●	1
G2MS**D0500**	5	15	55	6	2	●	1
G2MS**D0550**	5.5	15	55	6	2	●	1
G2MS**D0600**	6	15	55	6	2	●	2
G2MS**D0650**	6.5	20	65	8	2	●	1
G2MS**D0700**	7	20	65	8	2	●	1
G2MS**D0750**	7.5	20	65	8	2	●	1
G2MS**D0800**	8	20	65	8	2	●	2
G2MS**D0850**	8.5	25	75	10	2	●	1
G2MS**D0900**	9	25	75	10	2	●	1
G2MS**D0950**	9.5	25	75	10	2	●	1
G2MS**D1000**	10	25	75	10	2	●	2
G2MS**D1100**	11	30	85	12	2	●	1
G2MS**D1200**	12	30	85	12	2	●	2
G2MS**D1300**	13	35	90	12	2	●	3
G2MS**D1400**	14	35	95	16	2	●	1
G2MS**D1500**	15	40	100	16	2	●	1
G2MS**D1600**	16	40	100	16	2	●	2
G2MS**D1700**	17	40	100	16	2	●	3
G2MS**D1800**	18	40	100	16	2	●	3
G2MS**D1900**	19	45	115	20	2	●	1
G2MS**D2000**	20	45	115	20	2	●	2
G2MS**D2100**	21	45	115	20	2	●	3
G2MS**D2200**	22	45	115	20	2	●	3
G2MS**D2300**	23	50	120	25	2	●	1
G2MS**D2400**	24	50	120	25	2	●	1
G2MS**D2500**	25	50	120	25	2	●	2

TWO-FLUTE END MILLS

G2MS

End mill, Medium cut length, 2 flute

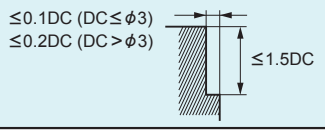
Unit : mm

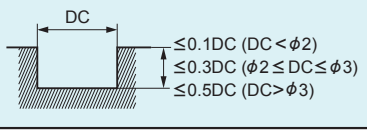
Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
G2MSD2600	26	50	120	25	2	●	3
G2MSD2700	27	55	125	25	2	●	3
G2MSD2800	28	55	125	25	2	●	3
G2MSD2900	29	55	125	25	2	●	3
G2MSD3000	30	55	125	25	2	●	3
G2MSD3100	31	60	145	25	2	●	3
G2MSD3200	32	60	145	32	2	●	2
G2MSD3300	33	60	145	32	2	●	3
G2MSD3400	34	60	145	32	2	●	3
G2MSD3500	35	60	145	32	2	●	3
G2MSD3600	36	65	150	32	2	●	3
G2MSD3700	37	65	150	32	2	●	3
G2MSD3800	38	65	150	32	2	●	3
G2MSD3900	39	65	150	32	2	●	3
G2MSD4000	40	65	150	32	2	●	3

RECOMMENDED CUTTING CONDITIONS

Work material	Structural steel, Carbon steel AISI 1045, AISI 1050		Carbon steel, Alloy steel (20−30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30−35HRC) AISI P20, AISI H13 AISI D2		Austenitic stainless steel AISI 304, AISI 316		Cast iron AISI No 35 B		Aluminium alloy	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	6400	80 (65)	5000	50 (40)	3600	35 (30)	2900	25 (20)	5400	85 (70)	13000	170 (135)
2	3700	85 (70)	3100	60 (50)	2200	50 (40)	1700	30 (25)	3200	90 (70)	8200	190 (150)
3	2800	90 (70)	2200	65 (50)	1700	55 (45)	1300	35 (30)	2400	95 (75)	5800	240 (190)
4	2150	100 (80)	1700	70 (55)	1300	55 (45)	1000	35 (30)	1900	110 (90)	4600	310 (250)
5	1900	115 (90)	1450	90 (70)	1100	60 (50)	850	40 (30)	1600	120 (95)	3800	360 (290)
6	1700	120 (95)	1200	90 (70)	940	65 (50)	730	50 (40)	1300	130 (105)	3400	400 (320)
8	1300	130 (105)	960	95 (75)	700	65 (50)	560	50 (40)	1000	140 (110)	2600	460 (370)
10	1000	145 (115)	770	110 (90)	560	65 (50)	460	55 (45)	840	160 (130)	2200	430 (350)
12	860	130 (105)	640	95 (75)	470	60 (50)	370	50 (40)	700	140 (110)	1900	420 (340)
16	650	115 (90)	480	90 (70)	360	55 (45)	280	40 (30)	530	120 (95)	1450	350 (280)
20	520	95 (75)	380	70 (55)	290	45 (35)	230	35 (30)	420	100 (80)	1150	300 (240)
25	420	85 (70)	300	60 (50)	230	40 (30)	180	30 (25)	340	90 (70)	910	260 (210)
30	350	80 (65)	250	55 (45)	190	35 (30)	145	25 (20)	290	85 (70)	770	240 (190)
40	250	60 (50)	180	35 (30)	140	25 (20)	110	22 (18)	220	65 (50)	580	190 (150)

Depth of cut





DC:Dia.

( ) : Indicates standard feed rate for slotting.

1) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

● : Inventory maintained in Japan.

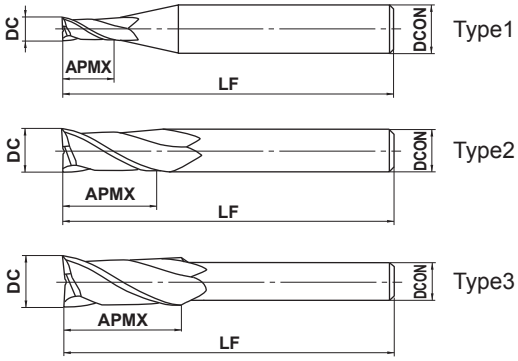
2MS

End mill, Medium cut length, 2 flute

CO HSS | 30° | DC<3 | DC≥3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○





DC≤3	3<DC≤20	DC>20		
0 - 0.020	0 - 0.030	0 - 0.040		

● 2 flute end mill with high grade HSS substrate for general use.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
2MSD0100	1	3	50	6	2	●	1
2MSD0150	1.5	4.5	50	6	2	●	1
2MSD0200	2	6	50	6	2	●	1
2MSD0250	2.5	7.5	50	6	2	●	1
2MSD0300	3	10	50	6	2	●	1
2MSD0350	3.5	12	50	6	2	●	1
2MSD0400	4	12	50	6	2	●	1
2MSD0450	4.5	15	55	6	2	●	1
2MSD0500	5	15	55	6	2	●	1
2MSD0550	5.5	15	55	6	2	●	1
2MSD0600	6	15	55	6	2	●	2
2MSD0650	6.5	20	65	8	2	●	1
2MSD0700	7	20	65	8	2	●	1
2MSD0750	7.5	20	65	8	2	●	1
2MSD0800	8	20	65	8	2	●	2
2MSD0850	8.5	25	75	10	2	●	1
2MSD0900	9	25	75	10	2	●	1
2MSD0950	9.5	25	75	10	2	●	1
2MSD1000	10	25	75	10	2	●	2
2MSD1100	11	30	85	12	2	●	1
2MSD1200	12	30	85	12	2	●	2
2MSD1300	13	35	90	12	2	●	3
2MSD1400	14	35	95	16	2	●	1
2MSD1500	15	40	100	16	2	●	1
2MSD1600	16	40	100	16	2	●	2
2MSD1700	17	40	100	16	2	●	3
2MSD1800	18	40	100	16	2	●	3
2MSD1900	19	45	115	20	2	●	1
2MSD2000	20	45	115	20	2	●	2
2MSD2100	21	45	115	20	2	●	3
2MSD2200	22	45	115	20	2	●	3
2MSD2300	23	50	120	25	2	●	1
2MSD2400	24	50	120	25	2	●	1
2MSD2500	25	50	120	25	2	●	2

TWO-FLUTE END MILLS

2MS

End mill, Medium cut length, 2 flute

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
2MSD2600	26	50	120	25	2	●	3
2MS**D2700**	27	55	125	25	2	●	3
2MS**D2800**	28	55	125	25	2	●	3
2MS**D2900**	29	55	125	25	2	●	3
2MS**D3000**	30	55	125	25	2	●	3
2MS**D3100**	31	60	145	25	2	●	3
2MS**D3200**	32	60	145	32	2	●	2
2MS**D3300**	33	60	145	32	2	●	3
2MS**D3400**	34	60	145	32	2	●	3
2MS**D3500**	35	60	145	32	2	●	3
2MS**D3600**	36	65	150	32	2	●	3
2MS**D3700**	37	65	150	32	2	●	3
2MS**D3800**	38	65	150	32	2	●	3
2MS**D3900**	39	65	150	32	2	●	3
2MS**D4000**	40	65	150	32	2	●	3
2MS**D4100**	41	70	155	32	2	●	3
2MS**D4200S32**	42	70	155	32	2	●	3
2MS**D4200S42**	42	70	155	42	2	●	2
2MS**D4500S32**	45	70	155	32	2	●	3
2MS**D4500S42**	45	70	155	42	2	●	3
2MS**D4600S32**	46	70	155	32	2	●	3
2MS**D4600S42**	46	70	155	42	2	●	3
2MS**D5000S32**	50	70	155	32	2	●	3
2MS**D5000S42**	50	70	155	42	2	●	3
2MS**D5500**	55	80	175	42	2	●	3
2MS**D6000**	60	85	185	42	2	●	3

● : Inventory maintained in Japan.

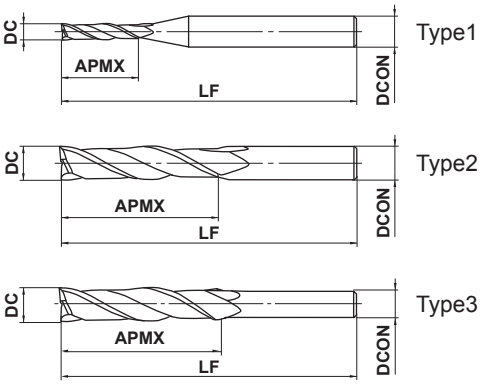
2LS

End mill, Long cut length, 2 flute

CO HSS | 30° | DC<3 | DC≥3

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○





DC≤3	3<DC≤20	DC>20		
0 - 0.020	0 - 0.030	0 - 0.040		

2 flute end mill with high grade HSS substrate for general use.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
2LSD0100	1	6	50	6	2	●	1
2LS**D0150**	1.5	7.5	50	6	2	●	1
2LS**D0200**	2	10	55	6	2	●	1
2LS**D0250**	2.5	15	55	6	2	●	1
2LS**D0300**	3	15	55	6	2	●	1
2LS**D0350**	3.5	15	55	6	2	●	1
2LS**D0400**	4	20	55	6	2	●	1
2LS**D0450**	4.5	20	55	6	2	●	1
2LS**D0500**	5	25	60	6	2	●	1
2LS**D0550**	5.5	25	60	6	2	●	1
2LS**D0600**	6	25	60	6	2	●	2
2LS**D0650**	6.5	35	75	8	2	●	1
2LS**D0700**	7	35	75	8	2	●	1
2LS**D0750**	7.5	35	75	8	2	●	1
2LS**D0800**	8	35	75	8	2	●	2
2LS**D0850**	8.5	35	75	10	2	●	1
2LS**D0900**	9	45	90	10	2	●	1
2LS**D0950**	9.5	45	90	10	2	●	1
2LS**D1000**	10	45	90	10	2	●	2
2LS**D1050**	10.5	55	105	12	2	●	1
2LS**D1100**	11	55	105	12	2	●	1
2LS**D1150**	11.5	55	105	12	2	●	1
2LS**D1200**	12	55	105	12	2	●	2
2LS**D1250**	12.5	55	105	12	2	●	3
2LS**D1300**	13	55	105	12	2	●	3
2LS**D1350**	13.5	55	110	16	2	●	1
2LS**D1400**	14	55	110	16	2	●	1
2LS**D1450**	14.5	65	120	16	2	●	1
2LS**D1500**	15	65	120	16	2	●	1
2LS**D1550**	15.5	65	120	16	2	●	1
2LS**D1600**	16	65	120	16	2	●	2
2LS**D1650**	16.5	65	120	16	2	●	3
2LS**D1700**	17	65	120	16	2	●	3
2LS**D1750**	17.5	65	120	16	2	●	3

TWO-FLUTE END MILLS

2LS

End mill, Long cut length, 2 flute

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
2LSD1800	18	65	120	16	2	●	3
2LS**D1850**	18.5	75	140	20	2	●	1
2LS**D1900**	19	75	140	20	2	●	1
2LS**D1950**	19.5	75	140	20	2	●	1
2LS**D2000**	20	75	140	20	2	●	2
2LS**D2100**	21	75	140	20	2	●	3
2LS**D2200**	22	75	140	20	2	●	3
2LS**D2300**	23	90	160	25	2	●	1
2LS**D2400**	24	90	160	25	2	●	1
2LS**D2500**	25	90	160	25	2	●	2
2LS**D2600**	26	90	160	25	2	●	3
2LS**D2700**	27	90	160	25	2	●	3
2LS**D2800**	28	90	160	25	2	●	3
2LS**D2900**	29	90	160	25	2	●	3
2LS**D3000**	30	90	160	25	2	●	3
2LS**D3100**	31	95	180	25	2	●	3
2LS**D3200**	32	95	180	32	2	●	2
2LS**D3300**	33	95	180	32	2	●	3
2LS**D3400**	34	100	185	32	2	●	3
2LS**D3500**	35	100	185	32	2	●	3
2LS**D3600**	36	105	190	32	2	●	3
2LS**D3700**	37	105	190	32	2	●	3
2LS**D3800**	38	105	190	32	2	●	3
2LS**D3900**	39	110	195	32	2	●	3
2LS**D4000**	40	110	195	32	2	●	3

● : Inventory maintained in Japan.

2MS
End mill, Medium cut length, 2 flute

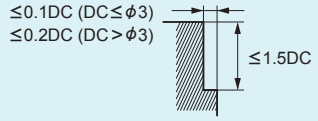
2LS 1)
End mill, Long cut length, 2 flute

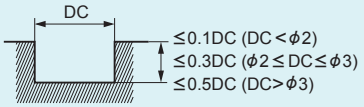
RECOMMENDED CUTTING CONDITIONS

Work material	Structural steel, Carbon steel AISI 1045, AISI 1050		Carbon steel, Alloy steel (20−30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30−35HRC) AISI H13		Austenitic stainless steel AISI 304, AISI 316		Cast iron AISI No 35 B		Aluminium alloy	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	5300	65 (50)	4200	40 (30)	3000	30 (25)	2400	22 (18)	4500	70 (55)	11000	140 (110)
2	3100	70 (55)	2600	50 (40)	1800	40 (30)	1400	25 (20)	2700	75 (60)	6800	160 (130)
3	2300	75 (60)	1800	55 (45)	1400	45 (35)	1100	30 (25)	2000	80 (65)	4800	200 (160)
4	1800	85 (70)	1400	60 (50)	1100	45 (35)	850	30 (25)	1600	90 (70)	3800	260 (210)
5	1600	95 (75)	1200	75 (60)	900	50 (40)	710	35 (25)	1300	100 (80)	3200	300 (240)
6	1400	100 (80)	1000	75 (60)	780	55 (45)	610	40 (30)	1100	110 (90)	2800	330 (260)
8	1100	110 (90)	800	80 (65)	580	55 (45)	470	40 (30)	850	115 (90)	2200	380 (300)
10	860	120 (95)	640	85 (70)	470	55 (45)	380	45 (35)	700	130 (105)	1800	360 (290)
12	720	110 (90)	530	80 (65)	390	50 (40)	310	40 (30)	580	115 (90)	1600	350 (280)
16	540	95 (75)	400	75 (60)	300	45 (35)	230	35 (28)	440	100 (80)	1200	290 (230)
20	430	80 (65)	320	60 (50)	240	38 (30)	190	30 (25)	350	85 (70)	960	250 (200)
25	350	70 (55)	250	50 (40)	190	32 (25)	150	25 (20)	285	75 (60)	760	220 (180)
30	290	65 (50)	210	45 (35)	160	28 (22)	120	22 (18)	240	70 (55)	640	200 (160)
40	210	50 (40)	150	30 (25)	120	22 (18)	90	18 (15)	180	55 (45)	480	160 (130)
50	160	40 (30)	115	28 (22)	90	20 (15)	70	15 (12)	140	45 (35)	380	130 (105)
60	130	35 (28)	95	25 (20)	75	18 (15)	55	12 (10)	115	40 (30)	310	110 (90)

Depth of cut

(2MS)





DC:Dia.

( ) : Indicates standard feed rate for slotting.

1) Decrease the revolution by 20−30% and the feed rate by 40−50% for 2LS.
2) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

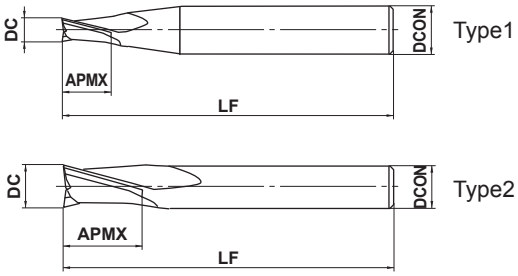
TWO-FLUTE END MILLS

2MK

End mill, Short cut length, 2 flute, For key ways

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○			○





● 2 flute end mill for NN (JIS) standards and plus or minus tolerance diameters.

2MKP($DC^{+0.02}_{0}$)

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
2MKPD0300	3	5	50	6	2	●	1
2MKPD0400	4	6	60	8	2	●	1
2MKPD0500	5	8	60	8	2	●	1
2MKPD0600	6	8	60	8	2	●	1
2MKPD0700	7	10	65	10	2	●	1
2MKPD0800	8	10	65	10	2	●	1
2MKPD1000	10	15	75	12	2	●	1
2MKPD1200	12	18	75	12	2	●	2
2MKPD1500	15	22	75	16	2	●	1
2MKPD1800	18	22	80	20	2	●	1
2MKPD2000	20	22	85	20	2	●	2

2MKN($DC^{0}_{-0.02}$)

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
2MKND0300	3	5	50	6	2	●	1
2MKND0400	4	6	60	8	2	●	1
2MKND0500	5	8	60	8	2	●	1
2MKND0600	6	8	60	8	2	●	1
2MKND0700	7	10	65	10	2	●	1
2MKND0800	8	10	65	10	2	●	1
2MKND1000	10	15	75	12	2	●	1
2MKND1200	12	18	75	12	2	●	2
2MKND1500	15	22	75	16	2	●	1

● : Inventory maintained in Japan.

2MKNN(DC$^{-0.02}_{-0.04}$)

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
2MKNND0300	3	5	50	6	2	●	1
2MKNND0400	4	6	60	8	2	●	1
2MKNND0500	5	8	60	8	2	●	1
2MKNND0600	6	8	60	8	2	●	1
2MKNND0700	7	10	65	10	2	●	1
2MKNND0800	8	10	65	10	2	●	1
2MKNND1000	10	15	75	12	2	●	1
2MKNND1200	12	18	75	12	2	●	2
2MKNND1500	15	22	75	16	2	●	1
2MKNND1800	18	22	80	20	2	●	1
2MKNND2000	20	22	85	20	2	●	2

LIGHT ALLOY STEEL END MILLS

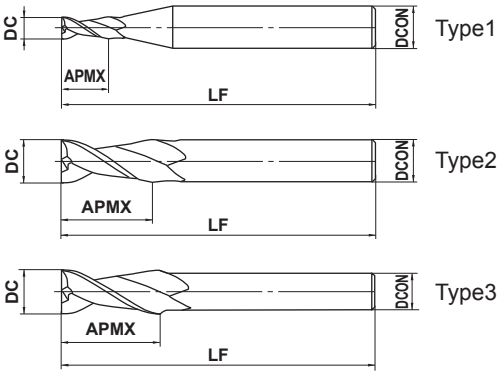
S2SDA

End mill, Short cut length, 2 flute, For aluminium alloy

KHA S | 37.5°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
						○	◎





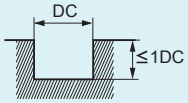
DC=3	DC>3			
0 - 0.020	0 - 0.030			

● 2 flute end mill for aluminium alloy and soft materials.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
S2SDAD0300	3	8	50	6	2	●	1
S2SDA**D0400**	4	8	60	8	2	●	1
S2SDA**D0500**	5	10	60	8	2	●	1
S2SDA**D0600**	6	12	60	8	2	●	1
S2SDA**D0800**	8	15	65	10	2	●	1
S2SDA**D1000**	10	20	75	10	2	●	2
S2SDA**D1200**	12	22	85	12	2	●	2
S2SDA**D1400**	14	26	90	16	2	●	1
S2SDA**D1600**	16	32	100	16	2	●	2
S2SDA**D1800**	18	34	100	16	2	●	3
S2SDA**D2000**	20	38	115	20	2	●	2

RECOMMENDED CUTTING CONDITIONS

Work material	Cast aluminium, Rolled aluminium, Magnesium alloy resin AC, ADC, A5052, A7075	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)
3	8200	410
4	6500	530
6	4800	680
8	3800	780
10	3200	750
12	2700	710
16	2000	600
20	1600	510
Depth of cut	 DC:Dia.	

1) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

● : **Inventory maintained in Japan.**

VIOLET END MILLS

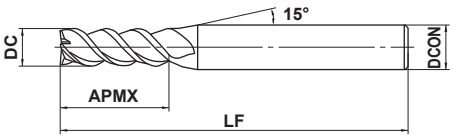
VAMH

End mill, Medium cut length, 2—4 flute

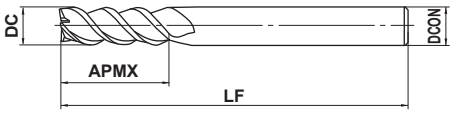
KHA S | V | 45° DC=5 | 50° DC≥6 | DC=5 | DC≤20 | DC≥21

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	○		





Type1



Type2

5≤DC≤30				
0 - 0.040				

2—4 flute end mill with high grade HSS substrate and Violet coating for general use.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VAMHD0500	5	12	65	8	2	●	1
VAMH**D0600**	6	15	65	8	3	●	1
VAMH**D0700**	7	20	75	10	3	●	1
VAMH**D0800**	8	20	75	10	3	●	1
VAMH**D0900**	9	25	90	10	3	●	1
VAMH**D1000**	10	25	90	12	3	●	1
VAMH**D1100**	11	30	95	12	3	●	1
VAMH**D1200**	12	30	95	12	3	●	2
VAMH**D1300**	13	35	105	16	3	●	1
VAMH**D1400**	14	35	105	16	3	●	1
VAMH**D1500**	15	40	115	16	3	●	1
VAMH**D1600**	16	40	115	16	3	●	2
VAMH**D1800**	18	40	125	20	3	●	1
VAMH**D2000**	20	45	130	20	3	●	2
VAMH**D2100**	21	45	135	25	4	●	1
VAMH**D2200**	22	45	135	25	4	●	1
VAMH**D2300**	23	50	140	25	4	●	1
VAMH**D2400**	24	50	140	25	4	●	1
VAMH**D2500**	25	50	140	25	4	●	2
VAMH**D2800**	28	55	150	32	4	●	1
VAMH**D3000**	30	55	150	32	4	●	1

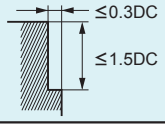
HSS

VAMH

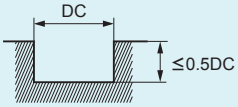
End mill, Medium cut length, 2—4 flute

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	3600	140	2700	100	1800	70	1500	60
6	3200	200	2400	150	1600	100	1300	80
8	2400	220	1800	160	1200	110	1000	90
10	1900	230	1400	170	960	120	800	100
12	1600	240	1200	180	800	120	660	100
16	1200	220	900	160	600	110	500	90
20	950	200	720	150	480	100	400	85
25	760	220	570	170	380	110	320	95
30	640	200	480	150	320	100	270	85
Depth of cut	 DC:Dia.							

Slotting

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	2900	105	2400	75	1500	50	1200	45
6	2600	150	2100	110	1300	75	1000	60
8	2000	165	1600	120	1000	80	800	70
10	1600	170	1300	130	800	90	640	75
12	1300	180	1100	135	660	90	530	75
16	1000	165	800	120	500	80	400	70
20	720	150	640	110	400	75	320	65
25	570	165	450	130	320	80	230	70
30	480	150	370	110	270	75	190	65
Depth of cut	 DC:Dia.							

1) Supply cutting fluid sufficiently during slotting. When slotting with dry cut, decrease the revolution and feed rate proportionately by 20—30%.
2) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

SOLID END MILLS

HIGH HELIX END MILLS

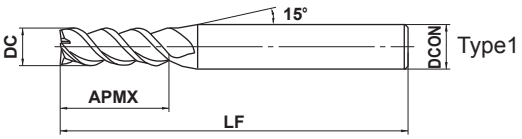
KMH

End mill, Medium cut length, 2—4 flute, High helix angle

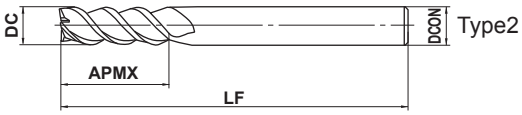
KHA | 45° DC=5 | 50° DC≥6 | DC=5 | DC≤20

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○	○	○





Type1



Type2

5≤DC≤20				
0 - 0.040				

2—4 flute end mill for general use on mild steel through to difficult-to-cut materials.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
KMHD0500	5	12	65	8	2	●	1
KMH**D0600**	6	15	65	8	3	●	1
KMH**D0700**	7	20	75	10	3	●	1
KMH**D0800**	8	20	75	10	3	●	1
KMH**D0900**	9	25	90	10	3	●	1
KMH**D1000**	10	25	90	12	3	●	1
KMH**D1200**	12	30	95	12	3	●	2
KMH**D1400**	14	35	105	16	3	●	1
KMH**D1600**	16	40	115	16	3	●	2
KMH**D2000**	20	45	130	20	3	●	2

RECOMMENDED CUTTING CONDITIONS

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel AISI 304, AISI 316	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	1600	65	1200	50	900	30	710	25
6	1400	90	1000	65	780	45	610	35
8	1100	100	800	75	580	50	470	40
10	860	105	640	80	470	55	380	45
12	720	110	530	80	390	55	310	45
16	540	100	400	75	300	50	230	40
20	430	90	320	65	240	50	190	35
Depth of cut	≤0.3DC ≤1.5DC DC:Dia.							

1) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

● : **Inventory maintained in Japan.**

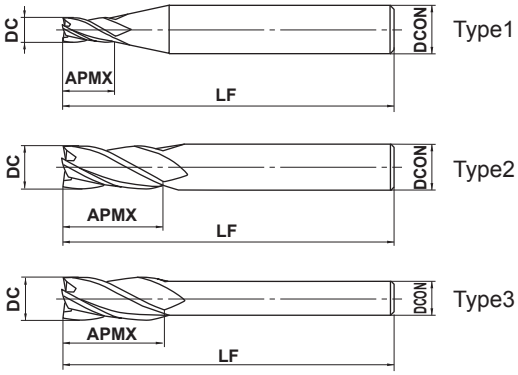
VIOLET END MILLS

VA4MC

End mill, Medium cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		





DC≤20	DC>20			
0 +0.030	0 +0.040			

4 flute end mill with high grade HSS substrate and Violet coating for general use.

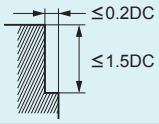
Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VA4MCD0300	3	10	50	6	4	●	1
VA4MCD0400	4	12	60	8	4	●	1
VA4MCD0500	5	15	60	8	4	●	1
VA4MCD0600	6	15	60	8	4	●	1
VA4MCD0700	7	20	65	10	4	●	1
VA4MCD0800	8	20	65	10	4	●	1
VA4MCD0900	9	25	75	10	4	●	1
VA4MCD1000	10	25	75	10	4	●	2
VA4MCD1100	11	30	85	12	4	●	1
VA4MCD1200	12	30	85	12	4	●	2
VA4MCD1300	13	35	90	12	4	●	3
VA4MCD1400	14	35	95	16	4	●	1
VA4MCD1500	15	40	100	16	4	●	1
VA4MCD1600	16	40	100	16	4	●	2
VA4MCD1700	17	40	100	16	4	●	3
VA4MCD1800	18	40	100	16	4	●	3
VA4MCD1900	19	45	115	20	4	●	1
VA4MCD2000	20	45	115	20	4	●	2
VA4MCD2200	22	45	115	20	4	●	3
VA4MCD2400	24	50	120	25	4	●	1
VA4MCD2500	25	50	120	25	4	●	2
VA4MCD2800	28	55	125	25	4	●	3
VA4MCD3000	30	55	125	25	4	●	3

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	5400	270	4000	200	2700	140	2200	100
4	4300	320	3200	240	2100	160	1800	120
5	3600	340	2700	250	1800	170	1500	130
6	3200	350	2400	260	1600	180	1300	140
8	2400	380	1800	290	1200	190	1000	145
10	1900	420	1400	300	950	210	800	160
12	1600	380	1200	290	800	190	660	145
16	1200	340	900	260	600	170	500	130
20	950	290	720	220	480	140	400	110
25	760	240	570	180	380	120	320	100
30	640	210	480	160	320	100	270	80
Depth of cut	 DC:Dia.							

1) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

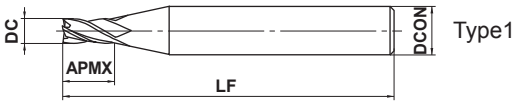
FOUR-FLUTE END MILLS

S4MD

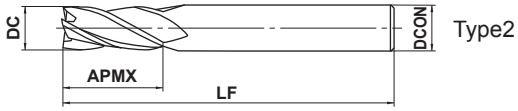
End mill, Medium cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○

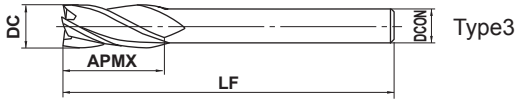




Type1



Type2



Type3

DC≤20	DC>20			
0 / + 0.020	0 / + 0.030			

● 4 flute end mill with high grade powder metallurgy HSS (KHA Super) substrate for high speed milling and cutting of high hardness difficult-to-cut materials.

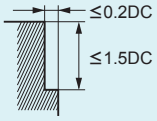
Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
S4MDD0250	2.5	10	50	6	4	●	1
S4MD**D0300**	3	10	50	6	4	●	1
S4MD**D0350**	3.5	12	60	8	4	●	1
S4MD**D0400**	4	12	60	8	4	●	1
S4MD**D0450**	4.5	15	60	8	4	●	1
S4MD**D0500**	5	15	60	8	4	●	1
S4MD**D0550**	5.5	15	60	8	4	●	1
S4MD**D0600**	6	15	60	8	4	●	1
S4MD**D0650**	6.5	20	65	10	4	●	1
S4MD**D0700**	7	20	65	10	4	●	1
S4MD**D0750**	7.5	20	65	10	4	●	1
S4MD**D0800**	8	20	65	10	4	●	1
S4MD**D0850**	8.5	25	75	10	4	●	1
S4MD**D0900**	9	25	75	10	4	●	1
S4MD**D0950**	9.5	25	75	10	4	●	1
S4MD**D1000S10**	10	25	75	10	4	●	2
S4MD**D1000S12**	10	25	75	12	4	●	1
S4MD**D1100**	11	30	85	12	4	●	1
S4MD**D1200**	12	30	85	12	4	●	2
S4MD**D1300**	13	35	90	12	4	●	3
S4MD**D1400**	14	35	95	16	4	●	1
S4MD**D1500**	15	40	100	16	4	●	1
S4MD**D1600**	16	40	100	16	4	●	2
S4MD**D1700**	17	40	100	16	4	●	3
S4MD**D1800**	18	40	100	16	4	●	3
S4MD**D1900**	19	45	115	20	4	●	1
S4MD**D2000**	20	45	115	20	4	●	2

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Structural steel, Carbon steel AISI 1045, AISI 1050		Carbon steel, Alloy steel (20−30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30−35HRC) AISI H13		Austenitic stainless steel, Alloy steel, Tool steel (35−40HRC) AISI 304, AISI 316		Cast iron AISI No 35 B		Aluminium alloy	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	3900	240	3100	175	2400	150	1900	95	3400	260	8200	660
4	3100	270	2400	190	1850	150	1450	95	2700	300	6500	850
5	2700	300	2000	240	1500	160	1200	110	2200	320	5400	980
6	2400	320	1700	240	1300	175	1000	135	1900	350	4800	1100
8	1900	350	1300	260	990	175	800	135	1450	380	3800	1250
10	1500	380	1100	290	800	175	650	145	1200	430	3200	1200
12	1250	350	900	260	670	160	540	135	990	380	2700	1100
16	940	300	680	230	500	135	400	110	760	320	2000	960
Depth of cut	(S4MD)  DC:Dia.											

1) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

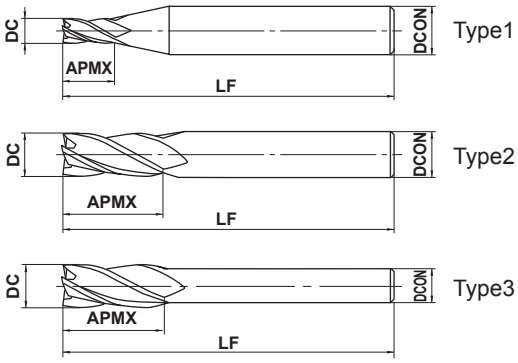
FOUR-FLUTE END MILLS

G4MC

End mill, Medium cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○





DC≤20	DC>20			
0 +0.030	0 +0.040			

● 4 flute end mill for high speed continuous cutting.

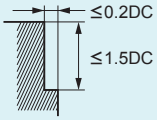
Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
G4MCD0300	3	10	50	6	4	●	1
G4MCD0350	3.5	12	60	8	4	●	1
G4MCD0400	4	12	60	8	4	●	1
G4MCD0450	4.5	15	60	8	4	●	1
G4MCD0500	5	15	60	8	4	●	1
G4MCD0550	5.5	15	60	8	4	●	1
G4MCD0600	6	15	60	8	4	●	1
G4MCD0650	6.5	20	65	10	4	●	1
G4MCD0700	7	20	65	10	4	●	1
G4MCD0750	7.5	20	65	10	4	●	1
G4MCD0800	8	20	65	10	4	●	1
G4MCD0850	8.5	25	75	10	4	●	1
G4MCD0900	9	25	75	10	4	●	1
G4MCD0950	9.5	25	75	10	4	●	1
G4MCD1000	10	25	75	10	4	●	2
G4MCD1100	11	30	85	12	4	●	1
G4MCD1200	12	30	85	12	4	●	2
G4MCD1300	13	35	90	12	4	●	3
G4MCD1400	14	35	95	16	4	●	1
G4MCD1500	15	40	100	16	4	●	1
G4MCD1600	16	40	100	16	4	●	2
G4MCD1700	17	40	100	16	4	●	3
G4MCD1800	18	40	100	16	4	●	3
G4MCD1900	19	45	115	20	4	●	1
G4MCD2000	20	45	115	20	4	●	2
G4MCD2100	21	45	115	20	4	●	3
G4MCD2200	22	45	115	20	4	●	3
G4MCD2300	23	50	120	25	4	●	1
G4MCD2400	24	50	120	25	4	●	1
G4MCD2500	25	50	120	25	4	●	2
G4MCD2600	26	50	120	25	4	●	3
G4MCD2700	27	55	125	25	4	●	3
G4MCD2800	28	55	125	25	4	●	3
G4MCD2900	29	55	125	25	4	●	3
G4MCD3000	30	55	125	25	4	●	3

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Structural steel, Carbon steel AISI 1045, AISI 1050		Carbon steel, Alloy steel (20−30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30−35HRC) AISI H13		Austenitic stainless steel AISI 304, AISI 316		Cast iron AISI No 35 B		Aluminium alloy	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	2800	145	2200	105	1700	90	1300	55	2400	150	5800	380
4	2150	160	1700	110	1300	90	1000	55	1900	175	4600	500
5	1900	185	1450	145	1100	95	850	65	1600	190	3800	580
6	1700	190	1200	145	940	105	730	80	1300	210	3400	640
8	1300	210	960	150	700	105	560	80	1000	220	2600	740
10	1000	230	770	175	560	105	460	90	840	260	2200	690
12	860	210	640	150	470	95	370	80	700	220	1900	670
16	650	180	480	145	360	90	280	65	530	190	1450	560
20	520	150	380	110	290	70	230	55	420	160	1150	480
25	420	135	300	95	230	65	180	50	340	145	910	420
30	350	130	250	90	190	55	145	40	290	135	770	380
40	250	95	180	55	140	40	110	35	220	105	580	300
50	190	80	140	55	110	40	85	30	170	90	460	260
Depth of cut	(G4MC)  ≤0.2DC ≤1.5DC DC:Dia.											

1) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

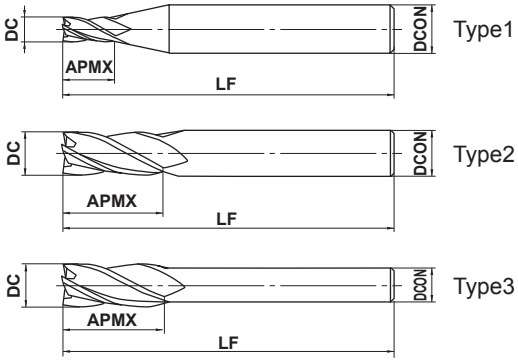
FOUR-FLUTE END MILLS

4MC

End mill, Medium cut length, 4 flute, Center cutting

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○





DC≤20	DC>20			
0 +0.020	0 +0.030			

● 4 flute end mill for general use.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
4MCD0250	2.5	10	50	6	4	●	1
4MC**D0300**	3	10	50	6	4	●	1
4MC**D0350**	3.5	12	60	8	4	●	1
4MC**D0400**	4	12	60	8	4	●	1
4MC**D0450**	4.5	15	60	8	4	●	1
4MC**D0500**	5	15	60	8	4	●	1
4MC**D0550**	5.5	15	60	8	4	●	1
4MC**D0600**	6	15	60	8	4	●	1
4MC**D0650**	6.5	20	65	10	4	●	1
4MC**D0700**	7	20	65	10	4	●	1
4MC**D0750**	7.5	20	65	10	4	●	1
4MC**D0800**	8	20	65	10	4	●	1
4MC**D0850**	8.5	25	75	10	4	●	1
4MC**D0900**	9	25	75	10	4	●	1
4MC**D0950**	9.5	25	75	10	4	●	1
4MC**D1000**	10	25	75	10	4	●	2
4MC**D1100**	11	30	85	12	4	●	1
4MC**D1200**	12	30	85	12	4	●	2
4MC**D1300**	13	35	90	12	4	●	3
4MC**D1400**	14	35	95	16	4	●	1
4MC**D1500**	15	40	100	16	4	●	1
4MC**D1600**	16	40	100	16	4	●	2
4MC**D1700**	17	40	100	16	4	●	3
4MC**D1800**	18	40	100	16	4	●	3
4MC**D1900**	19	45	115	20	4	●	1
4MC**D2000**	20	45	115	20	4	●	2
4MC**D2100**	21	45	115	20	4	●	3
4MC**D2200**	22	45	115	20	4	●	3
4MC**D2300**	23	50	120	25	4	●	1
4MC**D2400**	24	50	120	25	4	●	1
4MC**D2500**	25	50	120	25	4	●	2
4MC**D2600**	26	50	120	25	4	●	3
4MC**D2700**	27	55	125	25	4	●	3
4MC**D2800**	28	55	125	25	4	●	3

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
4MCD2900	29	55	125	25	4	●	3
4MCD3000	30	55	125	25	4	●	3
4MCD3100	31	60	145	25	4	●	3
4MCD3200	32	60	145	32	4	●	2
4MCD3300	33	60	145	32	4	●	3
4MCD3400	34	60	145	32	4	●	3
4MCD3500	35	60	145	32	4	●	3
4MCD3600	36	65	150	32	4	●	3
4MCD3700	37	65	150	32	4	●	3
4MCD3800	38	65	150	32	4	●	3
4MCD3900	39	65	150	32	4	●	3
4MCD4000	40	65	150	32	4	●	3

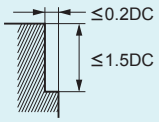
RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Structural steel, Carbon steel AISI 1045, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13		Austenitic stainless steel AISI 304, AISI 316		Cast iron AISI No 35 B		Aluminium alloy	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	2300	105	1800	80	1400	65	1100	45	2000	110	4800	280
4	1800	120	1400	85	1100	65	850	45	1600	125	3800	370
5	1600	135	1200	105	900	70	710	50	1300	140	3200	420
6	1400	140	1000	105	780	80	610	55	1100	155	2800	460
8	1100	155	800	110	580	80	470	55	850	160	2200	530
10	860	170	640	120	470	80	380	65	700	180	1800	500
12	720	155	530	110	390	70	310	55	580	160	1600	490
16	540	135	400	105	300	65	230	50	440	140	1200	410
20	430	110	320	85	240	55	190	45	350	120	960	350
25	350	100	250	70	190	45	150	35	285	105	760	310
30	290	90	210	65	160	40	120	30	240	100	640	280
40	210	70	150	40	120	30	90	25	180	80	480	220

Depth of cut

(4MC)



DC:Dia.

1) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

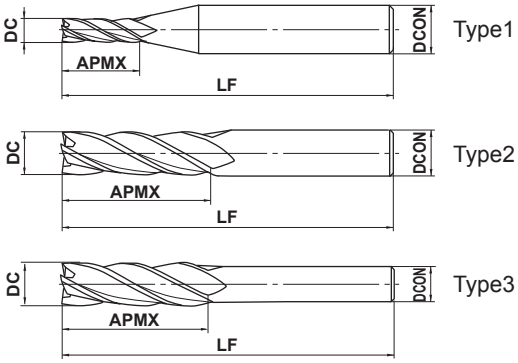
FOUR-FLUTE END MILLS

S4JC

End mill, Semi long cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○





DC≤20	DC>20			
0 +0.020	0 +0.030			

● 4 flute end mill for general use.

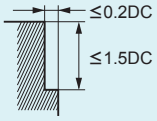
Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
S4JCD0300	3	12	60	6	4	●	1
S4JC**D0400**	4	15	65	8	4	●	1
S4JC**D0500**	5	20	75	8	4	●	1
S4JC**D0600**	6	20	75	8	4	●	1
S4JC**D0700**	7	25	80	10	4	●	1
S4JC**D0800**	8	25	80	10	4	●	1
S4JC**D0900**	9	35	90	10	4	●	1
S4JC**D1000**	10	35	90	10	4	●	2
S4JC**D1100**	11	45	110	12	4	●	1
S4JC**D1200**	12	45	110	12	4	●	2
S4JC**D1300**	13	45	110	12	4	●	3
S4JC**D1400**	14	55	125	16	4	●	1
S4JC**D1500**	15	55	125	16	4	●	1
S4JC**D1600**	16	55	125	16	4	●	2
S4JC**D1700**	17	55	125	16	4	●	3
S4JC**D1800**	18	55	125	16	4	●	3
S4JC**D1900**	19	65	145	20	4	●	1
S4JC**D2000**	20	65	145	20	4	●	2
S4JC**D2500**	25	75	165	25	4	●	2
S4JC**D3000**	30	75	165	25	4	●	3
S4JC**D3500**	35	85	190	32	4	●	3
S4JC**D4000**	40	95	200	32	4	●	3

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Structural steel, Carbon steel AISI 1045, AISI 1050		Carbon steel, Alloy steel (20−30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30−35HRC) AISI H13		Austenitic stainless steel, Alloy steel, Tool steel (35−40HRC) AISI 304, AISI 316		Cast iron AISI No 35 B		Aluminium alloy	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	3900	240	3100	175	2400	150	1900	95	3400	260	8200	660
4	3100	270	2400	190	1850	150	1450	95	2700	300	6500	850
5	2700	300	2000	240	1500	160	1200	110	2200	320	5400	980
6	2400	320	1700	240	1300	175	1000	135	1900	350	4800	1100
8	1900	350	1300	260	990	175	800	135	1450	380	3800	1250
10	1500	380	1100	290	800	175	650	145	1200	430	3200	1200
12	1250	350	900	260	670	160	540	135	990	380	2700	1100
16	940	300	680	230	500	135	400	110	760	320	2000	960
Depth of cut	(S4MD)  DC:Dia.											

1) Use the milling by reducing the feedrate in the table shown above by 20−30% in accordance with the cutting type.
2) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

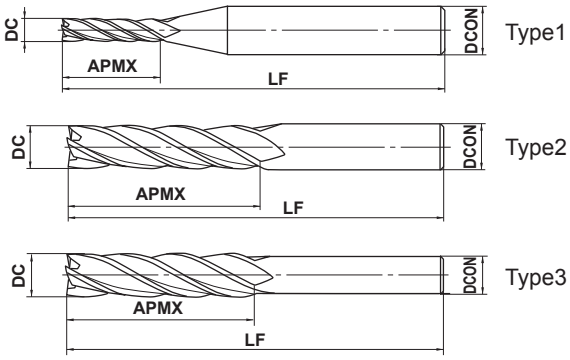
FOUR-FLUTE END MILLS

G4LC

End mill, Long cut length, 4 flute, Center cutting

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○





DC≤20	DC>20			
0 +0.030	0 +0.040			

4 flute end mill with long flute for deep cutting applications.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
G4LCD0300	3	15	55	6	4	●	1
G4LCD0400	4	20	55	8	4	●	1
G4LCD0500	5	25	60	8	4	●	1
G4LCD0600	6	25	60	8	4	●	1
G4LCD0700	7	35	75	10	4	●	1
G4LCD0800	8	35	75	10	4	●	1
G4LCD0900	9	45	90	10	4	●	1
G4LCD1000	10	45	90	10	4	●	2
G4LCD1100	11	55	105	12	4	●	1
G4LCD1200	12	55	105	12	4	●	2
G4LCD1300	13	55	105	12	4	●	3
G4LCD1400	14	55	110	16	4	●	1
G4LCD1500	15	65	120	16	4	●	1
G4LCD1600	16	65	120	16	4	●	2
G4LCD1700	17	65	120	16	4	●	3
G4LCD1800	18	65	120	16	4	●	3
G4LCD1900	19	75	140	20	4	●	1
G4LCD2000	20	75	140	20	4	●	2
G4LCD2100	21	75	140	20	4	●	3
G4LCD2200	22	75	140	20	4	●	3
G4LCD2300	23	90	160	25	4	●	1
G4LCD2400	24	90	160	25	4	●	1
G4LCD2500	25	90	160	25	4	●	2
G4LCD2600	26	90	160	25	4	●	3
G4LCD2700	27	90	160	25	4	●	3
G4LCD2800	28	90	160	25	4	●	3
G4LCD2900	29	90	160	25	4	●	3
G4LCD3000	30	90	160	25	4	●	3
G4LCD3100	31	95	180	25	4	●	3
G4LCD3200	32	95	180	32	4	●	2
G4LCD3300	33	95	180	32	4	●	3
G4LCD3400	34	100	185	32	4	●	3
G4LCD3500	35	100	185	32	4	●	3
G4LCD3600	36	105	190	32	4	●	3

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
G4LCD3700	37	105	190	32	4	●	3
G4LCD3800	38	105	190	32	4	●	3
G4LCD3900	39	110	195	32	4	●	3
G4LCD4000	40	110	195	32	4	●	3

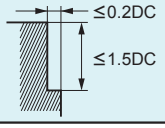
RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Structural steel, Carbon steel AISI 1045, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13		Austenitic stainless steel AISI 304, AISI 316		Cast iron AISI No 35 B		Aluminium alloy	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	2800	145	2200	105	1700	90	1300	55	2400	150	5800	380
4	2150	160	1700	110	1300	90	1000	55	1900	175	4600	500
5	1900	185	1450	145	1100	95	850	65	1600	190	3800	580
6	1700	190	1200	145	940	105	730	80	1300	210	3400	640
8	1300	210	960	150	700	105	560	80	1000	220	2600	740
10	1000	230	770	175	560	105	460	90	840	260	2200	690
12	860	210	640	150	470	95	370	80	700	220	1900	670
16	650	180	480	145	360	90	280	65	530	190	1450	560
20	520	150	380	110	290	70	230	55	420	160	1150	480
25	420	135	300	95	230	65	180	50	340	145	910	420
30	350	130	250	90	190	55	145	40	290	135	770	380
40	250	95	180	55	140	40	110	35	220	105	580	300
50	190	80	140	55	110	40	85	30	170	90	460	260

Depth of cut

(G4MC)



DC:Dia.

1) Use the milling by reducing the revolution in the table shown above by 20—30% and the feedrate 40—50% to match the cutting type.
2) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

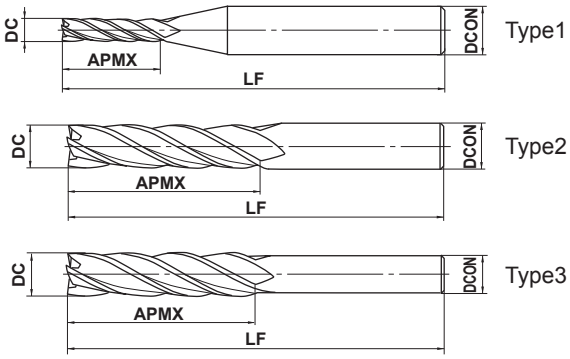
FOUR-FLUTE END MILLS

4LC

End mill, Long cut length, 4 flute, Center cutting

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○





DC≤20	DC>20			
0 / +0.020	0 / +0.030			

● 4 flute end mill with long flute for deep cutting applications.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
4LCD0300	3	15	55	6	4	●	1
4LC**D0400**	4	20	55	8	4	●	1
4LC**D0500**	5	25	60	8	4	●	1
4LC**D0600**	6	25	60	8	4	●	1
4LC**D0700**	7	35	75	10	4	●	1
4LC**D0800**	8	35	75	10	4	●	1
4LC**D0900**	9	45	90	10	4	●	1
4LC**D1000**	10	45	90	10	4	●	2
4LC**D1100**	11	55	105	12	4	●	1
4LC**D1200**	12	55	105	12	4	●	2
4LC**D1300**	13	55	105	12	4	●	3
4LC**D1400**	14	55	110	16	4	●	1
4LC**D1500**	15	65	120	16	4	●	1
4LC**D1600**	16	65	120	16	4	●	2
4LC**D1700**	17	65	120	16	4	●	3
4LC**D1800**	18	65	120	16	4	●	3
4LC**D1900**	19	75	140	20	4	●	1
4LC**D2000**	20	75	140	20	4	●	2
4LC**D2100**	21	75	140	20	4	●	3
4LC**D2200**	22	75	140	20	4	●	3
4LC**D2300**	23	90	160	25	4	●	1
4LC**D2400**	24	90	160	25	4	●	1
4LC**D2500**	25	90	160	25	4	●	2
4LC**D2600**	26	90	160	25	4	●	3
4LC**D2700**	27	90	160	25	4	●	3
4LC**D2800**	28	90	160	25	4	●	3
4LC**D2900**	29	90	160	25	4	●	3
4LC**D3000**	30	90	160	25	4	●	3
4LC**D3100**	31	95	180	25	4	●	3
4LC**D3200**	32	95	180	32	4	●	2
4LC**D3300**	33	95	180	32	4	●	3
4LC**D3400**	34	100	185	32	4	●	3
4LC**D3500**	35	100	185	32	4	●	3
4LC**D3600**	36	105	190	32	4	●	3

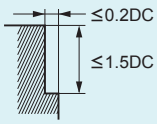
● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
4LCD3700	37	105	190	32	4	●	3
4LCD3800	38	105	190	32	4	●	3
4LCD3900	39	110	195	32	4	●	3
4LCD4000	40	110	195	32	4	●	3

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Structural steel, Carbon steel AISI 1045, AISI 1050		Carbon steel, Alloy steel (20−30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30−35HRC) AISI H13		Austenitic stainless steel AISI 304, AISI 316		Cast iron AISI No 35 B		Aluminium alloy	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	2300	105	1800	80	1400	65	1100	45	2000	110	4800	280
4	1800	120	1400	85	1100	65	850	45	1600	125	3800	370
5	1600	135	1200	105	900	70	710	50	1300	140	3200	420
6	1400	140	1000	105	780	80	610	55	1100	155	2800	460
8	1100	155	800	110	580	80	470	55	850	160	2200	530
10	860	170	640	120	470	80	380	65	700	180	1800	500
12	720	155	530	110	390	70	310	55	580	160	1600	490
16	540	135	400	105	300	65	230	50	440	140	1200	410
20	430	110	320	85	240	55	190	45	350	120	960	350
25	350	100	250	70	190	45	150	35	285	105	760	310
30	290	90	210	65	160	40	120	30	240	100	640	280
40	210	70	150	40	120	30	90	25	180	80	480	220
Depth of cut	 DC:Dia.											

1) Use the milling by reducing the revolution in the table shown above by 20−30% and the feedrate 40−50% to match the cutting type.
2) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

ROUGHING END MILLS

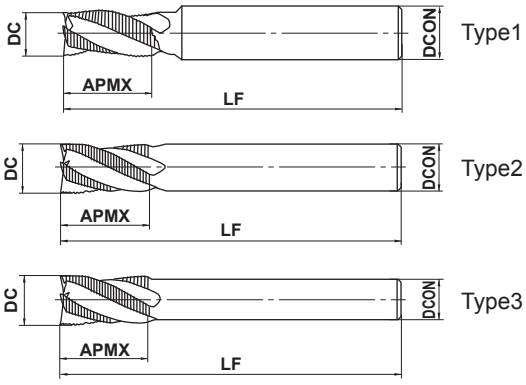
GSFPR

Roughing end mill, Short cut length, 3—6 flute, Fine pitch form

CO HSS | G | 30° | DC≤22 | 24≤DC≤32 | DC≥35

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○





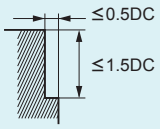
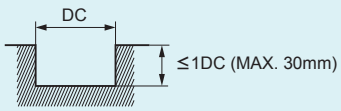
● 3—6 flute roughing end mill with good chip disposal properties for high feed milling.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
GSFPRD0500	5	10	80	6	3	●	1
GSFPR**D0600**	6	12	80	6	3	●	2
GSFPR**D0700**	7	17	80	8	3	●	1
GSFPR**D0800**	8	17	85	8	3	●	2
GSFPR**D0900**	9	22	100	10	3	●	1
GSFPR**D1000**	10	22	100	10	3	●	2
GSFPR**D1200**	12	27	110	12	3	●	2
GSFPR**D1300**	13	27	110	12	3	●	3
GSFPR**D1400**	14	27	135	12	3	●	3
GSFPR**D1500**	15	27	140	16	3	●	1
GSFPR**D1600**	16	33	140	16	3	●	2
GSFPR**D1800**	18	33	140	16	3	●	3
GSFPR**D1900**	19	38	145	20	3	●	1
GSFPR**D2000**	20	38	145	20	3	●	2
GSFPR**D2200**	22	38	145	20	3	●	3
GSFPR**D2400**	24	43	150	25	4	●	1
GSFPR**D2500**	25	43	150	25	4	●	2
GSFPR**D2800**	28	43	160	25	4	●	3
GSFPR**D3000**	30	48	165	25	4	●	3
GSFPR**D3200**	32	55	175	25	4	●	3
GSFPR**D3500**	35	55	175	32	6	●	3
GSFPR**D4000**	40	65	185	32	6	●	3
GSFPR**D4500**	45	65	200	42	6	●	3
GSFPR**D5000**	50	75	200	42	6	●	3

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel AISI 304, AISI 316	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	1200 (900)	50 (40)	900 (680)	35 (25)	730 (550)	30 (23)	610 (460)	25 (20)
6	1150 (860)	60 (45)	860 (650)	50 (40)	680 (510)	35 (26)	580 (440)	30 (23)
8	960 (720)	80 (60)	720 (540)	60 (45)	600 (450)	50 (40)	480 (360)	35 (26)
10	770 (580)	110 (85)	580 (440)	85 (65)	460 (350)	60 (45)	380 (290)	50 (40)
12	640 (480)	110 (85)	480 (360)	85 (65)	380 (290)	65 (50)	320 (240)	55 (40)
16	480 (360)	110 (85)	360 (270)	85 (65)	290 (220)	65 (50)	240 (180)	55 (40)
20	380 (290)	115 (85)	290 (220)	85 (65)	230 (170)	65 (50)	190 (145)	55 (40)
25	300 (230)	110 (85)	230 (170)	80 (60)	180 (135)	60 (45)	160 (120)	55 (40)
30	250 (190)	100 (75)	190 (145)	80 (60)	160 (120)	60 (45)	130 (100)	55 (40)
40	160 (120)	70 (55)	120 (90)	55 (40)	95 (70)	40 (30)	85 (65)	35 (26)
50	120 (90)	60 (45)	90 (70)	50 (40)	70 (55)	35 (25)	60 (45)	30 (23)
Depth of cut	  DC:Dia.							

( ) : Indicates standard revolution and feedrates for slotting

1) Supply cutting fluid sufficiently during cutting.
2) When the diameter exceeds 30 and the metal removal is less than the quantity shown in the table, the revolution and feed rate may be increased by 10—40%.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VIOLET END MILLS

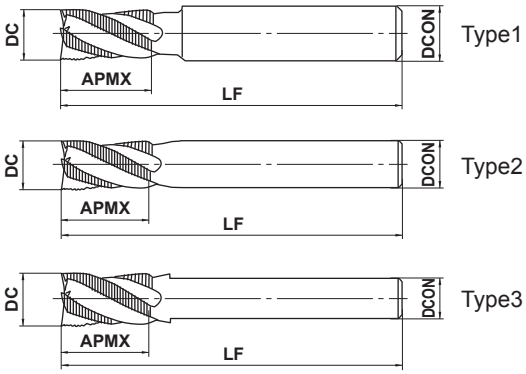
VASFPR

Roughing end mill, Short cut length, 4—6 flute, Fine pitch form

KHA S | V | 30° | DC≤24 | 25≤DC≤32 | DC≥35

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	○		





Roughing 4—6 flute end mill with high grade HSS substrate and Violet coating for general use.

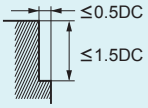
Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VASFPRD0500	5	10	80	6	4	●	1
VASFPRD0600	6	12	80	6	4	●	2
VASFPRD0700	7	17	80	8	4	●	1
VASFPRD0800	8	17	85	8	4	●	2
VASFPRD0900	9	22	100	10	4	●	1
VASFPRD1000	10	22	100	10	4	●	2
VASFPRD1200	12	27	110	12	4	●	2
VASFPRD1400	14	27	110	12	4	●	3
VASFPRD1500	15	27	125	16	4	●	1
VASFPRD1600	16	33	125	16	4	●	2
VASFPRD1800	18	33	125	16	4	●	3
VASFPRD2000	20	38	145	20	4	●	2
VASFPRD2200	22	38	145	20	4	●	3
VASFPRD2400	24	43	150	25	4	●	1
VASFPRD2500	25	43	150	25	5	●	2
VASFPRD2800	28	43	160	25	5	●	3
VASFPRD3000	30	48	165	25	5	●	3
VASFPRD3200	32	55	175	25	5	●	3
VASFPRD3500	35	55	175	32	6	●	3
VASFPRD4000	40	65	185	32	6	●	3
VASFPRD4500	45	65	200	42	6	●	3
VASFPRD5000	50	75	200	42	6	●	3

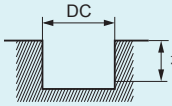
● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	2800	140	2200	120	1500	80	1300	70
6	2600	180	2000	140	1400	90	1200	80
8	2200	230	1700	180	1200	130	990	100
10	1750	330	1350	250	950	160	800	130
12	1450	330	1100	260	800	180	660	140
16	1100	330	850	260	600	180	500	140
20	880	340	680	260	480	180	400	140
25	700	330	540	250	380	170	320	140
30	580	300	450	230	320	170	270	140
40	350	210	270	170	190	120	160	100
50	250	170	190	130	130	90	110	75
Depth of cut	 DC:Dia.							

Slotting

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	2100	100	1650	80	1150	50	960	35
6	2000	130	1550	100	1050	60	900	45
8	1600	160	1300	130	920	90	760	60
10	1300	220	1000	175	730	110	610	80
12	1050	230	850	190	610	130	500	85
16	800	230	640	190	460	130	380	85
20	640	230	510	180	370	130	300	85
25	510	200	410	160	290	110	240	80
30	420	190	320	140	210	90	180	75
40	280	140	210	110	140	70	120	60
50	190	110	150	90	95	55	85	45
Depth of cut	 DC:Dia.							

1) Supply cutting fluid sufficiently during cutting. For dry-cutting, decrease the revolution and feed rate proportionately by 20—50%.
2) For smaller depths and widths of cut, the revolution may be increased by 10—20% and the feed rate by 10—40%.
3) When drilling, please set the feed rate at 1/3 or below of the values above.
4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

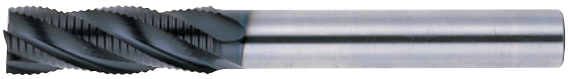
VIOLET END MILLS

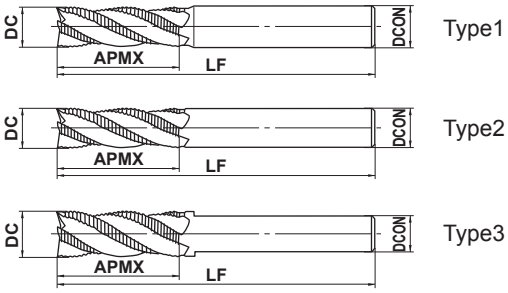
VAMFPR

Roughing end mill, Medium cut length, 4−6 flute, Fine pitch form

KHA S | V | 30° | DC≤20 | 22≤DC≤28 | DC≥30

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	○		





●4−6 flute end mill with medium cut length.

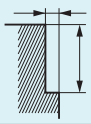
Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VAMFPRD0500	5	15	80	6	4	●	1
VAMFPRD0600	6	17	80	6	4	●	2
VAMFPRD0700	7	22	80	8	4	●	1
VAMFPRD0800	8	28	85	8	4	●	2
VAMFPRD0900	9	28	95	10	4	●	1
VAMFPRD1000	10	34	100	10	4	●	2
VAMFPRD1200	12	40	110	12	4	●	2
VAMFPRD1400	14	40	110	12	4	●	3
VAMFPRD1500	15	40	120	16	4	●	1
VAMFPRD1600	16	48	125	16	4	●	2
VAMFPRD1800	18	48	125	16	4	●	3
VAMFPRD2000	20	57	145	20	4	●	2
VAMFPRD2200	22	57	145	20	5	●	3
VAMFPRD2400	24	68	150	25	5	●	1
VAMFPRD2500	25	68	150	25	5	●	2
VAMFPRD2800	28	68	160	25	5	●	3
VAMFPRD3000	30	68	165	25	6	●	3
VAMFPRD3200	32	80	175	32	6	●	2
VAMFPRD3500	35	80	175	32	6	●	3
VAMFPRD4000	40	94	185	32	6	●	3
VAMFPRD4500	45	94	200	42	6	●	3
VAMFPRD5000	50	113	200	42	6	●	3

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	2600	90	2000	70	1400	50	1200	40
6	2500	100	1900	90	1300	50	1100	50
8	2000	170	1600	130	1100	90	930	80
10	1650	220	1300	170	900	100	750	90
12	1400	260	1000	210	750	140	620	120
16	1000	290	800	230	560	160	470	130
20	830	300	640	230	450	160	380	130
25	660	290	510	220	360	160	300	130
30	550	270	420	210	300	140	250	130
40	330	180	250	140	180	100	150	90
50	240	160	180	120	120	80	100	70
Depth of cut	 ≤0.25DC (MAX. 10mm) ≤2.5DC (DC≤ϕ25) ≤2DC (DC>ϕ25) DC:Dia.							

1) Supply cutting fluid sufficiently during cutting. For dry-cutting, decrease the revolution and feed rate proportionately by 20—50%.
2) When the diameter exceeds 30 and the metal removal is less than the quantity shown in the table, the revolution and feed rate may be increased proportionately by 10—40%.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VIOLET END MILLS

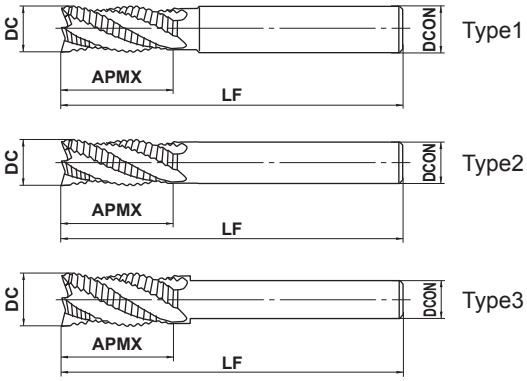
VAMR

Roughing end mill, Medium cut length, 4—6 flute

KHA S | V | 30° | DC≤15 | 16≤DC≤26 | 28≤DC≤32 | DC≥35

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	○		





Roughing 4—6 flute end mill with high grade HSS substrate and Violet coating for general use.

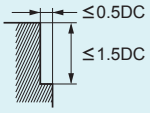
Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VAMRD0500	5	15	60	6	4	●	1
VAMRD0600	6	15	60	6	4	●	2
VAMRD0700	7	20	70	8	4	●	1
VAMRD0800	8	20	70	8	4	●	2
VAMRD0900	9	25	80	10	4	●	1
VAMRD1000	10	25	80	10	4	●	2
VAMRD1100	11	30	110	12	4	●	1
VAMRD1200	12	30	110	12	4	●	2
VAMRD1300	13	35	115	12	4	●	3
VAMRD1400	14	35	135	16	4	●	1
VAMRD1500	15	40	140	16	4	●	1
VAMRD1600	16	40	140	16	4	●	2
VAMRD1700	17	40	140	16	4	●	3
VAMRD1800	18	40	140	16	4	●	3
VAMRD1900	19	45	145	20	4	●	1
VAMRD2000	20	45	145	20	4	●	2
VAMRD2200	22	45	145	20	4	●	3
VAMRD2400	24	50	150	25	4	●	1
VAMRD2500	25	50	150	25	4	●	2
VAMRD2600	26	50	150	25	4	●	3
VAMRD2800	28	55	160	25	5	●	3
VAMRD3000	30	55	165	25	5	●	3
VAMRD3200	32	60	175	32	5	●	2
VAMRD3500	35	60	175	32	6	●	3
VAMRD4000	40	65	185	32	6	●	3
VAMRD4500	45	70	200	42	6	●	3
VAMRD5000	50	70	200	42	6	●	3

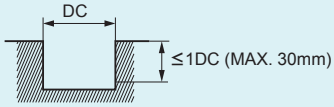
● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	2400	120	1800	90	1200	60	1000	50
6	2200	155	1700	120	1100	70	930	65
8	1800	200	1400	140	950	100	780	85
10	1500	250	1100	200	810	125	680	100
12	1250	270	960	220	680	160	560	120
16	930	270	720	220	510	160	430	120
20	750	290	580	220	410	160	340	120
25	600	270	460	210	320	140	270	120
30	490	250	380	200	270	140	230	120
40	300	180	230	140	160	105	140	90
50	210	140	160	110	110	80	90	65
Depth of cut	 DC:Dia.							

Slotting

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	1800	85	1350	60	920	40	740	25
6	1700	110	1300	85	830	45	700	35
8	1300	140	1050	100	730	70	600	50
10	1100	170	810	140	620	85	520	60
12	900	190	740	160	520	115	420	75
16	680	190	540	160	390	115	330	75
20	550	195	440	150	320	115	260	75
25	440	170	350	135	240	90	200	70
30	350	160	270	120	180	75	155	65
40	240	120	180	90	120	60	105	55
50	260	90	125	75	80	50	70	40
Depth of cut	 DC:Dia.							

1) Supply cutting fluid sufficiently during cutting. For dry-cutting, decrease the revolution and feed rate proportionately by 20—50%.
2) When the diameter exceeds 30 and the metal removal is less than the quantity shown in the table, the revolution and feed rate may be increased proportionately by 10—40%.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VIOLET END MILLS

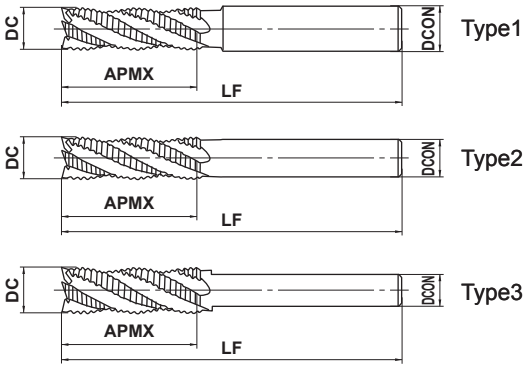
VAJR

Roughing end mill, Semi long cut length, 4—6 flute

KHA S | V | 30° | DC≤15 | 16≤DC≤25 | DC=30 | DC≥35

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	○		





● 4—6 flute end mill with longer cut length than standard.

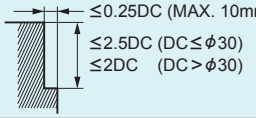
Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VAJRD1000	10	35	90	10	4	●	2
VAJR**D1200**	12	45	125	12	4	●	2
VAJR**D1400**	14	45	145	16	4	●	1
VAJR**D1500**	15	55	155	16	4	●	1
VAJR**D1600**	16	55	155	16	4	●	2
VAJR**D1800**	18	55	155	16	4	●	3
VAJR**D2000**	20	65	165	20	4	●	2
VAJR**D2500**	25	75	175	25	4	●	2
VAJR**D3000S25**	30	75	185	25	5	●	3
VAJR**D3000S32**	30	75	185	32	5	●	1
VAJR**D3500**	35	85	200	32	6	●	3
VAJR**D4000**	40	85	205	42	6	●	1
VAJR**D4500**	45	105	235	42	6	●	3
VAJR**D5000**	50	105	235	42	6	●	3

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1050, AISI 1055		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) SCM, AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
10	1400	170	1100	130	760	80	640	65
12	1200	170	900	130	640	90	530	80
16	870	170	680	130	480	90	400	80
20	700	170	540	130	380	90	320	80
25	560	170	430	120	300	90	260	80
30	460	155	360	120	260	80	220	65
40	280	105	220	90	150	65	130	65
50	200	90	150	65	100	50	90	40
Depth of cut	 DC:Dia.							

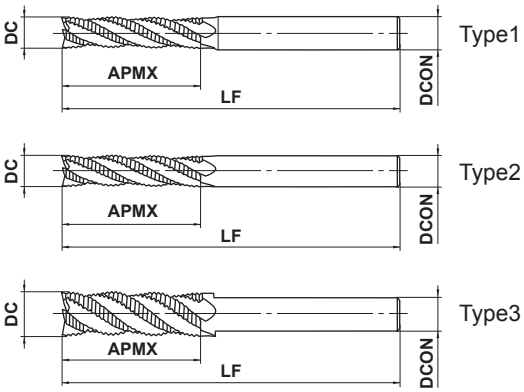
VALR

Roughing end mill, Long cut length, 4—6 flute



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	○		





●4—6 flute end mill with long cut length.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
VALRD1000	10	45	110	10	4	●	2
VALR**D1200**	12	50	130	12	4	●	2
VALR**D1400**	14	55	155	16	4	●	1
VALR**D1500**	15	65	165	16	4	●	1
VALR**D1600**	16	65	165	16	4	●	2
VALR**D1800**	18	65	165	16	4	●	3
VALR**D2000**	20	75	175	20	4	●	2
VALR**D2200**	22	75	175	20	4	●	3
VALR**D2400**	24	85	185	25	4	●	1
VALR**D2500**	25	90	190	25	4	●	2
VALR**D2800**	28	90	190	25	5	●	3
VALR**D3000**	30	90	200	25	5	●	3
VALR**D3200**	32	95	210	32	5	●	2
VALR**D3500**	35	100	215	32	6	●	3
VALR**D4000**	40	110	230	32	6	●	3
VALR**D4500**	45	120	250	42	6	●	3
VALR**D5000**	50	120	250	42	6	●	3

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel, Alloy steel, Tool steel (35—40HRC) AISI 304, AISI 316	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
10	1000	75	700	55	480	40	400	30
12	850	90	630	70	440	50	370	40
16	700	100	540	80	380	55	320	45
20	560	100	430	80	300	55	260	50
25	450	100	340	75	240	55	210	50
30	370	100	290	75	200	50	170	45
40	260	80	200	60	135	45	120	40
50	180	65	140	50	90	35	80	30
Depth of cut	≤0.1DC ≤3DC (DC≤ϕ30) ≤2.5DC (DC>ϕ30) (MAX. 100mm) DC:Dia.							

1) Supply cutting fluid sufficiently during cutting. For dry-cutting, decrease the revolution and feed rate proportionately by 20—50%.
2) When the diameter exceeds 30 and the metal removal is less than the quantity shown in the table, the revolution and feed rate may be increased proportionately by 10—40%.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

ROUGHING END MILLS

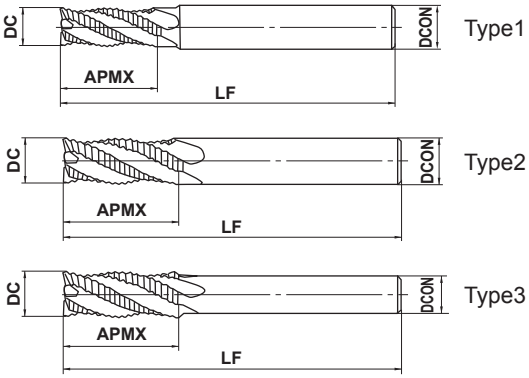
SR

Roughing end mill, Short cut length, 4—6 flute

CO HSS | 30° | DC≤25 | 28≤DC≤32 | DC≥35

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○





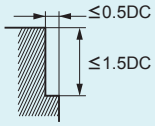
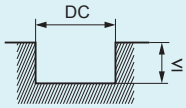
4—6 flute roughing end mill with full radius cutting edge profile for heavy cutting.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
SRD1000	10	22	75	10	4	●	2
SRD1200	12	27	85	12	4	●	2
SRD1300	13	27	85	12	4	●	3
SRD1400	14	27	90	16	4	●	1
SRD1500	15	27	95	16	4	●	1
SRD1600	16	33	100	16	4	●	2
SRD1800	18	33	100	16	4	●	3
SRD1900	19	38	110	20	4	●	1
SRD2000	20	38	110	20	4	●	2
SRD2200	22	38	110	20	4	●	3
SRD2500	25	43	125	25	4	●	2
SRD2800	28	43	125	25	5	●	3
SRD3000	30	48	130	25	5	●	3
SRD3200	32	55	145	32	5	●	2
SRD3500	35	55	145	32	6	●	3
SRD4000	40	65	165	32	6	●	3

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel AISI 304, AISI 316	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	1000 (750)	40 (30)	760 (570)	30 (25)	610 (460)	25 (20)	510 (380)	20 (15)
6	960 (720)	50 (40)	720 (540)	40 (30)	570 (430)	30 (25)	480 (360)	25 (20)
8	800 (600)	65 (50)	600 (450)	50 (40)	500 (380)	40 (30)	400 (300)	30 (25)
10	640 (480)	90 (70)	480 (360)	70 (55)	380 (290)	50 (40)	320 (240)	40 (30)
12	530 (400)	90 (70)	400 (300)	70 (55)	320 (240)	55 (40)	270 (200)	45 (35)
16	400 (300)	90 (70)	300 (230)	70 (55)	240 (180)	55 (40)	200 (150)	45 (35)
20	320 (240)	95 (70)	240 (180)	70 (55)	190 (140)	55 (40)	160 (120)	45 (35)
25	250 (190)	90 (70)	190 (140)	65 (50)	150 (110)	50 (40)	130 (100)	45 (35)
30	210 (160)	85 (65)	160 (120)	65 (50)	130 (100)	50 (40)	110 (85)	45 (35)
40	135 (100)	60 (45)	100 (75)	45 (40)	80 (60)	35 (26)	70 (55)	30 (25)
50	100 (75)	50 (40)	75 (55)	40 (30)	60 (45)	30 (23)	50 (40)	25 (20)
Depth of cut	  DC:Dia.							

( ) : Indicates standard revolution and feedrates for slotting

1) Supply cutting fluid sufficiently during cutting.
2) When the diameter exceeds 30 and the metal removal is less than the quantity shown in the table, the revolution and feed rate may be increased by 10—40%.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

ROUGHING END MILLS

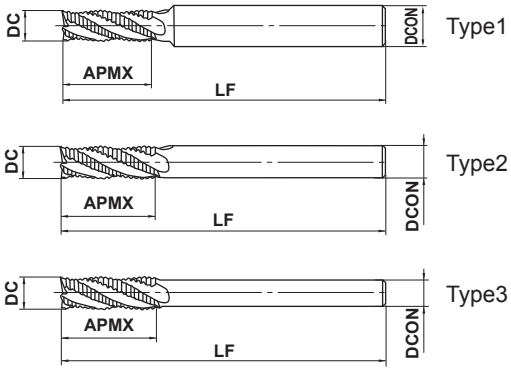
GMR

Roughing end mill, Medium cut length, 4—6 flute



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○





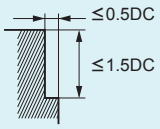
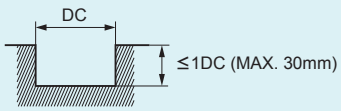
● 4—6 flute roughing end mill with TiN coating for general rough milling of steels through to difficult-to-cut materials.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
GMRD0500	5	15	60	6	4	●	1
GMR**D0600**	6	15	60	6	4	●	2
GMR**D0700**	7	20	70	8	4	●	1
GMR**D0800**	8	20	70	8	4	●	2
GMR**D0900**	9	25	80	10	4	●	1
GMR**D1000**	10	25	80	10	4	●	2
GMR**D1100**	11	30	110	12	4	●	1
GMR**D1200**	12	30	110	12	4	●	2
GMR**D1300**	13	35	115	12	4	●	3
GMR**D1400**	14	35	135	16	4	●	1
GMR**D1500**	15	40	140	16	4	●	1
GMR**D1600**	16	40	140	16	4	●	2
GMR**D1700**	17	40	140	16	4	●	3
GMR**D1800**	18	40	140	16	4	●	3
GMR**D1900**	19	45	145	20	4	●	1
GMR**D2000**	20	45	145	20	4	●	2
GMR**D2200**	22	45	145	20	4	●	3
GMR**D2400**	24	50	150	25	4	●	1
GMR**D2500**	25	50	150	25	4	●	2
GMR**D2600**	26	50	150	25	4	●	3
GMR**D2800**	28	55	160	25	5	●	3
GMR**D3000**	30	55	165	25	5	●	3
GMR**D3200**	32	60	175	32	5	●	2
GMR**D3500**	35	60	175	32	6	●	3
GMR**D4000**	40	65	185	32	6	●	3
GMR**D4500**	45	70	200	42	6	●	3
GMR**D5000**	50	70	200	42	6	●	3

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel AISI 304, AISI 316	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	1200 (900)	50 (40)	900 (680)	35 (25)	730 (550)	30 (23)	610 (460)	25 (20)
6	1150 (860)	60 (45)	860 (650)	50 (40)	680 (510)	35 (26)	580 (440)	30 (23)
8	960 (720)	80 (60)	720 (540)	60 (45)	600 (450)	50 (40)	480 (360)	35 (26)
10	770 (580)	110 (85)	580 (440)	85 (65)	460 (350)	60 (45)	380 (290)	50 (40)
12	640 (480)	110 (85)	480 (360)	85 (65)	380 (290)	65 (50)	320 (240)	55 (40)
16	480 (360)	110 (85)	360 (270)	85 (65)	290 (220)	65 (50)	240 (180)	55 (40)
20	380 (290)	115 (85)	290 (220)	85 (65)	230 (170)	65 (50)	190 (145)	55 (40)
25	300 (230)	110 (85)	230 (170)	80 (60)	180 (135)	60 (45)	160 (120)	55 (40)
30	250 (190)	100 (75)	190 (145)	80 (60)	160 (120)	60 (45)	130 (100)	55 (40)
40	160 (120)	70 (55)	120 (90)	55 (40)	95 (70)	40 (30)	85 (65)	35 (26)
50	120 (90)	60 (45)	90 (70)	50 (40)	70 (55)	35 (25)	60 (45)	30 (23)
Depth of cut	  DC:Dia.							

( ) : Indicates standard revolution and feedrates for slotting

1) Supply cutting fluid sufficiently during cutting.
2) When the diameter exceeds 30 and the metal removal is less than the quantity shown in the table, the revolution and feed rate may be increased by 10—40%.
3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

ROUGHING END MILLS

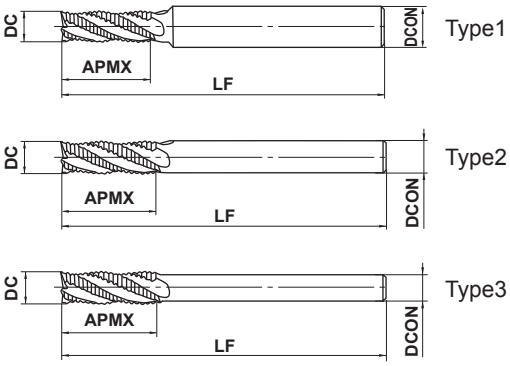
MR

Roughing end mill, Medium cut length, 4—6 flute

CO HSS | 30° | DC≤15 | 16≤DC≤26 | 28≤DC≤32 | DC≥35

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○





●4—6 flute roughing end mill with full radius cutting edge profile for heavy cutting.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
MRD0500	5	15	60	6	4	●	1
MR**D0600**	6	15	60	6	4	●	2
MR**D0700**	7	20	70	8	4	●	1
MR**D0800**	8	20	70	8	4	●	2
MR**D0900**	9	25	80	10	4	●	1
MR**D1000**	10	25	80	10	4	●	2
MR**D1100**	11	30	110	12	4	●	1
MR**D1200**	12	30	110	12	4	●	2
MR**D1300**	13	35	115	12	4	●	3
MR**D1400**	14	35	135	16	4	●	1
MR**D1500**	15	40	140	16	4	●	1
MR**D1600**	16	40	140	16	4	●	2
MR**D1700**	17	40	140	16	4	●	3
MR**D1800**	18	40	140	16	4	●	3
MR**D1900**	19	45	145	20	4	●	1
MR**D2000**	20	45	145	20	4	●	2
MR**D2200**	22	45	145	20	4	●	3
MR**D2400**	24	50	150	25	4	●	1
MR**D2500**	25	50	150	25	4	●	2
MR**D2600**	26	50	150	25	4	●	3
MR**D2800**	28	55	160	25	5	●	3
MR**D3000S25**	30	55	165	25	5	●	3
MR**D3000S32**	30	55	165	32	5	●	1
MR**D3200**	32	60	175	32	5	●	2
MR**D3500**	35	60	175	32	6	●	3
MR**D4000S32**	40	65	185	32	6	●	3
MR**D4000S42**	40	65	185	42	6	●	1
MR**D4500**	45	70	200	42	6	●	3
MR**D5000**	50	70	200	42	6	●	3

● : Inventory maintained in Japan.

JR

Roughing end mill, Semi long cut length, 4—6 flute

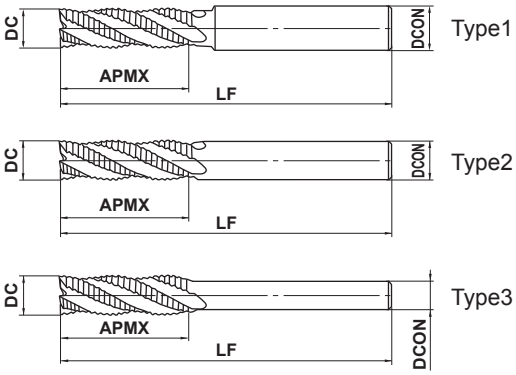
CO HSS

30°

DC≤15 | 16≤DC≤25 | 28≤DC≤32 | DC≥35

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○





●4—6 flute roughing end mill with full radius cutting edge profile for heavy cutting.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
JRD1000	10	35	90	10	4	●	2
JRD1200	12	45	125	12	4	●	2
JRD1400	14	45	145	16	4	●	1
JRD1500	15	55	155	16	4	●	1
JRD1600	16	55	155	16	4	●	2
JRD1800	18	55	155	16	4	●	3
JRD2000	20	65	165	20	4	●	2
JRD2200	22	65	165	20	4	●	3
JRD2400	24	65	165	25	4	●	1
JRD2500	25	75	175	25	4	●	2
JRD2800	28	75	180	25	5	●	3
JRD3000S25	30	75	185	25	5	●	3
JRD3000S32	30	75	185	32	5	●	1
JRD3200	32	75	190	32	5	●	2
JRD3500	35	85	200	32	6	●	3
JRD4000S32	40	85	205	32	6	●	3
JRD4000S42	40	85	205	42	6	●	1
JRD4500	45	105	235	42	6	●	3
JRD5000	50	105	235	42	6	●	3

ROUGHING END MILLS

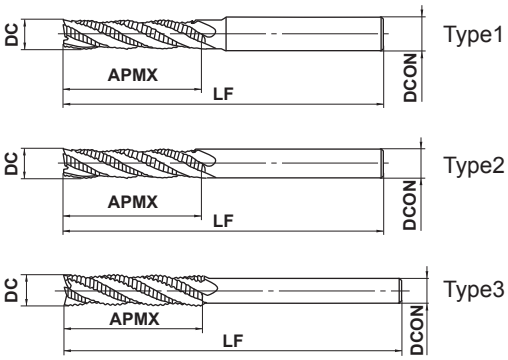
LR

Roughing end mill, Long cut length, 4—6 flute

CO HSS | 30° | DC≤25 | 28≤DC≤32 | DC≥35

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			○	○		○





●4—6 flute end mill with longer cut length and overall length than standard.

Unit : mm

Order Number	DC	APMX	LF	DCON	No. of Flutes	Stock	Type
LRD1000	10	45	110	10	4	●	2
LRD1200	12	50	130	12	4	●	2
LRD1400	14	55	155	16	4	●	1
LRD1500	15	65	165	16	4	●	1
LRD1600	16	65	165	16	4	●	2
LRD1800	18	65	165	16	4	●	3
LRD2000	20	75	175	20	4	●	2
LRD2200	22	75	175	20	4	●	3
LRD2400	24	85	185	25	4	●	1
LRD2500	25	90	190	25	4	●	2
LRD2800	28	90	190	25	5	●	3
LRD3000S25	30	90	200	25	5	●	3
LRD3000S32	30	90	200	32	5	●	1
LRD3200	32	95	210	32	5	●	2
LRD3500	35	100	215	32	6	●	3
LRD4000S32	40	110	230	32	6	●	3
LRD4000S42	40	110	230	42	6	●	1
LRD4500	45	120	250	42	6	●	3
LRD5000	50	120	250	42	6	●	3

● : Inventory maintained in Japan.

Roughing end mill, Medium cut length, 4—6 flute **MR**

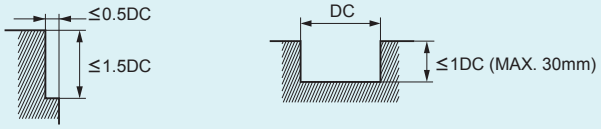
Roughing end mill, Medium cut length, 4—6 flute **JR**[1)] Roughing end mill, Long cut length, 4—6 flute **LR**[2)]

RECOMMENDED CUTTING CONDITIONS

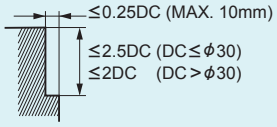
Work material	Structural steel, Cast iron, Carbon steel AISI 1045, AISI No 35 B, AISI 1050		Carbon steel, Alloy steel (20—30HRC) AISI 1055, AISI P20		Alloy steel, Tool steel, Pre-hardened steel (30—35HRC) AISI H13, AISI D2		Austenitic stainless steel AISI 304, AISI 316	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
5	1000 (750)	40 (30)	760 (570)	30 (25)	610 (460)	25 (20)	510 (380)	20 (15)
6	960 (720)	50 (40)	720 (540)	40 (30)	570 (430)	30 (25)	480 (360)	25 (20)
8	800 (600)	65 (50)	600 (450)	50 (40)	500 (380)	40 (30)	400 (300)	30 (25)
10	640 (480)	90 (70)	480 (360)	70 (55)	380 (290)	50 (40)	320 (240)	40 (30)
12	530 (400)	90 (70)	400 (300)	70 (55)	320 (240)	55 (40)	270 (200)	45 (35)
16	400 (300)	90 (70)	300 (230)	70 (55)	240 (180)	55 (40)	200 (150)	45 (35)
20	320 (240)	95 (70)	240 (180)	70 (55)	190 (140)	55 (40)	160 (120)	45 (35)
25	250 (190)	90 (70)	190 (140)	65 (50)	150 (110)	50 (40)	130 (100)	45 (35)
30	210 (160)	85 (65)	160 (120)	65 (50)	130 (100)	50 (40)	110 (85)	45 (35)
40	135 (100)	60 (45)	100 (75)	45 (40)	80 (60)	35 (26)	70 (55)	30 (25)
50	100 (75)	50 (40)	75 (55)	40 (30)	60 (45)	30 (23)	50 (40)	25 (20)

Depth of cut

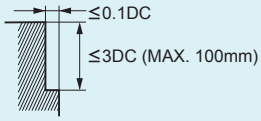
MR



JR



LR



( ) : Indicates standard revolution and feed rate for slotting with MR.

DC:Dia.

1) Decrease the revolution shown above by 10—20% and the feed rate by 20—30% for JR.
2) Decrease the revolution shown above by 20—30% and the feed rate by 30—50% for LR.
3) Supply cutting fluid sufficiently during cutting.
4) When the diameter exceeds 30 and the metal removal is less than the quantity shown in the table, the revolution and feed rate may be increased by 10—40%.
5) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

Memo

Memo

iMX END MILL SERIES

HEAD

Type	Applications, Features	No. of Flutes	Product Code	Shape	Size Range	Coolant hole	Long Cutting Edge Type	Work Material P: Carbon Steel, Alloy Steel, Cast Iron	Work Material P: Tool steel, Pre-Hardened Steel, Hardened Steel	Work Material H: Hardened Steel(-55HRC)	Work Material H: Hardened Steel(55HRC-)	Work Material M: Austenitic Stainless Steel	Work Material S: Titanium Alloy, Heat Resistant Alloy	Work Material N: Copper Alloy	Work Material N: Aluminium Alloy	Page Number: Dimensions	Page Number: Cutting Conditions
SQUARE																	
	For Difficult-to-cut Materials	3	iMX-S3HV	Square head, 3 flute, Irregular helix 	ϕ10—ϕ25			◎	○			◎	◎	○		J439	J458
		4	iMX-S4HV	Square head, 4 flute, Irregular helix 	ϕ10—ϕ32			◎	○			◎	◎	○		J440	J461 J464
			NEW	Square head, 4 flute, Irregular helix, Long cutting edge type 	ϕ16, ϕ20		●									J440	J463
		4	iMX-S4HV-S	Square head with coolant hole, 4 flute, Irregular helix 	ϕ10—ϕ25	●		◎	○			◎	◎	○		J441	J461
	For Machining of Aluminium Alloys	3	iMX-S3A	Square head, 3 flute, For aluminium alloy 	ϕ10—ϕ28										◎	J442	J469
RADIUS																	
	For Difficult-to-cut Materials	4	iMX-C4HV	Corner radius head, 4 flute, Irregular helix 	ϕ10—ϕ28			◎	○			◎	◎	○		J447	J461 J464
			NEW	Corner radius head, 4 flute, Irregular helix, Long cutting edge type 	ϕ16, ϕ20		●									J448	J463
		4	iMX-C4HV-S	Corner radius head, 4 flute, Irregular helix, with coolant hole 	ϕ10—ϕ25	●		◎	○			◎	◎	○		J449	J461
		6	iMX-C6HV	Corner radius head, Multi-flute, Irregular helix	ϕ10, ϕ12			◎	○			◎	◎			J450	J471
		10	iMX-C10HV		ϕ16			◎	○			◎	◎			J450	J471
		12	iMX-C12HV		ϕ20, ϕ25			◎	○			◎	◎			J450	J471
	NEW For High Feed Machining	4	iMX-C4FD-C	With coolant hole Multi-task corner radius end mill for high feed cutting 	ϕ10—ϕ25	●		◎	◎	◎		◎	◎	○		J451	J467
	For High Efficiency Machining	4	iMX-C4FV	Corner radius head for high efficiency machining, 4 flute, Irregular helix 	ϕ10—ϕ25			◎	◎	◎						J452	J468
	For Machining of Aluminium Alloys	3	iMX-C3A	Corner radius head, 3 flute, For aluminium alloy 	ϕ10—ϕ28										◎	J453	J469

Type	Applications, Features	No. of Flutes	Product Code	Shape	Size Range	Coolant hole	Long Cutting Edge Type	Work Material P: Carbon Steel, Alloy Steel, Cast Iron	P: Tool steel, Pre-Hardened Steel, Hardened Steel	H: Hardened Steel(-55HRC)	H: Hardened Steel(55HRC-)	M: Austenitic Stainless Steel	S: Titanium Alloy, Heat Resistant Alloy	N: Copper Alloy	N: Aluminium Alloy	Page Number Dimensions	Page Number Cutting Conditions
ROUGHING																	
	For Difficult-to-cut Materials	4	iMX-R4F	Roughing head, 4 flute 	ϕ10—ϕ25			◎	○			◎	◎	○		J443	J465
BALL																	
	For Difficult-to-cut Materials	4	iMX-B4HV	Ball nose head, 4 flute, Irregular helix 	ϕ10—ϕ25			◎	○			◎	◎	○		J444	J472
		4	iMX-B4HV-E	Ball nose head with coolant hole, 4 flute, Irregular helix 	ϕ10—ϕ25	●		◎	○			◎	◎	○		J445	J472
		6	iMX-B6HV	Ball nose head, 4 flute, Irregular helix 	ϕ10—ϕ25			◎	○			◎	◎			J446	J473

HOLDERS

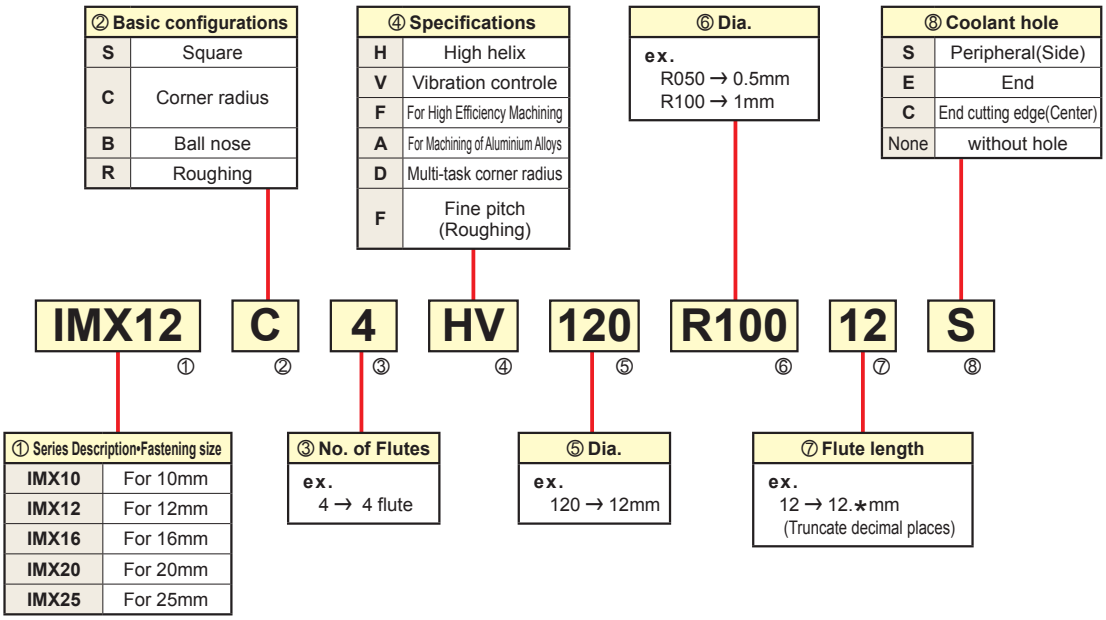
The undercut type is available in medium, semi-long, and long lengths.

Figure		Length	Taper angle one side	Tool material
Undercut		Medium Semi long Long	—	Carbide
NEW Straight		Semi long Long	—	Carbide
Taper neck		Long	1°	Carbide

IDENTIFICATION

iMX END MILL SERIES

HEAD



② Basic configurations	
S	Square
C	Corner radius
B	Ball nose
R	Roughing

④ Specifications	
H	High helix
V	Vibration controle
F	For High Efficiency Machining
A	For Machining of Aluminium Alloys
D	Multi-task corner radius
F	Fine pitch (Roughing)

⑥ Dia.

ex.
R050 → 0.5mm
R100 → 1mm

⑧ Coolant hole	
S	Peripheral(Side)
E	End
C	End cutting edge(Center)
None	without hole

① Series Description•Fastening size	
IMX10	For 10mm
IMX12	For 12mm
IMX16	For 16mm
IMX20	For 20mm
IMX25	For 25mm

③ No. of Flutes

ex.
4 → 4 flute

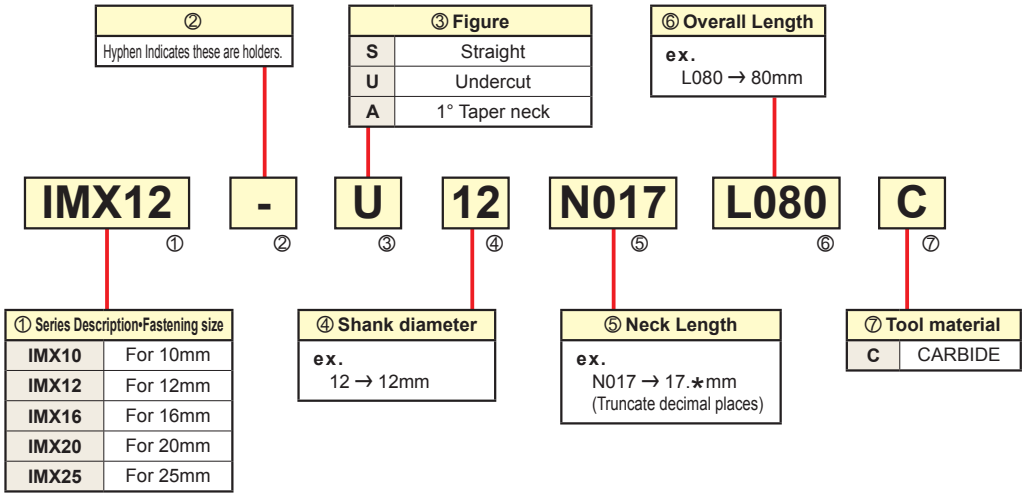
⑤ Dia.

ex.
120 → 12mm

⑦ Flute length

ex.
12 → 12.∗mm
(Truncate decimal places)

CARBIDE HOLDER



②

Hyphen Indicates these are holders.

③ Figure	
S	Straight
U	Undercut
A	1° Taper neck

⑥ Overall Length

ex.
L080 → 80mm

① Series Description•Fastening size	
IMX10	For 10mm
IMX12	For 12mm
IMX16	For 16mm
IMX20	For 20mm
IMX25	For 25mm

④ Shank diameter

ex.
12 → 12mm

⑤ Neck Length

ex.
N017 → 17.∗mm
(Truncate decimal places)

⑦ Tool material	
C	CARBIDE

RUN-OUT ACCURACY AND HEAD EXCHANGE ACCURACY

Unit : mm

Dia. DC	Run-out accuracy for the peripheral cutting edge	Head exchange accuracy (Axial)
<ø25	0.015	±0.02
≥ø25	0.020	

iMX-S3HV

Square head, 3 flute, Irregular helix

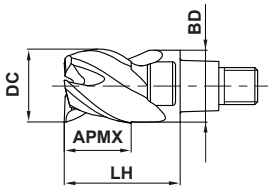






Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	





Type1

DC≤12	DC>12			
0 - 0.020	0 - 0.030			

- 3-flute end mills that cover side milling, slotting and plunging.
- Irregular lead controls vibration and achieves stable machining.

Unit : mm

Order Number	DC	APMX	LH	BD	No. of Flutes	Grade EP7020	Type
IMX10S3HV10008	10	8.5	16	9.7	3	●	1
IMX12S3HV12010	12	10.1	19	11.7	3	●	1
IMX16S3HV16013	16	13.3	24	15.5	3	●	1
IMX20S3HV20017	20	17	30	19.5	3	●	1
IMX25S3HV25021	25	21	37.5	24.5	3	●	1

∗ The fastening size of the holder and head should be the same. (refer to J438)

● : Inventory maintained in Japan.

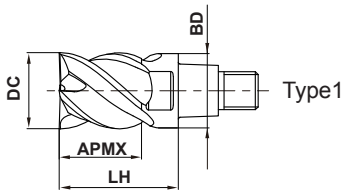
CUTTING CONDITIONS ➤ J458

iMX-S4HV

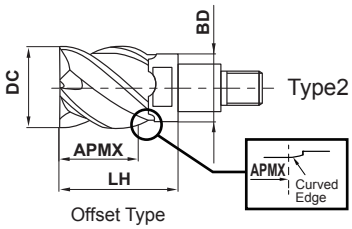
Square head, 4 flute, Irregular helix

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	





Type1



Type2

Offset Type

DC≤12	DC>12			
0 - 0.020	0 - 0.030			

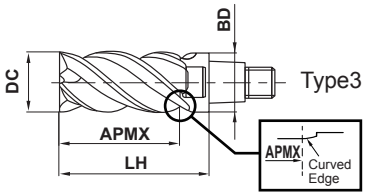
● Irregular lead controls vibration and achieves stable machining even when machining of difficult-to-cut materials and long overhang.

Unit : mm

Order Number	DC	APMX	LH	BD	No. of Flutes	Grade EP7020	Type
IMX10S4HV10010	10	10.5	16	9.7	4	●	1
NEW IMX10S4HV12012	12	12.5	19	9.7	4	●	2
IMX12S4HV12012	12	12.5	19	11.7	4	●	1
NEW IMX12S4HV14014	14	14.5	22.5	11.7	4	●	2
IMX16S4HV16016	16	16.5	24	15.5	4	●	1
NEW IMX16S4HV18018	18	18.5	27	15.5	4	●	2
IMX20S4HV20021	20	21	30	19.5	4	●	1
NEW IMX20S4HV22023	22	23	33	19.5	4	●	2
IMX25S4HV25026	25	26	37.5	24.5	4	●	1
NEW IMX25S4HV28029	28	29	41.5	24.5	4	●	2
NEW IMX25S4HV30031	30	31	43.5	24.5	4	●	2
NEW IMX25S4HV32033	32	33	45.5	24.5	4	●	2

CUTTING CONDITIONS ➤ J461





Type3

Long cutting edge type

Unit : mm

Order Number	DC	APMX	LH	BD	No. of Flutes	Grade EP7020	Type
NEW IMX16S4HV16032	16	32	40	15.5	4	●	3
NEW IMX20S4HV20040	20	40	50	19.5	4	●	3

* The fastening size of the holder and head should be the same. (refer to J438)

● : Inventory maintained in Japan.

CUTTING CONDITIONS ➤ J461

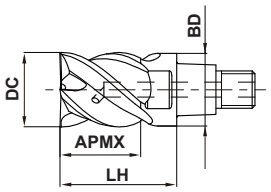
iMX-S4HV-S

Square head with coolant hole, 4 flute, Irregular helix

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	



Peripheral cutting edge with coolant hole



Type1

Peripheral cutting edge with coolant hole

DC≤12	DC>12			
0 - 0.020	0 - 0.030			

- Coolant holes for each cutting edge enable stable coolant supply.
- Irregular lead controls vibration and achieves stable machining.

Unit : mm

Order Number	DC	APMX	LH	BD	No. of Flutes	Grade EP7020	Type
IMX10S4HV10010S	10	10.5	16	9.7	4	●	1
IMX12S4HV12012S	12	12.5	19	11.7	4	●	1
IMX16S4HV16016S	16	16.5	24	15.5	4	●	1
IMX20S4HV20021S	20	21	30	19.5	4	●	1
IMX25S4HV25026S	25	26	37.5	24.5	4	●	1

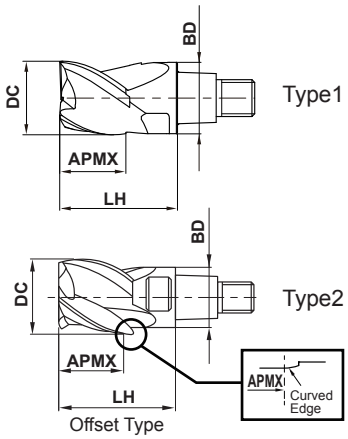
* The fastening size of the holder and head should be the same. (refer to J438)

iMX-S3A

Square head, 3 flute, For aluminium alloy

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎





DC≤12	DC>12			
0 - 0.020	0 - 0.030			

● High efficiency machining due to the sharp cutting edge suitable for aluminium alloy machining and polished rake face.

Unit : mm

Order Number	DC	APMX	LH	BD	No. of Flutes	Grade ET2020	Type
IMX10S3A10008	10	8.5	16	9.7	3	●	1
NEW IMX10S3A12010	12	10.1	19	9.7	3	●	2
IMX12S3A12010	12	10.1	19	11.7	3	●	1
NEW IMX12S3A14011	14	11.7	22.5	11.7	3	●	2
IMX16S3A16013	16	13.3	24	15.5	3	●	1
NEW IMX16S3A18014	18	14.9	27	15.5	3	●	2
IMX20S3A20017	20	17	30	19.5	3	●	1
NEW IMX20S3A22018	22	18.6	33	19.5	3	●	2
IMX25S3A25021	25	21	37.5	24.5	3	●	1
NEW IMX25S3A28023	28	23.4	41.5	24.5	3	●	2

∗ The fastening size of the holder and head should be the same. (refer to J438)

● : Inventory maintained in Japan.

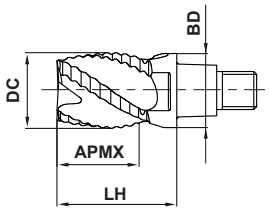
CUTTING CONDITIONS ➢ J469

iMX-R4F

Roughing head, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	





Type1

● Roughing cutting edge reduces the cutting resistance. Effective when the rigidity of the machine or workpiece is low.

Unit : mm

Order Number	DC	APMX	LH	BD	No. of Flutes	Grade EP7020	Type
IMX10R4F10010	10	10.5	16	9.7	4	●	1
IMX12R4F12012	12	12.5	19	11.7	4	●	1
IMX16R4F16016	16	16.5	24	15.5	4	●	1
IMX20R4F20021	20	21	30	19.5	4	●	1
IMX25R4F25026	25	26	37.5	24.5	4	●	1

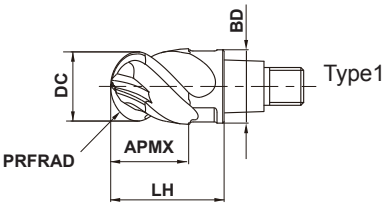
* The fastening size of the holder and head should be the same. (refer to J438)

iMX-B4HV

Ball nose head, 4 flute, Irregular helix

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	





R	DC≤12	DC>12			
	±0.010	±0.020			
	DC≤12	DC>12			
	0 - 0.020	0 - 0.030			

● The variable curve cutting edge controls vibraion and achieves stable machining of difficult-to-cut materilas and for long overhang applications.

Unit : mm

Order Number	PRFRAD	DC	APMX	LH	BD	No. of Flutes	Grade EP7020	Type
IMX10B4HV10010	5	10	10.5	16	9.7	4	●	1
IMX**12B4HV12012**	6	12	12.5	19	11.7	4	●	1
IMX**16B4HV16016**	8	16	16.5	24	15.5	4	●	1
IMX**20B4HV20021**	10	20	21	30	19.5	4	●	1
IMX**25B4HV25026**	12.5	25	26	37.5	24.5	4	●	1

* The fastening size of the holder and head should be the same. (refer to J438)

● : Inventory maintained in Japan.

CUTTING CONDITIONS ➤ J472

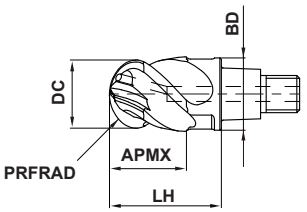
iMX-B4HV-E

Ball nose head with coolant hole, 4 flute, Irregular helix

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	



End cutting edge with coolant hole



Type1

End cutting edge with coolant hole

R	DC≤12	DC>12			
	±0.010	±0.020			
	DC≤12	DC>12			
	0 - 0.020	0 - 0.030			

- Coolant holes for each cutting edge enable stable coolant supply.
- The variable curve cutting edge controls vibraion and achieves stable machining of difficult-to-cut materilas and for long overhang applications.

Unit : mm

Order Number	PRFRAD	DC	APMX	LH	BD	No. of Flutes	Grade EP7020	Type
IMX10B4HV10010E	5	10	10.5	16	9.7	4	●	1
IMX12B4HV12012E	6	12	12.5	19	11.7	4	●	1
IMX16B4HV16016E	8	16	16.5	24	15.5	4	●	1
IMX20B4HV20021E	10	20	21	30	19.5	4	●	1
IMX25B4HV25026E	12.5	25	26	37.5	24.5	4	●	1

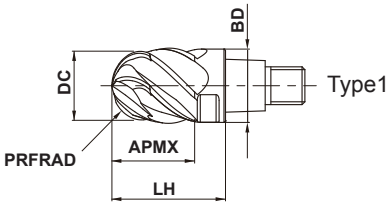
∗ The fastening size of the holder and head should be the same. (refer to J438)

iMX-B6HV

Ball nose head, 6 flute, Irregular helix

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎		





R	DC≤12	DC>12			
	±0.010	±0.020			
	DC≤12	DC>12			
	0 - 0.020	0 - 0.030			

- The variable curve cutting edge controls vibraion and achieves stable machining of difficult-to-cut materilas and for long overhang applications.
- 6 flutes enable high machining efficiency.

Unit : mm

Order Number	PRFRAD	DC	APMX	LH	BD	No. of Flutes	Grade EP7020	Type
IMX10B6HV10010	5	10	10.5	16	9.7	6	●	1
IMX**12B6HV12012**	6	12	12.5	19	11.7	6	●	1
IMX**16B6HV16016**	8	16	16.5	24	15.5	6	●	1
IMX**20B6HV20021**	10	20	21	30	19.5	6	●	1
IMX**25B6HV25026**	12.5	25	26	37.5	24.5	6	●	1

* The fastening size of the holder and head should be the same. (refer to J438)

● : Inventory maintained in Japan.

CUTTING CONDITIONS ➤ J473

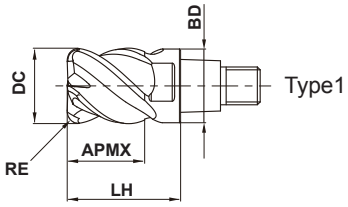
iMX-C4HV

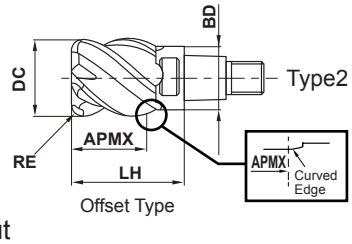
Corner radius head, 4 flute, Irregular helix

UWC 42° 45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	







Offset Type

R					
	±0.020				
	DC≤12	DC>12			
	0 - 0.020	0 - 0.030			

● Vibration control corner radius type achieving the stable machining of difficult-to-cut materials and for long overhang applications due to the irregular helix.

Unit : mm

Order Number	DC	RE	APMX	LH	BD	No. of Flutes	Grade EP7020	Type
IMX10C4HV100R05010	10	0.5	10.5	16	9.7	4	●	1
IMX10C4HV100R10010	10	1	10.5	16	9.7	4	●	1
IMX10C4HV100R15010	10	1.5	10.5	16	9.7	4	●	1
IMX10C4HV100R20010	10	2	10.5	16	9.7	4	●	1
IMX10C4HV100R25010	10	2.5	10.5	16	9.7	4	●	1
IMX10C4HV100R30010	10	3	10.5	16	9.7	4	●	1
NEW IMX10C4HV120R10012	12	1	12.5	19	9.7	4	●	2
NEW IMX10C4HV120R20012	12	2	12.5	19	9.7	4	●	2
IMX12C4HV120R05012	12	0.5	12.5	19	11.7	4	●	1
IMX12C4HV120R10012	12	1	12.5	19	11.7	4	●	1
IMX12C4HV120R15012	12	1.5	12.5	19	11.7	4	●	1
IMX12C4HV120R20012	12	2	12.5	19	11.7	4	●	1
IMX12C4HV120R25012	12	2.5	12.5	19	11.7	4	●	1
IMX12C4HV120R30012	12	3	12.5	19	11.7	4	●	1
NEW IMX12C4HV120R40012	12	4	12	19	11.7	4	●	1
NEW IMX12C4HV140R10014	14	1	14.5	22.5	11.7	4	●	2
NEW IMX12C4HV140R20014	14	2	14.5	22.5	11.7	4	●	2
IMX16C4HV160R05016	16	0.5	16.5	24	15.5	4	●	1
IMX16C4HV160R10016	16	1	16.5	24	15.5	4	●	1
IMX16C4HV160R15016	16	1.5	16.5	24	15.5	4	●	1
IMX16C4HV160R20016	16	2	16.5	24	15.5	4	●	1
IMX16C4HV160R25016	16	2.5	16.5	24	15.5	4	●	1
IMX16C4HV160R30016	16	3	16.5	24	15.5	4	●	1
IMX16C4HV160R40016	16	4	16.5	24	15.5	4	●	1
IMX16C4HV160R50016	16	5	16.5	24	15.5	4	●	1
NEW IMX16C4HV180R10018	18	1	18.5	27	15.5	4	●	2
NEW IMX16C4HV180R30018	18	3	18.5	27	15.5	4	●	2
IMX20C4HV200R05021	20	0.5	21	30	19.5	4	●	1
IMX20C4HV200R10021	20	1	21	30	19.5	4	●	1
IMX20C4HV200R15021	20	1.5	21	30	19.5	4	●	1
IMX20C4HV200R20021	20	2	21	30	19.5	4	●	1
IMX20C4HV200R25021	20	2.5	21	30	19.5	4	●	1
IMX20C4HV200R30021	20	3	21	30	19.5	4	●	1
IMX20C4HV200R40021	20	4	21	30	19.5	4	●	1
IMX20C4HV200R50021	20	5	21	30	19.5	4	●	1

iMX-C4HV

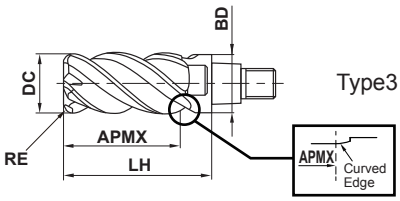
Corner radius head, 4 flute, Irregular helix

Unit : mm

Order Number	DC	RE	APMX	LH	BD	No. of Flutes	Grade EP7020	Type
IMX20C4HV200R63521	20	6.35	21	30	19.5	4	●	1
NEW IMX20C4HV220R10023	22	1	23	33	19.5	4	●	2
NEW IMX20C4HV220R30023	22	3	23	33	19.5	4	●	2
IMX25C4HV250R10026	25	1	26	37.5	24.5	4	●	1
IMX25C4HV250R20026	25	2	26	37.5	24.5	4	●	1
IMX25C4HV250R30026	25	3	26	37.5	24.5	4	●	1
IMX25C4HV250R40026	25	4	26	37.5	24.5	4	●	1
IMX25C4HV250R50026	25	5	26	37.5	24.5	4	●	1
IMX25C4HV250R63526	25	6.35	26	37.5	24.5	4	●	1
NEW IMX25C4HV280R10029	28	1	29	41.5	24.5	4	●	2
NEW IMX25C4HV280R30029	28	3	29	41.5	24.5	4	●	2

CUTTING CONDITIONS ➤ J461





Type3

Long cutting edge type

Unit : mm

Order Number	DC	RE	APMX	LH	BD	No. of Flutes	Grade EP7020	Type
NEW IMX16C4HV160R10032	16	1	32	40	15.5	4	●	3
NEW IMX16C4HV160R30032	16	3	32	40	15.5	4	●	3
NEW IMX20C4HV200R10040	20	1	40	50	19.5	4	●	3
NEW IMX20C4HV200R30040	20	3	40	50	19.5	4	●	3

* The fastening size of the holder and head should be the same. (refer to J438)

● : Inventory maintained in Japan.

CUTTING CONDITIONS ➤ J461

iMX-C4HV-S

Corner radius head, 4 flute, Irregular helix, with coolant hole

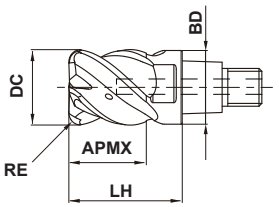





Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎	○	



(Peripheral cutting edge with coolant hole)



Type1

(Peripheral cutting edge with coolant hole)

R					
	±0.020				
	DC≤12	DC>12			
	0 - 0.020	0 - 0.030			

- Coolant holes for each cutting edge enable stable coolant supply.
- Irregular lead controls vibration and achieves stable machining even on difficult-to-cut materials and long overhang applications.

Unit : mm

Order Number	DC	RE	APMX	LH	BD	No. of Flutes	Grade EP7020	Type
IMX10C4HV100R10010S	10	1	10.5	16	9.7	4	●	1
IMX12C4HV120R10012S	12	1	12.5	19	11.7	4	●	1
IMX16C4HV160R10016S	16	1	16.5	24	15.5	4	●	1
IMX20C4HV200R10021S	20	1	21	30	19.5	4	●	1
IMX25C4HV250R10026S	25	1	26	37.5	24.5	4	●	1

* The fastening size of the holder and head should be the same. (refer to J438)

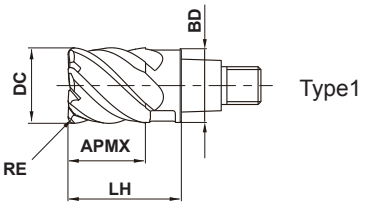
iMX-C6HV/C10HV/C12HV

Corner radius head, Multi-flute, Irregular helix

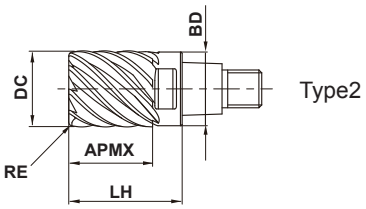
UWC | 43.5° 45° DC≤12 | 44.5° 45° DC>12 | DC≤12 | DC>12

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	○			◎	◎		





Type1



Type2

R					
	±0.020				
	DC≤12	DC>12			
	0 - 0.020	0 - 0.030			

- High machining efficiency due to the multi-flute design.
- Irregular lead controls vibration and achieves stable machining.

Unit : mm

Order Number	DC	RE	APMX	LH	BD	No. of Flutes	Grade EP7020	Type
NEW IMX10C6HV100R05010	10	0.5	10.5	16	9.7	6	●	1
IMX10C6HV100R10010	10	1	10.5	16	9.7	6	●	1
IMX12C6HV120R10012	12	1	12.5	19	11.7	6	●	1
IMX16C10HV160R10016	16	1	16.5	24	15.5	10	●	2
IMX20C12HV200R10021	20	1	21	30	19.5	12	●	2
IMX25C12HV250R10026	25	1	26	37.5	24.5	12	●	2

* The fastening size of the holder and head should be the same. (refer to J438)

● : Inventory maintained in Japan.

CUTTING CONDITIONS ➤ J471

iMX-C4FD-C NEW

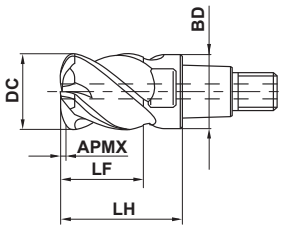
With coolant hole Multi-task corner radius end mill for high feed cutting

UWC 45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎		◎	◎	○	



(With end cutting edge center coolant hole)



(With end cutting edge center coolant hole)

DC≤12	DC>12			
0 - 0.020	0 - 0.030			

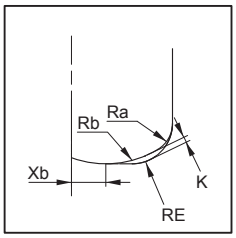
- Multi-task corner radius type and 4 flutes offer high feed and high efficiency.
- Coolant hole with the end cutting edge as the center provides a stable supply of coolant.

Unit : mm

Order Number	DC	RE *1	APMX	LF	LH	BD	No. of Flutes	RMPX *2	Grade EP7020	Type
IMX10C4FD10010C	10	1.99	0.7	10.5	16	9.7	4	2.1°	●	1
IMX12C4FD12012C	12	2.1	0.8	12.5	19	11.7	4	2.8°	●	1
IMX16C4FD16016C	16	2.75	1	16.5	24	15.5	4	3°	●	1
IMX20C4FD20021C	20	3.07	1.3	21	30	19.5	4	3.3°	●	1
IMX25C4FD25026C	25	4.21	1.6	26	37.5	24.5	4	4.5°	●	1

* The fastening size of the holder and head should be the same. (refer to J438)
* Multi-task corner radius is not suitable for corner radius milling that transfers an R-shape because cutting at R is incomplete.
*1 RE : Approx. R
*2 RMPX : Max. Ramping Angle

Order Number	RE *1	Multi-task radius part			
		K	Xb	Ra	Rb
IMX10C4FD10010C	1.99	0.27	1.7	1.5	5
IMX12C4FD12012C	2.1	0.33	2.25	1.5	6
IMX16C4FD16016C	2.75	0.42	3.1	2	8
IMX20C4FD20021C	3.07	0.59	4	2	10
IMX25C4FD25026C	4.21	0.67	5	3	12



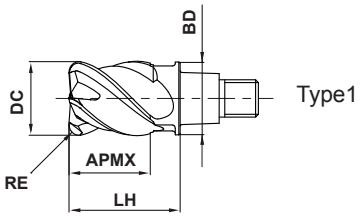
Please programme CAM as an R2 cutter radius, when using the ***iMX***.
The approximate uncut portions for the programme are as follows.

iMX-C4FV

Corner radius head for high efficiency machining, 4 flute, Irregular helix

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎					





Type1

R	DC≤20	DC>20			
	±0.010	±0.020			
	DC≤12	DC>12			
	0 - 0.020	0 - 0.030			

- Corner radius end mill for high efficiency machining
- Irregular lead controls vibration and achieves stable machining.

Unit : mm

Order Number	DC	RE	APMX	LH	BD	No. of Flutes	Grade EP6120	Type
IMX10C4FV100R20010	10	2	10.5	16	9.7	4	●	1
IMX12C4FV120R20012	12	2	12.5	19	11.7	4	●	1
IMX16C4FV160R30016	16	3	16.5	24	15.5	4	●	1
IMX20C4FV200R30021	20	3	21	30	19.5	4	●	1
IMX25C4FV250R40026	25	4	26	37.5	24.5	4	●	1

* The fastening size of the holder and head should be the same. (refer to J438)

● : Inventory maintained in Japan.

CUTTING CONDITIONS ➤ J468

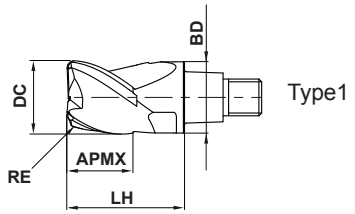
iMX-C3A

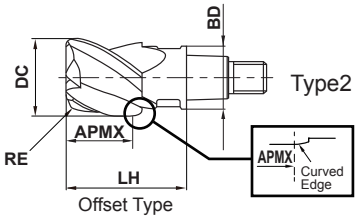
Corner radius head, 3 flute, For aluminium alloy

UWC 37.5°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
							◎







R					
	±0.020				
	DC≤12	DC>12			
	0 - 0.020	0 - 0.030			

● High efficiency machining due to the sharp cutting edge suitable for aluminium alloy machining and polished rake face.

Unit : mm

Order Number	DC	RE	APMX	LH	BD	No. of Flutes	Grade ET2020	Type
IMX10C3A100R10008	10	1	8.5	16	9.7	3	●	1
IMX10C3A100R25008	10	2.5	8.5	16	9.7	3	●	1
NEW IMX10C3A120R10010	12	1	10.1	19	9.7	3	●	2
IMX12C3A120R10010	12	1	10.1	19	11.7	3	●	1
IMX12C3A120R32010	12	3.2	10.1	19	11.7	3	●	1
NEW IMX12C3A140R10011	14	1	11.7	22.5	11.7	3	●	2
IMX16C3A160R10013	16	1	13.3	24	15.5	3	●	1
IMX16C3A160R32013	16	3.2	13.3	24	15.5	3	●	1
NEW IMX16C3A180R32014	18	3.2	14.9	27	15.5	3	●	2
IMX20C3A200R10017	20	1	17	30	19.5	3	●	1
IMX20C3A200R32017	20	3.2	17	30	19.5	3	●	1
NEW IMX20C3A220R32018	22	3.2	18.6	33	19.5	3	●	2
NEW IMX25C3A250R10020	25	1	20	37.5	24.5	3	●	1
IMX25C3A250R32021	25	3.2	21	37.5	24.5	3	●	1
IMX25C3A250R50021	25	5	21	37.5	24.5	3	●	1
NEW IMX25C3A280R32023	28	3.2	23.4	41.5	24.5	3	●	2

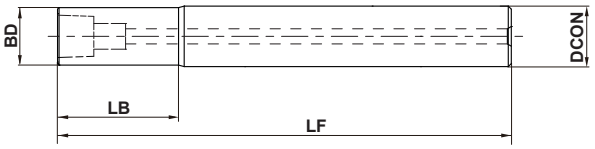
* The fastening size of the holder and head should be the same. (refer to J438)

INDEXABLE HEAD END MILLS

iMX
Carbide Holder

Undercut

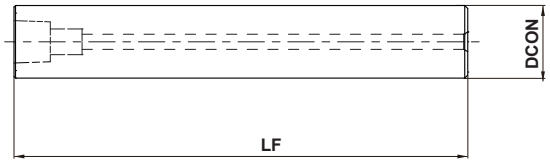




Type1

Straight

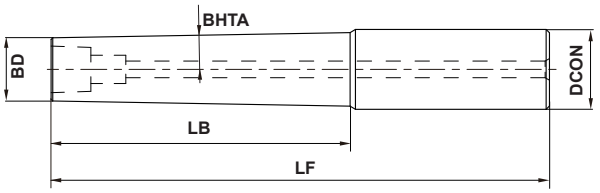




Type2

Taper neck type





Type3

h6	DCON=10	12≤DCON≤16	20≤DCON≤25		
	0 - 0.009	0 - 0.011	0 - 0.013		

Carbide Holder

Unit : mm

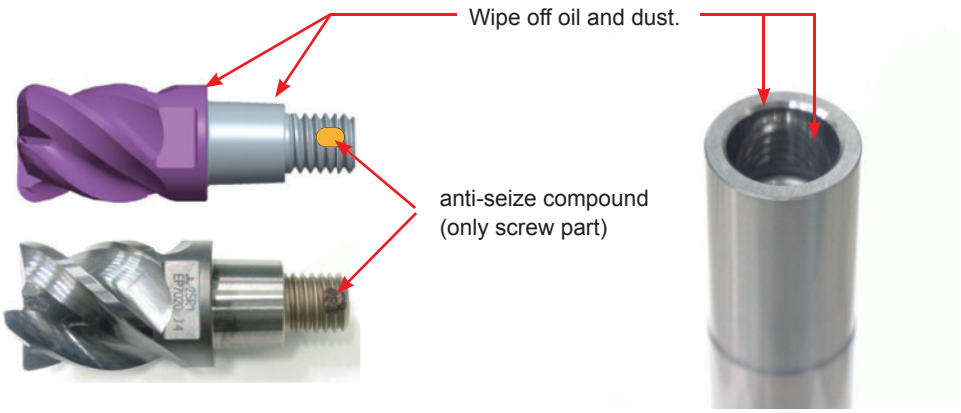
Order Number	BHTA	LB	BD	LF	DCON	Stock	Type	Suitable Head	Wrench	Anti-seize Lubricant
IMX10-U10N014L070C	—	14	9.7	70	10	●	1	IMX10□	IMX10-WR	MK1KS
NEW IMX10-S10L090C	—	—	—	90	10	●	2	IMX10□	IMX10-WR	MK1KS
IMX10-U10N034L090C	—	34	9.7	90	10	●	1	IMX10□	IMX10-WR	MK1KS
NEW IMX10-S10L110C	—	—	—	110	10	●	2	IMX10□	IMX10-WR	MK1KS
IMX10-U10N054L110C	—	54	9.7	110	10	●	1	IMX10□	IMX10-WR	MK1KS
IMX10-A12N054L110C	1°	54	9.7	110	12	●	3	IMX10□	IMX10-WR	MK1KS
IMX12-U12N017L080C	—	17	11.7	80	12	●	1	IMX12□	IMX12-WR	MK1KS
NEW IMX12-S12L100C	—	—	—	100	12	●	2	IMX12□	IMX12-WR	MK1KS
IMX12-U12N041L100C	—	41	11.7	100	12	●	1	IMX12□	IMX12-WR	MK1KS
NEW IMX12-S12L130C	—	—	—	130	12	●	2	IMX12□	IMX12-WR	MK1KS
IMX12-U12N065L130C	—	65	11.7	130	12	●	1	IMX12□	IMX12-WR	MK1KS
IMX12-A16N065L130C	1°	65	11.7	130	16	●	3	IMX12□	IMX12-WR	MK1KS
IMX16-U16N024L080C	—	24	15.5	80	16	●	1	IMX16□	IMX16-WR	MK1KS
NEW IMX16-S16L110C	—	—	—	110	16	●	2	IMX16□	IMX16-WR	MK1KS
IMX16-U16N056L110C	—	56	15.5	110	16	●	1	IMX16□	IMX16-WR	MK1KS
NEW IMX16-S16L150C	—	—	—	150	16	●	2	IMX16□	IMX16-WR	MK1KS
IMX16-U16N088L150C	—	88	15.5	150	16	●	1	IMX16□	IMX16-WR	MK1KS
IMX16-A20N088L150C	1°	88	15.5	150	20	●	3	IMX16□	IMX16-WR	MK1KS
IMX20-U20N030L090C	—	30	19.5	90	20	●	1	IMX20□	IMX20-WR	MK1KS
NEW IMX20-S20L130C	—	—	—	130	20	●	2	IMX20□	IMX20-WR	MK1KS
IMX20-U20N070L130C	—	70	19.5	130	20	●	1	IMX20□	IMX20-WR	MK1KS
NEW IMX20-S20L180C	—	—	—	180	20	●	2	IMX20□	IMX20-WR	MK1KS
IMX20-U20N110L180C	—	110	19.5	180	20	●	1	IMX20□	IMX20-WR	MK1KS
IMX20-A25N110L180C	1°	110	19.5	180	25	●	3	IMX20□	IMX20-WR	MK1KS
IMX25-U25N037L110C	—	37.5	24.5	110	25	●	1	IMX25□	IMX25-WR	MK1KS
NEW IMX25-S25L160C	—	—	—	160	25	●	2	IMX25□	IMX25-WR	MK1KS
IMX25-U25N087L160C	—	87.5	24.5	160	25	●	1	IMX25□	IMX25-WR	MK1KS
NEW IMX25-S25L210C	—	—	—	210	25	●	2	IMX25□	IMX25-WR	MK1KS

*The fastening size of the holder and head should be the same. (refer to J438)

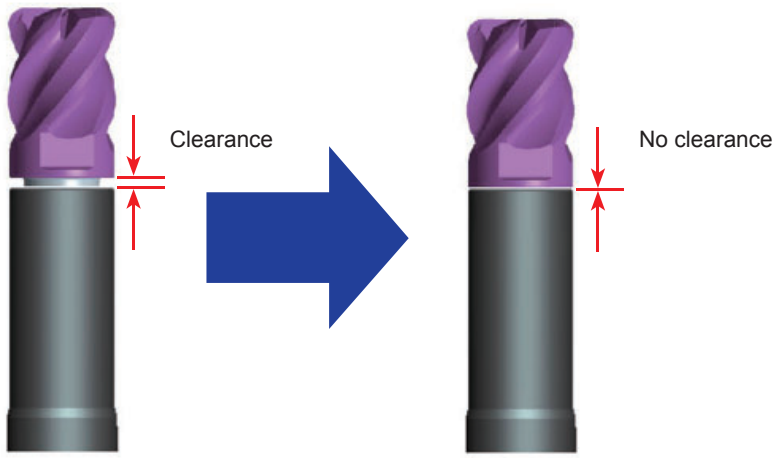
● : Inventory maintained in Japan.

HOW TO INSTALL THE HEAD

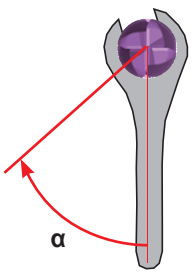
- Before installing remove all the dust and oil etc. Remove also the anti-rust oil from a new head.
  Coat only the screw part of the head with a small amount of anti-seize compound. If too much compound is used, during tightening, the anti-seize compound may enter the taper part and have a large effect on the coupling mechanism. Wipe off the anti-seize compound and make adjustments.
  Be careful that there is no anti-seize compound sticking inside the taper when inserting the head into the holder.



- Be careful because you may cut your hand if you touch the edge of the blade directly when tightening.
  There is still a clearance in this state, use the accessory wrench to tighten until the face of the head and holder fit snugly together.
- Refer to the table below for the necessary recommended torque angle.
  If regulating more strictly, use the torque wrench to tighten by the recommended torque below.



Fastening size	Reference tightening angle α	Recommended clamping torque (Nm)
iMX10	50°	10
iMX12	50°	15
iMX16	50°	30
iMX20	40°	50
iMX25	35°	75

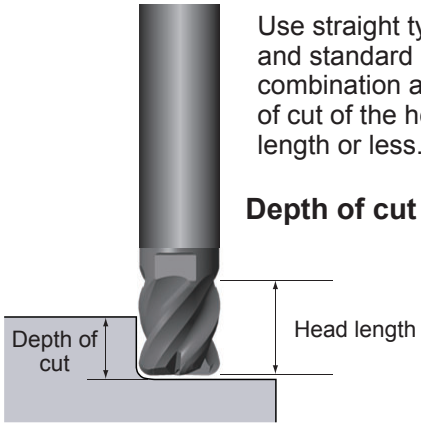


Note 1) Do not handle cutting edges with bare hands.
Note 2) Please use the wrench provided. It is thinner than a standard wrench to prevent damage to the flutes when tightening.

iMX holder application

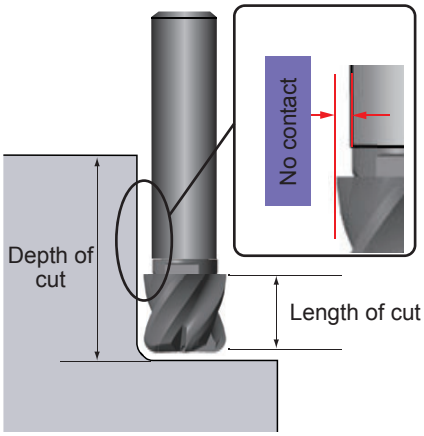
- Combination of the straight type and standard head causes interference when the depth of cut is head length or more. (Because holder diameter = head diameter)
- Combination of the straight type and offset head may make the depth of cutting length or more. (Because holder diameter < head diameter)

Straight + Standard head



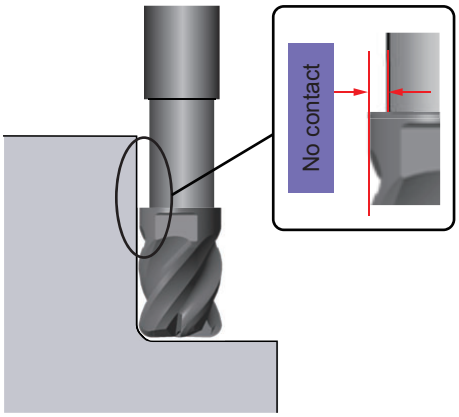
Installation at an overhang of 3D or less is also possible, if the depth of cut < head length is assumed.

Straight + Offset head

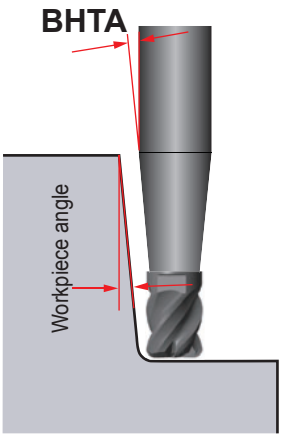


- It is suitable for vertical wall machining, because the undercut type has a relief neck.
- A taper neck with thick relief has high rigidity. Especially a stable cutting is demonstrated at deeper machining.
- Perform straight shank additional grinding together with customer application for undercut taper neck type. (Refer to the cutting edge diameter (BD) of each type for the minimum machining diameter.)

Undercut + Standard head



Taper neck + Standard head



Correction factor by recommended cutting condition overhang length (SIDE MILLING)

Use by multiplying the recommended cutting condition on the next page by the correction factor by overhang length.
Refer to each recommended condition for the long cutting and offset type.

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010				Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT				Austenitic stainless steel, Ferritic, Precipitation hardening stainless steel, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V			
L/D	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Cutting Width ae (mm)
2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
3	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
4	80%	80%	90%	70%	80%	80%	90%	70%	80%	80%	90%	70%
5	60%	60%	80%	40%	60%	60%	80%	40%	60%	60%	80%	40%
6	50%	50%	70%	30%	50%	50%	70%	30%	50%	50%	70%	30%
7	40%	40%	70%	20%	40%	40%	70%	20%	30%	30%	60%	20%
8	40%	40%	60%	10%	40%	40%	60%	10%	30%	30%	50%	10%
9	30%	30%	60%	10%	30%	30%	60%	10%	20%	20%	50%	10%

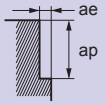
Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631				Heat resistant alloys Inconel718			
L/D	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Cutting Width ae (mm)
2	100%	100%	100%	100%	100%	100%	100%	100%
3	100%	100%	100%	100%	100%	100%	100%	100%
4	80%	80%	90%	70%	80%	80%	90%	70%
5	60%	60%	80%	40%	60%	60%	80%	40%
6	50%	50%	70%	30%	50%	50%	70%	30%
7	30%	30%	60%	20%	30%	30%	60%	20%
8	30%	30%	50%	10%	30%	30%	50%	10%
9	20%	20%	50%	10%	20%	20%	50%	10%

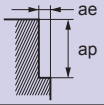
iMX-S3HV

Square head, 3 flute, Irregular helix

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic, Precipitation hardening stainless steel, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
Dia. **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)
10	150	4800	0.09	1300	8	2	120	3800	0.06	680	8	2	100	3200	0.075	720	8	2
12	150	4000	0.09	1100	9.6	2.4	120	3200	0.065	620	9.6	2.4	100	2700	0.08	650	9.6	2.4
16	150	3000	0.1	900	12.8	3.2	120	2400	0.075	540	12.8	3.2	100	2000	0.09	540	12.8	3.2
20	150	2400	0.1	720	16	4	120	1900	0.075	430	16	4	100	1600	0.09	430	16	4
25	150	1900	0.12	680	20	5	120	1500	0.075	340	20	5	100	1300	0.09	350	20	5
Depth of cut	 DC:Dia.																	

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
Dia. **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)
10	75	2400	0.06	430	8	2	40	1300	0.04	160	8	1
12	75	2000	0.065	390	9.6	2.4	40	1100	0.045	150	9.6	1.2
16	75	1500	0.075	340	12.8	3.2	40	800	0.05	120	12.8	1.6
20	75	1200	0.075	270	16	4	40	640	0.05	96	16	2
25	75	950	0.075	210	20	5	40	510	0.05	77	20	2.5
Depth of cut	 DC:Dia.											

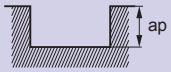
1) For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

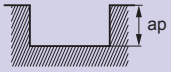
iMX-S3HV

Square head, 3 flute, Irregular helix

RECOMMENDED CUTTING CONDITIONS

Slotting

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic, Precipitation hardening stainless steel, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V				
Dia. **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)
10	100	3200	0.04	380	5	80	2500	0.03	230	5	75	2400	0.03	200	5
12	100	2700	0.05	410	6	80	2100	0.04	250	6	75	2000	0.04	240	6
16	100	2000	0.07	420	8	80	1600	0.05	240	8	75	1500	0.06	270	8
20	100	1600	0.07	340	10	80	1300	0.05	200	10	75	1200	0.06	220	10
25	100	1300	0.08	310	12	80	1000	0.05	150	12	75	950	0.06	170	12
Depth of cut	 DC:Dia.														

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631					Heat resistant alloys Inconel718				
Dia. **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)
10	60	1900	0.025	100	5	30	950	0.02	57	2
12	60	1600	0.035	170	6	30	800	0.03	72	2.4
16	60	1200	0.05	180	8	30	600	0.05	90	3.2
20	60	950	0.05	140	10	30	480	0.05	72	4
25	60	760	0.05	110	12	30	380	0.05	57	5
Depth of cut	 DC:Dia.									

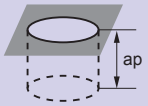
1) For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

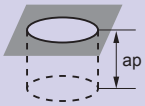
iMX-S3HV

Square head, 3 flute, Irregular helix

RECOMMENDED CUTTING CONDITIONS

Plunging

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic, Precipitation hardening stainless steel, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
Dia **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Revolution (mm/rev)	Table Feed per Min. (mm/min)	Drilled Depth ap (mm)	Step ap_2 (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Revolution (mm/rev)	Table Feed per Min. (mm/min)	Drilled Depth ap (mm)	Step ap_2 (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Revolution (mm/rev)	Table Feed per Min. (mm/min)	Drilled Depth ap (mm)	Step ap_2 (mm)
10	100	3200	0.14	450	5	2.5	70	2200	0.09	200	5	2	60	1900	0.03	57	5	0.6
12	100	2700	0.14	380	6	2.5	70	1900	0.09	170	6	2	60	1600	0.03	48	6	0.6
16	100	2000	0.14	280	8	2.5	70	1400	0.09	130	8	2	60	1200	0.03	36	8	0.6
20	100	1600	0.14	220	10	2.5	70	1100	0.09	99	10	2	60	950	0.03	29	10	0.6
25	100	1300	0.14	180	12.5	2.5	70	890	0.09	80	12.5	2	60	760	0.03	23	12.5	0.6
Depth of cut	 DC:Dia.																	

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631					
Dia **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Revolution (mm/rev)	Table Feed per Min. (mm/min)	Drilled Depth ap (mm)	Step ap_2 (mm)
10	40	1300	0.03	39	5	0.6
12	40	1100	0.03	33	6	0.6
16	40	800	0.03	24	8	0.6
20	40	640	0.03	19	10	0.6
25	40	510	0.03	15	12.5	0.6
Depth of cut	 DC:Dia.					

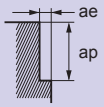
1) For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
2) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

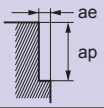
iMX-S4HV/iMX-S4HV-S/iMX-C4HV/iMX-C4HV-S

Square/Corner radius, 4 flute, Irregular helix (With/Without coolant hole)

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic, Precipitation hardening stainless steel, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
Dia **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)
10	150	4800	0.09	1700	10	2	120	3800	0.06	910	10	2	100	3200	0.075	960	10	2
12	150	4000	0.09	1400	12	2.4	120	3200	0.065	830	12	2.4	100	2700	0.08	860	12	2.4
16	150	3000	0.1	1200	16	3.2	120	2400	0.075	720	16	3.2	100	2000	0.09	720	16	3.2
20	150	2400	0.1	960	20	4	120	1900	0.075	570	20	4	100	1600	0.09	580	20	4
25	150	1900	0.12	910	25	5	120	1500	0.075	450	25	5	100	1300	0.09	470	25	5
Depth of cut	 DC:Dia.																	

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
Dia **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)
10	75	2400	0.06	580	10	2	40	1300	0.04	210	10	1
12	75	2000	0.065	520	12	2.4	40	1100	0.045	200	12	1.2
16	75	1500	0.075	450	16	3.2	40	800	0.05	160	16	1.6
20	75	1200	0.075	360	20	4	40	640	0.05	130	20	2
25	75	950	0.075	290	25	5	40	510	0.05	100	25	2.5
Depth of cut	 DC:Dia.											

1) For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur.
   In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

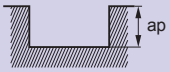
iMX-S4HV	➤ J440
iMX-S4HV-S	➤ J441
iMX-C4HV	➤ J447
iMX-C4HV-S	➤ J449

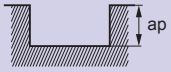
iMX-S4HV/iMX-S4HV-S/iMX-C4HV/iMX-C4HV-S

Square/Corner radius, 4 flute, Irregular helix (With/Without coolant hole)

RECOMMENDED CUTTING CONDITIONS

Slotting

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic, Precipitation hardening stainless steel, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V				
Dia **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)
10	100	3200	0.04	510	5	80	2500	0.03	300	5	75	2400	0.03	290	5
12	100	2700	0.05	540	6	80	2100	0.04	340	6	75	2000	0.04	320	6
16	100	2000	0.07	560	8	80	1600	0.05	320	8	75	1500	0.06	360	8
20	100	1600	0.07	450	10	80	1300	0.05	260	10	75	1200	0.06	290	10
25	100	1300	0.08	420	12	80	1000	0.05	200	12	75	950	0.06	230	12
Depth of cut	 DC:Dia.														

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631					Heat resistant alloys Inconel718				
Dia **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)
10	60	1900	0.025	190	5	30	950	0.02	76	2
12	60	1600	0.035	220	6	30	800	0.03	96	2.4
16	60	1200	0.05	240	8	30	600	0.05	120	3.2
20	60	950	0.05	190	10	30	480	0.05	96	4
25	60	760	0.05	150	12	30	380	0.05	76	5
Depth of cut	 DC:Dia.									

1) For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

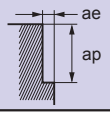
iMX-S4HV	➤ J440
iMX-S4HV-S	➤ J441
iMX-C4HV	➤ J447
iMX-C4HV-S	➤ J449

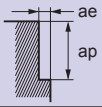
iMX-S4HV/iMX-C4HV

Square/Corner radius head, 4 flute, Irregular helix, Long cutting edge type

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material		Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic, Precipitation hardening stainless steel, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
L/D	Dia DC (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)
4	16	100	2000	0.09	720	32	0.8	80	1600	0.07	450	32	0.8	60	1200	0.08	380	32	0.8
	20	100	1600	0.09	580	40	1	80	1300	0.07	360	40	1	60	950	0.08	300	40	1
6	16	60	1200	0.07	340	32	0.8	50	990	0.05	200	32	0.8	40	800	0.06	190	32	0.8
	20	60	950	0.07	270	40	1	50	800	0.05	160	40	1	40	640	0.06	150	40	1
Depth of cut		 DC:Dia.																	

Work material		Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
L/D	Dia DC (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)
4	16	50	990	0.07	280	32	0.8	30	600	0.05	120	32	0.4
	20	50	800	0.07	220	40	1	30	480	0.05	96	40	0.5
6	16	30	600	0.05	120	32	0.8	20	400	0.04	64	32	0.4
	20	30	480	0.05	96	40	1	20	320	0.04	51	40	0.5
Depth of cut		 DC:Dia.											

1) For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills.
   However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur.
   In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
4) The length of the long cutting type is 2 times that of the standard head. L/D demonstrates +1 when installed to a holder of the same size.

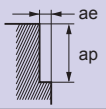
iMX-S4HV ➤ J440
iMX-C4HV ➤ J448

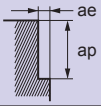
iMX-S4HV/iMX-C4HV

Square/Corner radius head, 4 flute, Irregular helix, Offset type

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material		Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic, Precipitation hardening stainless steel, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
L/D	Dia DC (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)
≤3	12	150	4000	0.09	1400	12	1.2	120	3200	0.06	770	12	1.2	100	2700	0.075	810	12	1.2
	14	150	3400	0.09	1200	14	1.4	120	2700	0.065	700	14	1.4	100	2300	0.08	740	14	1.4
	18	150	2700	0.1	1100	18	1.8	120	2100	0.075	630	18	1.8	100	1800	0.09	650	18	1.8
	22	150	2200	0.1	880	22	2.2	120	1700	0.075	510	22	2.2	100	1400	0.09	500	22	2.2
	28	150	1700	0.12	820	28	2.8	120	1400	0.075	420	28	2.8	100	1100	0.09	400	28	2.8
	30	150	1600	0.12	770	30	3	120	1300	0.075	390	30	3	100	1100	0.09	400	30	3
	32	150	1500	0.12	720	32	3.2	120	1200	0.075	360	32	3.2	100	990	0.09	360	32	3.2
5	12	90	2400	0.07	670	12	0.5	70	1900	0.05	380	12	0.5	60	1600	0.06	380	12	0.5
	14	90	2000	0.07	560	14	0.6	70	1600	0.05	320	14	0.6	60	1400	0.06	340	14	0.6
	18	90	1600	0.08	510	18	0.7	70	1200	0.06	290	18	0.7	60	1100	0.07	310	18	0.7
	22	90	1300	0.08	420	22	0.9	70	1000	0.06	240	22	0.9	60	870	0.07	240	22	0.9
	28	90	1000	0.1	400	28	1.1	70	800	0.06	190	28	1.1	60	680	0.07	190	28	1.1
	30	90	950	0.1	380	30	1.2	70	740	0.06	180	30	1.2	60	640	0.07	180	30	1.2
	32	90	900	0.1	360	32	1.3	70	700	0.06	170	32	1.3	60	600	0.07	170	32	1.3
7	12	60	1600	0.06	380	12	0.2	50	1300	0.04	210	12	0.2	32	850	0.05	170	12	0.2
	14	60	1400	0.06	340	14	0.3	50	1100	0.05	220	14	0.3	32	730	0.06	180	14	0.3
	18	60	1100	0.07	310	18	0.4	50	880	0.05	180	18	0.4	32	570	0.06	140	18	0.4
	22	60	870	0.07	240	22	0.4	50	720	0.05	140	22	0.4	32	460	0.06	110	22	0.4
	28	60	680	0.08	220	28	0.6	50	570	0.05	110	28	0.6	32	360	0.06	86	28	0.6
	30	60	640	0.08	200	30	0.6	50	530	0.05	110	30	0.6	32	340	0.06	82	30	0.6
	32	60	600	0.08	190	32	0.6	50	500	0.05	100	32	0.6	32	320	0.06	77	32	0.6
Depth of cut		 DC:Dia.																	

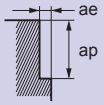
Work material		Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
L/D	Dia DC (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)
≤3	12	75	2000	0.06	480	12	1.2	30	800	0.04	130	12	0.9
	14	75	1700	0.065	440	14	1.4	30	680	0.045	120	14	1.1
	18	75	1300	0.075	390	18	1.8	40	710	0.05	140	18	1.4
	22	75	1100	0.075	330	22	2.2	40	580	0.05	120	22	1.7
	28	75	850	0.075	260	28	2.8	40	450	0.05	90	28	2.1
	30	75	800	0.075	240	30	3	40	420	0.05	84	30	2.3
	32	75	750	0.075	230	32	3.2	40	400	0.05	80	32	2.4
5	12	50	1300	0.05	260	12	0.5	10	270	0.03	32	12	0.4
	14	50	1100	0.05	220	14	0.6	10	230	0.04	37	14	0.4
	18	50	880	0.06	210	18	0.7	19	340	0.04	54	18	0.6
	22	50	720	0.06	170	22	0.9	19	270	0.04	43	22	0.7
	28	50	570	0.06	140	28	1.1	19	220	0.04	35	28	0.8
	30	50	530	0.06	130	30	1.2	19	200	0.04	32	30	0.9
	32	50	500	0.06	120	32	1.3	19	190	0.04	30	32	1.0
7	12	24	640	0.04	100	12	0.2	–	–	–	–	–	–
	14	24	550	0.05	110	14	0.3	–	–	–	–	–	–
	18	24	420	0.05	84	18	0.4	–	–	–	–	–	–
	22	24	350	0.05	70	22	0.4	–	–	–	–	–	–
	28	24	270	0.05	54	28	0.6	–	–	–	–	–	–
	30	24	250	0.05	50	30	0.6	–	–	–	–	–	–
	32	24	240	0.05	48	32	0.6	–	–	–	–	–	–
Depth of cut		 DC:Dia.											

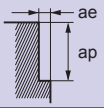
iMX-S4HV ➤ J440
iMX-C4HV ➤ J447

iMX-R4F
Roughing head, 4 flute

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic, Precipitation hardening stainless steel, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V					
Dia. **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)
10	150	4800	0.045	860	8	4	120	3800	0.03	460	8	4	100	3200	0.038	480	8	4
12	150	4000	0.045	720	9.6	4.8	120	3200	0.033	420	9.6	4.8	100	2700	0.04	430	9.6	4.8
16	150	3000	0.05	600	12.8	6.4	120	2400	0.038	360	12.8	6.4	100	2000	0.045	360	12.8	6.4
20	150	2400	0.05	480	16	8	120	1900	0.038	290	16	8	100	1600	0.045	290	16	8
25	150	1900	0.06	460	20	10	120	1500	0.038	230	20	10	100	1300	0.045	230	20	10
Depth of cut	 DC:Dia.																	

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631						Heat resistant alloys Inconel718					
Dia. **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)
10	75	2400	0.03	290	8	4	40	1300	0.04	210	8	1
12	75	2000	0.033	260	9.6	4.8	40	1100	0.045	200	9.6	1.2
16	75	1500	0.038	230	12.8	6.4	40	800	0.05	160	12.8	1.6
20	75	1200	0.038	180	16	8	40	640	0.05	130	16	2
25	75	950	0.038	140	20	10	40	510	0.05	100	20	2.5
Depth of cut	 DC:Dia.											

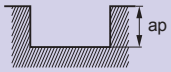
1) For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) Vibration may occur if the rigidity of machine or workpiece is low.
In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

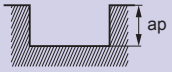
iMX-R4F

Roughing head, 4 flute

RECOMMENDED CUTTING CONDITIONS

Slotting

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT					Austenitic stainless steel, Ferritic, Precipitation hardening stainless steel, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V				
Dia **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)
10	100	3200	0.04	510	5	80	2500	0.03	300	5	60	1900	0.02	150	4
12	100	2700	0.045	490	6	80	2100	0.032	270	6	60	1600	0.025	160	4.8
16	100	2000	0.05	400	8	80	1600	0.038	240	8	60	1200	0.03	140	6.4
20	100	1600	0.05	320	10	80	1300	0.038	200	10	60	950	0.034	130	8
25	100	1300	0.06	310	12	80	1000	0.038	150	12	60	760	0.034	100	10
Depth of cut	 DC:Dia.														

Work material	Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631				
Dia **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)
10	40	1300	0.016	83	4
12	40	1100	0.02	88	4.8
16	40	800	0.024	77	6.4
20	40	640	0.027	70	8
25	40	510	0.027	55	10
Depth of cut	 DC:Dia.				

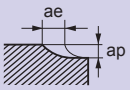
1) For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) Vibration may occur if the rigidity of machine or workpiece is low.In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

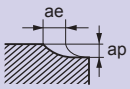
iMX-C4FD-C

With coolant hole Multi-task corner radius end mill for high feed cutting

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material	Carbon steel, Alloy steel, Mild Steel, Copper, Copper alloys AISI 1045, AISI 4140, ASTM A36, AISI 1010						Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Hardened steel,Precipitation hardening stainless steel, Ferritic, Precipitation hardening stainless steel, AISI H13, AISI L6, AISI 431, AISI 420J2, AISI 630, AISI 631					
Dia **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)
10	150	4800	0.4	7700	0.5	6	135	4300	0.4	6900	0.5	6	120	3800	0.3	4600	0.5	6
12	150	4000	0.45	7200	0.6	7.2	135	3600	0.45	6500	0.6	7.2	120	3200	0.3	3800	0.6	7.2
16	150	3000	0.5	6000	0.8	9.6	135	2700	0.5	5400	0.8	9.6	120	2400	0.4	3800	0.8	9.6
20	150	2400	0.5	4800	1	12	135	2100	0.5	4200	1	12	120	1900	0.4	3000	1	12
25	150	1900	0.5	3800	1.25	15	135	1700	0.5	3400	1.25	15	120	1500	0.4	2400	1.25	15
Depth of cut	 DC:Dia.																	

Work material	Austenitic stainless steel, Titanium alloy, Cobalt chromium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, Ti-6Al-4V						Heat resistant alloys Inconel718					
Dia **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)
10	40	1300	0.2	1000	0.5	6	25	800	0.1	320	0.5	6
12	40	1100	0.2	880	0.6	7.2	25	660	0.1	260	0.6	7.2
16	40	800	0.3	960	0.8	9.6	25	500	0.15	300	0.8	9.6
20	40	640	0.3	770	1	12	25	400	0.15	240	1	12
25	40	510	0.3	610	1.25	15	25	320	0.15	190	1.25	15
Depth of cut	 DC:Dia.											

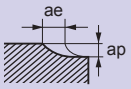
1) For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
4) Reduce the feed by 1/2 for ramping process.

iMX-C4FV

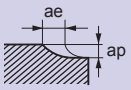
Corner radius head for high efficiency machining, 4 flute, Irregular helix

RECOMMENDED CUTTING CONDITIONS

High depth of cut conditions

Work material		Carbon steel, Alloy steel, Gray Cast Iron AISI 1045, AISI 4140, AISI No 45 B						Pre-hardened steel, Alloy tool steel AISI P21, AISI P20, SKD, SKT						Hardened steel (45－55HRC) AISI H13, AISI L6					
Dia. **DC** (mm)	Corner R **RE** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)
10	**2**	90	2900	0.25	2900	1.2	4.5	75	2400	0.21	2000	1	4.5	60	1900	0.22	1700	0.7	4.5
12	**2**	90	2400	0.25	2400	1.8	6	75	2000	0.21	1700	1.4	6	60	1600	0.22	1400	0.9	6
16	**3**	90	1800	0.25	1800	1.8	7.5	75	1500	0.2	1200	1.4	7.5	60	1200	0.22	1100	0.9	7.5
20	**3**	90	1400	0.25	1400	1.8	9	75	1200	0.2	1000	1.4	9	60	950	0.22	850	0.9	9
25	**4**	90	1100	0.25	1100	2.4	11.5	75	950	0.2	750	1.8	11.5	60	750	0.22	650	1.2	11.5
Depth of cut		 DC:Dia.																	

High speed milling

Work material		Carbon steel, Alloy steel, Gray Cast Iron AISI 1045, AISI 4140, AISI No 45 B						Pre-hardened steel, Alloy tool steel AISI P21, AISI P20, SKD, SKT						Hardened steel (45－55HRC) AISI H13, AISI L6					
Dia. **DC** (mm)	Corner R **RE** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)
10	**2**	150	4800	0.51	9800	0.6	4.5	125	4000	0.43	6900	0.46	4.5	100	3200	0.43	5500	0.36	4.5
12	**2**	150	4000	0.56	9000	0.9	6	125	3300	0.48	6400	0.7	6	100	2700	0.47	5100	0.45	6
16	**3**	150	3000	0.6	7200	0.9	7.5	125	2500	0.53	5300	0.7	7.5	100	2000	0.54	4300	0.45	7.5
20	**3**	150	2400	0.6	5800	0.9	9	125	2000	0.37	3000	0.7	9	100	1600	0.39	2500	0.45	9
25	**4**	150	1900	0.6	4500	1.2	11.5	125	1600	0.39	2500	0.9	11.5	100	1300	0.39	2000	0.6	11.5
Depth of cut		 DC:Dia.																	

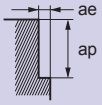
1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) Air blow or oil mist is recommended for good chip evacuation.
3) For profile machining such as moulds, machining conditions may differ considerably depending on the workpiece geometry, machining methods and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece.
4) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abonrmal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

iMX-S3A/iMX-C3A

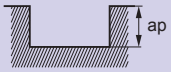
Square/Corner radius head, 3 flute, For aluminium alloy

RECOMMENDED CUTTING CONDITIONS

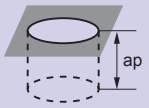
Side milling

Work material	Aluminium alloy A6061, A7075					
Dia. **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut Drilled Depth ap (mm)	Cutting Width ae (mm)
10	500	16000	0.117	5600	8	3
12	500	13000	0.118	4600	9.6	3.6
16	500	10000	0.153	4600	12.8	4.8
20	500	8000	0.175	4200	16	6
25	500	6000	0.211	3800	20	7.5
Depth of cut	 DC:Dia.					

Slotting

Work material	Aluminium alloy A6061, A7075				
Dia. **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut Drilled Depth ap (mm)
10	500	16000	0.068	3300	5
12	500	13000	0.072	2800	6
16	500	10000	0.093	2800	8
20	500	8000	0.108	2600	10
25	500	6000	0.127	2300	12.5
Depth of cut	 DC:Dia.				

Plunging

Work material	Aluminium alloy A6061, A7075					
Dia. **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Revolution (mm/rev)	Table Feed per Min. (mm/min)	Depth of Cut Drilled Depth ap (mm)	Step ap_2 (mm)
10	300	9600	0.1	960	5	2.5
12	300	8000	0.1	800	6	2.5
16	300	6000	0.1	600	8	2.5
20	300	4800	0.1	480	10	2.5
25	300	3800	0.1	380	12.5	2.5
Depth of cut	 DC:Dia.					

1) The use of water-soluble coolant is recommended.
2) Vibration may occur if the rigidity of machine or workpiece is low.
In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

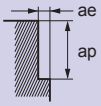
iMX-S3A ➤ J442
iMX-C3A ➤ J453

iMX-S3A/iMX-C3A

Square/Corner radius head, 3 flute, For aluminium alloy, Offset type

RECOMMENDED CUTTING CONDITIONS

Side milling

Work material		Aluminium alloy A6061, A7075					
L/D	Dia. DC (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)
≤3	12	500	13000	0.117	4600	9.6	2.4
	14	500	11000	0.118	3900	11.2	2.8
	18	500	8800	0.153	4000	14.4	3.6
	22	500	7200	0.175	3800	17.6	4.4
	28	500	5700	0.211	3600	22.4	5.6
5	12	300	8000	0.09	2200	9.6	1.0
	14	300	6800	0.09	1800	11.2	1.1
	18	300	5300	0.12	1900	14.4	1.4
	22	300	4300	0.14	1800	17.6	1.8
	28	300	3400	0.17	1700	22.4	2.2
7	12	200	5300	0.08	1300	9.6	0.5
	14	200	4500	0.08	1100	11.2	0.6
	18	200	3500	0.11	1200	14.4	0.7
	22	200	2900	0.12	1000	17.6	0.9
	28	200	2300	0.15	1000	22.4	1.1
Depth of cut		 DC:Dia.					

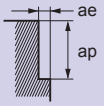
1) The use of water-soluble coolant is recommended.
2) Vibration may occur if the rigidity of machine or workpiece is low.
In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

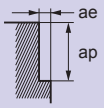
iMX-S3A ➤ J442
iMX-C3A ➤ J453

iMX-C6HV/C10HV/C12HV

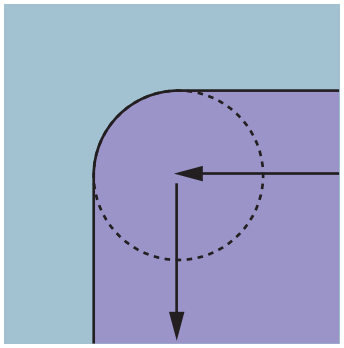
Corner radius head, Multi-flute, Irregular helix

Side milling

Work material	Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel AISI P21, AISI P20, AISI 4340, SKD, SKT						Austenitic stainless steel, Ferritic, Precipitation hardening stainless steel, Titanium alloy AISI 304, AISI 316, AISI 304LN, AISI 316LN, AISI 410, AISI 430, AISI 431, AISI 420J2, Ti-6Al-4V						Precipitation hardening stainless steel, Cobalt chromium alloy AISI 630, AISI 631					
Dia **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)
10	200	6400	0.07	2700	10	1	150	4800	0.07	2000	10	1	100	3200	0.07	1300	10	1
12	200	5300	0.085	2700	12	1.2	150	4000	0.085	2000	12	1.2	100	2700	0.085	1400	12	1.2
16	200	4000	0.07	2800	16	0.64	150	3000	0.088	2600	16	0.64	100	2000	0.07	1400	16	0.64
20	200	3200	0.08	3100	20	0.8	150	2400	0.1	2900	20	0.8	100	1600	0.08	1500	20	0.8
25	200	2500	0.08	2400	25	1	150	1900	0.1	2300	25	1	100	1300	0.08	1200	25	1
Depth of cut	 DC:Dia.																	

Work material	Heat resistant alloys Inconel718					
Dia **DC** (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min^{-1})	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Depth of Cut ap (mm)	Cutting Width ae (mm)
10	40	1300	0.033	260	10	0.5
12	40	1100	0.035	230	12	0.6
16	40	800	0.038	300	16	0.64
20	40	640	0.04	310	20	0.8
25	40	510	0.04	240	25	1
Depth of cut	 DC:Dia.					

1) For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
4) If the machining radius at the corner is the same as the tool radius when using the head with more than 10 flutes, please set the depth of cut and feed rate to half of the above.



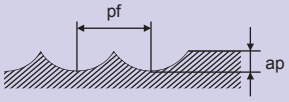
iMX-C6HV ➤ J450
iMX-C10HV ➤ J450
iMX-C12HV ➤ J450

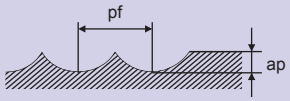
iMX-B4HV/iMX-B4HV-E

Ball nose head, 4 flute, Irregular helix (With/Without coolant hole)

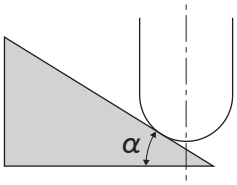
RECOMMENDED CUTTING CONDITIONS

Shoulder milling

Work material	Carbon steel, Alloy steel, Mild Steel, Pre-hardened steel, Copper, Copper alloys AISI 1045, AISI 4140, AISI 4340, ASTM A36, AISI 1010, AISI P21, AISI P20										Austenitic stainless steel, Ferritic, Precipitation hardening stainless steel, Cobalt chromium alloy, Titanium alloy AISI 304, AISI 316, AISI 431, AISI 420J2, AISI 630, AISI 631, Ti-6Al-4V									
Inclination angle		α≤15°				α>15°				Depth of cut	Pick Feed	α≤15°				α>15°				Depth of cut	Pick Feed
Dia DC (mm)	Radius of Ball Nose PRFRAD (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min⁻¹)	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Cutting Speed (m/min)	Main Spindle Revolution (min⁻¹)	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	ap (mm)	pf (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min⁻¹)	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Cutting Speed (m/min)	Main Spindle Revolution (min⁻¹)	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	ap (mm)	pf (mm)
10	**5**	300	9600	0.106	4100	200	6400	0.07	1800	1	2.5	225	7200	0.105	3000	150	4800	0.067	1300	1	2.5
12	**6**	300	8000	0.125	4000	200	5300	0.085	1800	1.2	3	225	6000	0.125	3000	150	4000	0.08	1300	1.2	3
16	**8**	300	6000	0.134	3200	200	4000	0.088	1400	1.6	4	225	4500	0.14	2500	150	3000	0.09	1100	1.6	4
20	**10**	300	4800	0.156	3000	200	3200	0.1	1300	2	5	225	3600	0.16	2300	150	2400	0.105	1000	2	5
25	**12.5**	300	3800	0.16	2400	200	2500	0.1	1000	2.5	6	225	2900	0.16	1900	150	1900	0.105	800	2.5	6
Depth of cut		 DC:Dia.																			

Work material	Heat resistant alloys Inconel718									
Inclination angle	α≤15°				α>15°				Depth of cut	Pick Feed
Dia DC (mm)	Radius of Ball Nose PRFRAD (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min⁻¹)	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Cutting Speed (m/min)	Main Spindle Revolution (min⁻¹)	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	ap (mm)	pf (mm)
10	**5**	60	1900	0.055	420	40	1300	0.035	180	0.5	1
12	**6**	60	1600	0.055	350	40	1100	0.035	150	0.6	1.2
16	**8**	60	1200	0.062	300	40	800	0.04	130	0.8	1.6
20	**10**	60	1000	0.062	250	40	640	0.04	100	1	2
25	**12.5**	60	760	0.062	190	40	510	0.04	80	1.2	2.5
Depth of cut		 DC:Dia.									

1) For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
4) α is the inclination angle of the machined surface.



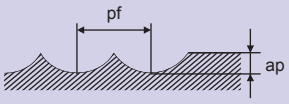
iMX-B4HV ➤ J444
iMX-B4HV-E ➤ J445

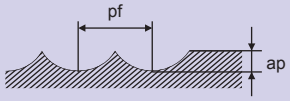
iMX-B6HV

Ball nose head, 6 flute, Irregular curve

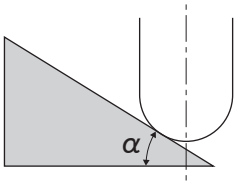
RECOMMENDED CUTTING CONDITIONS

Shoulder milling

Work material	Carbon steel, Alloy steel, Mild Steel, Pre-hardened steel AISI 1045, AISI 4140, AISI 4340, ASTM A36, AISI 1010, AISI P21, AISI P20										Austenitic stainless steel, Ferritic, Precipitation hardening stainless steel, Cobalt chromium alloy, Titanium alloy AISI 304, AISI 316, AISI 431, AISI 420J2, AISI 630, AISI 631, Ti-6Al-4V									
Inclination angle	α≤15°				α>15°				Depth of cut	Pick Feed	α≤15°				α>15°				Depth of cut	Pick Feed
Dia DC (mm)	Radius of Ball Nose PRFRAD (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min-1)	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Cutting Speed (m/min)	Main Spindle Revolution (min-1)	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	ap (mm)	pf (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min-1)	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Cutting Speed (m/min)	Main Spindle Revolution (min-1)	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	ap (mm)	pf (mm)
10	**5**	300	9600	0.106	6100	200	6400	0.07	2700	0.5	2	225	7200	0.105	4500	150	4800	0.067	1900	0.5	2
12	**6**	300	8000	0.125	6000	200	5300	0.085	2700	0.6	2.4	225	6000	0.125	4500	150	4000	0.08	1900	0.6	2.4
16	**8**	300	6000	0.134	4800	200	4000	0.088	2100	0.8	3.2	225	4500	0.14	3700	150	3000	0.09	1600	0.8	3.2
20	**10**	300	4800	0.156	4500	200	3200	0.1	1900	1	4	225	3600	0.16	3400	150	2400	0.105	1500	1	4
25	**12.5**	300	3800	0.16	3600	200	2500	0.1	1500	1.2	5	225	2900	0.16	2800	150	1900	0.105	1200	1.2	5
Depth of cut	 DC:Dia.																				

Work material	Heat resistant alloys Inconel718									
Inclination angle	α≤15°				α>15°				Depth of cut	Pick Feed
Dia DC (mm)	Radius of Ball Nose PRFRAD (mm)	Cutting Speed (m/min)	Main Spindle Revolution (min-1)	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	Cutting Speed (m/min)	Main Spindle Revolution (min-1)	Feed per Tooth (mm/t.)	Table Feed per Min. (mm/min)	ap (mm)	pf (mm)
10	**5**	60	1900	0.055	630	40	1300	0.035	270	0.5	1
12	**6**	60	1600	0.055	520	40	1100	0.035	220	0.6	1.2
16	**8**	60	1200	0.062	450	40	800	0.04	190	0.8	1.6
20	**10**	60	1000	0.062	370	40	640	0.04	150	1	2
25	**12.5**	60	760	0.062	300	40	510	0.04	120	1.2	2.5
Depth of cut	 DC:Dia.									

1) For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
4) α is the inclination angle of the machined surface.



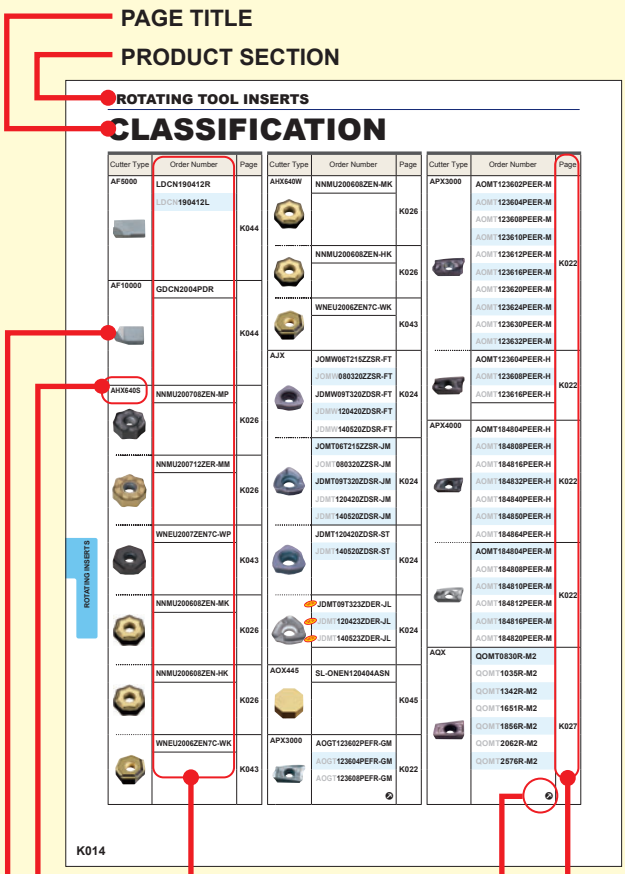
HOW TO READ THE STANDARD OF ROTATING TOOL INSERTS

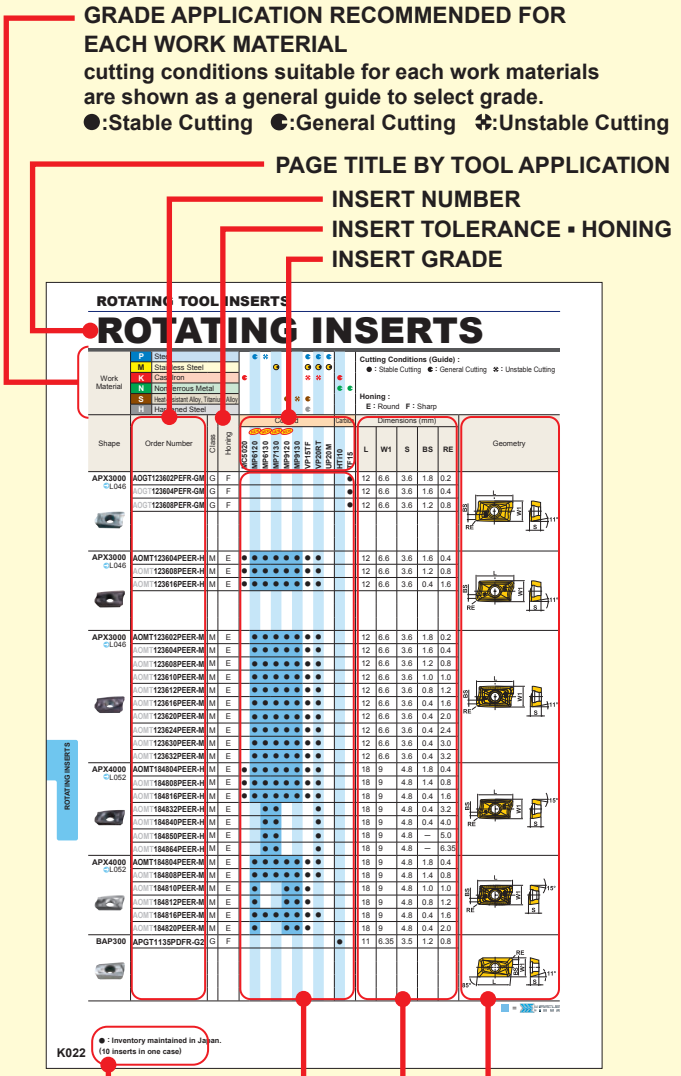
●How the section of milling inserts is organized

①Organized according to cutter type.
②Cutters are arranged in alphabetical order.

●How the standards for milling inserts are organized

①Classified into milling inserts, wiper inserts and drilling inserts.
②Arranged in order of alphabet of order number.





●To Order : Please specify
①insert number and grade.

MILLING TOOLS

INSERT STANDARDS
CBN&PCD INSERT STANDARDS
INSERT GRADES

IDENTIFICATION K002
GRADES FOR MILLING K004
MILLING APPLICATION RANGE K005
COATED CARBIDE(CVD and PVD) K008
CERMET K010
CEMENTED CARBIDE K011
CBN(SINTERED CBN) K012
PCD(SINTERED DIAMOND) K013
CLASSIFICATION K014

STANDARD MILLING INSERTS
- ROTATING INSERTS K022
- WIPER INSERTS K042
- CBN AND PCD K044
- CBN AND PCD WITH WIPER K047
- DRILLING INSERTS K048

IDENTIFICATION

Symbol	Insert Shape
N	Heptagonal
O	Octagonal
S	Square
T	Triangular
C	Rhombic80°
M	Rhombic86°
A	Parallelogram85°
R	Round
X	Special Design
W	Wiper

① Insert Shape

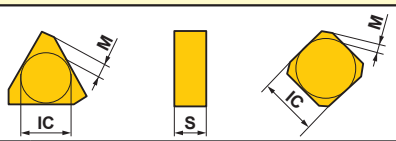
Symbol	Normal Clearance AN
C	7°
D	15°
E	20°
F	25°
G	30°
N	0°
P	11°
O	Other Normal Clearance
X	Other Normal Clearance

② Normal Clearance

① ② ③ ④

S **E** **E** **R**

③ Tolerance Class



Symbol	Tolerance of Nose Height **M** (mm)	Tolerance of Inscribed Circle **IC** (mm)	Tolerance of Thickness **S** (mm)
A	±0.005	±0.025	±0.025
C	±0.013	±0.025	±0.025
E	±0.025	±0.025	±0.025
G	±0.025	±0.025	±0.13
K*	±0.013	±0.05—±0.15	±0.025
M*	±0.08—±0.18	±0.05—±0.15	±0.13
N*	±0.08—±0.18	±0.05—±0.15	±0.025

The surface of insert with ✱ mark is sintered.

④ Fixing and/or for Chip Breaker

Symbol	Hole	Hole Configuration	Chip Breaker	Figure
W	With Hole	Cylindrical Hole + One Countersink (40°—60°)	No	
T	With Hole		Single Sided	
B	With Hole	Cylindrical Hole + One Countersink (70°—90°)	No	
N	Without Hole	—	No	
R	Without Hole	—	Single Sided	
X	—	—	—	Special Design

Symbol				Diameter of Inscribed Circle
R	C	S	T	
	06	06	11	6.35
	08	07	13	7.94
	09	09	16	9.525
10				10.00
12				12.00
	12	12	22	12.70
	16	15	27	15.875
20				20.00

⑤ Insert Size



Symbol	Insert Thickness (mm)
03	3.18
T3	3.97
04	4.76

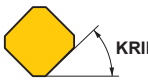
⑥ Insert Thickness

Symbol	Honing
F	Sharp
E	Round
T	Chamfer
S	Chamfer+Hone
Z	Chamfer (Strong Cutting Edge Type)

⑨ Cutting Edge Condition

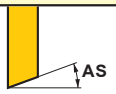
⑤	⑥	⑦	⑧	⑨	⑩	⑪		⑫
12	03	A	F	E	R	1	-	JS

⑦ Wiper insert cutting angle



Symbol	Wiper insert cutting angle
A	45°
E	75°
P	90°
Z	Other Angle

⑧ Clearance of Wiper Insert

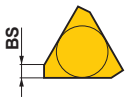


Symbol	Clearance Angle
D	15°
E	20°
F	25°
G	30°

⑩ Hand Tool Holder

Symbol	Hand Tool Holder
L	Left Hand Tool Holder
N	For Both Right and Left Hand Tool Holder
R	Right Hand Tool Holder

⑪ Width of Wiper Insert



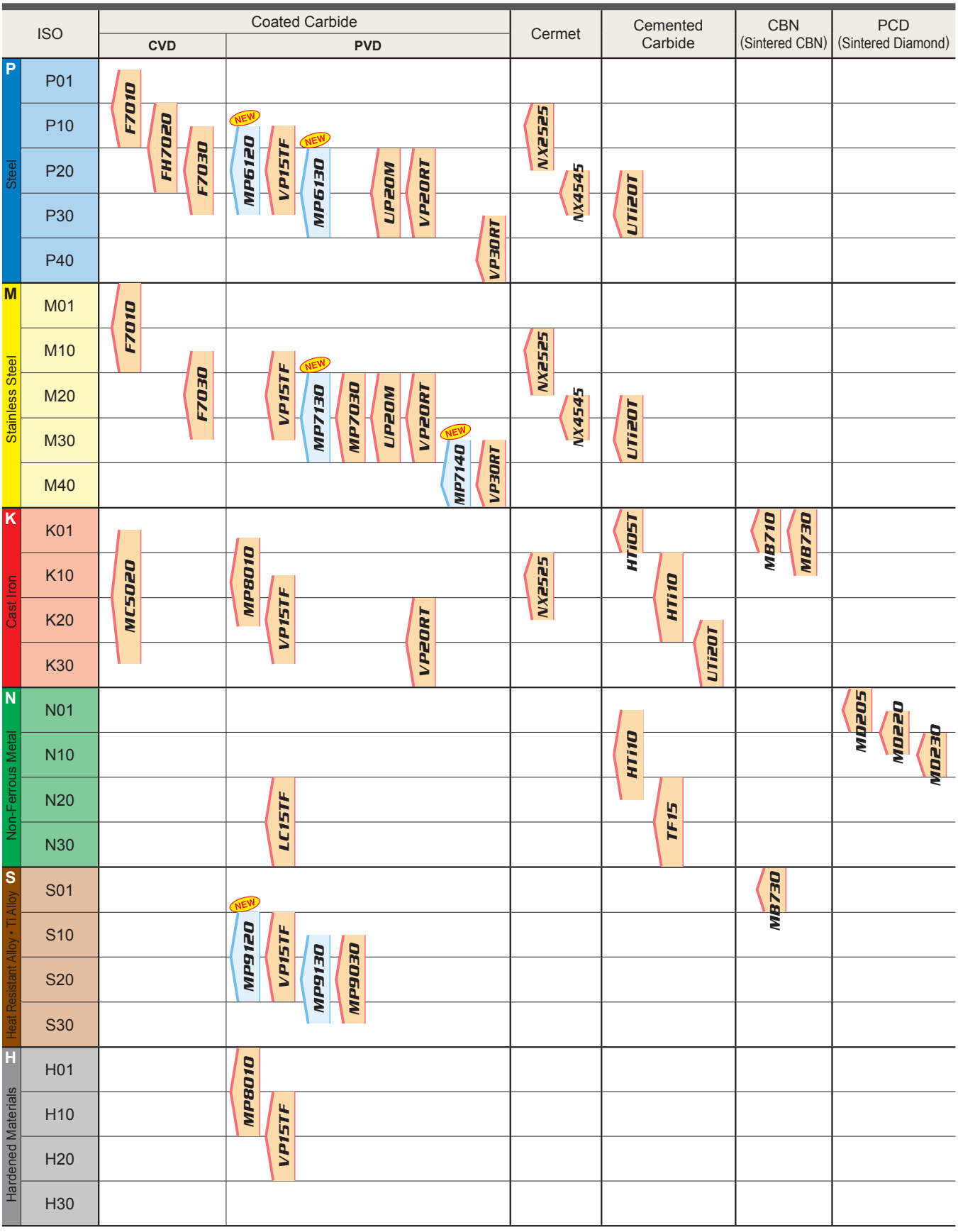
Symbol	Width of Wiper Insert
1	1.4 (1.94 only for TEKN)

⑫ Chip Breaker

Symbol	Name
FT	FT Breaker
HS	HS Breaker
JH	JH Breaker
JM	JM Breaker
JP	JP Breaker
JS	JS Breaker
LS	LS Breaker
MM	MM Breaker
MS	MS Breaker

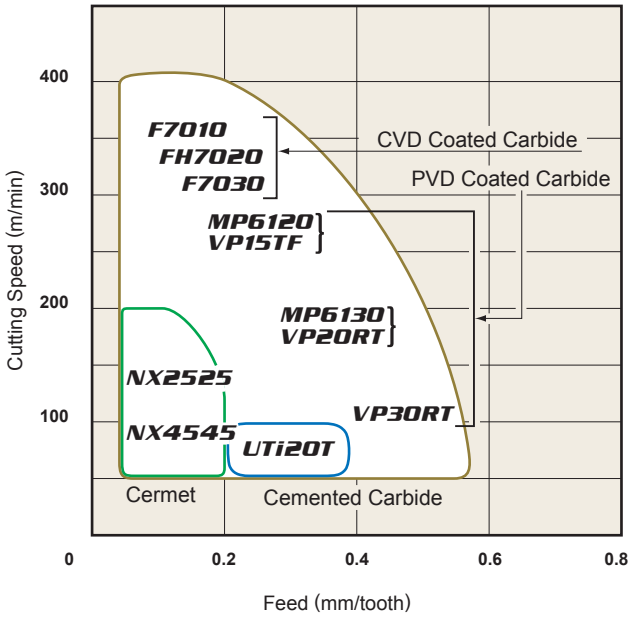
GRADES FOR MILLING

INDEXABLE INSERT GRADES FOR MILLING

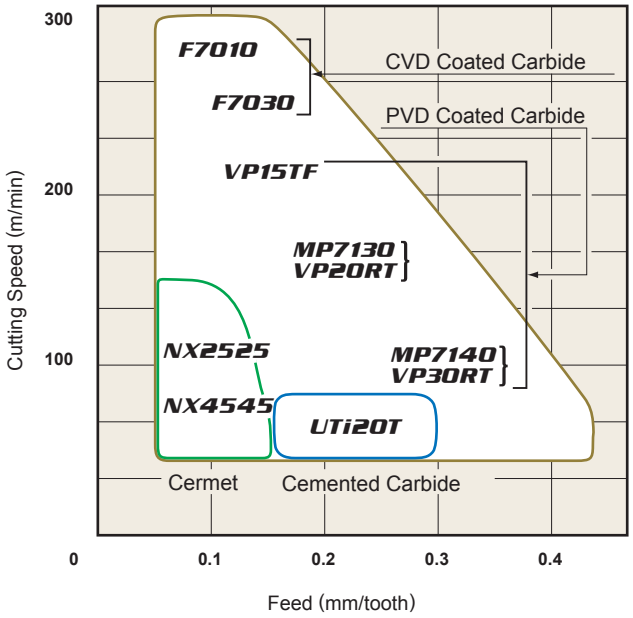


MILLING APPLICATION RANGE

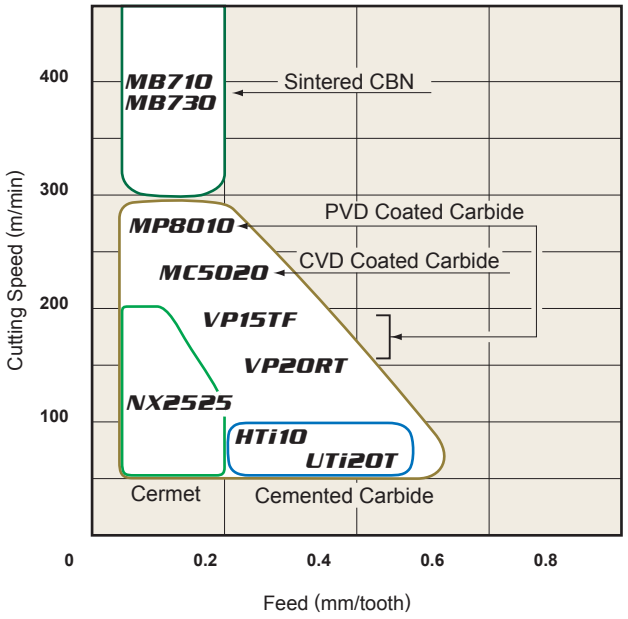
P STEEL



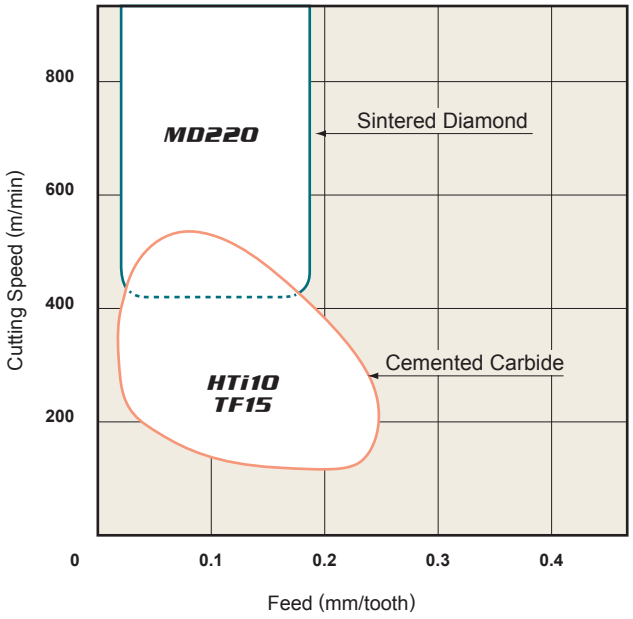
M STAINLESS STEEL



K CAST IRON



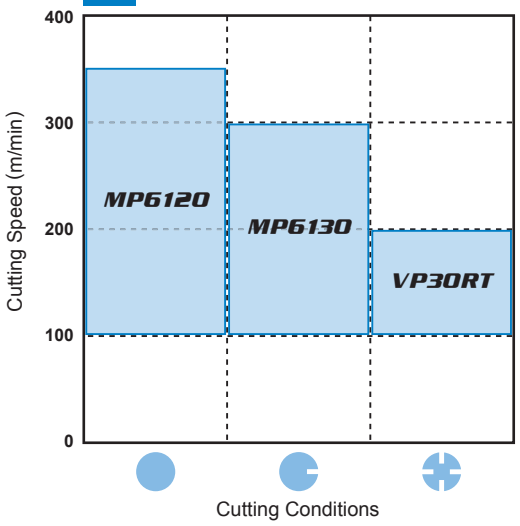
N NON-FERROUS METAL



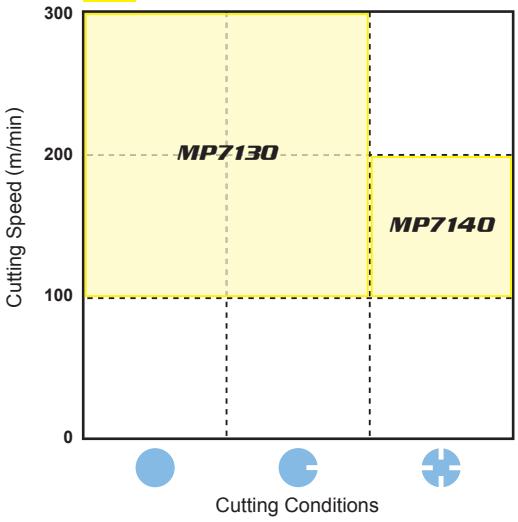
MILLING APPLICATION RANGE

●Recommendation of the insert grade based on cutting speed and conditions for each workpiece.

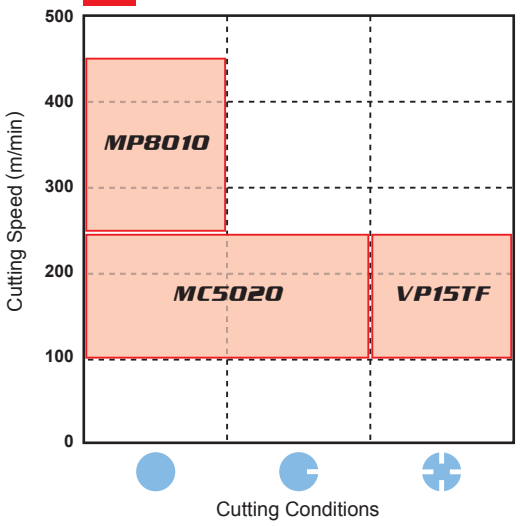
P STEEL (Medium to Rough Cutting)



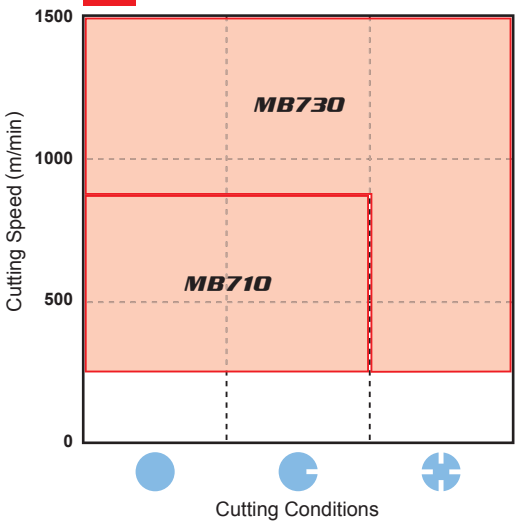
M STAINLESS STEEL



K CAST IRON



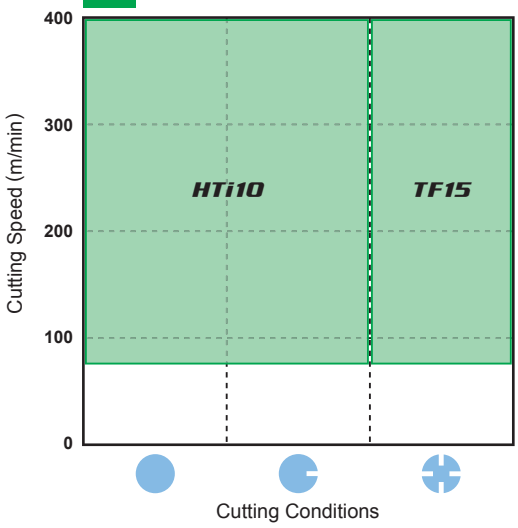
K CAST IRON (CBN)



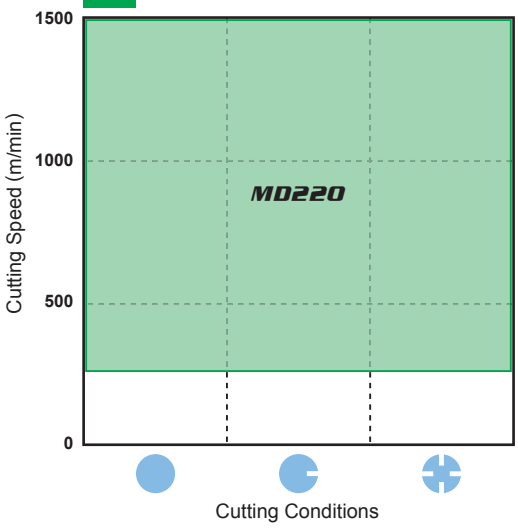
CUTTING CONDITIONS

Stable Cutting	Plane Cutting Constant Depth of Cut Pre-Machined Securely Clamped Component Cutting
General Cutting	
Unstable Cutting	Heavy Interrupted Cutting Irregular Depth of Cut Low Clamping Rigidity Cutting

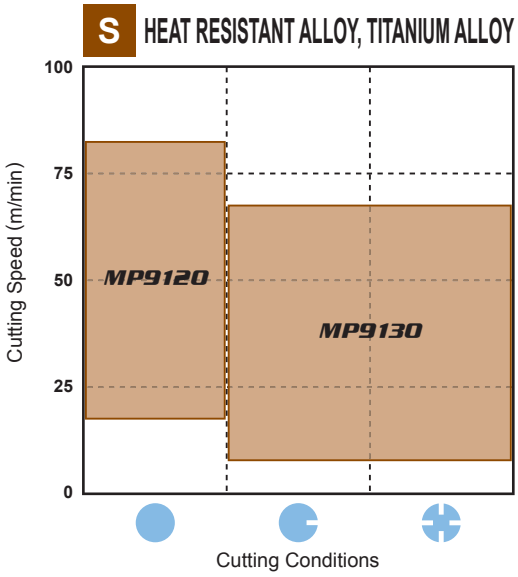
N NON-FERROUS METAL



N NON-FERROUS METAL (PCD)



S HEAT RESISTANT ALLOY, TITANIUM ALLOY



COATED CARBIDE (CVD&PVD)

<CVD>
- Special tough fibrous structure improves wear and fracture resistance.
- It covers a wide application range and reduces the number of tools required.

<PVD>
- PVD coating prolongs tool life when compared to cemented carbide under the same cutting conditions.
- Coating of tools with sharp edges is possible without softening or changing the quality of the subsrate.

SELECTION STANDARD

MILLING

	Work Material	Recommended Grade	Recommended Cutting Speed (m/min)	ISO	Application Range
P	Steel	F7030	200 (150 — 250)	P10	FH7020, F7030, NEW MP6120, VP15TF, NEW MP6130, UP20M, VP20RT, VP30RT
		MP6120	150 (100 — 200)	P20	
		MP6130	150 (100 — 200)	P30	
		VP15TF	150 (100 — 200)	P40	
M	Stainless Steel	F7030	200 (150 — 250)	M10	F7030, VP15TF, NEW MP7130, MP7030, UP20M, VP20RT, NEW MP7140, VP30RT
		MP7030	150 (100 — 200)	M20	
		MP7130	150 (100 — 200)	M30	
		MP7140	150 (100 — 200)	M40	
		VP15TF	150 (100 — 200)		
K	Cast Iron	MC5020	180 (100 — 250)	K01	MC5020, MP8010, VP15TF, VP20RT
				K10	
		VP15TF	150 (100 — 200)	K20	
				K30	
N	Aluminium Alloy	LC15TF	1000 (200 — 3000)	N10	LC15TF
				N20	
				N30	
S	Heat Resistant Alloy Ti Alloy	MP9120	30 (20 — 40)	S01	NEW MP9120, VP15TF, MP9130, MP9030
		VP15TF	30 (20 — 40)	S10	
		MP9130	40 (25 — 60)	S20	
		MP9030	40 (25 — 60)	S30	
H	Hardened Materials	MP8010	80 (50 — 120)	H01	MP8010, VP15TF
				H10	
		VP15TF	80 (50 — 120)	H20	
				H30	

■ = MIRACLE SIGMA

GRADE CHARACTERISTICS

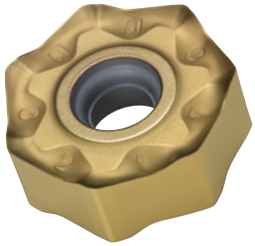
Grade	Substrate		Coating Layer	
	Hardness (HRA)	T.R.S (GPa)	Composition	Thickness
MC5020	91.0	2.2	TiCN-Al_2O_3-Ti Compound	Thick
FH7020	88.8	2.8	TiCN-Al_2O_3-Ti Compound	Thick
F7030	88.8	2.8	TiCN-Al^2O^3-TiN	Thin
NEW **MP6120**	91.5	2.5	(Al,Ti,Cr)N	Thin
NEW **MP6130**	90.5	2.5	(Al,Ti,Cr)N	Thin
MP7030	90.5	2.5	(Al,Ti)N-Ti Compound	Thin
NEW **MP7130**	90.5	2.5	(Al,Ti,Cr)N	Thin
NEW **MP7140**	88.8	2.8	(Al,Ti,Cr)N	Thin

Grade	Substrate		Coating Layer	
	Hardness (HRA)	T.R.S (GPa)	Composition	Thickness
MP8010	93.5	2.3	(Al,Ti,Si)N	Thin
NEW **MP9120**	91.5	2.5	(Al,Ti,Cr)N	Thin
MP9030	90.5	2.5	(Al,Ti)N-Ti Compound	Thin
MP9130	90.5	2.7	(Al,Ti,Cr)N	Thin
VP15TF	91.5	2.5	(Al,Ti)N	Thin
VP20RT	90.5	2.5	(Al,Ti)N	Thin
VP30RT	88.8	2.8	(Al,Ti)N	Thin
UP20M	90.5	2.0	TiN	Thin

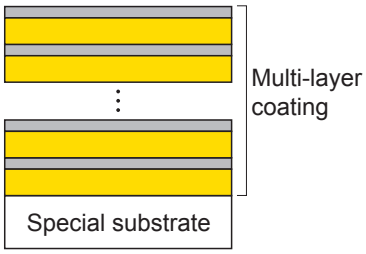
∗1GPa=102kg/mm^2

For machining of stainless steel

MP7030



MP7030 has a multi-layer coating based on newly developed Ti-compound. It provides superior wear and fracture resistance in stainless steel machining. A special tough cemented carbide substrate gives excellent performance in machining of difficult-to-cut materials such as stainless steel.



Heat-resistant Alloy, Cutting For Titanium Alloy

MP9130



An enhanced super fine cemented carbide substrate has increased toughness while maintaining hardness.
The Al-Ti-Cr-N accumulating coating ensures optimum heat and wear resistance. The combination of these properties gives excellent fracture resistance and welding resistance because of low coefficient of friction when machining titanium alloy.

CERMET

- NX2525 for high speed milling.
- NX4545 for general milling.

SELECTION STANDARD

MILLING

Work Material	Recommended Grade	Recommended Cutting Speed (m/min)	ISO	Application Range
P Steel M	NX2525	250 (150 — 350)	P10 M10	NX2525
			P20 M20	
	NX4545	150 (120 — 180)	P30 M30	NX4545
K Cast Iron	NX2525	200 (150 — 300)	K01	
			K10	NX2525
			K20	

(Note) In case of wet cutting, please use coated carbide VP15TF for steel cutting and coated carbide MC5020 for cast iron cutting.

GRADE CHARACTERISTICS

Grade	Hardness (HRA)	T.R.S. (GPa)	Thermal Conductivity (W/m•K) *	Thermal Expansion ($x10^{-6}$/K)
NX2525	92.2	2.0	33	7.8
NX4545	90.0	2.2	33	7.8

*1GPa=102kg/mm^2, 1W/m • K=2.39×10^{-3}cal/cm • sec • ℃

CEMENTED CARBIDE

● **Available grade series are UTi20T for steel and cast iron, and HTi10 for cast iron, non-ferrous metal and non-metal.**

SELECTION STANDARD

●MILLING

	Work Material	Recommended Grade	Recommended Cutting Speed (m/min)	ISO	Application Range
P	Steel	**UTi20T**	120 (50 — 180)	P10	
				P20	UTi20T
				P30	
M	Stainless Steel	**UTi20T**	120 (50 — 180)	M10	
				M20	UTi20T
				M30	
K	Cast Iron	**HTi10**	100 (50 — 150)	K10	HTi10
				K20	
		UTi20T	120 (50 — 180)	K30	UTi20T
N	Non-Ferrous Metal	**HTi10 TF15**	400 (300 — 500)	N01	
				N10	HTi10
				N20	TF15
				N30	

MAIN COMPONENT AND APPLICATION

ISO	Main Component	Characteristics	Work Material
P M	WC-TiC-TaC-Co	Heat / Deformation resistance.	Carbon steel, Alloy steel, Stainless steel and Cast iron
K N	WC-Co	High rigidity and wear resistance.	Cast iron, Non-Ferrous metals and Non-metal

GRADE CHARACTERISTICS

ISO	Grade	Hardness (HRA)	Thermal Conductivity (W/m•K)*	Thermal Expansion ($x10^{-6}$/K)	Young's Modulus (GPa) *	T.R.S (GPa) *
P M	**UTi20T**	90.5	38	5.5	520	2.0
K N	**HTi05T**	92.5	79	4.5	600	1.5
K N	**HTi10**	92.0	79	4.6	630	2.0
N	**TF15**	91.5	71	5.3	580	2.5

*1GPa=102kg/mm^2, 1W/m • K=2.39×10^{-3}cal/cm • sec • ℃

CBN (SINTERED CBN)



- MB710 and MB730 for cast iron cutting.
- BC5030 for high speed machining of cast irons now available.
- Due to the combination of the BC5030 insert geometry and the AOX allows the use of up to 16 corners per insert, enabling cost effective high efficiency machining.

SELECTION STANDARD / RECOMMENDED CUTTING CONDITIONS

FINISHING

Work Material		Structure	Cutting Speed (m/min) 250 500 750 1000 1250	Feed (mm/tooth)	Depth of Cut (mm)	Coolant
Grey Cast Iron	JIS FC250	Ferritic + Pearilitic	MB710 MB730	—0.3	—0.5	Dry
	JIS FC300	Pearilitic				

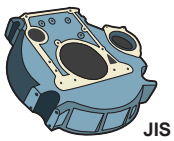
ROUGHING

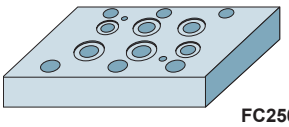
Work Material		Structure	Cutting Speed (m/min) 250 500 1000 1500 2000	Feed (mm/tooth)	Depth of Cut (mm)	Coolant
Grey Cast Iron	JIS FC250	Pearilitic	BC5030	—0.15	—3.0	Dry

FEATURES AND BASE

Grade	Application	Features	Main Component	Coating Layer
MB710	For General Cutting	General purpose grade with well balanced wear and fracture resistance.	CBN TiC Al_2O_3	—
MB730	For High Speed Cutting For interrupted Cutting	Has the largest CBN content and therefore displays good thermal conductivity. It is suitable for the high temperatures that are generated in high speed cutting.	CBN (High Content) Co Base Alloy	—
BC5030	For high-speed machining at large depths of cut High-speed interrupted machining at large depths of cut	High CBN content and high thermal conductivity. The whole insert is composed of sintered CBN. This enables high speed, high efficiency machining at larger depths of cut. The coated grade for easy recognition of used corners.	CBN AlN	TiN

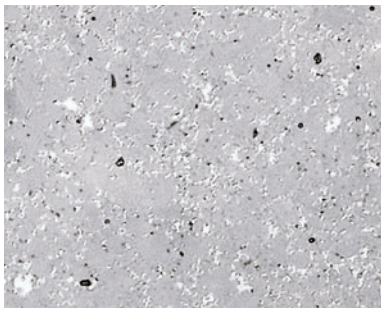
APPLICATION EXAMPLES

Tool		AOX445R10008D
Insert		SL-ONEN120404ASN (BC5030)
Machine		Machining Center
Workpiece		 JIS FC250
Cutting Condition	Cutting Speed (m/min)	1200
	Depth of Cut (mm)	2.8
	Width of Cut (mm)	70
	Table Feed (mm/min)	3057
	Feed per Tooth (mm/tooth)	0.1
Result		10 times longer tool life and 4 times higher efficiency than ceramics. Excellent machining with a surface finish of Ra < 1.6μm

Tool		NF10000R0408D (MB730)
Workpiece		 FC250
Component		Hydraulic component
Cutting Condition	Cutting Speed (m/min)	1800
	Feed per Tooth (mm/tooth)	0.1
	Table Feed (mm/min)	4584
	Depth of Cut (mm)	0.05
	Width of Cut (mm)	90
Coolant		Dry (Wet cutting at previous process)
Axial Runout (mm)		≤0.005mm
Result		Compared with competitor CBN grade cutting, the normal wear surface is excellent and a extendable life finishing is maintained.

PCD (SINTERED DIAMOND)

- **Suitable for non-ferrous metals cutting such as aluminium alloy.**
- **Suitable for extremely high speed finishing.**



Micro-Structure of **MD220**

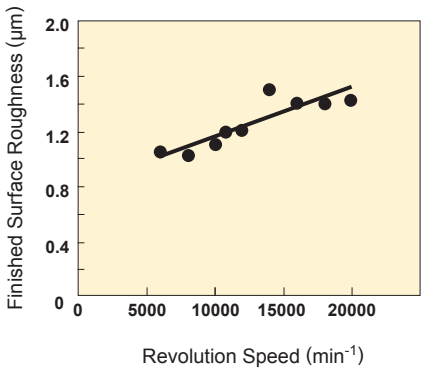
GRADE FEATURES

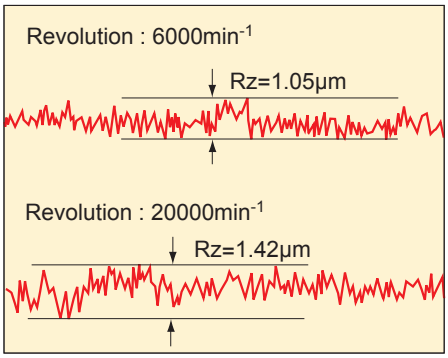
Grade	Features
MD220	Excellent in the balance between wear resistance and fracture resistance. For a wide range of tooling applications.

RECOMMENDED CUTTING CONDITIONS

Work Material	Cutting Speed (m/min)	Grade	Feed per Tooth (mm/tooth)	Depth of Cut (mm)
Aluminium Alloy (Si ≤12%)	1000—6000	**MD220**	—0.3	—0.5
Aluminium Alloy (Si ≥13%)	200—800			

CUTTING PERFORMANCE

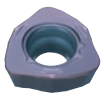




<Cutting Conditions>
Workpiece : JIS A7075-T6
Insert : NP-GDCW1240PDFR2
Grade : MD220
Tool : V10000R0406D
Feed : 0.2mm/tooth
Depth of Cut : 0.5mm
Width of Cut : 80mm
Dry Cutting

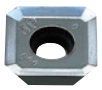
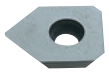
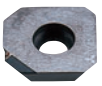
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	NNMU200712ZER-MM	K026
	WNEU2007ZEN7C-WP	K043
	NNMU200608ZEN-MK	K026
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Cutter Type	Order Number	Page
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	JDMW09T320ZDSR-FT	
	JDMW120420ZDSR-FT	
	JDMW140520ZDSR-FT	
	JOMT06T215ZZSR-JM	K024
	JOMT080320ZZSR-JM	
	JDMT09T320ZDSR-JM	
	JDMT120420ZDSR-JM	
	JDMT140520ZDSR-JM	
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AOX445 	SL-ONEN120404ASN	K045
APX3000 	AOGT123602PEFR-GM	K022
	AOGT123604PEFR-GM	
	AOGT123608PEFR-GM	

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	AOMT123620PEER-M	
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	AOMT123604PEER-H	K022
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APX4000 	AOMT184804PEER-H	K022
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AQX 	QOMT0830R-M2	K027
	QOMT1035R-M2	
	QOMT1342R-M2	
	QOMT1651R-M2	
	QOMT1856R-M2	
	QOMT2062R-M2	
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	QOGT1342R-G1	
	QOGT1651R-G1	
	QOGT1856R-G1	
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	QOGT2576R-G1	
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	RDMW0620M0E	
	RDMW0724M0E	
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	SOMT12T308PEEL-JM	
	SOMT12T308PEER-JH	K031
		
	SOMT12T320PEER-FT	K032
		
	SOGT12T308PEFR-JP	K031
		
	WOEW12T308PEER8C	K043
	WOEW12T308PETR8C	

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	SEMT13T3AGSN-FT	K030
		
	SEGT13T3AGFN-JP	K030
		
	WEEW13T3AGER8C	K042
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	WEEW13T3AGFR3C	K047
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	XDGX175012PDFR-GL	
	XDGX175016PDFR-GL	
	XDGX175020PDFR-GL	
	XDGX175024PDFR-GL	
	XDGX175030PDFR-GL	
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	XDGX175040PDFR-GL	
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CLASSIFICATION

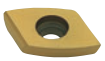
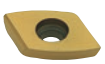
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	XDGX227040PDFR-GL	
	XDGX227050PDFR-GL	
BAE 	AEMW150304ER	K023
	AEMW150308ER	
	AEMW19T304ER	
	AEMW19T308ER	
BAP300 SRM2 	APMT1135PDER-H1	K023
	APMT1135PDER-H2	
	APMT1135PDER-H3	
	APMT1135PDER-H4	
	APMT1135PDER-H6	
	APMT1135PDER-M0	K023
	APMT1135PDER-M1	
	APMT1135PDER-M2	
	APGT1135PDFR-G2	K022
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	ZRM0603R-M4	
	ZRM0603R-M5	
BAP3500 	XPMT13T3PDER-M1	K041
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	XPMT13T3PDER-M6	
	XPMT13T3PDER-M75	
	XPMT13T3PDER-M8	

Cutter Type	Order Number	Page
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	XPGT13T3PDFR-G6	
	XPGT13T3PDFR-G75	
	XPGT13T3PDFR-G8	
	XPGT13T3PDER-G1	K041
	XPGT13T3PDER-G2	
	XPGT13T3PDER-G6	
	XPGT13T3PDER-G75	
	XPGT13T3PDER-G8	
BAP400 SRM2 	APMT1604PDER-H1	K023
	APMT1604PDER-H2	
	APMT1604PDER-H4	
	APMT1604PDER-H6	
	APMT1604PDER-H8	
	APMT1604PDER-M2	K023
	APGT1604PDFR-G2	K023
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	SFAN1203ZFFL2	
	SFCN1203ZFFR2	
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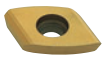
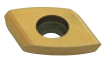
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	XDGT1550PDER-G12	
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	MPMT090308	K025
	MPMT120408	
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	SPMW090308	
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	CCMX09T308EN-A	
	CCMX09T308EN-B	K024
	ZCMX083508ER-A	K041
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	SPEN1203EEEL1	
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	SPER1203EEER-JS	K033
	SPEN1203EETR1	K045
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FF3000 	SPCA53Z	K032
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	SDKN1203AETN	
	SDKN1504AETN	
FP490 	SPEN424A	K032
FP590 	SPEN535A	K032
NF10000 QF10000 	GDCN2004PDFR3	K044
NF10000 	NP-GDCN2004PDSR3	K044
NR10000 	GDCN2004ZDTR1	K044
MG200 	MGEEW1035PFTR	K025
MG300 	MGEEW1242PFTR	K025
MG400 	MGEEW1650PFTR	K025

CLASSIFICATION

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MG445 	MGEEW1650AFTR	K025
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	TEEN1603PETR1	
	TEEN1603PESR1	
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	TEKN2204PETR	
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	TECN2204PEFR1	K045
OCTACUT BOE 	OEMX12T3ETR1	K026
	OEMX12T3ESR1	
	OEMX1705ESR1	
	OEMX1705ETR1	
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PMR 	CPMT1205ZPEN-M2	K024
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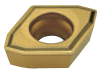
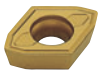
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SE545 	SEEN1504AFEN1	K029
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	JPMX140412-WH	K025
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	SRBT20	
	SRBT25	
	SRBT30	
	SRBT32	
SRF 	SRFT10	K034
	SRFT12	
	SRFT16	
	SRFT20	
	SRFT25	
	SRFT30	
	SRFT32	

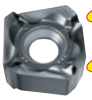
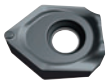
CLASSIFICATION

Cutter Type	Order Number	Page
SRM2 	SRM16C-M	K035
	SRM20C-M	
	SRM25C-M	
	SRM30C-M	
	SRM32C-M	
	SRM16E-M	K035
	SRM20E-M	
	SRM25E-M	
	SRM30E-M	
	SRM32E-M	
	SRG16C	K035
	SRG20C	
	SRG25C	
	SRG30C	
	SRG32C	
	SRG16E	K035
	SRG20E	
	SRG25E	
	SRG30E	
	SRG32E	
SRM2 ϕ40 ϕ50 	SRG40C	K035
	SRG50C	
	SRG40E	K035
	SRG50E	
	APMT1135PDER-H2	K023
	APMT1604PDER-H2	
	APMT1135PDER-M2	K023
	APMT1604PDER-M2	

Cutter Type	Order Number	Page
STAW 	STAWK○○○○TG	K055
	STAWN○○○○T	K053
	STAWN○○○○TH	
SUF 	SUFT10R05	K036
	SUFT10R10	
	SUFT10R20	
	SUFT12R05	
	SUFT12R10	
	SUFT12R20	
	SUFT12R30	
	SUFT16R05	
	SUFT16R10	
	SUFT16R15	
	SUFT16R20	
	SUFT16R30	
	SUFT20R05	
	SUFT20R10	
	SUFT20R15	
	SUFT20R20	
	SUFT20R30	
	SUFT25R05	
	SUFT25R10	
	SUFT25R20	
	SUFT25R30	
	SUFT30R05	
	SUFT30R10	
	SUFT30R20	
	SUFT30R30	
	SUFT32R05	
	SUFT32R10	
	SUFT32R20	

Cutter Type	Order Number	Page
TAF 	GCMT040204-U1	K048
	GCMT040204-U2	K048
	GPMT060204-U1	K048
	GPMT070204-U1	
	GPMT090304-U1	
	GPMT11T308-U1	
	GPMT140408-U1	
	GPMT060204-U2	K048
	GPMT070204-U2	
	GPMT090304-U2	
	GPMT11T308-U2	
	GPMT140408-U2	
	GPMT060204-U3	K048
	GPMT070204-U3	
	GPMT090304-U3	
	GPMT11T308-U3	
	GPMT140408-U3	
TAW 	TAWNH○○○○T	K049
	TAWKH○○○○TG	K051
	TAWBH○○○○T	K050

Cutter Type	Order Number	Page
TBE1 	SPMT120408-A	K034
TSMP 	MPMW070308 MPMW090308 MPMW120408	K025
V10000 	NP-GDCW1240PDFR2	K044
VFX5 	XNMU160708R-MS XNMU160712R-MS XNMU160716R-MS XNMU160724R-MS XNMU160732R-MS XNMU160740R-MS	K040
	XNMU160708R-HS	K040
	XNMU160708R-LS	K040
VFX6 	XNMU190912R-MS XNMU190916R-MS XNMU190924R-MS XNMU190932R-MS XNMU190940R-MS XNMU190950R-MS	K040
	XNMU190912R-HS	K040
	XNMU190912R-LS	K040

Cutter Type	Order Number	Page
VOX400 	SONX1206PER	K032
	WOEX1206PER5C	K043
VIPER 	TPNX1605N	K038
WSX445 	NEW SNGU140812ANFR-L NEW SNGU140812ANER-L NEW SNGU140812ANER-M NEW SNMU140812ANER-M NEW SNMU140812ANER-R NEW SNMU140812ANER-H	K031
	NEW WNGU1406ANEN8C-M	K043
Corner Angle 0° 11° Positive 	TPEN1603PPR TPEN2204PDR TPKN1603PPR TPKN2204PDR	K037
Corner Angle 15° 11° Positive 	SPKN1203EDR SPKN1504EDR SPEN1203EDR	K033
Corner Angle 45° 20° Positive 	SEKN1203AGTN	K030

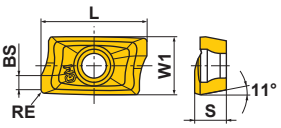
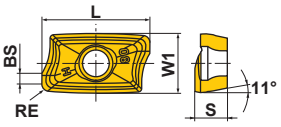
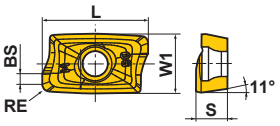
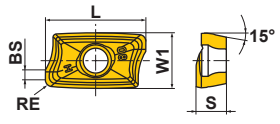
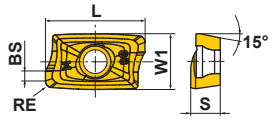
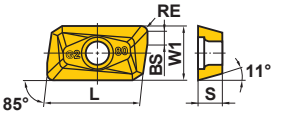
Cutter Type	Order Number	Page
Negative 	SNMN120408 SNMN120412	K031
11° Positive 	SPMN120408 SPMN120412	K033
11° Positive 	TPMN160304 TPMN160308 TPMN160312 TPMN220404 TPMN220408 TPMN220412	K038

ROTATING INSERTS

Work Material		
	P	Steel
	M	Stainless Steel
	K	Cast Iron
	N	Non-ferrous Metal
	S	Heat-resistant Alloy, Titanium Alloy
	H	Hardened Steel

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

Honing :
E : Round **F** : Sharp

Shape	Order Number	Class	Honing	Coated								Carbide		Dimensions (mm)					Geometry
				MC5020	MP6120 (NEW)	MP6130 (NEW)	MP7130 (NEW)	MP9120	MP9130	VP15TF	VP20RT	UP20M	HTi10	TF15	L	W1	S	BS	RE	
APX3000 ➲L046	AOGT123602PEFR-GM	G	F											●	12	6.6	3.6	1.8	0.2	
	AOGT123604PEFR-GM	G	F											●	12	6.6	3.6	1.6	0.4	
	AOGT123608PEFR-GM	G	F											●	12	6.6	3.6	1.2	0.8	
APX3000 ➲L046	AOMT123604PEER-H	M	E	●	●	●	●	●	●	●	●				12	6.6	3.6	1.6	0.4	
	AOMT123608PEER-H	M	E	●	●	●	●	●	●	●	●				12	6.6	3.6	1.2	0.8	
	AOMT123616PEER-H	M	E	●	●	●	●	●	●	●	●				12	6.6	3.6	0.4	1.6	
APX3000 ➲L046	AOMT123602PEER-M	M	E		●	●	●	●	●	●	●				12	6.6	3.6	1.8	0.2	
	AOMT123604PEER-M	M	E		●	●	●	●	●	●	●				12	6.6	3.6	1.6	0.4	
	AOMT123608PEER-M	M	E		●	●	●	●	●	●	●				12	6.6	3.6	1.2	0.8	
	AOMT123610PEER-M	M	E		●	●	●	●	●	●	●				12	6.6	3.6	1.0	1.0	
	AOMT123612PEER-M	M	E		●	●	●	●	●	●	●				12	6.6	3.6	0.8	1.2	
	AOMT123616PEER-M	M	E		●	●	●	●	●	●	●				12	6.6	3.6	0.4	1.6	
	AOMT123620PEER-M	M	E		●	●	●	●	●	●	●				12	6.6	3.6	0.4	2.0	
	AOMT123624PEER-M	M	E		●	●	●	●	●	●	●				12	6.6	3.6	0.4	2.4	
	AOMT123630PEER-M	M	E		●	●	●	●	●	●	●				12	6.6	3.6	0.4	3.0	
	AOMT123632PEER-M	M	E		●	●	●	●	●	●	●				12	6.6	3.6	0.4	3.2	
APX4000 ➲L052	AOMT184804PEER-H	M	E	●	●	●	●	●	●	●	●				18	9	4.8	1.8	0.4	
	AOMT184808PEER-H	M	E	●	●	●	●	●	●	●	●				18	9	4.8	1.4	0.8	
	AOMT184816PEER-H	M	E	●	●	●	●	●	●	●	●				18	9	4.8	0.4	1.6	
	AOMT184832PEER-H	M	E			●	●				●				18	9	4.8	0.4	3.2	
	AOMT184840PEER-H	M	E			●	●				●				18	9	4.8	0.4	4.0	
	AOMT184850PEER-H	M	E			●	●				●				18	9	4.8	—	5.0	
	AOMT184864PEER-H	M	E			●	●				●				18	9	4.8	—	6.35	
APX4000 ➲L052	AOMT184804PEER-M	M	E		●	●	●	●	●	●	●				18	9	4.8	1.8	0.4	
	AOMT184808PEER-M	M	E		●	●	●	●	●	●	●				18	9	4.8	1.4	0.8	
	AOMT184810PEER-M	M	E		●			●	●	●					18	9	4.8	1.0	1.0	
	AOMT184812PEER-M	M	E		●			●	●	●					18	9	4.8	0.8	1.2	
	AOMT184816PEER-M	M	E		●	●	●	●	●	●	●				18	9	4.8	0.4	1.6	
	AOMT184820PEER-M	M	E		●			●	●	●					18	9	4.8	0.4	2.0	
BAP300	APGT1135PDFR-G2	G	F										●		11	6.35	3.5	1.2	0.8	
																				

■ = MIRACLE SIGMA

● : Inventory maintained in Japan.
(10 inserts in one case)

Work Material			Coated			Cermet		Carbide		Dimensions (mm)						Geometry
			F7030	VP15TF	UP20M	NX2525	NX4545	UTi20T	HTi10	IC	L	W1	S	BS	RE	
P	Steel		●	●	●	●	●	●								
M	Stainless Steel		◐	◐	◐	○	◐	◐								
K	Cast Iron			✲		●		✲	●							
N	Non-ferrous Metal								◐							
S	Heat-resistant Alloy, Titanium Alloy			◐												
H	Hardened Steel			◐												

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

Honing :
E : Round **F :** Sharp

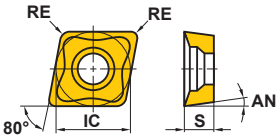
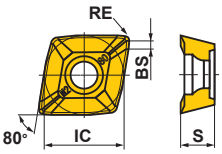
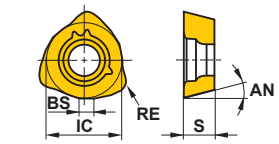
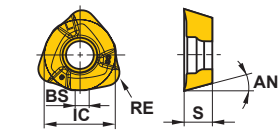
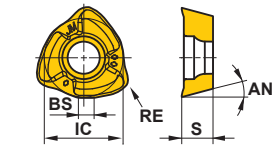
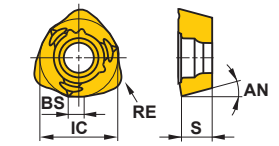
Shape	Order Number	Class	Honing	F7030	VP15TF	UP20M	NX2525	NX4545	UTi20T	HTi10	IC	L	W1	S	BS	RE	Geometry
BAE	**AEMW150304ER**	M	E			●	●		●		—	15.875	9.525	3.18	—	0.4	
	AEMW**150308ER**	M	E			●	●		●		—	15.875	9.525	3.18	—	0.8	
	AEMW**19T304ER**	M	E			●	●		●		—	19.05	12.7	3.97	—	0.4	
	AEMW**19T308ER**	M	E			●	●		●		—	19.05	12.7	3.97	—	0.8	
BAP400	**APGT1604PDFR-G2**	G	F							●	—	16.5	9.525	4.76	1.4	0.8	
BAP300 SRM2 ➲L128	**APMT1135PDER-H1**	M	E	●	●		●	●		●	—	11	6.35	3.5	1.5	0.4	
	APMT**1135PDER-H2**	M	E	●	●		●	●		●	—	11	6.35	3.5	1.2	0.8	
	APMT**1135PDER-H3**	M	E	●							—	11	6.35	3.5	0.8	1.2	
	APMT**1135PDER-H4**	M	E	●							—	11	6.35	3.5	0.4	1.6	
	APMT**1135PDER-H6**	M	E	●							—	11	6.35	3.5	0.4	2.4	
BAP400 SRM2 ➲L128	**APMT1604PDER-H1**	M	E	●							—	16.5	9.525	4.76	1.7	0.4	
	APMT**1604PDER-H2**	M	E	●	●		●	●		●	—	16.5	9.525	4.76	1.4	0.8	
	APMT**1604PDER-H4**	M	E	●							—	16.5	9.525	4.76	0.4	1.6	
	APMT**1604PDER-H6**	M	E	●							—	16.5	9.525	4.76	0.4	2.4	
	APMT**1604PDER-H8**	M	E	●							—	16.5	9.525	4.76	0.4	3.2	
BAP300 SRM2 ➲L128	**APMT1135PDER-M0**	M	E	●							—	11	6.35	3.5	1.8	0.2	
	APMT**1135PDER-M1**	M	E	●							—	11	6.35	3.5	1.5	0.4	
	APMT**1135PDER-M2**	M	E	●	●			●			—	11	6.35	3.5	1.2	0.8	
BAP400 SRM2 ➲L128	**APMT1604PDER-M2**	M	E	●	●			●			—	16.5	9.525	4.76	1.4	0.8	
DCCC	**CCMX083508EN-A**	M	E	●		●					7.94	—	—	3.5	—	0.8	
	CCMX**09T308EN-A**	M	E	●	●	●					9.525	—	—	3.97	—	0.8	

ROTATING INSERTS

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	
H	Hardened Steel	

Cutting Conditions (Guide) :
● : Stable Cutting ◔ : General Cutting ✲ : Unstable Cutting

Honing :
E : Round **S** : Chamfer + Hone

Shape	Order Number	Class	Honing	Coated										Dimensions (mm)					Geometry
				F7030	FH7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	IC	S	BS	RE	AN	
DCCC	CCMX09T308EN-B	M	E	●										9.525	3.97	—	0.8	7°	
PMR ➲L143	CPMT1205ZPEN-M2	M	E									●		12.7	5.56	1.4	0.8	—	
	CPMT1205ZPEN-M3	M	E									●		12.7	5.56	1.4	1.2	—	
	CPMT1906ZPEN-M2	M	E									●		19.05	6.35	1.4	0.8	—	
	CPMT1906ZPEN-M3	M	E									●		19.05	6.35	1.4	1.2	—	
AJX ➲L084	JOMW06T215ZZSR-FT	M	S		●	●	●	●	●			●	●	6.35	2.78	1.2	1.5	13°	
	JOMW080320ZZSR-FT	M	S		●	●	●	●	●			●	●	8	3.18	1.4	2	13°	
	JDMW09T320ZDSR-FT	M	S		●	●	●	●	●			●	●	9.525	3.97	1.8	2	15°	
	JDMW120420ZDSR-FT	M	S		●	●	●	●	●			●	●	12	4.76	2.5	2	15°	
	JDMW140520ZDSR-FT	M	S		●	●	●	●	●			●	●	14	5.56	2.8	2	15°	
AJX NEW ➲L084	JDMT09T323ZDER-JL	M	E							●	●			9.525	3.97	1.8	2.3	15°	
	NEW JDMT120423ZDER-JL	M	E							●	●			12	4.76	2.5	2.3	15°	
	NEW JDMT140523ZDER-JL	M	E							●	●			14	5.56	2.8	2.3	15°	
AJX ➲L084	JOMT06T215ZZSR-JM	M	S		●	●	●	●	●			●	●	6.35	2.78	1.2	1.5	13°	
	JOMT080320ZZSR-JM	M	S		●	●	●	●	●			●	●	8	3.18	1.4	2	13°	
	JDMT09T320ZDSR-JM	M	S		●	●	●	●	●			●	●	9.525	3.97	1.8	2	15°	
	JDMT120420ZDSR-JM	M	S		●	●	●	●	●			●	●	12	4.76	2.5	2	15°	
	JDMT140520ZDSR-JM	M	S		●	●	●	●	●			●	●	14	5.56	2.8	2	15°	
AJX ➲L084	JDMT120420ZDSR-ST	M	S		●	●	●	●	●			●	●	12	4.76	2.5	2	15°	
	JDMT140520ZDSR-ST	M	S		●	●	●	●	●			●	●	14	5.56	2.8	2	15°	

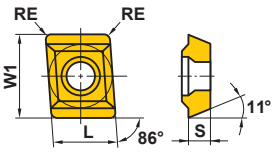
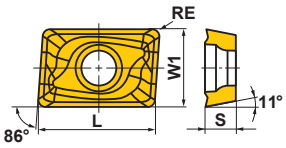
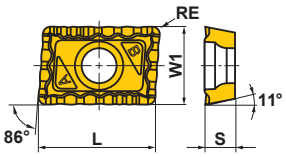
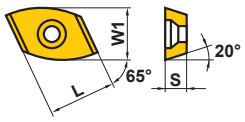
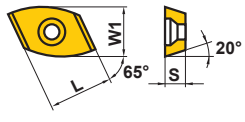
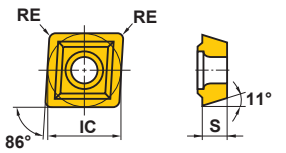
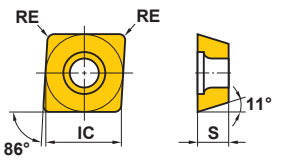
■ = MIRACLE SIGMA

● : Inventory maintained in Japan.
(10 inserts in one case)

Work Material			VP15TF	VP20RT	UP20M	NX2525	UTi20T	HTi10
	P	Steel	◐	◐	◐	●	◐	
	M	Stainless Steel	◔	◔	◔	○	◔	
	K	Cast Iron	✲	✲		●	✲	◐
	N	Non-ferrous Metal						◐
	S	Heat-resistant Alloy, Titanium Alloy	◐					
	H	Hardened Steel	◔					

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

Honing :
E : Round **T :** Chamfer

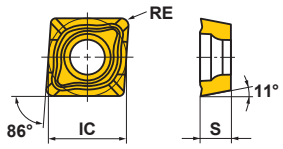
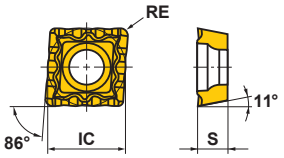
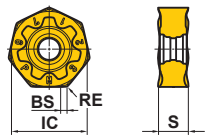
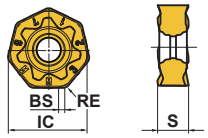
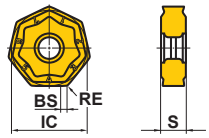
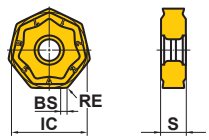
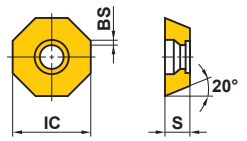
Shape	Order Number	Class	Honing	Coated			Cermet	Carbide		Dimensions (mm)					Geometry
				VP15TF	VP20RT	UP20M	NX2525	UTi20T	HTi10	L	W1	IC	S	RE	
CBJP ⇒L137 **TAB**	**JPMT060204-E**	M	E	●		●		●		6.5	7.94	—	2.38	0.4	 This figure is for outer insert (E).
SPX ⇒L108	**JPMX140412-JM**	M	E	●	●					14.3	12.7	—	4.83	1.2	
	JPMX**190412-JM**	M	E	●	●					19.05	12.7	—	4.79	1.2	
SPX ⇒L108	**JPMX140412-WH**	M	E	●	●					14.3	12.7	—	4.76	1.2	
	JPMX**190412-WH**	M	E	●	●					19.05	12.7	—	4.76	1.2	
MG245 **MG345** **MG445**	**MGEEW1035AFTR**	E	T			●	●	●	●	10	9	—	3.5	—	
	MGEEW**1242AFTR**	E	T			●	●	●	●	12	10.5	—	4.2	—	
	MGEEW**1650AFTR**	E	T			●	●	●	●	16	13	—	5	—	
MG200 **MG300** **MG400**	**MGEEW1035PFTR**	E	T			●	●	●	●	10	9	—	3.5	—	
	MGEEW**1242PFTR**	E	T			●	●	●	●	12	10.5	—	4.2	—	
	MGEEW**1650PFTR**	E	T			●		●	●	16	13	—	5	—	
CBMP ⇒L137 **ECMP** **TAB**	**MPMT070308**	M	E			●		●		—	—	7.94	3.18	0.8	
	MPMT**090308**	M	E	●		●		●		—	—	9.525	3.18	0.8	
	MPMT**120408**	M	E			●		●		—	—	12.7	4.76	0.8	
TSMP ⇒L136	**MPMW070308**	M	E					●		—	—	7.94	3.18	0.8	
	MPMW**090308**	M	E					●		—	—	9.525	3.18	0.8	
	MPMW**120408**	M	E					●		—	—	12.7	4.76	0.8	

ROTATING INSERTS

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	
H	Hardened Steel	

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

Honing :
E : Round **S :** Chamfer + Hone **T :** Chamfer

Shape	Order Number	Class	Honing	Coated F7030	Coated MC5020	Coated VP15TF	Coated VP20RT	Coated MP7030	Cermet NX4545	Carbide UTi20T	Dimensions (mm) IC	S	BS	RE	Geometry
SPX ➔L108	**MPMX120412-JM**	M	E			●	●				12.7	4.79	—	1.2	
SPX ➔L108	**MPMX120412-WH**	M	E			●	●				12.7	4.76	—	1.2	
AHX640S ➔L026	**NNMU200708ZEN-MP**	M	E			●					20	8.0	1	0.8	
AHX640S ➔L026	**NNMU200712ZER-MM**	M	E					●			20	8.0	1	1.2	
AHX640S ➔L026 **AHX640W** ➔L030	**NNMU200608ZEN-MK**	M	E		●	●	●				20	6.55	1	0.8	
AHX640S ➔L026 **AHX640W** ➔L030	**NNMU200608ZEN-HK**	M	E		●	●	●				20	6.55	1	0.8	
OCTACUT ➔L094	**OEMX12T3ETR1**	M	T						●		12.7	3.97	1	—	
	OEMX12T3ESR1	M	S	●							12.7	3.97	1	—	
	OEMX1705ETR1	M	T			●			●		17	5	1.4	—	
	OEMX1705ESR1	M	S	●							17	5	1.4	—	

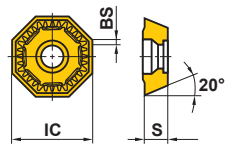
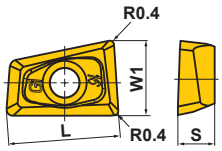
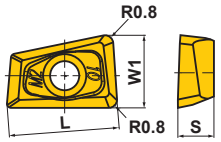
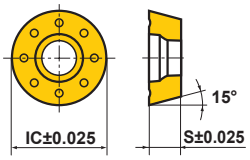
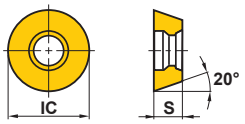
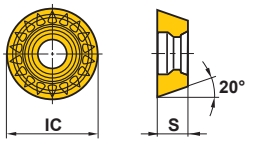
■ = MIRACLE SIGMA

● : Inventory maintained in Japan.
(10 inserts in one case)

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
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H	Hardened Steel	

Cutting Conditions (Guide) :
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Shape	Order Number	Class	Honing	Coated F7030	Coated VP15TF	Coated VP30RT	Coated UP20M	Coated MP8010	Carbide UTi20T	Carbide HTi10	L	W1	IC	S	BS	Geometry
OCTACUT ➲L094	**OEMX12T3EER1-JS**	M	E	●							—	—	12.7	3.97	1	
	OEMX**1705EER1-JS**	M	E	●							—	—	17	5	1.4	
	OEMX**1705ETR1-JS**	M	T		●						—	—	17	5	1.4	
AQX ➲L076	**QOGT0830R-G1**	G	F ✱1		●					●	8.4	5.5	—	3	—	
	QOGT**1035R-G1**	G	F ✱1		●					●	10.6	7	—	3.5	—	
	QOGT**1342R-G1**	G	F ✱1		●					●	13.1	8.7	—	4.2	—	
	QOGT**1651R-G1**	G	F ✱1		●					●	16.5	11	—	5.1	—	
	QOGT**1856R-G1**	G	F ✱1		●					●	18	12	—	5.6	—	
	QOGT**2062R-G1**	G	F ✱1		●					●	20.4	13.6	—	6.2	—	
	QOGT**2576R-G1**	G	F ✱1		●					●	25.8	17.2	—	7.6	—	
AQX ➲L076	**QOMT0830R-M2**	M	E		●	●					8.4	5.5	—	3	—	
	QOMT**1035R-M2**	M	E		●	●					10.6	7	—	3.5	—	
	QOMT**1342R-M2**	M	E		●	●					13.1	8.7	—	4.2	—	
	QOMT**1651R-M2**	M	E		●	●					16.5	11	—	5.1	—	
	QOMT**1856R-M2**	M	E		●	●					18	12	—	5.6	—	
	QOMT**2062R-M2**	M	E		●	●					20.4	13.6	—	6.2	—	
	QOMT**2576R-M2**	M	E		●	●					25.8	17.2	—	7.6	—	
ARX ➲L098	**RDMW0517M0E**	M	E		●			●			—	—	5	1.70	—	
	RDMW**0620M0E**	M	E		●			●			—	—	6	1.99	—	
	RDMW**0724M0E**	M	E		●			●			—	—	7	2.38	—	
OCTACUT ➲L094	**REMX1705SN**	M	S	●							—	—	17.25	5.2	—	
																
OCTACUT ➲L094	**REMX12T3EN-JS**	M	E	●							—	—	12.95	4.17	—	
	REMX**1705EN-JS**	M	E	●							—	—	17.25	5.2	—	

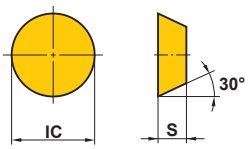
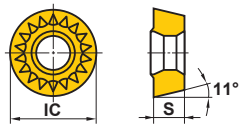
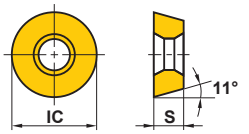
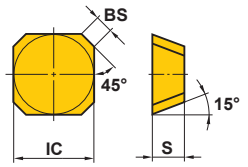
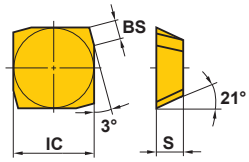
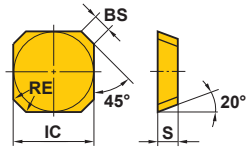
✱1 Grade VP15TF is "E".

ROTATING INSERTS

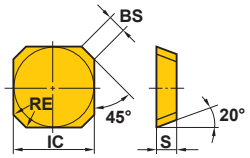
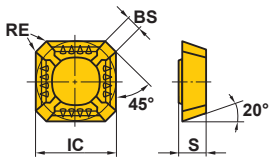
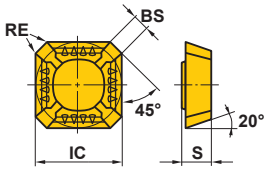
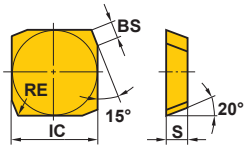
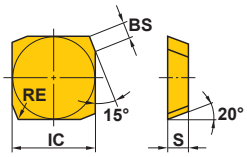
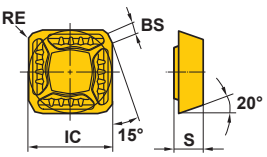
Work Material		
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Shape	Order Number	Class	Honing	Coated F7030	Coated MC5020	Coated VP15TF	Coated UP20M	Cermet NX2525	Cermet NX4545	Carbide UTi20T	Carbide HTi10	IC	S	BS	RE	Geometry
SG20 ➲L033	**RGEN2004M0EN**	E	E			●						20	4.76	—	—	
	RGEN**2004M0SN**	E	S	●			●			●	●	20	4.76	—	—	
BRP ➲L102	**RPMT08T2M0E-JS**	M	E	●		●						8	2.78	—	—	
	RPMT**10T3M0E-JS**	M	E	●		●						10	3.97	—	—	
	RPMT**1204M0E-JS**	M	E	●		●				●		12	4.76	—	—	
	RPMT**1606M0E-JS**	M	E	●		●						16	6.35	—	—	
BRP ➲L102	**RPMW08T2M0T**	M	T			●						8	2.78	—	—	
	RPMW**10T3M0E**	M	E	●					●			10	3.97	—	—	
	RPMW**10T3M0T**	M	T			●						10	3.97	—	—	
	RPMW**1204M0E**	M	E	●					●	●		12	4.76	—	—	
	RPMW**1204M0T**	M	T			●						12	4.76	—	—	
	RPMW**1606M0E**	M	E	●						●		16	6.35	—	—	
	RPMW**1606M0T**	M	T			●						16	6.35	—	—	
FMSD	**SDEN1203AEN**	E	T						▲			12.7	3.18	1.2	—	
	SDKN1203AEN	K	T	▲		●		▲		▲		12.7	3.18	1.2	—	
	SDKN**1203AETN**	K	T						▲			12.7	3.18	1.7	—	
	SDKN**1504AETN**	K	T						▲			15.875	4.76	1.7	—	
FE404 ➲L152 **E404**	**SEA42C10GR**	A	F								▲	12.7	3.18	2.4	—	
	SEA**42C10GL**	A	F								▲	12.7	3.18	2.4	—	
SE445	**SECN1203AFTN1**	C	T						●			12.7	3.18	1.4	1.0	
	SEEN1203AFFN1	E	F								●	12.7	3.18	1.4	1.0	
	SEEN**1203AFEN1**	E	E			●						12.7	3.18	1.4	1.0	
	SEEN**1203AFTN1**	E	T					●	●			12.7	3.18	1.4	1.0	
	SEEN**1203AFSN1**	E	S	●	●							12.7	3.18	1.4	1.0	
	SEKN1203AFSN1	K	S	●								12.7	3.18	1.4	—	
	SEKN**1203AFTN1**	K	T							●		12.7	3.18	1.4	—	
	SEKN**1203AFTN**	K	T						●			12.7	3.18	1.7	1.0	

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Work Material			Coated			Cermet		Carbide		Dimensions (mm)				Geometry
Shape	Order Number	Class	Honing	F7030	MC5020	VP15TF	NX2525	NX4545	UTi20T	HTi10	IC	S	BS	RE	
	P Steel			◐		◐	●	◐	◐						
	M Stainless Steel			◔		◔	○	◔	◔						
	K Cast Iron				◐	✲	●		✲	◐					
	N Non-ferrous Metal									◐					
	S Heat-resistant Alloy, Titanium Alloy					◐									
	H Hardened Steel					◔									
SE545	**SEEN1504AFEN1**	E	E			●					15.875	4.76	1.4	1.0	
	SEEN**1504AFTN1**	E	T				●	●			15.875	4.76	1.4	1.0	
	SEEN**1504AFSN1**	E	S	●	●						15.875	4.76	1.4	1.0	
	SEKN1504AFSN1	K	S	●							15.875	4.76	1.4	—	
	SEKN**1504AFTN1**	K	T						●		15.875	4.76	1.4	—	
SE445	**SEER1203AFEN-JS**	E	E	●	●	●					12.7	3.18	1.4	1.0	
															
SE545	**SEER1504AFEN-JS**	E	E	●	●						15.875	4.76	1.4	1.0	
															
SE415 **QSE415**	**SEEN1203EFFR1**	E	F							●	12.7	3.18	1.4	1.0	
	SEEN**1203EFER1**	E	E			●					12.7	3.18	1.4	1.0	
	SEEN**1203EFTR1**	E	T				●	●			12.7	3.18	1.4	1.0	
	SEEN**1203EFSR1**	E	S	●	●						12.7	3.18	1.4	1.0	
	SEKN1203EFSR1	K	S	●							12.7	3.18	1.4	—	
	SEKN**1203EFTR1**	K	T						●		12.7	3.18	1.4	—	
	SEKN**1203EFTR**	K	T					●			12.7	3.18	1.8	1.0	Right hand insert shown.
SE515 ➔L034	**SECN1504EFTR1**	C	T					●			15.875	4.76	1.4	1.0	
	SEEN1504EFER1	E	E			●					15.875	4.76	1.4	1.0	
	SEEN**1504EFTR1**	E	T					●			15.875	4.76	1.4	1.0	
	SEEN**1504EFSR1**	E	S	●							15.875	4.76	1.4	1.0	
	SEKN1504EFSR1	K	S	●							15.875	4.76	1.4	—	
	SEKN**1504EFTR1**	K	T						●		15.875	4.76	1.4	—	Right hand insert shown.
SE415 **QSE415**	**SEER1203EFER-JS**	E	E	●	●						12.7	3.18	1.4	1.0	
															

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

Honing :
E : Round **F :** Sharp **S :** Chamfer + Hone **T :** Chamfer

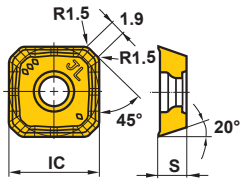
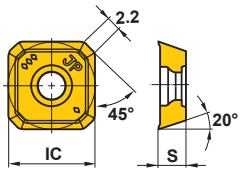
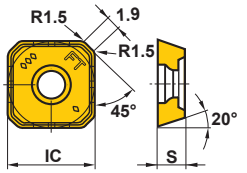
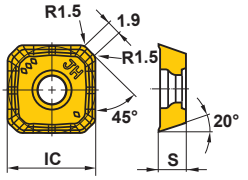
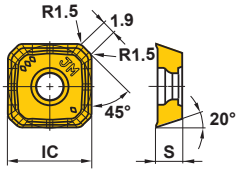
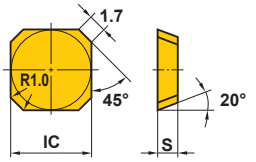
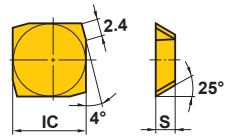
ROTATING INSERTS

ROTATING INSERTS

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	
H	Hardened Steel	

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

Honing :
E : Round **F** : Sharp
S : Chamfer + Hone **T** : Chamfer

Shape	Order Number	Class	Honing	Coated									Cermet	Carbide	Dimensions (mm)		Geometry
				F7030	MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	NX4545	HTi10	IC	S	
ASX445 ➲L018	SEET13T3AGEN-JL	E	E	●		●	●	●	●	●	●	●	●	●		13.4	3.97	
ASX445 ➲L018	SEGT13T3AGFN-JP	G	F												●	13.4	3.97	
ASX445 ➲L018	SEMT13T3AGSN-FT	M	S		●											13.4	3.97	
ASX445 ➲L018	SEMT13T3AGSN-JH	M	S	●	●	●	●	●	●	●	●	●	●			13.4	3.97	
ASX445 ➲L018	SEMT13T3AGSN-JM	M	S	●	●	●	●	●	●	●	●	●	●	●		13.4	3.97	
Corner Angle 45°	SEKN1203AGTN	K	T											▲		12.7	3.18	
BF407 QBF407	SFAN1203ZFFR2	A	F												●	12.7	3.175	
	SFAN1203ZFFL2	A	F												●	12.7	3.175	
	SFCN1203ZFFR2	C	F												●	12.7	3.175	
	SFCN1203ZFFL2	C	F												□	12.7	3.175	

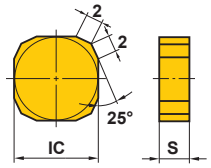
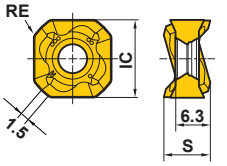
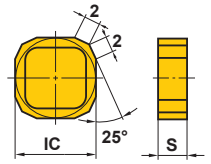
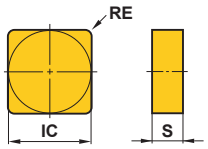
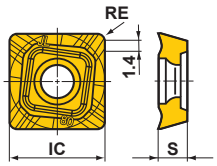
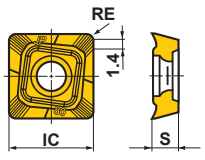
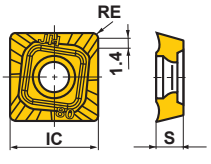
● : Inventory maintained in Japan. □ : Non stock, produced to order only. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

■ = MIRACLE SIGMA

Work Material		
P	Steel	
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N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	
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Cutting Conditions (Guide) :
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Shape	Order Number	Class	Honing	Coated										Cermet		Carbide			Dimensions (mm)			Geometry
				F7030	MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP20RT	VP30RT	NX2525	NX4545	UTi20T	HTi10	TF15	IC	S	RE	
BN425 DN	SNC43B2G	C	F															●		12.7	4.8	—	
	SNC43B2S	C	T *1													●	●			12.7	4.8	—	
	SNK43B2G	K	F														●	●		12.7	4.8	—	
	SNK43B2S	K	T *1												●	●	●			12.7	4.8	—	
WSX445 ➲L010	NEW SNGU140812ANFR-L	G	F																●	14	8.4	1.2	
	NEW SNGU140812ANER-L	G	E			●	●	●		●		●	●							14	8.4	1.2	
	NEW SNGU140812ANER-M	G	E			●	●	●		●		●	●							14	8.4	1.2	
	NEW SNMU140812ANER-M	M	E		●	●	●	●		●		●	●							14	8.4	1.2	
	NEW SNMU140812ANER-R	M	E		●	●	●					●	●							14	8.4	1.2	
	NEW SNMU140812ANER-H	M	E		●	●	●					●	●							14	8.4	1.2	
BN425 DN	SNKF43B2S	K	T													●				12.7	4.8	—	
	SNMF43B2G	M	E		●															12.7	4.8	—	
	SNMN120408	M	E		●															12.7	4.78	0.8	
	SNMN120412	M	E		●															12.7	4.78	1.2	
ASX400 ➲L040	SOET12T308PEER-JL	E	E	●		●	●	●	●	●	●	●		●		●				12.7	3.97	0.8	
ASX400 ➲L040	SOGT12T308PEFR-JP	G	F															●		12.7	3.97	0.8	
ASX400 ➲L040	SOMT12T308PEER-JH	M	E	●	●	●	●	●	●	●	●	●		●						12.7	3.97	0.8	

✱1 Grade UTi20T is "E".

■ = MIRACLE SIGMA

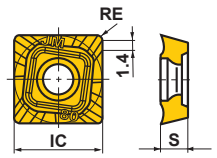
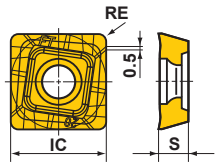
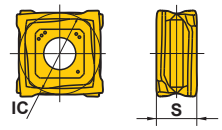
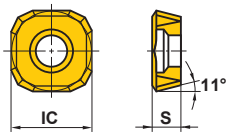
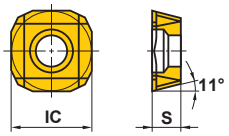
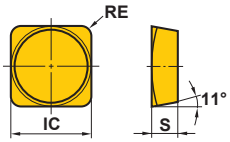
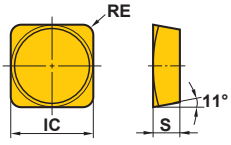
ROTATING INSERTS

ROTATING INSERTS

Work Material		
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Cutting Conditions (Guide) :
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Shape	Order Number	Class	Honing	Coated										Cermet		Carbide		Dimensions (mm)			Geometry
				F7030	MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	NX2525	NX4545	HTi10	HTi05T	IC	S	RE	
ASX400 ➲L040	**SOMT12T308PEER-JM**	M	E	●	●	●	●	●	●	●	●	●	●		●			12.7	3.97	0.8	
	SOMT**12T308PEEL-JM**	M	E									●						12.7	3.97	0.8	
																					Right hand insert shown.
ASX400 ➲L040	**SOMT12T320PEER-FT**	M	E		●	●				●	●	●						12.7	3.97	2.0	
																					
VOX400 ➲L036	**SONX1206PER**	N	E		●							●						12.7	6.3	—	
																					
FF3000 ➲L149	**SPCA53Z**	C	E											●				15.88	4.8	—	
																					
FF3000 ➲L149	**SPCG53Z**	C	F											●			●	15.88	4.8	—	
																					
FP490 ➲L150	**SPEN424A**	E	F													●	●	12.7	3.18	1.6	
																					
FP590 ➲L151	**SPEN535A**	E	F														●	15.875	4.76	2.0	
																					

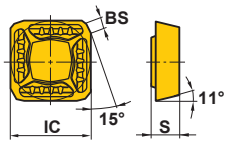
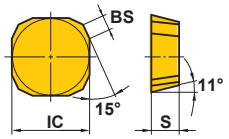
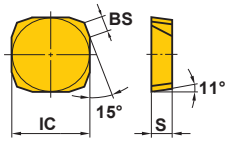
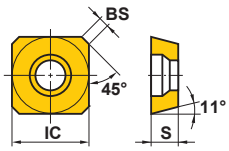
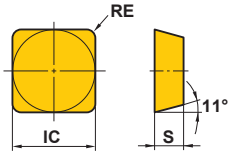
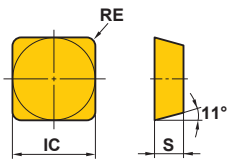
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Honing :
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Shape	Order Number	Class	Honing	Coated				Cermet		Carbide		Dimensions (mm)				Geometry
				F7030	MC5020	VP15TF	UP20M	NX2525	NX4545	UTi20T	HTi10	IC	S	BS	RE	
FBP415	**SPER1203EEER-JS**	E	E		●							12.7	3.18	1.4	—	
Corner Angle 15°	**SPEN1203EDR**	E	T	▲				▲	▲			12.7	3.18	1.4	—	 Right hand insert shown.
	SPKN1203EDR	K	T✱1	▲	●	●		▲		▲	▲	12.7	3.18	1.4	—	
	SPKN1504EDR	K	T✱1			●	▲	▲		▲	▲	15.875	4.76	1.4	—	
FBP415	**SPEN1203EEER1**	E	E		●						●	12.7	3.175	1.4	—	 Right hand insert shown.
	SPEN1203EEEL1	E	E		●						●	12.7	3.175	1.4	—	
	SPNN1203EEER1	N	E		●						●	12.7	3.18	1.3	—	
	SPNN1203EEEL1	N	E								●	12.7	3.18	1.3	—	
BSP	**SPMB1204APT**	M	T				●			●		12.7	4.76	1.4	—	
S400	**SPMN120304**	M	E✱1			●				●	●	12.7	3.18		0.4	
	SPMN120304T	M	T					●				12.7	3.18		0.4	
	SPMN120308	M	E	●		●	●			●	●	12.7	3.18		0.8	
	SPMN120312	M	E✱1	●		●				●	●	12.7	3.18		1.2	
	SPMN120408	M	E		●					●	●	12.7	4.76		0.8	
	SPMN120412	M	E		●					●		12.7	4.76		1.2	
	SPGN120304	G	E✱1					●		●	●	12.7	3.18		0.4	
	SPGN120308	G	E✱1				●	●		●	●	12.7	3.18		0.8	
	SPGN120312	G	F								●	12.7	3.18		1.2	
S500	**SPMN150408**	M	E							●		15.875	4.76		0.8	
	SPMN150412	M	E							●		15.875	4.76		1.2	
	SPGN150404	G	E							●		15.875	4.76		0.4	
	SPGN150408	G	E✱1								●	15.875	4.76		0.8	

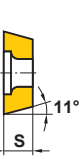
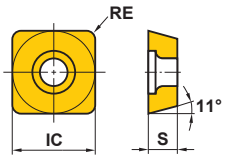
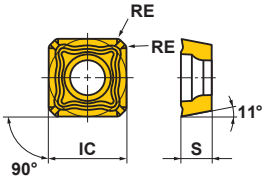
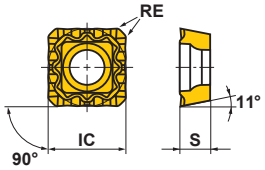
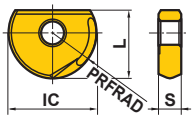
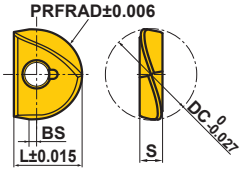
✱1 Grade HTi10 is "F".

ROTATING INSERTS

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	
H	Hardened Steel	

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing :
E : Round **F** : Sharp

Shape	Order Number	Class	Honing	Coated					Cermet		Carbide		Dimensions (mm)							Geometry
				EP6120 (NEW)	VP15TF	VP20RT	UP20M	MP8010	NX2525	NX4545	UTi20T	HTi10	L	IC	DC	S	BS	RE	PRFRAD	
TBE1	SPMT120408-A	M	E				▲				▲		—	12.7	—	4.76	—	0.8	—	
CESP CFSP CGSP ➲L113	SPMW090304	M	E *1		●		●		●	●	●	●	—	9.525	—	3.18	—	0.4	—	
	SPMW090308	M	E *1		●		●		●	●	●	●	—	9.525	—	3.18	—	0.8	—	
	SPMW120304	M	E *1		●		●		●	●	●	●	—	12.7	—	3.18	—	0.4	—	
	SPMW120308	M	E *1		●		●		●	●	●	●	—	12.7	—	3.18	—	0.8	—	
SPX ➲L108	SPMX120408-JM	M	E		●	●							—	12.7	—	4.80	—	0.8	—	
SPX ➲L108	SPMX120408-WH	M	E		●	●							—	12.7	—	4.76	—	0.8	—	
SRB ➲L120	SRBT10	—	F		●								8.5	10	—	2.6	—	—	5	
	SRBT12	—	F		●								10	12	—	3	—	—	6	
	SRBT16	—	F		●								12	16	—	4	—	—	8	
	SRBT20	—	F		●								15	20	—	5	—	—	10	
	SRBT25	—	F		●								18.5	25	—	6	—	—	12.5	
	SRBT30	—	F		●								22.5	30	—	7	—	—	15	
	SRBT32	—	F		●								23.5	32	—	7	—	—	16	
SRF ➲L120	* SRFT10	—	F	●	●			●					8.5	—	10	2.6	0.5	—	5	
	* SRFT12	—	F	●	●			●					10	—	12	3	0.5	—	6	
	* SRFT16	—	F	●	●			●					12	—	16	4	1	—	8	
	* SRFT20	—	F	●	●			●					15	—	20	5	1	—	10	
	* SRFT25	—	F	●	●			●					18.5	—	25	6	1	—	12.5	
	* SRFT30	—	F	●	●			●					22.5	—	30	7	1	—	15	
	* SRFT32	—	F	●	●			●					23.5	—	32	7	1	—	16	

✱ 2 inserts in one case.
✱1 Grade NX2525 and NX4545 are "T".

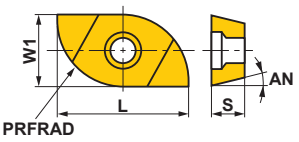
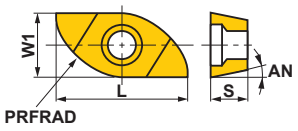
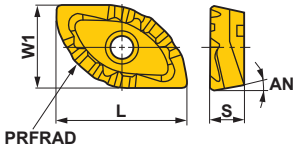
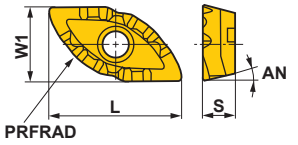
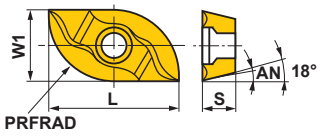
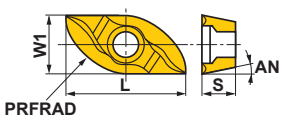
■ = MIRACLE SIGMA

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	
H	Hardened Steel	

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing :
E : Round

Shape	Order Number		Class	Honing	Coated			Dimensions (mm)					Geometry
					VP15TF	VP20RT	VP30RT	L	W1	S	PRFRAD	AN	
SRM2 ➲L128		**SRG16C**	G	E	●			16	8.2	3.5	8	11°	
		SRG**20C**	G	E	●			19	10.2	4.6	10	10°	
		SRG**25C**	G	E	●			24	12.8	5.5	12.5	10°	
		SRG**30C**	G	E	●			28	15.3	7	15	10°	
		SRG**32C**	G	E	●			28	16.3	7	16	10°	
SRM2 ➲L128		**SRG16E**	G	E	●			13.5	6.7	3.5	8	11°	
		SRG**20E**	G	E	●			15.5	8.5	4.6	10	9°	
		SRG**25E**	G	E	●			20.5	10.2	5.5	12.5	9°	
		SRG**30E**	G	E	●			25.2	12.2	7	15	9°	
		SRG**32E**	G	E	●			26.1	13.1	7	16	9°	
SRM2ϕ40 ϕ50 ➲L134	*	**SRG40C**	G	E	●	●	●	36	20.5	8.0	20	11°	
	*	SRG**50C**	G	E	●	●	●	40	26	8.5	25	11°	
SRM2ϕ40 ϕ50 ➲L134	*	**SRG40E**	G	E	●	●	●	32	16.6	8.0	20	11°	
	*	SRG**50E**	G	E	●	●	●	35.8	20	8.5	25	11°	
SRM2 ➲L128		**SRM16C-M**	M	E	●			16	8.2	3.5	8	11°	
		SRM**20C-M**	M	E	●			19	10.2	4.6	10	10°	
		SRM**25C-M**	M	E	●			24	12.8	5.5	12.5	10°	
		SRM**30C-M**	M	E	●			28	15.3	7	15	10°	
		SRM**32C-M**	M	E	●			28	16.3	7	16	10°	
SRM2 ➲L128		**SRM16E-M**	M	E	●			13.5	6.7	3.5	8	11°	
		SRM**20E-M**	M	E	●			15.5	8.5	4.6	10	9°	
		SRM**25E-M**	M	E	●			20.5	10.2	5.5	12.5	9°	
		SRM**30E-M**	M	E	●			25.2	12.2	7	15	9°	
		SRM**32E-M**	M	E	●			26.1	13.1	7	16	9°	

* 2 inserts in one case.

ROTATING INSERTS

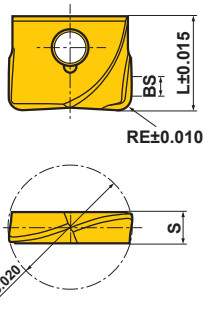
Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	
H	Hardened Steel	

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

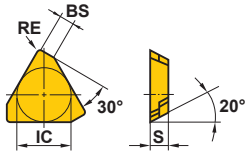
Honing :
E : Round **F** : Sharp **S** : Chamfer + Hone **T** : Chamfer

Shape	Order Number	Class	Honing	Coated					Cermet		Carbide		Dimensions (mm)						Geometry
				F7030	MC5020	VP15TF	UP20M	MP8010	NX2525	NX4545	UTi20T	HTi10	DC	IC	L	S	BS	RE	
SUF ➔L124	* SUFT10R05	—	F			●		●					10	—	8.5	2.6	1	0.5	
	* SUFT10R10	—	F			●		●					10	—	8.5	2.6	1	1	
	* SUFT10R20	—	F			●		●					10	—	8.5	2.6	1	2	
	* SUFT12R05	—	F			●		●					12	—	10	3	1.2	0.5	
	* SUFT12R10	—	F			●		●					12	—	10	3	1.2	1	
	* SUFT12R20	—	F			●		●					12	—	10	3	1.2	2	
	* SUFT12R30	—	F			●		●					12	—	10	3	1.2	3	
	* SUFT16R05	—	F			●		●					16	—	12	4	1.6	0.5	
	* SUFT16R10	—	F			●		●					16	—	12	4	1.6	1	
	* SUFT16R15	—	F			●		●					16	—	12	4	1.6	1.5	
	* SUFT16R20	—	F			●		●					16	—	12	4	1.6	2	
	* SUFT16R30	—	F			●		●					16	—	12	4	1.6	3	
	* SUFT20R05	—	F			●		●					20	—	15	5	2	0.5	
	* SUFT20R10	—	F			●		●					20	—	15	5	2	1	
	* SUFT20R15	—	F			●		●					20	—	15	5	2	1.5	
	* SUFT20R20	—	F			●		●					20	—	15	5	2	2	
	* SUFT20R30	—	F			●		●					20	—	15	5	2	3	
	* SUFT25R05	—	F			●		●					25	—	18.5	6	2.5	0.5	
	* SUFT25R10	—	F			●		●					25	—	18.5	6	2.5	1	
	* SUFT25R20	—	F			●		●					25	—	18.5	6	2.5	2	
	* SUFT25R30	—	F			●		●					25	—	18.5	6	2.5	3	
	* SUFT30R05	—	F			●		●					30	—	22.5	7	3	0.5	
	* SUFT30R10	—	F			●		●					30	—	22.5	7	3	1	
	* SUFT30R20	—	F			●		●					30	—	22.5	7	3	2	
	* SUFT30R30	—	F			●		●					30	—	22.5	7	3	3	
	* SUFT32R05	—	F			●		●					32	—	23.5	7	3.2	0.5	
	* SUFT32R10	—	F			●		●					32	—	23.5	7	3.2	1	
	* SUFT32R20	—	F			●		●					32	—	23.5	7	3.2	2	
NSE300 SE300	TEEN1603PEFR1	E	F									●	—	9.525	—	3.175	1.4	0.4	
	TEEN1603PEER1	E	E			●						●	—	9.525	—	3.175	1.4	0.4	
	TEEN1603PETR1	E	T				●		●	●	●		—	9.525	—	3.175	1.4	0.4	
	TEEN1603PESR1	E	S	●	●								—	9.525	—	3.175	1.4	0.4	









* 2 inserts in one case.

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

Work Material																							
	P	Steel	●		●	●		●	●	●													
	M	Stainless Steel	◔		◔	◔		○	○	◔													
	K	Cast Iron		●	✲		●	●		✲	●												
	N	Non-ferrous Metal																					
	S	Heat-resistant Alloy, Titanium Alloy			●																		
	H	Hardened Steel			◔																		

Cutting Conditions (Guide) :
● : Stable Cutting ◔ : General Cutting ✲ : Unstable Cutting

Honing :
E : Round **F :** Sharp **S :** Chamfer + Hone **T :** Chamfer

Shape	Order Number	Class	Honing	Coated					Cermet		Carbide		Dimensions (mm)				Geometry
				F7030	MC5020	VP15TF	UP20M	AP10H	NX2525	NX4545	UTi20T	HTi10	IC	S	BS	RE	
NSE300 SE300	TECN1603PEFR1W	C	F									●	9.525	3.175	1.4	0.4	
	TECN1603PEER1W	C	E									●	9.525	3.175	1.4	0.4	
	TECN1603PETR1W	C	T						●	●	●		9.525	3.175	1.4	0.4	
NSE300 NSE400	TEER1603PEER-JS	E	E	●							●		9.525	3.175	1.4	0.4	Wall face finishing.
	TEER2204PEER-JS	E	E	●							●		12.7	4.76	1.4	1.0	
NSE400 SE400	TECN2204PEFR1	C	F									●	12.7	4.76	1.4	1.0	
	TECN2204PEER1	C	E									●	12.7	4.76	1.4	1.0	
	TECN2204PETR1	C	T						●	●	●		12.7	4.76	1.4	1.0	
	TEEN2204PEFR1	E	F									●	12.7	4.76	1.4	1.0	
	TEEN2204PEER1	E	E			●						●	12.7	4.76	1.4	1.0	
	TEEN2204PETR1	E	T				●		●	●	●		12.7	4.76	1.4	1.0	
	TEEN2204PESR1	E	S	●	●								12.7	4.76	1.4	1.0	
	TEKN2204PEER1	K	E									●	12.7	4.76	1.94	—	
	TEKN2204PESR1	K	S	●									12.7	4.76	1.94	—	
	TEKN2204PETR1	K	T				●		●		●		12.7	4.76	1.94	—	
	TEKN2204PETR	K	T							●			12.7	4.76	1.94	—	Right hand insert shown.
	TPEN1603PPR	E	T	▲					▲				9.525	3.18	1.2	—	
	TPKN1603PPR	K	T *1	▲		●	▲		▲	▲	▲	▲	9.525	3.18	1.2	—	
	TPEN2204PDR	E	T *1	▲									12.7	4.76	1.4	—	
	TPKN2204PDR	K	T *1	▲		●	▲		▲	▲	▲	▲	12.7	4.76	1.4	—	
PMF L142	TPEW1303ZPER2	E	E			●		●					7.94	3.18	—	—	

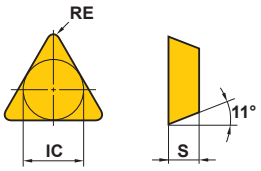
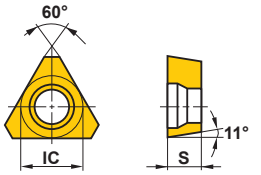
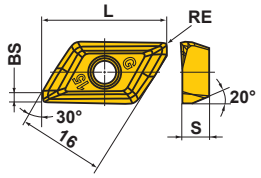
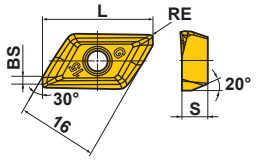
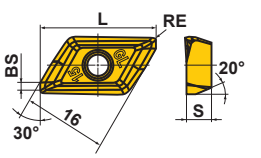
*1 Grade F7030 is "E".

ROTATING INSERTS

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	
H	Hardened Steel	

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

Honing :
E : Round **F** : Sharp

Shape	Order Number	Class	Honing	Coated F7030	Coated VP15TF	Coated LC15TF	Coated UP20M	Cermet NX2525	Carbide UTi20T	Carbide HTi10	Carbide TF15	L	IC	S	BS	RE	Geometry
11°Positive	**TPMN160304**	M	E*1	●	●		●	●	●	●		—	9.525	3.18	—	0.4	
	TPMN**160308**	M	E*2	●	●		●	●	●	●		—	9.525	3.18	—	0.8	
	TPMN**160312**	M	E*1				●			●		—	9.525	3.18	—	1.2	
	TPMN**220404**	M	E						●			—	12.7	4.76	—	0.4	
	TPMN**220408**	M	E*1	●	●		●		●	●		—	12.7	4.76	—	0.8	
	TPMN**220412**	M	E*1	●	●				●	●		—	12.7	4.76	—	1.2	
VIPER	**TPNX1605N**	N	E						●			—	9.525	5	—	—	
BXD4000 ➲L072	**XDGT1550PDER-G04**	G	E		●							22	—	5	1.5	0.4	
	XDGT**1550PDER-G08**	G	E		●							22	—	5	1.1	0.8	
	XDGT**1550PDER-G12**	G	E		●							22	—	5	0.7	1.2	
	XDGT**1550PDER-G16**	G	E		●							22	—	5	0.4	1.6	
	XDGT**1550PDER-G20**	G	E		●							21.7	—	5	0.2	2.0	
	XDGT**1550PDER-G30**	G	E		●							20	—	5	0.6	3.0	
	XDGT**1550PDER-G32**	G	E		●							20	—	5	0.4	3.2	
	XDGT**1550PDER-G40**	G	E		●							19	—	5	0.5	4.0	
	XDGT**1550PDER-G50**	G	E		●							18	—	5	0.4	5.0	
BXD4000 ➲L072	**XDGT1550PDFR-G04**	G	F			●					●	22	—	5	1.5	0.4	
	XDGT**1550PDFR-G08**	G	F			●					●	22	—	5	1.1	0.8	
	XDGT**1550PDFR-G12**	G	F			●					●	22	—	5	0.7	1.2	
	XDGT**1550PDFR-G16**	G	F			●					●	22	—	5	0.4	1.6	
	XDGT**1550PDFR-G20**	G	F			●					●	21.7	—	5	0.2	2.0	
	XDGT**1550PDFR-G30**	G	F			●					●	20	—	5	0.6	3.0	
	XDGT**1550PDFR-G32**	G	F			●					●	20	—	5	0.4	3.2	
	XDGT**1550PDFR-G40**	G	F			●					●	19	—	5	0.5	4.0	
	XDGT**1550PDFR-G50**	G	F			●					●	18	—	5	0.4	5.0	
BXD4000 ➲L072	**XDGT1550PDFR-GL04**	G	F								●	22	—	5	1.5	0.4	
	XDGT**1550PDFR-GL08**	G	F								●	22	—	5	1.1	0.8	

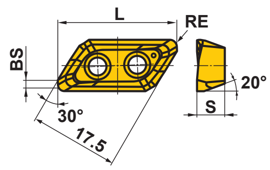
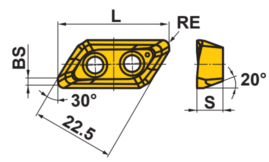
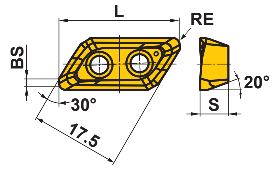
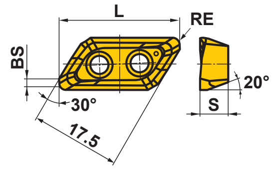
*1 Grade HTi10 is "F".
*2 Grade HTi10 is "F", Grade NX2525 is "T".

● : Inventory maintained in Japan.
(10 inserts in one case)

Work Material		LC15TF	MP9120	TF15
P	Steel			
M	Stainless Steel			
K	Cast Iron			
N	Non-ferrous Metal	✤	✤	◐
S	Heat-resistant Alloy, Titanium Alloy		◐	
H	Hardened Steel			

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

Honing :
E : Round F : Sharp

Shape	Order Number	Class	Honing	Coated LC15TF	Coated MP9120 (NEW)	Carbide TF15	L	S	BS	RE	Geometry
AXD4000 ➲L060	**XDGX175004PDFR-GL**	G	F	●		●	23	5	1.7	0.4	
	XDGX175008PDFR-GL	G	F	●		●	23	5	1.3	0.8	
	XDGX175012PDFR-GL	G	F	●		●	23	5	0.9	1.2	
	XDGX175016PDFR-GL	G	F	●		●	22	5	1.4	1.6	
	XDGX175020PDFR-GL	G	F	●		●	22	5	1.0	2.0	
	XDGX175024PDFR-GL	G	F	●		●	22	5	0.6	2.4	
	XDGX175030PDFR-GL	G	F	●		●	21.1	5	0.8	3.0	
	XDGX175032PDFR-GL	G	F	●		●	21.1	5	0.6	3.2	
	XDGX175040PDFR-GL	G	F	●		●	20	5	0.8	4.0	
	XDGX175050PDFR-GL	G	F	●		●	19.4	5	0.4	5.0	
AXD7000 ➲L066	**XDGX227008PDFR-GL**	G	F	●		●	30	7	2.0	0.8	
	XDGX227016PDFR-GL	G	F	●		●	30	7	1.2	1.6	
	XDGX227020PDFR-GL	G	F	●		●	30	7	0.8	2.0	
	XDGX227030PDFR-GL	G	F	●		●	28.8	7	0.8	3.0	
	XDGX227032PDFR-GL	G	F	●		●	28.8	7	0.6	3.2	
	XDGX227040PDFR-GL	G	F	●		●	27.5	7	0.9	4.0	
	XDGX227050PDFR-GL	G	F	●		●	27	7	0.4	5.0	
AXD4000 ➲L060	NEW **XDGX175004PDER-GM**	G	E		●		23.0	5	1.7	0.4	
	NEW XDGX175008PDER-GM	G	E		●		23.0	5	1.3	0.8	
	NEW XDGX175012PDER-GM	G	E		●		23.0	5	0.9	1.2	
	NEW XDGX175016PDER-GM	G	E		●		22.0	5	1.4	1.6	
	NEW XDGX175020PDER-GM	G	E		●		22.0	5	1.0	2.0	
	NEW XDGX175024PDER-GM	G	E		●		22.0	5	0.6	2.4	
	NEW XDGX175030PDER-GM	G	E		●		21.1	5	0.8	3.0	
	NEW XDGX175032PDER-GM	G	E		●		21.1	5	0.6	3.2	
	NEW XDGX175040PDER-GM	G	E		●		20.0	5	0.5	4.0	
	NEW XDGX175050PDER-GM	G	E		●		19.4	5	0.4	5.0	
AXD4000 ➲L060	NEW **XDGX175004PDFR-GM**	G	F			●	23.0	5	1.7	0.4	
	NEW XDGX175008PDFR-GM	G	F			●	23.0	5	1.3	0.8	
	NEW XDGX175012PDFR-GM	G	F			●	23.0	5	0.9	1.2	
	NEW XDGX175016PDFR-GM	G	F			●	22.0	5	1.4	1.6	
	NEW XDGX175020PDFR-GM	G	F			●	22.0	5	1.0	2.0	
	NEW XDGX175024PDFR-GM	G	F			●	22.0	5	0.6	2.4	
	NEW XDGX175030PDFR-GM	G	F			●	21.1	5	0.8	3.0	
	NEW XDGX175032PDFR-GM	G	F			●	21.1	5	0.6	3.2	
	NEW XDGX175040PDFR-GM	G	F			●	20.0	5	0.5	4.0	
	NEW XDGX175050PDFR-GM	G	F			●	19.4	5	0.4	5.0	

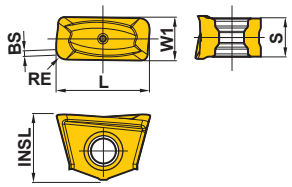
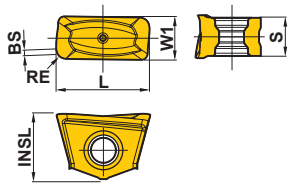
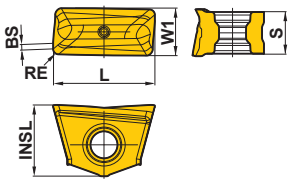
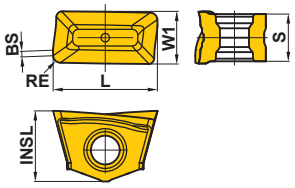
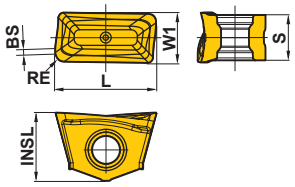
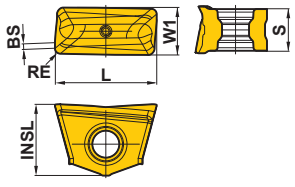
■ = MIRACLE SIGMA

ROTATING INSERTS

Work Material		
	P	Steel
	M	Stainless Steel
	K	Cast Iron
	N	Non-ferrous Metal
	S	Heat-resistant Alloy, Titanium Alloy
	H	Hardened Steel

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing :
E : Round

Shape	Order Number	Class	Honing	Coated MP9030	Coated MP9130	L	W1	INSL	S	BS	RE	Geometry
VFX5 L114 	**XNMU160708R-MS**	M	E	●		16.0	7.0	11.1	6.5	1.0	0.8	
	XNMU**160712R-MS**	M	E	●		16.0	7.0	11.1	6.5	1.0	1.2	
	XNMU**160716R-MS**	M	E	●		16.0	7.0	11.1	6.5	1.0	1.6	
	XNMU**160724R-MS**	M	E	●		16.0	7.0	11.1	6.5	1.0	2.4	
	XNMU**160732R-MS**	M	E	●		17.3	7.0	11.1	6.5	—	3.2	
	XNMU**160740R-MS**	M	E	●		18.9	7.0	11.1	6.5	—	4.0	
VFX5 	**XNMU160708R-HS**	M	E	●		16.0	7.0	11.1	6.5	1.0	0.8	
VFX5 	**XNMU160708R-LS**	M	E		●	16.0	7.0	11.1	6.5	1.0	0.8	
VFX6 L117 	**XNMU190912R-MS**	M	E	●		19.1	9.5	12.7	8.5	1.0	1.2	
	XNMU**190916R-MS**	M	E	●		19.1	9.5	12.7	8.5	1.0	1.6	
	XNMU**190924R-MS**	M	E	●		19.1	9.5	12.7	8.5	1.0	2.4	
	XNMU**190932R-MS**	M	E	●		20.2	9.5	12.7	8.5	—	3.2	
	XNMU**190940R-MS**	M	E	●		21.8	9.5	12.7	8.5	—	4.0	
	XNMU**190950R-MS**	M	E	●		21.8	9.5	12.7	8.5	—	5.0	
VFX6 	**XNMU190912R-HS**	M	E	●		19.1	9.5	12.7	8.5	1.0	1.2	
VFX6 	**XNMU190912R-LS**	M	E		●	19.1	9.5	12.7	8.5	1.0	1.2	

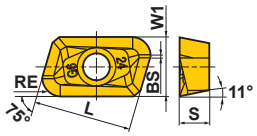
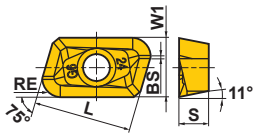
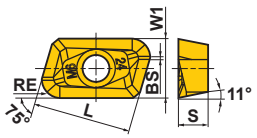
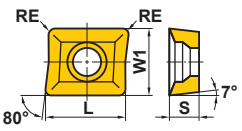
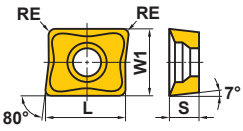
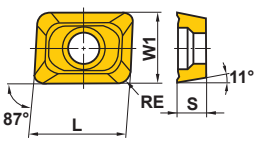
■ = MIRACLE SIGMA

● : Inventory maintained in Japan.
(10 inserts in one case)

Work Material			F7030	VP15TF	UP20M	MP9030	HTi10
	P	Steel	◐	◐	◐		
	M	Stainless Steel	◔	◔	◔		
	K	Cast Iron		✱			◐
	N	Non-ferrous Metal					◐
	S	Heat-resistant Alloy, Titanium Alloy		◐		◐	
	H	Hardened Steel		◔			

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing :
E : Round **F** : Sharp

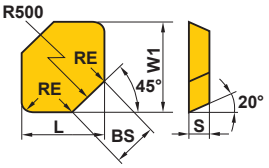
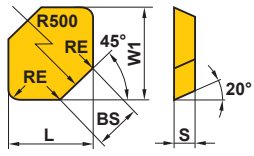
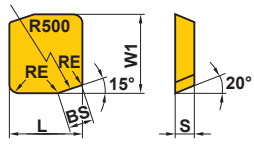
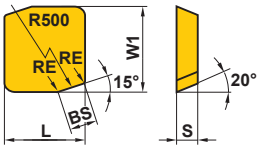
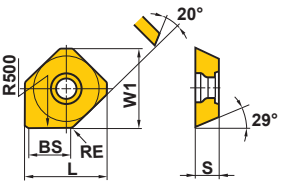
Shape	Order Number	Class	Honing	Coated				Carbide	Dimensions (mm)					Geometry
				F7030	VP15TF	UP20M	MP9030	HTi10	L	W1	S	BS	RE	
BAP3500	**XPGT13T3PDER-G1**	G	E		●				13	7.9	3.97	1.6	0.4	
	XPGT**13T3PDER-G2**	G	E		●				13	7.9	3.97	1.2	0.8	
	XPGT**13T3PDER-G6**	G	E		●				13	7.9	3.97	0.4	2.4	
	XPGT**13T3PDER-G75**	G	E		●				13	7.9	3.97	0.4	3.0	
	XPGT**13T3PDER-G8**	G	E		●				13	7.9	3.97	0.4	3.2	
BAP3500	**XPGT13T3PDFR-G1**	G	F					●	13	7.9	3.97	1.6	0.4	
	XPGT**13T3PDFR-G2**	G	F					●	13	7.9	3.97	1.2	0.8	
	XPGT**13T3PDFR-G6**	G	F					●	13	7.9	3.97	0.4	2.4	
	XPGT**13T3PDFR-G75**	G	F					●	13	7.9	3.97	0.4	3.0	
	XPGT**13T3PDFR-G8**	G	F					●	13	7.9	3.97	0.4	3.2	
BAP3500	**XPMT13T3PDER-M1**	M	E	●	●				13	7.9	3.97	1.6	0.4	
	XPMT**13T3PDER-M2**	M	E	●	●				13	7.9	3.97	1.2	0.8	
	XPMT**13T3PDER-M6**	M	E	●	●				13	7.9	3.97	0.4	2.4	
	XPMT**13T3PDER-M75**	M	E	●	●				13	7.9	3.97	0.4	3.0	
	XPMT**13T3PDER-M8**	M	E	●	●				13	7.9	3.97	0.4	3.2	
DCCC	**ZCMX083508ER-A**	M	E	●					10.4	7.94	3.5	—	0.8	
	ZCMX**09T308ER-A**	M	E	●	●	●			12	9.525	3.97	—	0.8	
DCCC	**ZCMX09T308ER-B**	M	E	●		●			12	9.525	3.97	—	0.8	
														
BAP300 Under-cut type	**ZRM0603R-M3**	M	E		●				8.5	6.35	3.18	—	1.2	
	ZRM**0603R-M4**	M	E		●				8.5	6.35	3.18	—	1.6	
	ZRM**0603R-M5**	M	E		●				8.5	6.35	3.18	—	2.0	

WIPER INSERTS

Work Material		
	P	Steel
	M	Stainless Steel
	K	Cast Iron
	N	Non-ferrous Metal
	S	Heat-resistant Alloy, Titanium Alloy
	H	Hardened Steel

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing :
E : Round **T :** Chamfer

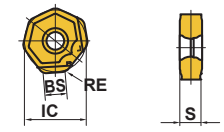
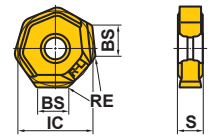
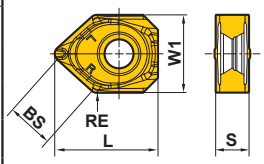
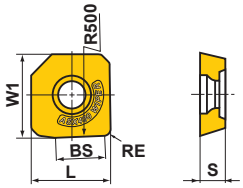
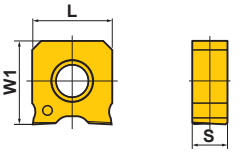
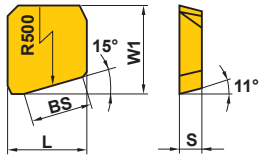
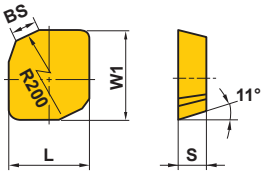
Shape	Order Number	Class	Honing	Coated		Cermet	Coated Cermet	Carbide	Dimensions (mm)					Dimensions (mm)
				MC5020	VP15TF	NX2525	VP25N	HTi05T	L	W1	S	BS	RE	
SE445	**WEC42AFTR5C**	C	T			●			12.7	15.33	3.18	5	1.0	 Right hand insert shown.
SE545	**WEC53AFER5C**	C	E					●	15.875	18.505	4.76	5	1.0	 Right hand insert shown.
	WEC**53AFTR5C**	C	T			●			15.875	18.505	4.76	5	1.0	
SE415	**WEC42EFER5C**	C	E					●	12.7	13.728	3.18	5	1.0	 Right hand insert shown.
	WEC**42EFTR5C**	C	T			●			12.7	13.728	3.18	5	1.0	
SE515 ➲L034	**WEC53EFTR5C**	C	T			●			15.875	16.903	4.76	5	1.0	 Right hand insert shown.
ASX445 ➲L018	**WEEW13T3AGER8C**	E	E	●	●			●	16.48	16.6	3.97	7.5	1.5	
	WEEW**13T3AGTR8C**	E	T			●	●		16.48	16.6	3.97	7.5	1.5	

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case) (CBN and PCD inserts are available in 1 piece in one case)

Work Material			MC5020	MP6120	VP15TF	NX2525	HTi10	HTi05T
	P	Steel	●	●	●			
	M	Stainless Steel		◔	○			
	K	Cast Iron	◔	✲	●		◔	●
	N	Non-ferrous Metal					◔	●
	S	Heat-resistant Alloy, Titanium Alloy		◕				
	H	Hardened Steel		◕				

Cutting Conditions (Guide) :
● : Stable Cutting ◔ : General Cutting ✲ : Unstable Cutting

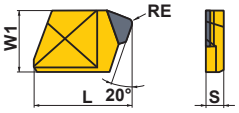
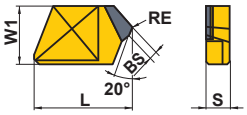
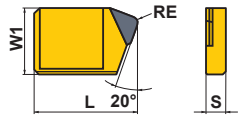
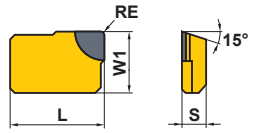
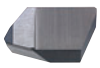
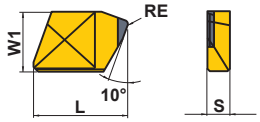
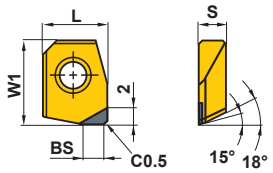
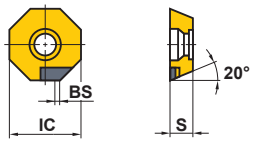
Honing :
E : Round **F :** Sharp **T :** Chamfer

Shape	Order Number	Class	Honing	Coated			Cermet	Carbide		Dimensions (mm)						Geometry
				MC5020	MP6120 (NEW)	VP15TF	NX2525	HTi10	HTi05T	L	W1	IC	S	BS	RE	
AHX640S ➲L026	**WNEU2007ZEN7C-WP**	E	E			●				—	—	20	7.2	7.1	0.8	
AHX640S ➲L026 **AHX640W** ➲L030	**WNEU2006ZEN7C-WK**	E	E	●						—	—	20	6.55	7.4	0.8	
WSX445 (NEW) ➲L010	**WNGU1406ANEN8C-M**	G	E		●	●				18.1	14	—	6	8	1.0	
ASX400 ➲L040	**WOEW12T308PEER8C**	E	E						●	12.5	13.2	—	3.97	8	0.8	
	WOEW**12T308PETR8C**	E	T				●			12.5	13.2	—	3.97	8	0.8	
VOX400 ➲L036	**WOEX1206PER5C**	E	E			●				12.5	13.025	—	5.5	—	—	
FBP415 **QBP415**	**WPC42EEER10C**	C	E						●	12.7	15.163	—	3.175	10	—	 Right hand insert shown.
	WPC**42EEEL10C**	C	E						●	12.7	15.163	—	3.175	10	—	
P425	**WPC42W3GR**	C	F					▲		12.7	14.5	—	3.2	6	—	

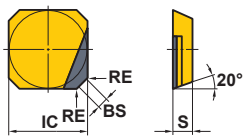
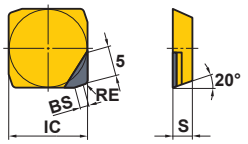
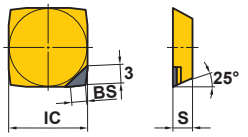
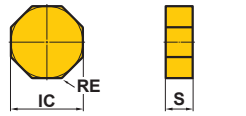
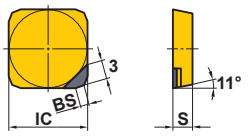
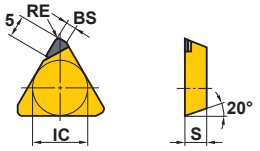
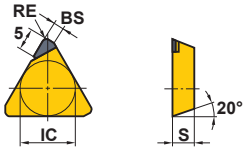
= MIRACLE SIGMA

ROTATING INSERTS

CBN AND PCD

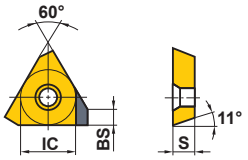
Shape	Order Number	Class	CBN	PCD	Dimensions (mm)						Geometry
			MB730	MD220	L	W1	IC	S	BS	RE	
NF10000 L148 QF10000 	GDCN2004PDFR3	C		●	20	12.7	—	4.76	—	1.2	
NF10000 L148 	GDCN2004ZDTR1	C		●	20	12.7	—	4.76	1.4	0.8	
AF10000 	GDCN2004PDR	C		●	20	12.7	—	4.76	—	1.2	
AF5000 	LDCN190412R	C	●	●	19.05	12.7	—	4.76	—	1.2	 Right hand insert shown.
	LDCN190412L	C		●	19.05	12.7	—	4.76	—	1.2	
NF10000 L148 	NP-GDCN2004PDSR3	C	●		20	12.7	—	4.76	—	0.8	
V10000 L147 	NP-GDCN1240PDFR2	C		●	9.5	12	—	4	2	—	
OCTACUT L094 	OEMX12T3ETR1	M	●		—	—	12.7	3.97	1	—	

● : Inventory maintained in Japan.
(10 inserts in one case) (CBN and PCD inserts are available in 1 piece in one case)

Shape	Order Number	Class	CBN		PCD	Dimensions (mm)				Geometry
			MB710	BC5030	MD220	IC	S	BS	RE	
SE445	**SECN1203AFFR1**	C			●	12.7	3.18	1.4	1.0	
SE415	**SECN1203EFFR1**	C			●	12.7	3.18	1.4	1.0	
BF407	**SFCN1203ZFFR2**	C			●	12.7	3.175	2.4	—	
AOX445 ➲L032	**SL-ONEN120404ASN**	E		●		12.7	4.76	—	0.4	
FBP415	**SPEN1203EETR1**	E	●			12.7	3.175	1.4	—	
SE300 **NSE300**	**TECN1603PEFR1**	C			●	9.525	3.175	1.4	0.4	
SE400 **NSE400**	**TECN2204PEFR1**	C			●	12.7	4.76	1.4	1.0	

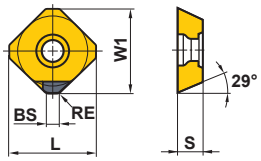
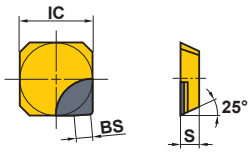
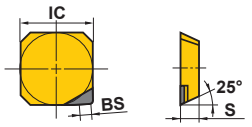
● : Inventory maintained in Japan.
(1 insert in one case)

CBN AND PCD

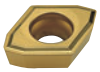
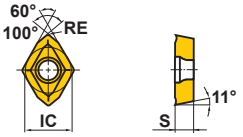
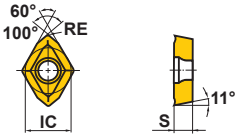
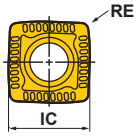
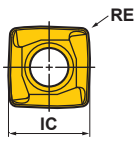
Shape	Order Number	Class	CBN		PCD	Dimensions (mm)				Geometry
			MB710	MB730	MD220	IC	S	BS	RE	
PMF L142 	**TPEW1303ZPTR2**	E	●			7.94	3.18	2	–	

● : Inventory maintained in Japan.
(1 insert in one case)

CBN AND PCD WITH WIPER

Shape	Order Number	Class	CBN	PCD	Dimensions (mm)						Geometry
			MB710	MD220	L	W1	IC	S	BS	RE	
ASX445 L018	**WEEW13T3AGFR3C**	E		●	16.48	16.6	—	3.97	3.0	1.5	
	WEEW**13T3AGTR3C**	E	●		16.48	16.6	—	3.97	3.0	1.5	
BF407	**WFC42ZFER2**	C		●	—	—	12.4	3.175	2.4	—	
											
BF407	**NP-WFC42ZFER2**	C		●	—	—	12.4	3.175	2.4	—	 Right hand insert shown.
											

DRILLING INSERTS

Shape	Order Number	Class	Coated							Dimensions (mm)				Geometry
			VP15TF	UP20M	GP20M	UE6020	US735	MC1020	MC5020	IC	L	S	RE	
TAF ➲N240	**GCMT040204-U1**	M		●						–	5.0	2.38	0.4	**U1** Breaker
	GPMT060204-U1	M		●		●				5.56	–	2.38	0.4	GCMT 
 GCMT	GPMT070204-U1	M		●		●				6.35	–	2.38	0.4	
	GPMT090304-U1	M		●		●				7.94	–	3.18	0.4	
	GPMT11T308-U1	M		●		●				9.525	–	3.97	0.8	
 GPMT	GPMT140408-U1	M		●		●				12.7	–	4.76	0.8	GPMT 
TAF ➲N240	**GCMT040204-U2**	M	●		●					–	5.0	2.38	0.4	**U2** Breaker
	GPMT060204-U2	M	●	●		●	●			5.56	–	2.38	0.4	GCMT 
 GCMT	GPMT070204-U2	M	●	●		●	●			6.35	–	2.38	0.4	
	GPMT090304-U2	M	●	●		●	●			7.94	–	3.18	0.4	
	GPMT11T308-U2	M	●	●		●	●			9.525	–	3.97	0.8	
 GPMT	GPMT140408-U2	M	●	●		●	●			12.7	–	4.76	0.8	GPMT 
TAF ➲N240	**GPMT060204-U3**	M		●		●	●			5.56	–	2.38	0.4	**U3** Breaker
	GPMT070204-U3	M		●		●	●			6.35	–	2.38	0.4	GPMT 
	GPMT090304-U3	M		●		●	●			7.94	–	3.18	0.4	
	GPMT11T308-U3	M		●		●	●			9.525	–	3.97	0.8	
	GPMT140408-U3	M		●		●	●			12.7	–	4.76	0.8	
MVX ➲N212	**SOMX063005-UM**	M	●					●	●	6	–	3	0.5	
	SOMX073505-UM	M	●					●	●	7	–	3.5	0.5	
	SOMX084005-UM	M	●					●	●	8.3	–	4	0.5	
	SOMX094506-UM	M	●					●	●	9.7	–	4.5	0.6	
 NEW	SOMX115506-UM	M	●					●	●	11.6	–	5.5	0.6	
NEW	SOMX136008-UM	M	●					●	●	13.8	–	6	0.8	
NEW	SOMX166508-UM	M	●					●	●	16.5	–	6.5	0.8	
NEW	SOMX187008-UM	M	●					●	●	18.2	–	7	0.8	
MVX NEW ➲N212	**SOMX063005-US**	M	●							6	–	3	0.5	
NEW	SOMX073505-US	M	●							7	–	3.5	0.5	
NEW	SOMX084005-US	M	●							8.3	–	4	0.5	
 NEW	SOMX094506-US	M	●							9.7	–	4.5	0.6	

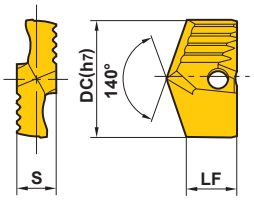
● : Inventory maintained in Japan.
(1 insert in one case)

Applicable Drill Shape Geometry

TAW H Type

N229





Order Number	Coated		Dimensions (mm)			Applicable Holder
	VP15TF	VP10H	DC	LF	S	
TAWNH1400T	▲		14.0	7.6	5.0	TAWSNH 1400S16
TAWNH**1410T**	▲		14.1	7.6	5.0	
TAWNH**1420T**	▲		14.2	7.6	5.0	TAWMNH 1400S16
TAWNH**1430T**	▲		14.3	7.6	5.0	TAWLNH 1400S16
TAWNH**1440T**	▲		14.4	7.6	5.0	
TAWNH**1450T**	▲		14.5	7.5	5.0	
TAWNH**1460T**	▲		14.6	7.5	5.0	
TAWNH**1470T**	▲		14.7	7.5	5.0	TAWSNH 1500S20
TAWNH**1480T**	▲		14.8	7.5	5.0	
TAWNH**1490T**	▲		14.9	7.5	5.0	TAWMNH 1500S20
TAWNH**1500T**	▲		15.0	7.4	5.0	
TAWNH**1510T**	▲		15.1	7.4	5.0	TAWLNH 1500S20
TAWNH**1520T**	▲		15.2	7.4	5.0	
TAWNH**1530T**	▲		15.3	7.4	5.0	
TAWNH**1540T**	▲		15.4	7.4	5.0	
TAWNH**1550T**	▲		15.5	7.9	6.0	
TAWNH**1560T**	▲		15.6	7.9	6.0	
TAWNH**1570T**	▲		15.7	7.9	6.0	TAWSN 1600S20
TAWNH**1580T**	▲		15.8	7.9	6.0	
TAWNH**1590T**	▲		15.9	7.9	6.0	TAWMN 1600S20
TAWNH**1600T**	▲		16.0	7.8	6.0	
TAWNH**1610T**	▲		16.1	7.8	6.0	TAWLN 1600S20
TAWNH**1620T**	▲		16.2	7.8	6.0	
TAWNH**1630T**	▲		16.3	7.8	6.0	
TAWNH**1640T**	▲		16.4	7.8	6.0	
TAWNH**1650T**	▲		16.5	7.7	6.0	
TAWNH**1660T**	▲		16.6	7.7	6.0	
TAWNH**1670T**	▲		16.7	7.7	6.0	TAWSN 1700S20
TAWNH**1680T**	▲		16.8	7.7	6.0	
TAWNH**1690T**	▲		16.9	7.7	6.0	TAWMN 1700S20
TAWNH**1700T**	▲		17.0	7.6	6.0	
TAWNH**1710T**	▲		17.1	7.6	6.0	TAWLN 1700S20
TAWNH**1720T**	▲		17.2	7.6	6.0	
TAWNH**1730T**	▲		17.3	7.6	6.0	
TAWNH**1740T**	▲		17.4	7.6	6.0	
TAWNH**1750T**	▲		17.5	7.5	6.0	
TAWNH**1760T**	▲		17.6	7.5	6.0	
TAWNH**1770T**	▲		17.7	7.5	6.0	TAWSN 1800S20
TAWNH**1780T**	▲		17.8	7.5	6.0	
TAWNH**1790T**	▲		17.9	7.5	6.0	TAWMN 1800S20
TAWNH**1800T**	▲		18.0	7.4	6.0	
TAWNH**1810T**	▲		18.1	7.4	6.0	TAWLN 1800S20
TAWNH**1820T**	▲		18.2	7.4	6.0	
TAWNH**1830T**	▲		18.3	7.4	6.0	
TAWNH**1840T**	▲		18.4	7.4	6.0	

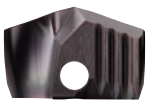
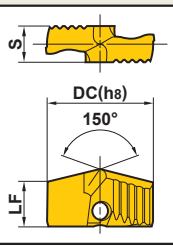
Order Number	Coated		Dimensions (mm)			Applicable Holder
	VP15TF	VP10H	DC	LF	S	
TAWNH1850T	●	□	18.5	9.3	7.0	
TAWNH**1860T**	●	□	18.6	9.3	7.0	
TAWNH**1870T**	●	□	18.7	9.3	7.0	TAWSN 1900S25
TAWNH**1880T**	●	□	18.8	9.3	7.0	
TAWNH**1890T**	●	□	18.9	9.3	7.0	TAWMN 1900S25
TAWNH**1900T**	●	□	19.0	9.2	7.0	
TAWNH**1910T**	●	□	19.1	9.2	7.0	TAWLN 1900S25
TAWNH**1920T**	●	□	19.2	9.2	7.0	
TAWNH**1930T**	●	□	19.3	9.2	7.0	
TAWNH**1940T**	●	□	19.4	9.2	7.0	
TAWNH**1950T**	●	□	19.5	9.1	7.0	
TAWNH**1960T**	●	□	19.6	9.1	7.0	
TAWNH**1970T**	●	□	19.7	9.1	7.0	TAWSN 2000S25
TAWNH**1980T**	●	□	19.8	9.1	7.0	
TAWNH**1990T**	●	□	19.9	9.1	7.0	TAWMN 2000S25
TAWNH**2000T**	●	□	20.0	9.0	7.0	
TAWNH**2010T**	□	□	20.1	9.0	7.0	TAWLN 2000S25
TAWNH**2020T**	□	□	20.2	9.0	7.0	
TAWNH**2030T**	□	□	20.3	9.0	7.0	
TAWNH**2040T**	□	□	20.4	9.0	7.0	
TAWNH**2050T**	●	□	20.5	8.9	7.0	
TAWNH**2060T**	□	□	20.6	8.9	7.0	
TAWNH**2070T**	□	□	20.7	8.9	7.0	TAWSN 2100S25
TAWNH**2080T**	□	□	20.8	8.9	7.0	
TAWNH**2090T**	□	□	20.9	8.9	7.0	TAWMN 2100S25
TAWNH**2100T**	●	□	21.0	8.8	7.0	
TAWNH**2110T**	□	□	21.1	8.8	7.0	TAWLN 2100S25
TAWNH**2120T**	□	□	21.2	8.8	7.0	
TAWNH**2130T**	□	□	21.3	8.8	7.0	
TAWNH**2140T**	□	□	21.4	8.8	7.0	
TAWNH**2150T**	●	□	21.5	10.6	8.0	
TAWNH**2160T**	□	□	21.6	10.6	8.0	
TAWNH**2170T**	□	□	21.7	10.6	8.0	TAWSN 2200S25
TAWNH**2180T**	□	□	21.8	10.6	8.0	
TAWNH**2190T**	□	□	21.9	10.6	8.0	TAWMN 2200S25
TAWNH**2200T**	●	□	22.0	10.5	8.0	
TAWNH**2210T**	□	□	22.1	10.5	8.0	TAWLN 2200S25
TAWNH**2220T**	□	□	22.2	10.5	8.0	
TAWNH**2230T**	□	□	22.3	10.5	8.0	
TAWNH**2240T**	□	□	22.4	10.5	8.0	
TAWNH**2250T**	●	□	22.5	10.4	8.0	TAWSN 2300S25
TAWNH**2260T**	□	□	22.6	10.4	8.0	
TAWNH**2270T**	□	□	22.7	10.4	8.0	TAWMN 2300S25
TAWNH**2280T**	□	□	22.8	10.4	8.0	
TAWNH**2290T**	□	□	22.9	10.4	8.0	TAWLN 2300S25

● : Inventory maintained in Japan. □ : Non stock, produced to order only. ▲ : Inventory maintained in Japan. To be replaced by new products.
(1 insert in one case)

DRILLING INSERTS

Order Number	Coated VP15TF	Coated VP10H	Dimensions (mm) DC	LF	S	Applicable Holder
TAWNH2300T	●	□	23.0	10.3	8.0	TAWSN 2300S25 TAWMN 2300S25 TAWLN 2300S25
TAWNH**2310T**	□	□	23.1	10.3	8.0	
TAWNH**2320T**	□	□	23.2	10.3	8.0	
TAWNH**2330T**	□	□	23.3	10.3	8.0	
TAWNH**2340T**	□	□	23.4	10.3	8.0	
TAWNH**2350T**	●	□	23.5	10.2	8.0	TAWSN 2400S32 TAWMN 2400S32 TAWLN 2400S32
TAWNH**2360T**	□	□	23.6	10.2	8.0	
TAWNH**2370T**	□	□	23.7	10.2	8.0	
TAWNH**2380T**	□	□	23.8	10.2	8.0	
TAWNH**2390T**	□	□	23.9	10.2	8.0	
TAWNH**2400T**	●	□	24.0	10.1	8.0	
TAWNH**2410T**	□	□	24.1	10.1	8.0	
TAWNH**2420T**	□	□	24.2	10.1	8.0	
TAWNH**2430T**	□	□	24.3	10.1	8.0	
TAWNH**2440T**	□	□	24.4	10.1	8.0	
TAWNH**2450T**	●	□	24.5	11.7	9.0	TAWSN 2500S32 TAWMN 2500S32 TAWLN 2500S32
TAWNH**2460T**	□	□	24.6	11.7	9.0	
TAWNH**2470T**	□	□	24.7	11.7	9.0	
TAWNH**2480T**	□	□	24.8	11.7	9.0	
TAWNH**2490T**	□	□	24.9	11.7	9.0	
TAWNH**2500T**	●	□	25.0	11.6	9.0	
TAWNH**2510T**	□	□	25.1	11.6	9.0	
TAWNH**2520T**	□	□	25.2	11.6	9.0	
TAWNH**2530T**	□	□	25.3	11.6	9.0	
TAWNH**2540T**	□	□	25.4	11.6	9.0	
TAWNH**2550T**	●	□	25.5	11.5	9.0	TAWSN 2600S32 TAWMN 2600S32 TAWLN 2600S32
TAWNH**2560T**	□	□	25.6	11.5	9.0	
TAWNH**2570T**	□	□	25.7	11.5	9.0	
TAWNH**2580T**	□	□	25.8	11.5	9.0	
TAWNH**2590T**	□	□	25.9	11.5	9.0	
TAWNH**2600T**	●	□	26.0	11.4	9.0	
TAWNH**2610T**	□	□	26.1	11.4	9.0	
TAWNH**2620T**	□	□	26.2	11.4	9.0	
TAWNH**2630T**	□	□	26.3	11.4	9.0	
TAWNH**2640T**	□	□	26.4	11.4	9.0	

Order Number	Coated VP15TF	Coated VP10H	Dimensions (mm) DC	LF	S	Applicable Holder
TAWNH2650T	●	□	26.5	11.3	9.0	TAWSN 2700S32 TAWMN 2700S32 TAWLN 2700S32
TAWNH**2660T**	□	□	26.6	11.3	9.0	
TAWNH**2670T**	□	□	26.7	11.3	9.0	
TAWNH**2680T**	□	□	26.8	11.3	9.0	
TAWNH**2690T**	□	□	26.9	11.3	9.0	
TAWNH**2700T**	●	□	27.0	11.2	9.0	
TAWNH**2710T**	□	□	27.1	11.2	9.0	
TAWNH**2720T**	□	□	27.2	11.2	9.0	
TAWNH**2730T**	□	□	27.3	11.2	9.0	
TAWNH**2740T**	□	□	27.4	11.2	9.0	
TAWNH**2750T**	●	□	27.5	12.3	10.0	TAWSN 2800S32 TAWMN 2800S32 TAWLN 2800S32
TAWNH**2760T**	□	□	27.6	12.3	10.0	
TAWNH**2770T**	□	□	27.7	12.3	10.0	
TAWNH**2780T**	□	□	27.8	12.3	10.0	
TAWNH**2790T**	□	□	27.9	12.3	10.0	
TAWNH**2800T**	●	□	28.0	12.2	10.0	
TAWNH**2810T**	□	□	28.1	12.2	10.0	
TAWNH**2820T**	□	□	28.2	12.2	10.0	
TAWNH**2830T**	□	□	28.3	12.2	10.0	
TAWNH**2840T**	□	□	28.4	12.2	10.0	
TAWNH**2850T**	●	□	28.5	12.1	10.0	TAWSN 2900S32 TAWMN 2900S32 TAWLN 2900S32
TAWNH**2860T**	□	□	28.6	12.1	10.0	
TAWNH**2870T**	□	□	28.7	12.1	10.0	
TAWNH**2880T**	□	□	28.8	12.1	10.0	
TAWNH**2890T**	□	□	28.9	12.1	10.0	
TAWNH**2900T**	●	□	29.0	12.0	10.0	
TAWNH**2910T**	□	□	29.1	12.0	10.0	
TAWNH**2920T**	□	□	29.2	12.0	10.0	
TAWNH**2930T**	□	□	29.3	12.0	10.0	
TAWNH**2940T**	□	□	29.4	12.0	10.0	
TAWNH**2950T**	●	□	29.5	11.9	10.0	TAWSN 3000S32 TAWMN 3000S32 TAWLN 3000S32
TAWNH**2960T**	□	□	29.6	11.9	10.0	
TAWNH**2970T**	□	□	29.7	11.9	10.0	
TAWNH**2980T**	□	□	29.8	11.9	10.0	
TAWNH**2990T**	□	□	29.9	11.9	10.0	
TAWNH**3000T**	●	□	30.0	11.8	10.0	
TAWNH**3010T**	□	□	30.1	11.8	10.0	
TAWNH**3020T**	□	□	30.2	11.8	10.0	
TAWNH**3030T**	□	□	30.3	11.8	10.0	
TAWNH**3040T**	□	□	30.4	11.8	10.0	

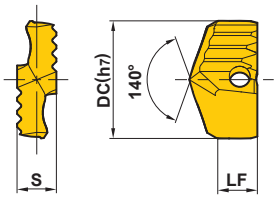
Applicable Drill Shape Geometry	Order Number	Coated VP15TF	Coated	Dimensions (mm) DC	LF	S
TAW H Type N239  	**TAWBH2450T**	●		24.5	11.7	9.0
	TAWBH**2460T**	□		24.6	11.7	9.0
	TAWBH**2470T**	●		24.7	11.7	9.0
	TAWBH**2650T**	□		26.5	11.3	9.0
	TAWBH**2670T**	●		26.7	11.3	9.0

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Applicable Drill Shape Geometry

TAW H Type
(Cast Iron)
➲ N229





Order Number	Coated DP5010	DC	LF	S	Applicable Holder
TAWKH1400TG	▲	14.0	7.1	5.0	TAWSNH 1400S16
TAWKH**1410TG**	▲	14.1	7.1	5.0	TAWMNH 1400S16
TAWKH**1420TG**	▲	14.2	7.1	5.0	TAWLNH 1400S16
TAWKH**1430TG**	▲	14.3	7.1	5.0	
TAWKH**1440TG**	▲	14.4	7.1	5.0	
TAWKH**1450TG**	▲	14.5	7.0	5.0	
TAWKH**1460TG**	▲	14.6	7.0	5.0	
TAWKH**1470TG**	▲	14.7	7.0	5.0	TAWSNH 1500S20
TAWKH**1480TG**	▲	14.8	7.0	5.0	TAWMNH 1500S20
TAWKH**1490TG**	▲	14.9	7.0	5.0	TAWLNH 1500S20
TAWKH**1500TG**	▲	15.0	6.9	5.0	
TAWKH**1510TG**	▲	15.1	6.9	5.0	
TAWKH**1520TG**	▲	15.2	6.9	5.0	
TAWKH**1530TG**	▲	15.3	6.9	5.0	
TAWKH**1540TG**	▲	15.4	6.9	5.0	
TAWKH**1550TG**	▲	15.5	7.3	6.0	
TAWKH**1560TG**	▲	15.6	7.3	6.0	
TAWKH**1570TG**	▲	15.7	7.3	6.0	TAWSN 1600S20
TAWKH**1580TG**	▲	15.8	7.3	6.0	TAWMN 1600S20
TAWKH**1590TG**	▲	15.9	7.3	6.0	TAWLN 1600S20
TAWKH**1600TG**	▲	16.0	7.2	6.0	
TAWKH**1610TG**	▲	16.1	7.2	6.0	
TAWKH**1620TG**	▲	16.2	7.2	6.0	
TAWKH**1630TG**	▲	16.3	7.2	6.0	
TAWKH**1640TG**	▲	16.4	7.2	6.0	
TAWKH**1650TG**	▲	16.5	7.1	6.0	
TAWKH**1660TG**	▲	16.6	7.1	6.0	
TAWKH**1670TG**	▲	16.7	7.1	6.0	TAWSN 1700S20
TAWKH**1680TG**	▲	16.8	7.1	6.0	TAWMN 1700S20
TAWKH**1690TG**	▲	16.9	7.1	6.0	TAWLN 1700S20
TAWKH**1700TG**	▲	17.0	7.0	6.0	
TAWKH**1710TG**	▲	17.1	7.0	6.0	
TAWKH**1720TG**	▲	17.2	7.0	6.0	
TAWKH**1730TG**	▲	17.3	7.0	6.0	
TAWKH**1740TG**	▲	17.4	7.0	6.0	
TAWKH**1750TG**	▲	17.5	6.8	6.0	
TAWKH**1760TG**	▲	17.6	6.8	6.0	
TAWKH**1770TG**	▲	17.7	6.8	6.0	TAWSN 1800S20
TAWKH**1780TG**	▲	17.8	6.8	6.0	TAWMN 1800S20
TAWKH**1790TG**	▲	17.9	6.8	6.0	TAWLN 1800S20
TAWKH**1800TG**	▲	18.0	6.8	6.0	
TAWKH**1810TG**	▲	18.1	6.8	6.0	
TAWKH**1820TG**	▲	18.2	6.8	6.0	
TAWKH**1830TG**	▲	18.3	6.8	6.0	
TAWKH**1840TG**	▲	18.4	6.8	6.0	

Order Number	Coated DP5010	DC	LF	S	Applicable Holder
TAWKH1850TG	●	18.5	8.6	7.0	
TAWKH**1860TG**	●	18.6	8.6	7.0	
TAWKH**1870TG**	●	18.7	8.6	7.0	TAWSN 1900S25
TAWKH**1880TG**	●	18.8	8.6	7.0	TAWMN 1900S25
TAWKH**1890TG**	●	18.9	8.6	7.0	TAWLN 1900S25
TAWKH**1900TG**	●	19.0	8.5	7.0	
TAWKH**1910TG**	●	19.1	8.5	7.0	
TAWKH**1920TG**	●	19.2	8.5	7.0	
TAWKH**1930TG**	●	19.3	8.5	7.0	
TAWKH**1940TG**	●	19.4	8.5	7.0	
TAWKH**1950TG**	●	19.5	8.4	7.0	
TAWKH**1960TG**	●	19.6	8.4	7.0	
TAWKH**1970TG**	●	19.7	8.4	7.0	TAWSN 2000S25
TAWKH**1980TG**	●	19.8	8.4	7.0	TAWMN 2000S25
TAWKH**1990TG**	●	19.9	8.4	7.0	TAWLN 2000S25
TAWKH**2000TG**	●	20.0	8.3	7.0	
TAWKH**2010TG**	□	20.1	8.3	7.0	
TAWKH**2020TG**	□	20.2	8.3	7.0	
TAWKH**2030TG**	□	20.3	8.3	7.0	
TAWKH**2040TG**	□	20.4	8.3	7.0	
TAWKH**2050TG**	●	20.5	8.2	7.0	
TAWKH**2060TG**	□	20.6	8.2	7.0	
TAWKH**2070TG**	□	20.7	8.2	7.0	TAWSN 2100S25
TAWKH**2080TG**	□	20.8	8.2	7.0	TAWMN 2100S25
TAWKH**2090TG**	□	20.9	8.2	7.0	TAWLN 2100S25
TAWKH**2100TG**	●	21.0	8.1	7.0	
TAWKH**2110TG**	□	21.1	8.1	7.0	
TAWKH**2120TG**	□	21.2	8.1	7.0	
TAWKH**2130TG**	□	21.3	8.1	7.0	
TAWKH**2140TG**	□	21.4	8.1	7.0	
TAWKH**2150TG**	●	21.5	9.8	8.0	
TAWKH**2160TG**	□	21.6	9.8	8.0	
TAWKH**2170TG**	□	21.7	9.8	8.0	TAWSN 2200S25
TAWKH**2180TG**	□	21.8	9.8	8.0	TAWMN 2200S25
TAWKH**2190TG**	□	21.9	9.8	8.0	TAWLN 2200S25
TAWKH**2200TG**	●	22.0	9.7	8.0	
TAWKH**2210TG**	□	22.1	9.7	8.0	
TAWKH**2220TG**	□	22.2	9.7	8.0	
TAWKH**2230TG**	□	22.3	9.7	8.0	
TAWKH**2240TG**	□	22.4	9.7	8.0	
TAWKH**2250TG**	●	22.5	9.6	8.0	TAWSN 2300S25
TAWKH**2260TG**	□	22.6	9.6	8.0	TAWMN 2300S25
TAWKH**2270TG**	□	22.7	9.6	8.0	TAWLN 2300S25
TAWKH**2280TG**	□	22.8	9.6	8.0	
TAWKH**2290TG**	□	22.9	9.6	8.0	

DRILLING INSERTS

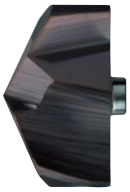
Order Number	Coated DP5010	Dimensions (mm) DC	LF	S	Applicable Holder
TAWKH2300TG	●	23.0	9.5	8.0	TAWSN 2300S25
TAWKH2310TG	□	23.1	9.5	8.0	TAWMN 2300S25
TAWKH2320TG	□	23.2	9.5	8.0	TAWLN 2300S25
TAWKH2330TG	□	23.3	9.5	8.0	
TAWKH2340TG	□	23.4	9.5	8.0	
TAWKH2350TG	●	23.5	9.4	8.0	
TAWKH2360TG	□	23.6	9.4	8.0	
TAWKH2370TG	□	23.7	9.4	8.0	TAWSN 2400S32
TAWKH2380TG	□	23.8	9.4	8.0	TAWMN 2400S32
TAWKH2390TG	□	23.9	9.4	8.0	TAWLN 2400S32
TAWKH2400TG	●	24.0	9.3	8.0	
TAWKH2410TG	□	24.1	9.3	8.0	
TAWKH2420TG	□	24.2	9.3	8.0	
TAWKH2430TG	□	24.3	9.3	8.0	
TAWKH2440TG	□	24.4	9.3	8.0	
TAWKH2450TG	●	24.5	10.8	9.0	
TAWKH2460TG	□	24.6	10.8	9.0	
TAWKH2470TG	□	24.7	10.8	9.0	TAWSN 2500S32
TAWKH2480TG	□	24.8	10.8	9.0	TAWMN 2500S32
TAWKH2490TG	□	24.9	10.8	9.0	TAWLN 2500S32
TAWKH2500TG	●	25.0	10.7	9.0	
TAWKH2510TG	□	25.1	10.7	9.0	
TAWKH2520TG	□	25.2	10.7	9.0	
TAWKH2530TG	□	25.3	10.7	9.0	
TAWKH2540TG	□	25.4	10.7	9.0	
TAWKH2550TG	●	25.5	10.6	9.0	
TAWKH2560TG	□	25.6	10.6	9.0	
TAWKH2570TG	□	25.7	10.6	9.0	TAWSN 2600S32
TAWKH2580TG	□	25.8	10.6	9.0	TAWMN 2600S32
TAWKH2590TG	□	25.9	10.6	9.0	TAWLN 2600S32
TAWKH2600TG	●	26.0	10.5	9.0	
TAWKH2610TG	□	26.1	10.5	9.0	
TAWKH2620TG	□	26.2	10.5	9.0	
TAWKH2630TG	□	26.3	10.5	9.0	
TAWKH2640TG	□	26.4	10.5	9.0	
TAWKH2650TG	●	26.5	10.4	9.0	
TAWKH2660TG	□	26.6	10.4	9.0	
TAWKH2670TG	□	26.7	10.4	9.0	TAWSN 2700S32
TAWKH2680TG	□	26.8	10.4	9.0	TAWMN 2700S32
TAWKH2690TG	□	26.9	10.4	9.0	TAWLN 2700S32
TAWKH2700TG	●	27.0	10.3	9.0	
TAWKH2710TG	□	27.1	10.3	9.0	
TAWKH2720TG	□	27.2	10.3	9.0	
TAWKH2730TG	□	27.3	10.3	9.0	
TAWKH2740TG	□	27.4	10.3	9.0	

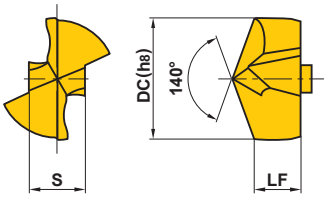
Order Number	Coated DP5010	Dimensions (mm) DC	LF	S	Applicable Holder
TAWKH2750TG	●	27.5	11.3	10.0	
TAWKH2760TG	□	27.6	11.3	10.0	
TAWKH2770TG	□	27.7	11.3	10.0	TAWSN 2800S32
TAWKH2780TG	□	27.8	11.3	10.0	TAWMN 2800S32
TAWKH2790TG	□	27.9	11.3	10.0	TAWLN 2800S32
TAWKH2800TG	●	28.0	11.2	10.0	
TAWKH2810TG	□	28.1	11.2	10.0	
TAWKH2820TG	□	28.2	11.2	10.0	
TAWKH2830TG	□	28.3	11.2	10.0	
TAWKH2840TG	□	28.4	11.2	10.0	
TAWKH2850TG	●	28.5	11.1	10.0	
TAWKH2860TG	□	28.6	11.1	10.0	
TAWKH2870TG	□	28.7	11.1	10.0	TAWSN 2900S32
TAWKH2880TG	□	28.8	11.1	10.0	TAWMN 2900S32
TAWKH2890TG	□	28.9	11.1	10.0	TAWLN 2900S32
TAWKH2900TG	●	29.0	11.0	10.0	
TAWKH2910TG	□	29.1	11.0	10.0	
TAWKH2920TG	□	29.2	11.0	10.0	
TAWKH2930TG	□	29.3	11.0	10.0	
TAWKH2940TG	□	29.4	11.0	10.0	
TAWKH2950TG	●	29.5	10.9	10.0	
TAWKH2960TG	□	29.6	10.9	10.0	
TAWKH2970TG	□	29.7	10.9	10.0	TAWSN 3000S32
TAWKH2980TG	□	29.8	10.9	10.0	TAWMN 3000S32
TAWKH2990TG	□	29.9	10.9	10.0	TAWLN 3000S32
TAWKH3000TG	●	30.0	10.8	10.0	
TAWKH3010TG	□	30.1	10.8	10.0	
TAWKH3020TG	□	30.2	10.8	10.0	
TAWKH3030TG	□	30.3	10.8	10.0	
TAWKH3040TG	□	30.4	10.8	10.0	

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

Applicable Drill Shape Geometry

STAW
N220





Order Number	Stock		Dimensions (mm)			Applicable Holder
	VP15TF	VP10H	DC	LF	S	
STAWN1000TH	●	□	10.0	3.8	4.6	STAWSS1000S16 STAWSN1000S16 STAWMN1000S16 STAWLN1000S16
STAWN**1010TH**	●	□	10.1	3.8	4.6	
STAWN**1020TH**	●	□	10.2	3.8	4.6	
STAWN**1030TH**	●	□	10.3	3.8	4.6	
STAWN**1040TH**	●	□	10.4	3.8	4.6	
STAWN**1050TH**	●	□	10.5	4.0	4.8	STAWSS1050S16 STAWSN1050S16 STAWMN1050S16 STAWLN1050S16
STAWN**1060TH**	●	□	10.6	4.0	4.8	
STAWN**1070TH**	●	□	10.7	4.0	4.8	
STAWN**1080TH**	●	□	10.8	4.0	4.8	
STAWN**1090TH**	●	□	10.9	4.0	4.8	
STAWN**1100TH**	●	□	11.0	4.2	5.1	STAWSS1100S16 STAWSN1100S16 STAWMN1100S16 STAWLN1100S16
STAWN**1110TH**	●	□	11.1	4.2	5.1	
STAWN**1120TH**	●	□	11.2	4.2	5.1	
STAWN**1130TH**	●	□	11.3	4.2	5.1	
STAWN**1140TH**	●	□	11.4	4.2	5.1	
STAWN**1150TH**	●	□	11.5	4.4	5.3	STAWSS1150S16 STAWSN1150S16 STAWMN1150S16 STAWLN1150S16
STAWN**1160TH**	●	□	11.6	4.4	5.3	
STAWN**1170TH**	●	□	11.7	4.4	5.3	
STAWN**1180TH**	●	□	11.8	4.4	5.3	
STAWN**1190TH**	●	□	11.9	4.4	5.3	
STAWN**1200TH**	●	□	12.0	4.6	5.5	STAWSS1200S16 STAWSN1200S16 STAWMN1200S16 STAWLN1200S16
STAWN**1210TH**	●	□	12.1	4.6	5.5	
STAWN**1220TH**	●	□	12.2	4.6	5.5	
STAWN**1230TH**	●	□	12.3	4.6	5.5	
STAWN**1240TH**	●	□	12.4	4.6	5.5	
STAWN**1250TH**	●	□	12.5	4.8	5.8	STAWSS1250S16 STAWSN1250S16 STAWMN1250S16 STAWLN1250S16
STAWN**1260TH**	●	□	12.6	4.8	5.8	
STAWN**1270TH**	●	□	12.7	4.8	5.8	
STAWN**1280TH**	●	□	12.8	4.8	5.8	
STAWN**1290TH**	●	□	12.9	4.8	5.8	
STAWN**1300TH**	●	□	13.0	4.9	6.0	STAWSS1300S16 STAWSN1300S16 STAWMN1300S16 STAWLN1300S16
STAWN**1310TH**	●	□	13.1	4.9	6.0	
STAWN**1320TH**	●	□	13.2	4.9	6.0	
STAWN**1330TH**	●	□	13.3	4.9	6.0	
STAWN**1340TH**	●	□	13.4	4.9	6.0	
STAWN**1350TH**	●	□	13.5	5.1	6.2	STAWSS1350S16 STAWSN1350S16 STAWMN1350S16 STAWLN1350S16
STAWN**1360TH**	●	□	13.6	5.1	6.2	
STAWN**1370TH**	●	□	13.7	5.1	6.2	
STAWN**1380TH**	●	□	13.8	5.1	6.2	
STAWN**1390TH**	●	□	13.9	5.1	6.2	
STAWN**1400TH**	●		14.0	5.3	6.4	STAWSS1400S16 STAWSN1400S16 STAWMN1400S16 STAWLN1400S16
STAWN**1410TH**	●		14.1	5.3	6.4	
STAWN**1420TH**	●		14.2	5.3	6.4	
STAWN**1430TH**	●		14.3	5.3	6.4	
STAWN**1440TH**	●		14.4	5.3	6.4	

DRILLING INSERTS

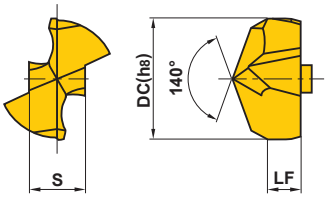
Order Number	Stock		Dimensions (mm)			Applicable Holder
	VP15TF	VP10H	DC	LF	S	
STAWN1450TH	●		14.5	5.5	6.7	STAWSS1450S16 STAWSN1450S16 STAWMN1450S16 STAWLN1450S16
STAWN**1460TH**	●		14.6	5.5	6.7	
STAWN**1470TH**	●		14.7	5.5	6.7	
STAWN**1480TH**	●		14.8	5.5	6.7	
STAWN**1490TH**	●		14.9	5.5	6.7	
STAWN**1500TH**	●		15.0	5.7	6.9	STAWSS1500S20 STAWSN1500S20 STAWMN1500S20 STAWLN1500S20
STAWN**1510TH**	●		15.1	5.7	6.9	
STAWN**1520TH**	●		15.2	5.7	6.9	
STAWN**1530TH**	●		15.3	5.7	6.9	
STAWN**1540TH**	●		15.4	5.7	6.9	
STAWN**1550T**	●		15.5	5.9	7.1	STAWSS1600S20 STAWSN1600S20 STAWMN1600S20 STAWLN1600S20
STAWN**1560T**	●		15.6	5.9	7.1	
STAWN**1570T**	●		15.7	5.9	7.1	
STAWN**1580T**	●		15.8	5.9	7.1	
STAWN**1590T**	●		15.9	5.9	7.1	
STAWN**1600T**	●		16.0	5.9	7.1	
STAWN**1610T**	●		16.1	5.9	7.1	
STAWN**1620T**	●		16.2	5.9	7.1	
STAWN**1630T**	●		16.3	5.9	7.1	
STAWN**1640T**	●		16.4	5.9	7.1	
STAWN**1650T**	●		16.5	6.3	7.6	STAWSS1700S20 STAWSN1700S20 STAWMN1700S20 STAWLN1700S20
STAWN**1660T**	●		16.6	6.3	7.6	
STAWN**1670T**	●		16.7	6.3	7.6	
STAWN**1680T**	●		16.8	6.3	7.6	
STAWN**1690T**	●		16.9	6.3	7.6	
STAWN**1700T**	●		17.0	6.3	7.6	
STAWN**1710T**	●		17.1	6.3	7.6	
STAWN**1720T**	●		17.2	6.3	7.6	
STAWN**1730T**	●		17.3	6.3	7.6	
STAWN**1740T**	●		17.4	6.3	7.6	
STAWN**1750T**	●		17.5	6.7	8.1	STAWSS1800S20 STAWSN1800S20 STAWMN1800S20 STAWLN1800S20
STAWN**1760T**	●		17.6	6.7	8.1	
STAWN**1770T**	●		17.7	6.7	8.1	
STAWN**1780T**	●		17.8	6.7	8.1	
STAWN**1790T**	●		17.9	6.7	8.1	
STAWN**1800T**	●		18.0	6.7	8.1	
STAWN**1810T**	●		18.1	6.7	8.1	
STAWN**1820T**	●		18.2	6.7	8.1	
STAWN**1830T**	●		18.3	6.7	8.1	
STAWN**1840T**	●		18.4	6.7	8.1	

● : Inventory maintained in Japan.
(1 insert in one case)

Applicable Drill Shape Geometry

STAW
N220





Order Number	Stock		Dimensions (mm)			Applicable Holder
	DP5010		DC	LF	S	
STAWK1000TG	●		10.0	3.3	4.6	STAWSS1000S16 STAWSN1000S16 STAWMN1000S16 STAWLN1000S16
STAWK**1010TG**	●		10.1	3.3	4.6	
STAWK**1020TG**	●		10.2	3.3	4.6	
STAWK**1030TG**	●		10.3	3.3	4.6	
STAWK**1040TG**	●		10.4	3.3	4.6	
STAWK**1050TG**	●		10.5	3.5	4.8	STAWSS1050S16 STAWSN1050S16 STAWMN1050S16 STAWLN1050S16
STAWK**1060TG**	●		10.6	3.5	4.8	
STAWK**1070TG**	●		10.7	3.5	4.8	
STAWK**1080TG**	●		10.8	3.5	4.8	
STAWK**1090TG**	●		10.9	3.5	4.8	
STAWK**1100TG**	●		11.0	3.7	5.1	STAWSS1100S16 STAWSN1100S16 STAWMN1100S16 STAWLN1100S16
STAWK**1110TG**	●		11.1	3.7	5.1	
STAWK**1120TG**	●		11.2	3.7	5.1	
STAWK**1130TG**	●		11.3	3.7	5.1	
STAWK**1140TG**	●		11.4	3.7	5.1	
STAWK**1150TG**	●		11.5	3.9	5.3	STAWSS1150S16 STAWSN1150S16 STAWMN1150S16 STAWLN1150S16
STAWK**1160TG**	●		11.6	3.9	5.3	
STAWK**1170TG**	●		11.7	3.9	5.3	
STAWK**1180TG**	●		11.8	3.9	5.3	
STAWK**1190TG**	●		11.9	3.9	5.3	
STAWK**1200TG**	●		12.0	4.1	5.5	STAWSS1200S16 STAWSN1200S16 STAWMN1200S16 STAWLN1200S16
STAWK**1210TG**	●		12.1	4.1	5.5	
STAWK**1220TG**	●		12.2	4.1	5.5	
STAWK**1230TG**	●		12.3	4.1	5.5	
STAWK**1240TG**	●		12.4	4.1	5.5	
STAWK**1250TG**	●		12.5	4.2	5.8	STAWSS1250S16 STAWSN1250S16 STAWMN1250S16 STAWLN1250S16
STAWK**1260TG**	●		12.6	4.2	5.8	
STAWK**1270TG**	●		12.7	4.2	5.8	
STAWK**1280TG**	●		12.8	4.2	5.8	
STAWK**1290TG**	●		12.9	4.2	5.8	
STAWK**1300TG**	●		13.0	4.4	6.0	STAWSS1300S16 STAWSN1300S16 STAWMN1300S16 STAWLN1300S16
STAWK**1310TG**	●		13.1	4.4	6.0	
STAWK**1320TG**	●		13.2	4.4	6.0	
STAWK**1330TG**	●		13.3	4.4	6.0	
STAWK**1340TG**	●		13.4	4.4	6.0	
STAWK**1350TG**	●		13.5	4.6	6.2	STAWSS1350S16 STAWSN1350S16 STAWMN1350S16 STAWLN1350S16
STAWK**1360TG**	●		13.6	4.6	6.2	
STAWK**1370TG**	●		13.7	4.6	6.2	
STAWK**1380TG**	●		13.8	4.6	6.2	
STAWK**1390TG**	●		13.9	4.6	6.2	

DRILLING INSERTS

Order Number	Stock		Dimensions (mm)			Applicable Holder
	DP5010		DC	LF	S	
STAWK1400TG	●		14.0	4.8	6.4	STAWSS1400S16 STAWSN1400S16 STAWMN1400S16 STAWLN1400S16
STAWK**1410TG**	●		14.1	4.8	6.4	
STAWK**1420TG**	●		14.2	4.8	6.4	
STAWK**1430TG**	●		14.3	4.8	6.4	
STAWK**1440TG**	●		14.4	4.8	6.4	
STAWK**1450TG**	●		14.5	5.0	6.7	STAWSS1450S16 STAWSN1450S16 STAWMN1450S16 STAWLN1450S16
STAWK**1460TG**	●		14.6	5.0	6.7	
STAWK**1470TG**	●		14.7	5.0	6.7	
STAWK**1480TG**	●		14.8	5.0	6.7	
STAWK**1490TG**	●		14.9	5.0	6.7	
STAWK**1500TG**	●		15.0	5.2	6.9	STAWSS1500S20 STAWSN1500S20 STAWMN1500S20 STAWLN1500S20
STAWK**1510TG**	●		15.1	5.2	6.9	
STAWK**1520TG**	●		15.2	5.2	6.9	
STAWK**1530TG**	●		15.3	5.2	6.9	
STAWK**1540TG**	●		15.4	5.2	6.9	
STAWK**1550TG**	●		15.5	5.3	7.1	STAWSS1600S20 STAWSN1600S20 STAWMN1600S20 STAWLN1600S20
STAWK**1560TG**	●		15.6	5.3	7.1	
STAWK**1570TG**	●		15.7	5.3	7.1	
STAWK**1580TG**	●		15.8	5.3	7.1	
STAWK**1590TG**	●		15.9	5.3	7.1	
STAWK**1600TG**	●		16.0	5.3	7.1	
STAWK**1610TG**	●		16.1	5.3	7.1	
STAWK**1620TG**	●		16.2	5.3	7.1	
STAWK**1630TG**	●		16.3	5.3	7.1	
STAWK**1640TG**	●		16.4	5.3	7.1	
STAWK**1650TG**	●		16.5	5.7	7.6	STAWSS1700S20 STAWSN1700S20 STAWMN1700S20 STAWLN1700S20
STAWK**1660TG**	●		16.6	5.7	7.6	
STAWK**1670TG**	●		16.7	5.7	7.6	
STAWK**1680TG**	●		16.8	5.7	7.6	
STAWK**1690TG**	●		16.9	5.7	7.6	
STAWK**1700TG**	●		17.0	5.7	7.6	
STAWK**1710TG**	●		17.1	5.7	7.6	
STAWK**1720TG**	●		17.2	5.7	7.6	
STAWK**1730TG**	●		17.3	5.7	7.6	
STAWK**1740TG**	●		17.4	5.7	7.6	
STAWK**1750TG**	●		17.5	6.0	8.1	STAWSS1800S20 STAWSN1800S20 STAWMN1800S20 STAWLN1800S20
STAWK**1760TG**	●		17.6	6.0	8.1	
STAWK**1770TG**	●		17.7	6.0	8.1	
STAWK**1780TG**	●		17.8	6.0	8.1	
STAWK**1790TG**	●		17.9	6.0	8.1	
STAWK**1800TG**	●		18.0	6.0	8.1	
STAWK**1810TG**	●		18.1	6.0	8.1	
STAWK**1820TG**	●		18.2	6.0	8.1	
STAWK**1830TG**	●		18.3	6.0	8.1	
STAWK**1840TG**	●		18.4	6.0	8.1	

● : Inventory maintained in Japan.
(1 insert in one case)

Memo

HOW TO READ THE STANDARD OF INDEXABLE MILLING

●How this section page is organized

①Organized according to the face milling cutting mode.
(Refer to the index on the next page.)

SCOPE OF AVAILABLE WORK MATERIAL
provides a graph depicting the scope of the available work material for machining.

PRODUCT FEATURES

CORNER ANGLE ICON

APPLICATION ICON
represents available machining applications, such as finishing and roughing.

TYPE/ NAME OF PRODUCT

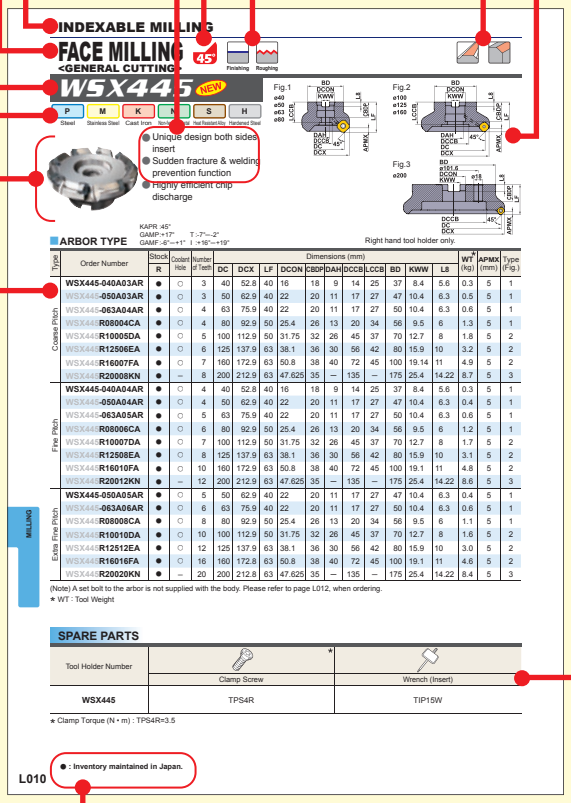
APPLICATION

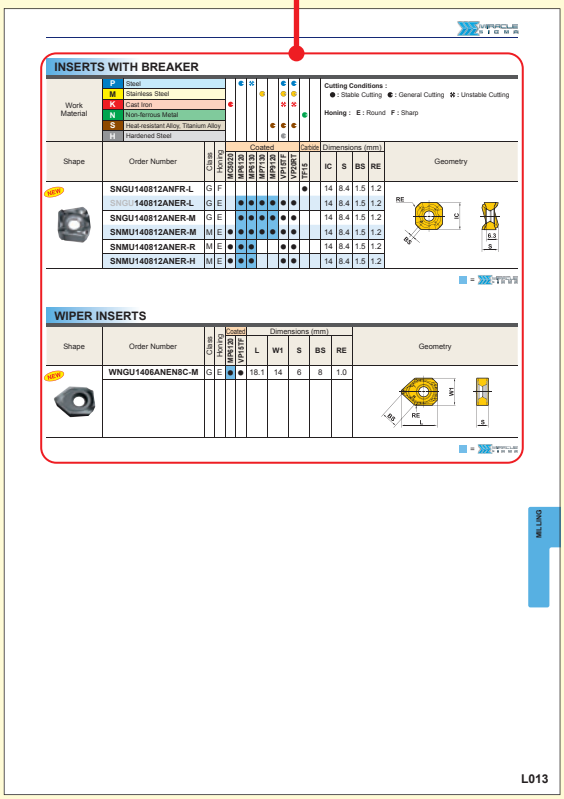
PRODUCT SECTION

CUTTING MODE ICON
represents available cutting modes, such as face milling and shoulder milling.

GEOMETRY

STANDARDS FOR APPLICABLE INSERTS
indicates stock status, dimensions, etc. for applicable inserts.





LEGEND FOR STOCK STATUS MARK
is shown on the left hand page of each double-page spread.

SPARE PARTS FOR MIILING TOOLS
indicates the names of the applicable spare parts.

PRODUCT STANDARDS
indicates tool types, order numbers, stock status (per right/left hand), dimensions, etc.

PHOTO OF PRODUCT

●To Order : For title product, please specify ①order number and hand of tool (right/left).
For insert, please specify ①insert number and ②grade.

MILLING TOOLS

INDEXABLE MILLING

CLASSIFICATION ····· L002
CLASSIFICATION OF SCREW-IN TOOLS ··· L005
CLASSIFICATION OF END MILLS ··· L006
HOW TO SELECT AN END MILL ··· L008

STANDARD OF MILLING

FACE MILLING
WSX445 ····· L010
ASX445 ····· L018
AHX640W ····· L030
AHX640S ····· L026
AOX445 ····· L032
SE515 ····· L034
SG20 ····· L033

FACE MILLING (HIGH FEED)
V10000 ····· L147
NF10000 ····· L148
FF3000 ····· L149

SHOULDER MILLING
VOX400 ····· L036
ASX400 ····· L040
BAP300 ····· L153

MULTI FUNCTIONAL MILLING
APX3000 ····· L046
APX4000 ····· L052
AXD4000 ····· L060
AXD7000 ····· L066
BXD4000 ····· L072
AQX ····· L076
AJX ····· L084
OCTACUT ····· L094
ARX ····· L098
BRP ····· L102

DEEP SHOULDER MILLING
APX4000LONG CUTTING EDGE TYPE ··· L058
BAP300LONG CUTTING EDGE TYPE ··· L156
SPX ····· L108
VFX5 ····· L114
VFX6 ····· L117

BALL NOSE END MILLING
SRF, SRB ····· L120
SUF ····· L124
SRM2 ····· L128
SRM2φ40, φ50 ····· L134

CHAMFER MILLING
CESP,CFSP,CGSP ····· L113

T-SLOT MILLING
TSMP ····· L136

SPOT MILLING
CBJP,CBMP ····· L137

SLOT MILLING
KSMG ····· L138

VERTICAL FEED MILLING
PMC ····· L140
PMF ····· L142
PMR ····· L143

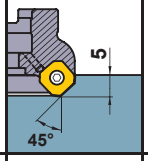
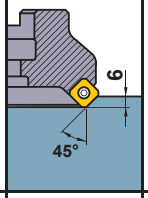
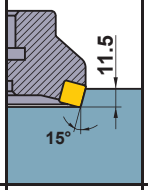
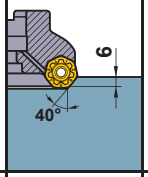
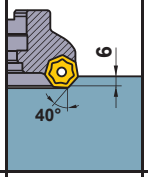
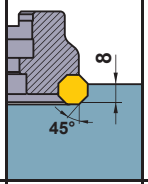
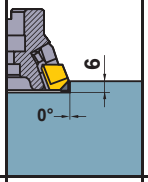
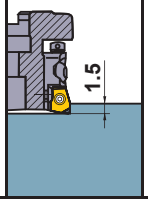
QUICK CHANGE TYPE
FP490 ····· L150
FP590 ····· L151
FE404 ····· L152
SETTING FIXTURE ····· L159

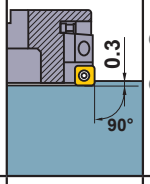
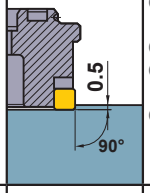
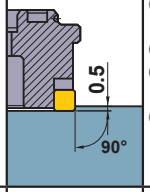
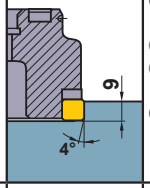
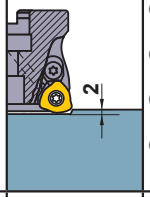
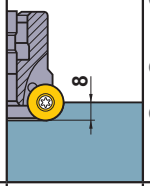
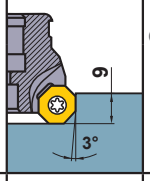
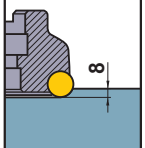
ARBOR STANDARDS
FOR SCREW-IN TOOLS ····· L145
Qing SYSTEM ····· L160
MAXIMUM ALLOWABLE REVOLUTION FOR CUTTER ··· L161
LIST OF CUTTING EDGE DIAMETER TOLERANCES ··· L162

*Arranged by Alphabetical order

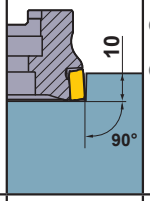
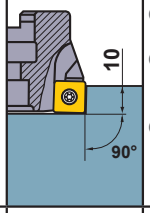
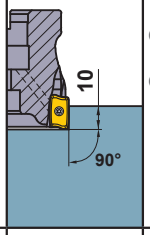
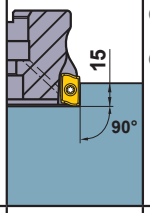
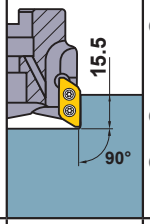
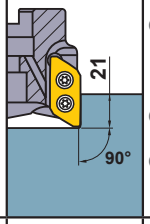
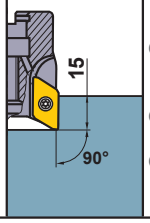
L026 AHX640S
L030 AHX640W
L084 AJX
L032 AOX445
L046 APX3000
L052 APX4000
L058 APX4000 LONG CUTTING EDGE TYPE
L076 AQX
L098 ARX
L040 ASX400
L018 ASX445
L060 AXD4000
L066 AXD7000
L153 BAP300
L156 BAP300 LONG CUTTING EDGE TYPE
L102 BRP
L072 BXD4000
L137 CBJP,CBMP
L113 CESP,CFSP,CGSP
L152 FE404
L149 FF3000
L150 FP490
L151 FP590
L138 KSMG
L148 NF10000
L094 OCTACUT
L140 PMC
L142 PMF
L143 PMR
L034 SE515
L033 SG20
L108 SPX
L120 SRF,SRB
L124 SUF
L128 SRM2
L134 SRM2φ40,φ50
L136 TSMP
L147 V10000
L114 VFX5
L117 VFX6
L036 VOX400
L010 WSX445
L145 ARBORS FOR SCREW-IN TOOLS
L159 SETTING FIXTURE

CLASSIFICATION

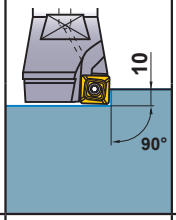
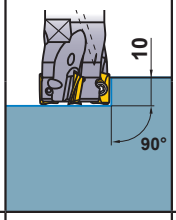
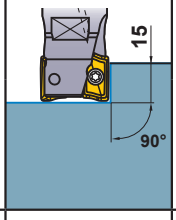
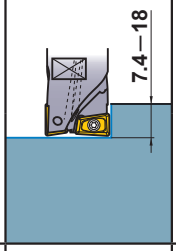
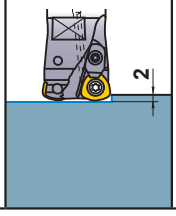
Cutting Mode	Corner Angle	Appli-cation	Product Name · Shape	Corner Angle, Max. Depth of Cut	Features	Cutter Dia.	Work Material: P Steel / M Stainless Steel / K Cast Iron / N Non-ferrous Metal / S Heat Resistant Alloy / H Hardened Steel
Face Milling	45°	General Cutting	**WSX445** MIRACLE SIGMA NEW 		●Unique design both sides insert ●Sudden fracture & welding prevention function ●Highly efficient chip discharge	·Ø40 ·Ø50 ·Ø63 ·Ø80 ·Ø100 ·Ø125 ·Ø160 ·Ø200	**WSX445** (Max. Depth of Cut : 5mm) ➲L010
	45°	General Cutting	**ASX445** MIRACLE SIGMA 		●Precision inexpen-sive moulded type 20°positive insert. ●Screw-on type. ●A wide range of chip breakers. ●High rigidity due to carbide shim.	·Ø50 ·Ø63 ·Ø80 ·Ø100 ·Ø125 ·Ø160 ·Ø200 ·Ø250 ·Ø315	**ASX445** (Max. Depth of Cut : 6mm) ➲L018
	15°	Heavy Cutting	**SE515** 		●20°positive insert. ●High rake angle. ●High rigidity due to carbide shim	·Ø100 ·Ø125 ·Ø160	**SE515** (Max. Depth of Cut : 11.5mm) ➲L034
	40°	General Cutting	**AHX640S** MIRACLE SIGMA 		●Heptagonal double sided insert. ●Economical 14 cutting edge inserts. ●Multi insert design for high feed machining.	·Ø63 ·Ø80 ·Ø100 ·Ø125 ·Ø160 ·Ø200	**AHX640S** (Max. Depth of Cut : 6mm) ➲L026
	40°	High Feed Cutting for Cast Iron	**AHX640W** 		●Heptagonal double sided insert. ●Economical 14 cutting edge inserts. ●Multi insert design for high feed machining.	·Ø80 ·Ø100 ·Ø125 ·Ø160 ·Ø200 ·Ø250 ·Ø315	**AHX640W** (Max. Depth of Cut : 6mm) ➲L030
	45°	High Efficiency Cutting for Cast Iron	**AOX445** 		●Solid CBN octagonal double sided insert. ●Economical 16 cutting edge inserts. (When the depth of cut is 3mm) ●For high efficiency roughing through to finishing. ●Easy operation and cleansing.	·Ø63 ·Ø80 ·Ø100 ·Ø125 ·Ø160 ·Ø200	**AOX445** (Max. Depth of Cut : 8mm) ➲L032
	0°	High Feed Finishing for Aluminium Alloy	**NF10000** 		●Insert with PCD. ●Suitable for high speed finishing of light alloys. ●Adjustable cutting edge run-out function.	·Ø80 ·Ø100 ·Ø125	**NF10000** (Max. Depth of Cut : 6mm) ➲L148
	0°	High Feed Finishing for Aluminium Alloy	**V10000** 		●Insert with PCD. ●Light weight, strong aluminium alloy cutter body. ●Anti-Fly insert mechanism enables high speed milling. ●Adjustable cutting edge run-out function.	·Ø63 ·Ø80 ·Ø100 ·Ø125	**V10000** (Max. Depth of Cut : 1.5mm) ➲L147

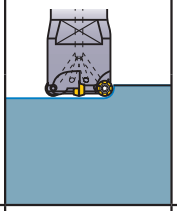
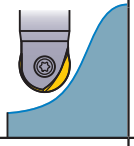
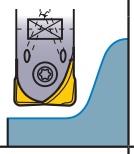
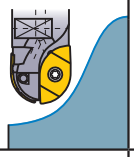
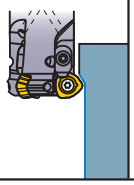
Cutting Mode	Corner Angle	Appli-cation	Product Name · Shape	Corner Angle, Max. Depth of Cut	Features	Cutter Dia.	Work Material P Steel	M Stainless Steel	K Cast Iron	N Non-ferrous Metal	S Heat Resistant Alloy	H Hardened Steel
Face Milling	0°	High Feed Finishing	**FF3000** 		●11°positive insert. ●1000–3000mm/min high feed machining. ●For finishing of steel machining. ●Adjustable cutting edge run-out function.	·Ø125 ·Ø160 ·Ø200 ·Ø250	**FF3000** (Max. Depth of Cut : 0.3mm) ➲L149					
	0°	High Feed Cutting for Cast Iron	**FP490** 		●11°positive insert. ●Suitable for cast iron finishing. ●Multi-insert design. ●For high feed cutting. ●Easy tool exchange.	·Ø80 I ·Ø500				**FP490** (Max. Depth of Cut : 0.5mm) ➲L150		
	0°	High Feed Cutting for Cast Iron	**FP590** 		●11°positive insert. ●Suitable for cast iron finishing. ●Multi-insert design. ●For high feed cutting. ●Easy tool exchange.	·Ø125 I ·Ø500				**FP590** (Max. Depth of Cut : 0.5mm) ➲L151		
	4°	High Feed Cutting for Cast Iron	**FE404** 		●21°positive insert. ●High rake and relief angle. ●Multi-insert design. ●Suitable for light alloy machining. ●Easy tool exchange.	·Ø100 I ·Ø500	**FE404** (Max. Depth of Cut : 9mm) ➲L152					
	—	Multi Functional Milling	**AJX** MIRACLE SIGMA 		●15°positive insert. ●High rigidity double clamp structure. ●Suitable for high feed machining. ●With through coolant holes. ●Special insert design with 3 cutting edges.	·Ø50 ·Ø63 ·Ø80 ·Ø100 ·Ø125 ·Ø160						**AJX** (Max. Depth of Cut : 2mm) ➲L084
	—	Multi Functional Milling	**BRP** 		●11°positive insert. ●Round shape insert with a strong cutting edge. ●Wide range of tools available. ●Suitable for mould machining.	·Ø40 ·Ø50 ·Ø63 ·Ø80 ·Ø100						**BRP** (Max. Depth of Cut : 8mm) ➲L104
	—	Multi Functional Milling	**OCTACUT** 		●20°positive insert. ●For octagonal and round type inserts. ●Multi functional machining.	Small Insert Type ·Ø40 ·Ø50 ·Ø63 ·Ø80 Standard Insert Type ·Ø50 ·Ø63 ·Ø80 ·Ø100 ·Ø125 ·Ø160						**OCTACUT** (Max. Depth of Cut : 9mm) ➲L095
	—	Cutting for Difficult-to-cut Materials	**SG20** 		●30°positive insert. ●High rake angle. ●Round shape insert with a strong cutting edge. ●Suitable for difficult-to-cut materials.	·Ø80 ·Ø100 ·Ø125 ·Ø160						**SG20** (Max. Depth of Cut : 8mm) ➲L033

CLASSIFICATION (ARBOR type)

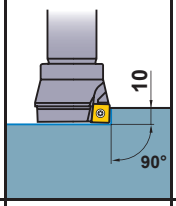
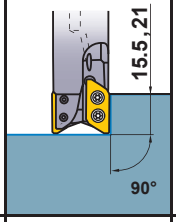
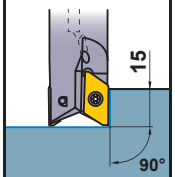
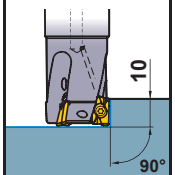
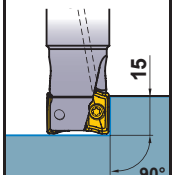
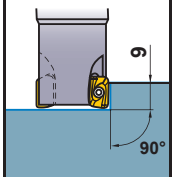
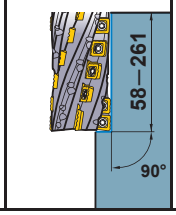
Cutting Mode	Corner Angle	Appli-cation	Product Name · Shape	Corner Angle, Max. Depth of Cut	Features	Cutter Dia.	Work Material P Steel	M Stainless Steel	K Cast Iron	N Non-ferrous Metal	S Heat Resistant Alloy	H Hardened Steel
Shoulder Milling	0°	For Cast Iron	**VOX400** 		●Vertical inserts with high strength cutting edge. ●Economical 8 cutting edge inserts. ●Screw-on type.	·Ø63 ·Ø80 ·Ø100 ·Ø125 ·Ø160 ·Ø200 ·Ø250				**VOX400** (Max. Depth of Cut : 10mm) ➲ L036		
	0°	General Cutting	**ASX400** MIRACLE SIGMA 		●High tolerance M-class inserts. ●Economical 4 cutting edge inserts. ●Curved cutting edge and high rigidity holder. ●Screw-on type.	·Ø50 ·Ø63 ·Ø80 ·Ø100 ·Ø125 ·Ø160 ·Ø200 ·Ø250	**ASX400** (Max. Depth of Cut : 10mm) ➲ L040					
	0°	Multi Functional Cutting	**APX3000** MIRACLE SIGMA 		●High accuracy, high quality vertical wall. ●Low cutting force insert. ●With through air & coolant holes.	·Ø32 ·Ø40 ·Ø50 ·Ø63 ·Ø80 ·Ø100	**APX3000** (Max. Depth of Cut : 10mm) ➲ L047					
	0°	General Cutting	**APX4000** MIRACLE SIGMA 		●High accuracy, high quality vertical wall. ●Low cutting force insert. ●With through air & coolant holes.	·Ø40 ·Ø50 ·Ø63 ·Ø80 ·Ø100 ·Ø125 ·Ø160			**APX4000** (Max. Depth of Cut : 15mm) ➲ L053			
	0°	For Aluminium Alloy	**AXD4000** MIRACLE SIGMA 		●Low resistance chipbreaker. ●Low resistance insert and high rigidity design for excellent performance. ●For high-speed machining. ●Multi-functional machining.	·Ø40 ·Ø50 ·Ø63 ·Ø80 ·Ø100 ·Ø125	**AXD4000** (Max. Depth of Cut : 15.5mm) ➲ L061					
	0°	For Aluminium Alloy	**AXD7000** 		●Low resistance chipbreaker. ●Low resistance insert and high rigidity design for excellent performance. ●For high-speed machining. ●Multi-functional machining.	·Ø50 ·Ø63 ·Ø80 ·Ø100 ·Ø125	**AXD7000** (Max. Depth of Cut : 21mm) ➲ L066					
	0°	Aluminium Alloy to Difficult-to-cut Material Cutting	**BXD4000** 		●Curved cutting edge and high rigidity holder produce high wall accuracy. ●Low resistance insert and high rigidity design for excellent performance. ●With through coolant holes to ensure smooth chip discharge. ●For high-speed machining.	·Ø40 ·Ø50 ·Ø63 ·Ø80 ·Ø100 ·Ø125	**BXD4000** (Max. Depth of Cut : 15mm) ➲ L072					

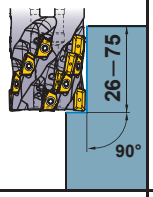
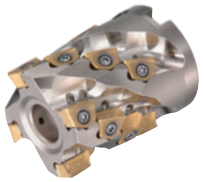
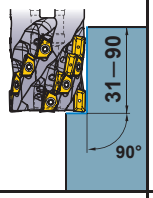
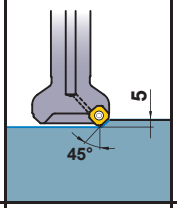
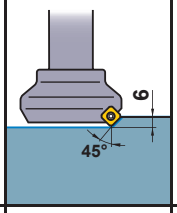
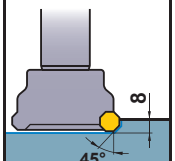
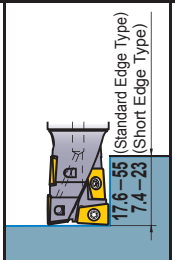
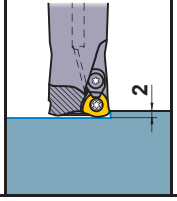
CLASSIFICATION OF SCREW-IN TOOLS

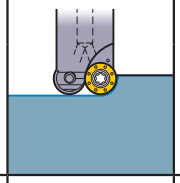
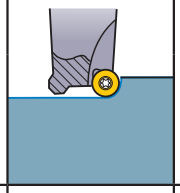
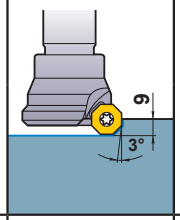
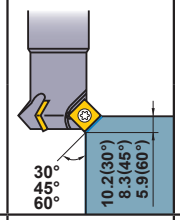
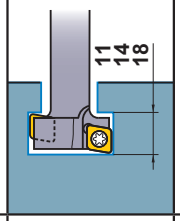
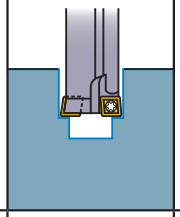
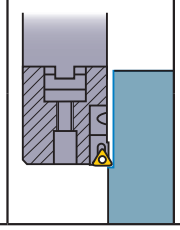
Product Name • Shape	Corner Angle, Max. Depth of Cut	Features
ASX400 MIRACLE SIGMA  L042		●High tolerance M-class inserts. ●Economical 4 cutting edge inserts. ●Curved cutting edge and high rigidity holder. ●Screw-on type. ●Max. depth of cut 10mm. **ϕ32, ϕ40**
APX3000 MIRACLE SIGMA  L048		●High accuracy, high quality vertical wall. ●Low cutting force insert. ●With through air & coolant holes. ●Max. depth of cut 10mm. **ϕ16 — ϕ40**
APX4000 MIRACLE SIGMA  L054		●High accuracy, high quality vertical wall. ●Low cutting force insert. ●With through air & coolant holes. ●Max. depth of cut 15mm. **ϕ25 — ϕ40**
AQX  L078		●The center bottom cutting edge enables drilling without previously formed hole. ●With through coolant holes. ●Max. depth of cut 7.4—18mm. **ϕ16 — ϕ40**
AJX MIRACLE SIGMA  L088		●13° and 15° positive inserts. ●High rigidity double clamp structure. ●Suitable for high feed machining. ●With through coolant holes. ●Special insert design with 3 cutting edges. **ϕ16 — ϕ40**

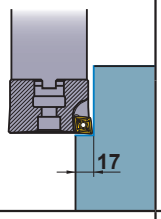
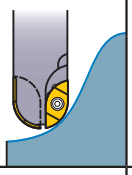
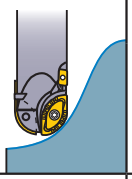
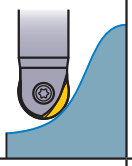
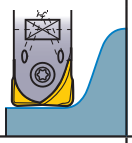
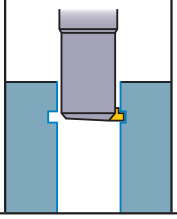
Product Name • Shape	Corner Angle, Max. Depth of Cut	Features
ARX  L099		●15°positive, high tolerance M-class insert. ●Effective for various machining applications. ●With through air & coolant holes. **ϕ16 — ϕ25**
SRF MIRACLE SIGMA  L121		●S-shaped cutting edge provides sharpness similar to that of solid ball nose end mills. ●Highly accurate corner radius tolerance allows for high precision finishing. ●Carbide shank type available. **ϕ16 — ϕ32**
SUF  L125		●Highly accurate corner radius tolerance allows for high precision finishing. ●Seamless gash. **ϕ16 — ϕ32**
SRM2  L130		●Suitable for roughing to semi-finishing of small and medium moulds. ●High rigidity body design. ●Low resistance chipbreaker. ●Through coolant hole type. **ϕ16 — ϕ32**
PMC  L140		●For under-cutting trimmed part of press mould. ●2 directional cutting with large overhang. **ϕ25 — ϕ40**

CLASSIFICATION

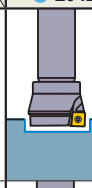
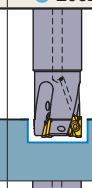
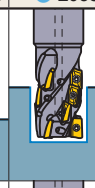
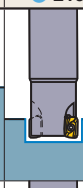
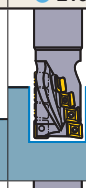
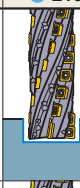
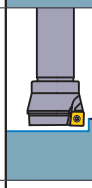
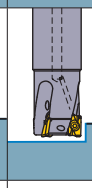
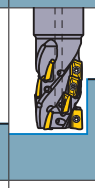
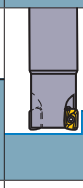
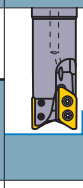
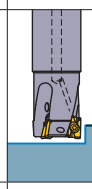
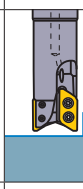
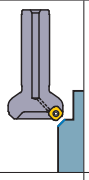
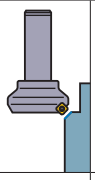
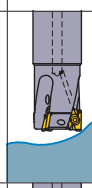
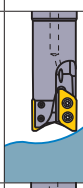
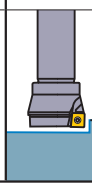
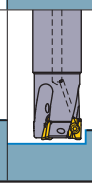
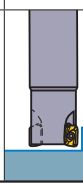
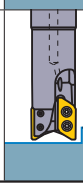
Product Name • Shape	Corner Angle, Max. Depth of Cut	Features
ASX400 MIRACLE SIGMA  L042		●High tolerance M-class inserts. ●Economical 4 cutting edge inserts. ●Curved cutting edge and high rigidity holder. ●Screw-on type. ●Max. depth of cut 10mm. **ϕ40 — ϕ80**
AXD4000 MIRACLE SIGMA **AXD7000**  L060 L066		●Low resistance chipbreaker. ●Low resistance insert and high rigidity design for excellent performance. ●For high-speed machining. ●Multi-functional machining. ●Max. depth of cut 15.5, 21mm **ϕ25, ϕ32, ϕ40**
BXD4000  L074		●Curved cutting edge and high rigidity holder produce high wall accuracy. ●Low resistance insert and high rigidity design for excellent performance. ●With through coolant holes to ensure smooth chip discharge. ●For high-speed machining. ●Max. depth of cut 15mm. **ϕ20 — ϕ40**
APX3000  L046		●High accuracy, high quality vertical wall. ●Low cutting force insert. ●With through air & coolant holes. ●Max. depth of cut 10mm. **ϕ12 — ϕ63**
APX4000 MIRACLE SIGMA **APX4000** **Long Cutting Edge**  L052 L058		●High accuracy, high quality vertical wall. ●Low cutting force insert. ●With through air & coolant holes. ●Max. depth of cut 15mm. **ϕ25 — ϕ63**
BAP300 **BAP300 Long Cutting Edge**  L153 L156		●11° positive insert. ●Inserts with wiper edges produce optimal finished surface. ●Multi insert design for high feed machining. BAP300 **ϕ10 — ϕ63** BAP300 Long Cutting Edge **ϕ20 — ϕ40**
SPX  L108		●Low cutting resistance due to the use of wavy inserts. ●Suitable for heavy cutting due to holder rigidity. **ϕ50**

Product Name • Shape	Corner Angle, Max. Depth of Cut	Features
VFX5 MIRACLE SIGMA  L114		●High performance titanium alloy milling. ●High rigidity design. ●Highly reliable clamping mechanism. **ϕ40 — ϕ80**
VFX6 MIRACLE SIGMA  L117		●Vertical inserts with high strength cutting edge. ●Screw-on type. ●High efficiency milling titanium alloys. **ϕ63 — ϕ100**
WSX445 MIRACLE SIGMA NEW  L012		●Unique design both sides insert ●Sudden fracture & welding prevention function ●Highly efficient chip discharge **ϕ40, ϕ50**
ASX445 MIRACLE SIGMA  L020		●Precision inexpensive moulded type 20°positive insert. ●Screw-on type. ●A wide range of chip breakers. ●High rigidity due to carbide shim. ●Max. depth of cut 6mm. **ϕ50 — ϕ80**
AOX445  L032		●Solid CBN octagonal double sided insert. ●Economical 16 cutting edge inserts. (when the depth of cut is 3mm) ●For high efficiency roughing through to finishing. ●Easy operation and cleansing.
AQX  L076		●The center bottom cutting edge enables drilling without previously formed hole. ●With through coolant holes. ●Max. depth of cut Standard Edge Type=55mm Short Edge Type=23mm **ϕ16 — ϕ50**
AJX MIRACLE SIGMA  L086		●13° and 15° positive inserts. ●High rigidity double clamp structure. ●Suitable for high feed machining. ●With through coolant holes. ●Special insert design with 3 cutting edges. **ϕ16 — ϕ63**

Product Name • Shape	Corner Angle, Max. Depth of Cut	Features
ARX  L098		●15°positive, high tolerance M-class insert. ●Effective for various machining applications. ●With through air & coolant holes. **ϕ10 – ϕ25**
BRP  L102		●11°positive insert. ●Round shape insert with a strong cutting edge. ●Wide range of tools available. ●Suitable for mould machining. **ϕ12 – ϕ63**
OCTACUT  L094		●20°positive insert. ●For octagonal and round type inserts. ●Multi-functional machining. **ϕ32 – ϕ63**
CESP•CFSP•CGSP  L113		●Covers 5 cutting modes. ●Excellent sharpness with 11°positive inserts. ●30°, 45° and 60° chamfer series. **ϕ4 – ϕ32**
TSMP  L136		●T-groove order number 14, 18 and 22 are available. ●86° rhombic shape 11° positive insert. ●Shoulder milling and inversed spot facing are also possible. **ϕ25 – ϕ40**
CBJP•CBMP  L137		●Capable of spot facing machining, boring and interpolation. ●For seat machining of hexagon socket head bolt (M8-M30). ●86°rhombic shape 11°positive insert. **ϕ14 – ϕ48**
PMF  L142		●2 directional cutting with large overhang. ●Excellent straightness. ●Excellent wall accuracy. **ϕ50 – ϕ80**

Product Name • Shape	Corner Angle, Max. Depth of Cut	Features
PMR  L143		●2 directional cutting with large overhang. ●Horizontal feed cutting and oblique cutting are also possible. ●Unique shape of curved edge gives high rigidity and low resistance. **ϕ50 – ϕ80**
SRM2  L128		●Suitable for roughing to semi-finishing of small and medium moulds. ●High rigidity body design. ●Low resistance chipbreaker. ●Through coolant hole type. **ϕ16 – ϕ30**
SRM2ϕ40/ϕ50  L134		●Best for roughing of moulds. ●Low resistance chipbreaker. ●Highly rigid body. **ϕ40, ϕ50**
SRF MIRACLE SIGMA  L120		●S-shaped cutting edge provides sharpness similar to that of solid ball nose end mills. ●Highly accurate corner radius tolerance allows for high precision finishing. ●Carbide shank type available. **ϕ10 – ϕ32**
SUF  L124		●Highly accurate corner radius tolerance allows for high precision finishing. ●Seamless gash. **ϕ10 – ϕ32**
KSMG  L138		●Side face grooving tool for machining centers. ●The minimum cutting diameter is ϕ25mm for internal grooving. ●For groove widths of 1.25mm – 6.0mm. **ϕ25, ϕ40**

CLASSIFICATION

Product Name / Cutting Mode	ASX400	APX3000 APX4000	APX4000	BAP300	BAP300 Long Cutting Edge	AXD4000 AXD7000	BXD4000	VFX5 VFX6	SPX	WSX445 NEW	ASX445	AOX445
												
	➲ L042	➲ L046 ➲ L052	➲ L058	➲ L153	➲ L156	➲ L060 ➲ L066	➲ L074	➲ L114 ➲ L117	➲ L108	➲ L012	➲ L020	➲ L032
Slot Milling												
Shoulder Milling												
Spot Milling												
Pocket Milling												
Chamfer Milling												
Radius Milling												
Drilling												
Copy Milling												
Face Milling												

MILLING

AQX MULTI FUNCTIONAL TYPE	AJX MULTI FUNCTIONAL TYPE	ARX MULTI FUNCTIONAL TYPE	BRP MULTI FUNCTIONAL TYPE	OCTACUT	CESP CFSP CGSP	TSMP	CBJP CBMP	PMF PMR PMC	SRM2	SRF	SUF	KSMG
												
➔ L076	➔ L086	➔ L098	➔ L102	➔ L094	➔ L113	➔ L136	➔ L137	➔ L142 ➔ L143 ➔ L140	➔ L128 ➔ L134	➔ L120	➔ L124	➔ L138

FACE MILLING
<GENERAL CUTTING>

45° Finishing Roughing

WSX445 NEW

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal	Heat Resistant Alloy	Hardened Steel



- Unique design both sides insert
- Sudden fracture & welding prevention function
- Highly efficient chip discharge

Fig.1

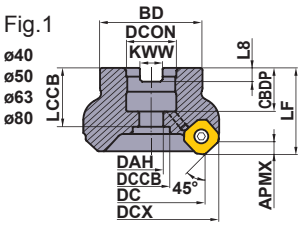


Fig.2

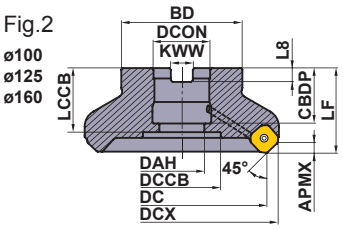
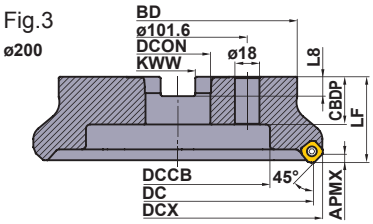


Fig.3



ARBOR TYPE

KAPR :45°
GAMP:+17° T :-7°—-2°
GAMF :-6°—+1° I :+16°—+19°

Right hand tool holder only.

Type	Order Number	Stock R	Coolant Hole	Number of Teeth	Dimensions (mm) DC	DCX	LF	DCON	CBDP	DAH	DCCB	LCCB	BD	KWW	L8	WT* (kg)	APMX (mm)	Type (Fig.)
Coarse Pitch	**WSX445-040A03AR**	●	○	3	40	52.8	40	16	18	9	14	25	37	8.4	5.6	0.3	5	1
	WSX445**-050A03AR**	●	○	3	50	62.9	40	22	20	11	17	27	47	10.4	6.3	0.5	5	1
	WSX445**-063A04AR**	●	○	4	63	75.9	40	22	20	11	17	27	50	10.4	6.3	0.6	5	1
	WSX445**R08004CA**	●	○	4	80	92.9	50	25.4	26	13	20	34	56	9.5	6	1.3	5	1
	WSX445**R10005DA**	●	○	5	100	112.9	50	31.75	32	26	45	37	70	12.7	8	1.8	5	2
	WSX445**R12506EA**	●	○	6	125	137.9	63	38.1	36	30	56	42	80	15.9	10	3.2	5	2
	WSX445**R16007FA**	●	○	7	160	172.9	63	50.8	38	40	72	45	100	19.14	11	4.9	5	2
	WSX445**R20008KN**	●	—	8	200	212.9	63	47.625	35	—	135	—	175	25.4	14.22	8.7	5	3
Fine Pitch	**WSX445-040A04AR**	●	○	4	40	52.8	40	16	18	9	14	25	37	8.4	5.6	0.3	5	1
	WSX445**-050A04AR**	●	○	4	50	62.9	40	22	20	11	17	27	47	10.4	6.3	0.4	5	1
	WSX445**-063A05AR**	●	○	5	63	75.9	40	22	20	11	17	27	50	10.4	6.3	0.6	5	1
	WSX445**R08006CA**	●	○	6	80	92.9	50	25.4	26	13	20	34	56	9.5	6	1.2	5	1
	WSX445**R10007DA**	●	○	7	100	112.9	50	31.75	32	26	45	37	70	12.7	8	1.7	5	2
	WSX445**R12508EA**	●	○	8	125	137.9	63	38.1	36	30	56	42	80	15.9	10	3.1	5	2
	WSX445**R16010FA**	●	○	10	160	172.9	63	50.8	38	40	72	45	100	19.1	11	4.8	5	2
	WSX445**R20012KN**	●	—	12	200	212.9	63	47.625	35	—	135	—	175	25.4	14.22	8.6	5	3
Extra Fine Pitch	**WSX445-050A05AR**	●	○	5	50	62.9	40	22	20	11	17	27	47	10.4	6.3	0.4	5	1
	WSX445**-063A06AR**	●	○	6	63	75.9	40	22	20	11	17	27	50	10.4	6.3	0.6	5	1
	WSX445**R08008CA**	●	○	8	80	92.9	50	25.4	26	13	20	34	56	9.5	6	1.1	5	1
	WSX445**R10010DA**	●	○	10	100	112.9	50	31.75	32	26	45	37	70	12.7	8	1.6	5	2
	WSX445**R12512EA**	●	○	12	125	137.9	63	38.1	36	30	56	42	80	15.9	10	3.0	5	2
	WSX445**R16016FA**	●	○	16	160	172.8	63	50.8	38	40	72	45	100	19.1	11	4.6	5	2
	WSX445**R20020KN**	●	—	20	200	212.8	63	47.625	35	—	135	—	175	25.4	14.22	8.4	5	3

(Note) A set bolt to the arbor is not supplied with the body. Please refer to page L012, when ordering.

* WT : Tool Weight

SPARE PARTS

Tool Holder Number	 * Clamp Screw	 Wrench (Insert)
WSX445	TPS4R	TIP15W

* Clamp Torque (N • m) : TPS4R=3.5

● : Inventory maintained in Japan.

For metric arbors

The cutter bore diameter DCON is indicated in millimetre.



Fig.1 ø40 ø50 ø63 ø80

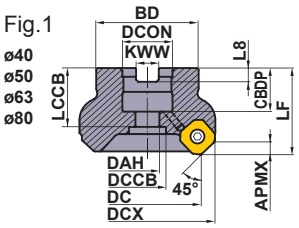


Fig.2 ø100 ø125

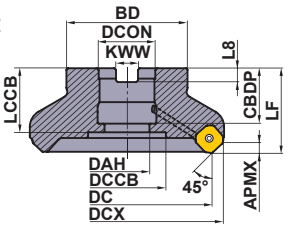


Fig.3 ø160

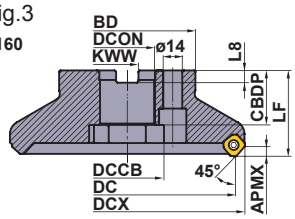
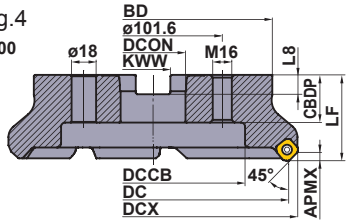


Fig.4 ø200



Right hand tool holder only.

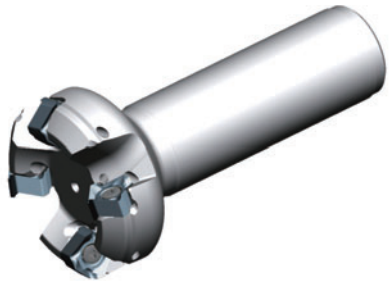
ARBOR TYPE

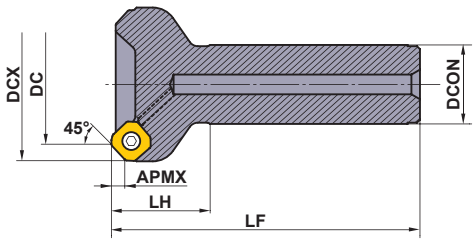
KAPR :45°
GAMP:+17° T :-7°—-2°
GAMF:-6°—+1° I :+16°—+19°

Type	Order Number	Stock R	Coolant Hole	Number of Teeth	Dimensions (mm) DC	DCX	LF	DCON	CBDP	DAH	DCCB	LCCB	BD	KWW	L8	WT* (kg)	APMX (mm)	Type (Fig.)
Coarse Pitch	**WSX445-040A03AR**	●	○	3	40	52.8	40	16	18	9	14	25	37	8.4	5.6	0.3	5	1
	WSX445-**050A03AR**	●	○	3	50	62.9	40	22	20	11	17	27	47	10.4	6.3	0.5	5	1
	WSX445-**063A04AR**	●	○	4	63	75.9	40	22	20	11	17	27	50	10.4	6.3	0.6	5	1
	WSX445-**080A04AR**	●	○	4	80	92.9	50	27	23	13	20	34	56	12.4	7	1.3	5	1
	WSX445-**100B05AR**	●	○	5	100	112.9	50	32	26	26	45	32	78	14.4	8	1.9	5	2
	WSX445-**125B06AR**	●	○	6	125	137.9	63	40	28	30	56	40	89	16.4	9	3.4	5	2
	WSX445-**160C07NR**	●	–	7	160	172.9	63	40	40	–	56	–	100	16.4	9	4.9	5	3
	WSX445-**200C08NR**	●	–	8	200	212.9	63	60	32	–	135	–	160	25.7	14.22	7.5	5	4
Fine Pitch	**WSX445-040A04AR**	●	○	4	40	52.8	40	16	18	9	14	25	37	8.4	5.6	0.3	5	1
	WSX445-**050A04AR**	●	○	4	50	62.9	40	22	20	11	17	27	47	10.4	6.3	0.4	5	1
	WSX445-**063A05AR**	●	○	5	63	75.9	40	22	20	11	17	27	50	10.4	6.3	0.6	5	1
	WSX445-**080A06AR**	●	○	6	80	92.9	50	27	23	13	20	34	56	12.4	7	1.2	5	1
	WSX445-**100B07AR**	●	○	7	100	112.9	50	32	26	26	45	32	78	14.4	8	1.9	5	2
	WSX445-**125B08AR**	●	○	8	125	137.9	63	40	28	30	56	40	89	16.4	9	3.4	5	2
	WSX445-**160C10NR**	●	–	10	160	172.9	63	40	40	–	56	–	100	16.4	9	4.8	5	3
	WSX445-**200C12NR**	●	–	12	200	212.9	63	60	32	–	135	–	160	25.7	14.22	7.4	5	4
Extra Fine Pitch	**WSX445-050A05AR**	●	○	5	50	62.9	40	22	20	11	17	27	47	10.4	6.3	0.4	5	1
	WSX445-**063A06AR**	●	○	6	63	75.9	40	22	20	11	17	27	50	10.4	6.3	0.6	5	1
	WSX445-**080A08AR**	●	○	8	80	92.9	50	27	23	13	20	34	56	12.4	7	1.1	5	1
	WSX445-**100B10AR**	●	○	10	100	112.9	50	32	26	26	45	32	78	14.4	8	1.8	5	2
	WSX445-**125B12AR**	●	○	12	125	137.9	63	40	28	30	56	40	89	16.4	9	3.2	5	2
	WSX445-**160C16NR**	●	–	16	160	172.8	63	40	40	–	56	–	100	16.4	9	4.6	5	3
	WSX445-**200C20NR**	●	–	20	200	212.8	63	60	32	–	135	–	160	25.7	14.22	7.2	5	4

(Note) A set bolt to the arbor is not supplied with the body. Please refer to page L012, when ordering.

* WT : Tool Weight





Right hand tool holder only.

SHANK TYPE

Type	Order Number	Stock R	Coolant Hole	Number of Teeth	Dimensions (mm) DC	DCX	LF	DCON	LH	WT* (kg)	APMX (mm)
Coarse Pitch	**WSX445R4003SA32M**	●	○	3	40	52.8	125	32	40	0.8	5
	WSX445R**5003SA32M**	●	○	3	50	62.9	125	32	40	1.0	5
	WSX445R**6304SA32M**	●	○	4	63	75.9	125	32	40	1.2	5
	WSX445R**8004SA32M**	●	○	4	80	92.9	125	32	40	1.6	5
Fine Pitch	**WSX445R4004SA32M**	●	○	4	40	52.8	125	32	40	0.8	5
	WSX445R**5004SA32M**	●	○	4	50	62.9	125	32	40	1.0	5
	WSX445R**6305SA32M**	●	○	5	63	75.9	125	32	40	1.2	5
	WSX445R**8006SA32M**	●	○	6	80	92.9	125	32	40	1.5	5

* WT : Tool Weight

SPARE PARTS

Tool Holder Number	 * Clamp Screw	 Wrench (Insert)
WSX445	TPS4R	TIP15W

* Clamp Torque (N • m) : TPS4R=3.5

SET BOLT (SOLD SEPARATELY)

Arbor Type	Set Bolt: With coolant hole Order Number	Set Bolt: Without coolant hole Order Number	Type	Reference Dimensions (mm) a	b	c	d	e	f	g	Geometry
WSX445-040A○○AR	HSC08025H	HSC08040	1	13	M8×1.25	33	8	5	–	–	Fig.1
WSX445-**050A○○AR**	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	–	–	
WSX445-**063A○○AR**	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	–	–	
WSX445-**080A○○AR**	HSC12035H	HSC12035 HSC12045	1	18	M12×1.75	47 57	12	10	–	–	
WSX445-**100B○○AR**	MBA16033H	—	2	40	M16×2	43	10	14	6	23	
WSX445-**125B○○AR**	MBA20040H	—	2	50	M20×2.5	54	14	17	6	27	
WSX445-**160C○○NR**	No coolant hole	—	2	50	M20×2.5	54	14	17	6	27	Fig.2
WSX445-**200C○○NR**	No coolant hole	—	1	24	M16×2	43	16	14	6	23	
WSX445R080○○CA	HSC12035H	HSC12035 HSC12045	1	18	M12×1.75	47 57	12	10	–	–	
WSX445R**100○○DA**	MBA16033H	—	2	40	M16×2	43	10	14	6	23	
WSX445R**125○○EA**	MBA20040H	—	2	50	M20×2.5	54	14	17	6	27	
WSX445R**160○○FA**	MBA24045H	—	2	65	M24×3	59	14	17	10	37	
WSX445R**200○○KN**	No coolant hole	—	2	24	M16×2	43	16	14	–	–	

(Note 1) Internal coolant is necessary with the set bolt.

"Confirmation method" (See the figure at the right.)

① Cutting dimensions "DAH" and "DCCB" shall be larger than bore diameters "ϕa" and "ϕg".

② Cutting dimension "LF-LCCB" shall be larger than bolt dimension "d".

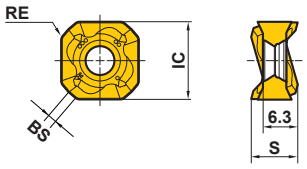
● : **Inventory maintained in Japan. (10 inserts in one case)**

INSERTS WITH BREAKER

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	
H	Hardened Steel	

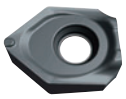
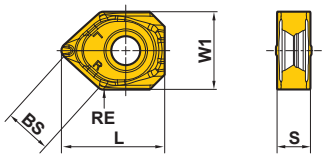
Cutting Conditions :
● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting

Honing : **E :** Round **F :** Sharp

Shape	Order Number	Class	Honing	Coated							Carbide		Dimensions (mm)				Geometry
				MC5020	MP6120	MP6130	MP7130	MP9120	VP15TF	VP20RT	TF15		IC	S	BS	RE	
NEW 	**SNGU140812ANFR-L**	G	F								●		14	8.4	1.5	1.2	
	SNGU140812ANER-L	G	E		●	●	●	●	●	●			14	8.4	1.5	1.2	
	SNGU140812ANER-M	G	E		●	●	●	●	●	●			14	8.4	1.5	1.2	
	SNMU140812ANER-M	M	E	●	●	●	●	●	●	●			14	8.4	1.5	1.2	
	SNMU140812ANER-R	M	E	●	●	●			●	●			14	8.4	1.5	1.2	
	SNMU140812ANER-H	M	E	●	●	●			●	●			14	8.4	1.5	1.2	

■ = MIRACLE SIGMA

WIPER INSERTS

Shape	Order Number	Class	Honing	Coated		Dimensions (mm)					Geometry
				MP6120	VP15TF	L	W1	S	BS	RE	
NEW 	**WNGU1406ANEN8C-M**	G	E	●	●	18.1	14	6	8	1.0	

■ = MIRACLE SIGMA

RECOMMENDED CUTTING CONDITIONS

Dry cutting

	Work Material	Hardness	Grade	vc (m/min)	Finish—Light Cutting L, M Breaker		Light—Rough Cutting M, R Breaker		Medium—Heavy Cutting R, H Breaker	
					fz (mm/t.)	ap (mm)	fz (mm/t.)	ap (mm)	fz (mm/t.)	ap (mm)
P	Mild Steel (ASTM A36, AISI 1010)	≤180HB	**MP6120 VP15TF**	250 (200—300)	0.15 (0.1—0.2)	≤3.0	0.2 (0.15—0.25)	≤4.0	0.25 (0.2—0.3)	≤5.0
			MP6130 VP20RT	240 (190—290)	0.15 (0.1—0.2)	≤3.0	0.2 (0.15—0.25)	≤4.0	0.25 (0.2—0.3)	≤5.0
	Carbon Steel Alloy Steel (AISI 1045, AISI 4140, AISI 4340)	180—350HB	**MP6120 VP15TF**	220 (170—270)	0.15 (0.1—0.2)	≤3.0	0.2 (0.15—0.25)	≤4.0	0.25 (0.2—0.3)	≤5.0
			MP6130 VP20RT	200 (150—250)	0.15 (0.1—0.2)	≤3.0	0.2 (0.15—0.25)	≤4.0	0.25 (0.2—0.3)	≤5.0
	Alloy Steel Pre-Hardened Steel (AISI D2, SKD61, SKT4, AISI P21, AISI P20)	35—45HRC	**MP6120 VP15TF**	140 (100—180)	0.15 (0.1—0.2)	≤2.0	0.2 (0.15—0.25)	≤4.0	0.25 (0.2—0.3)	≤5.0
			MP6130 VP20RT	120 (90—150)	0.15 (0.1—0.2)	≤2.0	0.2 (0.15—0.25)	≤4.0	0.25 (0.2—0.3)	≤5.0
M	Austenitic Stainless Steel Ferritic and Martensitic Stainless Steel (AISI 304, AISI 316) (AISI 410, AISI 430, AISI 431, AISI 420)	—	**MP7130 VP15TF VP20RT**	200 (150—250)	0.15 (0.1—0.2)	≤2.0	0.2 (0.15—0.25)	≤3.0	—	—
	Austenitic Stainless Steel (AISI 304LN, AISI 316LN)	>200HB	**MP7130 VP15TF VP20RT**	170 (120—220)	0.15 (0.1—0.2)	≤2.0	0.2 (0.15—0.25)	≤3.0	—	—
	Two-phase Stainless Steel (AISI 329)	≤280MPa	**MP7130 VP15TF VP20RT**	160 (110—210)	0.15 (0.1—0.2)	≤2.0	0.2 (0.15—0.25)	≤3.0	—	—
	Hardened Stainless Steel (AISI 630, AISI 631)	<450HB	**MP7130 VP15TF VP20RT**	150 (100—200)	0.15 (0.1—0.2)	≤2.0	0.2 (0.15—0.25)	≤3.0	—	—
K	Gray Cast Iron (FC300)	Tensile Strength ≤350MPa	**MC5020**	220 (200—270)	0.15 (0.1—0.2)	≤3.0	0.2 (0.15—0.25)	≤4.0	0.25 (0.2—0.3)	≤5.0
			VP15TF VP20RT	180 (130—250)	0.15 (0.1—0.2)	≤3.0	0.2 (0.15—0.25)	≤4.0	0.25 (0.2—0.3)	≤5.0
	Ductile Cast Iron (FCD700)	Tensile Strength ≤800MPa	**MC5020**	200 (180—250)	0.15 (0.1—0.2)	≤3.0	0.2 (0.15—0.25)	≤4.0	0.25 (0.2—0.3)	≤5.0
			VP15TF VP20RT	160 (110—240)	0.15 (0.1—0.2)	≤3.0	0.2 (0.15—0.25)	≤4.0	0.25 (0.2—0.3)	≤5.0
H	Hardened Steel (AISI H13, JIS SKT4)	40—55HRC	**VP15TF**	50 (30—70)	0.05 (0.05—0.1)	≤1.5	0.1 (0.05—0.15)	≤2.0	—	—

* Refer to the table above and set the cutting conditions to match the application.
* Wet cutting is recommended, when focusing on the surface finish. (Life is lower than dry cutting.)

Wet cutting

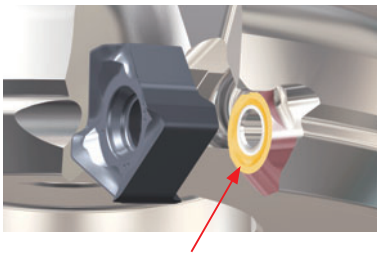
	Work Material	Hardness	Grade	vc (m/min)	Finish—Light Cutting L, M Breaker		Light—Rough Cutting M, R Breaker		Medium—Heavy Cutting R, H Breaker	
					fz (mm/t.)	ap (mm)	fz (mm/t.)	ap (mm)	fz (mm/t.)	ap (mm)
P	Mild Steel (ASTM A36, AISI 1010)	≤180HB	**MP6120 VP15TF** / **MP6130 VP20RT**	150 (100—200)	0.15 (0.1—0.2)	≤3.0	0.2 (0.15—0.25)	≤4.0	0.25 (0.2—0.3)	≤5.0
P	Carbon Steel Alloy Steel (AISI 1045, AISI 4140, AISI 4340)	180—350HB	**MP6120 VP15TF** / **MP6130 VP20RT**	120 (80—160)	0.15 (0.1—0.2)	≤3.0	0.2 (0.15—0.25)	≤4.0	0.25 (0.2—0.3)	≤5.0
P	Alloy Steel Pre-Hardened Steel (AISI D2, SKD61, SKT4, AISI P21, AISI P20)	35—45HRC	**MP6120 VP15TF** / **MP6130 VP20RT**	100 (80—120)	0.15 (0.1—0.2)	≤2.0	0.2 (0.15—0.25)	≤4.0	0.25 (0.2—0.3)	≤5.0
M	Austenitic Stainless Steel Ferritic and Martensitic Stainless Steel (AISI 304, AISI 316) (AISI 410, AISI 430, AISI 431, AISI 420)	—	**MP7130 VP15TF VP20RT**	130 (80—180)	0.15 (0.1—0.2)	≤2.0	0.2 (0.15—0.25)	≤3.0	—	—
M	Austenitic Stainless Steel (AISI 304LN, AISI 316LN)	>200HB	**MP7130 VP15TF VP20RT**	100 (80—150)	0.15 (0.1—0.2)	≤2.0	0.2 (0.15—0.25)	≤3.0	—	—
M	Two-phase Stainless Steel (AISI 329)	≤280MPa	**MP7130 VP15TF VP20RT**	100 (80—150)	0.15 (0.1—0.2)	≤2.0	0.2 (0.15—0.25)	≤3.0	—	—
M	Hardened Stainless Steel (AISI 630, AISI 631)	<450HB	**MP7130 VP15TF VP20RT**	90 (50—140)	0.15 (0.1—0.2)	≤2.0	0.2 (0.15—0.25)	≤3.0	—	—
K	Gray Cast Iron (FC300)	≤350MPa	**MC5020**	180 (160—200)	0.15 (0.1—0.2)	≤3.0	0.2 (0.15—0.25)	≤4.0	0.25 (0.2—0.3)	≤5.0
K			**VP15TF VP20RT**	130 (100—160)	0.15 (0.1—0.2)	≤3.0	0.2 (0.15—0.25)	≤4.0	0.25 (0.2—0.3)	≤5.0
K	Ductile Cast Iron (FCD700)	≤800MPa	**MC5020**	180 (160—200)	0.15 (0.1—0.2)	≤3.0	0.2 (0.15—0.25)	≤4.0	0.25 (0.2—0.3)	≤5.0
K			**VP15TF VP20RT**	110 (80—140)	0.15 (0.1—0.2)	≤3.0	0.2 (0.15—0.25)	≤4.0	0.25 (0.2—0.3)	≤5.0
N	Aluminium Alloy	—	**TF15**	300—	0.2 (0.1—0.3)	≤5.0	—	—	—	—
S	Titanium Alloy (Ti-6Al-4V)	—	**MP9120 VP15TF VP20RT**	50 (40—60)	0.05 (0.05—0.1)	≤1.5	0.1 (0.05—0.15)	≤2.0	—	—
S	Heat Resistant Alloy (Inconel®718)	—	**MP9120 VP15TF VP20RT**	40 (20—50)	0.05 (0.05—0.1)	≤1.5	0.1 (0.05—0.15)	≤2.0	—	—
H	Hardened Steel (AISI H13, JIS SKT4)	40—55HRC	**VP15TF**	50 (30—70)	0.05 (0.05—0.1)	≤1.5	0.1 (0.05—0.15)	≤2.0	—	—

* Refer to the table above and set the cutting conditions to match the application.
* Wet cutting is recommended, when focusing on the surface finish. (Life is lower than dry cutting.)

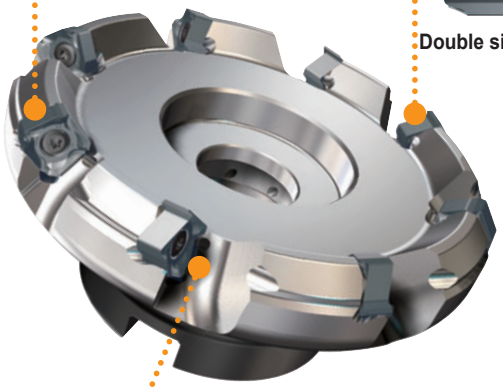
FEATURES

Conical seating surface prevents insert breakage

Anti Fly Insert (AFI) and conical insert seat hold the insert securely and prevent damage to the seat and body even if sudden fracture occured. The thick insert eliminates the need of shim.



Anti Fly Insert mechanism (AFI)



Extremely quiet, fly-free insert



Double sided, Z Geometry

Mitsubishi Materials' proprietary "Double sided, Z Geometry" insert features a low resistance and sharp cutting edge while being a negative (double sided) insert.

Coolant holes

Improves chip discharge and prevents chip welding

* Not applicable to some carbides
* Purchase the set bolt separately when using internal coolant.

WSX445



Excellent cutting edge sharpness

Unique double sided finished

(4 corners X 2)

* Rake angle when insert installed

BREAKER SYSTEM

Breaker series capable of various cutting

Focus on cutting edge sharpness ← Thin sheet, low rigidity — Interrupted cutting, with scale → Focus on cutting edge strength



L Breaker

Focus on cutting edge sharpness
Low resistance type
● Precision grinding

M Breaker

1st Recommendation
All-around
● General ungrounded precision
● Precision grinding (improved cutting surface)

R Breaker

Rough Cutting
Reinforced edge type
● General ungrounded precision

H Breaker

Heavy cutting and forced interrupted cutting
Reinforced edge type
● General ungrounded precision

Instructions for use of wiper inserts



Fig.1

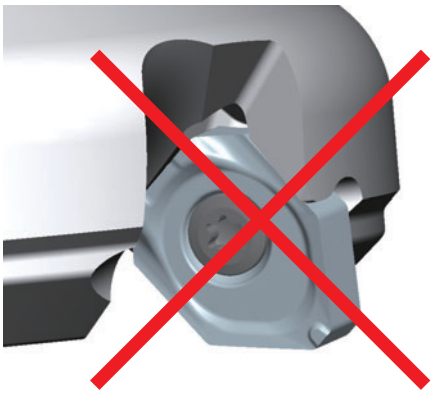


Fig.2

- These wiper inserts have 2 corners.
- Install the insert so that the cutting edge is located as shown in Fig.1.
  Do not install the wiper insert as shown in Fig.2. (The insert may be damaged by a too heavy cutting load.)
- Excellent finished surface can be obtained with one wiper insert.
- When the feed per revolution is larger than the width of the wiper edge, install 2 or more wiper inserts equally inside the cutting body.

FACE MILLING
<GENERAL CUTTING>

45° Finishing Roughing

ASX445

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal	Heat Resistant Alloy	Hardened Steel



- Precision inexpensive moulded type 20°positive insert.
- Screw-on type.
- A wide range of chip breakers.
- High rigidity due to carbide shim.

KAPR :45°
GAMP:+20°—+23° T :+4°49′—+9°53′
GAMF:-13°—-10° I :+22°55′—+23°02′

Fig.1 ø50 ø63

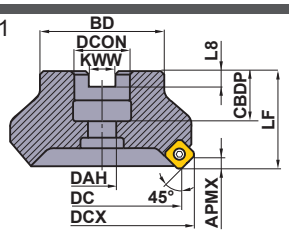


Fig.2 ø80 ø100 ø125 ø160

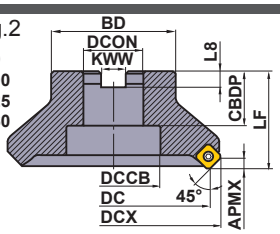


Fig.3 ø200 ø250

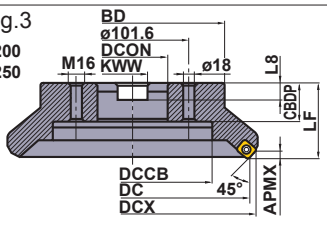
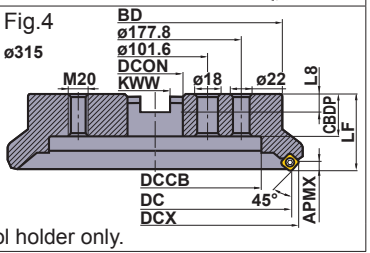


Fig.4 ø315

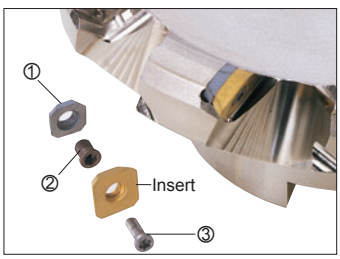


Right hand tool holder only.

ARBOR TYPE

Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	DCX	LF	DCON	CBDP	DAH	DCCB	BD	KWW	L8	WT* (kg)	APMX (mm)	Type (Fig.)
Coarse Pitch	ASX445-050A03R	●	3	50	63.0	40	22	20	11	—	45	10.4	6.3	0.5	6	1
	ASX445-063A04R	●	4	63	75.9	40	22	20	11	—	50	10.4	6.3	0.7	6	1
	ASX445R08004C	●	4	80	93.2	50	25.4	26	—	38	56	9.5	6	1.1	6	2
	ASX445R10005D	●	5	100	113.2	50	31.75	32	—	45	70	12.7	8	1.8	6	2
	ASX445R12506E	●	6	125	138.0	63	38.1	35	—	60	80	15.9	10	2.9	6	2
	ASX445R16007F	●	7	160	173.0	63	50.8	38	—	80	100	19.1	11	4.7	6	2
	ASX445R20008K	●	8	200	212.9	63	47.625	35	—	140	175	25.4	14.22	7.9	6	3
	ASX445R25010K	●	10	250	262.9	63	47.625	35	—	180	220	25.4	14.22	12.9	6	3
	ASX445R31514P	●	14	315	327.9	63	47.625	40	—	245	285	25.4	14.22	22.4	6	4
Fine Pitch	ASX445-050A04R	●	4	50	63.0	40	22	20	11	—	45	10.4	6.3	0.4	6	1
	ASX445-063A05R	●	5	63	75.9	40	22	20	11	—	50	10.4	6.3	0.6	6	1
	ASX445R08006C	●	6	80	93.2	50	25.4	26	—	38	56	9.5	6	1.0	6	2
	ASX445R10007D	●	7	100	113.2	50	31.75	32	—	45	70	12.7	8	1.7	6	2
	ASX445R12508E	●	8	125	138.0	63	38.1	35	—	60	80	15.9	10	2.8	6	2
	ASX445R16010F	●	10	160	173.0	63	50.8	38	—	80	100	19.1	11	4.6	6	2
	ASX445R20012K	●	12	200	212.9	63	47.625	35	—	140	175	25.4	14.22	7.8	6	3
	ASX445R25014K	●	14	250	262.9	63	47.625	35	—	180	220	25.4	14.22	12.8	6	3
	ASX445R31518P	●	18	315	327.9	63	47.625	40	—	245	285	25.4	14.22	22.2	6	4
Extra Fine Pitch	ASX445-050A05R	●	5	50	63.0	40	22	20	11	—	45	10.4	6.3	0.4	6	1
	ASX445-063A06R	●	6	63	75.9	40	22	20	11	—	50	10.4	6.3	0.6	6	1
	ASX445R08008C	●	8	80	93.2	50	25.4	26	—	38	56	9.5	6	1.1	6	2
	ASX445R10010D	●	10	100	113.2	50	31.75	32	—	45	70	12.7	8	1.8	6	2
	ASX445R12512E	●	12	125	138.0	63	38.1	35	—	60	80	15.9	10	2.9	6	2
	ASX445R16016F	●	16	160	173.0	63	50.8	38	—	80	100	19.1	11	4.7	6	2
	ASX445R20020K	●	20	200	212.9	63	47.625	35	—	140	175	25.4	14.22	7.8	6	3
	ASX445R25024K	●	24	250	262.9	63	47.625	35	—	180	220	25.4	14.22	12.8	6	3
	ASX445R31528P	●	28	315	327.9	63	47.625	40	—	245	285	25.4	14.22	21.8	6	4

* WT : Tool Weight



SPARE PARTS

Tool Holder Number	① Shim	② Shim Screw *	③ Clamp Screw *	Wrench (Insert)	Wrench (Shim)
ASX445	STASX445N	WCS503507H	TPS35	TIP15T	HKY35R

* Clamp Torque (N • m) : WCS503507H=5.0, TPS35=3.5

● : Inventory maintained in Japan.

Fig.1
ø50
ø63

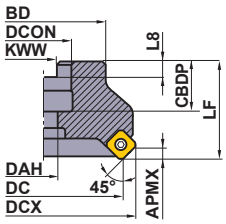


Fig.2
ø80
ø100

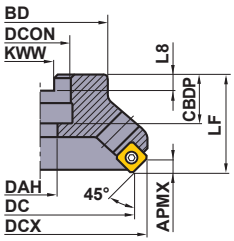
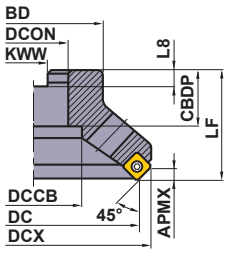


Fig.3
ø125



For metric arbor

The cutter bore diameter DCON is indicated in millimetre.



ø50, ø63



Over ø80

Fig.4
ø160

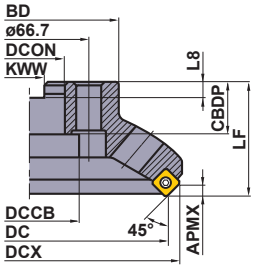
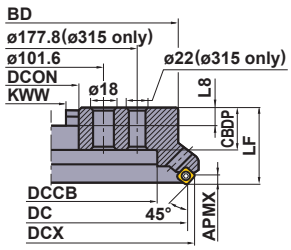


Fig.5
ø200
ø250
ø315



KAPR :45°
GAMP:+20°—+23° T :+4°49′—+9°53′
GAMF:-13°—-10° I :+22°55′—+23°02′

Right hand tool holder only.

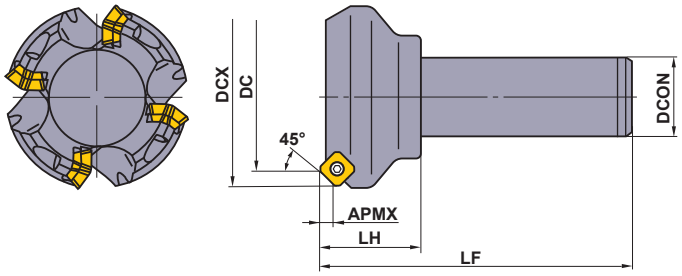
ARBOR TYPE

Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	DCX	LF	DCON	CBDP	DAH	DCCB	BD	KWW	L8	WT* (kg)	APMX (mm)	Type (Fig.)
Coarse Pitch	**ASX445-050A03R**	●	3	50	63.0	40	22	20	11	—	45	10.4	6.3	0.5	6	1
	ASX445-063A04R	●	4	63	75.9	40	22	20	11	—	50	10.4	6.3	0.7	6	1
	ASX445-080A04R	●	4	80	93.2	50	27	23	13	—	56	12.4	7	1.0	6	2
	ASX445-100A05R	●	5	100	113.2	50	32	26	17	—	70	14.4	8	1.6	6	2
	ASX445-125B06R	●	6	125	138.0	63	40	32	—	56	80	16.4	9	2.4	6	3
	ASX445-160C07R	●	7	160	173.0	63	40	29	—	56	100	16.4	9	3.9	6	4
	ASX445-200C08R	●	8	200	212.9	63	60	32	—	135	155	25.7	14.22	6.7	6	5
	ASX445-250C10R	●	10	250	262.9	63	60	32	—	174	200	25.7	14.22	10.5	6	5
	ASX445-315C14R	●	14	315	327.9	80	60	57	—	256.8	285	25.7	14.22	22.4	6	5
Fine Pitch	**ASX445-050A04R**	●	4	50	63.0	40	22	20	11	—	45	10.4	6.3	0.4	6	1
	ASX445-063A05R	●	5	63	75.9	40	22	20	11	—	50	10.4	6.3	0.6	6	1
	ASX445-080A06R	●	6	80	93.2	50	27	23	13	—	56	12.4	7	0.9	6	2
	ASX445-100A07R	●	7	100	113.2	50	32	26	17	—	70	14.4	8	1.5	6	2
	ASX445-125B08R	●	8	125	138.0	63	40	32	—	56	80	16.4	9	2.3	6	3
	ASX445-160C10R	●	10	160	173.0	63	40	29	—	56	100	16.4	9	3.6	6	4
	ASX445-200C12R	●	12	200	212.9	63	60	32	—	135	155	25.7	14.22	5.8	6	5
	ASX445-250C14R	●	14	250	262.9	63	60	32	—	174	200	25.7	14.22	10.6	6	5
	ASX445-315C18R	●	18	315	327.9	80	60	57	—	256.8	285	25.7	14.22	22.2	6	5
Extra Fine Pitch	**ASX445-050A05R**	●	5	50	63.0	40	22	20	11	—	45	10.4	6.3	0.4	6	1
	ASX445-063A06R	●	6	63	75.9	40	22	20	11	—	50	10.4	6.3	0.6	6	1
	ASX445-080A08R	●	8	80	93.2	50	27	23	13	—	56	12.4	7	0.9	6	2
	ASX445-100A10R	●	10	100	113.2	50	32	26	17	—	70	14.4	8	1.5	6	2
	ASX445-125B12R	●	12	125	138.0	63	40	32	—	56	80	16.4	9	2.3	6	3
	ASX445-160C16R	●	16	160	173.0	63	40	29	—	56	100	16.4	9	3.6	6	4
	ASX445-200C20R	●	20	200	212.9	63	60	32	—	135	155	25.7	14.22	6.5	6	5
	ASX445-250C24R	●	24	250	262.9	63	60	32	—	174	200	25.7	14.22	10.3	6	5
	ASX445-315C28R	●	28	315	327.9	80	60	57	—	256.8	285	25.7	14.22	21.8	6	5

* WT : Tool Weight

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

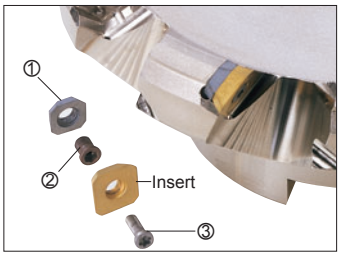




Right hand tool holder only.

SHANK TYPE

Order Number	Stock	Number of Teeth	Dimensions(mm)					APMX (mm)
	R		DC	DCX	LF	DCON	LH	
ASX445R503S32	●	3	50	63.0	125	32	40	6
ASX445R**634S32**	●	4	63	75.9	125	32	40	6
ASX445R**804S32**	●	4	80	93.2	125	32	40	6



SPARE PARTS

Tool Holder Number	① Shim	② Shim Screw *	③ Clamp Screw *	Wrench (Insert)	Wrench (Shim)
ASX445	STASX445N	WCS503507H	TPS35	TIP15T	HKY35R

* Clamp Torque (N • m) : WCS503507H=5.0, TPS35=3.5

Wrench	1. Wrench The ASX400 uses a TORXPLUS® clamp screw. The attached wrench is for the exclusive use of this screw. To ensure the effectiveness of TORXPLUS® only use the attached wrench. 2. Hexagonal wrench The attached hexagonal wrench is for use with the seat and the shim. The wrench size is 3.5mm.
Spare Parts	Only use the original parts that were supplied when purchased. If other parts are used the performance and safety can not be assured.

● : Inventory maintained in Japan. (10 inserts in one case) (CBN and PCD inserts are available in 1 piece in one case)

INSERTS WITH BREAKER

Work Material	
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-ferrous Metal
S	Heat-resistant Alloy, Titanium Alloy
H	Hardened Steel

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting

Honing :
E : Round F : Sharp
S : Chamfer + Hone T : Chamfer

Application	Shape	Order Number	Class	Honing	Coated F7030	Coated MC5020	Coated MP6120 (NEW)	Coated MP6130 (NEW)	Coated MP7130 (NEW)	Coated MP7140 (NEW)	Coated MP9120 (NEW)	Coated MP9130 (NEW)	Coated VP15TF	Coated VP30RT	Cermet NX4545	Carbide HTi10	IC	S	BS	RE	Geometry
Finish–Light Cutting	**JL** Breaker	**SEET13T3AGEN-JL**	E	E	●		●	●	●	●	●	●	●	●	●			13.4	3.97	1.9	1.5
Light–Rough Cutting	**JM** Breaker	**SEMT13T3AGSN-JM**	M	S	●	●	●	●	●	●	●	●	●	●	●			13.4	3.97	1.9	1.5
Medium–Heavy Cutting	**JH** Breaker	**SEMT13T3AGSN-JH**	M	S	●	●	●	●	●	●	●	●	●	●				13.4	3.97	1.9	1.5
Roughing For Cast Iron	**FT** Breaker	**SEMT13T3AGSN-FT**	M	S		●												13.4	3.97	1.9	1.5
For Aluminium Alloy	**JP** Breaker	**SEGT13T3AGFN-JP**	G	F													●	13.4	3.97	2.2	–

■ = MIRACLE SIGMA

Instructions for use of the JP breaker

* The JP breaker has sharp cutting edges.
  Wear gloves when handling.
* When machining aluminium alloy, welding to the cutting edge tends to occur, often leading to insert failure. To prevent this, wet cutting is recommended.

WIPER INSERTS

Shape	Order Number	Honing	Coated MC5020	Coated VP15TF	Cermet NX2525	Coated Cermet VP25N	Carbide HTi05T	CBN MB710	PCD MD220	L	W1	S	BS	RE	Geometry
	WEEW13T3AGER8C	E	●	●			●			16.48	16.60	3.97	7.5	1.5	
	WEEW13T3AGTR8C	T			●	●				16.48	16.60	3.97	7.5	1.5	
	WEEW13T3AGFR3C	F							●	16.48	16.60	3.97	3.0	1.5	
	WEEW13T3AGTR3C	T						●		16.48	16.60	3.97	3.0	1.5	

*Wiper inserts are single-cornered.
*CBN grade MB710 is for cast iron.
*PCD grade MD220 is for aluminum alloy.
*Please refer to page L023 for notes when using wiper insert.

MILLING

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Finish—Light Cutting		Light—Rough Cutting		Medium—Heavy Cutting	
					Feed per Tooth (mm/t.)	Breaker	Feed per Tooth (mm/t.)	Breaker	Feed per Tooth (mm/t.)	Breaker
P	Mild Steel	≤180HB	**F7030**	280 (210—350)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	0.3 (0.2—0.4)	**JH**
			MP6120 VP15TF	250 (200—300)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	0.3 (0.2—0.4)	**JH**
			MP6130	240 (190—290)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	0.3 (0.2—0.4)	**JH**
			VP30RT	230 (180—280)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	0.3 (0.2—0.4)	**JH**
			NX4545	180 (130—230)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	—	—
	Carbon Steel Alloy Steel	180—280HB	**F7030**	250 (200—300)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	0.3 (0.2—0.4)	**JH**
			MP6120 VP15TF	220 (170—270)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	0.3 (0.2—0.4)	**JH**
			MP6130	200 (150—230)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	0.3 (0.2—0.4)	**JH**
			VP30RT	150 (120—180)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	0.3 (0.2—0.4)	**JH**
			NX4545	150 (120—180)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	—	—
		280—350HB	**F7030**	180 (130—230)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	0.3 (0.2—0.4)	**JH**
			MP6120 VP15TF	140 (100—180)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	0.3 (0.2—0.4)	**JH**
			MP6130	120 (90—150)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	0.3 (0.2—0.4)	**JH**
			VP30RT	100 (80—160)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	0.3 (0.2—0.4)	**JH**
			NX4545	100 (80—160)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	—	—
M	Stainless Steel	≤270HB	**MP7130 VP15TF**	220 (170—270)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	0.3 (0.2—0.4)	**JH**
			MP7140 VP30RT	200 (150—250)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	0.3 (0.2—0.4)	**JH**
			NX4545	150 (120—180)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	—	—
K	Cast Iron Ductile Cast Iron	Tensile Strength ≤450MPa	**MC5020**	200 (150—250)	—	—	0.2 (0.1—0.3)	**JM**	0.3 (0.2—0.4)	**JH FT**
			VP15TF	180 (130—250)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	0.3 (0.2—0.4)	**JH**
		Tensile Strength ≥450MPa	**MC5020**	110 (80—150)	—	—	0.2 (0.1—0.3)	**JM**	0.3 (0.2—0.4)	**JH FT**
N	Aluminium Alloy	—	**HTi10**	650 (300—1000)	0.15 (0.1—0.2)	**JP**	0.2 (0.1—0.3)	**JP**	0.3 (0.2—0.4)	**JP**
S	Titanium Alloy	—	**MP9120 VP15TF**	50 (40—60)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	0.3 (0.2—0.4)	**JH**
			MP9130	45 (30—55)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	0.3 (0.2—0.4)	**JH**
	Heat Resistant Alloy (Inconel718 etc.)	—	**MP9120 VP15TF**	40 (20—50)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	0.3 (0.2—0.4)	**JH**
			MP9130	35 (15—45)	0.15 (0.1—0.2)	**JL**	0.2 (0.1—0.3)	**JM**	0.3 (0.2—0.4)	**JH**
H	Hardened Steel	40—55HRC	**VP15TF**	80 (60—100)	0.1 (0.05—0.15)	**JL**	0.15 (0.1—0.2)	**JM**	0.2 (0.1—0.3)	**JH**

●Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC) ●Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

Instructions for use of wiper inserts



Fig.1

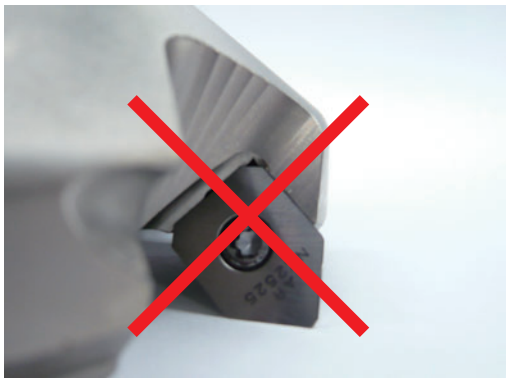


Fig.2

- These wiper inserts are single-cornered.
- Install the insert so that the cutting edge is located as shown in Fig., 1.
  Do not install the wiper insert as shown in Fig. 2. (The insert may be damaged by a too heavy cutting load.)
- Recommended depth of cutting is ap=0.2-0.5(mm).
  (Be aware of the cutting load if the depth of cut is over the recommendation.)
- The major cutting edge of a wiper insert is set more inside than a general tooth.
  This is to prevent heavy loads on the wiper insert. (To prevent fracture set the feed under 0.2 mm/tooth)
- Excellent finished surface can be obtained with one wiper insert.
- When the feed per revolution is larger than the width of the wiper edge, install 2 or more wiper inserts equally inside the cutting body.

RECOMMENDED CUTTING CONDITIONS WHEN USING A WIPER INSERT

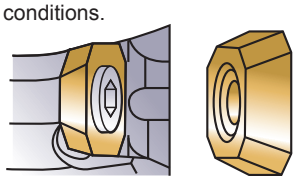
Work Material	Grade	Recommended Cutting Speed (m/min)
P	**VP25N**	200 (80—250)
	VP15TF	180 (80—250)
M	**VP15TF**	120—270
K	**MC5020**	130—250
	VP15TF	
S	**VP15TF**	20—50
H	**VP15TF**	40—80

●Recommended depth of cut (ap) is 0.2mm-0.5mm and feed per tooth (fz) is up to 0.2mm/t.

FEATURES

STABLE, LONG TOOL LIFE, HIGH ACCURACY BODY

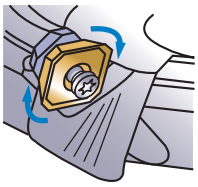
A carbide shim with Mitsubishi's proprietary Anti-Fly Insert (AFI) mechanism provides excellent insert location characteristics, permitting stable cutting even under high load conditions.



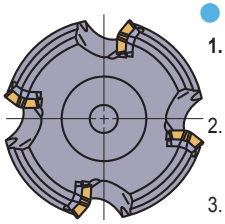
The cutter body is made from a special alloy that provides high strength at high temperature. A special surface treatment improves the corrosion resistance.



The ASX cutter uses screw-on type inserts that allow easy clamping of the inserts with high location precision. Indexing of the inserts can be performed without completely removing the screw.

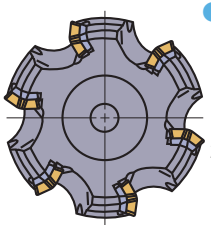


EFFECTIVE FOR VARIOUS MACHINING APPLICATIONS



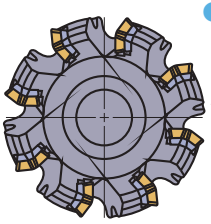
Coarse Pitch Type

1. **The 1st recommendation for cutting steel and stainless steel.**
2. For deep cutting and high feed rates with large-volume chip discharge.
3. Longer overhang possible for relatively low machining riidity.



Fine Pitch Type

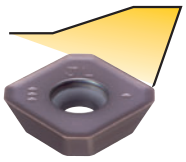
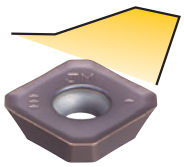
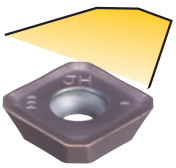
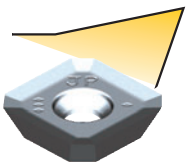
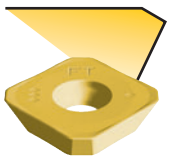
1. **The 1st recommendation type for cast iron, hardened steel and heat-resistant alloys.**
2. For shallow cutting with low feed rates and low-volume chip discharge.



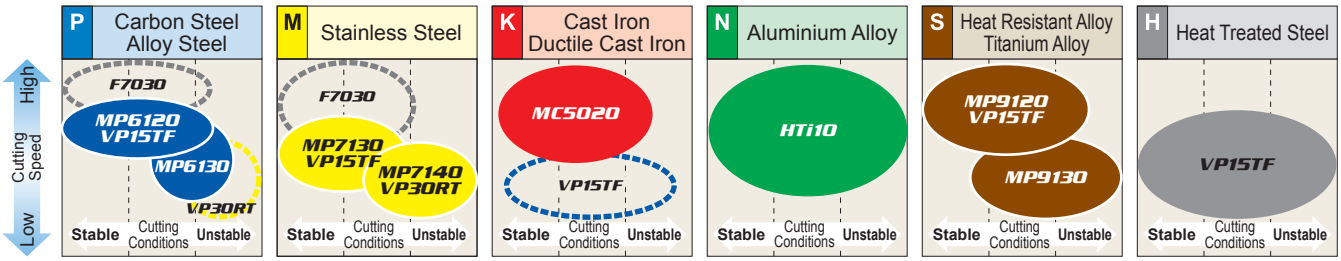
Extra Fine Pitch Type

1. **The 1st recommendation for cast iron.**
2. For cutting operations where chip discharge volume is small and high table feed is desired.

CHIPBREAKERS FOR A WIDE RANGE OF APPLICATIONS

JL Finish to Light cutting Breaker	JM Light to Rough cutting Breaker	JH Medium to Heavy cutting Breaker	JP Aluminium alloy cutting Breaker	FT Rough cutting for cast iron Breaker
				
High accuracy insert with ground-finished periphery. Large rake angle leading to low cutting resistance.	High accuracy M class insert. For a wide range of workpiece materials and cutting conditions.	High accuracy M class insert. Strong cutting edge for high fracture resistance.	High accuracy insert with ground-finished periphery. Large rake angle and mirror-finished rake face for sharp cutting performance and high welding resistance.	High accurate M class inserts. Higher fracture-resistant flat-top inserts.
①Workpiece rigidity is low.	**①General cutting.**	**①Interrupted cutting. ②Scaling.**	**①General cutting of aluminium alloy.**	**①For rough machining of scaled cast iron.**

INSERT GRADES FOR A WIDE RANGE OF MATERIALS



(Note) When machining steel or stainless steel where the emphasis is on surface finish, use cermet grade NX4545.
Stable Cutting : Continuous cutting, Constant depth of cut, Pre-machined securely clamped component cutting
Unstable Cutting : Heavy interrupted, Irregular depth of cut, Low clamping rigidity cutting

FACE MILLING
<GENERAL CUTTING>

40° Finishing Roughing

AHX640S

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron		Heat Resistant Alloy	Hardened Steel



- Heptagonal double sided insert.
- Economical 14 cutting edge inserts.
- Multi insert design for high feed machining.

Fig. 1
ø63
ø80

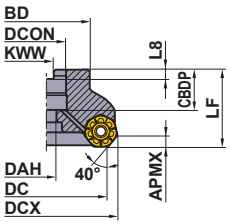


Fig. 2
ø100
ø125
ø160

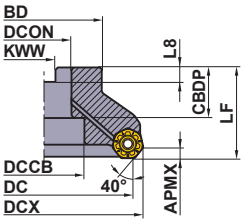
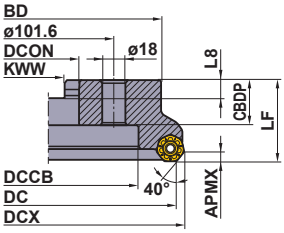
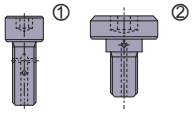


Fig. 3
ø200



Right hand tool holder only.

Cutter Diameter DC	Set Bolt	Geometry
ϕ63	HSC10030H	①
ϕ80	12035H	
ϕ100	MBA16033H	②
ϕ125	20040H	
ϕ160	24045H	
ϕ200	—	—



KAPR :40° T :10° (When using the MK breaker insert)
GAMP :-6° T :20° (When using MP, MM breaker inserts)
GAMF :-5° I :+9°—+10°

Type	Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm)										WT *2	APMX	Type (Fig.)	*1 Clamp Screw	Wrench
		R			DC	DCX	LF	DCON	CBDP	DAH	DCCB	BD	KWW	L8	(kg)	(mm)			
Coarse Pitch	**AHX640S-063A04AR**	●	○	4	63	75.55	50	22	20	11	—	50	10.4	6.3	0.7	6	1	CS5015060T	TKY20T
	AHX640S**R08004CA**	●	○	4	80	92.55	50	25.4	26	13	—	56	9.5	6	1.1	6	1	CS5015060T	TKY20T
	AHX640S**R10005DA**	●	○	5	100	112.55	50	31.75	35	—	45	70	12.7	8	1.7	6	2	CS5015060T	TKY20T
	AHX640S**R12506EA**	●	○	6	125	137.55	63	38.1	42	—	56	80	15.9	10	3.0	6	2	CS5015060T	TKY20T
	AHX640S**R16007FA**	●	○	7	160	172.55	63	50.8	43	—	72	100	19.1	11	4.9	6	2	CS5015060T	TKY20T
	AHX640S**R20008KN**	●	—	8	200	212.55	63	47.625	35	—	140	175	25.4	14.22	8.2	6	3	CS5015060T	TKY20T
Fine Pitch	**AHX640S-063A05AR**	●	○	5	63	75.55	50	22	20	11	—	50	10.4	6.3	0.6	6	1	CS5015060T	TKY20T
	AHX640S**R08006CA**	●	○	6	80	92.55	50	25.4	26	13	—	56	9.5	6	1.0	6	1	CS5015060T	TKY20T
	AHX640S**R10007DA**	●	○	7	100	112.55	50	31.75	35	—	45	70	12.7	8	1.5	6	2	CS5015060T	TKY20T
	AHX640S**R12508EA**	●	○	8	125	137.55	63	38.1	42	—	56	80	15.9	10	2.9	6	2	CS5015060T	TKY20T
	AHX640S**R16010FA**	●	○	10	160	172.55	63	50.8	43	—	72	100	19.1	11	4.7	6	2	CS5015060T	TKY20T
	AHX640S**R20012KN**	●	—	12	200	212.55	63	47.625	35	—	140	175	25.4	14.22	7.9	6	3	CS5015060T	TKY20T

*1 Clamp Torque (N • m) : CS5015060T=5.0
*2 WT : Tool Weight

● : Inventory maintained in Japan.



For metric arbor

The cutter bore diameter DCON is indicated in millimetre.

Fig. 1
ø63
ø80

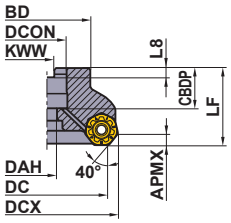


Fig. 2
ø100
ø125

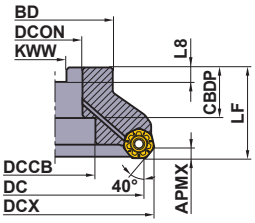


Fig. 3
ø160

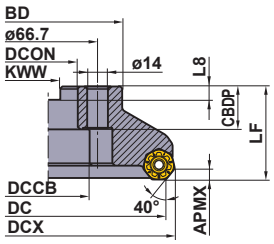
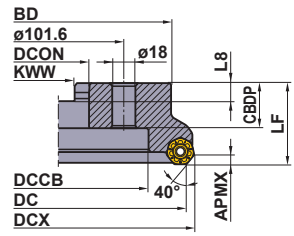
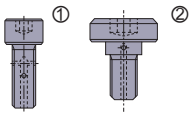


Fig. 4
ø200



Right hand tool holder only.

Cutter Diameter DC	Set Bolt	Geometry
ϕ63	HSC10030H	①
ϕ80	12035H	
ϕ100	MBA16033H	②
ϕ125	20040H	
ϕ160	—	—
ϕ200	—	—



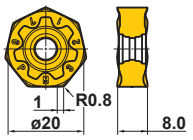
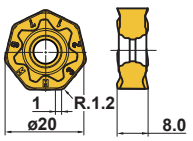
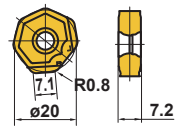
KAPR :40° T :10° (When using the MK breaker insert)
GAMP :-6° T :20° (When using MP, MM breaker inserts)
GAMF :-5° I :+9°—+10°

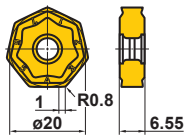
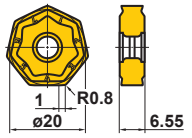
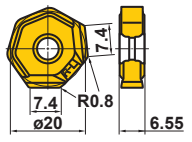
Type	Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm)										WT*2	APMX	Type (Fig.)	*1 Clamp Screw	Wrench
		R			DC	DCX	LF	DCON	CBDP	DAH	DCCB	BD	KWW	L8	(kg)	(mm)			
Coarse Pitch	**AHX640S-063A04AR**	●	○	4	63	75.55	50	22	20	11	—	50	10.4	6.3	0.7	6	1	CS5015060T	TKY20T
	AHX640S-080A04AR	●	○	4	80	92.55	50	27	23	13	—	56	12.4	7	1.1	6	1	CS5015060T	TKY20T
	AHX640S-100B05AR	●	○	5	100	112.55	50	32	32	—	45	78	14.4	8	1.7	6	2	CS5015060T	TKY20T
	AHX640S-125B06AR	●	○	6	125	137.55	63	40	42	—	56	89	16.4	9	3.1	6	2	CS5015060T	TKY20T
	AHX640S-160C07NR	●	—	7	160	172.55	63	40	29	—	56	120	16.4	9	5.4	6	3	CS5015060T	TKY20T
	AHX640S-200C08NR	●	—	8	200	212.55	63	60	32	—	140	175	25.7	14.22	7.8	6	4	CS5015060T	TKY20T
Fine Pitch	**AHX640S-063A05AR**	●	○	5	63	75.55	50	22	20	11	—	50	10.4	6.3	0.6	6	1	CS5015060T	TKY20T
	AHX640S-080A06AR	●	○	6	80	92.55	50	27	23	13	—	56	12.4	7	1.0	6	1	CS5015060T	TKY20T
	AHX640S-100B07AR	●	○	7	100	112.55	50	32	32	—	45	78	14.4	8	1.6	6	2	CS5015060T	TKY20T
	AHX640S-125B08AR	●	○	8	125	137.55	63	40	42	—	56	89	16.4	9	3.0	6	2	CS5015060T	TKY20T
	AHX640S-160C10NR	●	—	10	160	172.55	63	40	29	—	56	120	16.4	9	5.2	6	3	CS5015060T	TKY20T
	AHX640S-200C12NR	●	—	12	200	212.55	63	60	32	—	140	175	25.7	14.22	7.5	6	4	CS5015060T	TKY20T

*1 Clamp Torque (N • m) : CS5015060T=5.0
*2 WT : Tool Weight

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

INSERT

Application	Shape	Order Number	Class	Horning	Coated MC5020	Coated MP7030	Coated VP15TF	Geometry
Steel cutting・General Cutting	MP Breaker 	NNMU200708ZEN-MP	M	E			●	
For Stainless	MM Breaker 	NNMU200712ZER-MM	M	E		●		
Wiper Insert	WP Breaker 	WNEU2007ZEN7C-WP	E	E			●	

Application	Shape	Order Number	Class	Horning	Coated MC5020	Coated VP15TF	Coated VP20RT	Geometry
For Cast Iron	MK Breaker  General	NNMU200608ZEN-MK	M	E	●	●	●	
For Cast Iron	HK Breaker  Strong Cutting Edge Type	NNMU200608ZEN-HK	M	E	●	●	●	
For Cast Iron	WK Breaker 	WNEU2006ZEN7C-WK	E	E	●			

■ = MIRACLE SIGMA

RECOMMENDED CUTTING CONDITIONS

Dry cutting

	Work Material	Tensile Strength	Breaker	Insert Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)	Axial depth of cut **ap** (mm)
P	Mild Steel (ASTM A36,AISI 1010)	≤180HB	**MP**	**VP15TF**	250 (200—300)	0.3 (0.2—0.4)	5
	Carbon Steel, Alloy Steel (AISI 1045,AISI 4140)	180—280HB	**MP**	**VP15TF**	220 (170—250)	0.3 (0.2—0.4)	5
	Carbon Steel, Alloy Steel (AISI 4340)	280—350HB	**MP**	**VP15TF**	140 (100—180)	0.3 (0.2—0.4)	5
M	Austenitic Stainless Steel (AISI 304,AISI 316)	≤200HB	**MM**	**MP7030**	200 (150—250)	0.2 (0.1—0.3)	5
	Austenitic Stainless Steel (AISI 304LN,AISI 316LN)	>200HB	**MM**	**MP7030**	150 (100—200)	0.2 (0.1—0.3)	5
	Two-phase Stainless Steel (AISI 329)	≤280HB	**MM**	**MP7030**	140 (100—180)	0.15 (0.05—0.25)	5
	Ferritic and Martensitic Stainless Steel (AISI 410,AISI 430)	≤200HB	**MM**	**MP7030**	200 (150—250)	0.2 (0.1—0.3)	5
	Ferritic and Martensitic Stainless Steel (AISI 431,AISI 420)	>200HB	**MM**	**MP7030**	150 (100—200)	0.2 (0.1—0.3)	5
	Hardened Stainless Steel (AISI 630,AISI 631)	<450HB	**MM**	**MP7030**	130 (100—160)	0.15 (0.05—0.25)	5
K	Gray Cast Iron (AISI No 45 B)	Tensile Strength ≤350MPa	**MK,HK**	**MC5020**	220 (150—300)	0.3 (0.2—0.4)	5
			MP,MK,HK	**VP15TF**	180 (130—230)	0.3 (0.2—0.4)	5
	Ductile Cast Iron (FCD450)	Tensile Strength ≤450MPa	**MK,HK**	**MC5020**	200 (150—250)	0.2 (0.1—0.3)	5
			MP,MK,HK	**VP15TF**	170 (120—220)	0.2 (0.1—0.3)	5
	Ductile Cast Iron (AISI 100-70-03)	Tensile Strength ≤800MPa	**MK,HK**	**MC5020**	170 (150—200)	0.2 (0.1—0.3)	5
			MP,MK,HK	**VP15TF**	140 (100—180)	0.2 (0.1—0.3)	5
H	Hardened Steel (AISI H13,AISI L6)	40—55HRC	**MP**	**VP15TF**	80 (60—100)	0.15 (0.1—0.2)	3

(Note 1) Recommend wet cutting for good surface finishing of stainless steel. (Tool life is short compared to wet cutting.)

(Note 2) When clamp rigidity is low and tool is overhanged, we recommend to adjust the cutting speed and feed 70% to 80% than the conditon above.

● : **Inventory maintained in Japan. (10 inserts in one case)**

Wet cutting

	Work Material	Tensile Strength	Breaker	Insert Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)	Axial depth of cut **ap** (mm)
M	Austenitic Stainless Steel (AISI 304,AISI 316)	≤200HB	**MM**	**MP7030**	125 (100—150)	0.15 (0.1—0.2)	5
	Austenitic Stainless Steel (AISI 304LN,AISI 316LN)	>200HB	**MM**	**MP7030**	100 (75—125)	0.15 (0.1—0.2)	5
	Two-phase Stainless Steel (AISI 329)	≤280HB	**MM**	**MP7030**	80 (60—100)	0.10 (0.05—0.15)	5
	Ferritic and Martensitic Stainless Steel (AISI 410,AISI 430)	≤200HB	**MM**	**MP7030**	125 (100—150)	0.15 (0.1—0.2)	5
	Ferritic and Martensitic Stainless Steel (AISI 431,AISI 420)	>200HB	**MM**	**MP7030**	100 (75—125)	0.15 (0.1—0.2)	5
	Hardened Stainless Steel (AISI 630,AISI 631)	<450HB	**MM**	**MP7030**	70 (50—90)	0.1 (0.05—0.15)	5
S	Titanium Alloy (Ti-6A-4V)	—	**MM**	**MP7030**	40 (20—50)	0.15 (0.1—0.2)	3
	Heat Resistant Alloy (Inconel718)	—	**MM**	**MP7030**	40 (20—50)	0.15 (0.1—0.2)	3

(Note) With low workpiece clamping rigidity or long overhang of the tool, adjust cutting speed and feed to 70 or 80 % of the recommended conditons above.

Cutting Condition with Wiper insert

	Work Material	Tensile Strength	Main Insert	Grade	Wiper Insert	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)	Axial depth of cut **ap** (mm)
P	Mild Steel (ASTM A36,AISI 1010)	≤180HB	**MP**	**VP15TF**	**WP**	**VP15TF**	250 (200—300)	0.3 (0.2—0.4)	0.5
	Carbon Steel, Alloy Steel (AISI 1045,AISI 4140)	180—280HB	**MP**	**VP15TF**	**WP**	**VP15TF**	220 (170—270)	0.3 (0.2—0.4)	0.5
	Carbon Steel, Alloy Steel (AISI 4340)	280—350HB	**MP**	**VP15TF**	**WP**	**VP15TF**	140 (100—180)	0.3 (0.2—0.4)	0.5
K	Gray Cast Iron (AISI No 45 B)	Tensile Strength ≤350MPa	**MK,HK**	**MC5020**	**WK**	**MC5020**	320 (250—400)	0.3 (0.2—0.4)	0.5
			MP	**VP15TF**	**WP**	**VP15TF**	220 (150—300)	0.3 (0.2—0.4)	0.5
	Ductile Cast Iron (FCD450)	Tensile Strength ≤450MPa	**MK,HK**	**MC5020**	**WK**	**MC5020**	250 (200—300)	0.2 (0.1—0.3)	0.5
			MP	**VP15TF**	**WP**	**VP15TF**	200 (150—250)	0.2 (0.1—0.3)	0.5
	Ductile Cast Iron (AISI 100-70-03)	Tensile Strength ≤800MPa	**MK,HK**	**MC5020**	**WK**	**MC5020**	220 (200—250)	0.2 (0.1—0.3)	0.5
			MP	**VP15TF**	**WP**	**VP15TF**	170 (150—200)	0.2 (0.1—0.3)	0.5
S	Heat Resistant Alloy	—	**MP**	**VP15TF**	**WP**	**VP15TF**	40 (20—50)	0.15 (0.1—0.2)	0.5
H	Hardened Steel (AISI H13,AISI L6)	40—55HRC	**MP**	**VP15TF**	**WP**	**VP15TF**	80 (60—100)	0.15 (0.1—0.2)	0.5

(Note) With low workpiece clamping rigidity or long overhang of the tool, adjust cutting speed and feed to 70 or 80 % of the recommended conditons above.

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

FACE MILLING

<HIGH FEED CUTTING FOR CAST IRON>

40° | Finishing | Roughing

AHX640W

P | M | **K** | N | S | H

Cast Iron



- Heptagonal double sided insert.
- Economical 14 cutting edge inserts.
- Multi insert design for high feed machining.

KAPR :40°
GAMP :-6° T :+10°
GAMF :-4° I :+9°—+10° (T,I : When using the MK breaker insert)

Fig.1 ø80

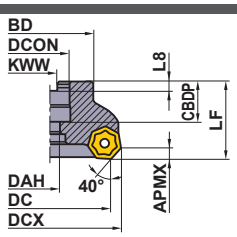


Fig.2 ø100 ø125 ø160

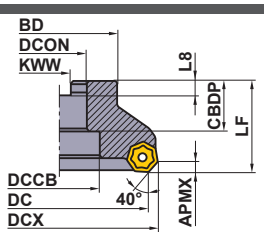


Fig.3 ø200 ø250

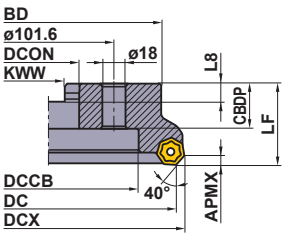
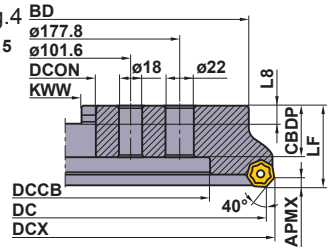


Fig.4 ø315

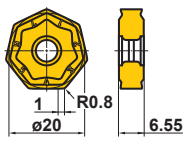
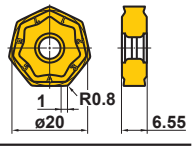
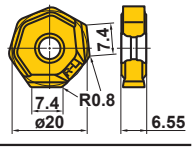


Right hand tool holder shown.

Type	Order Number	Stock R	Stock L	Number of Teeth	DC	DCX	LF	DCON	CBDP	DAH	DCCB	BD	KWW	L8	WT* (kg)	APMX (mm)	Type (Fig.)
Extra Fine Pitch Type	**AHX640WR/L08008C**	●	●	8	80	92.6	50	25.4	26	13	—	56	9.5	6	1.5	6	1
	AHX640WR/L**10010D**	●	●	10	100	112.6	50	31.75	32	—	45	70	12.7	8	2.1	6	2
	AHX640WR/L**12512E**	●	●	12	125	137.6	63	38.1	35	—	56	80	15.9	10	3.5	6	2
	AHX640WR/L**16016F**	●	●	16	160	172.6	63	50.8	38	—	72	100	19.1	11	5.6	6	2
	AHX640WR/L**20020K**	●	●	20	200	212.6	63	47.625	35	—	140	175	25.4	14.22	9.0	6	3
	AHX640WR/L**25024K**	●	●	24	250	262.6	63	47.625	35	—	180	220	25.4	14.22	14.4	6	3
	AHX640WR/L**31528P**	●	●	28	315	327.6	63	47.625	40	—	225	285	25.4	14.22	23.8	6	4
Super Extra Fine Pitch Type	**AHX640WR/L08010C**	●	●	10	80	92.6	50	25.4	26	13	—	56	9.5	6	1.5	6	1
	AHX640WR/L**10014D**	●	●	14	100	112.6	50	31.75	32	—	45	70	12.7	8	2.1	6	2
	AHX640WR/L**12518E**	●	●	18	125	137.6	63	38.1	35	—	56	80	15.9	10	3.5	6	2
	AHX640WR/L**16022F**	●	●	22	160	172.6	63	50.8	38	—	72	100	19.1	11	5.6	6	2
	AHX640WR/L**20028K**	●	●	28	200	212.6	63	47.625	35	—	140	175	25.4	14.22	9.0	6	3
	AHX640WR/L**25036K**	●	●	36	250	262.6	63	47.625	35	—	180	220	25.4	14.22	14.4	6	3
	AHX640WR/L**31544P**	●	●	44	315	327.6	63	47.625	40	—	225	285	25.4	14.22	23.8	6	4

* WT : Tool Weight

INSERTS

Shape	Order Number	Class	Honing	Coated MC5020	Coated VP15TF	Coated VP20RT	Geometry
MK Breaker **General**	**NNMU200608ZEN-MK**	M	E	●	●	●	
HK Breaker Strong Cutting Edge Type	**NNMU200608ZEN-HK**	M	E	●	●	●	
Wiper	**WNEU2006ZEN7C-WK**	E	E	●			

● : Inventory maintained in Japan. (10 inserts in one case)

RECOMMENDED CUTTING CONDITIONS

GENERAL CUTTING

Work Material		Tensile Strength	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
K	Gray Cast Iron	≤350MPa	**MC5020**	220 (150—300)	0.3 (0.2—0.4)
			VP15TF VP20RT	180 (130—250)	0.3 (0.2—0.4)
	Ductile Cast Iron	≤450MPa	**MC5020**	200 (150—250)	0.2 (0.1—0.3)
			VP15TF VP20RT	170 (120—220)	0.2 (0.1—0.3)
		≤800MPa	**MC5020**	170 (150—200)	0.2 (0.1—0.3)
			VP15TF VP20RT	140 (100—180)	0.2 (0.1—0.3)

FINISHING (USE OF WIPER INSERTS)

Work Material		Grade	Axial Depth of Cut (mm)	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
K	Gray Cast Iron	**MC5020**	<0.5	320 (250—400)	0.2 (0.1—0.3)
			0.5—3	270 (200—350)	
	Ductile Cast Iron		<0.5	270 (200—350)	
			0.5—3	220 (200—250)	

*Please use 2-3 pcs of Wiper inserts in case of 'over 6mm/rev'.



Fig.1
ø80

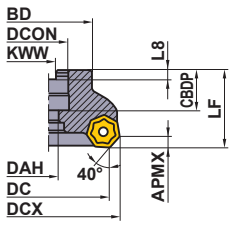


Fig.2
ø100
ø125

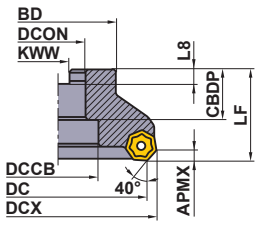


Fig.3
ø160

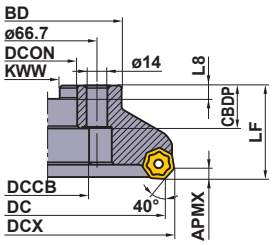
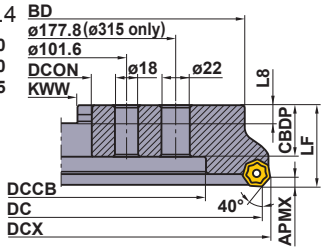


Fig.4
ø200
ø250
ø315



For metric arbor

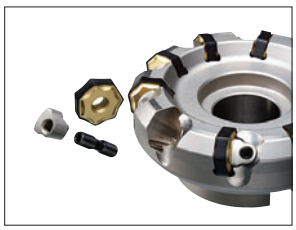
The cutter bore diameter DCON is indicated in millimetre.

KAPR :40°
GAMP :-6° T :+10°
GAMF :-4° I :+9°—+10° (T,I : When using the MK breaker insert)

Right hand tool holder shown.

Type	Order Number	Stock R	Stock L	Number of Teeth	Dimensions(mm) DC	DCX	LF	DCON	CBDP	DAH	DCCB	BD	KWW	L8	WT* (kg)	APMX (mm)	Type (Fig.)
Extra Fine Pitch Type	**AHX640W-080A08R/L**	●	●	8	80	92.6	50	27	23	13	—	56	12.4	7	1.5	6	1
	AHX640W-100B10R/L	●	●	10	100	112.6	50	32	32	—	45	70	14.4	8	2.1	6	2
	AHX640W-125B12R/L	●	●	12	125	137.6	63	40	32	—	56	80	16.4	9	3.1	6	2
	AHX640W-160C16R/L	●	●	16	160	172.6	63	40	29	—	56	100	16.4	9	5.6	6	3
	AHX640W-200C20R/L	●	●	20	200	212.6	63	60	32	—	135	155	25.7	14	8.0	6	4
	AHX640W-250C24R/L	●	●	24	250	262.6	63	60	32	—	180	200	25.7	14	12.6	6	4
	AHX640W-315C28R/L	●	●	28	315	327.6	80	60	57	—	225	285	25.7	14	31.5	6	4
Super Extra Fine Pitch Type	**AHX640W-080A10R/L**	●	●	10	80	92.6	50	27	23	13	—	56	12.4	7	1.5	6	1
	AHX640W-100B14R/L	●	●	14	100	112.6	50	32	32	—	45	70	14.4	8	2.1	6	2
	AHX640W-125B18R/L	●	●	18	125	137.6	63	40	32	—	56	80	16.4	9	3.1	6	2
	AHX640W-160C22R/L	●	●	22	160	172.6	63	40	29	—	56	100	16.4	9	5.6	6	3
	AHX640W-200C28R/L	●	●	28	200	212.6	63	60	32	—	135	155	25.7	14	8.0	6	4
	AHX640W-250C36R/L	●	●	36	250	262.6	63	60	32	—	180	200	25.7	14	12.6	6	4
	AHX640W-315C44R/L	●	●	44	315	327.6	80	60	57	—	225	285	25.7	14	31.5	6	4

* WT : Tool Weight



SPARE PARTS

Tool Holder Number		 *	
	Wedge	Clamp Screw	Wrench
AHX640W Type	CWAHX640WN	LS0622T	TKY15T

* Clamp Torque (N • m) : LS0622T=6.0

MILLING

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

FACE MILLING

<HIGH EFFICIENCY CUTTING FOR CAST IRON>

45° Finishing Roughing

AOX445

P M **K** N S H

Cast Iron



- Solid CBN octagonal double sided insert.
- Economical 16 cutting edge inserts. (when the depth of cut is 3mm)
- For high efficiency roughing through to finishing.
- Easy operation and cleansing.

Fig.1 ø63

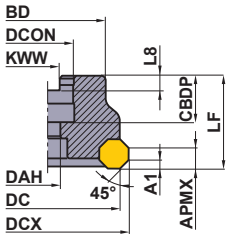
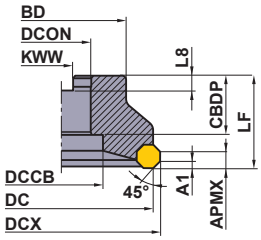


Fig.2 ø80 ø100 ø125 ø160



KAPR :45°
GAMP:-5° T :-9°—-6°
GAMF:-9°—-6° I :-5°

ARBOR TYPE

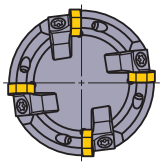
Right hand (R) only for the standard.

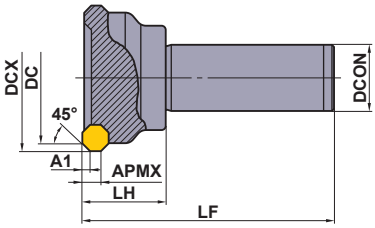
Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	DCX	LF	DCON	CBDP	DAH	DCCB	BD	KWW	L8	WT* (kg)	A1 (mm)	APMX (mm)	Max. Allowable Revolution (min^{-1})	Type (Fig.)
Coarse Pitch	**AOX445-063A04R**	●	4	63	70.8	40	22	20	11	—	50	10.4	6.3	0.6	3	8	12000	1
	AOX445-**R08006C**	●	6	80	87.8	50	25.4	26	—	38	60	9.5	6	1.2	3	8	11000	2
	AOX445-**R10008D**	●	8	100	107.8	50	31.75	32	—	45	70	12.7	8	1.8	3	8	9300	2
	AOX445-**R12510E**	●	10	125	132.8	63	38.1	35	—	60	80	15.9	10	3.0	3	8	8300	2
	AOX445-**R16012F**	●	12	160	167.8	63	50.8	38	—	80	100	19.1	11	4.9	3	8	7200	2

(Note) When machining with a depth of cut of 8mm, 16 corners cannot be used.

* WT : Tool Weight







SHANK TYPE

Right hand (R) only for the standard.

Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	DCX	LF	DCON	LH	WT* (kg)	A1 (mm)	APMX (mm)	Max. Allowable Revolution (min^{-1})
Coarse Pitch	**AOX445R503S32**	●	3	50	57.8	125	32	40	1.1	3	8	13000
	AOX445**R634S32**	●	4	63	70.8	125	32	40	1.4	3	8	12000

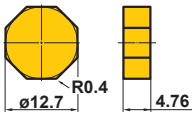
* WT : Tool Weight

SPARE PARTS

Tool Holder Number	 Wedge	 * Clamp Screw	 Wrench
AOX445	CWAOX445N	LS15T	TKY25T

* Clamp Torque (N • m) : LS15T=8.0

INSERTS

Order Number	Class	CBN BC5030	Geometry
SL-ONEN120404ASN	E	●	

RECOMMENDED CUTTING CONDITIONS

Work Material		Tensile Strength	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
K	Gray Cast Iron	≤200MPa	**BC5030**	1000 (800—1500)	0.1 (0.05—0.15)
		250—350 MPa			

Note) Dry cutting is recommended.

● : Inventory maintained in Japan. (CBN inserts are available in 1 piece in one case.)

FACE MILLING

<CUTTING FOR DIFFICULT-TO-CUT MATERIALS>

R10 Finishing Roughing

SG20

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron			Hardened Steel



- 30° positive insert.
- High rake angle.
- Round shape insert with a strong cutting edge.
- Suitable for difficult-to-cut materials.

Fig.1 ø80 ø100

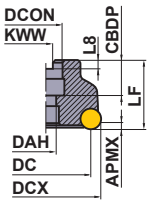
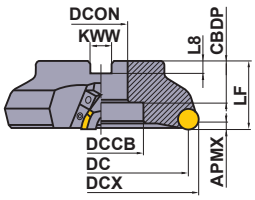


Fig.2 ø125 ø160



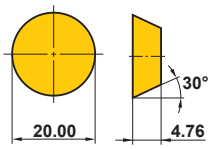
Right hand tool holder only.

GAMP:+24° T :+23° (KAPR=45°)
GAMF:+9°

Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	DCX	LF	DCON	CBDP	DAH	DCCB	KWW	L8	WT* (kg)	APMX (mm)	Type (Fig.)
SG20R0304C	●	4	80	101.2	50	25.4	26	13	—	9.5	6	1.5	8	1
SG20R**0405D**	●	5	100	121.4	63	31.75	32	17	—	12.7	8	2.9	8	1
SG20R**0506E**	●	6	125	146.4	63	38.1	38	—	60	15.9	10	3.8	8	2
SG20R**0608F**	●	8	160	181.4	63	50.8	38	—	80	19.1	11	6.1	8	2

* WT : Tool Weight

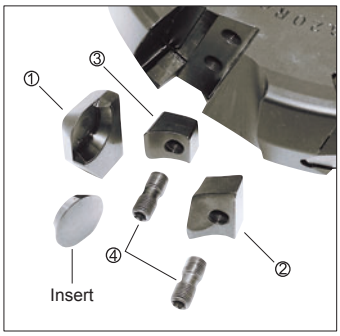
INSERTS

Order Number	Class	Coated F7030	Coated VP15TF	Coated UP20M	Carbide UTi20T	Carbide HTi10	Geometry
RGEN2004M0SN	E	●		●	●	●	
RGEN**2004M0EN**	E		●				

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)	Recommended Max. Depth of Cut (mm)
P	Carbon Steel Alloy Steel	≤180HB	**VP15TF**	180 (100—250)	0.35 (0.2—0.5)	4.5
			NX2525	175 (150—200)	0.25 (0.2—0.3)	4.5
		280—350HB	**VP15TF**	180 (100—250)	0.3 (0.2—0.4)	4.5
			NX2525	165 (130—200)	0.25 (0.2—0.3)	4.5
M	Stainless Steel	≤200HB	**VP15TF**	150 (100—200)	0.35 (0.2—0.5)	3
K	Gray Cast Iron	Tensile Strength ≤350MPa	**VP15TF**	160 (100—220)	0.4 (0.3—0.5)	4.5
H	Hardened Steel	40—60HRC	**VP15TF**	80 (50—100)	0.2 (0.1—0.3)	2

- Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
- Table Feed (mm/min)
  =Feed per Tooth x Number of Teeth x Cutter Revolution



SPARE PARTS

Tool Holder Number	① Locator	② Wedge-T	③ Wedge-S	④ Clamp Screw *	Wrench	Set Bolt
SG20R0304C	SPSG20R	CWSG20TR	CWSG20SN	LS15T	TKY25T	—
SG20R0405D						HSC16035
SG20R0506E						—
SG20R**0608F**						

* Clamp Torque (N • m) : LS15T=8.5

● : Inventory maintained in Japan. (10 inserts in one case)

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

FACE MILLING
<HEAVY CUTTING>

15° Finishing Roughing

SE515

P Steel | M Stainless Steel | K Cast Iron | N Non-ferrous Metal | S | H



- 20°positive insert.
- High rake angle.
- High rigidity due to carbide shim.

Fig.1 ø100

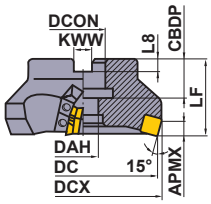
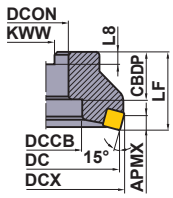


Fig.2 ø125 ø160

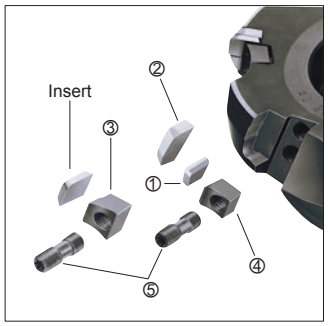


Right hand tool holder only.

KAPR :15°
GAMP:+19° T :+11°
GAMF:+5° I :+17°

Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	DCX	LF	DCON	CBDP	DAH	DCCB	KWW	L8	WT* (kg)	APMX (mm)	Type (Fig.)
Coarse Pitch	**SE515R0405D**	▲	5	100	108.9	63	31.75	32	17	—	12.7	8	2.3	11.5	1
	SE515R**0506E**	▲	6	125	133.6	63	38.1	38	—	60	15.9	10	3.5	11.5	2
	SE515R**0608F**	▲	8	160	168.3	63	50.8	38	—	80	19.1	11	5.6	11.5	2
Close Pitch	**SE515R0407D**	▲	7	100	108.9	63	31.75	32	17	—	12.7	8	2.3	11.5	1
	SE515R**0509E**	▲	9	125	133.6	63	38.1	38	—	60	15.9	10	3.5	11.5	2
	SE515R**0611F**	▲	11	160	168.3	63	50.8	38	—	80	19.1	11	5.6	11.5	2

* WT : Tool Weight



SPARE PARTS

Tool Holder Number	① Locator	② Shim	③ Wedge-T	④ Wedge-S	⑤* Clamp Screw	Wrench	Set Bolt
SE515R0405D 0407D	SPSE515R	STSE515R	CWSE545TR	CWSE545SN	LS15T	TKY25T	HSC16035
SE515R0506E – SE515R0611F							—

* Clamp Torque (N • m) : LS15T=8.5

RECOMMENDED CUTTING CONDITIONS

Work Material		Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
P	Mild Steel	≤180HB	**F7030**	200 (160—250)	0.2 (0.1—0.3)
			VP15TF	180 (100—250)	
			NX4545	140 (80—200)	
	Carbon Steel Alloy Steel	180—280HB	**F7030**	200 (160—250)	0.2 (0.1—0.3)
			VP15TF	180 (100—250)	
			NX4545	140 (80—200)	
		280—350HB	**VP15TF**	120 (80—160)	0.15 (0.1—0.2)

Work Material		Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
M	Stainless Steel	≤200HB	**VP15TF**	150 (100—200)	0.2 (0.1—0.3)
K	Cast Iron	Tensile Strength ≤450MPa	**MC5020**	175 (100—250)	0.2 (0.1—0.3)
			VP15TF	160 (100—220)	
N	Aluminium Alloy	—	**MD220**	1000 (200—1500)	0.15 (0.05—0.25)
			HTi10	650 (300—1000)	0.12 (0.05—0.2)

- Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
- Table Feed (mm/min)
  =Feed per Tooth x Number of Teeth x Cutter Revolution

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

INSERTS

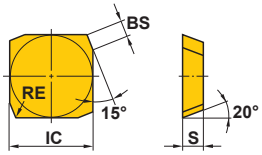
Work Material			Coated				Cermet		Carbide		Dimensions(mm)				Geometry
Shape	Order Number	Class	Honing	F7030	MC5020	VP15TF	NX2525	NX4545	UTi20T	HTi10	IC	S	BS	RE	
	SECN1504EFTR1	C	T					●			15.875	4.76	1.4	1.0	
	SEEN1504EFER1	E	E			●					15.875	4.76	1.4	1.0	
	SEEN1504EFTR1	E	T					●			15.875	4.76	1.4	1.0	
	SEEN1504EFSR1	E	S	●							15.875	4.76	1.4	1.0	
	SEKN1504EFTR1	K	T						●		15.875	4.76	1.4	—	
	SEKN1504EFSR1	K	S	●							15.875	4.76	1.4	—	

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-ferrous Metal

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing :
E : Round **S :** Chamfer + Hone **T :** Chamfer

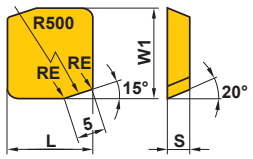




WIPER INSERTS

Shape	Order Number	Class	Honing	Cermet	Dimensions(mm)				Geometry
				NX2525	L	W1	S	RE	
	WEC53EFTR5C	C	T	●	15.875	16.903	4.76	1.0	





MILLING

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

SHOULDER MILLING
<FOR CAST IRON>

Roughing

VOX400

P | M | **K** | N | S | H

Cast Iron

Fig.1

ø50
ø63
ø80

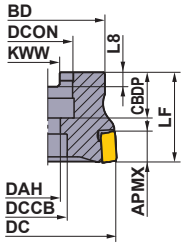


Fig.2

ø100
ø125
ø160

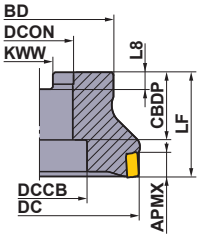
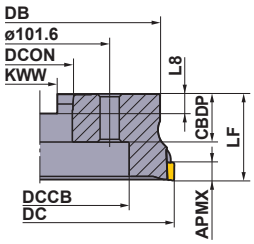


Fig.3

ø200
ø250





- Vertical inserts with high strength cutting edge.
- Economical 8 cutting edge inserts.
- Screw-on type.

ARBOR TYPE

Right hand tool holder only.

Type	Order Number	Stock	Number of Teeth	Dimensions(mm)									*2 WT (kg)	APMX (mm)	Type(Fig.)	*1 Clamp Screw	Wrench
		R		DC	LF	DCON	CBDP	DAH	DCCB	BD	KWW	L8					
Coarse Pitch	**VOX400-050A03R**	●	3	50	40	22	20	11	17	41	10.4	6.3	0.3	10	1	CS401160T	TKY15T
	VOX400-063A04R	●	4	63	40	22	20	11	17	50	10.4	6.3	0.6	10	1	CS401160T	TKY15T
	VOX400R08004C	●	4	80	50	25.4	26	13	20	55	9.5	6	1.0	10	1	CS401160T	TKY15T
	VOX400R10006D	●	6	100	50	31.75	32	—	45	70	12.7	8	1.5	10	2	CS401160T	TKY15T
	VOX400R12508E	●	8	125	63	38.1	40	—	60	80	15.9	10	2.7	10	2	CS401160T	TKY15T
	VOX400R16010F	●	10	160	63	50.8	43	—	80	120	19.1	11	5.3	10	2	CS401160T	TKY15T
	VOX400R20012K	●	12	200	63	47.625	35	—	130	175	25.4	14.22	8.5	10	3	CS401160T	TKY15T
	VOX400R25016K	●	16	250	63	47.625	35	—	180	220	25.4	14.22	13.3	10	3	CS401160T	TKY15T
Fine Pitch	**VOX400-050A05R**	●	5	50	40	22	20	11	17	41	10.4	6.3	0.3	10	1	CS401160T	TKY15T
	VOX400-063A06R	●	6	63	40	22	20	11	17	50	10.4	6.3	0.6	10	1	CS401160T	TKY15T
	VOX400R08008C	●	8	80	50	25.4	26	13	20	55	9.5	6	1.0	10	1	CS401160T	TKY15T
	VOX400R10010D	●	10	100	50	31.75	32	—	45	70	12.7	8	1.5	10	2	CS401160T	TKY15T
	VOX400R12512E	●	12	125	63	38.1	40	—	60	80	15.9	10	2.7	10	2	CS401160T	TKY15T
	VOX400R16016F	●	16	160	63	50.8	43	—	80	120	19.1	11	5.3	10	2	CS401160T	TKY15T
	VOX400R20020K	●	20	200	63	47.625	35	—	130	175	25.4	14.22	8.5	10	3	CS401160T	TKY15T
	VOX400R25024K	●	24	250	63	47.625	35	—	180	220	25.4	14.22	13.3	10	3	CS401160T	TKY15T
Extra Fine Pitch	**VOX400-063A08R**	●	8	63	40	22	20	11	17	50	10.4	6.3	0.5	10	1	CS401160T	TKY15T
	VOX400R08010C	●	10	80	50	25.4	26	13	20	55	9.5	6	1.0	10	1	CS401160T	TKY15T
	VOX400R10012D	●	12	100	50	31.75	32	—	45	70	12.7	8	1.4	10	2	CS401160T	TKY15T
	VOX400R12516E	●	16	125	63	38.1	40	—	60	80	15.9	10	2.6	10	2	CS401160T	TKY15T
	VOX400R16020F	●	20	160	63	50.8	43	—	80	120	19.1	11	5.1	10	2	CS401160T	TKY15T
	VOX400R20026K	●	26	200	63	47.625	35	—	130	175	25.4	14.22	8.2	10	3	CS401160T	TKY15T
	VOX400R25034K	●	34	250	63	47.625	35	—	180	220	25.4	14.22	13.0	10	3	CS401160T	TKY15T

*1 Clamp Torque (N • m) : CS401160T=3.5

*2 WT : Tool Weight

● : Inventory maintained in Japan.



Fig.1

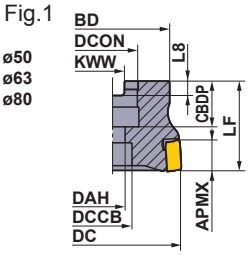
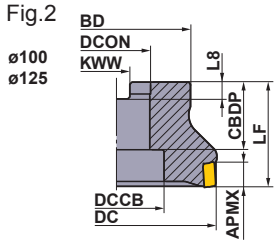
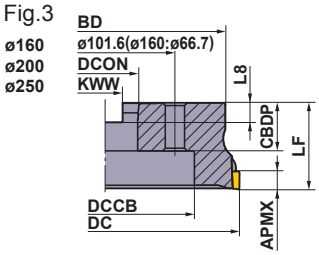


Fig.2



Right hand tool holder only.

Fig.3



For metric arbor

The cutter bore diameter DCON is indicated in millimetre.

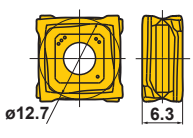
ARBOR TYPE

Type	Order Number	Stock	Number of Teeth	Dimensions(mm)									*2 WT (kg)	APMX (mm)	Type(Fig.)	*1 Clamp Screw	Wrench
		R		DC	LF	DCON	CBDP	DAH	DCCB	BD	KWW	L8					
Coarse Pitch	**VOX400-050A03R**	●	3	50	40	22	20	11	17	41	10.4	6.3	0.3	10	1	CS401160T	TKY15T
	VOX400-063A04R	●	4	63	40	22	20	11	17	50	10.4	6.3	0.6	10	1	CS401160T	TKY15T
	VOX400-080A04R	●	4	80	50	27	23	13	20	56	12.4	7	1	10	1	CS401160T	TKY15T
	VOX400-100B06R	●	6	100	50	32	32	—	45	78	14.4	8	1.7	10	2	CS401160T	TKY15T
	VOX400-125B08R	●	8	125	63	40	32	—	56	89	16.4	9	3	10	2	CS401160T	TKY15T
	VOX400-160C10R	●	10	160	63	40	29	—	56	120	16.4	9	5.4	10	3	CS401160T	TKY15T
	VOX400-200C12R	●	12	200	63	60	32	—	130	175	25.7	14.22	8.1	10	3	CS401160T	TKY15T
	VOX400-250C16R	●	16	250	63	60	32	—	180	210	25.7	14.22	11.8	10	3	CS401160T	TKY15T
Fine Pitch	**VOX400-050A05R**	●	5	50	40	22	20	11	17	41	10.4	6.3	0.3	10	1	CS401160T	TKY15T
	VOX400-063A06R	●	6	63	40	22	20	11	17	50	10.4	6.3	0.6	10	1	CS401160T	TKY15T
	VOX400-080A08R	●	8	80	50	27	23	13	20	56	12.4	7	1	10	1	CS401160T	TKY15T
	VOX400-100B10R	●	10	100	50	32	32	—	45	78	14.4	8	1.7	10	2	CS401160T	TKY15T
	VOX400-125B12R	●	12	125	63	40	32	—	56	89	16.4	9	3	10	2	CS401160T	TKY15T
	VOX400-160C16R	●	16	160	63	40	29	—	56	120	16.4	9	5.4	10	3	CS401160T	TKY15T
	VOX400-200C20R	●	20	200	63	60	32	—	130	175	25.7	14.22	8.1	10	3	CS401160T	TKY15T
	VOX400-250C24R	●	24	250	63	60	32	—	180	210	25.7	14.22	11.8	10	3	CS401160T	TKY15T
Extra Fine Pitch	**VOX400-063A08R**	●	8	63	40	22	20	11	17	50	10.4	6.3	0.5	10	1	CS401160T	TKY15T
	VOX400-080A10R	●	10	80	50	27	23	13	20	56	12.4	7	1.0	10	1	CS401160T	TKY15T
	VOX400-100B12R	●	12	100	50	32	32	—	45	78	14.4	8	1.6	10	2	CS401160T	TKY15T
	VOX400-125B16R	●	16	125	63	40	32	—	56	89	16.4	9	2.8	10	2	CS401160T	TKY15T
	VOX400-160C20R	●	20	160	63	40	29	—	56	120	16.4	9	5.2	10	3	CS401160T	TKY15T
	VOX400-200C26R	●	26	200	63	60	32	—	130	175	25.7	14.22	7.9	10	3	CS401160T	TKY15T
	VOX400-250C34R	●	34	250	63	60	32	—	180	210	25.7	14.22	11.5	10	3	CS401160T	TKY15T

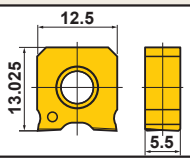
*1 Clamp Torque (N • m) : CS401160T=3.5

*2 WT : Tool Weight

INSERT

Shape	Order Number	Class	Horning	Coated MC5020	Coated VP15TF	Geometry
	**SONX1206PER**	N	E	●	●	

WIPER INSERT

Shape	Order Number	Class	Horning	Coated VP15TF	Geometry
	**WOEX1206PER5C**	E	E	●	

RECOMMENDED CUTTING CONDITIONS

VOX400 (Standard pitch)

Work Material		Tensile Strength	Insert Grade	Cutting Speed (m/min)	ϕ50－ϕ250		
					Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/tooth)
K	Gray Cast Iron	≤200MPa	MC5020	300(250－350)	≤DC	≤10	0.4(0.3－0.5)
			VP15TF	250(200－300)	≤DC	≤10	0.4(0.3－0.5)
		≤350MPa	MC5020	220(150－300)	≤DC	≤10	0.3(0.2－0.4)
			VP15TF	200(150－300)	≤DC	≤10	0.3(0.2－0.4)
	Ductile Cast Iron	≤450MPa	MC5020	200(150－250)	≤DC	≤10	0.3(0.2－0.4)
			VP15TF	170(150－200)	≤DC	≤10	0.3(0.2－0.4)
		≤800MPa	MC5020	170(150－200)	≤DC	≤10	0.2(0.1－0.3)
			VP15TF	150(100－200)	≤DC	≤10	0.2(0.1－0.3)

VOX400 (Fine pitch)

Work Material		Tensile Strength	Insert Grade	Cutting Speed (m/min)	ϕ50,ϕ63			ϕ80		
					Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)	Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)
K	Gray Cast Iron	≤200MPa	MC5020	300(250－350)	≤DC	≤10	0.4(0.3－0.5)	≤DC	≤10	0.4(0.3－0.5)
			VP15TF	250(200－300)	≤DC	≤10	0.4(0.3－0.5)	≤DC	≤10	0.4(0.3－0.5)
		≤350MPa	MC5020	220(150－300)	≤DC	≤10	0.3(0.2－0.4)	≤DC	≤10	0.3(0.2－0.4)
			VP15TF	200(150－300)	≤DC	≤10	0.3(0.2－0.4)	≤DC	≤10	0.3(0.2－0.4)
	Ductile Cast Iron	≤450MPa	MC5020	200(150－250)	≤0.8DC	≤10	0.3(0.2－0.4)	≤0.6DC	≤10	0.3(0.2－0.4)
			VP15TF	170(150－200)	≤0.8DC	≤10	0.3(0.2－0.4)	≤0.6DC	≤10	0.3(0.2－0.4)
		≤800MPa	MC5020	170(150－200)	≤0.8DC	≤10	0.2(0.1－0.3)	≤0.6DC	≤10	0.2(0.1－0.3)
			VP15TF	150(100－200)	≤0.8DC	≤10	0.2(0.1－0.3)	≤0.6DC	≤10	0.2(0.1－0.3)

Work Material		Tensile Strength	Insert Grade	Cutting Speed (m/min)	ϕ100			ϕ125		
					Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)	Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)
K	Gray Cast Iron	≤200MPa	MC5020	300(250－350)	≤DC	≤10	0.4(0.3－0.5)	≤DC	≤10	0.4(0.3－0.5)
			VP15TF	250(200－300)	≤DC	≤10	0.4(0.3－0.5)	≤DC	≤10	0.4(0.3－0.5)
		≤350MPa	MC5020	220(150－300)	≤DC	≤10	0.3(0.2－0.4)	≤DC	≤10	0.3(0.2－0.4)
			VP15TF	200(150－300)	≤DC	≤10	0.3(0.2－0.4)	≤DC	≤10	0.3(0.2－0.4)
	Ductile Cast Iron	≤450MPa	MC5020	200(150－250)	≤0.5DC	≤10	0.3(0.2－0.4)	≤0.4DC	≤10	0.3(0.2－0.4)
			VP15TF	170(150－200)	≤0.5DC	≤10	0.3(0.2－0.4)	≤0.4DC	≤10	0.3(0.2－0.4)
		≤800MPa	MC5020	170(150－200)	≤0.5DC	≤10	0.2(0.1－0.3)	≤0.4DC	≤10	0.2(0.1－0.3)
			VP15TF	150(100－200)	≤0.5DC	≤10	0.2(0.1－0.3)	≤0.4DC	≤10	0.2(0.1－0.3)

Work Material		Tensile Strength	Insert Grade	Cutting Speed (m/min)	ϕ160			ϕ200－ϕ250		
					Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)	Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)
K	Gray Cast Iron	≤200MPa	MC5020	300(250－350)	≤DC	≤10	0.4(0.3－0.5)	≤DC	≤10	0.4(0.3－0.5)
			VP15TF	250(200－300)	≤DC	≤10	0.4(0.3－0.5)	≤DC	≤10	0.4(0.3－0.5)
		≤350MPa	MC5020	220(150－300)	≤DC	≤10	0.3(0.2－0.4)	≤DC	≤10	0.3(0.2－0.4)
			VP15TF	200(150－300)	≤DC	≤10	0.3(0.2－0.4)	≤DC	≤10	0.3(0.2－0.4)
	Ductile Cast Iron	≤450MPa	MC5020	200(150－250)	≤0.3DC	≤10	0.3(0.2－0.4)	≤0.2DC	≤10	0.3(0.2－0.4)
			VP15TF	170(150－200)	≤0.3DC	≤10	0.3(0.2－0.4)	≤0.2DC	≤10	0.3(0.2－0.4)
		≤800MPa	MC5020	170(150－200)	≤0.3DC	≤10	0.2(0.1－0.3)	≤0.2DC	≤10	0.2(0.1－0.3)
			VP15TF	150(100－200)	≤0.3DC	≤10	0.2(0.1－0.3)	≤0.2DC	≤10	0.2(0.1－0.3)

(Note 1) DC is cutter diameter.

(Note 2) When using wiper insert, please reduce the feed per tooth to half the normal rate.

VOX400 (Extra fine pitch)

Work Material		Tensile Strength	Insert Grade	Cutting Speed (m/min)	ϕ63			ϕ80		
					Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)	Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)
K	Gray Cast Iron	≤200MPa	MC5020	300(250－350)	≤DC	≤10	0.4(0.3－0.5)	≤DC	≤10	0.4(0.3－0.5)
			VP15TF	250(200－300)	≤DC	≤10	0.4(0.3－0.5)	≤DC	≤10	0.4(0.3－0.5)
		≤350MPa	MC5020	220(150－300)	≤DC	≤10	0.3(0.2－0.4)	≤DC	≤10	0.3(0.2－0.4)
			VP15TF	200(150－300)	≤DC	≤10	0.3(0.2－0.4)	≤DC	≤10	0.3(0.2－0.4)
	Ductile Cast Iron	≤450MPa	MC5020	200(150－250)	≤0.6DC	≤10	0.3(0.2－0.4)	≤0.5DC	≤10	0.3(0.2－0.4)
			VP15TF	170(150－200)	≤0.6DC	≤10	0.3(0.2－0.4)	≤0.5DC	≤10	0.3(0.2－0.4)
		≤800MPa	MC5020	170(150－200)	≤0.6DC	≤10	0.2(0.1－0.3)	≤0.5DC	≤10	0.2(0.1－0.3)
			VP15TF	150(100－200)	≤0.6DC	≤10	0.2(0.1－0.3)	≤0.5DC	≤10	0.2(0.1－0.3)

Work Material		Tensile Strength	Insert Grade	Cutting Speed (m/min)	ϕ100			ϕ125		
					Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)	Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)
K	Gray Cast Iron	≤200MPa	MC5020	300(250－350)	≤DC	≤10	0.4(0.3－0.5)	≤DC	≤10	0.4(0.3－0.5)
			VP15TF	250(200－300)	≤DC	≤10	0.4(0.3－0.5)	≤DC	≤10	0.4(0.3－0.5)
		≤350MPa	MC5020	220(150－300)	≤DC	≤10	0.3(0.2－0.4)	≤DC	≤10	0.3(0.2－0.4)
			VP15TF	200(150－300)	≤DC	≤10	0.3(0.2－0.4)	≤DC	≤10	0.3(0.2－0.4)
	Ductile Cast Iron	≤450MPa	MC5020	200(150－250)	≤0.4DC	≤10	0.3(0.2－0.4)	≤0.3DC	≤10	0.3(0.2－0.4)
			VP15TF	170(150－200)	≤0.4DC	≤10	0.3(0.2－0.4)	≤0.3DC	≤10	0.3(0.2－0.4)
		≤800MPa	MC5020	170(150－200)	≤0.4DC	≤10	0.2(0.1－0.3)	≤0.3DC	≤10	0.2(0.1－0.3)
			VP15TF	150(100－200)	≤0.4DC	≤10	0.2(0.1－0.3)	≤0.3DC	≤10	0.2(0.1－0.3)

Work Material		Tensile Strength	Insert Grade	Cutting Speed (m/min)	ϕ160			ϕ200－ϕ250		
					Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)	Radial Depth of Cut ae (mm)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)
K	Gray Cast Iron	≤200MPa	MC5020	300(250－350)	≤DC	≤10	0.4(0.3－0.5)	≤DC	≤10	0.4(0.3－0.5)
			VP15TF	250(200－300)	≤DC	≤10	0.4(0.3－0.5)	≤DC	≤10	0.4(0.3－0.5)
		≤350MPa	MC5020	220(150－300)	≤DC	≤10	0.3(0.2－0.4)	≤DC	≤10	0.3(0.2－0.4)
			VP15TF	200(150－300)	≤DC	≤10	0.3(0.2－0.4)	≤DC	≤10	0.3(0.2－0.4)
	Ductile Cast Iron	≤450MPa	MC5020	200(150－250)	≤0.25DC	≤10	0.3(0.2－0.4)	≤0.15DC	≤10	0.3(0.2－0.4)
			VP15TF	170(150－200)	≤0.25DC	≤10	0.3(0.2－0.4)	≤0.15DC	≤10	0.3(0.2－0.4)
		≤800MPa	MC5020	170(150－200)	≤0.25DC	≤10	0.2(0.1－0.3)	≤0.15DC	≤10	0.2(0.1－0.3)
			VP15TF	150(100－200)	≤0.25DC	≤10	0.2(0.1－0.3)	≤0.15DC	≤10	0.2(0.1－0.3)

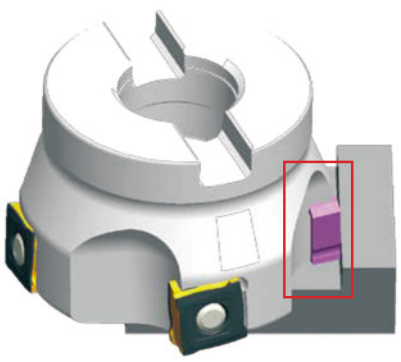
(Note 1) DC is cutter diameter.

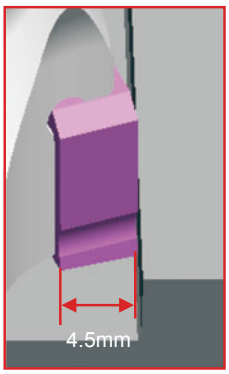
(Note 2) When using wiper insert, please reduce the feed per tooth to half the normal rate.

Usable cutting edge width of wiper inserts

The width of the wiper insert itself is 5.5mm, however the actual functioning cutting edge width after installation to the body is 4.5mm, as shown in the diagram.

With one wiper insert, it is possible to machine up to fr=4mm feed per revolution. When exceeding fr=4mm, use two or more wiper inserts. Note that there is a possibility to exceed fr=4mm when using a holder with more than 24 inserts.





SHOULDER MILLING
<GENERAL CUTTING>

Finishing Roughing

ASX400

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal	Heat Resistant Alloy	Hardened Steel

Fig.1
ø50
ø63

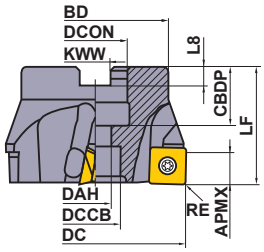
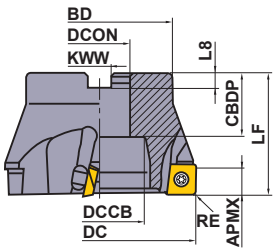


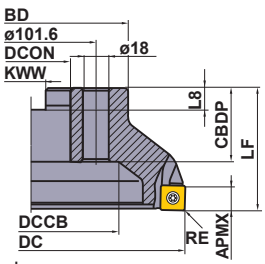
Fig.2
ø80
ø100
ø125
ø160





- High tolerance M-class inserts.
- Economical 4 cutting edge inserts.
- Curved cutting edge and high rigidity holder.
- Screw-on type.

Fig.3
ø200
ø250



ARBOR TYPE

KAPR :0°
GAMP:+11° T :-9°–-11°
GAMF:-9°–-11° I :+11°

Right hand tool holder only.

Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	DCON	CBDP	DAH	BD	KWW	L8	DCCB	WT * (kg)	APMX (mm)	Type (Fig.)
Coarse Pitch	**ASX400-050A03R**	●	3	50	40	22	20	11	41	10.4	6.3	17	0.3	10	1
	ASX400**-063A04R**	●	4	63	40	22	20	11	50	10.4	6.3	17	0.5	10	1
	ASX400**R08004C**	●	4	80	50	25.4	26	—	60	9.5	6	38	1.0	10	2
	ASX400**R10005D**	●	5	100	50	31.75	32	—	70	12.7	8	45	1.5	10	2
	ASX400**R12506E**	●	6	125	63	38.1	35	—	80	15.9	10	60	2.5	10	2
	ASX400**R16008F**	●	8	160	63	50.8	38	—	100	19.1	11	90	4.0	10	2
	ASX400**R20010K**	●	10	200	63	47.625	35	—	160	25.4	14.22	135	7.0	10	3
	ASX400**R25012K**	●	12	250	63	47.625	35	—	210	25.4	14.22	180	12.0	10	3
Fine Pitch	**ASX400-050A04R**	●	4	50	40	22	20	11	41	10.4	6.3	17	0.3	10	1
	ASX400**-063A05R**	●	5	63	40	22	20	11	50	10.4	6.3	17	0.5	10	1
	ASX400**R08006C**	●	6	80	50	25.4	26	—	60	9.5	6	38	1.0	10	2
	ASX400**R10007D**	●	7	100	50	31.75	32	—	70	12.7	8	45	1.5	10	2
	ASX400**R12508E**	●	8	125	63	38.1	35	—	80	15.9	10	60	2.5	10	2
	ASX400**R16012F**	●	12	160	63	50.8	38	—	100	19.1	11	90	4.0	10	2
	ASX400**R20016K**	●	16	200	63	47.625	35	—	160	25.4	14.22	135	7.0	10	3
	ASX400**R25018K**	●	18	250	63	47.625	35	—	210	25.4	14.22	180	12.0	10	3

* WT : Tool Weight

SPARE PARTS

Tool Holder Number	Shim	Shim Screw *	Clamp Screw *	Wrench (Insert)	Wrench (Shim)
ASX400	STASX400N	WCS503507H	TPS35	TIP15T	HKY35R

* Clamp Torque (N • m) : WCS503507H=5.0, TPS35=3.5

● : Inventory maintained in Japan.



Fig.1
ø50
ø63

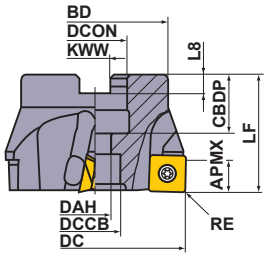


Fig.2
ø80
ø100
ø125

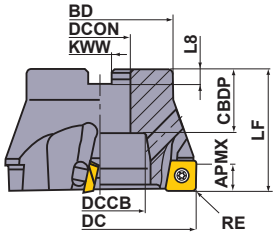


Fig.3
ø160

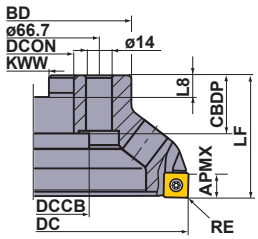
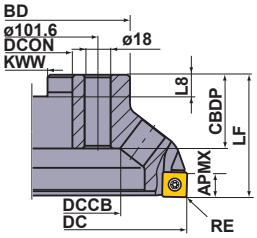


Fig.4
ø200
ø250



For metric arbor

The cutter bore diameter DCON is indicated in millimetre.

ARBOR TYPE

KAPR :0°
GAMP:+11° T :-9°—-11°
GAMF :-9°—-11° I :+11°

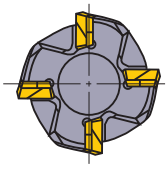
Right hand tool holder only.

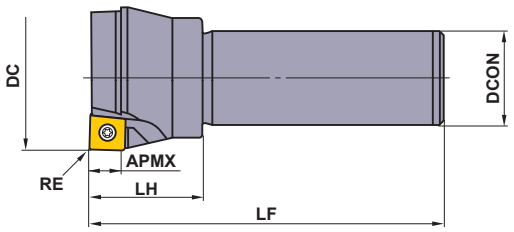
Type	Order Number	Stock	Number of Teeth	Dimensions(mm)									WT * (kg)	APMX (mm)	Type (Fig.)
		R		DC	LF	DCON	CBDP	DAH	BD	KWW	L8	DCCB			
Coarse Pitch	**ASX400-050A03R**	●	3	50	40	22	20	11	41	10.4	6.3	17	0.3	10	1
	ASX400-063A04R	●	4	63	40	22	20	11	50	10.4	6.3	17	0.5	10	1
	ASX400-080B04R	●	4	80	50	27	29	—	60	12.4	7	38	0.9	10	2
	ASX400-100B05R	●	5	100	50	32	32	—	70	14.4	8	45	1.4	10	2
	ASX400-125B06R	●	6	125	63	40	32	—	80	16.4	9	60	2.3	10	2
	ASX400-160C08R	●	8	160	63	40	29	—	100	16.4	9	56	3.6	10	3
	ASX400-200C10R	●	10	200	63	60	32	—	160	25.7	14.22	135	6.3	10	4
	ASX400-250C12R	●	12	250	63	60	32	—	210	25.7	14.22	180	10.8	10	4
Fine Pitch	**ASX400-050A04R**	●	4	50	40	22	20	11	41	10.4	6.3	17	0.3	10	1
	ASX400-063A05R	●	5	63	40	22	20	11	50	10.4	6.3	17	0.5	10	1
	ASX400-080B06R	●	6	80	50	27	29	—	60	12.4	7	38	0.9	10	2
	ASX400-100B07R	●	7	100	50	32	32	—	70	14.4	8	45	1.4	10	2
	ASX400-125B08R	●	8	125	63	40	32	—	80	16.4	9	60	2.2	10	2
	ASX400-160C12R	●	12	160	63	40	29	—	100	16.4	9	56	3.5	10	3
	ASX400-200C16R	●	16	200	63	60	32	—	160	25.7	14.22	135	6.2	10	4
	ASX400-250C18R	●	18	250	63	60	32	—	210	25.7	14.22	180	10.7	10	4
Extra Fine Pitch	**ASX400-050A05R**	●	5	50	40	22	20	11	41	10.4	6.3	17	0.3	10	1
	ASX400-063A06R	●	6	63	40	22	20	11	50	10.4	6.3	17	0.5	10	1
	ASX400-080B08R	●	8	80	50	27	29	—	60	12.4	7	38	0.9	10	2
	ASX400-100B10R	●	10	100	50	32	32	—	70	14.4	8	45	1.4	10	2
	ASX400-125B12R	●	12	125	63	40	32	—	80	16.4	9	60	2.1	10	2
	ASX400-160C15R	●	15	160	63	40	29	—	100	16.4	9	56	3.4	10	3
	ASX400-200C19R	●	19	200	63	60	32	—	160	25.7	14.22	135	6.2	10	4
	ASX400-250C22R	●	22	250	63	60	32	—	210	25.7	14.22	180	10.5	10	4

* WT : Tool Weight

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001







SHANK TYPE

Right hand tool holder only.

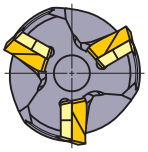
Type	Order Number	Stock	Number of Teeth	Dimensions(mm)				
		R		DC	LF	DCON	LH	APMX
Coarse Pitch	**ASX400R403S32**	●	3	40	125	32	40	10
	ASX400R**503S32**	●	3	50	125	32	40	10
	ASX400R**634S32**	●	4	63	125	32	40	10
	ASX400R**804S32**	●	4	80	125	32	40	10
Fine Pitch	ASX400R**504S32**	●	4	50	125	32	40	10
	ASX400R**635S32**	●	5	63	125	32	40	10
	ASX400R**806S32**	●	6	80	125	32	40	10

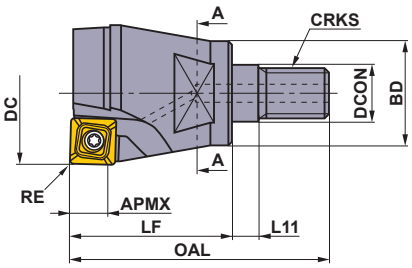
SPARE PARTS

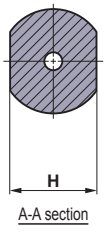
Tool Holder Number		 *	 *		
	Shim	Shim Screw	Clamp Screw	Wrench (Insert)	Wrench (Shim)
ASX400	STASX400N	WCS503507H	TPS35	TIP15T	HKY35R

* Clamp Torque (N • m) : WCS503507H=5.0, TPS35=3.5









SCREW-IN TYPE

Right hand tool holder only.

Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm)									*1 WT		 *2	 *2		
	R			DC	DCON	BD	OAL	LF	L11	H	CRKS	APMX	(kg)	Shim	Shim Screw	Clamp Screw	Wrench (Insert)	Wrench (Shim)
ASX400R322AM1640	●	○	2	32	17	29	63	40	6	24	M16	10	0.3	—	WCS503507H	TPS35	TIP15T	HKY35R
ASX400R**403AM1645**	●	○	3	40	17	29	68	45	6	24	M16	10	0.3	STASX400N	WCS503507H	TPS35	TIP15T	HKY35R

(Note) For screw-in type arbors, refer to page L145—L146.

*1 WT : Tool Weight

*2 Clamp Torque (N • m) : WCS503507H=5.0, TPS35=3.5

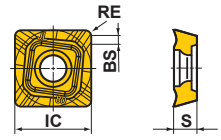
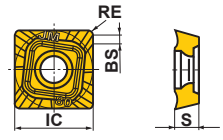
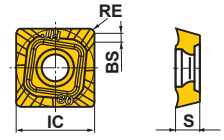
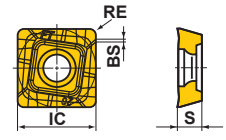
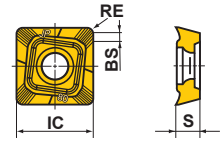
● : Inventory maintained in Japan. (10 inserts in one case)

INSERTS WITH BREAKER

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	
H	Hardened Steel	

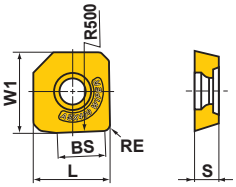
Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting
✱ : Unstable Cutting

Honing :
E : Round **F** : Sharp **T** : Chamfer

Application	Shape	Order Number	Class	Honing	Coated										Cermet		Carbide		Dimensions (mm)				Geometry
					F7030	MC5020	MP6120 NEW	MP6130 NEW	MP7130 NEW	MP7140 NEW	MP9120 NEW	MP9130 NEW	VP15TF	VP30RT	NX4545		HTi10		IC	S	BS	RE	
Finish–Light Cutting	**JL** Breaker	**SOET12T308PEER-JL**	E	E	●		●	●	●	●	●	●	●	●	●				12.7	3.97	1.4	0.8	
Light–Rough Cutting	**JM** Breaker	**SOMT12T308PEER-JM**	M	E	●	●	●	●	●	●	●	●	●	●	●				12.7	3.97	1.4	0.8	
Medium–Heavy Cutting	**JH** Breaker	**SOMT12T308PEER-JH**	M	E	●	●	●	●	●	●	●	●	●	●					12.7	3.97	1.4	0.8	
Heavy Interrupted Cutting	**FT** Breaker	**SOMT12T320PEER-FT**	M	E		●	●				●	●	●						12.7	3.97	0.5	2.0	
For Aluminium Alloy	**JP** Breaker	**SOGT12T308PEFR-JP**	G	F													●		12.7	3.97	1.4	0.8	

■ = MIRACLE SIGMA

WIPER INSERTS

Shape	Order Number	Class	Honing	Cermet		Carbide		Dimensions(mm)					Geometry
				NX2525		HTi05T		L	W1	S	BS	RE	
	**WOEW12T308PEER8C**	E	E			●		12.5	13.2	3.97	8	0.8	
	WOEW**12T308PETR8C**	E	T	●				12.5	13.2	3.97	8	0.8	

SCREW-IN ARBORS ➤ L145
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (SFM)	Finish—Light Cutting		Light—Rough Cutting		Medium—Heavy Cutting	
					Feed per Tooth (mm/t.)	Breaker	Feed per Tooth (mm/t.)	Breaker	Feed per Tooth (mm/t.)	Breaker
P	Mild Steel	≤180HB	**F7030**	280 (210—350)	0.18 (0.08—0.28)	**JL**	0.20 (0.10—0.30)	**JM**	0.25 (0.10—0.35)	**JH**
			MP6120 VP15TF	250 (200—300)	0.18 (0.08—0.28)	**JL**	0.20 (0.10—0.30)	**JM**	0.25 (0.10—0.35)	**JH FT**
			MP6130	240 (190—290)	0.18 (0.08—0.28)	**JL**	0.20 (0.10—0.30)	**JM**	0.25 (0.10—0.35)	**JH**
			VP30RT	230 (180—280)	0.18 (0.08—0.28)	**JL**	0.20 (0.10—0.30)	**JM**	0.25 (0.10—0.35)	**JH**
			NX4545	180 (130—230)	0.15 (0.07—0.23)	**JL**	0.18 (0.10—0.28)	**JM**	—	—
	Carbon Steel Alloy Steel	180—280HB	**F7030**	250 (200—300)	0.15 (0.07—0.23)	**JL**	0.18 (0.10—0.28)	**JM**	0.20 (0.10—0.30)	**JH**
			MP6120 VP15TF	220 (170—270)	0.15 (0.07—0.23)	**JL**	0.18 (0.10—0.28)	**JM**	0.20 (0.10—0.30)	**JH FT**
			MP6130	180 (150—230)	0.15 (0.07—0.23)	**JL**	0.18 (0.10—0.28)	**JM**	0.20 (0.10—0.30)	**JH**
			VP30RT	150 (120—180)	0.15 (0.07—0.23)	**JL**	0.18 (0.10—0.28)	**JM**	0.20 (0.10—0.30)	**JH**
			NX4545	150 (120—180)	0.13 (0.06—0.20)	**JL**	0.15 (0.10—0.25)	**JM**	—	—
		280—350HB	**F7030**	180 (130—230)	0.13 (0.06—0.20)	**JL**	0.15 (0.10—0.25)	**JM**	0.18 (0.10—0.28)	**JH**
			MP6120 VP15TF	140 (100—180)	0.13 (0.06—0.20)	**JL**	0.15 (0.10—0.25)	**JM**	0.18 (0.10—0.28)	**JH FT**
			MP6130	120 (90—150)	0.13 (0.06—0.20)	**JL**	0.15 (0.10—0.25)	**JM**	0.18 (0.10—0.28)	**JH**
			VP30RT	100 (80—160)	0.13 (0.06—0.20)	**JL**	0.15 (0.10—0.25)	**JM**	0.18 (0.10—0.28)	**JH**
			NX4545	100 (80—160)	0.10 (0.05—0.15)	**JL**	0.13 (0.10—0.20)	**JM**	—	—
M	Stainless Steel	≤270HB	**MP7130 VP15TF**	220 (170—270)	0.15 (0.07—0.23)	**JL**	0.18 (0.10—0.28)	**JM**	0.20 (0.10—0.30)	**JH FT**
			MP7140 VP30RT	200 (150—250)	0.15 (0.07—0.23)	**JL**	0.18 (0.10—0.28)	**JM**	0.20 (0.10—0.30)	**JH**
			NX4545	150 (120—180)	0.15 (0.07—0.23)	**JL**	0.18 (0.10—0.28)	**JM**	—	—
K	Cast Iron Ductile Cast Iron	Tensile Strength ≤450MPa	**MC5020**	200 (150—250)	—	—	0.20 (0.10—0.30)	**JM**	0.25 (0.10—0.35)	**JH FT**
			VP15TF	180 (130—230)	0.18 (0.10—0.28)	**JL**	0.20 (0.10—0.30)	**JM**	0.25 (0.10—0.35)	**JH FT**
N	Aluminium Alloy	—	**HTi10**	650 (300—1000)	0.15 (0.10—0.20)	**JP**	0.20 (0.10—0.30)	**JP**	0.30 (0.20—0.40)	**JP**
S	Titanium Alloy	—	**MP9120 VP15TF**	50 (40—60)	0.12 (0.05—0.20)	**JL**	0.15 (0.05—0.20)	**JM**	0.18 (0.10—0.28)	**JH FT**
			MP9130	45 (30—55)	0.10 (0.05—0.20)	**JL**	0.15 (0.05—0.20)	**JM**	0.18 (0.10—0.28)	**JH FT**
	Heat Resistant Alloy (Inconel etc.)	—	**MP9120 VP15TF**	40 (20—50)	0.12 (0.05—0.20)	**JL**	0.15 (0.05—0.20)	**JM**	0.18 (0.10—0.28)	**JH FT**
			MP9130	35 (15—45)	0.10 (0.05—0.20)	**JL**	0.15 (0.05—0.20)	**JM**	0.18 (0.10—0.28)	**JH FT**
H	Hardened Steel	40—55HRC	**VP15TF**	80 (60—100)	0.08 (0.04—0.13)	**JL**	0.10 (0.05—0.15)	**JM**	0.12 (0.07—0.17)	**JH FT**

●Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC) ●Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

INSTRUCTIONS FOR USING INSERTS

Instructions for use of the JP breaker

- The JP breaker has sharp cutting edges. Wear gloves when handling.
- When machining aluminium alloy, welding to the cutting edge tends to occur, often leading to insert failure. To prevent this, wet cutting is recommended.

Instructions for use of wiper inserts

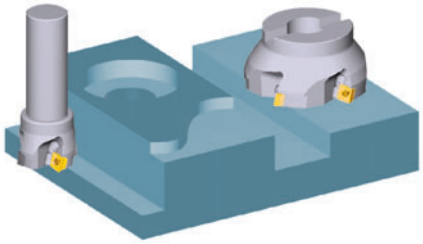


- Wiper inserts for the ASX400 are single-cornered.
- When installing the wiper insert, place the insert so that the small chamfer is located as shown.
- The peripheral cutting edge of the wiper insert is located back than general inserts. Beware of wear of the insert just behind the wiper insert.
- When using wiper set the following standard conditions. Depth of Cut (ap)≤0.5mm, Feed per Tooth (fz)≤0.2mm/t.

FEATURES

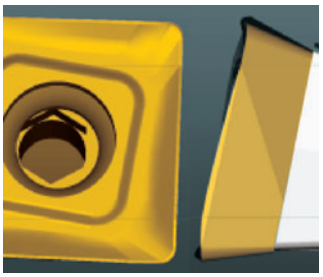
ECONOMICAL

ASX400 is economical as it employs inserts that have 4 cutting edges. Additionally with one tool, it is possible to carry out face milling, shoulder milling, and slotting operations.



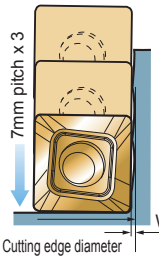
LOW RESISTANCE

Due to the 3D design of the cutting edge and a large rake angle, high cutting edge sharpness has been achieved with reduced cutting resistance.



HIGH ACCURACY

Due to the curved edge and high accuracy body and insert, high accuracy surface finish on walls and high quality surface finish on faces can be achieved.



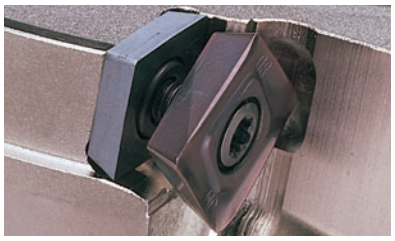
* JM breaker data

Tool	δ
ASX400	30
Competitor A	100
Competitor B	122

Values obtained under recommended cutting conditions.

EASY TO USE

Employs a screw on type mechanism, therefore, the inserts can be easily set. Additionally when indexing the insert, it is not necessary to remove the screw completely.



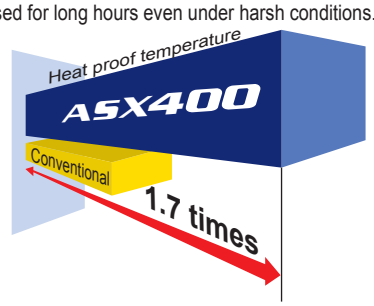
HIGH RELIABILITY

Uses a carbide shim and Mitsubishi's proprietary Anti-Fly-Insert (A.F.I) to prevent the inserts from moving when machining. Additionally the clamp screw uses TORXPLUS®, for high clamping force ensuring high reliability.

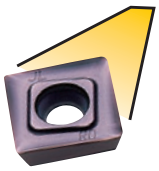
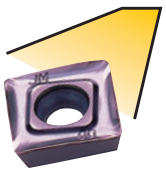
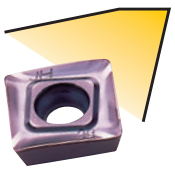
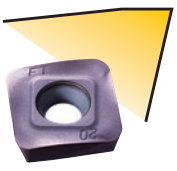
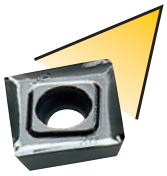


HIGH HEAT-RESISTANT BODY

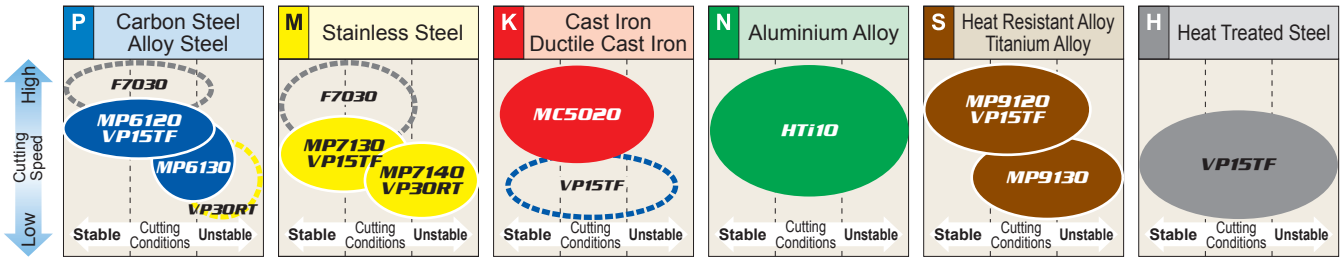
The cutter body is made from a special alloy that provides high strength at high temperatures. A special surface treatment improves the corrosion and friction resistance. The **ASX400** can be used for long hours even under harsh conditions.



CHIPBREAKERS FOR A WIDE RANGE OF APPLICATIONS

JL Finish to Light cutting Breaker	JM Light to Rough cutting Breaker	JH Medium to Heavy cutting Breaker	FT Heavy cutting/Heavy interrupted cutting Breaker	JP Aluminium alloy cutting Breaker
				
●High accuracy insert with ground-finished periphery. ●Large rake angle leading to low cutting resistance.	●High accuracy M class insert. ●For a wide range of workpiece materials and cutting conditions.	●High accuracy M class insert. ●Strong cutting edge for high fracture resistance.	●High accuracy M-class insert. ●Nose radius of 2.0mm has improved fracture resistance. Strong main cutting edge allows heavy cutting and heavy interrupted cutting. Stable cutting performance.	●High accuracy insert with ground-finished periphery. ●Large rake angle and mirror-finished rake face lead to sharp cutting performance and high welding resistance.

INSERT GRADES FOR A WIDE RANGE OF MATERIALS



(Note) When machining steel or stainless steel and the emphasis is on surface finish, use cermet grade NX4545.
Stable Cutting : Continuous cutting, Constant depth of cut, Pre-machined securely clamped component cutting
Unstable Cutting : Heavy interrupted, Irregular depth of cut, Low clamping rigidity cutting

MULTI FUNCTIONAL MILLING

0° | Finishing | Roughing | Including Flat faces

APX3000

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal	Heat Resistant Alloy	Hardened Steel



- High accuracy, high quality vertical wall.
- Low cutting force insert.
- With through air & coolant holes.

SHANK TYPE

Fig.1

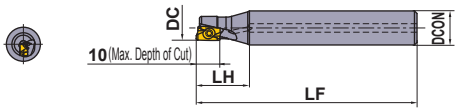


Fig.2

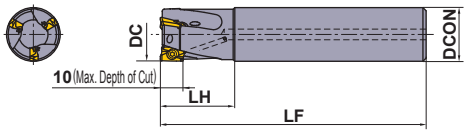
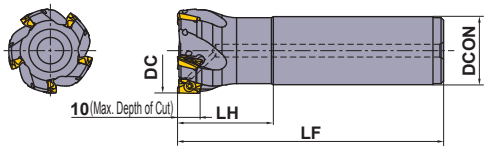


Fig.3



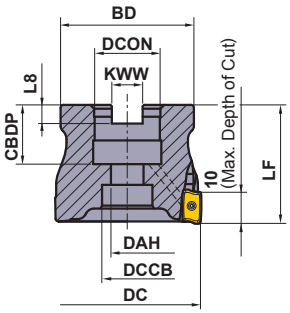
Right hand tool holder only.

Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	DCON	LF	LH	∗2 RMPX	Max. Allowable Revolution (min⁻¹)	Type(Fig.)	∗1 Clamp Screw	Wrench	Anti-seize Lubricant	Inserts
Standard	APX3000R121SA16SA	●	1	12	16	85	25	6.0°	10500	1	TPS25	TIP07F	MK1KS	
	APX3000R141SA16SA	●	1	14	16	85	25	6.0°	9000	1	TPS25	TIP07F	MK1KS	
	APX3000R162SA16SA	●	2	16	16	85	25	11.3°	20900	2	TPS25	TIP07F	MK1KS	
	APX3000R182SA16SA	●	2	18	16	85	25	8.6°	19600	3	TPS25	TIP07F	MK1KS	
	APX3000R202SA20SA	●	2	20	20	100	30	6.9°	18500	2	TPS25	TIP07F	MK1KS	
	APX3000R203SA20SA	●	3	20	20	100	30	6.9°	18500	2	TPS25	TIP07F	MK1KS	
	APX3000R223SA20SA	●	3	22	20	115	30	5.7°	17600	3	TPS25—1	TIP07F	MK1KS	
	APX3000R252SA25SA	●	2	25	25	115	35	4.6°	16400	2	TPS25—1	TIP07F	MK1KS	
	APX3000R253SA25SA	●	3	25	25	115	35	4.6°	16400	2	TPS25—1	TIP07F	MK1KS	
	APX3000R254SA25SA	●	4	25	25	115	35	4.6°	16400	2	TPS25—1	TIP07F	MK1KS	
	APX3000R284SA25SA	●	4	28	25	115	35	3.8°	15500	3	TPS25—1	TIP07F	MK1KS	
	APX3000R304SA32SA	●	4	30	32	125	45	3.4°	14900	2	TPS25—1	TIP07F	MK1KS	
	APX3000R323SA32SA	●	3	32	32	125	45	3.1°	14400	2	TPS25—1	TIP07F	MK1KS	
	APX3000R324SA32SA	●	4	32	32	125	45	3.1°	14400	2	TPS25—1	TIP07F	MK1KS	
	APX3000R325SA32SA	●	5	32	32	125	45	3.1°	14400	2	TPS25—1	TIP07F	MK1KS	
	APX3000R403SA32SA	●	3	40	32	125	45	2.2°	12800	3	TPS25—1	TIP07F	MK1KS	
	APX3000R405SA32SA	●	5	40	32	125	45	2.2°	12800	3	TPS25—1	TIP07F	MK1KS	
	APX3000R406SA32SA	●	6	40	32	125	45	2.2°	12800	3	TPS25—1	TIP07F	MK1KS	
	APX3000R507SA32SA	●	7	50	32	125	45	1.7°	11300	3	TPS25—1	TIP07F	MK1KS	AOMT 1236□□ PEER-□
	APX3000R638SA32SA	●	8	63	32	125	45	1.3°	10000	3	TPS25—1	TIP07F	MK1KS	AOGT 1236□□ PEFR-GM
Long	APX3000R182SA16LA	●	2	18	16	120	25	8.6°	19600	3	TPS25	TIP07F	MK1KS	
	APX3000R202SA20LA	●	2	20	20	150	60	6.9°	18500	2	TPS25	TIP07F	MK1KS	
	APX3000R222SA20LA	●	2	22	20	150	30	5.7°	17600	3	TPS25—1	TIP07F	MK1KS	
	APX3000R252SA25LA	●	2	25	25	170	70	4.6°	16400	2	TPS25—1	TIP07F	MK1KS	
	APX3000R253SA25LA	●	3	25	25	170	70	4.6°	16400	2	TPS25—1	TIP07F	MK1KS	
	APX3000R282SA25LA	●	2	28	25	170	35	3.8°	15500	3	TPS25—1	TIP07F	MK1KS	
	APX3000R283SA25LA	●	3	28	25	170	35	3.8°	15500	3	TPS25—1	TIP07F	MK1KS	
	APX3000R322SA32LA	●	2	32	32	190	90	3.1°	14400	2	TPS25—1	TIP07F	MK1KS	
	APX3000R323SA32LA	●	3	32	32	190	90	3.1°	14400	2	TPS25—1	TIP07F	MK1KS	
	APX3000R352SA32LA	●	2	35	32	190	45	2.7°	13700	3	TPS25—1	TIP07F	MK1KS	
	APX3000R353SA32LA	●	3	35	32	190	45	2.7°	13700	3	TPS25—1	TIP07F	MK1KS	
Extra Long	APX3000R182SA16ELA	●	2	18	16	180	25	8.6°	19600	3	TPS25	TIP07F	MK1KS	
	APX3000R202SA20ELA	●	2	20	20	200	70	6.9°	18500	2	TPS25	TIP07F	MK1KS	
	APX3000R222SA20ELA	●	2	22	20	200	30	5.7°	17600	3	TPS25—1	TIP07F	MK1KS	
	APX3000R252SA25ELA	●	2	25	25	220	80	4.6°	16400	2	TPS25—1	TIP07F	MK1KS	
	APX3000R253SA25ELA	●	3	25	25	220	80	4.6°	16400	2	TPS25—1	TIP07F	MK1KS	
	APX3000R282SA25ELA	●	2	28	25	220	35	3.8°	15500	3	TPS25—1	TIP07F	MK1KS	
	APX3000R283SA25ELA	●	3	28	25	220	35	3.8°	15500	3	TPS25—1	TIP07F	MK1KS	
	APX3000R322SA32ELA	●	2	32	32	260	100	3.1°	14400	2	TPS25—1	TIP07F	MK1KS	
	APX3000R323SA32ELA	●	3	32	32	260	100	3.1°	14400	2	TPS25—1	TIP07F	MK1KS	
	APX3000R352SA32ELA	●	2	35	32	260	45	2.7°	13700	3	TPS25—1	TIP07F	MK1KS	
	APX3000R353SA32ELA	●	3	35	32	260	45	2.7°	13700	3	TPS25—1	TIP07F	MK1KS	

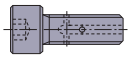
(Note 1) When using inserts with corner radius RE≥2.4, machining of the holder is required as shown page L049.
(Note 2) The maximum allowable revolutions are set to ensure tool and insert stability.
(Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
∗1 Clamp Torque (N • m) : TPS25=1.0, TPS25—1=1.0 ∗2 RMPX : Max. Ramping Angle

● : **Inventory maintained in Japan.**





Right hand tool holder only.

Cutter Diameter DC	Set Bolt	Geometry
ϕ32, ϕ40	HSC08030H	
ϕ50, ϕ63	10030H	
ϕ80	12035H	
ϕ100	16040H	

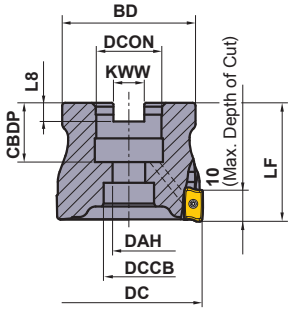
ARBOR TYPE

KAPR :0°
GAMP:+7°—+21° T :+15°—+27°
GAMF:+15°—+27°I :+7°—+21°

Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	DCON	CBDP	DAH	BD	KWW	L8	DCCB	WT*3 (kg)	RMPX*2	Max. Allowable Revolution (min-1)	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Inserts
APX3000-032A05RA	●	5	32	40	16	18	9	30	8.4	5.6	14	0.2	3.1°	14400	TPS25—1	TIP07F	MK1KS	AOMT 1236□□ PEER-□
APX3000**-040A06RA**	●	6	40	40	16	18	9	34	8.4	5.6	14	0.3	2.2°	12800	TPS25—1	TIP07F	MK1KS	
APX3000**-050A07RA**	●	7	50	40	22	20	11	45	10.4	6.3	17	0.4	1.7°	11300	TPS25—1	TIP07F	MK1KS	
APX3000**-063A08RA**	●	8	63	40	22	20	11	55	10.4	6.3	17	0.7	1.3°	10000	TPS25—1	TIP07F	MK1KS	AOGT 1236□□ PEFR-GM
APX3000**R08009CA**	●	9	80	50	25.4	26	13	70	9.5	6	20	1.3	1.0°	8800	TPS25—1	TIP07F	MK1KS	
APX3000**R10011DA**	●	11	100	63	31.75	32	17	80	12.7	8	26	2.2	0.8°	7800	TPS25—1	TIP07F	MK1KS	

(Note 1) When using inserts with corner radius RE≥2.4, machining of the holder is required as shown page L049.
(Note 2) The maximum allowable revolutions are set to ensure tool and insert stability.
(Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
*1 Clamp Torque (N • m) : TPS25—1=1.0
*2 RMPX : Max. Ramping Angle
*3 WT : Tool Weight

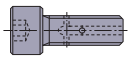




Right hand tool holder only.

For metric arbor

The cutter bore diameter DCON is indicated in millimetre.

Cutter Diameter DC	Set Bolt	Geometry
ϕ32, ϕ40	HSC08030H	
ϕ50, ϕ63	10030H	
ϕ80	12035H	
ϕ100	16040H	

ARBOR TYPE

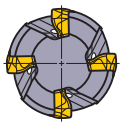
KAPR :0°
GAMP:+7°—+21° T :+15°—+27°
GAMF:+15°—+27°I :+7°—+21°

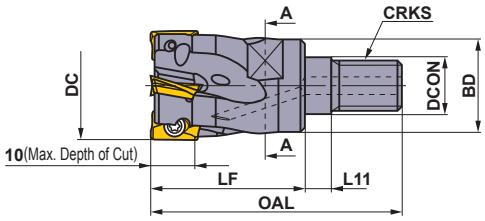
Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	DCON	CBDP	DAH	BD	KWW	L8	DCCB	WT*3 (kg)	RMPX*2	Max. Allowable Revolution (min-1)	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Inserts
APX3000-032A05RA	●	5	32	40	16	18	9	30	8.4	5.6	14	0.2	3.1°	14400	TPS25—1	TIP07F	MK1KS	AOMT 1236□□ PEER-□
APX3000**-040A06RA**	●	6	40	40	16	18	9	34	8.4	5.6	14	0.3	2.2°	12800	TPS25—1	TIP07F	MK1KS	
APX3000**-050A07RA**	●	7	50	40	22	20	11	45	10.4	6.3	17	0.4	1.7°	11300	TPS25—1	TIP07F	MK1KS	
APX3000**-063A08RA**	●	8	63	40	22	20	11	55	10.4	6.3	17	0.7	1.3°	10000	TPS25—1	TIP07F	MK1KS	AOGT 1236□□ PEFR-GM
APX3000**-080A09RA**	●	9	80	50	27	23	13	70	12.4	7	20	1.3	1.0°	8800	TPS25—1	TIP07F	MK1KS	
APX3000**-100A11RA**	●	11	100	63	32	26	17	80	14.4	8	26	2.2	0.8°	7800	TPS25—1	TIP07F	MK1KS	

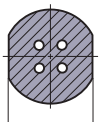
(Note 1) When using inserts with corner radius RE≥2.4, machining of the holder is required as shown page L049.
(Note 2) The maximum allowable revolutions are set to ensure tool and insert stability.
(Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
*1 Clamp Torque (N • m) : TPS25—1=1.0 *2 RMPX : Max. Ramping Angle
*3 WT : Tool Weight

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001









● With through air & coolant holes.

SCREW-IN TYPE

Right hand tool holder only.

Order Number	Stock	Number of Teeth	Dimensions(mm)								∗2 WT (kg)	∗1 Clamp Screw	Wrench	Anti-seize Lubricant	Inserts
	R		DC	DCON	BD	OAL	LF	L11	H	CRKS					
APX3000R162M08A30	●	2	16	8.5	13	48	30	6	10	M8	0.1	TPS25	TIP07F	MK1KS	AOMT 1236◯◯ PEER-◯ AOGT 1236◯◯ PEFR-GM
APX3000R182M08A30	●	2	18	8.5	13	48	30	6	10	M8	0.1	TPS25	TIP07F	MK1KS	
APX3000R203M10A30	●	3	20	10.5	18	49	30	6	14	M10	0.1	TPS25	TIP07F	MK1KS	
APX3000R223M10A30	●	3	22	10.5	18	49	30	6	14	M10	0.1	TPS25−1	TIP07F	MK1KS	
APX3000R254M12A35	●	4	25	12.5	21	57	35	6	19	M12	0.2	TPS25−1	TIP07F	MK1KS	
APX3000R284M12A35	●	4	28	12.5	21	57	35	6	19	M12	0.2	TPS25−1	TIP07F	MK1KS	
APX3000R304M16A40	●	4	30	17	29	63	40	6	24	M16	0.3	TPS25−1	TIP07F	MK1KS	
APX3000R325M16A40	●	5	32	17	29	63	40	6	24	M16	0.3	TPS25−1	TIP07F	MK1KS	
APX3000R355M16A40	●	5	35	17	29	63	40	6	24	M16	0.3	TPS25−1	TIP07F	MK1KS	
APX3000R406M16A40	●	6	40	17	29	63	40	6	24	M16	0.3	TPS25−1	TIP07F	MK1KS	

(Note 1) When using inserts with corner radius RE≥2.4, machining of the holder is required as shown page L049.
(Note 2) For screw-in type arbors, refer to page L145−L146.
∗1 Clamp Torque (N • m) : TPS25=1.0, TPS25−1=1.0
∗2 WT : Tool Weight

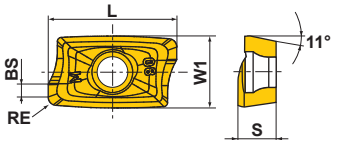
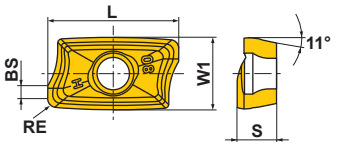
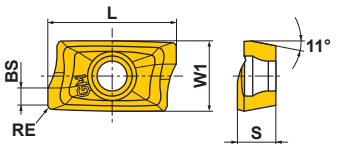
● : Inventory maintained in Japan. (10 inserts in one case)

INSERTS

Work Material	
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-ferrous Metal
S	Heat-resistant Alloy, Titanium Alloy
H	Hardened Steel

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

Honing :
E : Round **F** : Sharp

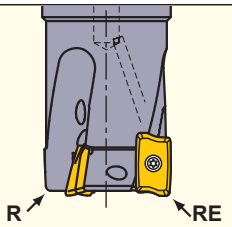
Shape	Order Number	Class	Honing	Coated								Carbide		Dimensions (mm)					Geometry
				MC5020	MP6120 (NEW)	MP6130 (NEW)	MP7130 (NEW)	MP9120 (NEW)	MP9130 (NEW)	VP15TF	VP20RT	TF15		L	W1	S	BS	RE*	
General **M** Breaker	**AOMT123602PEER-M**	M	E		●	●	●	●	●	●	●			12	6.6	3.6	1.8	0.2	
	AOMT**123604PEER-M**	M	E		●	●	●	●	●	●	●			12	6.6	3.6	1.6	0.4	
	AOMT**123608PEER-M**	M	E		●	●	●	●	●	●	●			12	6.6	3.6	1.2	0.8	
	AOMT**123610PEER-M**	M	E		●	●	●	●	●	●	●			12	6.6	3.6	1.0	1.0	
	AOMT**123612PEER-M**	M	E		●	●	●	●	●	●	●			12	6.6	3.6	0.8	1.2	
	AOMT**123616PEER-M**	M	E		●	●	●	●	●	●	●			12	6.6	3.6	0.4	1.6	
	AOMT**123620PEER-M**	M	E		●	●	●	●	●	●	●			12	6.6	3.6	0.4	2.0	
	AOMT**123624PEER-M**	M	E		●	●	●	●	●	●	●			12	6.6	3.6	0.4	2.4	
	AOMT**123630PEER-M**	M	E		●	●	●	●	●	●	●			12	6.6	3.6	0.4	3.0	
	AOMT**123632PEER-M**	M	E		●	●	●	●	●	●	●			12	6.6	3.6	0.4	3.2	
Strong Cutting Edge Type **H** Breaker	**AOMT123604PEER-H**	M	E	●	●	●	●	●	●	●	●			12	6.6	3.6	1.6	0.4	
	AOMT**123608PEER-H**	M	E	●	●	●	●	●	●	●	●			12	6.6	3.6	1.2	0.8	
	AOMT**123616PEER-H**	M	E	●	●	●	●	●	●	●	●			12	6.6	3.6	0.4	1.6	
For Machining of Aluminium Alloys **GM** Breaker	**AOGT123602PEFR-GM**	G	F									●		12	6.6	3.6	1.8	0.2	
	AOGT**123604PEFR-GM**	G	F									●		12	6.6	3.6	1.6	0.4	
	AOGT**123608PEFR-GM**	G	F									●		12	6.6	3.6	1.2	0.8	

∗ Nose R is different from the workpiece of R shape depending on the axial rake angle of the body.
Consult us for more details.

■ = MIRACLE SIGMA

NOTE ON USE OF INSERTS WITH LARGE CORNER RADII

When using inserts with corner radius RE≥R2.4, please machine the holder with a radius form as shown on the right.



RE (mm)	R (mm)
2.4	1.9
3.0	2.5
3.2	2.7

R : Holder end radius
RE : Insert corner radius

SCREW-IN ARBORS ➤ L145
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED

	Work Material	Hardness	Insert Grade 1st Recommenedation	Insert Grade 2nd Recommenedation	Breaker		Cutting Width **ae** (mm) ≤0.25DC	0.25—0.5DC	0.5—0.75DC	DC (Slot)
							Cutting Speed **vc** (m/min)			
P	Mild Steel	≤180HB	MP6120	VP15TF	M	H	230(180—270)	220(170—260)	180(140—210)	180(140—210)
			MP6130	VP20RT	M	H	200(150—240)	190(140—230)	150(110—180)	150(110—180)
	Carbon Steel Alloy Steel	180—350HB	MP6120	VP15TF	M	H	180(140—210)	170(130—200)	140(110—160)	140(110—160)
			MP6130	VP20RT	M	H	150(110—180)	140(100—170)	110(80—130)	110(80—130)
M	Stainless Steel	≤270HB	MP7130	VP20RT	M	H	180(140—210)	170(130—200)	140(110—160)	140(110—160)
K	Gray Cast Iron	≤350MPa	MC5020	VP15TF	H		250(200—300)	240(190—290)	210(160—260)	140(110—160)
	Ductile, Cast Iron	≤800MPa	MC5020	VP15TF	H		130(100—150)	120(90—140)	100(80—120)	100(80—120)
N	Aluminium Alloy	—	TF15		GM		500(200—1000)	500(200—1000)	500(200—1000)	500(200—1000)
S	Titanium Alloy	≤350HB	MP9120	VP15TF	M	H	50(40—70)			50(40—70)
			MP9130	VP20RT	M	H	40(30—60)			40(30—60)
	Heat-resistant Alloy	—	MP9120	VP15TF	M	H	40(30—60)			40(30—60)
			MP9130	VP20RT	M	H	30(20—40)			30(20—40)
H	Hardened Steel	40—55HRC	VP15TF		H		90(70—100)	85(60—100)	70(50—80)	70(50—80)

DEPTH OF CUT AND FEED

	Work Material	Hardness	Cutting Width **ae** (mm)	Cutter Diameter (mm) ø12—ø16 Depth of Cut **ap** (mm)	ø12—ø16 Feed per Tooth **fz** (mm/t.)	ø18—ø25 Depth of Cut **ap** (mm)	ø18—ø25 Feed per Tooth **fz** (mm/t.)	ø28—ø100 Depth of Cut **ap** (mm)	ø28—ø100 Feed per Tooth **fz** (mm/t.)
P	Mild Steel Carbon Steel Alloy Steel	≤180HB 180—350HB	≤0.25DC	≤4	0.15	≤5	0.25	≤5	0.20
				4—7	0.10	5—7	0.20	5—7	0.15
						7—8.5	0.15	7—8.5	0.10
						8.5—10	0.10	8.5—10	0.07
			0.25—0.5DC	≤2	0.15	≤3	0.25	≤3	0.20
				2—5	0.10	3—5.5	0.20	3—5.5	0.15
						5.5—8	0.15	5.5—8	0.10
						8—10	0.10	8—10	0.07
			0.5—0.75DC	≤4	0.10	≤4	0.15	≤3	0.10
						4—10	0.10	3—7	0.07
			DC (Slot)	≤3	0.10	≤4	0.10	≤3	0.10
						4—7	0.07	3—5	0.07
M	Stainless Steel	≤270HB	≤0.25DC	≤4	0.15	≤5	0.20	≤5	0.20
				4—7	0.10	5—7	0.15	5—7	0.15
						7—8.5	0.10	7—8.5	0.10
						8.5—10	0.07	8.5—10	0.07
			0.25—0.5DC	≤2	0.15	≤3	0.20	≤3	0.20
				2—5	0.10	3—5.5	0.15	3—5.5	0.15
						5.5—8	0.10	5.5—8	0.10
						8—10	0.07	8—10	0.07
			0.5—0.75DC	≤4	0.10	≤4	0.10	≤3	0.10
						4—10	0.07	3—7	0.07
			DC (Slot)	≤3	0.10	≤4	0.10	≤3	0.10
						4—7	0.07	3—5	0.07
K	Gray Cast Iron	Tensile Strength ≤350MPa	≤0.25DC	≤4	0.15	≤5	0.25	≤5	0.20
				4—7	0.10	5—7	0.20	5—7	0.15
						7—8.5	0.15	7—8.5	0.10
						8.5—10	0.10	8.5—10	0.07
			0.25—0.5DC	≤2	0.15	≤3	0.25	≤3	0.20
				2—5	0.10	3—5.5	0.20	3—5.5	0.15
						5.5—8	0.15	5.5—8	0.10
						8—10	0.10	8—10	0.07
			0.5—0.75DC	≤4	0.10	≤4	0.15	≤3	0.10
						4—10	0.10	3—7	0.07
			DC (Slot)	≤3	0.10	≤4	0.10	≤3	0.10
						4—7	0.07	3—5	0.07
	Ductile, Cast Iron	Tensile Strength ≤800MPa	≤0.25DC	≤4	0.10	≤5	0.20	≤5	0.20
				4—7	0.07	5—7	0.15	5—7	0.15
						7—8.5	0.10	7—8.5	0.10
						8.5—10	0.07	8.5—10	0.07
			0.25—0.5DC	≤2	0.10	≤3	0.20	≤3	0.20
				2—5	0.07	3—5.5	0.15	3—5.5	0.15
						5.5—8	0.10	5.5—8	0.10
						8—10	0.07	8—10	0.07
			0.5—0.75DC	≤4	0.07	≤4	0.10	≤3	0.10
						4—10	0.07	3—7	0.07
			DC (Slot)	≤3	0.07	≤4	0.10	≤3	0.10
						4—7	0.07	3—5	0.07

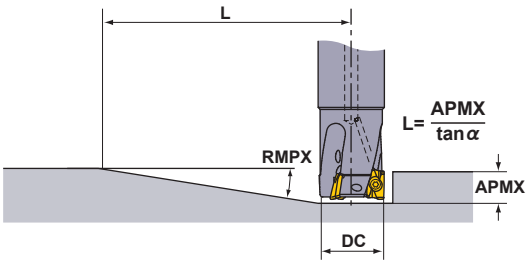
Work Material		Hardness	Cutting Width **ae** (mm)	Cutter Diameter (mm) ø12—ø16 Depth of Cut **ap** (mm)	ø12—ø16 Feed per Tooth **fz** (mm/t.)	ø18—ø25 Depth of Cut **ap** (mm)	ø18—ø25 Feed per Tooth **fz** (mm/t.)	ø28—ø100 Depth of Cut **ap** (mm)	ø28—ø100 Feed per Tooth **fz** (mm/t.)
N	Aluminium Alloy	—	≤0.25DC	≤4	0.15	≤4	0.25	≤4	0.20
				4—7	0.10	4—7	0.15	4—7	0.10
			0.25—0.5DC	≤4	0.15	≤4	0.20	≤4	0.20
				4—7	0.10	4—7	0.10	4—7	0.10
			0.5—0.75DC	≤5	0.10	≤5	0.15	≤5	0.10
			DC (Slot)	≤5	0.10	≤5	0.20	≤5	0.15
S	Titanium Alloy	≤350HB	≤0.25DC	≤4	0.15	≤4	0.15	≤4	0.10
				4—7	0.10	4—7	0.10	4—7	0.07
			0.25—0.5DC	≤3	0.05	≤3	0.05	≤3	0.05
	Heat-resistant Alloy	—	0.5—0.75DC	≤2	0.10	≤2	0.05	≤2	0.05
			DC (Slot)	≤1	0.05	≤1	0.05	≤1	0.05
H	Hardened Steel	40—55HRC	≤0.25DC	≤4	0.10	≤5	0.15	≤5	0.15
				4—7	0.07	5—7	0.10	5—7	0.10
						7—8.5	0.07		
			0.25—0.5DC	≤2	0.10	≤3	0.15	≤3	0.15
				2—5	0.07	3—5.5	0.10		
			0.5—0.75DC	≤4	0.07	≤4	0.07	≤3	0.07
			DC (Slot)	≤3	0.07	≤4	0.07	≤3	0.07

(Note 1) These cutting conditions are a guide to the standard shank type and the arbor type.
Please make adjustments according to the machining conditions.
(Note 2) Vibration is liable to occur in certain cases. Please reduce the depth of cut and / or reduce cutting conditions in the following cases.
- When using the long shank type and extra long shank type.
- When using long tool overhang with the standard or arbor type.
- When the application has poor clamping rigidity or when using a low rigidity machine.

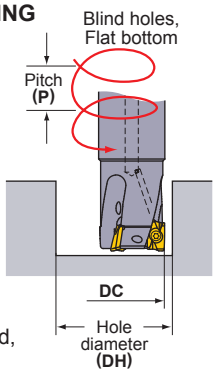
(Note 3) In case of coarse and fine pitch cutters, the coarse pitch type is recommended to prevent vibration.
(Note 4) For heavy interrupted and unstable cutting, the H breaker is first recommendation.

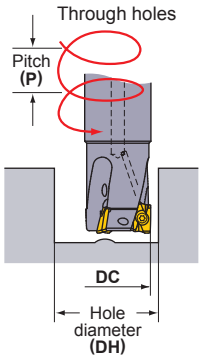
RAMPING/HELICAL CUTTING

RAMPING



HELICAL CUTTING





Refer to the table below for cutting conditions. For feed per tooth and cutting speed, follow the cutting conditions for slot milling.

Cutting Edge Diameter **DC**(mm)	Ramping: Maximum Ramping Angle **RMPX**	Ramping: Minimum Distance ✱1 **L**(mm)	Helical Cutting (Blind Hole, Flat Bottom): Maximum Hole Diameter ✱2 **DH max.**(mm)	Maximum Pitch **P max.**(mm)	Minimum Hole Diameter **DH min.**(mm)	Maximum Pitch **P max.**(mm)	Helical Cutting (Through Hole): Minimum Hole Diameter **DH min.**(mm)	Maximum Pitch **P max.**(mm)
12	6.0°	95	22	2.5	20.5	2	14	0.5
14	6.0°	95	26	2.5	24.5	2	18	1
16	11.3°	50	30	9	28	7	21	2
18	8.6°	66	34	5	32	4.5	25	2
20	6.9°	83	38	5	36	4.5	29	2
22	5.7°	100	42	5	40	4.5	33	2
25	4.6°	124	48	6	46	5	39	3
28	3.8°	151	54	4.5	52	4	45	2
30	3.4°	168	58	4.5	56	4	49	2
32	3.1°	185	62	4.5	60	4	53	2
35	2.7°	212	68	4	66	3.5	59	2
40	2.2°	260	78	4	76	3.5	69	2
50	1.7°	337	98	2	96	2	89	2
63	1.3°	441	124	2	122	2	115	2
80	1.0°	573	158	2	156	2	149	2
100	0.8°	716	198	1	196	1	189	1

(Note) When machining highly ductile materials with ramping angles above, chips could be continuous.
In this case, decrease the ramping angle or feed per tooth.
✱1 L (=10 / tan α). Cutters' moving distance until depth of cut reaches 10mm at a maximum ramping angle.
✱2 In case corner radius of 0.8mm. Other than that, find with the below formula.
{(cutting edge diameter DC)—(corner radius)—0.2)}×2

MULTI FUNCTIONAL MILLING

Finishing Roughing

APX4000

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron		Heat Resistant Alloy	Hardened Steel



- High accuracy, high quality vertical wall.
- Low cutting force insert.
- With through air & coolant holes.

Fig.1

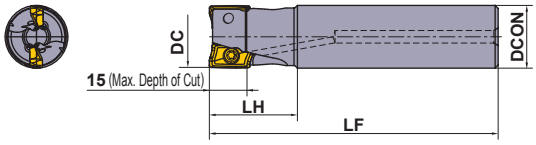
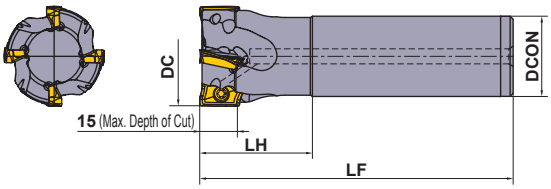


Fig.2



SHANK TYPE

Right hand tool holder only.

Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	DCON	LF	LH	RMPX *2	Max. Allowable Revolution (min^{-1})	Type (Fig.)	Clamp Screw *1	Wrench	Anti-seize Lubricant	Inserts
Standard	APX4000R252SA25SA	●	2	25	25	115	35	11°	18900	1	TPS4	TIP15W	MK1KS	AOMT 1848□□ PEER-□
	APX4000R322SA32SA	●	2	32	32	125	45	7°	16300	1	TPS4	TIP15W	MK1KS	
	APX4000R323SA32SA	●	3	32	32	125	45	7°	16300	1	TPS4	TIP15W	MK1KS	
	APX4000R403SA32SA	●	3	40	32	125	45	6°	14200	2	TPS43	TIP15W	MK1KS	
	APX4000R404SA32SA	●	4	40	32	125	45	6°	14200	2	TPS43	TIP15W	MK1KS	
	APX4000R504SA32SA	●	4	50	32	125	45	4°	12400	2	TPS43	TIP15W	MK1KS	
	APX4000R505SA32SA	●	5	50	32	125	45	4°	12400	2	TPS43	TIP15W	MK1KS	
	APX4000R634SA32SA	●	4	63	32	125	45	3°	10800	2	TPS43	TIP15W	MK1KS	
	APX4000R636SA32SA	●	6	63	32	125	45	3°	10800	2	TPS43	TIP15W	MK1KS	
Long	APX4000R252SA25LA	●	2	25	25	170	35	11°	18900	1	TPS4	TIP15W	MK1KS	
	APX4000R282SA25LA	●	2	28	25	170	35	9°	17700	2	TPS4	TIP15W	MK1KS	
	APX4000R322SA32LA	●	2	32	32	190	45	7°	16300	1	TPS4	TIP15W	MK1KS	
	APX4000R323SA32LA	●	3	32	32	190	45	7°	16300	1	TPS4	TIP15W	MK1KS	
	APX4000R352SA32LA	●	2	35	32	190	45	6°	15400	2	TPS4	TIP15W	MK1KS	
	APX4000R353SA32LA	●	3	35	32	190	45	6°	15400	2	TPS4	TIP15W	MK1KS	
	APX4000R402SA32LA	●	2	40	32	190	45	6°	14200	2	TPS43	TIP15W	MK1KS	
	APX4000R403SA32LA	●	3	40	32	190	45	6°	14200	2	TPS43	TIP15W	MK1KS	
	APX4000R404SA32LA	●	4	40	32	190	45	6°	14200	2	TPS43	TIP15W	MK1KS	
Extra Long	APX4000R252SA25ELA	●	2	25	25	220	80	11°	18900	1	TPS4	TIP15W	MK1KS	
	APX4000R282SA25ELA	●	2	28	25	220	35	9°	17700	2	TPS4	TIP15W	MK1KS	
	APX4000R322SA32ELA	●	2	32	32	260	100	7°	16300	1	TPS4	TIP15W	MK1KS	
	APX4000R323SA32ELA	●	3	32	32	260	100	7°	16300	1	TPS4	TIP15W	MK1KS	
	APX4000R352SA32ELA	●	2	35	32	260	45	6°	15400	2	TPS4	TIP15W	MK1KS	
	APX4000R353SA32ELA	●	3	35	32	260	45	6°	15400	2	TPS4	TIP15W	MK1KS	
	APX4000R402SA32ELA	●	2	40	32	260	45	6°	14200	2	TPS43	TIP15W	MK1KS	
	APX4000R403SA32ELA	●	3	40	32	260	45	6°	14200	2	TPS43	TIP15W	MK1KS	
	APX4000R404SA32ELA	●	4	40	32	260	45	6°	14200	2	TPS43	TIP15W	MK1KS	

(Note 1) When using inserts with corner radius RE≥3.2, machining of the holder is required as shown page L055.
(Note 2) The maximum allowable revolutions are set to ensure tool and insert stability.
(Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
*1 Clamp Torque (N • m) : TPS4=3.5, TPS43=3.5
*2 RMPX : Max. Ramping Angle

● : Inventory maintained in Japan.

Fig.1

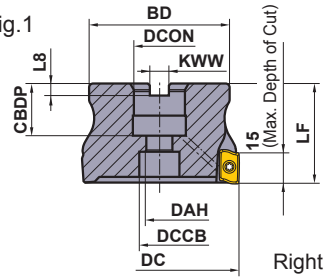
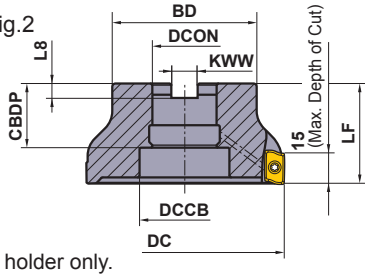


Fig.2



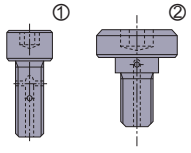
Right hand tool holder only.



ARBOR TYPE

KAPR :0°
GAMP:+15°—+22° T :+21°—+28°
GAMF:+21°—+28° I :+15°—+22°

Cutter Diameter DC	Set Bolt	Geometry
ϕ40	HSC08030H	①
ϕ50, ϕ63	10030H	①
ϕ80	12035H	①
ϕ100	16040H	①
ϕ125	MBA20040H	②
ϕ160	24045H	②



Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	DCON	CBDP	DAH	BD	KWW	L8	DCCB	WT *3 (kg)	RMPX *2	Max. Allowable Revolution (min⁻¹)	Type(Fig.)	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Insert
APX4000-040A04RA	●	4	40	40	16	18	9	34	8.4	5.6	14	0.2	6°	14200	1	TPS43	TIP15W	MK1KS	AOMT 1848○○ PEER-○
APX4000**-050A05RA**	●	5	50	40	22	20	11	45	10.4	6.3	17	0.3	4°	12400	1	TPS43	TIP15W	MK1KS	
APX4000**-063A06RA**	●	6	63	40	22	20	11	50	10.4	6.3	17	0.5	3°	10800	1	TPS43	TIP15W	MK1KS	
APX4000**R08007CA**	●	7	80	50	25.4	26	13	70	9.5	6	20	1.2	2°	9300	1	TPS43	TIP15W	MK1KS	
APX4000**R10008DA**	●	8	100	63	31.75	32	17	80	12.7	8	26	2.1	1.5°	8100	1	TPS43	TIP15W	MK1KS	
APX4000**R12509EA**	●	9	125	63	38.1	40	—	100	15.9	10	56	3.3	1°	7100	2	TPS43	TIP15W	MK1KS	
APX4000**R16010FA**	●	10	160	63	50.8	40	—	100	19.1	11	72	4.8	1°	6100	2	TPS43	TIP15W	MK1KS	

(Note 1) When using inserts with corner radius RE≥3.2, machining of the holder is required as shown page L055.
(Note 2) The maximum allowable revolutions are set to ensure tool and insert stability.
(Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
∗1 Clamp Torque (N • m) : TPS43=3.5
∗2 RMPX : Max. Ramping Angle
∗3 WT : Tool Weight

Fig.1

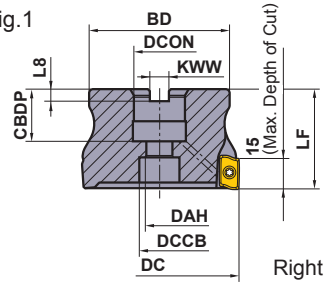
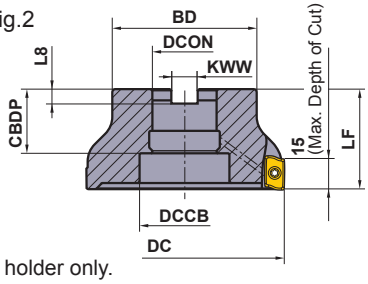


Fig.2



Right hand tool holder only.



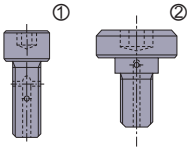
For metric arbor

The cutter bore diameter DCON is indicated in millimetre.

ARBOR TYPE

KAPR :0°
GAMP:+15°—+22° T :+21°—+28°
GAMF:+21°—+28° I :+15°—+22°

Cutter Diameter DC	Set Bolt	Geometry
ϕ40	HSC08030H	①
ϕ50, ϕ63	10030H	①
ϕ80	12035H	①
ϕ100	16040H	①
ϕ125	MBA20040H	②
ϕ160	20040H	②



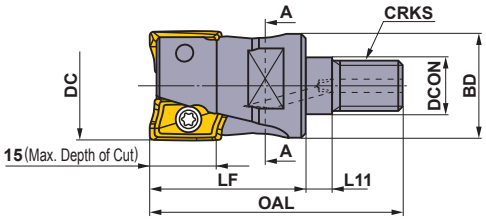
Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	DCON	CBDP	DAH	BD	KWW	L8	DCCB	WT *3 (kg)	RMPX *2	Max. Allowable Revolution (min⁻¹)	Type(Fig.)	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Insert
APX4000-040A04RA	●	4	40	40	16	18	9	34	8.4	5.6	14	0.2	6°	14200	1	TPS43	TIP15W	MK1KS	AOMT 1848○○ PEER-○
APX4000**-050A05RA**	●	5	50	40	22	20	11	45	10.4	6.3	17	0.3	4°	12400	1	TPS43	TIP15W	MK1KS	
APX4000**-063A06RA**	●	6	63	40	22	20	11	50	10.4	6.3	17	0.5	3°	10800	1	TPS43	TIP15W	MK1KS	
APX4000**-080A07RA**	●	7	80	50	27	23	13	60	12.4	7	20	1.2	2°	9300	1	TPS43	TIP15W	MK1KS	
APX4000**-100A08RA**	●	8	100	50	32	26	17	70	14.4	8	27	2.1	1.5°	8100	1	TPS43	TIP15W	MK1KS	
APX4000**-125A09RA**	●	9	125	63	40	40	—	90	16.4	9	56	3.3	1°	7100	2	TPS43	TIP15W	MK1KS	
APX4000**-160A10RA**	●	10	160	63	40	40	—	100	16.4	9	72	4.8	1°	6100	2	TPS43	TIP15W	MK1KS	

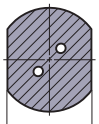
(Note 1) **When using inserts with corner radius RE≥3.2, machining of the holder is required as shown page L055.**
(Note 2) The maximum allowable revolutions are set to ensure tool and insert stability.
(Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
∗1 Clamp Torque (N • m) : TPS43=3.5 ∗2 RMPX : Max. Ramping Angle
∗3 WT : Tool Weight

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001









● With through air & coolant holes.

SCREW-IN TYPE

Right hand tool holder only.

Order Number	Stock	Number of Teeth	Dimensions(mm)								*2 WT (kg)	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Insert
	R		DC	DCON	BD	OAL	LF	L11	H	CRKS					
APX4000R252M12A35	●	2	25	12.5	23.5	57	35	6	19	M12	0.2	TPS4	TIP15W	MK1KS	AOMT 1848○○ PEER-○
APX4000R**282M12A35**	●	2	28	12.5	23.5	57	35	6	19	M12	0.2	TPS4	TIP15W	MK1KS	
APX4000R**322M16A40**	●	2	32	17	28.5	63	40	6	24	M16	0.3	TPS4	TIP15W	MK1KS	
APX4000R**323M16A40**	●	3	32	17	28.5	63	40	6	24	M16	0.3	TPS4	TIP15W	MK1KS	
APX4000R**352M16A40**	●	2	35	17	28.5	63	40	6	24	M16	0.3	TPS4	TIP15W	MK1KS	
APX4000R**353M16A40**	●	3	35	17	28.5	63	40	6	24	M16	0.3	TPS4	TIP15W	MK1KS	
APX4000R**403M16A40**	●	3	40	17	28.5	63	40	6	24	M16	0.3	TPS43	TIP15W	MK1KS	
APX4000R**404M16A40**	●	4	40	17	28.5	63	40	6	24	M16	0.3	TPS43	TIP15W	MK1KS	

(Note 1) When using inserts with corner radius RE≥3.2, machining of the holder is required as shown page L055.
(Note 2) For screw-in type arbors, refer to page L145−L146.
*1 Clamp Torque (N • m) : TPS4=3.5, TPS43=3.5
*2 WT : Tool Weight

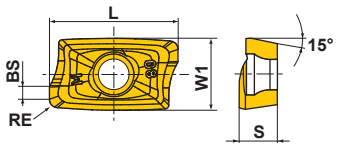
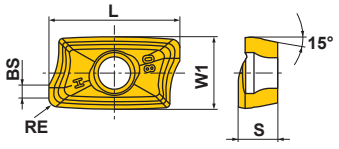
● : Inventory maintained in Japan. (10 inserts in one case)

INSERTS

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
S	Heat-resistant Alloy, Titanium Alloy	
H	Hardened Steel	

Cutting Conditions (Guide) :
● : Stable Cutting ◕ : General Cutting ✱ : Unstable Cutting

Honing :
E : Round

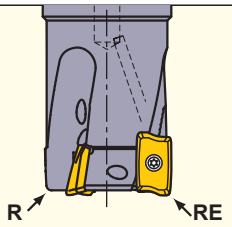
Shape	Order Number	Class	Honing	Coated								Dimensions (mm)					Geometry
				MC5020	MP6120 (NEW)	MP6130 (NEW)	MP7130 (NEW)	MP9120 (NEW)	MP9130 (NEW)	VP15TF	VP20RT	L	W1	S	BS	RE*	
General M Breaker	**AOMT184804PEER-M**	M	E		●	●	●	●	●	●	●	18	9	4.8	1.8	0.4	
	AOMT184808PEER-M	M	E		●	●	●	●	●	●	●	18	9	4.8	1.4	0.8	
	AOMT184810PEER-M	M	E		●			●	●	●		18	9	4.8	1.0	1.0	
	AOMT184812PEER-M	M	E		●			●	●	●		18	9	4.8	0.8	1.2	
	AOMT184816PEER-M	M	E		●	●	●	●	●	●	●	18	9	4.8	0.4	1.6	
	AOMT184820PEER-M	M	E		●			●	●	●		18	9	4.8	0.4	2.0	
Strong Cutting Edge Type H Breaker	**AOMT184804PEER-H**	M	E	●	●	●	●	●	●	●	●	18	9	4.8	1.8	0.4	
	AOMT184808PEER-H	M	E	●	●	●	●	●	●	●	●	18	9	4.8	1.4	0.8	
	AOMT184816PEER-H	M	E	●	●	●	●	●	●	●	●	18	9	4.8	0.4	1.6	
	AOMT184832PEER-H	M	E			●	●				●	18	9	4.8	0.4	3.2	
	AOMT184840PEER-H	M	E			●	●				●	18	9	4.8	0.4	4.0	
	AOMT184850PEER-H	M	E			●	●				●	18	9	4.8	—	5.0	
	AOMT184864PEER-H	M	E			●	●				●	18	9	4.8	—	6.35	

∗ Nose R is different from the workpiece of R shape depending on the axial rake angle of the body.
Consult us for more details.

■ = MIRACLE SIGMA

NOTE ON USE OF INSERTS WITH LARGE CORNER RADII

When using inserts with corner radius RE≥R3.2, please machine the holder with a radius form as shown on the right.



RE (mm)	R (mm)
3.2	2.0
4.0	2.5
5.0	3.5
6.35	5.0

R : Holder end radius
RE : Insert corner radius

SCREW-IN ARBORS ➤ L145
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED

	Work Material	Hardness	Insert Grade 1st Recommenedation	Insert Grade 2nd Recommenedation	Breaker		Cutting Width **ae** (mm) ≤0.25DC	0.25—0.5DC	0.5—0.75DC	DC (Slot)
							Cutting Speed **vc** (m/min)			
P	Mild Steel	≤180HB	MP6120	VP15TF	M	H	230(180—270)	220(170—260)	180(140—210)	180(140—210)
			MP6130	VP20RT	M	H	200(150—240)	190(140—230)	150(110—180)	150(110—180)
	Carbon Steel Alloy Steel	180—350HB	MP6120	VP15TF	M	H	180(140—210)	170(130—200)	140(110—160)	140(110—160)
			MP6130	VP20RT	M	H	150(110—180)	140(100—170)	110(80—130)	110(80—130)
M	Stainless Steel	≤270HB	MP7130	VP20RT	M	H	180(140—210)	170(130—200)	140(110—160)	140(110—160)
K	Gray Cast Iron	≤350MPa	MC5020	VP15TF	H		250(200—300)	240(190—290)	210(160—260)	140(110—160)
	Ductile, Cast Iron	≤800MPa	MC5020	VP15TF	H		130(100—150)	120(90—140)	100(80—120)	100(80—120)
S	Titanium Alloy	≤350HB	MP9120	VP15TF	H	M	50(40—70)			50(40—70)
			MP9130	VP20RT	H	M	40(30—60)			40(30—60)
	Heat-resistant Alloy	—	MP9120	VP15TF	H	M	40(30—60)			40(30—60)
			MP9130	VP20RT	H	M	30(20—40)			30(20—40)
H	Hardened Steel	40—55HRC	VP15TF		H		90(70—100)	85(60—100)	70(50—80)	70(50—80)

DEPTH OF CUT AND FEED

	Work Material	Hardness	Cutting Width **ae** (mm)	Depth of Cut **ap** (mm)	Feed per Tooth **fz** (mm/t.) Cutter Diameter (mm) ø25—ø40	ø50—ø80	ø100—ø160
P	Mild Steel Carbon Steel Alloy Steel	≤180HB 180—350HB	≤0.5DC	≤5	0.30	0.30	0.25
				5—7.5	0.25	0.25	0.20
				7.5—10	0.20	0.20	0.15
				10—12.5	0.15	0.15	0.10
				12.5—15	0.10	0.10	0.07
			0.5—0.75DC	≤5	0.20	0.20	0.15
				5—10	0.15	0.15	0.10
				10—15	0.10	0.10	0.07
			DC (Slot)	≤5	0.15	0.15	0.15
				5—7.5	0.10	0.10	0.10
				7.5—10	0.07	0.07	0.07
M	Stainless Steel	≤270HB	≤0.5DC	≤5	0.30	0.25	0.25
				5—7.5	0.25	0.20	0.20
				7.5—10	0.20	0.15	0.15
				10—12.5	0.15	0.10	0.10
				12.5—15	0.10	0.07	0.07
			0.5—0.75DC	≤5	0.20	0.15	0.15
				5—10	0.15	0.10	0.10
				10—15	0.10	0.07	0.07
			DC (Slot)	≤5	0.15	0.15	0.15
				5—7.5	0.10	0.10	0.10
				7.5—10	0.07	0.07	0.07
K	Gray Cast Iron	Tensile Strength ≤350MPa	≤0.5DC	≤5	0.30	0.30	0.25
				5—7.5	0.25	0.25	0.20
				7.5—10	0.20	0.20	0.15
				10—12.5	0.15	0.15	0.10
				12.5—15	0.10	0.10	0.07
			0.5—0.75DC	≤5	0.20	0.20	0.15
				5—10	0.15	0.15	0.10
				10—15	0.10	0.10	0.07
			DC (Slot)	≤5	0.15	0.15	0.15
				5—7.5	0.10	0.10	0.10
				7.5—10	0.07	0.07	0.07
	Ductile, Cast Iron	Tensile Strength ≤800MPa	≤0.5DC	≤5	0.25	0.25	0.25
				5—7.5	0.20	0.20	0.20
				7.5—10	0.15	0.15	0.15
				10—12.5	0.10	0.10	0.10
				12.5—15	0.07	0.07	0.07
			0.5—0.75DC	≤5	0.20	0.20	0.15
				5—10	0.15	0.15	0.10
				10—15	0.10	0.10	0.07
			DC (Slot)	≤5	0.15	0.15	0.15
				5—7.5	0.10	0.10	0.10
				7.5—10	0.07	0.07	0.07

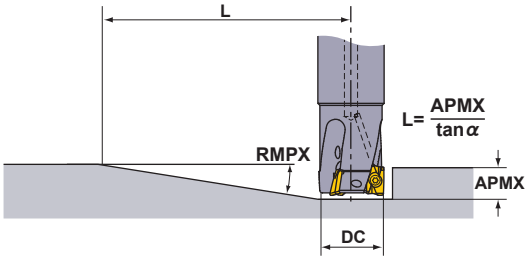
Work Material		Hardness	Cutting Width **ae** (mm)	Depth of Cut **ap** (mm)	Feed per Tooth **fz** (mm/t.) Cutter Diameter (mm)		
					ø25—ø40	**ø50—ø80**	**ø100—ø160**
S	Titanium Alloy	≤350HB	≤0.25DC	≤5	0.15	0.10	0.10
				5—7.5	0.10	0.05	0.05
				7.5—10	0.05	—	—
			DC (Slot)	≤5	0.05	0.05	0.05
	Heat-resistant Alloy	—	≤0.25DC	≤2	0.10	0.05	0.05
			DC (Slot)	≤1	0.05	0.05	0.05
H	Hardened Steel	40—55HRC	≤0.25DC	≤5	0.15	0.15	0.15
				5—7.5	0.10	0.10	0.10
				7.5—10	0.07	0.07	0.07
			0.25—0.5DC	≤5	0.10	0.10	0.10
				5—7.5	0.07	0.07	0.07
			0.5—0.75DC	≤5	0.07	0.07	0.07
			DC (Slot)	≤5	0.07	0.07	0.07

(Note 1) These cutting conditions are a guide to the standard shank type and the arbor type.
Please make adjustments according to the machining conditions.
(Note 2) Vibration is liable to occur in certain cases. Please reduce the depth of cut and / or reduce cutting conditions in the following cases.
- When using the long shank type and extra long shank type.
- When using long tool overhang with the standard or arbor type.
- When the application has poor clamping rigidity or when using a low rigidity machine.

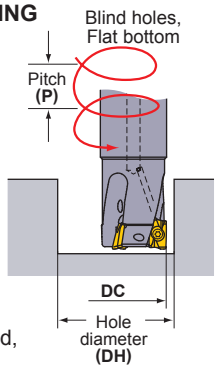
(Note 3) In case of coarse and fine pitch cutters, the coarse pitch type is recommended to prevent vibration.
(Note 4) For heavy interrupted and unstable cutting, the H breaker is first recommendation.

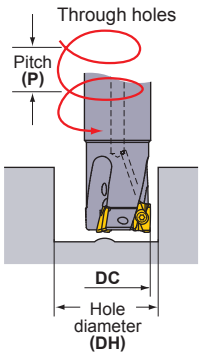
RAMPING/HELICAL CUTTING

RAMPING



HELICAL CUTTING





Refer to the table below for cutting conditions. For feed per tooth and cutting speed, follow the cutting conditions for slot milling.

Cutting Edge Diameter **DC** (mm)	Ramping		Helical Cutting (Blind Hole, Flat Bottom)				Helical Cutting (Through Hole)	
	Maximum Ramping Angle **RMPX**	Minimum Distance ∗1 **L** (mm)	Maximum Hole Diameter ∗2 **DH max.** (mm)	Maximum Pitch **P max.** (mm)	Minimum Hole Diameter **DH min.** (mm)	Maximum Pitch **P max.** (mm)	Minimum Hole Diameter **DH min.** (mm)	Maximum Pitch **P max.** (mm)
25	11°	85	48	14	45	12	32	4
28	9°	105	54	12	51	11	38	4
32	7°	135	62	11	59	10	46	5
35	6°	158	68	10	65	9	52	5
40	6°	158	78	12	75	11	62	7
50	4°	238	98	10	95	9	82	7
63	3°	318	124	10	121	9	108	7
80	2°	477	158	8	155	8	142	6
100	1.5°	636	198	8	195	7	182	6
125	1°	954	248	6	245	6	232	5
160	1°	954	318	8	315	8	302	7

(Note) When machining highly ductile materials with ramping angles above, chips could be continuous.
In this case, decrease the ramping angle or feed per tooth.
∗1 L (=15 / tan α). Cutters' moving distance until depth of cut reaches 15mm at a maximum ramping angle.
∗2 In case corner radius of 0.8mm. Other than that, find with the below formula.
{(cutting edge diameter DC)—(corner radius)—0.2}×2

DEEP SHOULDER MILLING

0° Finishing Roughing

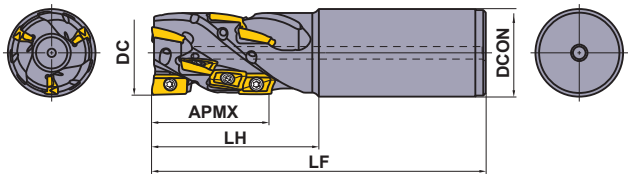
APX4000

P Steel | M Stainless Steel | K Cast Iron | N | S Heat Resistant Alloy | H

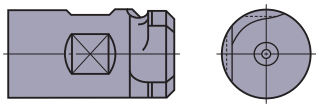
LONG CUTTING EDGE



- High accuracy, high quality vertical wall.
- Low cutting force insert.
- With through air & coolant holes.



*1 Combination Shank



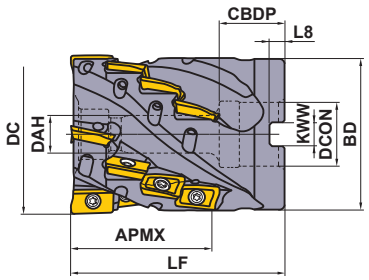
SHANK TYPE

Right hand tool holder only.

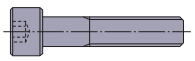
Order Number	Stock	Number of Flutes	Total	Dimensions(mm)					*2		
	R			DC	DCON	LF	LH	APMX	Clamp Screw	Wrench	Insert
APX4KR4008SA42S056A	●	2	8	40	42	160	80	56	TPS43	TIP15W	AOMT1848○○PEER-○
APX4KR4012SA42S056A	●	3	12	40	42	160	80	56	TPS43	TIP15W	
*1 APX4KR5012WA508S056A	●	3	12	50	50.8	160	80	56	TPS43	TIP15W	
*1 APX4KR5018WA508M084A	●	3	18	50	50.8	190	110	84	TPS43	TIP15W	

(Note 1) When using inserts with corner radius RE≥3.2, machining of the holder is required as shown on page L055.
(Note 2) Only corner radius RE 0.4mm and 0.8mm can be used for the peripheral cutting edges expect the bottom cutting edge (the end cuttting edge).
(Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
*2 Clamp Torque (N • m) : TPS43=3.5





Right hand tool holder only.

Cutter Diameter DC	Set Bolt	Geometry
ϕ50	HSC10050	
ϕ63	12070	

SHELL TYPE

Order Number	Stock	Number of Flutes	Total	Dimensions(mm)									*			
	R			DC	LF	DCON	CBDP	DAH	BD	KWW	L8	APMX	Clamp Screw	Wrench	Anti-seize Lubricant	Insert
APX4K-050A09A042RA	●	3	9	50	65	22	22	11	48	10.4	6.3	42	TPS43	TIP15W	MK1KS	AOMT1848 ○○PEER-○
APX4KR06316CA056A	●	4	16	63	85	25.4	26	13	60.7	9.5	6	56	TPS43	TIP15W	MK1KS	

* Clamp Torque (N • m) : TPS43=3.5

For metric arbor

The cutter bore diameter DCON is indicated in millimetre.

Order Number	Stock	Number of Flutes	Total	Dimensions(mm)									*			
	R			DC	LF	DCON	CBDP	DAH	BD	KWW	L8	APMX	Clamp Screw	Wrench	Anti-seize Lubricant	Insert
APX4K-050A09A042RA	●	3	9	50	65	22	22	11	48	10.4	6.3	42	TPS43	TIP15W	MK1KS	AOMT1848 ○○PEER-○
APX4K-063A16A056RA	●	4	16	63	85	27	28	13	60.7	12.4	7	56	TPS43	TIP15W	MK1KS	

(Note 1) When using inserts with corner radius RE≥3.2, machining of the holder is required as shown on page L055.
(Note 2) Only corner radius RE 0.4mm and 0.8mm can be used for the peripheral cutting edges expect the bottom cutting edge (the end cuttting edge).
(Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
(Note 4) In case of internal coolant supply, please use a face mill arbor with through coolant channels. Regular center-thru or side-thru arbors can't be used.
* Clamp Torque (N • m) : TPS43=3.5

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED

Work Material		Hardness	Insert Grade 1st Recommenedation	Insert Grade 2nd Recommenedation	Breaker		Cutting Width **ae** (mm) ≤0.15DC	0.15—0.3DC	DC (Slot)
							Cutting Speed **vc** (m/min)		
P	Mild Steel	≤180HB	MP6120	VP15TF	M	H	200(160—250)	160(120—200)	140(120—160)
			MP6130	VP20RT	M	H	170(130—220)	130(90—170)	110(90—130)
	Carbon Steel Alloy Steel	180—350HB	MP6120	VP15TF	M	H	160(120—200)	120(100—140)	100(80—120)
			MP6130	VP20RT	M	H	130(90—170)	90(70—110)	70(50—90)
M	Stainless Steel	≤270HB	MP7130	VP15TF	M	H	160(120—200)	120(100—140)	100(80—120)
K	Gray Cast Iron	≤350MPa	MC5020	VP15TF	H		230(180—280)	190(140—240)	190(140—240)
	Ductile, Cast Iron	≤800MPa	MC5020	VP15TF	H		190(140—220)	170(120—220)	170(120—220)
S	Titanium Alloy	≤350HB	MP9120	VP15TF	H	M	50(40—70)		50(40—70)
			MP9130	VP20RT	H	M	40(30—60)		40(30—60)
	Heat-resistant Alloy	—	MP9120	VP15TF	H	M	40(30—60)		40(30—60)
			MP9130	VP20RT	H	M	30(20—40)		30(20—40)

DEPTH OF CUT AND FEED

Work Material		Hardness	Cutting Width **ae** (mm)	Depth of Cut **ap** (mm)	Feed per Tooth **fz** (mm/t.) Cutter Diameter (mm) ø40 Length of cut 56mm ø50 Length of cut 42mm	ø50 Length of cut 56mm ø63 Length of cut 56mm	ø50 Length of cut 84mm
P	Mild Steel	≤180HB	≤0.3DC	≤20	0.25	0.25	0.20
				20—50	0.20	0.20	0.15
				50—80			0.10
			DC (Slot)	≤20	0.20	0.20	0.15
				20—50	0.15	0.15	
	Carbon Steel Alloy Steel	180—350HB	≤0.3DC	≤20	0.25	0.25	0.20
				20—50	0.20	0.20	0.15
				50—80			0.10
			DC (Slot)	≤20	0.15	0.15	0.10
				20—50	0.10	0.10	
M	Stainless Steel	≤270HB	≤0.3DC	≤20	0.25	0.25	0.20
				20—50	0.20	0.20	0.15
				50—80			0.10
			DC (Slot)	≤10	0.10	0.10	0.07
K	Gray Cast Iron	Tensile Strength ≤350MPa	≤0.15DC	≤10	0.30	0.30	0.25
				10—50	0.25	0.25	0.20
				50—80			0.15
			0.15—0.3DC	≤10	0.25	0.25	0.20
				10—50	0.20	0.20	0.15
				50—80			0.10
			DC (Slot)	≤10	0.25	0.25	0.20
				10—50	0.20	0.20	0.15
	Ductile, Cast Iron	Tensile Strength ≤800MPa	≤0.15DC	≤20	0.25	0.25	0.20
				20—50	0.20	0.20	0.15
				50—80			0.10
			0.15—0.3DC	≤20	0.20	0.20	0.15
				20—50	0.15	0.15	0.10
				50—80			0.07
			DC (Slot)	≤10	0.15	0.15	0.10
				10—50	0.10	0.10	
S	Titanium Alloy	≤350HB	≤0.15DC	≤20	0.10	0.10	
				20—50	0.10	0.10	
			DC (Slot)	≤50	0.08	0.08	
	Heat-resistant Alloy	—	≤0.15DC	≤10	0.07	0.07	
			DC (Slot)	≤20	0.05	0.05	

(Note) The above cutting conditons are determined based on high rigidity machine and workpiece, where no vibration occurred. Please adjust processing conditions if the vibration is generated.

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

MULTI FUNCTIONAL MILLING

<ALUMINIUM ALLOY TO DIFFICULT-TO-CUT MATERIAL CUTTING>

Finishing Roughing

Including Flat faces

AXD4000

P M K **N** **S** H

Non-ferrous Metal Heat Resistant Alloy



Fig.1

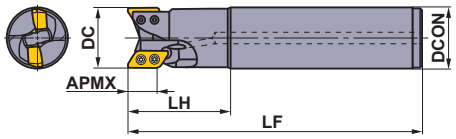
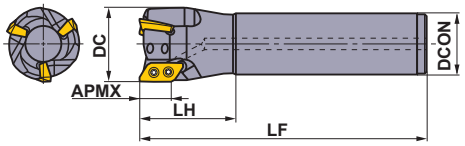


Fig.2



SHANK TYPE

Right hand tool holder only.

Type	Insert Corner Radius RE	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	LH	DCON	APMX (mm)	Max. Allowable Revolution (min^{-1})	Type(Fig.)	Clamp Screw *	Wrench	Anti-seize Lubricant	Insert
A Type	0.4 | 3.2	NEW AXD4000R201SA20SA	●	1	20	110	35	20	15.5	15000	1	TS3SBS	TKY08D	MK1KS	XDGX1750◯◯ PD◯R-◯◯
		AXD4000R252SA25SA	●	2	25	125	50	25	15.5	49000	1	TS3SB	TKY08D	MK1KS	
		AXD4000R252SA25LA	●	2	25	170	80	25	15.5	49000	1	TS3SB	TKY08D	MK1KS	
		NEW AXD4000R282SA25SA	●	2	28	125	50	25	15.5	48500	2	TS3SB	TKY08D	MK1KS	
		NEW AXD4000R282SA25ELA	●	2	28	220	50	25	15.5	48500	2	TS3SB	TKY08D	MK1KS	
		AXD4000R322SA32SA	●	2	32	150	50	32	15.5	48000	1	TS3SB	TKY08D	MK1KS	
		AXD4000R322SA32LA	●	2	32	200	80	32	15.5	48000	1	TS3SB	TKY08D	MK1KS	
		NEW AXD4000R352SA32SA	●	2	35	150	50	32	15.5	45000	2	TS3SB	TKY08D	MK1KS	
		NEW AXD4000R352SA32ELA	●	2	35	250	50	32	15.5	45000	2	TS3SB	TKY08D	MK1KS	
		AXD4000R403SA32SA	●	3	40	150	50	32	15.5	41000	2	TS3SB	TKY08D	MK1KS	
		AXD4000R403SA42SA	●	3	40	170	80	42	15.5	41000	1	TS3SB	TKY08D	MK1KS	
		NEW AXD4000R403SA32ELA	●	3	40	250	50	32	15.5	41000	2	TS3SB	TKY08D	MK1KS	
B Type	4.0 | 5.0	NEW AXD4000R201SA20SB	●	1	20	110	35	20	14.8	15000	1	TS3SBS	TKY08D	MK1KS	
		AXD4000R252SA25SB	●	2	25	125	50	25	14.8	49000	1	TS3SB	TKY08D	MK1KS	
		AXD4000R252SA25LB	●	2	25	170	80	25	14.8	49000	1	TS3SB	TKY08D	MK1KS	
		NEW AXD4000R282SA25SB	●	2	28	125	50	25	14.8	48500	2	TS3SB	TKY08D	MK1KS	
		NEW AXD4000R282SA25ELB	●	2	28	220	50	25	14.8	48500	2	TS3SB	TKY08D	MK1KS	
		AXD4000R322SA32SB	●	2	32	150	50	32	14.8	48000	1	TS3SB	TKY08D	MK1KS	
		AXD4000R322SA32LB	●	2	32	200	80	32	14.8	48000	1	TS3SB	TKY08D	MK1KS	
		NEW AXD4000R352SA32SB	●	2	35	150	50	32	14.8	45000	2	TS3SB	TKY08D	MK1KS	
		NEW AXD4000R352SA32ELB	●	2	35	250	50	32	14.8	45000	2	TS3SB	TKY08D	MK1KS	
		AXD4000R403SA32SB	●	3	40	150	50	32	14.8	41000	2	TS3SB	TKY08D	MK1KS	
		AXD4000R403SA42SB	●	3	40	170	80	42	14.8	41000	1	TS3SB	TKY08D	MK1KS	
		NEW AXD4000R403SA32ELB	●	3	40	250	50	32	14.8	41000	2	TS3SB	TKY08D	MK1KS	

(Note 1) The maximum allowable revolutions are set to ensure tool and insert stability.
Before operating the tool read the operational guidance on page L071.
(Note 2) When using the tool at high spindle speeds, ensure that the tool and chuck are correctly balanced.
(Note 3) Note for inserts with a corner radius of 1.6 and above, as corner radius increases the LF and LH dimensions decrease.
* Clamp Torque (N • m) : TS3SBS=1.5, TS3SB=1.5
* Use the clamp screw by setting the bundled screw.

 ● : Inventory maintained in Japan.



Fig. 1

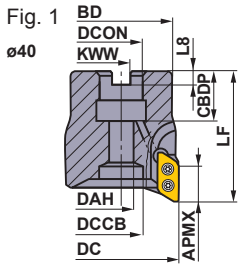


Fig. 2

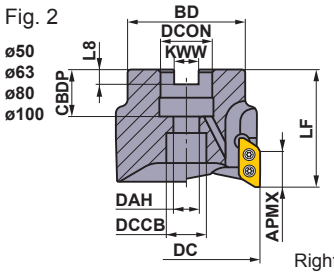
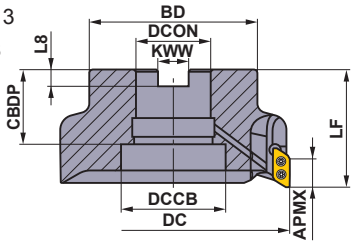
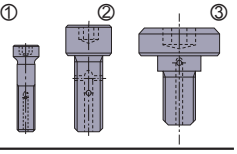


Fig. 3



Right hand tool holder only.

Cutter Diameter DC	Set Bolt	Geometry
ϕ40	HFF08043H	①
ϕ50, ϕ63	HSC10030H	②
ϕ80	12035H	②
ϕ100	16040H	②
ϕ125	MBA20040H	③



KAPR :0°
GAMP:+14°—15° T :+21°—+26°
GAMF:+21°—+26° I :+14°—+15°

ARBOR TYPE

Type	Insert Corner Radius RE	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	DCON	CBDP	DAH	BD	KWW	L8	DCCB	WT *2 (kg)	APMX (mm)	Max. Allowable Revolution (min^{-1})	Type(Fig.)	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Insert
A Type	0.4 I 3.2	AXD4000-040A02RA	●	2	40	50	16	18	8.5	34	8.4	5.6	12	0.3	15.5	41000	1	TS3SB	TKY08D	MK1KS	XDGX1750○○ PD○R-○○
		AXD4000-040A03RA	●	3	40	50	16	18	8.5	34	8.4	5.6	12	0.3	15.5	41000	1	TS3SB	TKY08D	MK1KS	
		AXD4000-050A02RA	●	2	50	50	22	20	11	45	10.4	6.3	17	0.4	15.5	35000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-050A04RA	●	4	50	50	22	20	11	45	10.4	6.3	17	0.4	15.5	35000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-063A05RA	●	5	63	50	22	20	11	50	10.4	6.3	17	0.6	15.5	30000	2	TS3SB	TKY08D	MK1KS	
		AXD4000R08005CA	●	5	80	50	25.4	26	13	60	9.5	6	20	1.0	15.5	27000	2	TS3SB	TKY08D	MK1KS	
		AXD4000R10006DA	●	6	100	63	31.75	32	17	70	12.7	8	26	2.0	15.5	23000	2	TS3SB	TKY08D	MK1KS	
		AXD4000R12507EA	●	7	125	63	38.1	40	—	90	15.9	10	56	2.8	15.5	20000	3	TS3SB	TKY08D	MK1KS	
B Type	4.0 I 5.0	AXD4000-040A02RB	●	2	40	50	16	18	8.5	34	8.4	5.6	12	0.3	14.8	41000	1	TS3SB	TKY08D	MK1KS	
		AXD4000-040A03RB	●	3	40	50	16	18	8.5	34	8.4	5.6	12	0.3	14.8	41000	1	TS3SB	TKY08D	MK1KS	
		AXD4000-050A02RB	●	2	50	50	22	20	11	45	10.4	6.3	17	0.4	14.8	35000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-050A04RB	●	4	50	50	22	20	11	45	10.4	6.3	17	0.4	14.8	35000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-063A05RB	●	5	63	50	22	20	11	50	10.4	6.3	17	0.6	14.8	30000	2	TS3SB	TKY08D	MK1KS	
		AXD4000R08005CB	●	5	80	50	25.4	26	13	60	9.5	6	20	1.0	14.8	27000	2	TS3SB	TKY08D	MK1KS	
		AXD4000R10006DB	●	6	100	63	31.75	32	17	70	12.7	8	26	2.0	14.8	23000	2	TS3SB	TKY08D	MK1KS	
		AXD4000R12507EB	●	7	125	63	38.1	40	—	90	15.9	10	56	2.8	14.8	20000	3	TS3SB	TKY08D	MK1KS	

METRIC Standard

For metric arbor

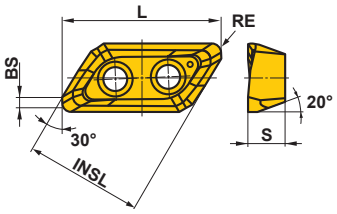
Type	Insert Corner Radius RE	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	DCON	CBDP	DAH	BD	KWW	L8	DCCB	WT *2 (kg)	APMX (mm)	Max. Allowable Revolution (min^{-1})	Type(Fig.)	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Insert
A Type	0.4 I 3.2	AXD4000-040A02RA	●	2	40	50	16	18	8.5	34	8.4	5.6	12	0.3	15.5	41000	1	TS3SB	TKY08D	MK1KS	XDGX1750○○ PD○R-○○
		AXD4000-040A03RA	●	3	40	50	16	18	8.5	34	8.4	5.6	12	0.3	15.5	41000	1	TS3SB	TKY08D	MK1KS	
		AXD4000-050A02RA	●	2	50	50	22	20	11	45	10.4	6.3	17	0.4	15.5	35000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-050A04RA	●	4	50	50	22	20	11	45	10.4	6.3	17	0.4	15.5	35000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-063A05RA	●	5	63	50	22	20	11	50	10.4	6.3	17	0.6	15.5	30000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-080A05RA	●	5	80	50	27	23	13	60	12.4	7	20	1.0	15.5	27000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-100A06RA	●	6	100	63	32	26	17	78	14.4	8	26	2.0	15.5	23000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-125B07RA	●	7	125	63	40	40	—	90	16.4	9	56	2.8	15.5	20000	3	TS3SB	TKY08D	MK1KS	
B Type	4.0 I 5.0	AXD4000-040A02RB	●	2	40	50	16	18	8.5	34	8.4	5.6	12	0.3	14.8	41000	1	TS3SB	TKY08D	MK1KS	
		AXD4000-040A03RB	●	3	40	50	16	18	8.5	34	8.4	5.6	12	0.3	14.8	41000	1	TS3SB	TKY08D	MK1KS	
		AXD4000-050A02RB	●	2	50	50	22	20	11	45	10.4	6.3	17	0.4	14.8	35000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-050A04RB	●	4	50	50	22	20	11	45	10.4	6.3	17	0.4	14.8	35000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-063A05RB	●	5	63	50	22	20	11	50	10.4	6.3	17	0.6	14.8	30000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-080A05RB	●	5	80	50	27	23	13	60	12.4	7	20	1.0	14.8	27000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-100A06RB	●	6	100	63	32	26	17	78	14.4	8	26	2.0	14.8	23000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-125B07RB	●	7	125	63	40	40	—	90	16.4	9	56	2.8	14.8	20000	3	TS3SB	TKY08D	MK1KS	

(Note 1) The maximum allowable spindle speeds are set to ensure tool and insert stability.
Before operating the tool read the operational guidance on page L071.
(Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
(Note 3) Note for inserts with a corner radius of 1.6 and above, as corner radius increases the LF dimension decrease.
*1 Clamp Torque (N • m) : TS3SB=1.5
*1 Use the clamp screw by setting the bundled screw.
*2 WT : Tool Weight

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

INSERTS

Work Material			Cutting Conditions (Guide): ● :Stable Cutting ◐ :General Cutting ✲ :Unstable Cutting Honing: F :Sharp E :Round
	N	Aluminium Alloy	✲ ✲ ◐
	S	Titanium Alloy	●

Shape	Order Number	Class	Honing	Stock: Coated LC15TF	Stock: Coated MP9120	Stock: Carbide TF15	Dimensions (mm) L	INSL	S	BS	RE*	Geometry
	XDGX175004PDFR-GL	G	F	●		●	23.0	17.5	5	1.7	0.4	
	XDGX175008PDFR-GL	G	F	●		●	23.0	17.5	5	1.3	0.8	
	XDGX175012PDFR-GL	G	F	●		●	23.0	17.5	5	0.9	1.2	
	XDGX175016PDFR-GL	G	F	●		●	22.0	17.5	5	1.4	1.6	
	XDGX175020PDFR-GL	G	F	●		●	22.0	17.5	5	1.0	2.0	
	XDGX175024PDFR-GL	G	F	●		●	22.0	17.5	5	0.6	2.4	
	XDGX175030PDFR-GL	G	F	●		●	21.1	17.5	5	0.8	3.0	
	XDGX175032PDFR-GL	G	F	●		●	21.1	17.5	5	0.6	3.2	
	XDGX175040PDFR-GL	G	F	●		●	20.0	17.5	5	0.8	4.0	
	XDGX175050PDFR-GL	G	F	●		●	19.4	17.5	5	0.4	5.0	
NEW 	XDGX175004PDER-GM	G	E		●		23.0	17.5	5	1.7	0.4	
	XDGX175008PDER-GM	G	E		●		23.0	17.5	5	1.3	0.8	
	XDGX175012PDER-GM	G	E		●		23.0	17.5	5	0.9	1.2	
	XDGX175016PDER-GM	G	E		●		22.0	17.5	5	1.4	1.6	
	XDGX175020PDER-GM	G	E		●		22.0	17.5	5	1.0	2.0	
	XDGX175024PDER-GM	G	E		●		22.0	17.5	5	0.6	2.4	
	XDGX175030PDER-GM	G	E		●		21.1	17.5	5	0.8	3.0	
	XDGX175032PDER-GM	G	E		●		21.1	17.5	5	0.6	3.2	
	XDGX175040PDER-GM	G	E		●		20.0	17.5	5	0.5	4.0	
	XDGX175050PDER-GM	G	E		●		19.4	17.5	5	0.4	5.0	
NEW 	XDGX175004PDFR-GM	G	F			●	23.0	17.5	5	1.7	0.4	
	XDGX175008PDFR-GM	G	F			●	23.0	17.5	5	1.3	0.8	
	XDGX175012PDFR-GM	G	F			●	23.0	17.5	5	0.9	1.2	
	XDGX175016PDFR-GM	G	F			●	22.0	17.5	5	1.4	1.6	
	XDGX175020PDFR-GM	G	F			●	22.0	17.5	5	1.0	2.0	
	XDGX175024PDFR-GM	G	F			●	22.0	17.5	5	0.6	2.4	
	XDGX175030PDFR-GM	G	F			●	21.1	17.5	5	0.8	3.0	
	XDGX175032PDFR-GM	G	F			●	21.1	17.5	5	0.6	3.2	
	XDGX175040PDFR-GM	G	F			●	20.0	17.5	5	0.5	4.0	
	XDGX175050PDFR-GM	G	F			●	19.4	17.5	5	0.4	5.0	

* Be careful because corner R(RE) has a different shape than machined workpiece R.
When a GM breaker is recommended, stress the dimensional precision of the workpiece shape.

■ = MIRACLE SIGMA

Holder And Insert Corner Radius Combination

Holder	A Type Holder: AXD4000–□□□□□□A / AXD4000R□□□□□□A								B Type Holder: AXD4000–□□□□□□B / AXD4000R□□□□□□B	
Applicable Insert Corner R (RE)	R0.4	R0.8	R1.2	R1.6	R2.0	R2.4	R3.0	R3.2	R4.0	R5.0
	XDGX 175004PD□R-□□	XDGX 175008PD□R-□□	XDGX 175012PD□R-□□	XDGX 175016PD□R-□□	XDGX 175020PD□R-□□	XDGX 175024PD□R-□□	XDGX 175030PD□R-□□	XDGX 175032PD□R-□□	XDGX 175040PD□R-□□	XDGX 175050PD□R-□□

Not interchangeable with the corresponding inserts of the A type and B type holders.

● : Inventory maintained in Japan. (10 inserts in one case)

RECOMMENDED CUTTING CONDITIONS

Work Material		Grade	Breaker	Cutting Speed **vc** (m/min)	Cutting Width **ae** (mm)	Depth of Cut **ap** (mm)	Feed per Tooth (mm/t.)				
							Cutting Edge Diameter **DC**				
							ϕ20	**ϕ25–ϕ28**	**ϕ32–ϕ35**	**ϕ40**	**ϕ50–ϕ125**
N Aluminium Alloy (A6061, A7075 etc)	**Si<5%**	**TF15 LC15TF**	**GL**	1000 (200–3000)	≤0.25 DC	≤5	≤0.05	≤0.25			
						≤10	≤0.05	≤0.2			
						≤14.5	≤0.05	≤0.15			
					≤0.5 DC	≤5	≤0.05	≤0.25			
						≤10	–	≤0.2			
						≤14.5	–	≤0.15			
					≤0.75 DC	≤5	≤0.05	≤0.25			
						≤10	–	≤0.2			
						≤14.5	–	≤0.15			
					DC(Slot)	≤5	≤0.05	≤0.25			
						≤10	–	–			
						≤14.5	–	–			
Aluminium Alloy (A6061, A7075 etc)	**Si<5%**	**TF15 MP9120**	**GM**	1000 (200–3000)	≤0.25 DC	≤5	≤0.05	≤0.35	≤0.35	≤0.4	≤0.4
						≤10	≤0.05	≤0.3	≤0.3	≤0.35	≤0.35
						≤14.5	≤0.05	≤0.25	≤0.25	≤0.3	≤0.3
					≤0.5 DC	≤5	≤0.05	≤0.35	≤0.35	≤0.35	≤0.4
						≤10	–	≤0.3	≤0.3	≤0.3	≤0.35
						≤14.5	–	≤0.2	≤0.25	≤0.25	≤0.3
					≤0.75 DC	≤5	≤0.05	≤0.3	≤0.3	≤0.3	≤0.35
						≤10	–	≤0.25	≤0.25	≤0.25	≤0.3
						≤14.5	–	≤0.2	≤0.2	≤0.2	≤0.25
					DC(Slot)	≤5	≤0.05	≤0.25	≤0.25	≤0.3	≤0.35
						≤10	–	–	–	–	–
						≤14.5	–	–	–	–	–
Aluminium Alloy (AC4B etc) Aluminium Alloy (ADC12, A390 etc)	**5%≤Si≤10% Si>10%**	**MP9120**	**GM**	200 (200–3000)	≤0.25 DC	≤5	≤0.05	≤0.35	≤0.35	≤0.4	≤0.4
						≤10	≤0.05	≤0.3	≤0.3	≤0.35	≤0.35
						≤14.5	≤0.05	≤0.25	≤0.25	≤0.3	≤0.3
					≤0.5 DC	≤5	≤0.05	≤0.35	≤0.35	≤0.35	≤0.4
						≤10	–	≤0.3	≤0.3	≤0.3	≤0.35
						≤14.5	–	≤0.2	≤0.25	≤0.25	≤0.3
					≤0.75 DC	≤5	≤0.05	≤0.3	≤0.3	≤0.3	≤0.35
						≤10	–	≤0.25	≤0.25	≤0.25	≤0.3
						≤14.5	–	≤0.2	≤0.2	≤0.2	≤0.25
					DC(Slot)	≤5	≤0.05	≤0.25	≤0.25	≤0.3	≤0.35
						≤10	–	–	–	–	–
						≤14.5	–	–	–	–	–
S Titanium Alloy (Ti-6Al-4V etc)		**MP9120**	**GM**	40 (30–60)	≤0.25 DC	≤5	≤0.05	≤0.1			
						≤10	≤0.05	≤0.1			
						≤14.5	≤0.05	≤0.1			
					≤0.5 DC	≤5	≤0.05	≤0.08	≤0.1	≤0.1	≤0.1
						≤10	–	≤0.08	≤0.1	≤0.1	≤0.1
						≤14.5	–	≤0.08	≤0.1	≤0.1	≤0.1
					≤0.75 DC	≤5	≤0.05	≤0.05	≤0.08	≤0.1	≤0.1
						≤10	–	≤0.05	≤0.08	≤0.1	≤0.1
						≤14.5	–	≤0.05	≤0.08	≤0.1	≤0.1
					DC(Slot)	≤5	≤0.05	≤0.05	≤0.05	≤0.05	≤0.05
						≤10	–	–	–	–	–
						≤14.5	–	–	–	–	–

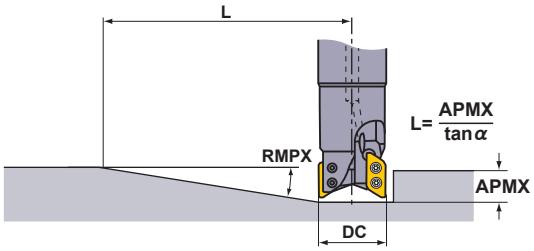
(Note 1) The above cutting conditions are determined based on high workpiece and machine rigidity, where no vibration occurred. If vibrations occur make adjustments according to the machining conditions.

(Note 2) Note, vibrations may occur in the following conditions.
- When using long tool overhang.
- When pocket machining corner radii.
- When the workpiece has poor clamping rigidity or when the machine rigidity or workpiece rigidity is low, vibrations can occur easily, if so, reduce cutting conditions such as width and depth of cut and feed per tooth.

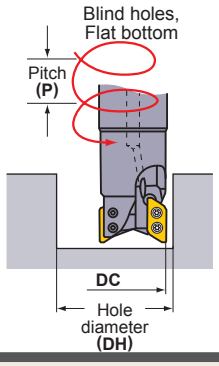
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

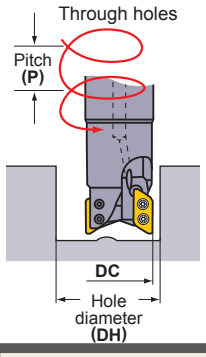
RAMPING/HELICAL CUTTING

RAMPING



HELICAL CUTTING





RAMPING/HELICAL CUTTING

Holder Type	Cutting Edge Diameter **DC** (mm)	Insert Corner R **RE** (mm)	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling	
			Maximum Ramping Angle **RMPX**	Minimum Distance **L** *1 (mm)	Maximum Hole Diameter **DH max.** (mm)	Maximum Pitch **P max.** (mm)	Minimum Hole Diameter **DH min.** (mm)	Maximum Pitch **P max.** (mm)	Minimum Hole Diameter **DH min.** (mm)	Maximum Pitch **P max.** (mm)
A type	20	0.4—1.2	20.7°	42	37.1 *2	14	36.1	14	22	2
		1.6—2.4	19.9°	43	34.7 *3	13	34.6	13	22	2
		3.0—3.2	18.9°	46	33.1 *4	12	33.3	12	22	1
	25	0.4—1.2	23.1°	37	47.1 *2	14	46	14	32	8
		1.6—2.4	22.0°	39	44.7 *3	13	44.4	13	32	8
		3.0—3.2	18.7°	46	43.1 *4	12	43	12	32	7
	28	0.4—1.2	19.2°	45	53.1 *2	14	52	14	36	8
		1.6—2.4	18.5°	47	50.7 *3	13	50.4	13	36	8
		3.0—3.2	16.7°	52	49.1 *4	12	48.9	12	36	7
	32	0.4—1.2	15.4°	57	61.1 *2	14	59.9	14	46	11
		1.6—2.4	14.7°	60	58.7 *3	13	58.3	13	46	11
		3.0—3.2	13.8°	64	57.1 *4	12	56.8	12	46	10
	35	0.4—1.2	13.4°	66	67.1 *2	14	65.8	14	50	11
		1.6—2.4	12.7°	69	64.7 *3	13	64.3	13	50	10
		3.0—3.2	11.8°	75	63.1 *4	12	62.8	12	50	9
	40	0.4—1.2	11.1°	80	76.7 *2	14	75.9	14	62	13
		1.6—2.4	10.4°	85	74.3 *3	13	74.2	13	62	12
		3.0—3.2	9.7°	91	72.7 *4	12	72.7	12	62	11
	50	0.4—1.2	8.2°	108	96.7 *2	14	95.6	14	81	14
		1.6—2.4	7.6°	117	94.3 *3	13	94	13	81	13
		3.0—3.2	6.9°	129	92.7 *4	12	92.4	12	81	11
	63	0.4—1.2	6.1°	146	122.7 *2	14	121.6	14	107	14
		1.6—2.4	5.6°	159	120.3 *3	13	119.9	13	107	13
		3.0—3.2	5.2°	171	118.7 *4	12	118.4	12	107	12
	80	0.4—1.2	4.6°	193	156.7 *2	14	155.6	14	141	14
		1.6—2.4	4.2°	212	154.3 *3	13	153.9	13	141	13
		3.0—3.2	3.8°	234	152.7 *4	12	152.4	12	141	12
	100	0.4—1.2	3.5°	254	196.7 *2	14	195.5	14	181	14
		1.6—2.4	3.2°	278	194.3 *3	13	193.9	13	181	13
		3.0—3.2	2.9°	306	192.7 *4	12	192.3	12	181	12
	125	0.4—1.2	2.7°	329	246.7 *2	14	245.5	14	231	14
		1.6—2.4	2.5°	356	244.3 *3	13	243.8	13	231	13
		3.0—3.2	2.3°	386	242.7 *4	12	242.3	12	231	12

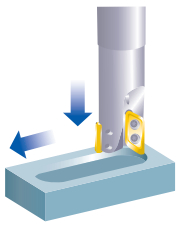
Holder Type	Cutting Edge Diameter **DC** (mm)	Insert Corner R **RE** (mm)	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling	
			Maximum Ramping Angle **RMPX**	Minimum Distance **L** ∗1 (mm)	Maximum Hole Diameter **DH max.** (mm)	Maximum Pitch **P max.** (mm)	Minimum Hole Diameter **DH min.** (mm)	Maximum Pitch **P max.** (mm)	Minimum Hole Diameter **DH min.** (mm)	Maximum Pitch **P max.** (mm)
B type	20	4	17.5°	47	31.5	10	31.8	10	22	1
		5	16.6°	71	29.5	6	31.1	7	22	1
	25	4	15.1°	55	41.5	10	41.4	10	32	5
		5	13.7°	61	39.5	9	40.6	9	32	5
	28	4	14.1°	59	47.5	10	47.2	10	36	6
		5	13°	65	45.5	9	46.4	9	36	5
	32	4	12.7°	66	55.5	10	55.1	10	46	9
		5	12°	70	53.5	9	54.3	9	46	8
	35	4	10.8°	78	61.5	10	61	10	50	8
		5	10.2°	83	59.5	9	60.2	9	50	8
	40	4	8.8°	96	71.1	10	70.9	10	62	10
		5	8.2°	103	69.1	9	70.1	9	62	9
	50	4	6.3°	135	91.1	10	90.6	10	81	10
		5	5.8°	146	89.1	9	89.8	9	81	9
	63	4	4.6°	184	117.1	10	116.6	10	107	10
		5	4.2°	202	115.1	9	115.7	9	107	9
	80	4	3.4°	250	151.1	10	150.5	10	141	10
		5	3.1°	274	149.1	9	149.6	9	141	9
	100	4	2.6°	326	191.1	10	190.5	10	181	10
		5	2.4°	354	189.1	9	189.6	9	181	9
	125	4	2°	424	241.1	10	240.5	10	231	10
		5	1.8°	471	239.1	9	239.6	9	231	9

(Note 1) The recommended ramping feed is 0.05mm/tooth or under.
∗1) Using the maximum ramping angle, the distance to reach the maximum depth of cut is as follows:
L= (maximum depth of cut APMX/tan α). Maximum depth of cut A type is 15.5mm, B type is 14.8mm.
∗2) Corner radius of 1.2mm. For other corner radii, use the following formula. {(cutting edge diameter DC)–(corner radius RE)–0.25}×2
∗3) Corner radius of 2.4mm. For other corner radii, use the following formula. {(cutting edge diameter DC)–(corner radius RE)–0.25}×2
∗4) Corner radius of 3.2mm. For other corner radii, use the following formula. {(cutting edge diameter DC)–(corner radius RE)–0.25}×2

Max.Drilling Depth

Type	Insert Corner R **RE** (mm)	Max.Drilling Depth (mm)					
		Cutting Edge Diameter **DC**					
		ϕ20	**ϕ25**	**ϕ28**	**ϕ32**	**ϕ35**	**ϕ40–ϕ125**
A type	0.4	5.3	5.2	5.2	5.2	5.3	5.3
	0.8	5.3	5.2	5.2	5.2	5.3	5.3
	1.2	5.3	5.2	5.2	5.2	5.3	5.3
	1.6	4.8	4.6	4.7	4.7	4.9	4.8
	2.0	4.8	4.6	4.7	4.7	4.9	4.8
	2.4	4.8	4.6	4.7	4.7	4.9	4.8
	3.0	4.3	3.7	4.2	4.2	4.4	4.4
	3.2	4.3	3.7	4.2	4.2	4.4	4.4
B type	4.0	3.7	2.7	3.7	3.6	3.8	3.8
	5.0	3.4	2.3	3.3	3.3	3.5	3.5

AXD4000 can be effectively used for pocket machining without the need for a prepared hole.



MULTI FUNCTIONAL MILLING
<FOR ALUMINIUM ALLOY>

Finishing Roughing

AXD7000

P M K **N** S H

Non-ferrous Metal



- Low resistance chipbreaker.
- Low resistance insert and high rigidity design for excellent performance.
- For high-speed machining.
- Multi-functional machining.

Fig.1

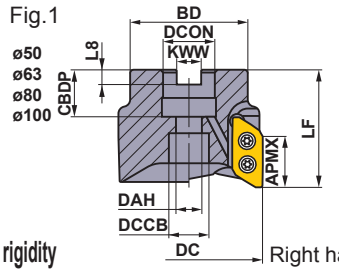
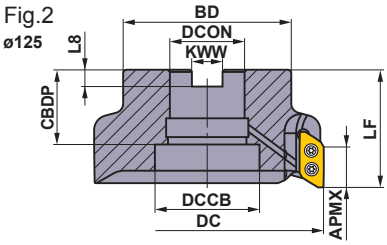


Fig.2



Right hand tool holder only.

Cutter Diameter DC	Set Bolt	Geometry
ϕ50, ϕ63	HSC10030H	① ②
ϕ80	12035H	①
ϕ100	16040H	
ϕ125	MBA20040H	②

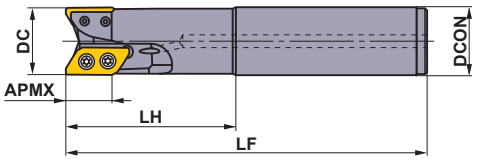
ARBOR TYPE

KAPR :0°
GAMP:+11° T :+26°—+29°
GAMF:+26°—+29° I :+11°

Type	Insert Corner Radius RE	Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	LF	DCON	CBDP	DAH	BD	KWW	L8	DCCB	∗2 WT (kg)	APMX (mm)	Max. Allowable Revolution (min⁻¹)	Type (Fig.)	∗1 Clamp Screw	Wrench	Anti-seize Lubricant	Insert
A Type	0.8 I 3.2	AXD7000-050A03RA	●	3	50	50	22	20	11	45	10.4	6.3	17	0.4	21	30000	1	TS4SBL	TKY15D	MK1KS	XDGX2270○○ PDFR-GL
		AXD7000-063A03RA	●	3	63	50	22	20	11	50	10.4	6.3	17	0.5	21	25000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000R08004CA	●	4	80	63	25.4	26	13	63	9.5	6	20	1.2	21	23000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000R10005DA	●	5	100	63	31.75	32	17	70	12.7	8	26	1.8	21	19000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000R12506EA	●	6	125	63	38.1	40	—	90	15.9	10	56	2.7	21	16000	2	TS4SBL	TKY15D	MK1KS	
B Type	4.0 I 5.0	AXD7000-050A03RB	●	3	50	50	22	20	11	45	10.4	6.3	17	0.4	20.4	30000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000-063A03RB	●	3	63	50	22	20	11	50	10.4	6.3	17	0.5	20.4	25000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000R08004CB	●	4	80	63	25.4	26	13	63	9.5	6	20	1.2	20.4	23000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000R10005DB	●	5	100	63	31.75	32	17	70	12.7	8	26	1.8	20.4	19000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000R12506EB	●	6	125	63	38.1	40	—	90	15.9	10	56	2.7	20.4	16000	2	TS4SBL	TKY15D	MK1KS	







SHANK TYPE

Right hand tool holder only.

Type	Insert Corner Radius RE	Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	LF	LH	DCON	APMX (mm)	Max. Allowable Revolution (min⁻¹)	∗1 Clamp Screw	Wrench	Anti-seize Lubricant	Insert
A Type	0.8 I 3.2	AXD7000R322SA32SA	●	2	32	170	80	32	21	41000	TS4SB	TKY15D	MK1KS	XDGX2270○○ PDFR-GL
		AXD7000R402SA42SA	●	2	40	170	80	42	21	36000	TS4SBL	TKY15D	MK1KS	
B Type	4.0 I 5.0	AXD7000R322SA32SB	●	2	32	170	80	32	20.4	41000	TS4SB	TKY15D	MK1KS	
		AXD7000R402SA42SB	●	2	40	170	80	42	20.4	36000	TS4SBL	TKY15D	MK1KS	

(Note 1) The maximum allowable revolutions are set to ensure tool and insert stability.
Before operating the tool read the operational guidance on L071 page.
(Note 2) When using the tool at high spindle speeds, ensure that the tool and chuck are correctly balanced.
(Note 3) Note for inserts with a corner radius of 3.0 and above, as corner radius increases the LF and LH dimensions decreases.
∗1 Clamp Torque (N • m) : TS4SB=3.5, TS4SBL=3.5
∗1 Use the clamp screw by setting the bundled screw.
∗2 WT : Tool Weight

● : **Inventory maintained in Japan.**



Fig.1

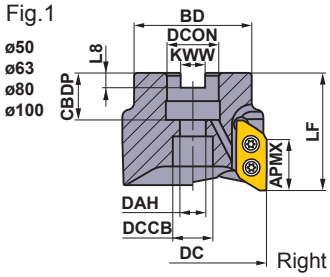
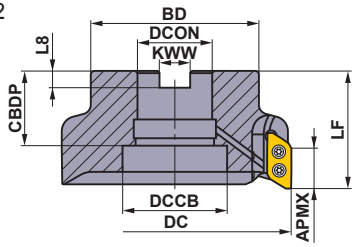


Fig.2

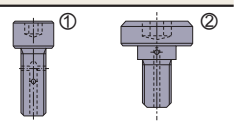


Right hand tool holder only.

For metric arbor

The cutter bore diameter DCON is indicated in millimetre.

Cutter Diameter DC	Set Bolt	Geometry
ϕ50, ϕ63	HSC10030H	①
ϕ80	12035H	①
ϕ100	16040H	②
ϕ125	MBA20040H	②

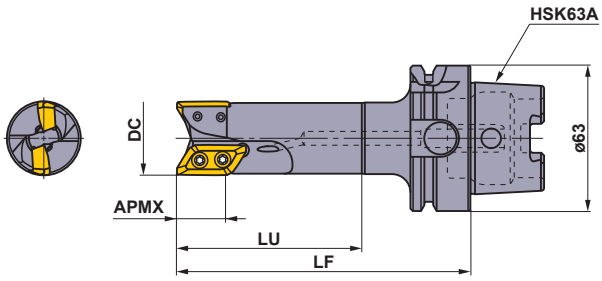


ARBOR TYPE

KAPR :0°
GAMP:+11°　　T :+26°—+29°
GAMF:+26°—+29°　　I :+11°

Type	Insert Corner Radius RE	Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	LF	DCON	CBDP	DAH	BD	KWW	L8	DCCB	*2 WT (kg)	APMX (mm)	Max. Allowable Revolution (min⁻¹)	Type (Fig.)	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Insert
A Type	0.8 I 3.2	AXD7000-050A03RA	●	3	50	50	22	20	11	45	10.4	6.3	17	0.4	21	30000	1	TS4SBL	TKY15D	MK1KS	XDGX2270□□ PDFR-GL
		AXD7000-063A03RA	●	3	63	50	22	20	11	50	10.4	6.3	17	0.5	21	25000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000-080A04RA	●	4	80	63	27	23	13	63	12.4	7	20	1.2	21	23000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000-100A05RA	●	5	100	63	32	26	17	70	14.4	8	26	1.8	21	19000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000-125B06RA	●	6	125	63	40	40	—	90	16.4	9	56	2.7	21	16000	2	TS4SBL	TKY15D	MK1KS	
B Type	4.0 I 5.0	AXD7000-050A03RB	●	3	50	50	22	20	11	45	10.4	6.3	17	0.4	20.4	30000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000-063A03RB	●	3	63	50	22	20	11	50	10.4	6.3	17	0.5	20.4	25000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000-080A04RB	●	4	80	63	27	23	13	63	12.4	7	20	1.2	20.4	23000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000-100A05RB	●	5	100	63	32	26	17	70	14.4	8	26	1.8	20.4	19000	1	TS4SBL	TKY15D	MK1KS	
		AXD7000-125B06RB	●	6	125	63	40	40	—	90	16.4	9	56	2.7	20.4	16000	2	TS4SBL	TKY15D	MK1KS	





HSK63A SHANK TYPE

Right hand tool holder only.

Type	Insert Corner Radius RE	Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	LF	LU	APMX (mm)	Max. Allowable Revolution (min⁻¹)	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Insert
A Type	0.8 I 3.2	AXD7000R03202A-H63A	●	2	32	127	80	21	41000	TS4SB	TKY15D	MK1KS	XDGX2270□□ PDFR-GL
		AXD7000R04002A-H63A	●	2	40	132	85	21	36000	TS4SBL	TKY15D	MK1KS	
		AXD7000R05003A-H63A	●	3	50	137	90	21	30000	TS4SBL	TKY15D	MK1KS	

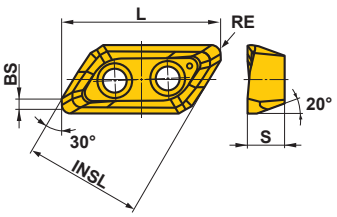
(Note 1) The maximum allowable revolutions are set to ensure tool and insert stability.
Before operating the tool read the operational guidance on L071 page.
(Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
(Note 3) Note for inserts with a corner radius of 3.0 and above, as corner radius increases the LF and LU dimensions decreases.
(Note 4) No hole for data carrier.
*1 Clamp Torque (N • m) : TS4SB=3.5, TS4SBL=3.5
*1 Use the clamp screw by setting the bundled screw.
*2 WT : Tool Weight

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

INSERTS

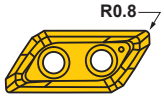
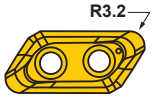
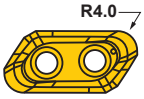
Work Material	N	Aluminium Alloy	◐				◐	

Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting **Honing :** **F :** Sharp

Shape	Order Number	Class	Honing	Stock: Coated LC15TF			Stock: Carbide TF15		Dimensions(mm) L	INSL	S	BS	* RE	Geometry
	**XDGX227008PDFR-GL**	G	F	●			●		30	22.5	7	2.0	0.8	
	XDGX227016PDFR-GL	G	F	●			●		30	22.5	7	1.2	1.6	
	XDGX227020PDFR-GL	G	F	●			●		30	22.5	7	0.8	2.0	
	XDGX227030PDFR-GL	G	F	●			●		28.8	22.5	7	0.8	3.0	
	XDGX227032PDFR-GL	G	F	●			●		28.8	22.5	7	0.6	3.2	
	XDGX227040PDFR-GL	G	F	●			●		27.5	22.5	7	0.9	4.0	
	XDGX227050PDFR-GL	G	F	●			●		27	22.5	7	0.4	5.0	

* Be careful because corner R(RE) has a different shape than machined workpiece R.

HOLDER AND INSERT CORNER RADIUS COMBINATION

Holder	**A** Holder					**B** Holder	
	AXD7000–○○○○○○○A **AXD7000R○○○○○○○A** **AXD7000R○○○○A-H63A**					**AXD7000–○○○○○○○B** **AXD7000R○○○○○○○B**	
Insert Corner Radius (**RE**)	R0.8	R1.6	R2.0	R3.0	R3.2	R4.0	R5.0
							
	XDGX 227008PDFR-GL	**XDGX 227016PDFR-GL**	**XDGX 227020PDFR-GL**	**XDGX 227030PDFR-GL**	**XDGX 227032PDFR-GL**	**XDGX 227040PDFR-GL**	**XDGX 227050PDFR-GL**

Not interchangeable with the corresponding inserts of the A type and B type holders.

● : **Inventory maintained in Japan.**

RECOMMENDED CUTTING CONDITIONS

Work Material		Grade	Breaker	Cutting Speed **vc** (m/min)	Cutting Width **ae** (mm)	Cutting Depth **ap** (mm)	Feed per Tooth (mm/t.)		
							Cutting Edge Diameter **DC**		
							ϕ32	**ϕ40**	**ϕ50−ϕ125**
N	Aluminium Alloy	**LC15TF TF15**	**GL**	1000 (200−3000)	≤0.25 DC	≤5	≤0.35	≤0.40	≤0.40
						5−10	≤0.30	≤0.35	≤0.35
						10−15	≤0.25	≤0.30	≤0.30
						15−20	≤0.20	≤0.25	≤0.25
					≤0.5 DC	≤5	≤0.35	≤0.35	≤0.40
						5−10	≤0.30	≤0.30	≤0.35
						10−15	≤0.25	≤0.25	≤0.30
						15−20	≤0.20	≤0.20	≤0.25
					≤0.75 DC	≤5	≤0.30	≤0.30	≤0.35
						5−10	≤0.25	≤0.25	≤0.30
						10−15	≤0.20	≤0.20	≤0.25
						15−20	≤0.15	≤0.15	≤0.20
					≤DC	≤5	≤0.25	≤0.30	≤0.35
						5−10	≤0.20	≤0.25	≤0.30
						10−15	≤0.15	≤0.20	≤0.25
						15−20	≤0.10	≤0.15	≤0.20

(Note 1) The above cutting conditions are determined based on high workpiece and machine rigidity, where no vibration occurred. If vibrations occur make adjustments according to the machining conditions.

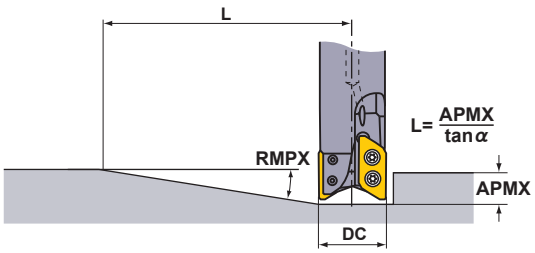
(Note 2) Note, vibrations may occur in the following conditions.

- When using long tool overhang.
- When the workpiece has poor clamping rigidity or when the machine rigidity or workpiece rigidity is low,vibrations can occur easily, if so, reduce the cutting conditions.
- When pocket machining corner radii.

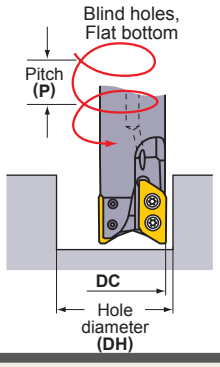
SPARE PARTS ➢ P001
TECHNICAL DATA ➢ Q001

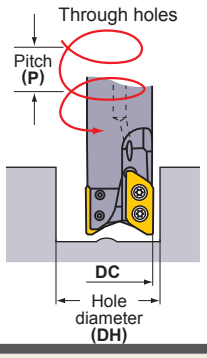
RAMPING/HELICAL CUTTING

RAMPING



HELICAL CUTTING





RAMPING/HELICAL CUTTING

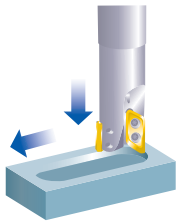
Type	Cutting Edge Diameter **DC** (mm)	Ramping		Helical Cutting (Blind Hole, Flat Bottom)				Helical Cutting (Through Hole)	
		Maximum Ramping Angle **RMPX**	Minimum Distance **L** ∗1 (mm)	Maximum Hole Diameter **DH max.** ∗2 (mm)	Maximum Pitch **P max.** (mm)	Minimum Hole Diameter **DH min.** ∗3 (mm)	Maximum Pitch **P max.** (mm)	Minimum Hole Diameter **DH min.** (mm)	Maximum Pitch **P max.** (mm)
A type	32	19°	61	61.8	21	58.2	20	41	7
	40	13°	91	77.8	18	74.2	17	57	9
	50	9°	133	97.8	16	94.2	16	77	10
	63	7°	171	123.8	15	120.2	15	103	11
	80	5°	240	157.8	16	154.2	15	137	12
	100	4°	300	197.8	15	194.2	15	177	12
	125	3°	401	247.8	12	244.2	12	227	11
B type	32	18°	63	55.4	16	54.0	16	41	7
	40	11°	105	71.4	14	70.0	14	57	8
	50	8°	146	91.4	13	90.0	12	77	8
	63	6°	195	117.4	11	116.0	11	103	8
	80	4°	293	151.4	11	150.0	11	137	9
	100	3°	391	191.4	9	190.0	9	177	8
	125	2°	587	241.4	12	240.0	12	227	11

(Note) The recommended ramping feed is 0.05mm/tooth or under.
∗1 L (Max. Depth of Cut =15 / tan α). Cutters' moving distance until depth of cut reaches APMX at a maximum ramping angle.
Maximum depth of cut A type is 21mm, B type is 20.4mm.
∗2 The maximum diameter when machining a blind hole with a flat face using a corner radius of 0.8mm for A type and 4mm for B type.
Other than that, find with the below formula.
{(cutting edge diameter DC)−(corner radius)−0.3)}×2
∗3 The minimum diameter when machining a blind hole with a flat face using a corner radius of 0.8mm for A type and 4mm for B type.
Other than that, find with the below formula.
{(cutting edge diameter DC)−(corner radius)−(Width of wiper edge BS)−0.1)}×2

Max. Drilling Depth

Type	Insert corner radius **RE** (mm)	Max. Drilling Depth (mm)
Type A	0.8 | 3.2	5
Type B	4.0 | 5.0	4

AXD7000 can be effectively used for pocket machining without the need for a prepared hole.



CAUTION FOR USE

Procedure for attaching inserts

1) Clean the seat by air blowing or with a brush before installing the insert.
2) Tighten the clamp screw using the accessory wrench while pressing the insert against the seat.
3) Tighten the clamp screw as shown in Figure 1.
4) Coat the clamp screw with anti-seize compound and tighten it to the specified tightening torque.
   The tightening torque is shown below.
   AXD7000 3.5N•m(2.58ft•lb)
   AXD4000 1.5N•m(1.11ft•lb)
5) The clamp screw is an important part in ensuring safety.
   Purchase an official product from Mitsubishi Materials.
   When using over the revolution shown in Table 2, replacing the clamp screw simultaneously with insert replacement is recommended.

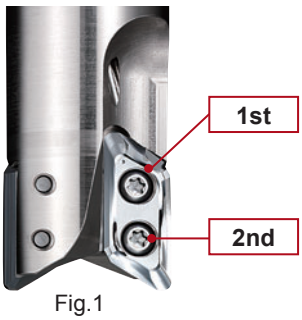
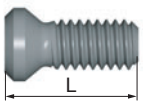


Fig.1

Type	AXD4000		AXD7000		
Cutting Edge Diameter **DC**(mm)	ø20	ø25–ø125	ø32	ø40–ø125	
Clamp Screw Number	TS3SBS	TS3SB	TS4SB	TS4SBL	
Overall Length **L**(mm)	6.5	8	9	10.5	

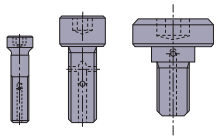


6) Check that there is no clearance at the insert seat surface.

Installation of arbor type

1) Clean carefully the inside and face of the hole and the arbor face before installing the body to the arbor.
2) Set the body at the arbor and tighten it with the accessory. Refer to the table shown below for the tightening torque.
3) The set bolt supplied with the AXD is a special coolant through compatible nozzle. Be careful not to lose it.

AXD4000

Geometry	Set Bolt	Clamp Torque (N • m)	Cutting Edge Diameter **DC**(mm)	Fig
Fig.1 Fig.2 Fig.3 	HFF08043H	11	ø40	1
	HSC10030H	40	ø50, ø63	2
	HSC12035H	80	ø80	2
	HSC16040H	150	ø100	2
	MBA20040H	320	ø120	3

AXD7000

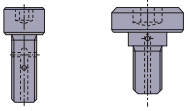
Geometry	Set Bolt	Clamp Torque (N•m)	Cutting Edge Diameter **DC**(mm)	Fig
Fig.1 Fig.2 	HSC10030H	40	ø50, ø63	1
	HSC12035H	80	ø80	1
	HSC16040H	150	ø100	1
	MBA20040H	320	ø120	2

Table 1 Max. Allowable Revolution

AXD4000

Cutting Edge Diameter **DC**(mm)	ø25	ø32	ø40	ø50	ø63	ø80	ø100	ø125
Max. Allowable Revolution (min^{-1})	49000	48000	41000	35000	30000	27000	23000	20000

AXD7000

Cutting Edge Diameter **DC**(mm)	ø32	ø40	ø50	ø63	ø80	ø100	ø125
Max. Allowable Revolution (min^{-1})	41000	36000	30000	25000	23000	19000	16000

- Even when operating under the maximum allowable spindle speed, if the spindle speed is equal to or higher than the values shown in table 2, it is recommended that the balance quality (with the arbor or milling chuck) conforms to G6.3 or betterbased on ISO1940. It is also recommended to replace the clamp screws with new ones when changing inserts. Furthermore,ensure to use machines that are provided with safety measures in case of cutter breakage.

(Note) The balance quality of the holder (without inserts and clamp screws) is G6.3 or better at 10,000min^{-1}.

Table 2 Maximum spindle speed when balancing with the arbor or milling chuck has not been achieved

AXD4000

Cutting Edge Diameter **DC**(mm)	ø25	ø32	ø40	ø50	ø63	ø80	ø100	ø125
Max. Allowable Revolution (min^{-1})	12000	9500	7600	6000	4800	3800	3000	2400

AXD7000

Cutting Edge Diameter **DC**(mm)	ø32	ø40	ø50	ø63	ø80	ø100	ø125
Max. Allowable Revolution (min^{-1})	9500	7600	6000	4800	3800	3000	2400

- When setting the spindle speed, take into consideration the maximum allowable spindle speed of the arbor or milling chuck.
- Use the specified set bolt when using the arbor type with through coolant.
- The inserts have sharp cutting edges and handling them with bare hands may cause injuries.
  Always wear safety gloves whenhandling the indexable inserts.

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

MULTI FUNCTIONAL MILLING

<ALUMINIUM ALLOY TO DIFFICULT-TO-CUT MATERIAL CUTTING>

Finishing Roughing

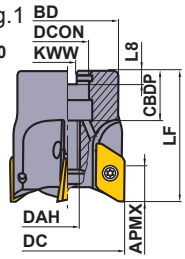
BXD4000

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal	Heat Resistant Alloy	Hardened Steel



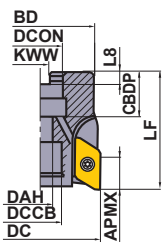
- Curved cutting edge and high rigidity holder produce high wall accuracy.
- Low resistance insert and high rigidity design for excellent performance.
- With through coolant holes to ensure smooth chip discharge.
- For high-speed machining.

Fig.1



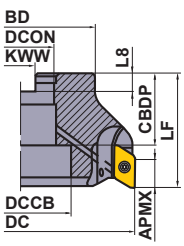
ø40

Fig.2



ø50
ø63
ø80
ø100

Fig.3



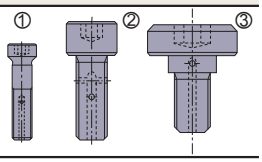
ø125

Right hand tool holder only.

● The set bolts in the right table are supplied with respective cutter.

KAPR :0°
GAMP:+11°—+15° T :+8°—+16°
GAMF:+8°—+16° I :+11°—+15°

Cutter Diameter DC	Set Bolt	Geometry
ϕ40	HFF08043H	①
ϕ50, ϕ63	HSC10030H	②
ϕ80	12035H	②
ϕ100	16040H	②
ϕ125	MBA20040H	③



ARBOR TYPE

Type	Insert Radius RE	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	DCON	CBDP	DAH	BD	KWW	L8	DCCB	WT *3 (kg)	APMX (mm)	RMPX *2	Max. Allowable Revolution (min^{-1})	Type(Fig.)	*1 Clamp Screw	Wrench	Insert
A type	0.4 — 3.2	BXD4000-040A03RA	●	3	40	50	16	18	8.5	32	8.4	5.6	—	0.3	15	9°	29000	1	TS4SL	TKY15W	XDGT1550 PD○R-G○○
		BXD4000-050A04RA	●	4	50	50	22	20	11	41	10.4	6.3	17	0.4	15	6°	24000	2	TS4SL	TKY15W	
		BXD4000-063A05RA	●	5	63	50	22	20	11	50	10.4	6.3	17	0.7	15	5°	21000	2	TS4SL	TKY15W	
		BXD4000R08005CA	●	5	80	50	25.4	26	13	60	9.5	6	20	1.1	15	3°	19000	2	TS4SL	TKY15W	XDGT1550 PD○R-GL○○
		BXD4000R10006DA	●	6	100	63	31.75	32	17	70	12.7	8	26	2.0	15	3°	16000	2	TS4SL	TKY15W	
		BXD4000R12507EA	●	7	125	63	38.1	40	—	80	15.9	10	56	2.8	15	2°	14000	3	TS4SL	TKY15W	
B type	4.0 — 5.0	BXD4000-040A03RB	●	3	40	50	16	18	8.5	32	8.4	5.6	—	0.3	15	9°	29000	1	TS4SL	TKY15W	XDGT1550 PD○R-G○○
		BXD4000-050A04RB	●	4	50	50	22	20	11	41	10.4	6.3	17	0.4	15	6°	24000	2	TS4SL	TKY15W	
		BXD4000-063A05RB	●	5	63	50	22	20	11	50	10.4	6.3	17	0.7	15	5°	21000	2	TS4SL	TKY15W	
		BXD4000R08005CB	●	5	80	50	25.4	26	13	60	9.5	6	20	1.1	15	3°	19000	2	TS4SL	TKY15W	
		BXD4000R10006DB	●	6	100	63	31.75	32	17	70	12.7	8	26	2.0	15	3°	16000	2	TS4SL	TKY15W	
		BXD4000R12507EB	●	7	125	63	38.1	40	—	80	15.9	10	56	2.8	15	2°	14000	3	TS4SL	TKY15W	

(Note 1) The maximum allowable revolutions are set to ensure tool and insert stability.
Before operating the tool read the operational guidance on L073 page.
(Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
*1 Clamp Torque (N • m) : TS4SL=4.0
*2 RMPX : Max. Ramping Angle
*3 WT : Tool Weight

● : Inventory maintained in Japan.



Fig.1 ø40

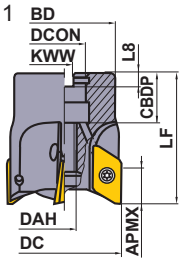


Fig.2 ø50 ø63 ø80 ø100

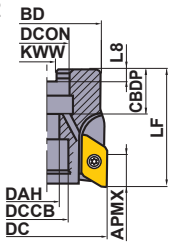
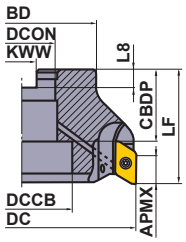
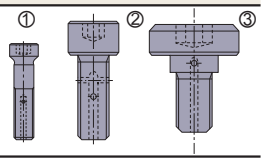


Fig.3 ø125



Right hand tool holder only.

Cutter Diameter **DC**	Set Bolt	Geometry
ϕ40	HFF08043H	①
ϕ50, ϕ63	HSC10030H	②
ϕ80	12035H	
ϕ100	16040H	
ϕ125	MBA20040H	③



For metric arbor

The cutter bore diameter DCON is indicated in millimetre.

ARBOR TYPE

KAPR :0°
GAMP:+11°—+15° T :+8°—+16°
GAMF :+8°—+16° I :+11°—+15°

Type	Insert Radius RE	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	LF	DCON	CBDP	DAH	BD	KWW	L8	DCCB	WT*3 (kg)	APMX (mm)	RMPX*2	Max. Allowable Revolution (min-1)	Type(Fig.)	*1 Clamp Screw	Wrench	Insert
A type	0.4 — 3.2	**BXD4000-040A03RA**	●	3	40	50	16	18	8.5	32	8.4	5.6	—	0.3	15	9°	29000	1	TS4SL	TKY15W	XDGT1550 PDOR-GOO
		BXD4000-050A04RA	●	4	50	50	22	20	11	41	10.4	6.3	17	0.4	15	6°	24000	2	TS4SL	TKY15W	
		BXD4000-063A05RA	●	5	63	50	22	20	11	50	10.4	6.3	17	0.7	15	5°	21000	2	TS4SL	TKY15W	
		BXD4000-080A05RA	●	5	80	50	27	23	13	60	12.4	7	20	1.1	15	3°	19000	2	TS4SL	TKY15W	
		BXD4000-100A06RA	●	6	100	63	32	26	17	70	14.4	8	26	2.0	15	3°	16000	2	TS4SL	TKY15W	
		BXD4000-125B07RA	●	7	125	63	40	40	—	80	16.4	9	56	2.8	15	2°	14000	3	TS4SL	TKY15W	
B type	4.0 — 5.0	**BXD4000-040A03RB**	●	3	40	50	16	18	8.5	32	8.4	5.6	—	0.3	15	9°	29000	1	TS4SL	TKY15W	XDGT1550 PDOR-GOO
		BXD4000-050A04RB	●	4	50	50	22	20	11	41	10.4	6.3	17	0.4	15	6°	24000	2	TS4SL	TKY15W	
		BXD4000-063A05RB	●	5	63	50	22	20	11	50	10.4	6.3	17	0.7	15	5°	21000	2	TS4SL	TKY15W	
		BXD4000-080A05RB	●	5	80	50	27	23	13	60	12.4	7	20	1.1	15	3°	19000	2	TS4SL	TKY15W	
		BXD4000-100A06RB	●	6	100	63	32	26	17	70	14.4	8	26	2.0	15	3°	16000	2	TS4SL	TKY15W	
		BXD4000-125B07RB	●	7	125	63	40	40	—	80	16.4	9	56	2.8	15	2°	14000	3	TS4SL	TKY15W	

(Note 1) The maximum allowable revolutions are set to ensure tool and insert stability.
Before operating the tool read the operational guidance on L073 page.
(Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
*1 Clamp Torque (N • m) : TS4SL=4.0 *2 RMPX : Max. Ramping Angle
*3 WT : Tool Weight

CAUTION FOR USE

- Only use the inserts and parts provided by Mitsubishi Materials with this tool. Use of the correct insert clamp screws is especially important to ensure overall tool safety. Do not use damaged or worn clamp screws.
- The maximum allowable spindle speeds are shown in Table 1. Ensure that the cutter operates under the maximum allowable spindle speed. The maximum allowable spindle speeds for safety purposes are determined in accordance with ISO15641 (Milling Cutters for high speed machining–Safety requirements).

Table 1 Max. Allowable Revolution

Cutting Edge Diameter **DC**(mm)	ø20	ø25	ø28	ø32	ø35	ø40	ø50	ø63	ø80	ø100	ø125
Max. Allowable Revolution (min-1)	15000*	38000	35000	33000	31000	29000	24000	21000	19000	16000	14000

* ϕ20mm with one tooth balancing is necessary to adjust sensitively.

- Even when operating under the maximum allowable spindle speed, if the spindle speed is equal to or higher than the values shown in table 2, it is recommended that the balance quality (with the arbor or milling chuck) conforms to G40 or betterbased on ISO1940. It is also recommended to replace the clamp screws with new ones when changing inserts. Furthermore,ensure to use machines that are provided with safety measures in case of cutter breakage.

Table 2 Maximum spindle speed when balancing with the arbor or milling chuck has not been achieved

Cutting Edge Diameter **DC**(mm)	ø20	ø25	ø28	ø32	ø35	ø40	ø50	ø63	ø80	ø100	ø125
Max. Allowable Revolution (min-1)	15000	12000	10800	9500	8700	7600	6000	4800	3800	3000	2400

- When setting the spindle speed, take into consideration the maximum allowable spindle speed of the arbor or milling chuck.
- Use the specified set bolt when using the arbor type with through coolant.
- The inserts have sharp cutting edges and handling them with bare hands may cause injuries. Always wear safety gloves whenhandling the indexable inserts.

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001



Fig.1 Straight Shank

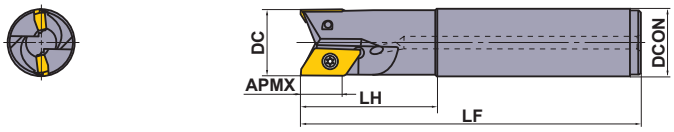
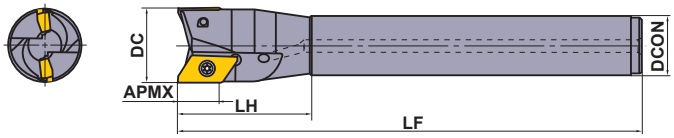


Fig.2 Offset Shank



SHANK TYPE

Right hand tool holder only.

Type	Insert Radius RE	Shank Type	Order Number	Stock R	Number of Teeth	Dimensions(mm) DC	APMX	LF	LH	DCON	∗2 RMPX	Max. Allowable Revolution (min^{-1})	Type(Fig.)	∗1 Clamp Screw	Wrench	Insert
Type A	0.4 – 3.2	Standard	BXD4000R201SA20SA	●	1	20	15	110	35	20	28	15000	1	TS4SL	TKY15W	XDGT1550 PD○R-G○○ XDGT1550 PD○R-GL○○
			BXD4000R252SA25SA	●	2	25	15	125	50	25	20	38000	1	TS4SL	TKY15W	
			BXD4000R282SA25SA	●	2	28	15	125	50	25	17	35000	2	TS4SL	TKY15W	
			BXD4000R322SA32SA	●	2	32	15	150	50	32	13	33000	1	TS4SL	TKY15W	
			BXD4000R352SA32SA	●	2	35	15	150	50	32	11	31000	2	TS4SL	TKY15W	
			BXD4000R403SA32SA	●	3	40	15	170	80	32	9	29000	2	TS4SL	TKY15W	
			BXD4000R403SA42SA	●	3	40	15	170	80	42	9	29000	1	TS4SL	TKY15W	
		Long	BXD4000R252SA25LA	●	2	25	15	170	80	25	20	38000	1	TS4SL	TKY15W	
			BXD4000R322SA32LA	●	2	32	15	200	80	32	13	33000	1	TS4SL	TKY15W	
		Extra Long	BXD4000R282SA25ELA	●	2	28	15	220	50	25	17	35000	2	TS4SL	TKY15W	
			BXD4000R352SA32ELA	●	2	35	15	250	50	32	11	31000	2	TS4SL	TKY15W	
			BXD4000R403SA32ELA	●	3	40	15	250	65	32	9	29000	2	TS4SL	TKY15W	
Type B	4.0 – 5.0	Standard	BXD4000R201SA20SB	●	1	20	15	110	35	20	28	15000	1	TS4SL	TKY15W	XDGT1550 PD○R-G○○
			BXD4000R252SA25SB	●	2	25	15	125	50	25	20	38000	1	TS4SL	TKY15W	
			BXD4000R282SA25SB	●	2	28	15	125	50	25	17	35000	2	TS4SL	TKY15W	
			BXD4000R322SA32SB	●	2	32	15	150	50	32	13	33000	1	TS4SL	TKY15W	
			BXD4000R352SA32SB	●	2	35	15	150	50	32	11	31000	2	TS4SL	TKY15W	
			BXD4000R403SA32SB	●	3	40	15	170	80	32	9	29000	2	TS4SL	TKY15W	
			BXD4000R403SA42SB	●	3	40	15	170	80	42	9	29000	1	TS4SL	TKY15W	
		Long	BXD4000R252SA25LB	●	2	25	15	170	80	25	20	38000	1	TS4SL	TKY15W	
			BXD4000R322SA32LB	●	2	32	15	200	80	32	13	33000	1	TS4SL	TKY15W	
		Extra Long	BXD4000R282SA25ELB	●	2	28	15	220	50	25	17	35000	2	TS4SL	TKY15W	
			BXD4000R352SA32ELB	●	2	35	15	250	50	32	11	31000	2	TS4SL	TKY15W	
			BXD4000R403SA32ELB	●	3	40	15	250	65	32	9	29000	2	TS4SL	TKY15W	

(Note 1) The maximum allowed revolutions are set to ensure tool and insert stability.
Before operating the tool read the operational guidance on L073 page.
(Note 2) When using the tool at high revolutions, ensure that the tool and arbor are correctly balanced.
∗1 Clamp Torque (N • m) : TS4SL=4.0
∗2 RMPX : Max. Ramping Angle

HOLDER AND INSERT CORNER RADIUS COMBINATION

Holder	A Holder							B Holder	
	BXD4000R○○○○○○○A							BXD4000R○○○○○○○B	
Insert Corner Radius (RE)	R 0.4	R 0.8	R 1.2	R 1.6	R 2.0	R 3.0	R 3.2	R 4.0	R 5.0
	XDGT.....-G04 XDGT.....-GL04	XDGT.....-G08 XDGT.....-GL08	XDGT.....-G12	XDGT.....-G16	XDGT.....-G20	XDGT.....-G30	XDGT.....-G32	XDGT.....-G40	XDGT.....-G50

(Note 1) Please only use the holder and insert corner radius combinations shown above.
(Note 2) XDGT....-GL08 and -G12 inserts are compatible only with the BXD4000R○○○○○○○A type holder.

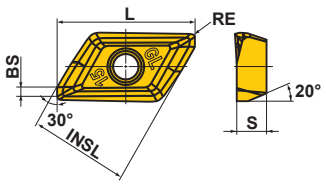
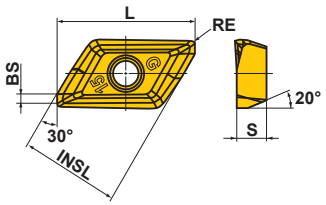
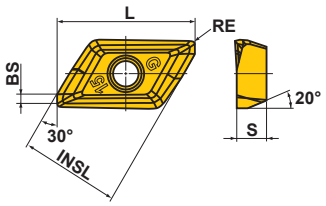
● : Inventory maintained in Japan. (10 inserts in one case)

INSERTS

Work Material			
	P	Steel	●
	M	Stainless Steel	◕
	K	Cast Iron	✱
	N	Non-ferrous Metal	✱
	S	Heat-resistant Alloy, Titanium Alloy	●
	H	Hardened Steel	◕

Cutting Conditions (Guide) :
● : Stable Cutting ◕ : General Cutting ✱ : Unstable Cutting

Honing :
E : Round **F :** Sharp

Shape	Order Number	Class	Honing	Stock: Coated VP15TF	Stock: Coated LC15TF	Stock: Coated	Stock: Coated	Stock: Carbide TF15	Stock: Carbide	L	INSL	S	BS	RE	Geometry
Low Resistance Type 	**XDGT1550PDFR-GL04**	G	F					●		22	16	5	1.5	0.4	
	XDGT1550PDFR-GL08	G	F					●		22	16	5	1.1	0.8	
	**XDGT1550PDFR-G04**	G	F		●			●		22	16	5	1.5	0.4	
	XDGT1550PDFR-G08	G	F		●			●		22	16	5	1.1	0.8	
	XDGT1550PDFR-G12	G	F		●			●		22	16	5	0.7	1.2	
	XDGT1550PDFR-G16	G	F		●			●		22	16	5	0.4	1.6	
	XDGT1550PDFR-G20	G	F		●			●		21.7	16	5	0.2	2.0	
	XDGT1550PDFR-G30	G	F		●			●		20	16	5	0.6	3.0	
	XDGT1550PDFR-G32	G	F		●			●		20	16	5	0.4	3.2	
	XDGT1550PDFR-G40	G	F		●			●		19	16	5	0.5	4.0	
	XDGT1550PDFR-G50	G	F		●			●		18	16	5	0.4	5.0	
	XDGT1550PDER-G04	G	E	●						22	16	5	1.5	0.4	
	XDGT1550PDER-G08	G	E	●						22	16	5	1.1	0.8	
	XDGT1550PDER-G12	G	E	●						22	16	5	0.7	1.2	
	XDGT1550PDER-G16	G	E	●						22	16	5	0.4	1.6	
	XDGT1550PDER-G20	G	E	●						21.7	16	5	0.2	2.0	
	XDGT1550PDER-G30	G	E	●						20	16	5	0.6	3.0	
	XDGT1550PDER-G32	G	E	●						20	16	5	0.4	3.2	
	XDGT1550PDER-G40	G	E	●						19	16	5	0.5	4.0	
	XDGT1550PDER-G50	G	E	●						18	16	5	0.4	5.0	

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
P	Mild Steel	≤180HB	**VP15TF**	180 (150—200)	0.15 (0.1—0.2)
P	Carbon Steel Alloy Steel	≤280HB	**VP15TF**	150 (120—200)	0.15 (0.1—0.2)
P		280—350HB	**VP15TF**	140 (120—160)	0.15 (0.1—0.2)
M	Stainless Steel	≤270HB	**VP15TF**	140 (120—160)	0.2 (0.1—0.3)
N	Aluminium Alloy	—	**LC15TF TF15**	1000 (200—3000)	0.3 (0.1—0.5)
S	Ti Alloy	—	**VP15TF**	40 (30—60)	0.1 (0.1—0.3)
S	Heat Resistance Alloy (Inconel etc.)	—	**VP15TF**	30 (20—40)	0.15 (0.1—0.2)
H	Hardened Steel	40—60HRC	**VP15TF**	70 (50—100)	0.1 (0.05—0.15)

- Figures above are a guide lines for optimum general use. They may vary depending on machine rigidity, work clamping and length of tool overhang.
- When using ϕ20 shank type, set the table feed at under 0.05mm/t. and maintain observation during cutting.
- Please adjust the table feed when using long- and extra-long-shank types.
- Please adjust the table feed when ramp machining (Recommended feed:0.05 mm/t. under).

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

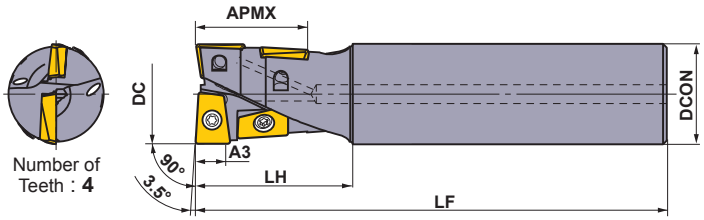
MULTI FUNCTIONAL MILLING

Roughing

AQX

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal		Hardened Steel





- The center bottom cutting edge enables drilling without previously formed hole.
- With through coolant holes.

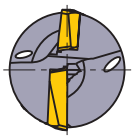
STANDARD EDGE TYPE

Right hand tool holder only.

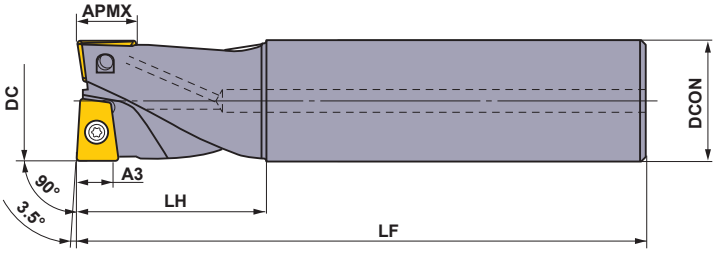
Type	Order Number	Stock	Coolant Hole	Dimensions (mm)						*3		
		R		DC	LF	DCON	LH	A3 *1	APMX *2	Clamp Screw	Wrench	Insert
Standard	AQXR164SA16S	●	○	16	120	16	30	4.5	17.6	TS2A	①TKY06F	QOG/MT0830R-G1/M2
	AQXR164SN16S	●	–	16	120	16	30	4.5	17.6	TS2A	①TKY06F	
	AQXR174SA16S	●	○	17	120	16	30	4.5	17.6	TS2A	①TKY06F	
	AQXR174SN16S	●	–	17	120	16	30	4.5	17.6	TS2A	①TKY06F	
	AQXR204SA20S	●	○	20	130	20	35	6	22	TS25	①TKY08F	QOG/MT1035R-G1/M2
	AQXR204SN20S	●	–	20	130	20	35	6	22	TS25	①TKY08F	
	AQXR214SA20S	●	○	21	130	20	35	6	22	TS25	①TKY08F	
	AQXR214SN20S	●	–	21	130	20	35	6	22	TS25	①TKY08F	
	AQXR254SA25S	●	○	25	140	25	40	7.5	27.5	TS33	②TKY08D	QOG/MT1342R-G1/M2
	AQXR254SN25S	●	–	25	140	25	40	7.5	27.5	TS33	②TKY08D	
	AQXR264SA25S	●	○	26	140	25	40	7.5	27.5	TS33	②TKY08D	
	AQXR264SN25S	●	–	26	140	25	40	7.5	27.5	TS33	②TKY08D	
	AQXR324SA32S	●	○	32	150	32	50	9.5	35.2	TS407	②TKY15D	QOG/MT1651R-G1/M2
	AQXR324SN32S	●	–	32	150	32	50	9.5	35.2	TS407	②TKY15D	
	AQXR334SA32S	●	○	33	150	32	50	9.5	35.2	TS407	②TKY15D	
	AQXR334SN32S	●	–	33	150	32	50	9.5	35.2	TS407	②TKY15D	
	AQXR354SA32S	●	○	35	150	32	50	11	40	TS407	②TKY15D	QOG/MT1856R-G1/M2
	AQXR354SN32S	●	–	35	150	32	50	11	40	TS407	②TKY15D	
	AQXR404SA32S	●	○	40	160	32	60	12	44	TS55	②TKY25D	QOG/MT2062R-G1/M2
	AQXR404SN32S	●	–	40	160	32	60	12	44	TS55	②TKY25D	
	AQXR504SA42S	●	○	50	170	42	70	15	55	TS6S	③TKY30T	QOG/MT2576R-G1/M2
	AQXR504SN42S	●	–	50	170	42	70	15	55	TS6S	③TKY30T	
Long	AQXR164SA16L	●	○	16	175	16	50	4.5	17.6	TS2A	①TKY06F	QOG/MT0830R-G1/M2
	AQXR164SN16L	●	–	16	175	16	50	4.5	17.6	TS2A	①TKY06F	
	AQXR174SA16L	●	○	17	175	16	30	4.5	17.6	TS2A	①TKY06F	
	AQXR174SN16L	●	–	17	175	16	30	4.5	17.6	TS2A	①TKY06F	
	AQXR204SA20L	●	○	20	185	20	60	6	22	TS25	①TKY08F	QOG/MT1035R-G1/M2
	AQXR204SN20L	●	–	20	185	20	60	6	22	TS25	①TKY08F	
	AQXR214SA20L	●	○	21	185	20	35	6	22	TS25	①TKY08F	
	AQXR214SN20L	●	–	21	185	20	35	6	22	TS25	①TKY08F	
	AQXR254SA25L	●	○	25	220	25	75	7.5	27.5	TS33	②TKY08D	QOG/MT1342R-G1/M2
	AQXR254SN25L	●	–	25	220	25	75	7.5	27.5	TS33	②TKY08D	
	AQXR264SA25L	●	○	26	220	25	40	7.5	27.5	TS33	②TKY08D	
	AQXR264SN25L	●	–	26	220	25	40	7.5	27.5	TS33	②TKY08D	
	AQXR324SA32L	●	○	32	230	32	90	9.5	35.2	TS407	②TKY15D	QOG/MT1651R-G1/M2
	AQXR324SN32L	●	–	32	230	32	90	9.5	35.2	TS407	②TKY15D	
	AQXR334SA32L	●	○	33	230	32	50	9.5	35.2	TS407	②TKY15D	
	AQXR334SN32L	●	–	33	230	32	50	9.5	35.2	TS407	②TKY15D	
	AQXR354SA32L	●	○	35	230	32	50	11	40	TS407	②TKY15D	QOG/MT1856R-G1/M2
	AQXR354SN32L	●	–	35	230	32	50	11	40	TS407	②TKY15D	
	AQXR404SA32L	●	○	40	240	32	60	12	44	TS55	②TKY25D	QOG/MT2062R-G1/M2
	AQXR404SN32L	●	–	40	240	32	60	12	44	TS55	②TKY25D	
	AQXR504SA42L	●	○	50	250	42	70	15	55	TS6S	③TKY30T	QOG/MT2576R-G1/M2
	AQXR504SN42L	●	–	50	250	42	70	15	55	TS6S	③TKY30T	

*1 Dimension A3 represents the depth of cut when the cutting edge consists of 2 inserts. *2 APMX : Maximum depth of cut.
*3 Clamp Torque (N • m) : TS2A=0.6, TS25=1.0, TS33=1.0, TS407=3.5, TS55=7.5, TS6S=10.0

● : Inventory maintained in Japan.



Number of Teeth : **2**



SHORT EDGE TYPE

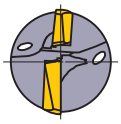
Right hand tool holder only.

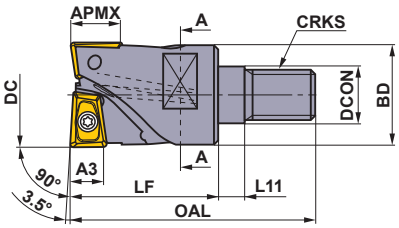
Type	Order Number	Stock	Coolant Hole	Dimensions (mm)						✱3 Clamp Screw	① ② ③ Wrench	Insert
		R		DC	LF	DCON	LH	A3 ✱1	APMX ✱2			
Standard	**AQXR162SA16S**	●	○	16	120	16	30	4.5	7.4	TS2A	①TKY06F	QOG/MT0830R-G1/M2
	AQXR**162SN16S**	●	–	16	120	16	30	4.5	7.4	TS2A	①TKY06F	
	AQXR**172SA16S**	●	○	17	120	16	30	4.5	7.4	TS2A	①TKY06F	
	AQXR**172SN16S**	●	–	17	120	16	30	4.5	7.4	TS2A	①TKY06F	
	AQXR**202SA20S**	●	○	20	130	20	35	6	9.2	TS25	①TKY08F	QOG/MT1035R-G1/M2
	AQXR**202SN20S**	●	–	20	130	20	35	6	9.2	TS25	①TKY08F	
	AQXR**212SA20S**	●	○	21	130	20	35	6	9.2	TS25	①TKY08F	
	AQXR**212SN20S**	●	–	21	130	20	35	6	9.2	TS25	①TKY08F	
	AQXR**252SA25S**	●	○	25	140	25	40	7.5	11.5	TS33	②TKY08D	QOG/MT1342R-G1/M2
	AQXR**252SN25S**	●	–	25	140	25	40	7.5	11.5	TS33	②TKY08D	
	AQXR**262SA25S**	●	○	26	140	25	40	7.5	11.5	TS33	②TKY08D	
	AQXR**262SN25S**	●	–	26	140	25	40	7.5	11.5	TS33	②TKY08D	
	AQXR**322SA32S**	●	○	32	150	32	50	9.5	14.5	TS407	②TKY15D	QOG/MT1651R-G1/M2
	AQXR**322SN32S**	●	–	32	150	32	50	9.5	14.5	TS407	②TKY15D	
	AQXR**332SA32S**	●	○	33	150	32	50	9.5	14.5	TS407	②TKY15D	
	AQXR**332SN32S**	●	–	33	150	32	50	9.5	14.5	TS407	②TKY15D	
	AQXR**352SA32S**	●	○	35	150	32	50	11	16	TS407	②TKY15D	QOG/MT1856R-G1/M2
	AQXR**352SN32S**	●	–	35	150	32	50	11	16	TS407	②TKY15D	
	AQXR**402SA32S**	●	○	40	160	32	60	12	18	TS55	②TKY25D	QOG/MT2062R-G1/M2
	AQXR**402SN32S**	●	–	40	160	32	60	12	18	TS55	②TKY25D	
	AQXR**502SA42S**	●	○	50	170	42	70	15	23	TS6S	③TKY30T	QOG/MT2576R-G1/M2
	AQXR**502SN42S**	●	–	50	170	42	70	15	23	TS6S	③TKY30T	
Long	**AQXR162SA16L**	●	○	16	175	16	50	4.5	7.4	TS2A	①TKY06F	QOG/MT0830R-G1/M2
	AQXR**162SN16L**	●	–	16	175	16	50	4.5	7.4	TS2A	①TKY06F	
	AQXR**172SA16L**	●	○	17	175	16	30	4.5	7.4	TS2A	①TKY06F	
	AQXR**172SN16L**	●	–	17	175	16	30	4.5	7.4	TS2A	①TKY06F	
	AQXR**202SA20L**	●	○	20	185	20	60	6	9.2	TS25	①TKY08F	QOG/MT1035R-G1/M2
	AQXR**202SN20L**	●	–	20	185	20	60	6	9.2	TS25	①TKY08F	
	AQXR**212SA20L**	●	○	21	185	20	35	6	9.2	TS25	①TKY08F	
	AQXR**212SN20L**	●	–	21	185	20	35	6	9.2	TS25	①TKY08F	
	AQXR**252SA25L**	●	○	25	220	25	75	7.5	11.5	TS33	②TKY08D	QOG/MT1342R-G1/M2
	AQXR**252SN25L**	●	–	25	220	25	75	7.5	11.5	TS33	②TKY08D	
	AQXR**262SA25L**	●	○	26	220	25	40	7.5	11.5	TS33	②TKY08D	
	AQXR**262SN25L**	●	–	26	220	25	40	7.5	11.5	TS33	②TKY08D	
	AQXR**322SA32L**	●	○	32	230	32	90	9.5	14.5	TS407	②TKY15D	QOG/MT1651R-G1/M2
	AQXR**322SN32L**	●	–	32	230	32	90	9.5	14.5	TS407	②TKY15D	
	AQXR**332SA32L**	●	○	33	230	32	50	9.5	14.5	TS407	②TKY15D	
	AQXR**332SN32L**	●	–	33	230	32	50	9.5	14.5	TS407	②TKY15D	
	AQXR**352SA32L**	●	○	35	230	32	50	11	16	TS407	②TKY15D	QOG/MT1856R-G1/M2
	AQXR**352SN32L**	●	–	35	230	32	50	11	16	TS407	②TKY15D	
	AQXR**402SA32L**	●	○	40	240	32	60	12	18	TS55	②TKY25D	QOG/MT2062R-G1/M2
	AQXR**402SN32L**	●	–	40	240	32	60	12	18	TS55	②TKY25D	
	AQXR**502SA42L**	●	○	50	250	42	70	15	23	TS6S	③TKY30T	QOG/MT2576R-G1/M2
	AQXR**502SN42L**	●	–	50	250	42	70	15	23	TS6S	③TKY30T	

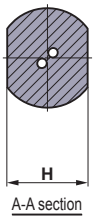
✱1 Dimension A3 represents the depth of cut when the cutting edge consists of 2 inserts.
✱2 APMX : Maximum depth of cut.
✱3 Clamp Torque (N • m) : TS2A=0.6, TS25=1.0, TS33=1.0, TS407=3.5, TS55=7.5, TS6S=10.0

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001









SCREW-IN TYPE

Right hand tool holder only.

Order Number	Stock	Coolant Hole	Dimensions(mm)										*4 WT (kg)	*3 Clamp Screw	① ② Wrench	Insert
	R		DC	DCON	BD	OAL	LF	L11	H	CRKS	A3 *1	APMX *2				
AQXR162M08A30	●	○	16	8.5	14.7	48	30	6	10	M8	4.5	7.4	0.1	TS2A	①TKY06F	QO○T0830R-○○
AQXR172M08A30	●	○	17	8.5	14.5	48	30	6	10	M8	4.5	7.4	0.1	TS2A	①TKY06F	
AQXR202M10A30	●	○	20	10.5	18.6	49	30	6	14	M10	6	9.2	0.2	TS25	①TKY08F	QO○T1035R-○○
AQXR212M10A30	●	○	21	10.5	18.5	49	30	6	14	M10	6	9.2	0.2	TS25	①TKY08F	
AQXR252M12A35	●	○	25	12.5	23.5	57	35	6	19	M12	7.5	11.5	0.2	TS33	②TKY08D	QO○T1342R-○○
AQXR262M12A35	●	○	26	12.5	23.5	57	35	6	19	M12	7.5	11.5	0.2	TS33	②TKY08D	
AQXR322M16A40	●	○	32	17	28.5	63	40	6	24	M16	9.5	14.5	0.3	TS407	②TKY15D	QO○T1651R-○○
AQXR332M16A40	●	○	33	17	28.5	63	40	6	24	M16	9.5	14.5	0.3	TS407	②TKY15D	
AQXR352M16A40	●	○	35	17	28.5	63	40	6	24	M16	11	16	0.3	TS407	②TKY15D	QO○T1856R-○○
AQXR402M16A45	●	○	40	17	28.5	68	45	6	24	M16	12	18	0.3	TS55	②TKY25D	QO○T2062R-○○

(Note) For screw-in type arbors, refer to page L145—L146.

∗1 Dimension A3 represents the depth of cut when the cutting edge consists of 2 inserts.

∗2 APMX : Maximum depth of cut.

∗3 Clamp Torque (N • m) : TS2A=0.6, TS25=1.0, TS33=1.0, TS407=3.5, TS55=7.5

∗4 WT : Tool Weight

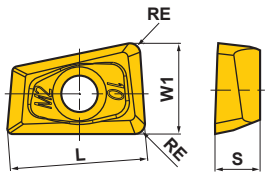
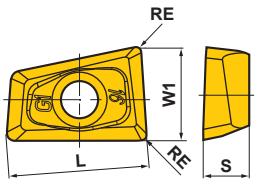
● : Inventory maintained in Japan. (10 inserts in one case)

INSERTS

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	
H	Hardened Steel	

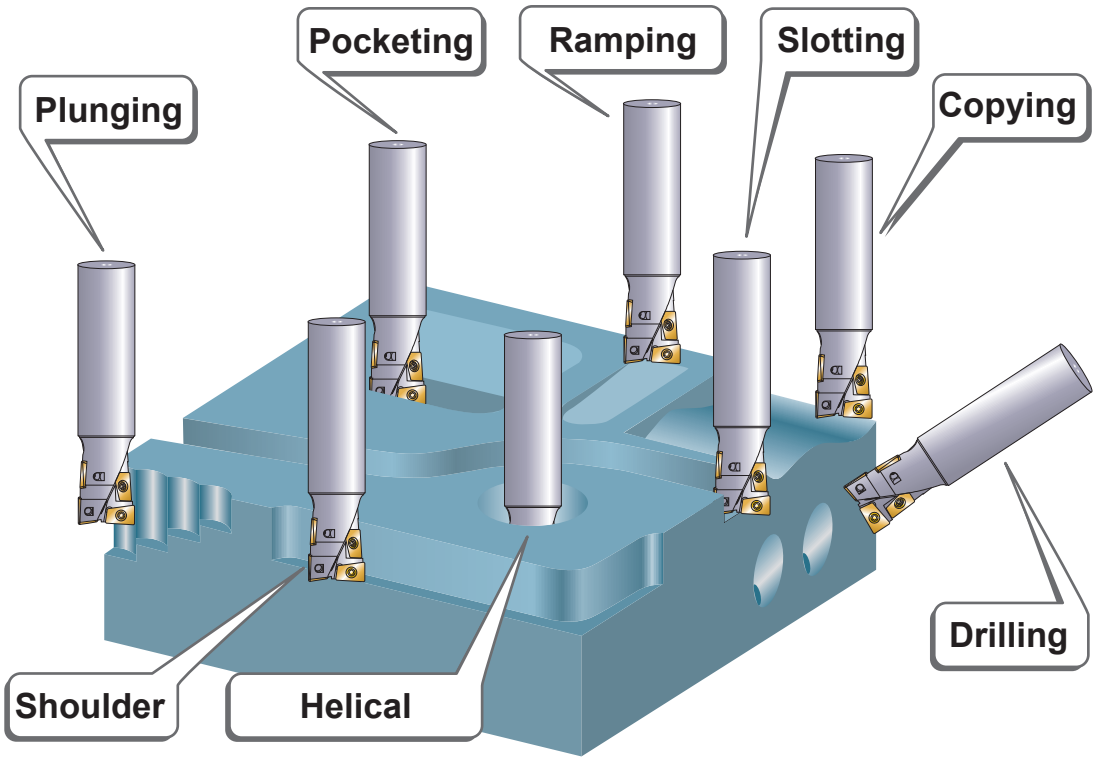
Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing :
E : Round **F :** Sharp

Shape	Order Number	Endmill Dia.	Class	Honing	Coated VP15TF	Coated VP30RT	Carbide HTi10	L	W1	S	RE	Geometry
	**QOMT0830R-M2**	ϕ16,17	M	E	●	●		8.4	5.5	3	0.8	
	QOMT**1035R-M2**	ϕ20,21	M	E	●	●		10.6	7	3.5	0.8	
	QOMT**1342R-M2**	ϕ25,26	M	E	●	●		13.1	8.7	4.2	0.8	
	QOMT**1651R-M2**	ϕ32,33	M	E	●	●		16.5	11	5.1	0.8	
	QOMT**1856R-M2**	ϕ35	M	E	●	●		18	12	5.6	0.8	
	QOMT**2062R-M2**	ϕ40	M	E	●	●		20.4	13.6	6.2	0.8	
	QOMT**2576R-M2**	ϕ50	M	E	●	●		25.8	17.2	7.6	0.8	
	**QOGT0830R-G1**	ϕ16,17	G	F*	●		●	8.4	5.5	3	0.4	
	QOGT**1035R-G1**	ϕ20,21	G	F*	●		●	10.6	7	3.5	0.4	
	QOGT**1342R-G1**	ϕ25,26	G	F*	●		●	13.1	8.7	4.2	0.4	
	QOGT**1651R-G1**	ϕ32,33	G	F*	●		●	16.5	11	5.1	0.4	
	QOGT**1856R-G1**	ϕ35	G	F*	●		●	18	12	5.6	0.4	
	QOGT**2062R-G1**	ϕ40	G	F*	●		●	20.4	13.6	6.2	0.4	
	QOGT**2576R-G1**	ϕ50	G	F*	●		●	25.8	17.2	7.6	0.4	

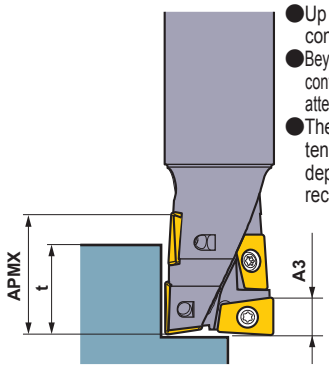
* VP15TF insert honing is "E" type.

CUTTING MODE



SCREW-IN ARBORS ➤ L145
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

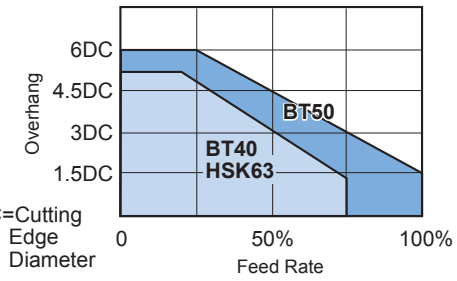
RECOMMENDED CUTTING CONDITIONS



∗ Figures for A3 and APMX are shown in the standard holder tables on the previous pages.

- Up to A3 depth of cut, the two lower cutting edges maintain contact with the workpiece.
- Beyond the range of A3, there is an area where the cutting edge contact with the workpiece becomes single bladed. Please pay special attention to the relationship between depth of cut and feed in this area.
- The insert in contact with the top edge of the workpiece tends to suffer from damege. At large depths of cut, applying depth of cut (t), where there are 2 inserts in contact is recommended to reduce wear and damage to the inserts.

Diameter	Recommended depth of cut **t** (mm)
ϕ16,17	12 — 14
ϕ20,21	14 — 17
ϕ25,26	17 — 22
ϕ32,33	22 — 28
ϕ35	25 — 32
ϕ40	28 — 35
ϕ50	35 — 45



∗ **DC**=Cutting Edge Diameter

- Chatter, vibration and other operational problems tend to occur with a long tool overhang and/or low machine rigidity, resulting in unstable machining.
- Please reduce the feed accordingly in these conditions, using the chart above as a guideline.

FOR SHOULDER MILLING

	Work Material	Hardness	Grade	Cutting Speed (m/min)	ϕ16, ϕ17			ϕ20, ϕ21		
					Depth of Cut (mm)	Width of Cut (mm)	Feed (mm/rev)	Depth of Cut (mm)	Width of Cut (mm)	Feed (mm/rev)
P	Mild Steel	≤180HB	**VP15TF**	180 (150—220)	—4.5	—8	0.25	—6	—10	0.30
					4.5—12	—5	0.16	6—14	—7	0.25
					12—17	—3	0.10	14—22	—4	0.18
	Carbon Steel Alloy Steel	180—350HB	**VP15TF**	160 (120—200)	—4.5	—8	0.20	—6	—10	0.25
					4.5—12	—4	0.14	6—14	—6	0.20
					12—17	—2	0.08	14—22	—3	0.16
M	Stainless Steel	≤270HB	**VP30RT (VP15TF)**	150 (120—180)	—4.5	—8	0.20	—6	—10	0.25
					4.5—12	—4	0.14	6—14	—6	0.20
					12—17	—2	0.08	14—22	—3	0.16
K	Cast Iron	Tensile Strength ≤450MPa	**VP15TF**	180 (150—220)	—4.5	—8	0.25	—6	—10	0.30
					4.5—12	—5	0.16	6—14	—7	0.25
					12—17	—3	0.10	14—22	—4	0.18
N	Aluminium Alloy	—	**HTi10** (G1 Breaker)	500 (200—800)	—4.5	—11	0.30	—6	—14	0.35
					4.5—12	—8	0.21	6—14	—10	0.30
					12—17	—5	0.15	14—22	—6	0.23
H	Hardened Steel	40—55HRC	**VP15TF**	80 (50—120)	—4.5	—5	0.16	—6	—6	0.20
					4.5—12	—3	0.10	6—14	—4	0.16
					12—17	—1	0.06	14—22	—2	0.12

(Note 1) Please pay special attention to the depth of cut when using the short edge type.
(Note 2) When using the G1 breaker (VP15TF), reduce the feed rate by at least 20%.

FOR SLOT MILLING

	Work Material	Hardness	Grade	Cutting Speed (m/min)	ϕ16, ϕ17		ϕ20, ϕ21	
					Depth of Cut (mm)	Feed (mm/rev)	Depth of Cut (mm)	Feed (mm/rev)
P	Mild Steel	≤180HB	**VP15TF**	180 (150—220)	—4.5	0.16	—6	0.18
					4.5—12	0.10	6—14	0.14
					12—17	0.07	14—22	0.10
	Carbon Steel Alloy Steel	180—350HB	**VP15TF**	160 (120—200)	—4.5	0.14	—6	0.16
					4.5—12	0.09	6—14	0.12
					12—17	0.05	14—22	0.10
M	Stainless Steel	≤270HB	**VP30RT (VP15TF)**	150 (120—180)	—4.5	0.14	—6	0.16
					4.5—12	0.09	6—14	0.12
					12—17	0.05	14—22	0.10
K	Cast Iron	Tensile Strength ≤450MPa	**VP15TF**	180 (150—220)	—4.5	0.16	—6	0.18
					4.5—12	0.10	6—14	0.14
					12—17	0.07	14—22	0.10
N	Aluminium Alloy	—	**HTi10** (G1 Breaker)	500 (200—800)	—4.5	0.18	—6	0.20
					4.5—12	0.12	6—14	0.16
					12—17	0.09	14—22	0.12
H	Hardened Steel	40—55HRC	**VP15TF**	80 (50—120)	—4.5	0.10	—6	0.12
					4.5—12	0.07	6—14	0.10

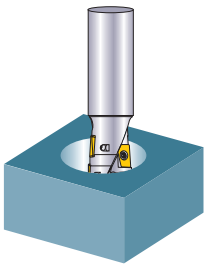
(Note 1) Please pay special attention to the depth of cut when using the short edge type.
(Note 2) When using the G1 breaker (VP15TF), reduce the feed rate by at least 20%.

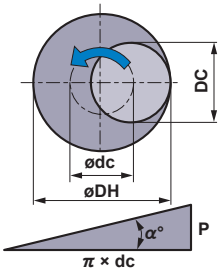
	ϕ25, ϕ26			ϕ32, ϕ33			ϕ35			ϕ40			ϕ50		
	Depth of Cut (mm)	Width of Cut (mm)	Feed (mm/rev)	Depth of Cut (mm)	Width of Cut (mm)	Feed (mm/rev)	Depth of Cut (mm)	Width of Cut (mm)	Feed (mm/rev)	Depth of Cut (mm)	Width of Cut (mm)	Feed (mm/rev)	Depth of Cut (mm)	Width of Cut (mm)	Feed (mm/rev)
	−7.5	−12.5	0.35	−9.5	−16	0.40	−11	−17.5	0.45	−12	−20	0.50	−15	−25	0.60
	7.5−17	−8	0.28	9.5−22	−11	0.32	11−25	−12	0.35	12−28	−13	0.40	15−35	−16	0.50
	17−27	−5	0.20	22−35	−6	0.25	25−40	−6.5	0.28	28−44	−7	0.30	35−55	−10	0.35
	−7.5	−12.5	0.30	−9.5	−16	0.35	−11	−17.5	0.37	−12	−20	0.40	−15	−25	0.50
	7.5−17	−7	0.25	9.5−22	−10	0.28	11−25	−11	0.30	12−28	−12	0.32	15−35	−14	0.40
	17−27	−4	0.18	22−35	−5	0.20	25−40	−5.5	0.22	28−44	−6	0.25	35−55	−8	0.30
	−7.5	−12.5	0.30	−9.5	−16	0.35	−11	−17.5	0.37	−12	−20	0.40	−15	−25	0.50
	7.5−17	−7	0.25	9.5−22	−10	0.28	11−25	−12	0.30	12−28	−12	0.32	15−35	−14	0.40
	17−27	−4	0.18	22−35	−5	0.20	25−40	−6.5	0.22	28−44	−6	0.25	35−55	−8	0.30
	−7.5	−12.5	0.35	−9.5	−16	0.40	−11	−17.5	0.45	−12	−20	0.50	−15	−25	0.60
	7.5−17	−8	0.28	9.5−22	−11	0.32	11−25	−12	0.35	12−28	−13	0.40	15−35	−16	0.50
	17−27	−5	0.20	22−35	−6	0.25	25−40	−6.5	0.28	28−44	−7	0.30	35−55	−10	0.35
	−7.5	−17.5	0.40	−9.5	−23	0.45	−11	−24.5	0.50	−12	−28	0.55	−15	−35	0.65
	7.5−17	−12.5	0.33	9.5−22	−16	0.37	11−25	−17.5	0.40	12−28	−20	0.45	15−35	−25	0.55
	17−27	−7.5	0.25	22−35	−10	0.30	25−40	−10.5	0.32	28−44	−12	0.35	35−55	−15	0.40
	−7.5	−7	0.22	−9.5	−8	0.25	−11	−9	0.28	−12	−10	0.30	−15	−14	0.35
	7.5−17	−4	0.18	9.5−22	−5	0.20	11−25	−5.5	0.22	12−28	−6	0.24	15−35	−8	0.30
	17−27	−2	0.14	22−35	−2	0.16	25−40	−2	0.17	28−44	−2	0.18	35−55	−4	0.22

	ϕ25, ϕ26		ϕ32, ϕ33		ϕ35		ϕ40		ϕ50	
	Depth of Cut (mm)	Feed (mm/rev)	Depth of Cut (mm)	Feed (mm/rev)	Depth of Cut (mm)	Feed (mm/rev)	Depth of Cut (mm)	Feed (mm/rev)	Depth of Cut (mm)	Feed (mm/rev)
	−7.5	0.20	−9.5	0.25	−11	0.27	−12	0.30	−15	0.35
	7.5−17	0.16	9.5−22	0.20	11−25	0.22	12−28	0.25	15−35	0.30
	17−27	0.12	22−35	0.14	25−40	0.16	28−44	0.18	35−55	0.22
	−7.5	0.18	−9.5	0.20	−11	0.22	−12	0.25	−15	0.30
	7.5−17	0.14	9.5−22	0.16	11−25	0.18	12−28	0.20	15−35	0.25
	17−27	0.10	22−35	0.12	25−40	0.13	28−44	0.14	35−55	0.16
	−7.5	0.18	−9.5	0.20	−11	0.22	−12	0.25	−15	0.30
	7.5−17	0.14	9.5−22	0.16	11−25	0.18	12−28	0.20	15−35	0.25
	17−27	0.10	22−35	0.12	25−40	0.13	28−44	0.14	35−55	0.16
	−7.5	0.20	−9.5	0.25	−11	0.27	−12	0.30	−15	0.35
	7.5−17	0.16	9.5−22	0.20	11−25	0.22	12−28	0.25	15−35	0.30
	17−27	0.12	22−35	0.14	25−40	0.16	28−44	0.18	35−55	0.22
	−7.5	0.22	−9.5	0.27	−11	0.30	−12	0.32	−15	0.37
	7.5−17	0.18	9.5−22	0.22	11−25	0.25	12−28	0.27	15−35	0.32
	17−27	0.14	22−35	0.16	25−40	0.18	28−44	0.20	35−55	0.25
	−7.5	0.14	−9.5	0.16	−11	0.17	−12	0.18	−15	0.22
	7.5−17	0.12	9.5−22	0.12	11−25	0.13	12−28	0.14	15−35	0.16

RECOMMENDED CUTTING CONDITIONS

FOR HELICAL CUTTING





- How to derive a locus of the center of the tool.

$$\text{Ø dc (Locus of the center of the tool)} = \text{Ø DH (Desired hole diameter)} - \text{DC (Cutting edge diameter)}$$

- Depth of cut for each pass.

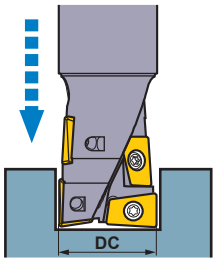
$$P = \pi \times dc \times \tan \alpha^\circ \quad \text{(Note) } \alpha^\circ \leq 3^\circ$$

- Min. machined hole diameter for helical cutting : 1.2DC
  Max. machined hole diameter for helical cutting : 1.8DC
- For efficient chip discharge, always apply air blow.
- When using a G1 breaker insert (VP15TF), please reduce the feed rate by 20%.

Work Material		Hardness	Grade	Cutting Speed (m/min)	ϕ16, ϕ17				ϕ20, ϕ21				ϕ25, ϕ26			
					Machining Diameter (mm)	Max. Depth of Cut (mm)	Feed (mm/rev)	DOC/pass (mm/pass)	Machining Diameter (mm)	Max. Depth of Cut (mm)	Feed (mm/rev)	DOC/pass (mm/pass)	Machining Diameter (mm)	Max. Depth of Cut (mm)	Feed (mm/rev)	DOC/pass (mm/pass)
P	Mild Steel	≤180HB	**VP15TF**	180 (150–220)	20	8	0.16	0.44	24	10	0.18	0.44	30	12.5	0.20	0.55
					25	12	0.14	0.99	30	15	0.16	1.10	38	19	0.18	1.43
					29	16	0.12	1.43	36	20	0.14	1.76	45	25	0.16	2.20
	Carbon Steel Alloy Steel	180–350HB	**VP15TF**	160 (120–200)	20	8	0.14	0.33	24	10	0.16	0.33	30	12.5	0.18	0.41
					25	12	0.12	0.74	30	15	0.14	0.82	38	19	0.16	1.07
					29	16	0.10	1.07	36	20	0.12	1.32	45	25	0.14	1.65
M	Stainless Steel	≤270HB	**VP30RT (VP15TF)**	150 (120–180)	20	3	0.14	0.22	24	4	0.16	0.22	30	5	0.18	0.27
					25	5	0.12	0.49	30	7	0.14	0.55	38	9	0.16	0.71
					29	8	0.10	0.71	36	10	0.12	0.88	45	12.5	0.14	1.10
K	Cast Iron	Tensile Strength ≤450MPa	**VP15TF**	180 (150–220)	20	10	0.16	0.55	24	14	0.18	0.55	30	18	0.20	0.69
					25	13	0.14	1.23	30	17	0.16	1.37	38	21	0.18	1.78
					29	16	0.12	1.78	36	20	0.14	2.19	45	25	0.16	2.74
N	Aluminium Alloy	–	**HTi10** (G1 Breaker)	500 (200–800)	20	10	0.18	0.44	24	14	0.20	0.44	30	18	0.22	0.55
					25	13	0.16	0.99	30	17	0.18	1.10	38	21	0.20	1.43
					29	16	0.14	1.43	36	20	0.16	1.76	45	25	0.18	2.20
H	Hardened Steel	40–55HRC	**VP15TF**	80 (50–120)	20	3	0.10	0.22	24	4	0.12	0.22	30	5	0.14	0.27
					25	5	0.08	0.49	30	7	0.10	0.55	38	9	0.12	0.71
					29	8	0.06	0.71	36	10	0.08	0.88	45	12.5	0.10	1.10

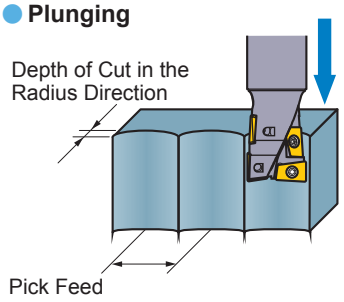
FOR DRILLING AND PLUNGING

Drilling



- The recommended drilling depth is less than 0.5DC.
- Use step feed when drilling (0.25–0.5mm) to ensure that the chips are effectively broken.
- Use internal or external cooling to ensure that the chips disposal is sufficiently achieved.
- The chips generated can dispel in any direction, so ensure that adequate safety precautions are taken.

Plunging



- The feed for plunging is the same as the feed for drilling.
- No step feed necessary.
- Please refer to the following table for the depth of cut at plunging operations.

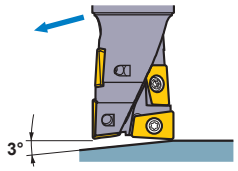
Depth of Cut in the Radius Direction	≤0.4DC
Pick Feed	≤0.5DC

Work Material		Hardness	Grade	Cutting Speed (m/min)	ϕ16, ϕ17		ϕ20, ϕ21		ϕ25, ϕ26	
					Feed (mm/rev)	Step (mm)	Feed (mm/rev)	Step (mm)	Feed (mm/rev)	Step (mm)
P	Mild Steel	≤180HB	**VP15TF**	180 (150–220)	0.035	0.2	0.045	0.3	0.05	0.3
	Carbon Steel, Alloy Steel	180–350HB	**VP15TF**	160 (120–200)	0.03	0.2	0.04	0.3	0.045	0.3
M	Stainless Steel	≤270HB	**VP30RT (VP15TF)**	150 (120–180)	0.03	0.15	0.04	0.25	0.045	0.25
K	Cast Iron	Tensile Strength ≤450MPa	**VP15TF**	180 (150–220)	0.04	0.4	0.05	0.5	0.06	0.5
N	Aluminium Alloy	–	**HTi10** (G1 Breaker)	500 (200–800)	0.04	0.2	0.05	0.3	0.06	0.3
H	Hardened Steel	40–55HRC	**VP15TF**	80 (50–120)	0.02	0.15	0.03	0.25	0.035	0.25

(Note) Helical grooving is strongly recommended for machining of tempered steel.
∗ When using the G1 breaker (VP15TF), reduce the feed rate by at least 20%.

	ϕ32, ϕ33				ϕ35				ϕ40				ϕ50			
	Machining Diameter (mm)	Max. Depth of Cut (mm)	Feed (mm/rev)	DOC/pass (mm/pass)	Machining Diameter (mm)	Max. Depth of Cut (mm)	Feed (mm/rev)	DOC/pass (mm/pass)	Machining Diameter (mm)	Max. Depth of Cut (mm)	Feed (mm/rev)	DOC/pass (mm/pass)	Machining Diameter (mm)	Max. Depth of Cut (mm)	Feed (mm/rev)	DOC/pass (mm/pass)
	38	16	0.25	0.66	42	18	0.28	0.77	48	20	0.30	0.88	60	25	0.35	1.10
	48	24	0.22	1.76	53	27	0.24	1.97	60	30	0.26	2.19	75	38	0.30	2.74
	58	32	0.20	2.85	63	35	0.21	3.07	72	40	0.22	3.51	90	50	0.26	4.39
	38	16	0.20	0.49	42	18	0.22	0.58	48	20	0.25	0.66	60	25	0.28	0.82
	48	24	0.18	1.32	53	27	0.2	1.48	60	30	0.22	1.65	75	38	0.26	2.06
	58	32	0.16	2.14	63	35	0.18	2.3	72	40	0.20	2.63	90	50	0.24	3.29
	38	6	0.20	0.33	42	7	0.22	0.38	48	8	0.25	0.44	60	10	0.28	0.55
	48	11	0.18	0.88	53	13	0.2	0.99	60	14	0.22	1.10	75	18	0.26	1.37
	58	16	0.16	1.43	63	18	0.18	1.53	72	20	0.20	1.75	90	25	0.24	2.19
	38	22	0.25	0.82	42	25	0.28	0.95	48	28	0.30	1.10	60	35	0.35	1.37
	48	27	0.22	2.19	53	30	0.24	2.47	60	34	0.26	2.74	75	43	0.30	3.43
	58	32	0.20	3.57	63	35	0.21	3.84	72	40	0.22	4.39	90	50	0.26	5.49
	38	22	0.27	0.66	42	25	0.3	0.77	48	28	0.32	0.88	60	35	0.37	1.10
	48	27	0.24	1.76	53	30	0.26	1.97	60	34	0.28	2.19	75	43	0.32	2.74
	58	32	0.22	2.85	63	35	0.21	3.07	72	40	0.24	3.51	90	50	0.27	4.39
	38	6	0.16	0.33	42	7	0.17	0.38	48	8	0.18	0.44	60	10	0.20	0.55
	48	11	0.14	0.88	53	13	0.15	0.99	60	14	0.16	1.10	75	18	0.18	1.37
	58	16	0.12	1.43	63	18	0.13	1.53	72	20	0.14	1.75	90	25	0.16	2.19

FOR RAMPING



- When machining steel the recommended ramping angle is 3°. If a ramping angle larger than 3° is used, then the chips may not be broken effectively resulting in chips wrapping around the tool.
- During ramping, it is recommended to reduce the feed rate by 40% from the cutting conditions on page L080.

	ϕ32, ϕ33, ϕ35		ϕ40		ϕ50	
	Feed (mm/rev)	Step (mm)	Feed (mm/rev)	Step (mm)	Feed (mm/rev)	Step (mm)
	0.055	0.3	0.06	0.3	0.065	0.3
	0.05	0.3	0.055	0.3	0.06	0.3
	0.05	0.25	0.055	0.25	0.06	0.25
	0.065	0.5	0.07	0.5	0.075	0.5
	0.065	0.3	0.07	0.3	0.075	0.3
	0.04	0.25	0.045	0.25	0.05	0.25

MULTI FUNCTIONAL MILLING

Roughing

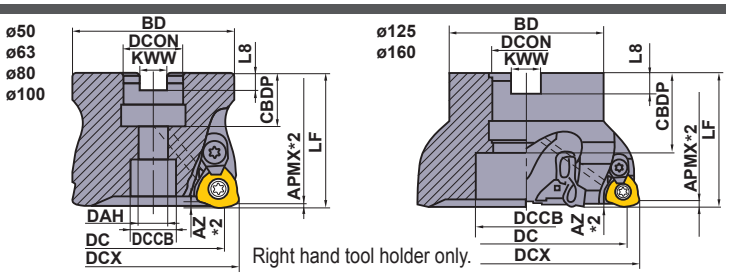
Including Flat faces

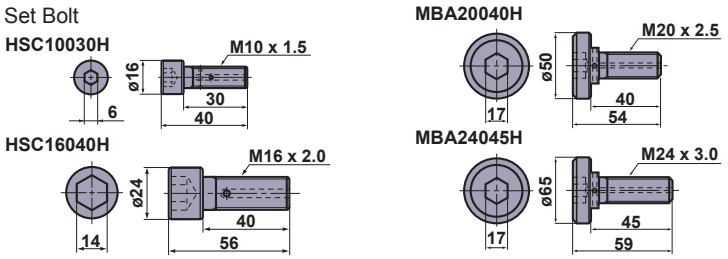
AJX

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron		Heat Resistant Alloy	Hardened Steel



- 13° and 15° positive inserts.
- High rigidity double clamp structure.
- Suitable for high feed machining.
- With through coolant holes.
- Special insert design with 3 cutting edges.





ARBOR TYPE

AJX09	AJX12	AJX14
GAMP :+8°	GAMP :+8°	GAMP :+8°
GAMF :-6°	GAMF :-5°—-4°	GAMF :-3°

Type	Order Number	Stock	Number of Teeth	Dimensions(mm)										*3 WT (kg)	*1 Clamp Screw	Clamp Bridge	*1 Clamp Bridge Screw	Spring	① ② Wrench	Set Bolt	Insert
		R		DCX	DC	LF	DCON	CBDP	DAH	BD	KWW	L8	DCCB								
Coarse Pitch	AJX12-050A03R	●	3	50	38.3	50	22	20	11	47	10.4	6.3	17	0.4	TS43	AMS4	AJS40 12T15	ASS2	①TKY15T	HSC100 30H	JDM□ 1204□□ ZD□R-□□
	AJX12R05003B	●	3	50	38.3	50	22.225	19	11	47	8.4	5	17	0.4							
	AJX14-063A03R	●	3	63	51.1	50	22	20	11	60	10.4	6.3	17	0.7	TS54	AMS5	AJS50 14T25	ASS3	①TKY25T	HSC100 30H	JDM□ 1405□□ ZD□R-□□
	AJX14R06303B	●	3	63	51.1	50	22.225	19	11	60	8.4	5	17	0.7							
	AJX14R08004D	●	4	80	68.1	63	31.75	32	17	76	12.7	8	26	1.3						HSC160 40H	
	AJX14R10005D	●	5	100	88.1	63	31.75	32	17	96	12.7	8	26	2.4							
	AJX14R12505E	●	5	125	113.2	63	38.1	40	—	100	15.9	10	56	3.3						MBA200 40H	
	AJX14R16006F	●	6	160	148.2	63	50.8	43	—	100	19.1	11	72	5.0						MBA240 45H	
Fine Pitch	AJX12-050A04R	●	4	50	38.3	50	22	20	11	47	10.4	6.3	17	0.4	TS43	AMS4	AJS40 12T15	ASS2	①TKY15T	HSC100 30H	JDM□ 1204□□ ZD□R-□□
	AJX12R05004B	●	4	50	38.3	50	22.225	19	11	47	8.4	5	17	0.4							
	AJX14-063A04R	●	4	63	51.1	50	22	20	11	60	10.4	6.3	17	0.7	TS54	AMS5	AJS50 14T25	ASS3	①TKY25T	HSC100 30H	JDM□ 1405□□ ZD□R-□□
	AJX14R06304B	●	4	63	51.1	50	22.225	19	11	60	8.4	5	17	0.7							
	AJX14R08005D	●	5	80	68.1	63	31.75	32	17	76	12.7	8	26	1.3						HSC160 40H	
	AJX14R10006D	●	6	100	88.1	63	31.75	32	17	96	12.7	8	26	2.4							
	AJX14R12507E	●	7	125	113.2	63	38.1	40	—	100	15.9	10	56	3.3						MBA200 40H	
	AJX14R16008F	●	8	160	148.2	63	50.8	43	—	100	19.1	11	72	5.0						MBA240 45H	
Extra Fine Pitch	AJX09-050A05R	●	5	50	40	50	22	20	11	47	10.4	6.3	17	0.5	TS351	AMS3	AJS30 10T10	ASS2	②TKY10D	HSC100 30H	JDM□ 09T3□□ ZD□R-□□
	AJX09R05005B	●	5	50	40	50	22.225	19	11	47	8.4	5	17	0.5							
	AJX12-063A05R	●	5	63	51.3	50	22	20	11	60	10.4	6.3	17	0.9	TS43	AMS4	AJS40 12T15	ASS2	①TKY15T	HSC100 30H	JDM□ 1204□□ ZD□R-□□
	AJX12R06305B	●	5	63	51.3	50	22.225	19	11	60	8.4	5	17	0.9							
	AJX12R08006D	●	6	80	68.3	63	31.75	32	17	76	12.7	8	26	1.7						HSC160 40H	
	AJX12R10007D	●	7	100	88.3	63	31.75	32	17	96	12.7	8	26	2.9							

*1 Clamp Torque (N • m) : TS351=2.5, TS43=3.5, TS54=7.5, AJS3010T10=2.5, AJS4012T15=3.5, AJS5014T25=7.5
*2 Refer to page L091 for the max. depth of cut APMX and maximum drilling depth AZ.
*3 WT : Tool Weight

● : Inventory maintained in Japan.



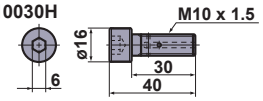
For metric arbor

The cutter bore diameter DCON is indicated in millimetre.

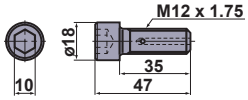
AJX09	AJX12	AJX14
GAMP :+8°	GAMP :+8°	GAMP :+8°
GAMF :-6°	GAMF :-5°—-4°	GAMF :-3°

Set Bolt

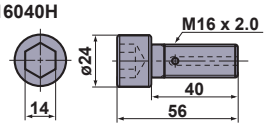
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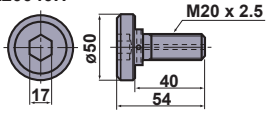
HSC12035H



HSC16040H



MBA20040H



ARBOR TYPE

Type	Order Number	Stock	Number of Teeth	Dimensions(mm)										∗3 WT (kg)	∗1 Clamp Screw	Clamp Bridge	∗1 Clamp Bridge Screw	Spring	① ② Wrench	Set Bolt	Insert
		R		DCX	DC	LF	DCON	CBDP	DAH	BD	KWW	L8	DCCB								
Coarse Pitch	**AJX12-050A03R**	●	3	50	38.3	50	22	20	11	47	10.4	6.3	17	0.4	TS43	AMS4	AJS40 12T15	ASS2	①TKY15T	HSC100 30H	JDM□ 1204□□ ZD□R-□□
	AJX14-063A03R	●	3	63	51.1	50	22	20	11	60	10.4	6.3	17	0.7	TS54	AMS5	AJS50 14T25	ASS3	①TKY25T	HSC100 30H	JDM□ 1405□□ ZD□R-□□
	AJX14-**080A04R**	●	4	80	68.1	50	27	23	13	76	12.4	7.0	19	1.2						HSC120 35H	
	AJX14-**100A05R**	●	5	100	88.1	63	32	26	17	96	14.4	8.0	26	2.4						HSC160 40H	
	AJX14-**125B05R**	●	5	125	113.2	63	40	40	—	100	16.4	9.0	56	3.3						MBA200 40H	
	AJX14-**160B06R**	●	6	160	148.2	63	40	40	—	100	16.4	9.0	56	5.0							
Fine Pitch	**AJX12-050A04R**	●	4	50	38.3	50	22	20	11	47	10.4	6.3	17	0.4	TS43	AMS4	AJS40 12T15	ASS2	①TKY15T	HSC100 30H	JDM□ 1204□□ ZD□R-□□
	AJX12-**080A06R**	●	6	80	68.3	50	27	23	13	76	12.4	7.0	19	1.2						HSC120 35H	
	AJX12-**100A07R**	●	7	100	88.3	63	32	26	17	96	14.4	8.0	26	2.6						HSC160 40H	
	AJX14-063A04R	●	4	63	51.1	50	22	20	11	60	10.4	6.3	17	0.7	TS54	AMS5	AJS50 14T25	ASS3	①TKY25T	HSC100 30H	JDM□ 1405□□ ZD□R-□□
	AJX14-**080A05R**	●	5	80	68.1	50	27	23	13	76	12.4	7.0	19	1.2						HSC120 35H	
	AJX14-**100A06R**	●	6	100	88.1	63	32	26	17	96	14.4	8.0	26	2.4						HSC160 40H	
	AJX14-**125B07R**	●	7	125	113.2	63	40	40	—	100	16.4	9.0	56	3.3						MBA200 40H	
	AJX14-**160B08R**	●	8	160	148.2	63	40	40	—	100	16.4	9.0	56	5.0							
Extra Fine Pitch	**AJX09-050A05R**	●	5	50	40	50	22	20	11	47	10.4	6.3	17	0.4	TS351	AMS3	AJS30 10T10	ASS2	②TKY10D	HSC100 30H	JDM□ 09T3□□ ZD□R-□□
	AJX12-063A05R	●	5	63	51.3	50	22	20	11	60	10.4	6.3	17	0.7	TS43	AMS4	AJS40 12T15	ASS2	①TKY15T	HSC100 30H	JDM□ 1204□□ ZD□R-□□

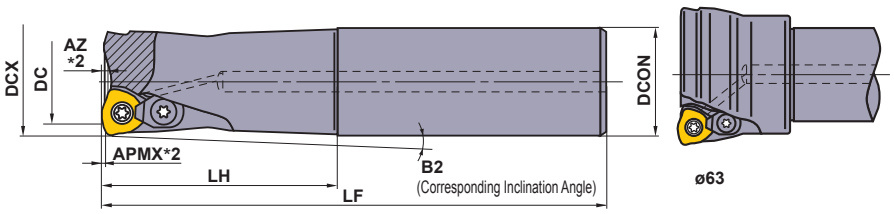
∗1 Clamp Torque (N • m) : TS351=2.5, TS43=3.5, TS54=7.5, AJS3010T10=2.5, AJS4012T15=3.5, AJS5014T25=7.5

∗2 Refer to page L091 for the max. depth of cut APMX and maximum drilling depth AZ.

∗3 WT : Tool Weight

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001





SHANK TYPE

Right hand tool holder only.

Type	Order Number	Stock	Number of Teeth	Dimensions(mm)						*1 Clamp Screw	Clamp Bridge	*1 Clamp Bridge Screw	Spring	Wrench	Insert
		R		DCX	DCON	DC	LF	LH	B2						
Short	**AJX06R162SA16SS**	●	2	16	16	8.9	70	20	3°30′	TS25	—	—	—	①TKY08F	JOM□06T215 ZZ□R-□□
	AJX06R**172SA16SS**	●	2	17	16	9.9	70	20	—	TS25	—	—	—	①TKY08F	
Standard	**AJX06R162SA16S**	●	2	16	16	8.9	110	30	2°15′	TS25	—	—	—	①TKY08F	JOM□ 06T215 ZZ□R-□□
	AJX06R**172SA16S**	●	2	17	16	9.9	110	20	—	TS25	—	—	—	①TKY08F	
	AJX06R**203SA20S**	●	3	20	20	12.9	130	50	1°18′	TS25	—	—	—	①TKY08F	
	AJX06R**223SA20S**	●	3	22	20	14.9	130	30	—	TS25	—	—	—	①TKY08F	
	AJX08R202SA20S	●	2	20	20	11.4	130	50	1°20′	TS33	—	—	—	②TKY08D	JOM□ 080320 ZZ□R-□□
	AJX08R**222SA20S**	●	2	22	20	13.4	130	30	—	TS33	—	—	—	②TKY08D	
	AJX08R**253SA25S**	●	3	25	25	16.4	140	60	1°06′	TS33	—	—	—	②TKY08D	
	AJX08R**283SA25S**	●	3	28	25	19.4	140	40	—	TS33	—	—	—	②TKY08D	
	AJX09R252SA25S	●	2	25	25	14.9	140	60	1°06′	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	JDM□ 09T3□□ ZD□R-□□
	AJX09R**282SA25S**	●	2	28	25	17.9	140	40	—	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
	AJX09R**303SA32S**	●	3	30	32	20.0	150	70	1°48′	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
	AJX09R**323SA32S**	●	3	32	32	21.9	150	70	0°56′	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
	AJX09R**353SA32S**	●	3	35	32	24.9	150	50	—	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
	AJX09R**404SA32S**	●	4	40	32	29.9	150	50	—	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
	AJX09R**404SA42S**	●	4	40	42	29.9	150	70	1°48′	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
	AJX12R302SA32S	●	2	30	32	18.3	150	70	1°48′	TS407	AMS4	AJS4012T15	ASS2	②TKY15D	JDM□ 1204□□ ZD□R-□□
	AJX12R**322SA32S**	●	2	32	32	20.3	150	70	0°58′	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
	AJX12R**352SA32S**	●	2	35	32	23.3	150	50	—	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
	AJX12R**403SA32S**	●	3	40	32	28.3	150	50	—	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
	AJX12R**403SA42S**	●	3	40	42	28.3	150	70	1°48′	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
	AJX14R503SA42S	●	3	50	42	38.2	150	50	—	TS54	AMS5	AJS5014T25	ASS3	②TKY25D	JDM□1405□□ ZD□R-□□
	AJX14R**634SA42S**	●	4	63	42	51.1	150	50	—	TS54	AMS5	AJS5014T25	ASS3	②TKY25D	

*1 Clamp Torque (N • m) : TS25=1.0, TS33=1.0, TS351=2.5, TS407=3.5, TS43=3.5, TS54=7.5, AJS3010T10=2.5, AJS4012T15=3.5, AJS5014T25=7.5

*2 Refer to page L091 for the max. depth of cut APMX(max), and maximum drilling depth AZ.

● : Inventory maintained in Japan.

Type	Order Number	Stock	Number of Teeth	Dimensions(mm)						*1		*1		①②	
		R		DCX	DCON	DC	LF	LH	B2	Clamp Screw	Clamp Bridge	Clamp Bridge Screw	Spring	Wrench	Insert
Long	AJX06R162SA16L	●	2	16	16	8.9	150	70	0°56′	TS25	—	—	—	①TKY08F	JOM□ 06T215 ZZ□R-□□
	AJX06R172SA16L	●	2	17	16	9.9	150	20	—	TS25	—	—	—	①TKY08F	
	AJX06R203SA20L	●	3	20	20	12.9	180	100	0°38′	TS25	—	—	—	①TKY08F	
	AJX06R223SA20L	●	3	22	20	14.9	180	30	—	TS25	—	—	—	①TKY08F	
	AJX08R202SA20L	●	2	20	20	11.4	180	100	0°39′	TS33	—	—	—	②TKY08D	JOM□ 080320 ZZ□R-□□
	AJX08R222SA20L	●	2	22	20	13.4	180	30	—	TS33	—	—	—	②TKY08D	
	AJX08R253SA25L	●	3	25	25	16.4	200	120	0°32′	TS33	—	—	—	②TKY08D	
	AJX08R283SA25L	●	3	28	25	19.4	200	40	—	TS33	—	—	—	②TKY08D	
	AJX09R252SA25L	●	2	25	25	14.9	200	120	0°32′	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	JDM□ 09T3□□ ZD□R-□□
	AJX09R282SA25L	●	2	28	25	17.9	200	40	—	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
	AJX09R303SA32L	●	3	30	32	20.0	200	120	1°02′	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
	AJX09R323SA32L	●	3	32	32	21.9	200	120	0°32′	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
	AJX09R353SA32L	●	3	35	32	24.9	200	50	—	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
	AJX09R404SA32L	●	4	40	32	29.9	250	50	—	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
	AJX09R404SA42L	●	4	40	42	29.9	250	70	1°48′	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
	AJX12R302SA32L	●	2	30	32	18.3	200	120	1°02′	TS407	AMS4	AJS4012T15	ASS2	②TKY15D	JDM□ 1204□□ ZD□R-□□
	AJX12R322SA32L	●	2	32	32	20.3	200	120	0°33′	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
	AJX12R352SA32L	●	2	35	32	23.3	200	50	—	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
	AJX12R403SA32L	●	3	40	32	28.3	250	50	—	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
	AJX12R403SA42L	●	3	40	42	28.3	250	70	1°48′	TS43	AMS4	AJS4012T15	ASS2	②TKY25D	
	AJX14R503SA42L	●	3	50	42	38.1	250	50	—	TS54	AMS5	AJS5014T25	ASS3	②TKY25D	JDM□ 1405□□ ZD□R-□□
	AJX14R634SA42L	●	4	63	42	51.1	250	50	—	TS54	AMS5	AJS5014T25	ASS3	②TKY25D	
Extra Long	AJX06R162SA16EL	●	2	16	16	8.9	200	100	0°38′	TS25	—	—	—	①TKY08F	JOM□ 06T215 ZZ□R-□□
	AJX06R172SA16EL	●	2	17	16	9.9	200	20	—	TS25	—	—	—	①TKY08F	
	AJX08R202SA20EL	●	2	20	20	11.4	250	130	0°30′	TS33	—	—	—	②TKY08D	JOM□ 080320 ZZ□R-□□
	AJX08R222SA20EL	●	2	22	20	13.4	250	30	—	TS33	—	—	—	②TKY10D	
	AJX09R252SA25EL	●	2	25	25	14.9	300	180	0°22′	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	JDM□ 09T3□□ ZD□R-□□
	AJX09R282SA25EL	●	2	28	25	17.9	300	40	—	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
	AJX12R302SA32EL	●	2	30	32	18.3	300	180	0°42′	TS407	AMS4	AJS4012T15	ASS2	②TKY15D	JDM□ 1204□□ ZD□R-□□
	AJX12R322SA32EL	●	2	32	32	20.3	300	180	0°22′	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
	AJX12R352SA32EL	●	2	35	32	23.3	300	50	—	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
	AJX12R402SA32EL	●	2	40	32	28.3	350	50	—	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
	AJX12R402SA42EL	●	2	40	42	28.3	350	70	1°48′	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	

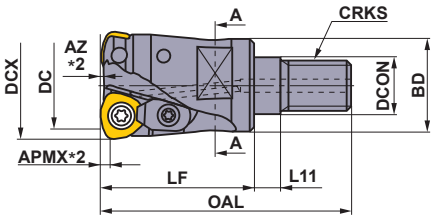
*1 Clamp Torque (N • m) : TS25=1.0, TS33=1.0, TS351=2.5, TS407=3.5, TS43=3.5, TS54=7.5, AJS3010T10=2.5, AJS4012T15=3.5, AJS5014T25=7.5

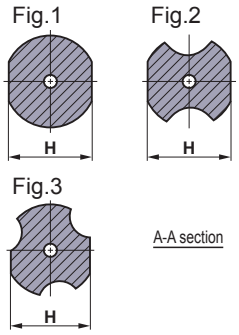
*2 Refer to page L091 for the max. depth of cut APMX(max), and maximum drilling depth AZ.

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001









SCREW-IN TYPE

Right hand tool holder only.

Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions(mm)									*3 WT (kg)	Type (Fig.)	*1 Clamp Screw	Clamp Bridge	*1 Clamp Bridge Screw	Spring	① ② Wrench	Insert
	R			DCX	DCON	BD	DC	OAL	LF	L11	H	CRKS								
AJX06R162AM0830	●	○	2	16	8.5	13	8.9	48	30	6	10	M8	0.1	1	TS25	—	—	—	①TKY08F	
AJX06R**172AM0830**	●	○	2	17	8.5	13	9.9	48	30	6	10	M8	0.1	1	TS25	—	—	—	①TKY08F	JOM○ 06T215 ZZ○R-○○
AJX06R**203AM1030**	●	○	3	20	10.5	18	12.9	49	30	6	14	M10	0.1	3	TS25	—	—	—	①TKY08F	
AJX06R**223AM1030**	●	○	3	22	10.5	18	14.9	49	30	6	14	M10	0.1	3	TS25	—	—	—	①TKY08F	
AJX08R202AM1030	●	○	2	20	10.5	18	11.4	49	30	6	14	M10	0.1	2	TS33	—	—	—	①TKY08D	
AJX08R**222AM1030**	●	○	2	22	10.5	18	13.4	49	30	6	14	M10	0.1	2	TS33	—	—	—	①TKY08D	JOM○ 080320 ZZ○R-○○
AJX08R**253AM1235**	●	○	3	25	12.5	21	16.4	57	35	6	19	M12	0.1	1	TS33	—	—	—	①TKY08D	
AJX08R**283AM1235**	●	○	3	28	12.5	21	19.4	57	35	6	19	M12	0.1	1	TS33	—	—	—	①TKY08D	
AJX09R252AM1235	●	○	2	25	12.5	21	14.9	57	35	6	19	M12	0.2	2	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
AJX09R**282AM1235**	●	○	2	28	12.5	21	17.9	57	35	6	19	M12	0.2	2	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
AJX09R**303AM1645**	●	○	3	30	17	29	20.0	68	45	6	24	M16	0.2	1	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	JDM○ 09T3○○ ZD○R-○○
AJX09R**323AM1645**	●	○	3	32	17	29	21.9	68	45	6	24	M16	0.2	1	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
AJX09R**353AM1645**	●	○	3	35	17	29	24.9	68	45	6	24	M16	0.2	1	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
AJX09R**404AM1645**	●	○	4	40	17	29	29.9	68	45	6	24	M16	0.2	1	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	
AJX12R302AM1645	●	○	2	30	17	29	18.3	68	45	6	24	M16	0.3	2	TS407	AMS4	AJS4012T15	ASS2	②TKY15D	
AJX12R**322AM1645**	●	○	2	32	17	29	20.3	68	45	6	24	M16	0.3	2	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	JDM○ 1204○○ ZD○R-○○
AJX12R**352AM1645**	●	○	2	35	17	29	23.3	68	45	6	24	M16	0.3	2	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	
AJX12R**403AM1645**	●	○	3	40	17	29	28.3	68	45	6	24	M16	0.3	2	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	

(Note) For screw-in type arbors, refer to page L145—L146.

*1 Clamp Torque (N • m) : TS25=1.0, TS33=1.0, TS351=2.5, TS407=3.5, TS43=3.5, AJS3010T10=2.5, AJS4012T15=3.5

*2 Refer to page L091 for the max. depth of cut APMX(max), and maximum drilling depth AZ.

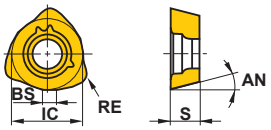
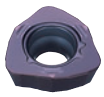
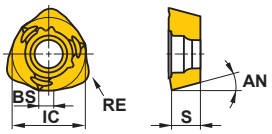
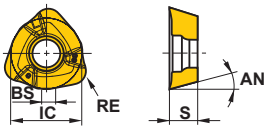
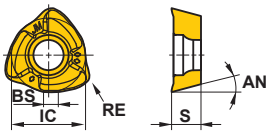
*3 WT : Tool Weight

● : Inventory maintained in Japan. (10 inserts in one case)

INSERTS

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
S	Heat-resistant Alloy, Titanium Alloy	
H	Hardened Steel	

Cutting Conditions (Guide) :
● : Stable Cutting ◕ : General Cutting ✣ : Unstable Cutting

Shape	Order Number	Class	Coated								Dimensions (mm)					Geometry
			FH7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	AN	IC	S	BS	RE	
 General purpose	JOMW06T215ZZSR-FT	M	●	●	●	●	●			●	●	13°	6.35	2.78	1.2	1.5	
	JOMW080320ZZSR-FT	M	●	●	●	●	●			●	●	13°	8	3.18	1.4	2	
	JDMW09T320ZDSR-FT	M	●	●	●	●	●			●	●	15°	9.525	3.97	1.8	2	
	JDMW120420ZDSR-FT	M	●	●	●	●	●			●	●	15°	12	4.76	2.5	2	
	JDMW140520ZDSR-FT	M	●	●	●	●	●			●	●	15°	14	5.56	2.8	2	
 Cutting edge enhancement type	JDMT120420ZDSR-ST	M	●	●	●	●	●			●	●	15°	12	4.76	2.5	2	
	JDMT140520ZDSR-ST	M	●	●	●	●	●			●	●	15°	14	5.56	2.8	2	
NEW  Low cutting resistance (Difficult-to-Cut Materials)	JDMT09T323ZDER-JL	M						●	●			15°	9.525	3.97	1.8	2.3	
	JDMT120423ZDER-JL	M						●	●			15°	12	4.76	2.5	2.3	
	JDMT140523ZDER-JL	M						●	●			15°	14	5.56	2.8	2.3	
 Low cutting resistance	JOMT06T215ZZSR-JM	M	●	●	●	●	●			●	●	13°	6.35	2.78	1.2	1.5	
	JOMT080320ZZSR-JM	M	●	●	●	●	●			●	●	13°	8	3.18	1.4	2	
	JDMT09T320ZDSR-JM	M	●	●	●	●	●			●	●	15°	9.525	3.97	1.8	2	
	JDMT120420ZDSR-JM	M	●	●	●	●	●			●	●	15°	12	4.76	2.5	2	
	JDMT140520ZDSR-JM	M	●	●	●	●	●			●	●	15°	14	5.56	2.8	2	

(Note) Setting height for ST chipbreaker is slightly different from that for other chipbreakers.
If you use ST chipbreaker, check the setting height.

■ = MIRACLE SIGMA

MILLING

SCREW-IN ARBORS ➤ L145
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

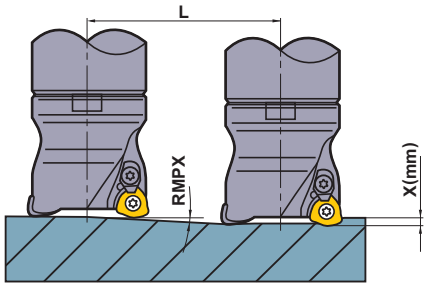
RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED

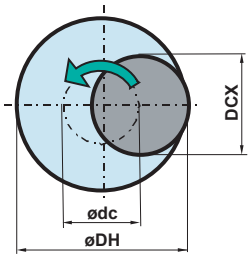
Work Material		Hardness	Cutting speed (m/min) for different grades			
P			FH7020	MP6120	MP6130	VP30RT
	Mild Steel	≤180HB	170 (120—220)	150 (100—200)	130 (80—180)	110 (60—160)
	Carbon Steel Alloy Steel	180—280HB	150 (100—200)	130 (80—180)	110 (60—160)	90 (40—140)
	Carbon Steel Alloy Steel	280—350HB	130 (80—180)	100 (50—150)	80 (30—130)	60 (20—110)
	Alloy Tool Steel	≤350HB	130 (80—180)	100 (50—150)	80 (30—120)	60 (20—90)
	Pre-hardened Steel	35—45HRC	—	100 (70—130)	80 (50—110)	80 (30—90)
M			MP7130	MP7140		
	Stainless Steel	≤270HB	140 (100—180)	120 (80—160)	—	—
K			FH7020	VP15TF		
	Gray Cast Iron	≤350MPa	150 (100—200)	—	—	—
	Ductile Cast Iron	≤800MPa	—	120 (80—160)	—	—
S			MP9120	MP9130		
	Heat Resistant Alloy	≤350HB	30 (20—40)	25 (20—35)	—	—
	Titanium Alloy	—	50 (40—60)	45 (30—55)		
H			VP15TF			
	Hardened Steel	40—55HRC	70 (50—90)	—	—	—

MAXIMUM CAPACITIES BY MODE

RAMPING



HELICAL DRILLING



- How to derive a locus of the center of the tool.

ødc = øDH - DC

Locus of the center of the tool | Desired hole diameter | Tool Diameter

- The depth of cut per pass must not exceed the max. depth of cut APMX.
- Set the machine spindle revolution so that the tool is rotating and cutting in a down cut direction.

- When ramping and helical cutting, please apply a lower feed (60% of the calculated feed rate or less).
- When drilling, please set the feed in the axial direction at 0.2mm/rev or less.
- The long chips generated can disperse, ensure that adequate safety precautions are taken.

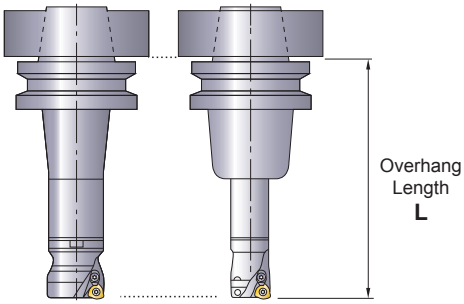
Type	Order Number	Tool Diameter **DCX** (mm)	Machined Face Diameter **DC** (mm)	Max. Depth of Cut **APMX** (mm)		Ramping					Helical Drilling		Max. Drilling Depth **AZ** (mm)
				FT/JM/ST Breaker	JL Breaker	Max. Angle **RMPX**	L (mm) Required distance for X mm depth X=1	X=1.2	X=1.5	X=2	Desired hole diameter **DH** (mm) Min.	Max.	
Shank/screw-in	**AJX06R162**	16	8	1	—	3°	19.1	—	—	—	23	29	0.3
	AJX**06R172**	17	9	1	—	2° 30′	22.9	—	—	—	25	31	0.3
	AJX**06R203**	20	12	1	—	1° 30′	38.2	—	—	—	31	37	0.3
	AJX**06R223**	22	14	1	—	1°	57.3	—	—	—	35	41	0.3
	AJX**08R202**	20	11	1.5	—	3° 30′	16.3	19.6	24.5	—	27	36	0.5
	AJX**08R222**	22	13	1.5	—	3°	19.1	22.9	28.6	—	31	40	0.5
	AJX**08R253**	25	16	1.5	—	2°	28.6	34.4	43	—	37	46	0.5
	AJX**08R283**	28	19	1.5	—	1° 42′	33.7	40.4	50.5	—	43	52	0.5
	AJX**09R252**	25	14	2	1.2	4°	14.3	17.2	21.5	28.6	33	46	1
	AJX**09R282**	28	17	2	1.2	3°	19.1	22.9	28.6	38.1	39	52	1
	AJX**09R303**	30	19	2	1.2	2° 42′	21.2	25.4	31.8	42.4	43	56	1
	AJX**09R323**	32	21	2	1.2	2° 30′	22.9	27.5	34.4	45.8	47	60	1
	AJX**09R353**	35	24	2	1.2	2°	28.6	34.4	43	57.3	53	66	1
	AJX**09R404**	40	29	2	1.2	1° 30′	38.2	45.8	57.3	76.4	63	76	1
	AJX**12R302**	30	18	2	1.2	4° 30′	12.7	15.2	19	25.4	39	56	1.5
	AJX**12R322**	32	20	2	1.2	4°	14.3	17.2	21.4	28.6	41	60	1.5
	AJX**12R352**	35	23	2	1.2	3° 30′	16.3	19.6	24.5	32.7	47	66	1.5
	AJX**12R402**	40	28	2	1.2	3°	19.1	22.9	28.6	38.2	57	76	1.5
	AJX**12R403**	40	28	2	1.2	3°	19.1	22.9	28.6	38.2	57	76	1.5
	AJX**14R503**	50	38	2	1.2	4° 12′	13.6	16.3	20.4	27.2	72	96	2
	AJX**14R634**	63	51	2	1.2	2° 48′	20.4	24.5	30.7	40.9	98	122	2
Arbor	**AJX09-050**	50	40	2	1.2	1° 06′	52.1	62.5	78.1	104.2	83	96	1
	AJX**09R05005B**	50	40	2	1.2	1° 06′	52.1	62.5	78.1	104.2	83	96	1
	AJX**12-050**	50	38	2	1.2	2°	28.6	34.4	43	57.3	77	96	1.5
	AJX**R050**	50	38	2	1.2	2°	28.6	34.4	43	57.3	77	96	1.5
	AJX**12-063**	63	51	2	1.2	1° 30′	38.2	45.8	57.3	76.4	103	122	1.5
	AJX**R063**	63	51	2	1.2	1° 30′	38.2	45.8	57.3	76.4	103	122	1.5
	AJX**R080**	80	68	2	1.2	1° 06′	52.1	62.5	78.1	104.2	137	156	1.5
	AJX**R100**	100	88	2	1.2	0° 48′	71.6	85.9	107.4	143.2	177	196	1.5
	AJX**14-063**	63	51	2	1.2	2° 48′	20.4	24.5	30.7	40.9	98	122	2
	AJX**R063**	63	51	2	1.2	2° 48′	20.4	24.5	30.7	40.9	98	122	2
	AJX**R080**	80	68	2	1.2	1° 48′	31.8	38.2	47.7	63.6	132	156	2
	AJX**R100**	100	88	2	1.2	1° 12′	47.7	57.3	71.6	95.5	172	196	2
	AJX**R125**	125	113	2	1.2	0° 48′	71.6	85.9	107.4	143.2	222	246	2
	AJX**R160**	160	148	2	1.2	0° 30′	114.6	137.5	171.9	229.2	292	316	2

RECOMMENDED CUTTING CONDITIONS

DEPTH OF CUT AND FEEDRATE

	Work Material	Hardness	Shank Type / Screw-In Type								
			ø16, ø17			ø20, ø22			ø25, ø28		
			Overhang Length (mm)	Axial depth of cut (mm)	Feed per Tooth (mm/t.)	Overhang Length (mm)	Axial depth of cut (mm)	Feed per Tooth (mm/t.)	Overhang Length (mm)	Axial depth of cut (mm)	Feed per Tooth (mm/t.)
P	Mild Steel (ASTM A36, AISI 1010)	≤180HB	140	0.8	0.8	160	1.0	1.0	170	1.0	1.2
			180	0.6	0.6	210	0.8	0.8	230	0.8	1.0
			210	0.4	0.4	240	0.6	0.6	290	0.6	0.8
	Carbon Steel, Alloy Steel (AISI 1045, AISI 4140)	180–280HB	140	0.8	0.8	160	1.0	1.0	170	1.0	1.2
			180	0.6	0.6	210	0.8	0.8	230	0.8	1.0
			210	0.4	0.4	240	0.6	0.6	290	0.6	0.8
	Carbon Steel, Alloy Steel (AISI 4340)	280–350HB	140	0.7	0.8	160	0.8	1.0	170	0.8	1.2
			180	0.5	0.6	210	0.6	0.8	230	0.6	1.0
			210	0.3	0.4	240	0.4	0.6	290	0.4	0.8
	Alloy Tool Steel (SKD,SKT)	≤350HB	140	0.7	0.8	160	0.8	1.0	170	0.8	1.2
			180	0.5	0.6	210	0.6	0.8	230	0.6	1.0
			210	0.3	0.4	240	0.4	0.6	290	0.4	0.8
	Pre-hardened Steel	35–45HRC	140	0.7	0.7	160	0.8	0.8	170	0.8	1.0
			180	0.5	0.5	210	0.6	0.6	230	0.6	0.8
			210	0.3	0.3	240	0.4	0.4	290	0.4	0.6
M	Stainless Steel	≤270HB	140	0.8	0.7	160	1.0	0.8	170	1.0	1.0
			180	0.6	0.5	210	0.8	0.6	230	0.8	0.8
			210	0.4	0.3	240	0.6	0.4	290	0.6	0.6
K	Gray Cast Iron (FC300)	Tensile Strength ≤350MPa	140	0.8	1.0	160	1.0	1.2	170	1.0	1.4
			180	0.6	0.8	210	0.8	1.0	230	0.8	1.2
			210	0.4	0.6	240	0.6	0.8	290	0.6	1.0
	Ductile Cast Iron (FCD450)	Tensile Strength ≤800MPa	140	0.7	0.8	160	0.8	1.0	170	0.8	1.2
			180	0.5	0.6	210	0.6	0.8	230	0.6	1.0
			210	0.3	0.4	240	0.4	0.6	290	0.4	0.8
S	Heat Resistant Alloy	≤350HB	—	—	—	—	—	—	170	1.0	0.6
			—	—	—	—	—	—	230	0.8	0.4
	Titanium Alloy (Ti-6A-4V)	—	—	—	—	—	—	—	290	0.6	0.3
H	Hardened Steel (SKD,SKT)	40–55HRC	140	0.5	0.5	160	0.5	0.6	170	0.5	0.8
			180	0.4	0.3	210	0.4	0.4	230	0.4	0.6
			210	0.3	0.2	240	0.3	0.2	290	0.3	0.4

①Overhang Length **L**



②Main Spindle Revolution
$n(min^{-1})$=(Recommended Cutting Speed x 1000)÷(Outer Tool Diameter x 3.14)

③Table Feed Rate
vf(mm/min)=n x Feed per Tooth x Number of Teeth

④Recommended width of cut (ae) is more than 60% of the cutting edge diameter.

⑤The above cutting conditions are guides to cutting on a #50 BT machine. In case of #40 BT and #63 HSK machines, a cutting edge diameter of under 35mm is recommended.In the case also, reduce the axial direction depth of cut and table feed rate.

⑥Use of ***ST*** chipbreaker with tougher cutting edges is recommended for machining parts that require interrupted cutting. First recommended insert grade for non-standard 06/08/09 ***ST*** chipbreakers is ***VP30RT*** irrespective of the workpiece material.

⑦Cutter body with coarse pitch is recommended for the unstable cutting caused by the long tool overhang.

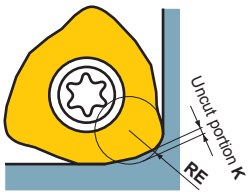
⑧Use the "sharp" ***JM*** chipbreaker to lower cutting forces or when long tool overhangs are used.

⑨Heavy chips are generated when machining with the ***AJX***. To avoid chip jamming-related problems, use air blow while machining to discharging chips effectively.

Shank Type / Screw-In Type													Arbor Type					
ø30, ø32, ø35			ϕ40 (ϕ32 Shank)			ϕ40 (ϕ42 Shank)			ø50, ø63			ø50, ø63			ø80, ø100, ø125, ø160		
Overhang Length (mm)	Axial depth of cut (mm)	Feed per Tooth (mm/t.)	Overhang Length (mm)	Axial depth of cut (mm)	Feed per Tooth (mm/t.)	Overhang Length (mm)	Axial depth of cut (mm)	Feed per Tooth (mm/t.)	Overhang Length (mm)	Axial depth of cut (mm)	Feed per Tooth (mm/t.)	Overhang Length (mm)	Axial depth of cut (mm)	Feed per Tooth (mm/t.)	Overhang Length (mm)	Axial depth of cut (mm)	Feed per Tooth (mm/t.)
180	1.2	1.4	180	1.2	1.4	180	1.2	1.5	180	1.4	1.5	150	1.5	1.5	170	1.5	1.5
230	1.0	1.2	240	1.0	1.2	240	1.0	1.3	240	1.2	1.3	250	1.3	1.3	300	1.3	1.3
290	0.8	1.0	300	0.8	1.0	300	0.8	1.1	–	–	–	350	1.1	1.1	450	1.0	1.0
180	1.2	1.4	180	1.2	1.4	180	1.2	1.5	180	1.4	1.5	150	1.5	1.5	170	1.5	1.5
230	1.0	1.2	240	1.0	1.2	240	1.0	1.3	240	1.2	1.3	250	1.3	1.3	300	1.3	1.3
290	0.8	1.0	300	0.8	1.0	300	0.8	1.1	–	–	–	350	1.1	1.1	450	1.0	1.0
180	1.0	1.4	180	1.0	1.4	180	1.0	1.5	180	1.2	1.5	150	1.3	1.5	170	1.3	1.5
230	0.8	1.2	240	0.8	1.2	240	0.8	1.3	240	1.0	1.3	250	1.1	1.3	300	1.1	1.3
290	0.6	1.0	300	0.6	1.0	300	0.6	1.1	–	–	–	350	0.9	1.1	450	0.8	1.0
180	1.0	1.4	180	1.0	1.4	180	1.0	1.5	180	1.2	1.5	150	1.3	1.5	170	1.3	1.5
230	0.8	1.2	240	0.8	1.2	240	0.8	1.3	240	1.0	1.3	250	1.1	1.3	300	1.1	1.3
290	0.6	1.0	300	0.6	1.0	300	0.6	1.1	–	–	–	350	0.9	1.1	450	0.8	1.0
180	1.0	1.2	180	1.0	1.2	180	1.0	1.3	180	1.2	1.3	150	1.3	1.3	170	1.3	1.3
230	0.8	1.0	240	0.8	1.0	240	0.8	1.1	240	1.0	1.1	250	1.1	1.1	300	1.1	1.1
290	0.6	0.8	300	0.6	0.8	300	0.6	0.9	–	–	–	350	0.9	0.9	450	0.8	0.8
180	1.2	1.2	180	1.2	1.2	180	1.2	1.3	180	*1.4	1.3	150	*1.5	1.3	170	*1.5	1.3
230	1.0	1.0	240	1.0	1.0	240	1.0	1.1	240	1.2	1.1	250	*1.3	1.1	300	*1.3	1.1
290	0.8	0.8	300	0.8	0.8	300	0.8	0.9	–	–	–	350	1.1	0.9	450	1.0	0.8
180	1.2	1.6	180	1.2	1.6	180	1.2	1.7	180	1.4	1.7	150	1.5	1.7	170	1.5	1.7
230	1.0	1.4	240	1.0	1.4	240	1.0	1.5	240	1.2	1.5	250	1.3	1.5	300	1.3	1.5
290	0.8	1.2	300	0.8	1.2	300	0.8	1.3	–	–	–	350	1.1	1.3	450	1.0	1.2
180	1.0	1.4	180	1.0	1.4	180	1.0	1.5	180	1.2	1.5	150	1.3	1.5	170	1.3	1.5
230	0.8	1.2	240	0.8	1.2	240	0.8	1.3	240	1.0	1.3	250	1.1	1.3	300	1.1	1.3
290	0.6	1.0	300	0.6	1.0	300	0.6	1.1	–	–	–	350	0.9	1.1	450	0.8	1.0
180	1.2	0.6	180	1.2	0.6	180	1.2	0.6	180	1.2	0.6	150	1.2	0.6	170	1.2	0.6
230	1.0	0.4	240	1.0	0.4	240	1.0	0.4	240	1.0	0.4	250	1.0	0.4	300	1.0	0.4
290	0.8	0.3	300	0.8	0.3	300	0.8	0.3	–	–	–	350	0.8	0.3	450	0.8	0.3
180	0.6	1.0	180	0.6	1.0	180	0.6	1.1	180	0.8	1.1	150	0.9	1.1	170	0.9	1.1
230	0.5	0.8	240	0.5	0.8	240	0.5	0.9	240	0.6	0.9	250	0.7	0.9	300	0.7	0.9
290	0.4	0.6	300	0.4	0.6	300	0.4	0.7	–	–	–	–	–	–	–	–	–

* The JL breaker depth of cut is up to 1.2mm.

NOTE FOR PROGRAMMING



When using the ***AJX***, please programme as an R3 radius cutter. The approximate uncut portions for the programme are as follows.

Size	Breaker	Approx. **RE**(mm)	Uncut portion **K**(mm)
06	**FT / JM**	2.0	0.33
08	**FT / JM**	2.5	0.46
09	**FT / JM**	3.0	0.47
	JL	3.0	0.46
12	**FT / JM / ST**	3.0	0.63
	JL	3.0	0.53
14	**FT / JM / ST**	3.0	0.64
	JL	3.0	0.55

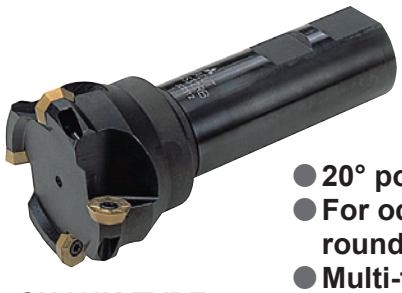
(Note) The uncut portion may change slightly depending on cutting conditions.

MULTI FUNCTIONAL MILLING

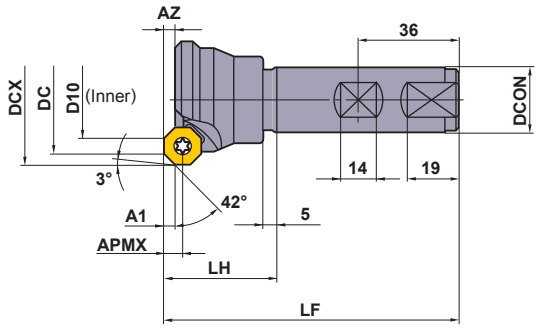
Roughing

OCTACUT

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron			Hardened Steel



- 20° positive insert.
- For octagonal and round type inserts.
- Multi-functional machining.



SHANK TYPE

Right hand tool holder only.

Order Number	Stock	Number of Teeth	Dimensions (mm)									*		
	R		DCX	DC	D10	LF	DCON	LH	A1	APMX	AZ	Clamp Screw	Wrench	Insert
OCTACUT322S32RB	●	2	32	23.6	13.1	125	32	45	2.5	7	3	CS350990T	①TKY10F	①OEMX12T3○○○○ ②REMX12T3○○○○
OCTACUT**403S32RB**	●	3	40	31.7	21.2	125	32	45	2.5	7	3	CS350990T	①TKY10F	
OCTACUT**504S32RB**	●	4	50	41.9	31.4	125	32	45	2.5	7	3	CS350990T	①TKY10F	
OCTACUT**634S32RB**	●	4	63	54.9	44.5	125	32	45	2.5	7	3	CS350990T	①TKY10F	
OCTACUT**503S32R**	●	3	50	38.3	24.5	125	32	45	3	9	4	CS501290T	②TKY25T	①OEMX1705○○○○ ②REMX1705○○○○
OCTACUT**634S32R**	●	4	63	51.4	37.6	125	32	45	3	9	4	CS501290T	②TKY25T	

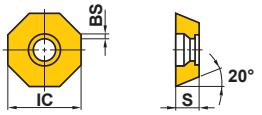
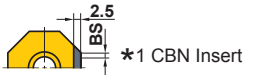
* Clamp Torque (N • m) : CS350990T=2.5, CS501290T=7.5

INSERTS

Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
H	Hardened Steel	

Cutting Conditions (Guide) :
●: Stable Cutting ◔: General Cutting ✲: Unstable Cutting

Honing :
E : Round **S :** Chamfer + Hone **T :** Chamfer

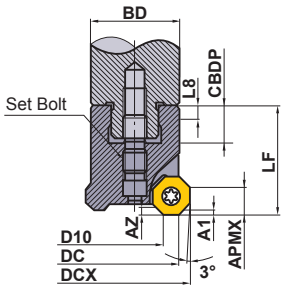
Shape	Order Number	Class	Honing	Coated F7030	Coated VP15TF	Cermet NX2525	Cermet NX4545	CBN MB730 *1	Dimensions (mm) IC	S	BS	Geometry
	**OEMX12T3ETR1**	M	T				●	●	12.7	3.97	1.0	
	OEMX**12T3ESR1**	M	S	●					12.7	3.97	1.0	
*2	OEMX**12T3EER1-JS**	M	E	●					12.7	3.97	1.0	
	**OEMX1705ETR1**	M	T		●		●		17.0	5.0	1.4	
	OEMX**1705ESR1**	M	S	●					17.0	5.0	1.4	
*2	OEMX**1705EER1-JS**	M	E	●					17.0	5.0	1.4	
*2	OEMX**1705ETR1-JS**	M	T		●				17.0	5.0	1.4	
*2 JS Breaker												*2 JS Breaker
												 *1 CBN Insert
	*2 **REMX12T3EN-JS**	M	E	●					12.95	4.17	—	
	REMX1705SN	M	S	●					17.25	5.2	—	
	*2 REMX**1705EN-JS**	M	E	●					17.25	5.2	—	
*2 JS Breaker												*2 JS Breaker

*2 Insert with breaker.

● : Inventory maintained in Japan. (10 inserts in one case) (CBN inserts are available in 1 piece in one case.)

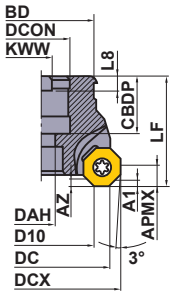


Fig.1



Small Insert Type
ø40
Standard Insert Type
ø50

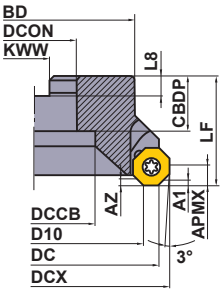
Fig.2



Small Insert Type
ø50
ø63
ø80

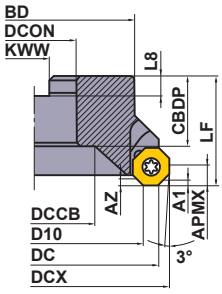
Standard Insert Type
ø63
ø80
ø100

Fig.3



Standard Insert Type
ø125

Fig.4



Standard Insert Type
ø160

KAPR :3°
GAMP:+13°
GAMF:-4°

ARBOR TYPE

Right hand tool holder only.

Order Number	Stock	Number of Teeth	Dimensions (mm)											WT* (kg)	Max. Depth of Cut			Type (Fig.)
	R		DCX	DC	D10	LF	DCON	CBDP	DAH	DCCB	KWW	BD	L8		A1	APMX	AZ	
OCTACUT0403ARB	●	3	40	31.7	21.2	40	16	18	—	—	8.4	33	5.6	0.4	2.5	7	3	1
OCTACUT0504ARB	●	4	50	41.9	31.4	50	22	20	11	—	10.4	42.5	6.3	0.5	2.5	7	3	2
OCTACUT0634ARB	●	4	63	54.9	44.5	50	22	20	11	—	10.4	44	6.3	0.7	2.5	7	3	2
OCTACUT0805CRB	●	5	80	71.9	61.5	50	25.4	26	13	—	9.5	53	6	1.2	2.5	7	3	2
OCTACUT0503AR	●	3	50	38.3	24.5	50	22	20	—	—	10.4	41	6.3	0.5	3	9	4	1
OCTACUT0634AR	●	4	63	51.4	37.6	50	22	20	11	—	10.4	44	6.3	0.7	3	9	4	2
OCTACUT0805CR	●	5	80	68.4	54.7	50	25.4	26	13	—	9.5	53	6	1.2	3	9	4	2
OCTACUT1006DR	●	6	100	88.5	74.7	63	31.75	32	17	—	12.7	70	8	1.6	3	9	4	2
OCTACUT1257ER	●	7	125	113.5	99.8	63	38.1	35	—	60	15.9	80	10	1.8	3	9	4	3
OCTACUT1608FR	●	8	160	148.5	134.8	63	50.8	38	—	80.9	19.1	120	11	3.6	3	9	4	4

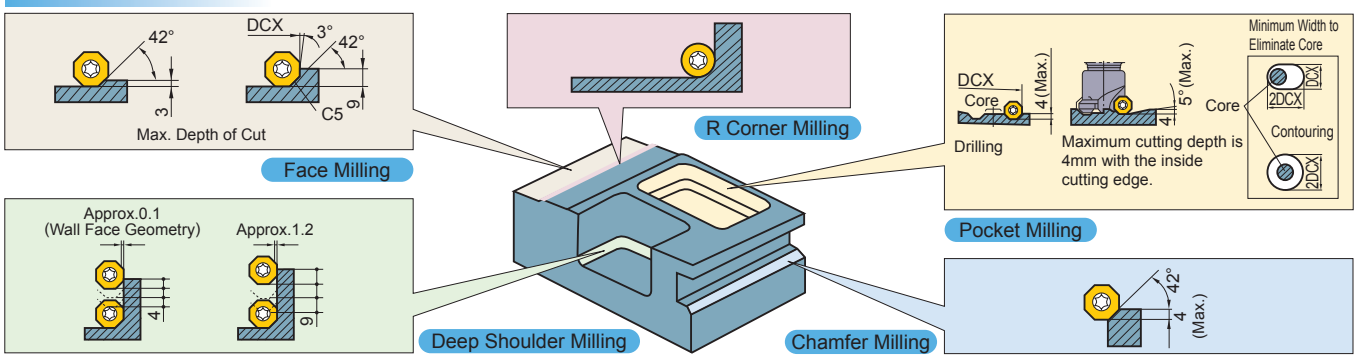
* WT : Tool Weight

SPARE PARTS

Tool Holder Number	Clamp Screw *	Wrench	Wrench	Set Bolt	Set Bolt	Insert
OCTACUT0403ARB	CS350990T	TKY10F	—	HDS08030	—	①OEMX12T3○○○○ ②REMX12T3○○○○
OCTACUT0504ARB				—	BOES101	
OCTACUT0634ARB					—	
OCTACUT0805CRB						
OCTACUT0503AR	CS501290T	—	TKY25T	HDS10031	—	①OEMX1705○○○○ ②REMX1705○○○○
OCTACUT0634AR				—	BOES101	
OCTACUT0805CR					—	
OCTACUT1006DR					HSC16035	
OCTACUT1257ER					—	
OCTACUT1608FR						

* Clamp Torque (N • m) : CS350990T=2.5, CS501290T=7.5

APPLICATION



Above sizes are for OEMX1705○○○○.

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001



For metric arbor

The cutter bore diameter DCON is indicated in millimetre.

Fig.1

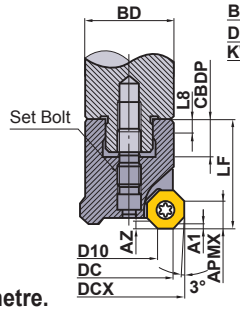


Fig.2

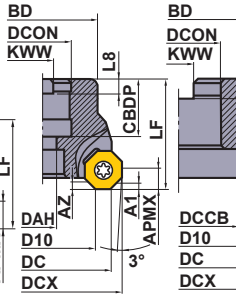


Fig.3

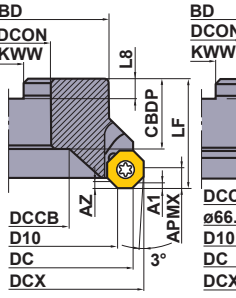
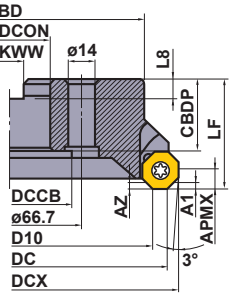


Fig.4



ARBOR TYPE

KAPR :3°
GAMP:+13°
GAMF :-4°

Right hand tool holder only.

Order Number	Stock	Number of Teeth	Dimensions (mm)											WT* (kg)	Max. Depth of Cut			Type (Fig.)
	R		DCX	DC	D10	LF	DMM	CBDP	DAH	DCCB	KWW	BD	L8		A1	APMX	AZ	
OCTACUT0403ARB	●	3	40	31.7	21.2	40	16	18	—	—	8.4	33	5.6	0.4	2.5	7	3	1
OCTACUT0504ARB	●	4	50	41.9	31.4	50	22	20	11	—	10.4	42.5	6.3	0.5	2.5	7	3	2
OCTACUT0634ARB	●	4	63	54.9	44.5	50	22	20	11	—	10.4	44	6.3	0.7	2.5	7	3	2
OCTACUT0805ARB	●	5	80	71.9	61.5	50	27	23	13	—	12.4	53	7	1.2	2.5	7	3	2
OCTACUT0503AR	●	3	50	38.3	24.5	50	22	20	—	—	10.4	41	6.3	0.5	3	9	4	1
OCTACUT0634AR	●	4	63	51.4	37.6	50	22	20	11	—	10.4	44	6.3	0.7	3	9	4	2
OCTACUT0805AR	●	5	80	68.4	54.7	50	27	23	13	—	12.4	53	7	1.2	3	9	4	2
OCTACUT1006AR	●	6	100	88.5	74.7	50	32	32	45	—	14.4	70	8	1.6	3	9	4	2
OCTACUT1257BR	●	7	125	113.5	99.8	50	40	32	—	56	16.4	80	9	1.8	3	9	4	3
OCTACUT1608CR	●	8	160	148.5	134.8	50	40	29	—	88.7	16.4	120	9	3.6	3	9	4	4

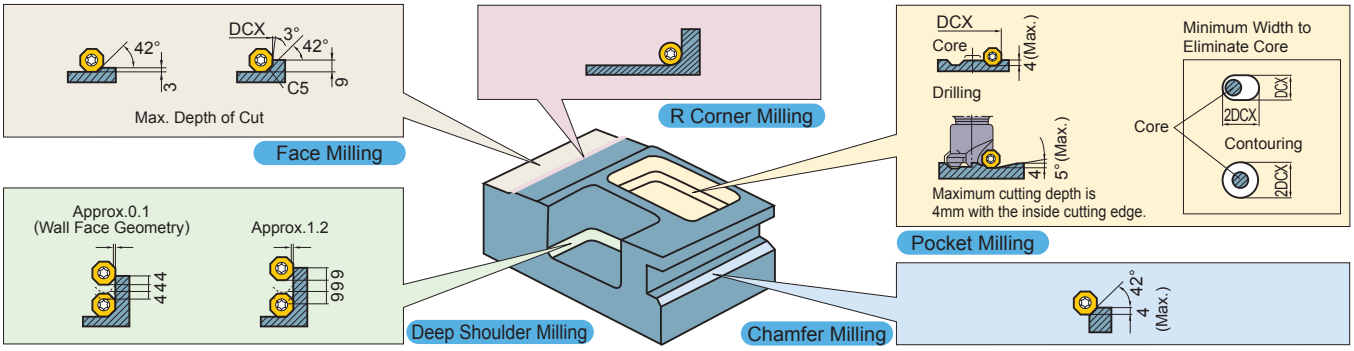
* WT : Tool Weight

SPARE PARTS

Tool Holder Number	Clamp Screw *	Wrench	Wrench	Set Bolt	Set Bolt	Insert
OCTACUT0403ARB	CS350990T	TKY10F	—	HDS08030	—	①OEMX12T3○○○○ ②REMX12T3○○○○
OCTACUT0504ARB				—	BOES101	
OCTACUT0634ARB					—	
OCTACUT0805ARB						
OCTACUT0503AR	CS501290T	—	TKY25T	HDS10031	—	①OEMX1705○○○○ ②REMX1705○○○○
OCTACUT0634AR				—	BOES101	
OCTACUT0805AR					—	
OCTACUT1608CR						

* Clamp Torque (N • m) : CS350990T=2.5, CS501290T=7.5

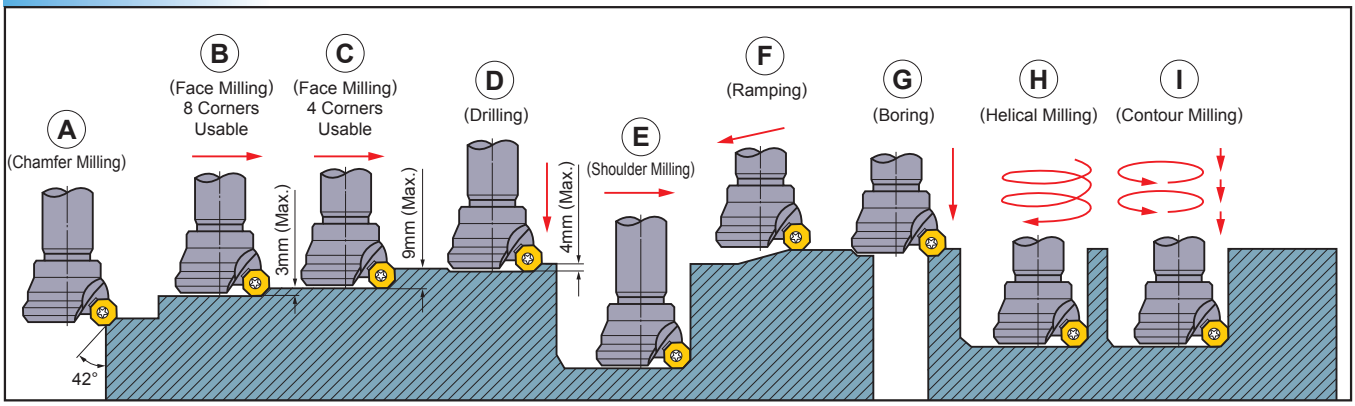
APPLICATION



Above sizes are for OEMX1705○○○○.

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS



This list of recommended cutting conditions is for cutters with diameter≤ϕ80. For cutters with diameter>ϕ80 increase cutting speed by 10%.
Above sizes are for OEMX1705□□□□.

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Cutting Mode	Feed per Tooth (mm/t.)
P	Mild Steel	≤180HB	F7030	240 (180—300)	A	0.2 (0.15—0.25)
					B	0.2 (0.15—0.25)
			VP15TF	180 (100—250)	C,E,F	0.2 (0.15—0.25)
					D,G,H,I	0.075 (0.05—0.1)
	Carbon Steel Alloy Steel	180—280HB	F7030	200 (140—240)	A	0.2 (0.15—0.25)
					B	0.2 (0.15—0.25)
			VP15TF	180 (100—250)	C,E,F	0.2 (0.15—0.25)
					D,G,H,I	0.075 (0.05—0.1)
		280—380HB	F7030	150 (100—170)	A	0.2 (0.15—0.25)
					B	0.2 (0.15—0.25)
			VP15TF	120 (80—160)	C,E,F	0.2 (0.15—0.25)
					D,G,H,I	0.075 (0.05—0.1)
	Pre-Hardened Steel	35—45HRC	F7030	130 (90—160)	A	0.15 (0.1—0.2)
					B	0.15 (0.1—0.2)
			VP15TF	120 (80—160)	C,E,F	0.1 (0.05—0.15)
					D,G,H,I	0.05 (0.025—0.075)
	High Alloy Steel	≤300HB	F7030	150 (100—170)	A	0.15 (0.1—0.2)
					B	0.15 (0.1—0.2)
			VP15TF	120 (80—160)	C,E,F	0.1 (0.05—0.15)
					D,G,H,I	0.05 (0.025—0.075)
M	Stainless Steel	≤270HB	F7030	200 (140—240)	A	0.15 (0.1—0.2)
					B	0.15 (0.1—0.2)
			VP15TF	150 (100—200)	C,E,F	0.1 (0.05—0.15)
					D,G,H,I	0.075 (0.05—0.1)
K	Gray Cast Iron	Tensile Strength ≤350MPa	VP15TF	160 (100—220)	A	0.3 (0.25—0.35)
					B	0.25 (0.2—0.3)
					C,E,F	0.15 (0.1—0.2)
					D,G,H,I	0.075 (0.05—0.1)
			MB730	1500 (1000—3000)	B (D.O.C 0.1—0.5mm)	0.15 (0.1—0.2)
	Ductile Cast Iron	Tensile Strength 360—500MPa	VP15TF	160 (100—220)	A	0.25 (0.2—0.3)
					B	0.2 (0.15—0.25)
					C,E,F	0.1 (0.05—0.15)
					D,G,H,I	0.05 (0.025—0.075)
	Ductile Cast Iron	Tensile Strength 500—800MPa	VP15TF	140 (90—190)	A	0.25 (0.2—0.3)
					B	0.2 (0.15—0.25)
					C,E,F	0.1 (0.05—0.15)
					D,G,H,I	0.05 (0.025—0.075)
H	Hardened Steel	45—60HRC	VP15TF	80 (50—100)	A	0.15 (0.1—0.2)
					B	0.15 (0.1—0.2)
					C,E,F	0.1 (0.05—0.12)
					D,G,H,I	0.05 (0.025—0.06)
			MB730	150 (100—200)	B (D.O.C 0.1—0.3mm)	0.15 (0.1—0.2)

● Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
● Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution
(Note 1) This list of recommended cutting conditions is for flank wear of 0.3mm in 30 min. cutting time.
(Note 2) More than 50mm shank length should be clamped in the milling chuck.
(Note 3) Use step cutting when driling (0.5 mm steps are recommended).
(Note 4) When chattering occurs, reduce cutting speed by 20—30 %.
(Note 5) When using round inserts, make sure that the flat portion of the flank surface is secure against the insert seat wall.

SPARE PARTS ➤P001
TECHNICAL DATA ➤Q001

MULTI FUNCTIONAL MILLING

Roughing

Including Flat faces

ARX

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron			Hardened Steel



- 15° positive, high tolerance M-class insert.
- Effective for various machining applications.
- With through air & coolant holes.

Fig.1

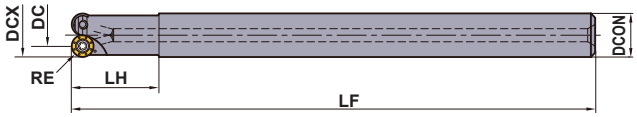


Fig.2 (Center Cutting Edge Type)

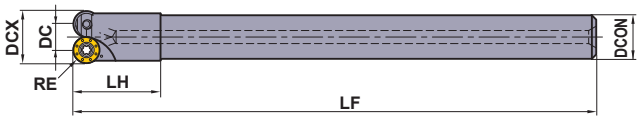
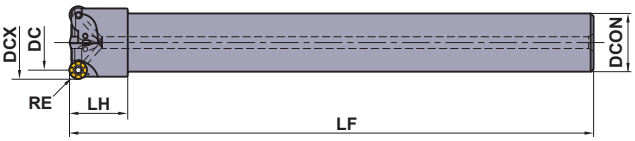


Fig.3 (Non-center Cutting Edge Type (Multi-tooth))



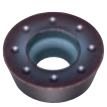
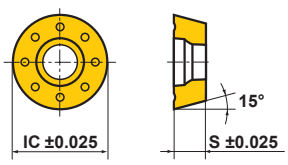
STEEL SHANK TYPE

Right hand tool holder only.

Type	Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm)						Type (Fig.)	*		
		R			RE	DCX	DCON	DC	LF	LH		Clamp Screw	Wrench	Insert
Center Cutting	**ARX25R102SA10S**	●	○	2	2.5	10	10	5	120	20	1	TPS20	TIP06F	RDMW0517M0E
	ARX30R122SA10S	●	○	2	3.0	12	10	6	120	20	2	TPS22S	TIP07FS	RDMW0620M0E
	ARX35R142SA12S	●	○	2	3.5	14	12	7	140	20	2	TPS22	TIP07FS	RDMW0724M0E
Non-center Cutting (Multi-tooth)	**ARX25R122SA10S**	●	○	2	2.5	12	10	7	120	20	3	TPS20	TIP06F	RDMW0517M0E
	ARX25R163SA16S	●	○	3	2.5	16	16	11	180	20	1	TPS20	TIP06F	RDMW0517M0E
	ARX30R163SA16S	●	○	3	3.0	16	16	10	180	20	1	TPS22	TIP07FS	RDMW0620M0E
	ARX25R173SA16S	●	○	3	2.5	17	16	12	180	20	1	TPS20	TIP06F	RDMW0517M0E
	ARX30R173SA16S	●	○	3	3.0	17	16	11	180	20	1	TPS22	TIP07FS	RDMW0620M0E
	ARX25R204SA20S	●	○	4	2.5	20	20	15	180	20	1	TPS20	TIP06F	RDMW0517M0E
	ARX30R203SA20S	●	○	3	3.0	20	20	14	180	20	1	TPS22	TIP07FS	RDMW0620M0E
	ARX25R224SA20S	●	○	4	2.5	22	20	17	180	20	3	TPS20	TIP06F	RDMW0517M0E
	ARX30R224SA20S	●	○	4	3.0	22	20	16	180	20	3	TPS22	TIP07FS	RDMW0620M0E
	ARX25R255SA20S	●	○	5	2.5	25	20	20	180	20	3	TPS20	TIP06F	RDMW0517M0E
	ARX30R254SA20S	●	○	4	3.0	25	20	19	180	20	3	TPS22	TIP07FS	RDMW0620M0E

* Clamp Torque (N • m) : TPS20=0.6, TPS22S=0.6, TPS22=0.6

INSERTS

Shape	Order Number	Coated		Dimensions (mm)		Geometry
		MP8010	VP15TF	IC	S	
	**RDMW0517M0E**	●	●	5.0	1.70	
	RDMW0620M0E	●	●	6.0	1.99	
	RDMW0724M0E	●	●	7.0	2.38	

● : Inventory maintained in Japan. (10 inserts in one case)



Fig.1

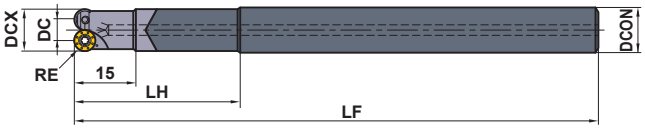


Fig.2

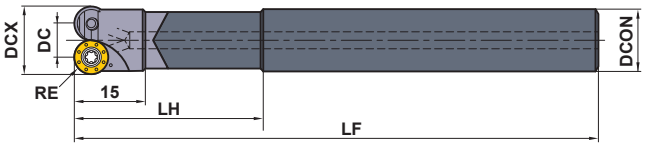
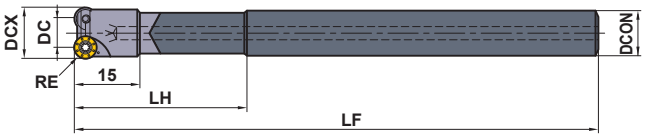


Fig.3



CARBIDE SHANK TYPE

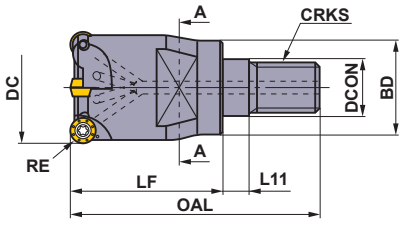
Right hand tool holder only.

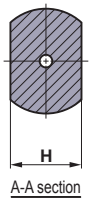
Type	Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm)						Type (Fig.)	* Clamp Screw	Wrench	Insert
		R			RE	DCX	DCON	DC	LF	LH				
Center Cutting	**ARX25R102SA10LW**	●	○	2	2.5	10	10	5	150	40	1	TPS20	TIP06F	RDMW0517M0E
	ARX30R122SA10LW	●	○	2	3.0	12	10	6	150	40	2	TPS22S	TIP07FS	RDMW0620M0E
	ARX35R142SA12LW	●	○	2	3.5	14	12	7	170	40	2	TPS22	TIP07FS	RDMW0724M0E
Non-center Cutting (Multi-tooth)	**ARX25R122SA10LW**	●	○	2	2.5	12	10	7	150	40	3	TPS20	TIP06F	RDMW0517M0E

* Clamp Torque (N • m) : TPS20=0.6, TPS22S=0.6, TPS22=0.6









SCREW-IN TYPE

Right hand tool holder only.

Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm)									*2 WT (kg)	*1 Clamp Screw	Wrench	Insert
	R			RE	DC	DCON	BD	OAL	LF	L11	H	CRKS				
ARX25R163M08A30	●	○	3	2.5	16	8.5	14.7	48	30	6	10	M8	0.1	TPS20	TIP06F	RDMW0517M0E
ARX25R**173M08A30**	●	○	3	2.5	17	8.5	14.5	48	30	6	10	M8	0.1	TPS20	TIP06F	RDMW0517M0E
ARX25R**204M10A30**	●	○	4	2.5	20	10.5	18.6	49	30	6	14	M10	0.2	TPS20	TIP06F	RDMW0517M0E
ARX25R**224M10A30**	●	○	4	2.5	22	10.5	18.5	49	30	6	14	M10	0.2	TPS20	TIP06F	RDMW0517M0E
ARX25R**255M12A35**	●	○	5	2.5	25	12.5	23.6	57	35	6	19	M12	0.2	TPS20	TIP06F	RDMW0517M0E
ARX30R163M08A30	●	○	3	3.0	16	8.5	14.6	48	30	6	10	M8	0.1	TPS22	TIP07FS	RDMW0620M0E
ARX30R**173M08A30**	●	○	3	3.0	17	8.5	14.5	48	30	6	10	M8	0.1	TPS22	TIP07FS	RDMW0620M0E
ARX30R**203M10A30**	●	○	3	3.0	20	10.5	18.5	49	30	6	14	M10	0.2	TPS22	TIP07FS	RDMW0620M0E
ARX30R**224M10A30**	●	○	4	3.0	22	10.5	18.5	49	30	6	14	M10	0.2	TPS22	TIP07FS	RDMW0620M0E
ARX30R**254M12A35**	●	○	4	3.0	25	12.5	23.4	57	35	6	19	M12	0.2	TPS22	TIP07FS	RDMW0620M0E

(Note) For screw-in type arbors, refer to page L145—L146.

*1 Clamp Torque (N • m) : TPS20=0.6, TPS22=0.6

*2 WT : Tool Weight

SCREW-IN ARBORS	➤ L145
SPARE PARTS	➤ P001
TECHNICAL DATA	➤ Q001

RECOMMENDED CUTTING CONDITIONS

* The cutting conditions below are a guide only.Please make adjustments according to the machining conditions.
* Please note the follows when machining the hardened steel by using MP8010.
  - Please shorten the overhang length as much as possible.
  - Use with carbide shank recommended.
  - Please note the setting of the depth of cut especially to prevent the fracture.
  - The first recommended grade when machining hardened steel of less than 50HRC is VP15TF.

SHOULDER MILLING • POCKET MILLING • RAMPING • COPYING

	Work Material	Hardness	Grade	Cutting Speed **vc** (m/min)	ARX25R□□□SA□□S ARX25R□□□M□□A□□		ARX30R□□□SA□□S ARX30R□□□M□□A□□		ARX35R□□□SA□□S	
					Depth of Cut **ap** (mm)	Feed per Tooth **fz** (mm/t.)	Depth of Cut **ap** (mm)	Feed per Tooth **fz** (mm/t.)	Depth of Cut **ap** (mm)	Feed per Tooth **fz** (mm/t.)
P	Mild Steel	≤180HB	VP15TF	180 (150—220)	≤1.0	≤0.5	≤1.2	≤0.5	≤1.5	≤0.5
	Carbon Steel • Alloy Steel	180—350HB	VP15TF	160 (120—200)	≤0.7	≤0.3	≤0.9	≤0.3	≤1.2	≤0.3
M	Stainless Steel	≤270HB	VP15TF	150 (120—180)	≤0.7	≤0.3	≤0.9	≤0.3	≤1.2	≤0.3
K	Gray Cast Iron	Tensile Strength≤350MPa	VP15TF	180 (150—220)	≤1.0	≤0.5	≤1.2	≤0.5	≤1.5	≤0.5
	Ductile Cast Iron	Tensile Strength≤800MPa	VP15TF	120 (80—160)	≤1.0	≤0.5	≤1.2	≤0.5	≤1.5	≤0.5
H	Hardened Steel	<50HRC	VP15TF	80 (50—120)	≤0.5	≤0.2	≤0.7	≤0.2	≤1.0	≤0.2
		≥50HRC	MP8010	80 (50—120)	≤0.3	≤0.2	≤0.4	≤0.2	≤0.5	≤0.2

(Note) For ramping, refer to the maximum capacities on page L101.

SLOT MILLING

	Work Material	Hardness	Grade	Cutting Speed **vc** (m/min)	ARX25R□□□SA□□S ARX25R□□□M□□A□□		ARX30R□□□SA□□S ARX30R□□□M□□A□□		ARX35R□□□SA□□S	
					Depth of Cut **ap** (mm)	Feed per Tooth **fz** (mm/t.)	Depth of Cut **ap** (mm)	Feed per Tooth **fz** (mm/t.)	Depth of Cut **ap** (mm)	Feed per Tooth **fz** (mm/t.)
P	Mild Steel	≤180HB	VP15TF	180 (150—220)	≤1.0	≤0.4	≤1.2	≤0.4	≤1.5	≤0.4
	Carbon Steel • Alloy Steel	180—350HB	VP15TF	160 (120—200)	≤0.7	≤0.2	≤0.9	≤0.2	≤1.2	≤0.2
M	Stainless Steel	≤270HB	VP15TF	150 (120—180)	≤0.7	≤0.2	≤0.9	≤0.2	≤1.2	≤0.2
K	Gray Cast Iron	Tensile Strength≤350MPa	VP15TF	180 (150—220)	≤1.0	≤0.4	≤1.2	≤0.4	≤1.5	≤0.4
	Ductile Cast Iron	Tensile Strength≤800MPa	VP15TF	120 (80—160)	≤1.0	≤0.4	≤1.2	≤0.4	≤1.5	≤0.4
H	Hardened Steel	<50HRC	VP15TF	80 (50—120)	≤0.5	≤0.1	≤0.7	≤0.1	≤1.0	≤0.1
		≥50HRC	MP8010	80 (50—120)	≤0.3	≤0.1	≤0.4	≤0.1	≤0.5	≤0.1

PLUNGING

	Work Material	Hardness	Grade	Cutting Speed **vc** (m/min)	ARX25R□□□SA□□S ARX25R□□□M□□A□□		ARX30R□□□SA□□S ARX30R□□□M□□A□□		ARX35R□□□SA□□S	
					Cutting Width **ae** (mm)	Feed per Tooth **fz** (mm/t.)	Cutting Width **ae** (mm)	Feed per Tooth **fz** (mm/t.)	Cutting Width **ae** (mm)	Feed per Tooth **fz** (mm/t.)
P	Mild Steel	≤180HB	VP15TF	180 (150—220)	≤2.5	≤0.3	≤3.0	≤0.3	≤3.5	≤0.3
	Carbon Steel • Alloy Steel	180—350HB	VP15TF	160 (120—200)	≤2.5	≤0.2	≤3.0	≤0.2	≤3.5	≤0.2
M	Stainless Steel	≤270HB	VP15TF	150 (120—180)	≤2.5	≤0.2	≤3.0	≤0.2	≤3.5	≤0.2
K	Gray Cast Iron	Tensile Strength≤350MPa	VP15TF	180 (150—220)	≤2.5	≤0.3	≤3.0	≤0.3	≤3.5	≤0.3
	Ductile Cast Iron	Tensile Strength≤800MPa	VP15TF	120 (80—160)	≤2.5	≤0.3	≤3.0	≤0.3	≤3.5	≤0.3
H	Hardened Steel	<50HRC	VP15TF	80 (50—120)	≤2.5	≤0.1	≤3.0	≤0.1	≤3.5	≤0.1
		≥50HRC	MP8010	80 (50—120)	≤2.5	≤0.1	≤3.0	≤0.1	≤3.5	≤0.1

HELICAL DRILLING

	Work Material	Hardness	Grade	Cutting Speed **vc** (m/min)	ARX25R□□□SA□□S ARX25R□□□M□□A□□		ARX30R□□□SA□□S ARX30R□□□M□□A□□		ARX35R□□□SA□□S	
					DOC/pass **ap** (mm/pass)	Feed per Tooth **fz** (mm/t.)	DOC/pass **ap** (mm/pass)	Feed per Tooth **fz** (mm/t.)	DOC/pass **ap** (mm/pass)	Feed per Tooth **fz** (mm/t.)
P	Mild Steel	≤180HB	VP15TF	180 (150—220)	≤1.0	≤0.3	≤1.0	≤0.3	≤1.0	≤0.3
	Carbon Steel • Alloy Steel	180—350HB	VP15TF	160 (120—200)	≤0.7	≤0.2	≤0.9	≤0.2	≤1.0	≤0.2
M	Stainless Steel	≤270HB	VP15TF	150 (120—180)	≤0.7	≤0.2	≤0.9	≤0.2	≤1.0	≤0.2
K	Gray Cast Iron	Tensile Strength≤350MPa	VP15TF	180 (150—220)	≤1.0	≤0.3	≤1.0	≤0.3	≤1.0	≤0.3
	Ductile Cast Iron	Tensile Strength≤800MPa	VP15TF	120 (80—160)	≤1.0	≤0.3	≤1.0	≤0.3	≤1.0	≤0.3
H	Hardened Steel	<50HRC	VP15TF	80 (50—120)	≤0.5	≤0.1	≤0.7	≤0.1	≤1.0	≤0.1
		≥50HRC	MP8010	80 (50—120)	≤0.3	≤0.1	≤0.4	≤0.1	≤0.5	≤0.1

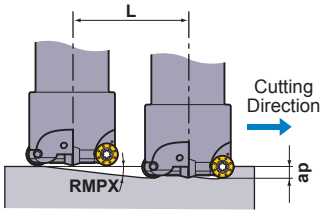
(Note) For helical drilling, refer to the maximum capacities on page L101.

CUTTING MODE MAXIMUM CAPACITIES

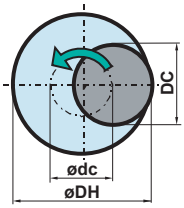
RAMPING

Finding a cutters' distance moved **"L"** when depth of cut reaches **"ap"** at a ramping angle of **"α°"**.

L=ap/tan α (mm)



HELICAL DRILLING



- How to derive a locus of the center of the tool.

ødc = øDH - DC

Locus of the center of the tool | Desired hole diameter | Cutting edge diameter

- For the depth of cut per cycle, refer to the cutting conditions for helical drilling on L100.
- Set the machine spindle revolution so that the tool is rotating and cutting in a down cut direction.

Type	Order Number	Tool Diameter **DC** (mm)	Corner **RE** (mm)	Number of Teeth	Ramping			Helical Drilling	
					RMPX ∗1	**APMX** (mm) ∗2	Distance L at Depth of Cut of **ap** L (mm)	Min. Hole Diameter **DH min.** (mm)	Max. Hole Diameter **DH max.** (mm)
Center Cutting	**ARX25R102SA10S**	10	2.5	2	90°	2.5	0	15	19
	ARX25R102SA10LW	10	2.5	2	90°	2.5	0	15	19
	ARX30R122SA10S	12	3.0	2	90°	3.0	0	18	23
	ARX30R122SA10LW	12	3.0	2	90°	3.0	0	18	23
	ARX35R142SA12S	14	3.5	2	90°	3.5	0	21	27
	ARX35R142SA12LW	14	3.5	2	90°	3.5	0	21	27
Non-center Cutting (Multi-tooth)	**ARX25R122SA10S**	12	2.5	2	27.17°	2.5	4.87	19	23
	ARX25R122SA10LW	12	2.5	2	27.17°	2.5	4.87	19	23
	ARX25R163M08A30	16	2.5	3	13.70°	2.5	10.76	27	31
	ARX25R163SA16S	16	2.5	3	13.70°	2.5	10.26	27	31
	ARX30R163M08A30	16	3.0	3	21.25	3.0	7.71	26	31
	ARX30R163SA16S	16	3.0	3	21.25°	3.0	7.71	26	31
	ARX25R173M08A30	17	2.5	3	12.22°	2.5	11.54	29	33
	ARX25R173SA16S	17	2.5	3	12.22°	2.5	11.54	29	33
	ARX30R173M08A30	17	3.0	3	18.42°	3.0	9.01	28	33
	ARX30R173SA16S	17	3.0	3	18.42°	3.0	9.01	28	33
	ARX30R203M10A30	20	3.0	3	13.21°	3.0	12.78	34	39
	ARX30R203SA20S	20	3.0	3	13.21°	3.0	12.78	34	39
	ARX25R204M10A30	20	2.5	4	9.23°	2.5	15.38	35	39
	ARX25R204SA20S	20	2.5	4	9.23°	2.5	15.38	35	39
	ARX25R224M10A30	22	2.5	4	7.94°	2.5	17.92	39	43
	ARX25R224SA20S	22	2.5	4	7.94°	2.5	17.92	39	43
	ARX30R224M10A30	22	3.0	4	11.13°	3.0	15.25	38	43
	ARX30R224SA20S	22	3.0	4	11.13°	3.0	15.25	38	43
	ARX30R254M12A35	25	3.0	4	9.01°	3.0	18.92	44	49
	ARX30R254SA20S	25	3.0	4	9.01°	3.0	18.92	44	49
	ARX25R255M12A35	25	2.5	5	6.57°	2.5	21.71	45	49
	ARX25R255SA20S	25	2.5	5	6.57°	2.5	21.71	45	49

∗1 RMPX : Max.Ramping Angle
∗2 APMX : Max. Depth of Cut

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

MULTI FUNCTIONAL MILLING

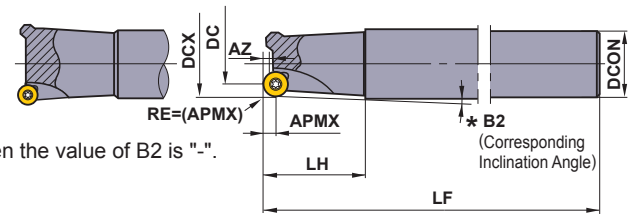
Roughing

Including Flat faces

BRP

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron		Heat Resistant Alloy	Hardened Steel





When the value of B2 is "-".

- 11°positive insert.
- Round shape insert with a strong cutting edge.
- Wide range of tools available.
- Suitable for mould machining.

*Please allow for an inclination angle of B2+1°

SHANK TYPE

Right hand tool holder only.

Cutting Edge R (APMX)	Type	Order Number	Stock R	Number of Teeth	Dimensions (mm) DCX	DC	LF	DCON	LH	AZ	B2	APMX	* Clamp Screw	Wrench	①② Insert
4	R	BRP4NR121S12	●	1	12	3.8	85	12	25	0.2	3°00′	4	CS250560T	TKY08F	①RPMW08T2M0◌ ②RPMT08T2M0E-JS
		BRP4NR161S16	●	1	16	7.8	85	16	25	1.0	3°00′	4	CS250560T	TKY08F	
		BRP4NR202S20	●	2	20	11.8	100	20	30	2.0	2°25′	4	CS250560T	TKY08F	
		BRP4NR253S25	●	3	25	16.8	115	25	35	2.0	2°02′	4	CS250560T	TKY08F	
	L	BRP4NR121LS12	●	1	12	3.8	150	12	70	0.2	0°57′	4	CS250560T	TKY08F	
		BRP4NR161LS16	●	1	16	7.8	150	16	70	1.0	0°57′	4	CS250560T	TKY08F	
		BRP4NR202LS20	●	2	20	11.8	180	20	100	2.0	0°39′	4	CS250560T	TKY08F	
		BRP4NR253LS25	●	3	25	16.8	180	25	100	2.0	0°39′	4	CS250560T	TKY08F	
	EL	BRP4NR202ELS20	●	2	20	11.8	250	20	130	2.0	0°30′	4	CS250560T	TKY08F	
		BRP4NR253ELS25	●	3	25	16.8	250	25	130	2.0	0°30′	4	CS250560T	TKY08F	
5	R	BRP5NR161S16	●	1	16	5.8	85	16	25	0.3	3°09′	5	CS350760T	TKY15F	①RPMW10T3M0◌ ②RPMT10T3M0E-JS
		BRP5NR201S20	●	1	20	9.8	100	20	30	1.2	2°31′	5	CS350760T	TKY15F	
		BRP5NR252S25	●	2	25	14.8	115	25	35	2.5	2°06′	5	CS350860T	TKY15F	
		BRP5NR323S32	●	3	32	21.8	125	32	45	2.5	1°34′	5	CS350860T	TKY15F	
	L	BRP5NR161LS16	●	1	16	5.8	150	16	70	0.3	0°58′	5	CS350760T	TKY15F	
		BRP5NR201LS20	●	1	20	9.8	180	20	100	1.2	0°40′	5	CS350760T	TKY15F	
		BRP5NR252LS25	●	2	25	14.8	180	25	100	2.5	0°40′	5	CS350860T	TKY15F	
		BRP5NR323LS32	●	3	32	21.8	200	32	120	2.5	0°33′	5	CS350860T	TKY15F	
	EL	BRP5NR252ELS25	●	2	25	14.8	250	25	130	2.5	0°30′	5	CS350860T	TKY15F	
		BRP5NR323ELS32	●	3	32	21.8	300	32	180	2.5	0°22′	5	CS350860T	TKY15F	

(Note) **R :** regular type **L :** long type **EL :** extra long type

* Clamp Torque (N • m) : CS250560T=1.0, CS350760T=3.5, CS350860T=3.5

● : Inventory maintained in Japan.

Cutting Edge R (APMX)	Type	Order Number	Stock	Number of Teeth	Dimensions (mm)								*		① ②
			R		DCX	DC	LF	DCON	LH	AZ	B2	APMX	Clamp Screw	Wrench	Insert
6	R	**BRP6PR322S32**	●	2	32	19.8	125	32	45	4	1°37′	6	TS43	TKY15D	①RPMW1204M0□ ②RPMT1204M0E-JS
		BRP6PR**403S32**	●	3	40	27.9	125	32	45	4	—	6	TS43	TKY15D	
		BRP6PR**504S32**	●	4	50	37.8	150	32	50	4	—	6	TS43	TKY15D	
		BRP6PR**504S42**	●	4	50	37.8	150	42	50	4	—	6	TS43	TKY15D	
	L	BRP6PR**322LS32**	●	2	32	19.8	200	32	120	4	0°33′	6	TS43	TKY15D	
		BRP6PR**403LS32**	●	3	40	27.9	200	32	120	4	—	6	TS43	TKY15D	
		BRP6PR**504LS32**	●	4	50	37.8	250	32	150	4	—	6	TS43	TKY15D	
		BRP6PR**504LS42**	●	4	50	37.8	250	42	150	4	—	6	TS43	TKY15D	
	EL	BRP6PR**322ELS32**	●	2	32	19.8	300	32	50	4	1°26′	6	TS43	TKY15D	
		BRP6PR**403ELS32**	●	3	40	27.9	300	32	50	4	—	6	TS43	TKY15D	
		BRP6PR**403ELS42**	●	3	40	27.9	300	42	50	4	2°44′	6	TS43	TKY15D	
		BRP6PR**504ELS42**	●	4	50	37.8	300	42	50	4	—	6	TS43	TKY15D	
8	R	**BRP8PR402S32**	●	2	40	23.8	125	32	45	5.5	—	8	TS54	TKY25D	①RPMW1606M0□ ②RPMT1606M0E-JS
		BRP8PR**503S32**	●	3	50	33.8	150	32	50	5.5	—	8	TS54	TKY25D	
		BRP8PR**503S42**	●	3	50	33.8	150	42	50	5.5	—	8	TS54	TKY25D	
		BRP8PR**634S32**	●	4	63	46.8	150	32	50	5.5	—	8	TS54	TKY25D	
		BRP8PR**634S42**	●	4	63	46.8	150	42	50	5.5	—	8	TS54	TKY25D	
	L	BRP8PR**402LS32**	●	2	40	23.8	200	32	120	5.5	—	8	TS54	TKY25D	
		BRP8PR**503LS32**	●	3	50	33.8	250	32	150	5.5	—	8	TS54	TKY25D	
		BRP8PR**503LS42**	●	3	50	33.8	250	42	150	5.5	—	8	TS54	TKY25D	
		BRP8PR**634LS32**	●	4	63	46.8	250	32	150	5.5	—	8	TS54	TKY25D	
		BRP8PR**634LS42**	●	4	63	46.8	250	42	150	5.5	—	8	TS54	TKY25D	
	EL	BRP8PR**402ELS32**	●	2	40	23.8	300	32	50	5.5	—	8	TS54	TKY25D	
		BRP8PR**402ELS42**	●	2	40	23.8	300	42	50	5.5	2°52′	8	TS54	TKY25D	
		BRP8PR**503ELS42**	●	3	50	33.8	300	42	50	5.5	—	8	TS54	TKY25D	
		BRP8PR**634ELS42**	●	4	63	46.8	300	42	50	5.5	—	8	TS54	TKY25D	

(Note) **R :** regular type **L :** long type **EL :** extra long type
∗ Clamp Torque (N • m) : TS43=3.5, TS54=7.5

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001



Fig.1
ø40

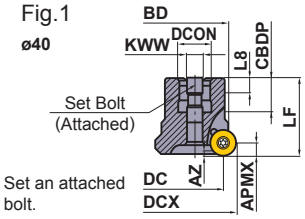
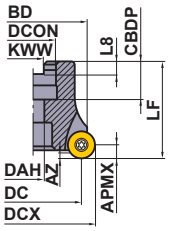
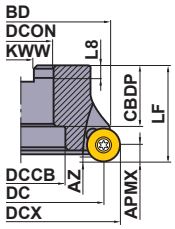


Fig.2
ø50
ø63
ø80



Right hand tool holder only.

Fig.3
ø100



ARBOR TYPE

GAMP:-7°—+5°
GAMF:-15°—0°

Cutting Edge R (APMX)	Order Number	Stock	Number of Teeth	Dimensions (mm)										WT* (kg)	Max. Depth of Cut (mm)		Type (Fig.)
		R		DCX	DC	BD	LF	DCON	CBDP	DAH	DCCB	KWW	L8		APMX	AZ	
6	**BRP6P-040A03R**	●	3	40	27.9	33.3	40	16	18	—	—	8.4	5.6	0.4	6	4	1
	BRP6P-050A04R	●	4	50	37.8	43.1	50	22	20	11	—	10.4	6.3	0.5	6	4	2
	BRP6PR05004B	●	4	50	37.8	43.1	63	22.225	29	11	—	8.4	5	0.5	6	4	2
	BRP6P-063A05R	●	5	63	50.8	56.1	50	22	20	11	—	10.4	6.3	0.7	6	4	2
	BRP6PR06305B	●	5	63	50.8	56.1	63	22.225	29	11	—	8.4	5	0.7	6	4	2
	BRP6PR08006C	●	6	80	67.8	72.8	50	25.4	26	13	—	9.5	6	1.2	6	4	2
8	**BRP8P-063A04R**	●	4	63	46.8	54.5	50	22	20	11	—	10.4	6.3	0.7	8	5.5	2
	BRP8PR06304B	●	4	63	46.8	54.5	63	22.225	29	11	—	8.4	5	0.7	8	5.5	2
	BRP8PR08005C	●	5	80	63.8	70.9	50	25.4	26	13	—	9.5	6	1.2	8	5.5	2
	BRP8PR10006D	●	6	100	83.8	90.6	50	31.75	32	—	45	12.7	8	1.6	8	5.5	3

* WT : Tool Weight

SPARE PARTS

Tool Holder Number	 * Clamp Screw	 Wrench	 Set Bolt	 Insert
BRP6P-040A03R	TS43	TKY15D	HDS08030	①RPMW1204M0○ ②RPMT1204M0E-JS
BRP6P-050A04R ~ BRP6P-R08006C	TS43	TKY15D	—	
BRP8P	TS54	TKY25D	—	①RPMW1606M0○ ②RPMT1606M0E-JS

* Clamp Torque (N • m) : TS43=3.5, TS54=7.5

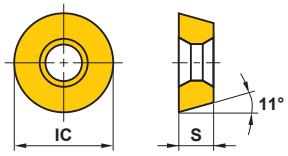
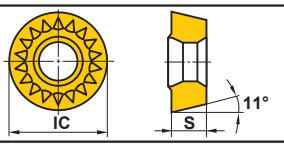
● : Inventory maintained in Japan. (10 inserts in one case)

INSERTS

Work Material			F7030	VP15TF			NX4545		UTi20T	
	P	Steel	◐	◐			◐		◐	
	M	Stainless Steel	◑	◑			◑		◑	
	K	Cast Iron		✱					✱	
	S	Heat-resistant Alloy, Titanium Alloy		◐						
	H	Hardened Steel		◐						

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting

Honing :
E : Round **T :** Chamfer

Shape	Order Number	Class	Honing	Coated F7030	Coated VP15TF			Cermet NX4545		Carbide UTi20T		Dimensions (mm) IC	S	Geometry
	**RPMW08T2M0T**	M	T		●							8	2.78	
	RPMW10T3M0E	M	E	●				●				10	3.97	
	RPMW10T3M0T	M	T		●							10	3.97	
	RPMW1204M0E	M	E	●				●		●		12	4.76	
	RPMW1204M0T	M	T		●							12	4.76	
	RPMW1606M0E	M	E	●						●		16	6.35	
	RPMW1606M0T	M	T		●							16	6.35	
	**RPMT08T2M0E-JS**	M	E	●	●							8	2.78	
	RPMT10T3M0E-JS	M	E	●	●							10	3.97	
	RPMT1204M0E-JS	M	E	●	●					●		12	4.76	
	RPMT1606M0E-JS	M	E	●	●							16	6.35	

MILLING

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED (m/min)

	Work Material	Hardness	Coated		Carbide
			F7030	VP15TF	UTi20T
P	Mild Steel	≤180HB	**250 (200—300)**	250 (200—300)	150 (100—200)
P	Carbon Steel Alloy Steel	180—280HB	**180 (130—220)**	180 (130—220)	140 (100—170)
P	Carbon Steel Alloy Steel	280—380HB	**160 (110—190)**	160 (110—190)	100 (70—120)
P	Pre-Hardened Steel	35—45HRC	**120 (80—140)**	120 (80—140)	90 (60—100)
P	High Alloy Steel	300HB	**130 (90—160)**	130 (90—160)	100 (70—120)
M	Stainless Steel	≤260HB	**180 (130—220)**	180 (130—220)	140 (100—170)
K	Gray Cast Iron	Tensile Strength ≤350MPa	—	**170 (130—220)**	140 (100—170)
K	Ductile Cast Iron	Tensile Strength 360—500MPa	—	**140 (100—180)**	120 (80—140)
K	Ductile Cast Iron	Tensile Strength 500—800MPa	—	**110 (80—140)**	90 (70—110)
H	Hardened Steel	45—60HRC	—	**60 (50—100)**	60 (40—70)

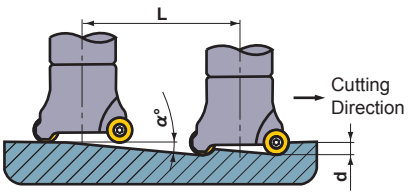
(Note) Cutting speeds shown in bold type are for the recommended first choice grades.

FEED PER TOOTH (mm/t.)

Type	Depth of Cut (mm)							
	1	2	3	4	5	6	7	8
BRP4	0.40	0.30	0.20	0.10	—	—	—	—
BRP5	0.40	0.35	0.30	0.20	0.10	—	—	—
BRP6	0.50	0.40	0.30	0.25	0.23	0.20	—	—
BRP8	0.60	0.50	0.45	0.40	0.33	0.30	0.25	0.20

RAMPING

RAMPING ANGLE AND MACHINING LENGTH



Formula to find cutting length "L" at maximum ramping angle.

$$L = \frac{d}{\tan \alpha} \text{ (mm)}$$

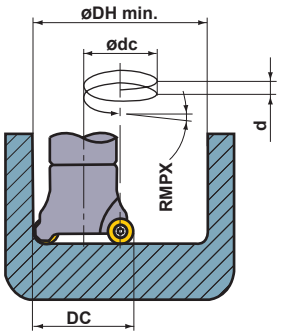
Type	Cutting Edge Diameter (ϕ)	Max. Ramping Angle **RMPX**	tan α	Cutting Length L at Max. Ramping Angle **L**(mm)*				
				d=2mm	d=4mm	d=5mm	d=6mm (max.)	d=8mm (max.)
BRP4	12	5.02°	0.088	22	45	—	—	—
	16	12.2°	0.216	9	18	—	—	—
	20	14.52°	0.259	7	15	—	—	—
	25	8.8°	0.155	12	25	—	—	—
BRP5	16	4.52°	0.079	25	50	63	—	—
	20	11.4°	0.202	9	19	24	—	—
	25	14.4°	0.257	7	15	19	—	—
	32	8.37°	0.147	13	27	33	—	—
BRP6	32	15.91°	0.285	7	14	17	21	—
	40	10.29°	0.181	11	22	27	33	—
	50	7.12°	0.125	16	32	40	48	—
	63	5.08°	0.089	22	44	56	67	—
	80	3.69°	0.064	31	62	77	93	—
BRP8	40	18.86°	0.342	5	11	14	17	23
	50	11.91°	0.211	9	18	23	28	37
	63	8.01°	0.141	14	28	35	42	56
	80	5.60°	0.098	20	40	50	61	81
	100	4.13°	0.072	27	55	69	83	110

* "L" value is approximate rounded value.

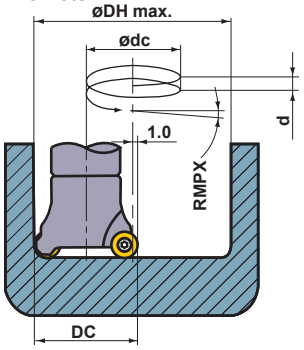
HELICAL DRILLING

RELATIONSHIP BETWEEN HOLE DIAMETER AND DEPTH OF CUT

Minimum Hole Diameter



Maximum Hole Diameter



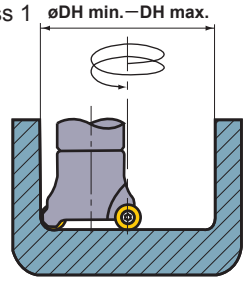
Type	Cutting Edge Diameter DC (mm)	∗1 øDH min.	∗2 ødc	Ramping Angle RMPX d=2mm	d=4mm	d=5mm	d=6mm	d=8mm	∗1 øDH max.	∗2 ødc	Ramping Angle RMPX d=2mm	d=4mm	d=5mm	d=6mm	d=8mm
BRP4	12	16	4	d=1mm,RMPX=4.55°					22	10	3.64°	—	—	—	—
	16	24	8	4.55°	9.10°	—	—	—	30	14	2.60°	5.20°	—	—	—
	20	32	12	3.04°	6.08°	—	—	—	38	18	2.03°	4.05°	—	—	—
	25	42	17	2.15°	4.29°	—	—	—	48	23	1.59°	3.17°	—	—	—
BRP5	16	22	6	d=1mm,RMPX=3.04°					30	14	2.60°	5.20°	6.50°	—	—
	20	30	10	3.64°	7.26°	9.10°	—	—	38	18	2.03°	4.05°	5.08°	—	—
	25	40	15	2.43°	4.85°	6.08°	—	—	48	23	1.59°	3.17°	3.98°	—	—
	32	54	22	1.66°	3.31°	4.15°	—	—	62	30	1.22°	2.43°	3.04°	—	—
BRP6	32	52	20	1.82°	3.64°	4.55°	5.45°	—	62	30	1.22°	2.43°	3.04°	3.64°	—
	40	68	28	1.30°	2.60°	3.25°	3.90°	—	78	38	0.96°	1.92°	2.40°	2.88°	—
	50	88	38	0.96°	1.92°	2.40°	2.88°	—	98	48	0.78°	1.52°	1.90°	2.28°	—
	63	114	51	0.72°	1.43°	1.79°	2.14°	—	124	61	0.60°	1.20°	1.49°	1.79°	—
	80	148	68	0.54°	1.07°	1.34°	1.61°	—	158	78	0.47°	0.94°	1.17°	1.40°	—
BRP8	40	64	24	1.52°	3.04°	3.79°	4.55°	6.06°	78	38	0.96°	1.92°	2.40°	2.88°	3.38°
	50	84	34	1.07°	2.14°	2.68°	3.22°	4.28°	98	48	0.76°	1.52°	1.90°	2.28°	3.04°
	63	110	47	0.78°	1.55°	1.94°	2.33°	3.10°	124	61	0.60°	1.20°	1.49°	1.79°	2.39°
	80	144	64	0.57°	1.14°	1.42°	1.71°	2.28°	158	78	0.47°	0.94°	1.17°	1.40°	1.87°
	100	184	84	0.43°	0.87°	1.09°	1.30°	1.74°	198	98	0.37°	0.74°	0.93°	1.12°	1.49°

∗1 DH=Hole Diameter : ϕ(mm)　∗2 dc=Tool Pass : ϕ(mm)

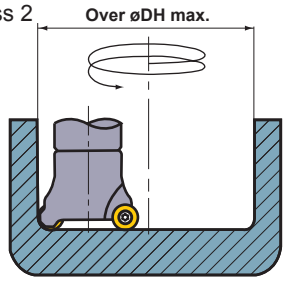
BRP4 DH min. (Minimum Hole Diameter)=(DC - 4)×2, DH max. (Maximum Hole Diameter)=(DC - 1)×2, d max. (Maximum Depth of Cut)=4(mm)
BRP5 DH min. (Minimum Hole Diameter)=(DC - 5)×2, DH max. (Maximum Hole Diameter)=(DC - 1)×2, d max. (Maximum Depth of Cut)=5(mm)
BRP6 DH min. (Minimum Hole Diameter)=(DC - 6)×2, DH max. (Maximum Hole Diameter)=(DC - 1)×2, d max. (Maximum Depth of Cut)=6(mm)
BRP8 DH min. (Minimum Hole Diameter)=(DC - 8)×2, DH max. (Maximum Hole Diameter)=(DC - 1)×2, d max. (Maximum Depth of Cut)=8(mm)
dc=(Tool Pass)**=DH-D**

◀Note▶ When machining a hole larger than DH max., first machine a pilot hole smaller than DH max. before enlarging to the required size as shown above.

Process 1 **øDH min.—DH max.**



Process 2 **Over øDH max.**



DEEP SHOULDER MILLING

Roughing

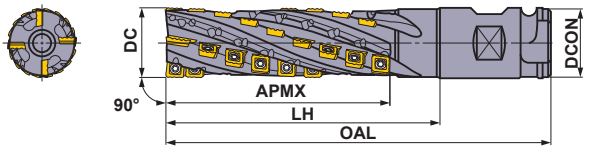
SPX

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron		Heat Resistant Alloy	

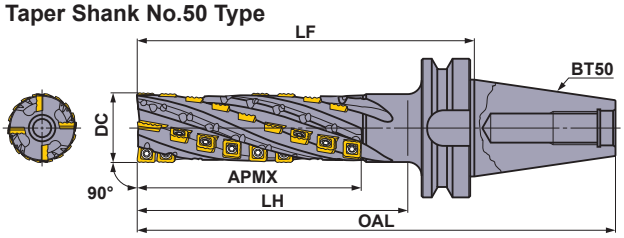


- Low cutting resistance due to the use of wavy inserts.
- Suitable for heavy cutting due to holder rigidity.

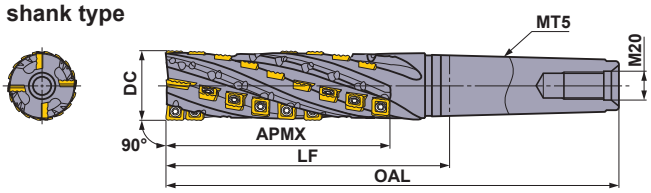
Straight Shank Type (Combination Shank)



7/24 Taper Shank No.50 Type



MT5 shank type



SHANK TYPE

Right hand tool holder only.

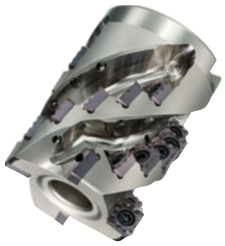
Type		Order Number	Stock	Number of Teeth		Dimensions (mm)						Number of Insert		
												Bottom On-edge A	Bottom On-edge B	Peripheral
			R	Flutes	Total	DC	OAL	DCON	LH	LF	APMX	JPMX 190412-○○	MPMX 120412-○○	SPMX 120408-○○
Straight Shank (Combination Shank)	Short Edge Type	SPX4R05016WNES	●	2	16	50	180	50.8	100	—	72	2	2	12
	Coarse Pitch	SPX4R05024WNS	●	2	24	50	220	50.8	140	—	110	2	2	20
		SPX4R05034WNM	●	2	34	50	270	50.8	190	—	157	2	2	30
		SPX4R05044WNL	●	2	44	50	320	50.8	240	—	205	2	2	40
7/24 Taper Shank (No. 50)	Short Edge Type	SPX4R05016BT50NES	●	2	16	50	249.8	—	100	148	72	2	2	12
	Coarse Pitch	SPX4R05024BT50NS	●	2	24	50	289.8	—	140	188	110	2	2	20
		SPX4R05034BT50NM	●	2	34	50	339.8	—	190	238	157	2	2	30
		SPX4R05044BT50NL	●	2	44	50	389.8	—	240	288	205	2	2	40
		SPX4R06324BT50NS	●	2	24	63	289.8	—	140	188	110	2	2	20
		SPX4R06334BT50NM	●	2	34	63	339.8	—	190	238	157	2	2	30
		SPX4R06344BT50NL	●	2	44	63	389.8	—	240	288	205	2	2	40
		SPX4R06356BT50NX	●	2	56	63	439.8	—	290	338	261	2	2	52
MT5 shank type		SPX4R05024MT5NS	●	2	24	50	279.5	—	—	150	110	2	2	20
		SPX4R05034MT5NM	●	2	34	50	329.5	—	—	200	157	2	2	30
		SPX4R05044MT5NL	●	2	44	50	379.5	—	—	250	205	2	2	40

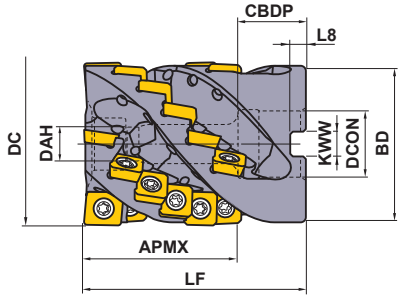
SPARE PARTS

Tool Holder Number	Clamp Screw *	Wrench	Anti-seize Lubricant	Insert		
				Bottom On-edge A	Bottom On-edge B	Peripheral
SPX	TS55	TKY25D	MK1KS	JPMX190412-WH	MPMX120412-WH	SPMX120408-WH
				JPMX190412-JM	MPMX120412-JM	SPMX120408-JM

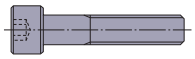
* Clamp Torque (N • m) : TS55=7.5

● : Inventory maintained in Japan.





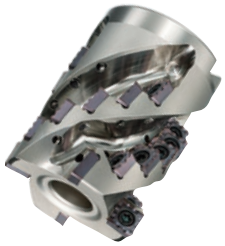
Right hand tool holder only.

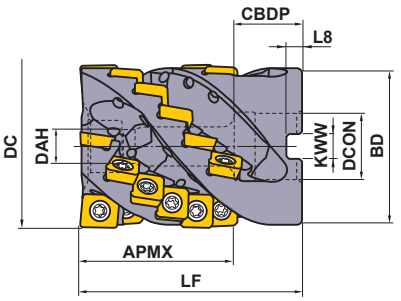
Cutter Diameter **DC**	Set Bolt	Geometry
ϕ63	HSC12070	
ϕ80	16065	

SHELL TYPE

Order Number	Stock	Number of Teeth		Dimensions (mm)									Number of Insert		
													Bottom On-edge **A**	Bottom On-edge **B**	Peripheral
	R	Flutes	Total	DC	LF	DCON	CBDP	DAH	BD	KWW	L8	APMX	**JPMX 140412-○○**	**MPMX 120412-○○**	**SPMX 120408-○○**
SPX4R06324CA058A	●	4	24	63	85	25.4	26	13	60	9.5	6	58	2	2	20
SPX4R08024DA058A	●	4	24	80	85	31.75	38	17	76.8	12.7	8	58	2	2	20

(Note) In case of internal coolant supply, please use a face mill arbor with through coolant channels. Regular center-thru or side-thru arbors can't be used.

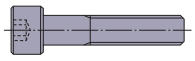




Right hand tool holder only.

For metric arbor

The cutter bore diameter DCON is indicated in millimetre.

Cutter Diameter **DC**	Set Bolt	Geometry
ϕ63	HSC12070	
ϕ80	16065	

SHELL TYPE

Order Number	Stock	Number of Teeth		Dimensions (mm)									Number of Insert		
													Bottom On-edge **A**	Bottom On-edge **B**	Peripheral
	R	Flutes	Total	DC	LF	DCON	CBDP	DAH	BD	KWW	L8	APMX	**JPMX 140412-○○**	**MPMX 120412-○○**	**SPMX 120408-○○**
SPX4-063A24A058RA	●	4	24	63	85	27	28	13	60	12.4	7	58	2	2	20
SPX4-080A24A058RA	●	4	24	80	85	32	40	17	76.8	14.4	8	58	2	2	20

(Note) In case of internal coolant supply, please use a face mill arbor with through coolant channels. Regular center-thru or side-thru arbors can't be used.

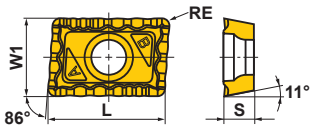
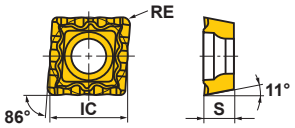
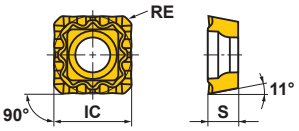
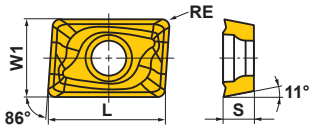
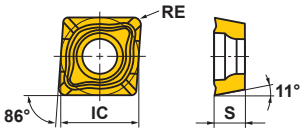
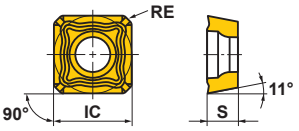
SPARE PARTS

Tool Holder Number	 *					
	Clamp Screw	Wrench	Anti-seize Lubricant	Insert		
				Bottom On-edge **A**	Bottom On-edge **B**	Peripheral
SPX	TS55	TKY25D	MK1KS	JPMX140412-WH	MPMX120412-WH	SPMX120408-WH
				JPMX140412-JM	MPMX120412-JM	SPMX120408-JM

* Clamp Torque (N • m) : TS55=7.5

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

INSERTS

Type		Shape	Order Number	Class	Coated				Dimensions(mm)					Geometry
					VP15TF	VP20RT			L	W1	IC	S	RE	
Wavy cutting edge type (**WH** Breaker)	Bottom On-edge **A**		**JPMX190412-WH**	M	●	●			19.05	12.7	—	4.76	1.2	
			* JPMX**140412-WH**	M	●	●			14.3	12.7	—	4.76	1.2	
	Bottom On-edge **B**		**MPMX120412-WH**	M	●	●			—	—	12.7	4.76	1.2	
	Peripheral		**SPMX120408-WH**	M	●	●			—	—	12.7	4.76	0.8	
Straight cutting edge type (**JM** Breaker)	Bottom On-edge **A**		**JPMX190412-JM**	M	●	●			19.05	12.7	—	4.83	1.2	
			* JPMX**140412-JM**	M	●	●			14.3	12.7	—	4.79	1.2	
	Bottom On-edge **B**		**MPMX120412-JM**	M	●	●			—	—	12.7	4.79	1.2	
	Peripheral		**SPMX120408-JM**	M	●	●			—	—	12.7	4.80	0.8	

* Only for use with a shell type holder.

● : Inventory maintained in Japan. (10 inserts in one case)

RECOMMENDED CUTTING CONDITIONS (SHANK TYPE)

CUTTING CONDITIONS FOR SHOULDER MILLING

	Work Material	Hardness	Grade	Breaker	Cutting Speed **vc** (m/min)	Cutting Width : **ae** (mm) Feed per Tooth : **fz** (mm/t.)						
						ϕ50 (the last letter of order number for cutter body)			ϕ63 (the last letter of order number for cutter body)			
						S (APMX≤110)	M (APMX=157)	L (APMX=205)	S (APMX=110)	M (APMX=157)	L (APMX=205)	X (APMX=261)
P	Mild Steel	≤180HB	VP15TF	WH	120 (100−140)	≤10.0 0.15−0.25	≤5.0 0.15−0.25	≤2.5 0.10−0.20	≤12.5 0.15−0.25	≤10.0 0.15−0.25	≤5.0 0.15−0.25	≤2.5 0.10−0.20
				JM	120 (100−140)	≤7.5 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.05−0.15	≤10.0 0.10−0.20	≤7.5 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.05−0.15
	Carbon Steel Alloy Steel	180−350HB		WH	80 (70−120)	≤10.0 0.15−0.25	≤5.0 0.15−0.25	≤2.5 0.10−0.20	≤12.5 0.15−0.25	≤10.0 0.15−0.25	≤5.0 0.15−0.25	≤2.5 0.10−0.20
				JM	80 (70−120)	≤7.5 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.05−0.15	≤10.0 0.10−0.20	≤7.5 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.05−0.15
	Alloy Tool Steel	≤300HB		WH	80 (60−100)	≤10.0 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.05−0.15	≤12.5 0.10−0.20	≤10.0 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.05−0.15
				JM	80 (60−100)	≤7.5 0.10−0.15	≤5.0 0.10−0.15	≤2.5 0.05−0.10	≤10.0 0.10−0.15	≤7.5 0.10−0.15	≤5.0 0.10−0.15	≤2.5 0.05−0.10
M	Stainless Steel	≤200HB	VP20RT	WH	80 (60−100)	≤7.5 0.08−0.15	≤5.0 0.08−0.15	≤2.5 0.05−0.10	≤10.0 0.08−0.15	≤7.5 0.08−0.15	≤5.0 0.08−0.15	≤2.5 0.05−0.10
				JM	80 (60−100)	≤5.0 0.08−0.15	≤3.5 0.08−0.15	≤2.0 0.05−0.10	≤7.5 0.08−0.15	≤5.0 0.08−0.15	≤3.5 0.08−0.15	≤2.0 0.05−0.10
K	Gray Cast Iron	Tensile Strength ≤350MPa	VP15TF	WH	100 (80−120)	≤10.0 0.15−0.40	≤5.0 0.15−0.35	≤2.5 0.10−0.30	≤12.5 0.15−0.40	≤10.0 0.15−0.40	≤5.0 0.15−0.35	≤2.5 0.10−0.30
				JM	100 (80−120)	≤7.5 0.10−0.25	≤5.0 0.10−0.25	≤2.5 0.05−0.20	≤10.0 0.10−0.25	≤7.5 0.10−0.25	≤5.0 0.10−0.25	≤2.5 0.05−0.20
	Ductile Cast Iron	Tensile Strength ≤800MPa		WH	80 (60−100)	≤10.0 0.15−0.35	≤5.0 0.15−0.30	≤2.5 0.10−0.25	≤12.5 0.15−0.35	≤10.0 0.15−0.35	≤5.0 0.15−0.30	≤2.5 0.10−0.25
				JM	80 (60−100)	≤7.5 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.05−0.15	≤10.0 0.10−0.20	≤7.5 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.05−0.15
S	Ti Alloy	≤350HB	VP20RT	WH	40 (35−50)	≤5.0 0.05−0.10	≤3.5 0.05−0.10	≤2.0 0.05−0.10	≤7.5 0.05−0.10	≤5.0 0.05−0.10	≤3.5 0.05−0.10	≤2.0 0.05−0.10
				JM	40 (35−50)	≤3.5 0.05−0.10	≤2.5 0.05−0.10	≤1.5 0.05−0.10	≤5.0 0.05−0.10	≤3.5 0.05−0.10	≤2.5 0.05−0.10	≤1.5 0.05−0.10

(Note 1) The above cutting conditons are determined based on high rigidity machine and workpiece, where no vibration occurred. Please adjust processing conditions if the vibration is generated.

(Note 2) If the cutting angle between the tool and workpiece exceeds 90° when machining corners ,Reduce the cutting speed and table feed by 10-20% and ae by 50%. Also if possible, set a radius cutting path for corners.

SLOT MILLING

	Work Material	Hardness	Grade	Breaker	Cutting Speed **vc** (m/min)	Depth of Cut : **ap** : (mm) Feed per Tooth : **fz** (mm/t.)						
						ϕ50 (the last letter of order number for cutter body)			ϕ63 (the last letter of order number for cutter body)			
						S (APMX≤110)	M (APMX=157)	L (APMX=205)	S (APMX=110)	M (APMX=157)	L (APMX=205)	X (APMX=261)
P	Mild Steel	≤180HB	VP15TF	WH	60 (50−120)	≤10.0 0.10−0.25	≤5.0 0.10−0.20	≤2.5 0.10−0.15	≤12.5 0.10−0.25	≤10.0 0.10−0.25	≤5.0 0.10−0.20	≤2.5 0.10−0.15
				JM	60 (50−120)	≤7.5 0.10−0.15	≤5.0 0.10−0.15	≤2.5 0.10−0.15	≤10.0 0.10−0.15	≤7.5 0.10−0.15	≤5.0 0.10−0.15	≤2.5 0.10−0.15
	Carbon Steel Alloy Steel	180−350HB		WH	60 (50−100)	≤10.0 0.10−0.25	≤5.0 0.10−0.20	≤2.5 0.10−0.15	≤12.5 0.10−0.25	≤10.0 0.10−0.25	≤5.0 0.10−0.20	≤2.5 0.10−0.15
				JM	60 (50−100)	≤7.5 0.10−0.15	≤5.0 0.10−0.15	≤2.5 0.10−0.15	≤10.0 0.10−0.15	≤7.5 0.10−0.15	≤5.0 0.10−0.15	≤2.5 0.10−0.15
	Alloy Tool Steel	≤300HB		WH	50 (40−80)	≤10.0 0.10−0.25	≤5.0 0.10−0.20	≤2.5 0.10−0.15	≤12.5 0.10−0.25	≤10.0 0.10−0.25	≤5.0 0.10−0.20	≤2.5 0.10−0.15
				JM	50 (40−80)	≤7.5 0.10−0.15	≤5.0 0.10−0.15	≤2.5 0.10−0.15	≤10.0 0.10−0.15	≤7.5 0.10−0.15	≤5.0 0.10−0.15	≤2.5 0.10−0.15
M	Stainless Steel	≤200HB	VP20RT	WH	40 (35−80)	≤10.0 0.08−0.15	≤5.0 0.08−0.15	≤2.5 0.05−0.10	≤12.5 0.08−0.15	≤10.0 0.08−0.15	≤5.0 0.08−0.15	≤2.5 0.05−0.10
				JM	40 (35−80)	≤7.5 0.08−0.15	≤5.0 0.08−0.15	≤2.5 0.05−0.10	≤10.0 0.08−0.15	≤7.5 0.08−0.15	≤5.0 0.08−0.15	≤2.5 0.05−0.10
K	Gray Cast Iron	Tensile Strength ≤350MPa	VP15TF	WH	50 (40−80)	≤10.0 0.15−0.25	≤5.0 0.10−0.25	≤2.5 0.10−0.20	≤12.5 0.15−0.25	≤10.0 0.15−0.25	≤5.0 0.10−0.25	≤2.5 0.10−0.20
				JM	50 (40−80)	≤7.5 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.10−0.20	≤10.0 0.10−0.20	≤7.5 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.10−0.20
	Ductile Cast Iron	Tensile Strength ≤800MPa		WH	40 (35−80)	≤10.0 0.15−0.25	≤5.0 0.10−0.25	≤2.5 0.10−0.20	≤12.5 0.15−0.25	≤10.0 0.15−0.25	≤5.0 0.10−0.25	≤2.5 0.10−0.20
				JM	40 (35−80)	≤7.5 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.10−0.20	≤10.0 0.10−0.20	≤7.5 0.10−0.20	≤5.0 0.10−0.20	≤2.5 0.10−0.20
S	Ti Alloy	≤350HB	VP20RT	WH	35 (30−50)	≤5.0 0.05−0.10	≤3.5 0.05−0.10	≤2.0 0.05−0.10	≤7.5 0.05−0.10	≤5.0 0.05−0.10	≤3.5 0.05−0.10	≤2.0 0.05−0.10
				JM	35 (30−50)	≤5.0 0.05−0.10	≤3.5 0.05−0.10	≤2.0 0.05−0.10	≤7.5 0.05−0.10	≤5.0 0.05−0.10	≤3.5 0.05−0.10	≤2.0 0.05−0.10

(Note 1) The above cutting conditons are determined based on high rigidity machine and workpiece, where no vibration occurred. Please adjust processing conditions if the vibration is generated.

(Note 2) For slotting, please use high rigidity tools such as SPX4R05016WNES/BT50NES.

SPARE PARTS ➤P001
TECHNICAL DATA ➤Q001

RECOMMENDED CUTTING CONDITIONS (SHELL TYPE)

CUTTING CONDITIONS FOR SHOULDER MILLING

	Work Material	Hardness	Grade Breaker	Cutting Speed **vc** (m/min)	Depth of Cut **ap** (mm)	Cutting Width **ae** (mm)	Feed per Tooth **fz** (mm/t.)
P	Mild Steel	≤180HB	**VP15TF JM**	120 (100—140)	—0.5DC	—10	0.15—0.30
				120 (100—140)	0.5DC—	—10	0.15—0.25
	Carbon Steel Alloy Steel	180—350HB	**VP15TF JM**	120 (80—130)	—0.5DC	—10	0.15—0.30
				100 (80—120)	0.5DC—	—10	0.15—0.25
	Alloy Tool Steel	≤300HB	**VP15TF JM**	100 (60—110)	—0.5DC	—10	0.10—0.20
				80 (60—100)	0.5DC—	—10	0.10—0.15
M	Stainless Steel	≤200HB	**VP20RT JM**	140 (100—150)	—0.5DC	—10	0.10—0.25
				120 (100—140)	0.5DC—	—10	0.10—0.20
K	Gray Cast Iron	Tensile Strength ≤350MPa	**VP15TF WH**	120 (80—130)	—0.5DC	—10	0.25—0.40
				100 (80—120)	0.5DC—	—10	0.25—0.40
			VP15TF JM	120 (80—130)	—0.5DC	—10	0.15—0.30
				100 (80—120)	0.5DC—	—10	0.15—0.25
	Ductile Cast Iron	Tensile Strength ≤800MPa	**VP15TF WH**	100 (60—110)	—0.5DC	—10	0.20—0.35
				80 (60—110)	0.5DC—	—10	0.20—0.35
			VP15TF JM	100 (60—120)	—0.5DC	—10	0.15—0.30
				80 (60—120)	0.5DC—	—10	0.15—0.30
S	Ti Alloy	≤350HB	**VP20RT JM**	45 (35—50)	—0.5DC	—10	0.08—0.10
				40 (35—50)	0.5DC—	—10	0.08—0.10

(Note 1) The above cutting conditons are determined based on high rigidity machine and workpiece, where no vibration occurred. Please adjust processing conditions if the vibration is generated.

SLOT MILLING

	Work Material	Hardness	Grade Breaker	Cutting Speed **vc** (m/min)	Depth of Cut **ap** (mm)	Cutting Width **ae** (mm)	Feed per Tooth **fz** (mm/t.)
P	Mild Steel	≤180HB	**VP15TF JM**	120 (100—140)	—10	DC	0.15—0.25
	Carbon Steel Alloy Steel	180—350HB	**VP15TF JM**	100 (80—120)	—0.25DC	DC	0.15—0.25
	Alloy Tool Steel	≤300HB	**VP15TF JM**	80 (60—100)	—10	DC	0.10—0.20
M	Stainless Steel	≤200HB	**VP20RT JM**	100 (80—140)	—10	DC	0.10—0.15
K	Gray Cast Iron	Tensile Strength ≤350MPa	**VP15TF WH**	80 (60—100)	—0.25DC	DC	0.10—0.25
				60 (50—100)	—0.6DC	DC	0.10—0.20
			VP15TF JM	80 (60—100)	—0.25DC	DC	0.10—0.20
				60 (50—100)	—0.6DC	DC	0.10—0.15
	Ductile Cast Iron	Tensile Strength ≤800MPa	**VP15TF WH**	80 (60—100)	—0.25DC	DC	0.10—0.25
				60 (50—100)	—0.5DC	DC	0.10—0.20
			VP15TF JM	80 (60—100)	—0.25DC	DC	0.10—0.20
				60 (50—100)	—0.5DC	DC	0.10—0.15
S	Ti Alloy	≤350HB	**VP20RT JM**	40 (35—50)	—0.25DC	DC	0.06—0.10

(Note 1) The above cutting conditons are determined based on high rigidity machine and workpiece, where no vibration occurred. Please adjust processing conditions if the vibration is generated.

CHAMFER MILLING

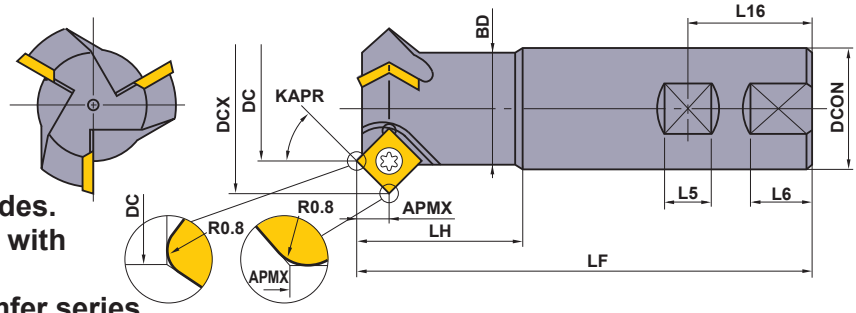
45° Roughing

CESP,CFSP,CGSP

P	M	K	N	S	H
Steel		Cast Iron			



- Covers 5 cutting modes.
- Excellent sharpness with 11° positive inserts.
- 30°, 45° and 60°chamfer series.

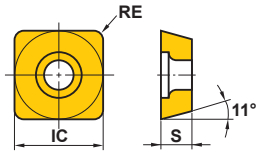


Right hand tool holder only.

Order Number	Stock	Number of Teeth	Dimensions (mm)											*	① ②	
	R		KAPR	DC	DCX	LF	DCON	BD	LH	L16	L5	L6	APMX	Clamp Screw	Wrench	Insert
CESPR081S20	●	1	30°	8	19.6	110	20	19.5	40	25	11	—	10.2	TS52	①TKY25R	SPMW1203○○
CESPR**161S20**	●	1	30°	16	27.8	110	20	19.5	40	25	11	—	10.2	TS5	①TKY25R	SPMW1203○○
CESPR**323S32**	●	3	30°	32	43.8	125	32	31.5	45	36	14	19	10.2	TS5	①TKY25R	SPMW1203○○
CFSPR041S16S	●	1	45°	4	15.7	85	16	14.4	25	24	10	—	5.9	TS4	②TKY15F	SPMW0903○○
CFSPR**041S16L**	●	1	45°	4	15.7	110	16	14.4	50	24	10	—	5.9	TS4	②TKY15F	SPMW0903○○
CFSPR**081S20**	●	1	45°	8	24.6	110	20	19.5	40	25	11	—	8.3	TS5	①TKY25R	SPMW1203○○
CFSPR**161S20**	●	1	45°	16	32.6	110	20	19.5	40	25	11	—	8.3	TS5	①TKY25R	SPMW1203○○
CFSPR**323S32**	●	3	45°	32	48.6	125	32	31.5	45	36	14	19	8.3	TS5	①TKY25R	SPMW1203○○
CGSPR081S20	●	1	60°	8	28.4	110	20	19.5	40	25	11	—	5.9	TS5	①TKY25R	SPMW1203○○
CGSPR**161S20**	●	1	60°	16	36.4	110	20	19.5	40	25	11	—	5.9	TS5	①TKY25R	SPMW1203○○
CGSPR**323S32**	●	3	60°	32	52.4	125	32	31.5	45	36	14	19	5.9	TS5	①TKY25R	SPMW1203○○

* Clamp Torque (N • m) : TS4=3.5, TS5=7.5, TS52=7.5

INSERTS

Shape	Order Number	Class	Honing	Coated				Cermet		Carbide		Dimensions (mm)			Geometry
				VP15TF	UP20M			NX2525	NX4545	UTi20T	HTi10	IC	S	RE	
	**SPMW090304**	M	E*	●	●			●	●	●	●	9.525	3.18	0.4	
	SPMW**090308**	M	E*	●	●			●	●	●	●	9.525	3.18	0.8	
	SPMW**120304**	M	E*	●	●			●	●	●	●	12.7	3.18	0.4	
	SPMW**120308**	M	E*	●	●			●	●	●	●	12.7	3.18	0.8	

* NX2525 and NX4545 insert honing is "T" type.

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)	
					Chamfer Milling	Face Milling
P	Carbon Steel Alloy Steel	180—280HB	**UTi20T**	80 (60—100)	0.4	0.15
			UP20M	130 (100—160)	0.4	0.2
			NX4545	130 (100—160)	0.4	0.2
		280—350HB	**UTi20T**	80 (60—100)	0.3	0.15
K	Cast Iron	Tensile Strength ≤450MPa	**UTi20T**	100 (85—120)	0.5	0.25
			HTi10	100 (85—120)	0.5	0.25

- Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
- Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

● : **Inventory maintained in Japan. (10 inserts in one case)**

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

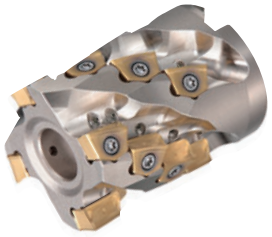
DEEP SHOULDER MILLING

Roughing

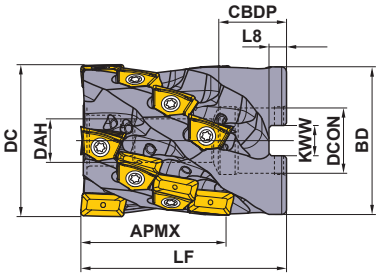
VFX5

P M K N **S** H

Heat Resistant Alloy



- Vertical inserts with high strength cutting edge.
- Screw-on type clamping.
- High efficiency milling of titanium alloys.



Right hand tool holder only.

SHELL TYPE

Order Number	Stock	Number of Flutes	Total	Dimensions (mm)									WT* (kg)
	R			DC	LF	DCON	CBDP	DAH	BD	KWW	L8	APMX	
VFX5-040A03A026R	●	3	6	40	50	16	21	8.5	38.2	8.4	5.6	26	0.3
VFX5-040A03A038R	●	3	9	40	60	16	21	8.5	38.2	8.4	5.6	38	0.4
VFX5-050X03A026R	●	3	6	50	50	27	23	12.5	48.2	12.4	7.0	26	0.4
VFX5-050X03A038R	●	3	9	50	60	27	23	12.5	48.2	12.4	7.0	38	0.5
VFX5-050A04A026R	●	4	8	50	50	22	21	10.5	48.2	10.4	6.3	26	0.5
VFX5-050A04A038R	●	4	12	50	60	22	21	10.5	48.2	10.4	6.3	38	0.6
VFX5-050X04A038R	●	4	12	50	60	27	23	12.5	48.2	12.4	7.0	38	0.5
VFX5-050A04A050R	●	4	16	50	70	22	21	10.5	48.2	10.4	6.3	50	0.7
VFX5-063A05A026R	●	5	10	63	60	27	28	12.5	61	12.4	7.0	26	1.0
VFX5-063A05A063R	●	5	25	63	85	27	28	12.5	61	12.4	7.0	63	1.4
VFX5-080A06A075R	●	6	36	80	100	32	28	16.5	77.3	14.4	8.0	75	2.8

∗ WT : Tool Weight

SPARE PARTS

Order Number	*2				*3				Number of Insert	
	Clamp Screw	Number	Seal Washer	Wrench	Coolant Nozzle	Number	Anti-seize Lubricant	Set Bolt	End cutting edge XNMU1607 ○○R-○○	Peripheral cutting edge *1 XNMU1607 08R-○○
VFX5-040A03A026R	TS352	6	W8-S1	TKY10D	HSD04004H08	9	MK1KS	HSC08040	3	3
VFX5-040A03A038R	TS352	9	W8-S1	TKY10D	HSD04004H08	12	MK1KS	HSC08050	3	6
VFX5-050X03A026R	TS352	6	W12-S1	TKY10D	HSD04004H08	9	MK1KS	HSC12035	3	3
VFX5-050X03A038R	TS352	9	W12-S1	TKY10D	HSD04004H08	12	MK1KS	HSC12045	3	6
VFX5-050A04A026R	TS352	8	W10-S1	TKY10D	HSD04004H08	12	MK1KS	HSC10035	4	4
VFX5-050A04A038R	TS352	12	W10-S1	TKY10D	HSD04004H08	16	MK1KS	HSC10045	4	8
VFX5-050X04A038R	TS352	12	W12-S1	TKY10D	HSD04004H08	16	MK1KS	HSC12045	4	8
VFX5-050A04A050R	TS352	16	W10-S1	TKY10D	HSD04004H08	20	MK1KS	HSC10055	4	12
VFX5-063A05A026R	TS352	10	W12-S1	TKY10D	HSD04004H08	15	MK1KS	HSC12045	5	5
VFX5-063A05A063R	TS352	25	W12-S1	TKY10D	HSD04004H08	30	MK1KS	HSC12070	5	20
VFX5-080A06A075R	TS352	36	W16-S1	TKY10D	HSD04004H08	42	MK1KS	HSC16080	6	30

∗1 Only corner radius R0.8 can be used for the peripheral cutting edges.

∗2 Clamp Torque (N • m) : TS352=2.5

∗3 Coolant nozzles are available with varying diameters for adjusting coolant pressure. Select nozzles as required by the specification.

	≤1Mpa (≤20 l/min.)	←Standard→	≥5Mpa (≥30 l/min.)	≥7Mpa (≥50 l/min.)
Nozzle Dia.	ø0.6mm	ø0.8mm	ø1.2mm	ø1.6mm
Order Number	**HSD04004H06**	**HSD04004H08**	**HSD04004H12**	**HSD04004H16**

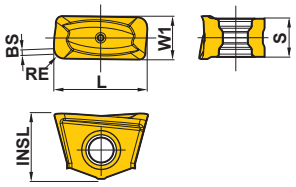
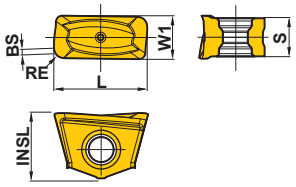
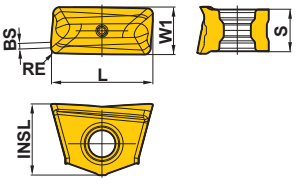
∗ Clamp Torque (N • m) : HSD04004H○○=1.5

∗4 To plug a coolant hole, HSS04004(JIS B 1177 flat point M4x4, clamp torque 1.5N • m) is available.

∗5 Note for insert with a corner radius of 3.2 and above, as corner radius increases the LF dimension increases.
Corner radius 3.2: LF+0.7mm Corner radius 4.0: LF+1.5mm

● : **Inventory maintained in Japan. (10 inserts in one case)**

INSERTS

Shape	Order Number	Stock				Dimensions (mm)						Geometry
		Coated										
		MP9030	MP9130			L	W1	INSL	S	BS	RE	
 General purpose	XNMU160708R-MS	●				16.0	7.0	11.1	6.5	1.0	0.8	
	XNMU160712R-MS	●				16.0	7.0	11.1	6.5	1.0	1.2	
	XNMU160716R-MS	●				16.0	7.0	11.1	6.5	1.0	1.6	
	XNMU160724R-MS	●				16.0	7.0	11.1	6.5	1.0	2.4	
	∗1 XNMU160732R-MS	●				17.3	7.0	11.1	6.5	—	3.2	
	∗1 XNMU160740R-MS	●				18.9	7.0	11.1	6.5	—	4.0	
 Cutting edge enhancement type	XNMU160708R-HS	●				16.0	7.0	11.1	6.5	1.0	0.8	
 Chip processing type	XNMU160708R-LS		●			16.0	7.0	11.1	6.5	1.0	0.8	

∗1 Note for insert with a corner radius of 3.2 and above, as corner radius increases the LF dimension increases.
Corner radius 3.2: LF+0.7mm Corner radius 4.0: LF+1.5mm

■ = MIRACLE SIGMA

MILLING

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

RECOMMENDED CUTTING CONDITIONS

VFX5

	Work Material	Cutting Edge Diameter (mm)	Number of Flutes	Recommended Insert	Cutting Speed **vc** (m/min)	Revolution **n** (min^{-1})	Depth of Cut **ap** (mm)	Cutting Width **ae** (mm)	Feed per Tooth **fz** (mm/t.)	Table Feed **vf** (mm/min)	Chip Removal Rate **Q** (cm^3/min)	Estimated cutting power (kW)	Expected Torque (Nm)	Tool life ratio (%)
S	Titanium Alloy (Ti-Al-4V)	ϕ40	3	LS	40	318	38	40	0.10	95	145	6.5	194	40
			3	MS	50	398	38	24	0.10	119	109	4.5	109	60
			3	MS	60	477	38	16	0.10	143	87	3.5	69	80
			3	HS	60	477	38	8	0.12	172	52	2.3	45	100
		ϕ50	3	LS	40	255	38	50	0.10	76	145	6.5	242	40
			4	MS	50	318	50	30	0.10	127	191	7.9	237	60
			4	MS	60	382	50	20	0.10	153	153	6.0	151	80
			4	HS	60	382	50	10	0.12	183	92	3.9	98	100
		ϕ63	5	LS	40	202	60	63	0.10	101	382	16.8	793	40
			5	MS	50	253	60	38	0.10	126	286	11.8	447	60
			5	MS	60	303	60	25	0.10	152	229	9.0	285	80
			5	HS	60	303	60	13	0.12	182	138	5.9	185	100
		ϕ80	6	LS	40	159	75	80	0.10	95	573	25.0	1500	40
			6	MS	50	199	75	48	0.10	119	430	17.6	846	60
			6	MS	60	239	75	32	0.10	143	344	13.5	539	80
			6	HS	60	239	75	16	0.12	172	206	8.7	350	100
	Titanium Alloy (Ti-5Al-5V-5Mo-3Cr)	ϕ40	3	LS	25	199	38	40	0.08	48	73	3.4	161	30
			3	MS	25	199	38	24	0.08	48	44	1.9	92	50
			3	MS	30	239	38	16	0.10	72	44	1.8	74	70
			3	HS	30	239	38	8	0.10	72	22	1.0	41	90
		ϕ50	4	LS	25	159	50	50	0.08	51	127	5.8	350	30
			4	MS	25	159	50	30	0.08	51	76	3.4	201	50
			4	MS	30	191	50	20	0.10	76	76	3.2	160	70
			4	HS	30	191	50	10	0.10	76	38	1.8	89	90
		ϕ63	5	LS	25	126	60	63	0.08	51	191	8.7	658	30
			5	MS	25	126	60	38	0.08	51	115	5.0	378	50
			5	MS	30	152	60	25	0.10	76	115	4.8	301	70
			5	HS	30	152	60	13	0.10	76	57	2.6	167	90
		ϕ80	6	LS	25	99	75	80	0.08	48	286	13.0	1246	30
			6	MS	25	99	75	48	0.08	48	172	7.5	716	50
			6	MS	30	119	75	32	0.10	72	172	7.1	570	70
			6	HS	30	119	75	16	0.10	72	86	3.9	316	90

∗1 Please note that machining performance varies depending to the conditions such as machine rigidity, work clamping rigidity, coolant supply system, pressure and flow volume etc.

∗2 Internal coolant is recommended. Please use an FMH type arbor for through coolant. Using external coolant in combination with through coolant is even more effective.

∗3 The tool life ratio shows the standard when ae = tool diameter × 20% is assumed to be 100 when shoulder cutting.

∗4 The maximum depth of cut (ap) varies according to the machine rigidity and power.

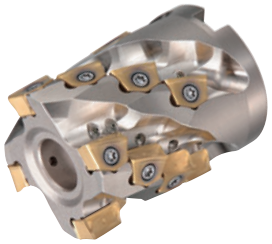
DEEP SHOULDER MILLING
<CUTTING FOR TITANIUM ALLOY>

Roughing

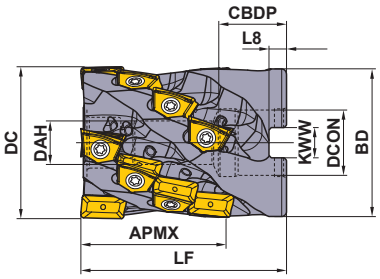
VFX6

P M K N **S** H

Heat Resistant Alloy



- **Vertical inserts with high strength cutting edge.**
- **Screw-on type.**
- **High efficiency milling titanium alloys.**



Right hand tool holder only.

SHELL TYPE

Order Number	Stock	Number of Flutes	Total	Dimensions (mm)									WT* (kg)
	R			DC	LF	DCON	CBDP	DAH	BD	KWW	L8	APMX	
VFX6-063A04A031R	●	4	8	63	60	27	28	12.5	61	12.4	7	31	0.9
VFX6-063A04A060R	●	4	16	63	85	27	28	12.5	61	12.4	7	60	1.3
VFX6-080A05A031R	●	5	10	80	60	32	28	16.5	77.3	14.4	8	31	1.5
VFX6-080A05A075R	●	5	25	80	100	32	28	16.5	77.3	14.4	8	75	2.6
VFX6-100A06A031R	●	6	12	100	65	40	30	20.5	96.6	16.4	9	31	2.7
VFX6-100A06A090R	●	6	36	100	115	40	30	20.5	96.6	16.4	9	90	4.8

* WT : Tool Weight

SPARE PARTS

Order Number	*2				*3				Number of Insert	
	Clamp Screw	Number	Seal Washer	Wrench	Coolant Nozzle	Number	Anti-seize Lubricant	Set Bolt	End cutting edge	Peripheral cutting edge *1
									XNMU1909 ○○R-○○	XNMU1909 12R-○○
VFX6-063A04A031R	TS450	8	W12-S1	TKY20T	HSD04004H08	12	MK1KS	HSC12045	4	4
VFX6-063A04A060R	TS450	16	W12-S1	TKY20T	HSD04004H08	20	MK1KS	HSC12070	4	12
VFX6-080A05A031R	TS450	10	W16-S1	TKY20T	HSD04004H08	15	MK1KS	HSC16040	5	5
VFX6-080A05A075R	TS450	25	W16-S1	TKY20T	HSD04004H08	30	MK1KS	HSC16080	5	20
VFX6-100A06A031R	TS450	12	W20-S1	TKY20T	HSD04004H08	18	MK1KS	HSC20040	6	6
VFX6-100A06A090R	TS450	36	W20-S1	TKY20T	HSD04004H08	42	MK1KS	HSC20090	6	30

*1 Only corner radius R1.2 can be used for the peripheral cutting edges except the end cutting edge.

*2 Clamp Torque (N • m) : TS450=5.0

*3 Coolant nozzles are available with varying diameters for adjusting coolant pressure. Select nozzles as required by the specification.

	≤1Mpa (≤20 l/min.)	←Standard→	≥5Mpa (≥30 l/min.)	≥7Mpa (≥50 l/min.)
Nozzle Dia.	ø0.6mm	ø0.8mm	ø1.2mm	ø1.6mm
Order Number	**HSD04004H06**	**HSD04004H08**	**HSD04004H12**	**HSD04004H16**

* Clamp Torque (N • m) : HSD04004H○○=1.5

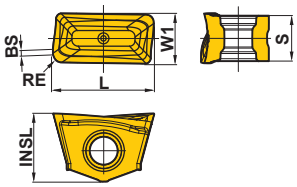
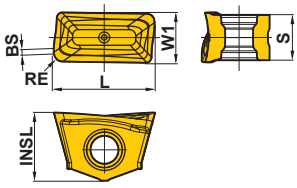
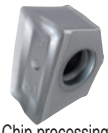
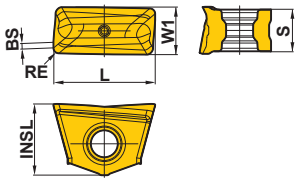
*4 The part number for a blank screw without a through nozzle is HSS04004.

*5 Note for insert with a corner radius of 3.2 and above, as corner radius increases the LF dimension increases.
Corner radius 3.2: LF+0.7mm Corner radius 4.0: LF+1.5mm Corner radius 5.0: LF+1.5mm

● : Inventory maintained in Japan. (10 inserts in one case)

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

INSERTS

Shape	Order Number	Stock (Coated) MP9030	Stock (Coated) MP9130			Dimensions (mm) L	W1	INSL	S	BS	RE	Geometry
 General purpose	**XNMU190912R-MS**	●				19.1	9.5	12.7	8.5	1.0	1.2	
	XNMU190916R-MS	●				19.1	9.5	12.7	8.5	1.0	1.6	
	XNMU190924R-MS	●				19.1	9.5	12.7	8.5	1.0	2.4	
	∗1**XNMU190932R-MS**	●				20.2	9.5	12.7	8.5	—	3.2	
	∗1**XNMU190940R-MS**	●				21.8	9.5	12.7	8.5	—	4.0	
	∗1**XNMU190950R-MS**	●				21.8	9.5	12.7	8.5	—	5.0	
 Cutting edge enhancement type	**XNMU190912R-HS**	●				19.1	9.5	12.7	8.5	1.0	1.2	
 Chip processing type	**XNMU190912R-LS**		●			19.1	9.5	12.7	8.5	1.0	1.2	

∗1 Note for insert with a corner radius of 3.2 and above, as corner radius increases the LF dimension increases.
Corner radius 3.2: LF+0.7mm Corner radius 4.0: LF+1.5mm Corner radius 5.0: LF+1.5mm

■ = MIRACLE SIGMA

● : Inventory maintained in Japan. (10 inserts in one case)

RECOMMENDED CUTTING CONDITIONS

VFX6

	Work Material	Cutting Edge Diameter (mm)	Number of Flutes	Recommended Insert	Cutting Speed **vc** (m/min)	Revolution **n** (min^{-1})	Depth of Cut **ap** (mm)	Cutting Width **ae** (mm)	Feed per Tooth **fz** (mm/t.)	Table Feed **vf** (mm/min)	Chip Removal Rate **Q** (cm^3/min)	Estimated cutting power (kW)	Expected Torque (Nm)	Tool life ratio (%)
S	Titanium Alloy (Ti-Al-4V)	**ϕ63**	4	LS	40	202	60	63	0.10	81	306	13.4	634	40
			4	MS	50	253	60	38	0.10	101	229	9.5	357	60
			4	MS	60	303	60	25	0.10	121	183	7.2	228	80
			4	HS	60	303	60	13	0.12	146	110	4.7	148	100
		ϕ80	5	LS	40	159	75	80	0.10	80	477	20.8	1250	40
			5	MS	50	199	75	48	0.10	99	358	14.7	705	60
			5	MS	60	239	75	32	0.10	119	286	11.2	449	80
			5	HS	60	239	75	16	0.12	143	172	7.3	291	100
		ϕ100	6	LS	40	127	90	100	0.10	76	688	29.6	2218	40
			6	MS	50	159	90	60	0.10	95	516	20.9	1252	60
			6	MS	60	191	90	40	0.10	115	413	16.0	798	80
			6	HS	60	191	90	20	0.12	138	248	10.3	517	100
	Titanium Alloy (Ti-5Al-5V-5Mo-3Cr)	**ϕ63**	4	LS	25	126	60	63	0.08	40	153	7.0	527	30
			4	MS	25	126	60	38	0.08	40	92	4.0	303	50
			4	MS	30	152	60	25	0.10	61	92	3.8	241	70
			4	HS	30	152	60	13	0.10	61	46	2.1	133	80
		ϕ80	5	LS	25	99	75	80	0.08	40	239	10.8	1038	30
			5	MS	25	99	75	48	0.08	40	143	6.2	597	50
			5	MS	30	119	75	32	0.10	60	143	5.9	475	70
			5	HS	30	119	75	16	0.10	60	72	3.3	263	80
		ϕ100	6	LS	25	80	90	100	0.08	38	344	15.3	1841	30
			6	MS	25	80	90	60	0.08	38	206	8.8	1059	50
			6	MS	30	95	90	40	0.10	57	206	8.4	844	70
			6	HS	30	95	90	20	0.10	57	103	4.7	466	80

∗1 Please note that machining performance varies depending to the conditions such as machine rigidity, work clamping rigidity, coolant supply system, pressure and flow volume etc.

∗2 Internal coolant is recommended. Please use an FMH type arbor for through coolant. Using external coolant in combination with through coolant is even more effective.

∗3 The tool life ratio shows the standard when ae = tool diameter × 20% is assumed to be 100 when shoulder cutting.

∗4 The maximum depth of cut (ap) varies according to the machine rigidity and power.

BALL NOSE END MILL

Finishing

SRF, SRB

P Steel | M | K Cast Iron | N Non-ferrous Metal | S | H Hardened Steel



- S-shaped cutting edge provides sharpness similar to that of solid ball nose end mills.
- Highly accurate corner radius tolerance allows for high precision finishing.
- Carbide shank type available.

Fig.1

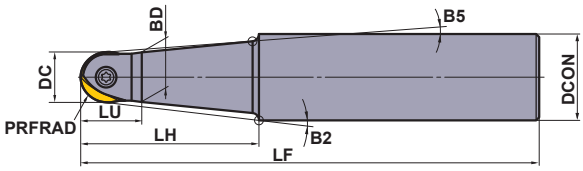


Fig.2

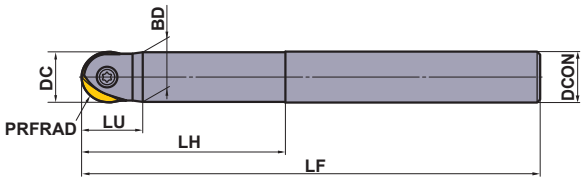
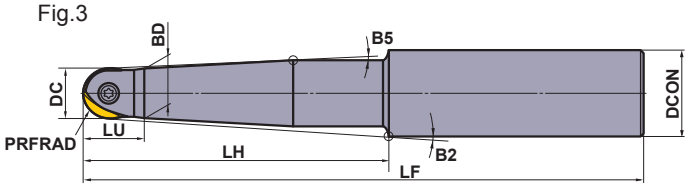


Fig.3



Right hand tool holder only.

STEEL SHANK TYPE

Type	Order Number	Stock	Number of Teeth	Dimensions (mm)									Type (Fig.)	Clamp Screw *	Wrench ①②	Insert
		R		PRFRAD	DC	DCON	LF	BD	LH	LU	B2	B5				
Standard	SRFH10S12M	●	1	5	10	12	110	9.5	40	13	1°38′	1°30′	1	RS3008T	①TKY08D	SRFT10 SRBT10
	SRFH12S16M	●	1	6	12	16	120	11.5	50	15	2°36′	1°30′	1	RS3510T	①TKY10D	SRFT12 SRBT12
	SRFH16S20M	●	1	8	16	20	130	15.5	50	20	2°44′	1°30′	1	RS4015T	②TKY15T	SRFT16 SRBT16
	SRFH20S25M	●	1	10	20	25	150	19.5	70	24	2°23′	1°30′	1	RS5020T	②TKY20T	SRFT20 SRBT20
	SRFH25S32M	●	1	12.5	25	32	180	24.5	80	30	2°58′	1°30′	1	RS6025T	②TKY25T	SRFT25 SRBT25
	SRFH30S32M	●	1	15	30	32	200	29.5	100	35	—	—	2	RS8030T	②TKY30T	SRFT30 SRBT30
	SRFH32S32M	●	1	16	32	32	200	31.5	100	35	—	—	2	RS8030T	②TKY30T	SRFT32 SRBT32
Semi-long	SRFH10S12L	●	1	5	10	12	150	9.5	60	13	1°30′	1°30′	1	RS3008T	①TKY08D	SRFT10 SRBT10
	SRFH12S16L	●	1	6	12	16	160	11.5	70	15	1°47′	1°30′	1	RS3510T	①TKY10D	SRFT12 SRBT12
	SRFH16S20L	●	1	8	16	20	160	15.5	70	20	1°51′	1°30′	1	RS4015T	②TKY15T	SRFT16 SRBT16
	SRFH20S25L	●	1	10	20	25	180	19.5	80	24	2°03′	1°30′	1	RS5020T	②TKY20T	SRFT20 SRBT20
	SRFH20S20L80	●	1	10	20	20	180	19.5	80	24	—	—	2	RS5020T	②TKY20T	SRFT20 SRBT20
	SRFH25S32L	●	1	12.5	25	32	200	24.5	100	30	2°17′	1°30′	1	RS6025T	②TKY25T	SRFT25 SRBT25
	SRFH25S25L100	●	1	12.5	25	25	200	24.5	100	30	—	—	2	RS6025T	②TKY25T	SRFT25 SRBT25
	SRFH30S32L	●	1	15	30	32	230	29.5	130	35	—	—	2	RS8030T	②TKY30T	SRFT30 SRBT30
Long	SRFH20S25E	●	1	10	20	25	220	19.5	120	24	1°30′	1°30′	3	RS5020T	②TKY20T	SRFT20 SRBT20
	SRFH20S20E120	●	1	10	20	20	220	19.5	120	24	—	—	2	RS5020T	②TKY20T	SRFT20 SRBT20
	SRFH25S32E	●	1	12.5	25	32	250	24.5	150	30	1°30′	1°30′	3	RS6025T	②TKY25T	SRFT25 SRBT25
	SRFH25S25E150	●	1	12.5	25	25	250	24.5	150	30	—	—	2	RS6025T	②TKY25T	SRFT25 SRBT25
	SRFH30S32E	●	1	15	30	32	300	29.5	200	35	—	—	2	RS8030T	②TKY30T	SRFT30 SRBT30

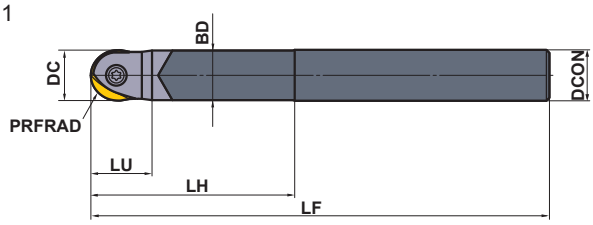
(Note) Ensure inserts are fitted in the correct way. (Refer to page L123.)

∗ Clamp Torque (N • m) : RS3008T=1.5, RS3510T=2.5, RS4015T=3.3, RS5020T=5.0, RS6025T=7.5, RS8030T=10.0

● : Inventory maintained in Japan.



Fig.1



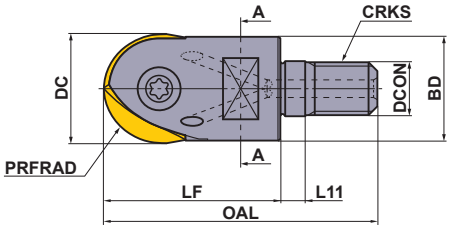
Right hand tool holder only.

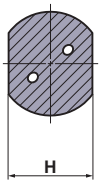
CARBIDE SHANK TYPE

Type	Order Number	Stock	Number of Teeth	Dimensions (mm)							Type (Fig.)	* Clamp Screw	①② Wrench	Insert
		R		PRFRAD	DC	DCON	LF	BD	LH	LU				
Standard	SRFH10S10MW	●	1	5	10	10	110	9.5	40	13	1	RS3008T	①TKY08D	SRFT10 SRBT10
	SRFH12S12MW	●	1	6	12	12	120	11.5	50	15	1	RS3510T	①TKY10D	SRFT12 SRBT12
	SRFH16S16MW	●	1	8	16	16	130	15.5	50	20	1	RS4015T	②TKY15T	SRFT16 SRBT16
	SRFH20S20MW	●	1	10	20	20	180	19.5	80	24	1	RS5020T	②TKY20T	SRFT20 SRBT20
	SRFH25S25MW	●	1	12.5	25	25	200	24.5	100	30	1	RS6025T	②TKY25T	SRFT25 SRBT25
	SRFH30S32MW	●	1	15	30	32	230	29.5	130	35	1	RS8030T	②TKY30T	SRFT30 SRBT30
				16	32	32	231	29.5	131	36				SRFT32 SRBT32
Long	SRFH10S10LW	●	1	5	10	10	150	9.5	60	13	1	RS3008T	①TKY08D	SRFT10 SRBT10
	SRFH12S12LW	●	1	6	12	12	160	11.5	70	15	1	RS3510T	①TKY10D	SRFT12 SRBT12
	SRFH16S16LW	●	1	8	16	16	160	15.5	70	20	1	RS4015T	②TKY15T	SRFT16 SRBT16
	SRFH16S16EW	●	1	8	16	16	200	15.5	110	20	1	RS4015T	②TKY15T	SRFT16 SRBT16
	SRFH20S20LW	●	1	10	20	20	250	19.5	150	24	1	RS5020T	②TKY20T	SRFT20 SRBT20
	SRFH25S25LW	●	1	12.5	25	25	300	24.5	200	30	1	RS6025T	②TKY25T	SRFT25 SRBT25
	SRFH30S32LW	●	1	15	30	32	350	29.5	250	35	1	RS8030T	②TKY30T	SRFT30 SRBT30
				16	32	32	351	29.5	251	36				SRFT32 SRBT32

(Note 1) SRFH30S32MW and SRFH30S32LW tool body can use both inserts SRFT30 and SRFT32.
However, the overall length size LF is different respectively.
(Note 2) Ensure inserts are fitted in the correct way. (Refer to page L123.)
∗ Clamp Torque (N • m) : RS3008T=1.5, RS3510T=2.5, RS4015T=3.3, RS5020T=5.0, RS6025T=7.5, RS8030T=10.0







A-A section

SCREW-IN TYPE

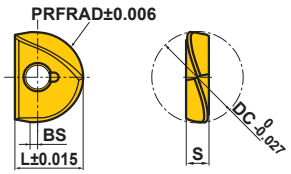
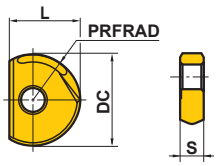
Right hand tool holder only.

Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm)									*2 WT (kg)	*1 Clamp Screw	Wrench	Insert
	R			PRFRAD	DC	DCON	BD	OAL	LF	L11	H	CRKS				
SRFH16AM0830	●	○	1	8	16	8.5	14.9	48	30	6	10	8	0.1	RS4015T	TKY15T	SRFT16 SRBT16
SRFH20AM1035	●	○	1	10	20	10.5	18.4	54	35	6	14	10	0.1	RS5020T	TKY20T	SRFT20 SRBT20
SRFH25AM1240	●	○	1	12.5	25	12.5	23.5	62	40	6	19	12	0.1	RS6025T	TKY25T	SRFT25 SRBT25
SRFH30AM1645	●	○	1	15	30	17	28.1	68	45	6	24	16	0.2	RS8030T	TKY30T	SRFT30 SRBT30
				16	32	17	28.1	69	46	6	24	16	0.2			SRFT32 SRBT32

(Note 1) SRFH30AM1645 tool body can use both inserts SRFT30 and SRFT32. However, the overall length size OAL is different respectively.
(Note 2) For screw-in type arbors, refer to page L145—L146.
∗1 Clamp Torque (N • m) : RS4015T=3.3, RS5020T=5.0, RS6025T=7.5, RS8030T=10.0
∗2 WT : Tool Weight

SPARE PARTS ➢ P001
TECHNICAL DATA ➢ Q001

INSERTS

Shape	Order Number	Coated				Dimensions (mm)					Geometry
		EP6120 (NEW)	VP15TF	MP8010		DC	PRFRAD	L	BS	S	
	**SRFT10**	●	●	●		10	5	8.5	0.5	2.6	
	SRFT**12**	●	●	●		12	6	10	0.5	3	
	SRFT**16**	●	●	●		16	8	12	1	4	
	SRFT**20**	●	●	●		20	10	15	1	5	
	SRFT**25**	●	●	●		25	12.5	18.5	1	6	
	SRFT**30**	●	●	●		30	15	22.5	1	7	
	SRFT**32**	●	●	●		32	16	23.5	1	7	
	**SRBT10**		●			10	5	8.5	—	2.6	
	SRBT**12**		●			12	6	10	—	3	
	SRBT**16**		●			16	8	12	—	4	
	SRBT**20**		●			20	10	15	—	5	
	SRBT**25**		●			25	12.5	18.5	—	6	
	SRBT**30**		●			30	15	22.5	—	7	
	SRBT**32**		●			32	16	23.5	—	7	

■ = MIRACLE SIGMA

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed **vc** (m/min)	Feed per Tooth **fz** (mm/t.)	Depth of Cut **ap** (mm)
P	Mild Steel (ASTM A36, AISI 1010)	≤180HB	**EP6120**	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
P	Carbon Steel, Alloy Steel (AISI 1045, AISI 4140)	180—280HB	**EP6120**	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
P			**VP15TF**	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
P	Carbon Steel, Alloy Steel (AISI 4340)	280—350HB	**EP6120**	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
P	Pre-Hardened Steel (AISI P21, AISI P20 etc)	35—45HRC	**EP6120**	150 (80—200)	0.2 (0.1—0.3)	≤0.05DC
P			**VP15TF**	150 (80—200)	0.2 (0.1—0.3)	≤0.05DC
P	Alloy Tool Steel	≤350HB	**EP6120**	150 (80—200)	0.2 (0.1—0.3)	≤0.05DC
P			**VP15TF**	150 (80—200)	0.2 (0.1—0.3)	≤0.05DC
K	Gray Cast Iron (FC300)	Tensile Strength ≤350MPa	**MP8010**	250 (80—450)	0.2 (0.1—0.3)	≤0.05DC
K	Ductile Cast Iron (FCD450)	Tensile Strength ≤450MPa	**MP8010**	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
K	Ductile Cast Iron	Tensile Strength ≤800MPa	**MP8010**	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
N	Copper, Copper alloys		**EP6120**	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
H	Hardened Steel	45—55HRC	**MP8010**	100 (60—120)	0.2 (0.1—0.3)	≤0.05DC
H	Hardened Steel	55—65HRC	**MP8010**	80 (60—120)	0.2 (0.1—0.3)	≤0.01DC

(Note 1) The above values are average condition values at actual cutting speeds. The values change slightly according to the state of a machine to be used and method of workholding. Adjust the values depending on an actual machine condition, referring to the above values.
(Note 2) For end mills with a carbide shank, you will be able to set about 20 percent higher cutting conditions.
(Note 3) Please note the following when machining hardened steel with MP8010.
- Please shorten the overhang length as much as possible.
- Use with carbide shank recommended.
- Please note the setting of the depth of cut especially to prevent the fracture.

● : **Inventory maintained in Japan. (2 inserts in one case)**

CUTTING SPEED FORMULAE

1. Employing$\theta°$ ➡ Calculate cutting speed at point P.
(Cutting speed at the cutting depth border for oblique machining)

Formula : Cutting Speed = $\frac{\pi \cdot DC \cdot \sin\theta \cdot n}{1000}$ (m/min)

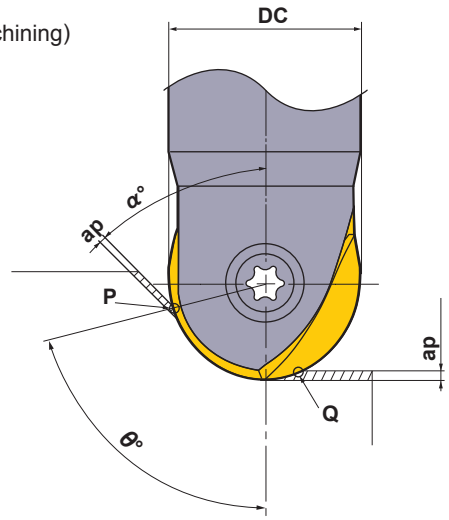
$$\theta° = \cos^{-1}\left(\frac{DC-2ap}{DC}\right)+90-\alpha$$

n : Spindle Speed (min^{-1})

2. Employing ap ➡ Calculate cutting speed at point Q.
(Cutting speed at the cutting depth border)

Formula : Cutting Speed = $\frac{2\pi n\sqrt{ap\,(DC-ap)}}{1000}$ (m/min)

n : Spindle Speed (min^{-1})
DC : Cutting Edge Diameter (mm)
ap : Depth of Cut (mm)



FITTING INSERTS ON HOLDERS

1. Clean the insert seat

Clean the insert seat in the holder body by blowing air or using a brush.

2. Fit the insert

Place the concave mark of the insert into the clamp-screw-fastening part of the holder(only SRF type inserts). Fasten the clamp screw while firmly pressing the insert against the insert seat wall. You are recommended to use the special lubricant for preventing screw seizing, MK1KS, and to fasten with recommended torque.



SPARE PARTS ➢ P001
TECHNICAL DATA ➢ Q001

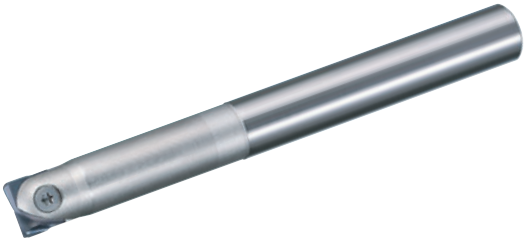
RADIUS END MILL

Finishing

Including Flat faces

SUF

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron			Hardened Steel



- **Highly accurate corner radius tolerance allows for high precision finishing.**
- **Seamless gash.**

Fig.1

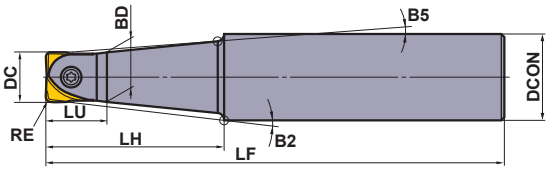


Fig.2

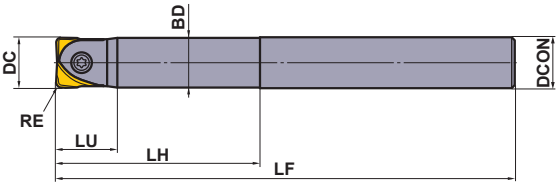
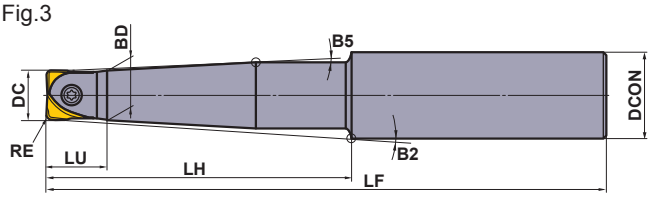


Fig.3



STEEL SHANK TYPE

Right hand tool holder only.

Type	Order Number	Stock	Number of Teeth	Dimensions (mm)								Type (Fig.)	* Clamp Screw	① ② Wrench	Insert
		R		DC	DCON	LF	BD	LH	LU	B2	B5				
Standard	**SRFH10S12M**	●	1	10	12	110	9.5	40	13	1°38′	—	1	RS3008T	①TKY08D	SUFT10R○○
	SRFH**12S16M**	●	1	12	16	120	11.5	50	15	2°36′	—	1	RS3510T	①TKY10D	SUFT12R○○
	SRFH**16S20M**	●	1	16	20	130	15.5	50	20	2°44′	—	1	RS4015T	②TKY15T	SUFT16R○○
	SRFH**20S25M**	●	1	20	25	150	19.5	70	24	2°23′	1°30′	1	RS5020T	②TKY20T	SUFT20R○○
	SRFH**25S32M**	●	1	25	32	180	24.5	80	30	2°58′	1°30′	1	RS6025T	②TKY25T	SUFT25R○○
	SRFH**30S32M**	●	1	30	32	200	29.5	100	35	—	—	2	RS8030T	②TKY30T	SUFT30R○○
	SRFH**32S32M**	●	1	32	32	200	31.5	100	35	—	—	2	RS8030T	②TKY30T	SUFT32R○○
Semi-long	**SRFH10S12L**	●	1	10	12	150	9.5	60	13	1°30′	—	1	RS3008T	①TKY08D	SUFT10R○○
	SRFH**12S16L**	●	1	12	16	160	11.5	70	15	1°47′	—	1	RS3510T	①TKY10D	SUFT12R○○
	SRFH**16S20L**	●	1	16	20	160	15.5	70	20	1°51′	—	1	RS4015T	②TKY15T	SUFT16R○○
	SRFH**20S25L**	●	1	20	25	180	19.5	80	24	2°03′	1°30′	1	RS5020T	②TKY20T	SUFT20R○○
	SRFH**20S20L80**	●	1	20	20	180	19.5	80	24	—	—	2	RS5020T	②TKY20T	SUFT20R○○
	SRFH**25S32L**	●	1	25	32	200	24.5	100	30	2°17′	1°30′	1	RS6025T	②TKY25T	SUFT25R○○
	SRFH**25S25L100**	●	1	25	25	200	24.5	100	30	—	—	2	RS6025T	②TKY25T	SUFT25R○○
	SRFH**30S32L**	●	1	30	32	230	29.5	130	35	—	—	2	RS8030T	②TKY30T	SUFT30R○○
Long	**SRFH20S25E**	●	1	20	25	220	19.5	120	24	1°30′	1°30′	3	RS5020T	②TKY20T	SUFT20R○○
	SRFH**20S20E120**	●	1	20	20	220	19.5	120	24	—	—	2	RS5020T	②TKY20T	SUFT20R○○
	SRFH**25S32E**	●	1	25	32	250	24.5	150	30	1°30′	1°30′	3	RS6025T	②TKY25T	SUFT25R○○
	SRFH**25S25E150**	●	1	25	25	250	24.5	150	30	—	—	2	RS6025T	②TKY25T	SUFT25R○○
	SRFH**30S32E**	●	1	30	32	300	29.5	200	35	—	—	2	RS8030T	②TKY30T	SUFT30R○○

(Note) Ensure inserts are fitted in the correct way. (Refer to page L126.)

∗ Clamp Torque (N • m) : RS3008T=1.5, RS3510T=2.5, RS4015T=3.3, RS5020T=5.0, RS6025T=7.5, RS8030T=10.0

● : Inventory maintained in Japan.

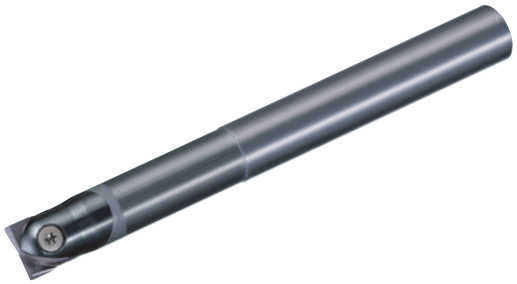
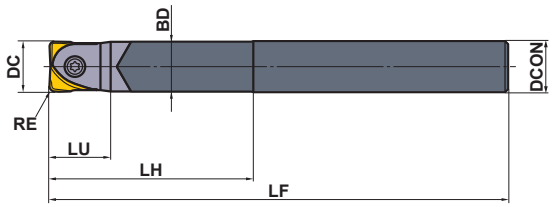


Fig.1



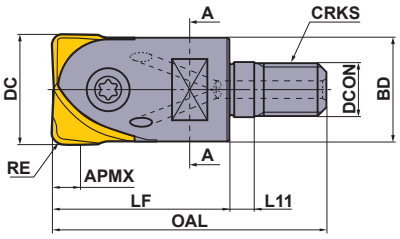
CARBIDE SHANK TYPE

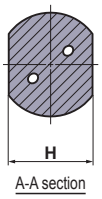
Right hand tool holder only.

Type	Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	DCON	LF	BD	LH	LU	Type (Fig.)	Clamp Screw *	Wrench ①②	Insert
Standard	SRFH10S10MW	●	1	10	10	110	9.5	40	13	1	RS3008T	①TKY08D	SUFT10R○○
	SRFH12S12MW	●	1	12	12	120	11.5	50	15	1	RS3510T	①TKY10D	SUFT12R○○
	SRFH16S16MW	●	1	16	16	130	15.5	50	20	1	RS4015T	②TKY15T	SUFT16R○○
	SRFH20S20MW	●	1	20	20	180	19.5	80	24	1	RS5020T	②TKY20T	SUFT20R○○
	SRFH25S25MW	●	1	25	25	200	24.5	100	30	1	RS6025T	②TKY25T	SUFT25R○○
	SRFH30S32MW	●	1	30	32	230	29.5	130	35	1	RS8030T	②TKY30T	SUFT30R○○
				32	32	231	29.5	131	36				SUFT32R○○
Long	SRFH10S10LW	●	1	10	10	150	9.5	60	13	1	RS3008T	①TKY08D	SUFT10R○○
	SRFH12S12LW	●	1	12	12	160	11.5	70	15	1	RS3510T	①TKY10D	SUFT12R○○
	SRFH16S16LW	●	1	16	16	160	15.5	70	20	1	RS4015T	②TKY15T	SUFT16R○○
	SRFH20S20LW	●	1	20	20	250	19.5	150	24	1	RS5020T	②TKY20T	SUFT20R○○
	SRFH25S25LW	●	1	25	25	300	24.5	200	30	1	RS6025T	②TKY25T	SUFT25R○○
	SRFH30S32LW	●	1	30	32	350	29.5	250	35	1	RS8030T	②TKY30T	SUFT30R○○
				32	32	351	29.5	251	36				SUFT32R○○

(Note 1) SRFH30S32MW and SRFH30S32LW tool body can use both inserts SUFT30R○○ and SUFT32R○○.
However, the overall length size LF is different respectively.
(Note 2) Ensure inserts are fitted in the correct way. (Refer to page L126.)
∗ Clamp Torque (N • m) : RS3008T=1.5, RS3510T=2.5, RS4015T=3.3, RS5020T=5.0, RS6025T=7.5, RS8030T=10.0







SCREW-IN TYPE

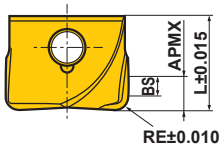
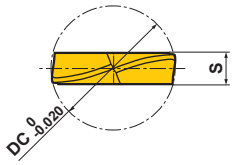
Right hand tool holder only.

Order Number	Stock R	Coolant Hole	Number of Teeth	Dimensions (mm) DC	DCON	BD	OAL	LF	L11	H	CRKS	∗2 WT (kg)	Clamp Screw ∗1	Wrench	Insert
SRFH16AM0830	●	○	1	16	8.5	14.9	48	30	6	10	8	0.1	RS4015T	TKY15T	SUFT16R○○
SRFH20AM1035	●	○	1	20	10.5	18.4	54	35	6	14	10	0.1	RS5020T	TKY20T	SUFT20R○○
SRFH25AM1240	●	○	1	25	12.5	23.5	62	40	6	19	12	0.1	RS6025T	TKY25T	SUFT25R○○
SRFH30AM1645	●	○	1	30	17	28.1	68	45	6	24	16	0.2	RS8030T	TKY30T	SUFT30R○○
				32	17	28.1	69	46	6	24	16				SUFT32R○○

(Note 1) SRFH30AM1645 tool body can use both inserts SUFT30R○○ and SUFT32R○○.
However, the overall length size OAL is different respectively.
(Note 2) For screw-in type arbors, refer to page L145—L146.
∗1 Clamp Torque (N • m) : RS4015T=3.3, RS5020T=5.0, RS6025T=7.5, RS8030T=10.0
∗2 WT : Tool Weight

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

INSERTS

Shape	Order Number	Coated				Dimensions (mm)						Geometry
		MP8010	VP15TF			DC	RE	BS	APMX	L	S	
	SUFT10R05	●	●			10	0.5	1	1.5	8.5	2.6	 
	SUFT10R10	●	●			10	1	1	2	8.5	2.6	
	SUFT10R20	●	●			10	2	1	3	8.5	2.6	
	SUFT12R05	●	●			12	0.5	1.2	1.7	10	3	
	SUFT12R10	●	●			12	1	1.2	2.2	10	3	
	SUFT12R20	●	●			12	2	1.2	3.2	10	3	
	SUFT12R30	●	●			12	3	1.2	4.2	10	3	
	SUFT16R05	●	●			16	0.5	1.6	2.1	12	4	
	SUFT16R10	●	●			16	1	1.6	2.6	12	4	
	SUFT16R15	●	●			16	1.5	1.6	3.1	12	4	
	SUFT16R20	●	●			16	2	1.6	3.6	12	4	
	SUFT16R30	●	●			16	3	1.6	4.6	12	4	
	SUFT20R05	●	●			20	0.5	2	2.5	15	5	
	SUFT20R10	●	●			20	1	2	3	15	5	
	SUFT20R15	●	●			20	1.5	2	3.5	15	5	
	SUFT20R20	●	●			20	2	2	4	15	5	
	SUFT20R30	●	●			20	3	2	5	15	5	
	SUFT25R05	●	●			25	0.5	2.5	3	18.5	6	
	SUFT25R10	●	●			25	1	2.5	3.5	18.5	6	
	SUFT25R20	●	●			25	2	2.5	4.5	18.5	6	
	SUFT25R30	●	●			25	3	2.5	5.5	18.5	6	
	SUFT30R05	●	●			30	0.5	3	3.5	22.5	7	
	SUFT30R10	●	●			30	1	3	4	22.5	7	
	SUFT30R20	●	●			30	2	3	5	22.5	7	
	SUFT30R30	●	●			30	3	3	6	22.5	7	
	SUFT32R05	●	●			32	0.5	3.2	3.7	23.5	7	
	SUFT32R10	●	●			32	1	3.2	4.2	23.5	7	
	SUFT32R20	●	●			32	2	3.2	5.2	23.5	7	

FITTING INSERTS ON HOLDERS

1. Clean the insert seat

Clean the insert seat in the holder body by blowing air or using a brush.

2. Fit the insert

Place the concave mark of the insert into the clamp-screw-fastening part of the holder(only SRF type inserts). Fasten the clamp screw while firmly pressing the insert against the insert seat wall. You are recommended to use the special lubricant for preventing screw seizing, MK1KS, and to fasten with recommended torque.



● : Inventory maintained in Japan. (2 inserts in one case)

RECOMMENDED CUTTING CONDITIONS

SHOULDER MILLING(When small width of cut.*)

	Work Material	Hardness	Grade	Cutting Speed **vc** (m/min)	Depth of Cut **ap** (mm)	Cutting Width **ae** (mm)	Feed per Tooth **fz** (mm/t.)
P	Carbon Steel Alloy Steel	180—280HB	**VP15TF**	200 (80—300)	≤0.05DC	≤0.05DC	0.2 (≤0.4)
P	Pre-Hardened Steel	≤45HRC	**VP15TF**	150 (80—200)	≤0.05DC	≤0.05DC	0.15 (≤0.3)
P	Alloy Tool Steel	180—380HB	**VP15TF**	150 (80—200)	≤0.05DC	≤0.05DC	0.15 (≤0.3)
M	Stainless Steel	≤270HB	**VP15TF**	150 (100—200)	≤0.05DC	≤0.05DC	0.2 (≤0.4)
K	Gray Cast Iron	Tensile Strength ≤350MPa	**MP8010**	250 (180—450)	≤0.05DC	≤0.1DC	0.3 (≤0.4)
K	Ductile Cast Iron	Tensile Strength ≤800MPa	**MP8010**	200 (80—300)	≤0.05DC	≤0.1DC	0.3 (≤0.4)
H	Hardened Steel	45—55HRC	**MP8010**	100 (80—120)	≤0.05DC	≤0.02DC	0.1 (≤0.2)
H	Hardened Steel	55—65HRC	**MP8010**	80 (60—100)	≤0.05DC	≤0.02DC	0.1 (≤0.2)

* When the pick feed direction is along the axis of the tool such as finish machining at the wall part.

SLOTTING•SHOULDER MILLING(When large width of cut.*)

	Work Material	Hardness	Grade	Cutting Speed **vc** (m/min)	Depth of Cut **ap** (mm)	Cutting Width **ae** (mm)	Feed per Tooth **fz** (mm/t.)
P	Carbon Steel Alloy Steel	180—280HB	**VP15TF**	200 (80—300)	≤0.02DC	≤DC	0.2 (≤0.4)
P	Pre-Hardened Steel	≤45HRC	**VP15TF**	150 (80—200)	≤0.02DC	≤DC	0.15 (≤0.3)
P	Alloy Tool Steel	180—380HB	**VP15TF**	150 (80—200)	≤0.02DC	≤DC	0.15 (≤0.3)
M	Stainless Steel	≤270HB	**VP15TF**	150 (100—200)	≤0.02DC	≤DC	0.2 (≤0.4)
K	Gray Cast Iron	Tensile Strength ≤350MPa	**MP8010**	250 (180—450)	≤0.03DC	≤DC	0.3 (≤0.4)
K	Ductile Cast Iron	Tensile Strength ≤800MPa	**MP8010**	200 (80—300)	≤0.03DC	≤DC	0.3 (≤0.4)
H	Hardened Steel	45—55HRC	**MP8010**	100 (80—120)	≤0.01DC	≤DC	0.1 (≤0.2)
H	Hardened Steel	55—65HRC	**MP8010**	70 (60—80)	≤0.01DC	≤DC	0.1 (≤0.2)

* When the pick feed direction is along the axis of the tool such as finish machining at the wall part.

(Note 1) This cutting condition is the standard condition when using the steel standard shank type. If it is occurred vibration or chipping on the cutting edge, please decrease the cutting condition as width of cut, depth of cut and feed per tooth depending on the situation.

(Note 2) The value of cutting speed is stood at the peripheral diameter of the tool. Please calculate the spindle speed of tool in the following expressions.

Spindle speed of cutting tool n(min^{-1})=1000×Cutting speed vc ÷Diameter of cutting tool DC÷3.14

(Note 3) Please note the following when machining hardened steel with MP8010.

- Please shorten the overhang length as much as possible.
- Use with carbide shank recommended.
- Please note the setting of the depth of cut especially to prevent the fracture.

BALL NOSE END MILL

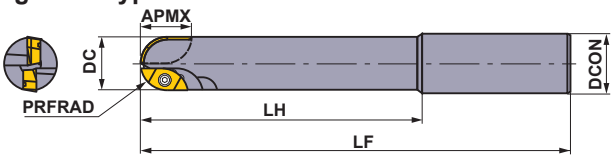
Roughing

- Suitable for roughing to semi-finishing of small and medium moulds.
- High rigidity body design.
- Low resistance chipbreaker.
- Through coolant hole type.

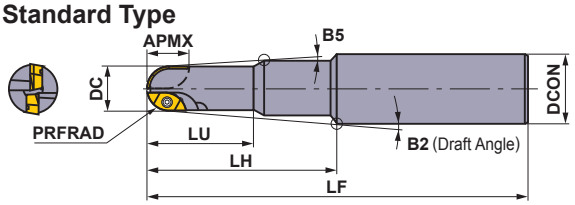
SRM2

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron			Hardened Steel

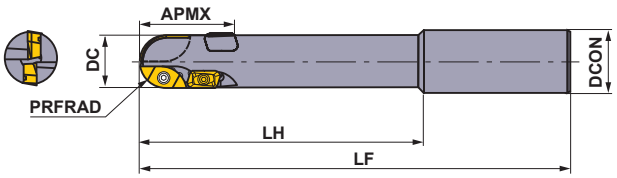
Long Neck Type



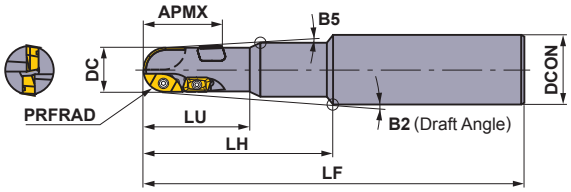
Standard Type



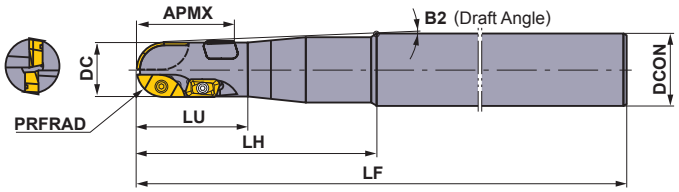
Long Neck Cutting Edge Type



Long Cutting Edge Type



Extra Long Cutting Edge Type



Right hand tool holder only.

Type	Order Number	Stock R	Coolant Hole	Number of Teeth	Dimensions (mm) PRFRAD	DC	DCON	LF	LH	LU	APMX	B2	B5	Clamp Screw Inner, Outer	Clamp Screw Peripheral	Wrench Inner, Outer	Wrench Peripheral	Insert Inner	Insert Outer	Insert Peripheral
Standard	**SRM2160SNM**	●	–	2	8	16	20	130	50	25	12	2°48′	1°30′	TS25H	–	①TKY08D	–	SRG16C SRM16C-M	SRG16E SRM16E-M	–
	SRM**2160SAM**	●	○	2	8	16	20	130	50	25	12	2°48′	1°30′	TS25H	–	①TKY08D	–	SRG16C SRM16C-M	SRG16E SRM16E-M	–
	SRM**2200SNM**	●	–	2	10	20	25	150	70	35	14	2°27′	1°30′	TS32	–	①TKY08D	–	SRG20C SRM20C-M	SRG20E SRM20E-M	–
	SRM**2200SAM**	●	○	2	10	20	25	150	70	35	14	2°27′	1°30′	TS32	–	①TKY08D	–	SRG20C SRM20C-M	SRG20E SRM20E-M	–
	SRM**2250SNM**	●	–	2	12.5	25	32	180	80	40	19	3°13′	1°30′	TS43	–	②TKY15T	–	SRG25C SRM25C-M	SRG25E SRM25E-M	–
	SRM**2250SAM**	●	○	2	12.5	25	32	180	80	40	19	3°13′	1°30′	TS43	–	②TKY15T	–	SRG25C SRM25C-M	SRG25E SRM25E-M	–
	SRM**2300SNM**	●	–	2	15	30	32	200	100	50	24	0°44′	0°30′	TS55	–	②TKY25T	–	SRG30C SRM30C-M	SRG30E SRM30E-M	–
	SRM**2300SAM**	●	○	2	15	30	32	200	100	50	24	0°44′	0°30′	TS55	–	②TKY25T	–	SRG30C SRM30C-M	SRG30E SRM30E-M	–
Long Cutting Edge	**SRM2200SNL**	●	–	4	10	20	25	150	70	35	30	2°27′	1°30′	TS32	TS25	①TKY08D	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-○2
	SRM**2200SAL**	●	○	4	10	20	25	150	70	35	30	2°27′	1°30′	TS32	TS25	①TKY08D	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-○2
	SRM**2250SNL**	●	–	4	12.5	25	32	180	80	40	37	3°13′	1°30′	TS43	TS25	②TKY15T	③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-○2
	SRM**2250SAL**	●	○	4	12.5	25	32	180	80	40	37	3°13′	1°30′	TS43	TS25	②TKY15T	③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-○2
	SRM**2300SNL**	●	–	4	15	30	32	200	100	50	44	0°44′	0°30′	TS55	TS43	②TKY25T	③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-○2
	SRM**2300SAL**	●	○	4	15	30	32	200	100	50	44	0°44′	0°30′	TS55	TS43	②TKY25T	③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-○2
Long Neck	**SRM2160SNF**	●	–	2	8	16	16	150	70	–	12	–	–	TS25H	–	①TKY08D	–	SRG16C SRM16C-M	SRG16E SRM16E-M	–
	SRM**2160SAF**	●	○	2	8	16	16	150	70	–	12	–	–	TS25H	–	①TKY08D	–	SRG16C SRM16C-M	SRG16E SRM16E-M	–
	SRM**2200SNF**	●	–	2	10	20	20	180	100	–	14	–	–	TS32	–	①TKY08D	–	SRG20C SRM20C-M	SRG20E SRM20E-M	–
	SRM**2200SAF**	●	○	2	10	20	20	180	100	–	14	–	–	TS32	–	①TKY08D	–	SRG20C SRM20C-M	SRG20E SRM20E-M	–
	SRM**2250SNF**	●	–	2	12.5	25	25	200	120	–	19	–	–	TS43	–	②TKY15T	–	SRG25C SRM25C-M	SRG25E SRM25E-M	–
	SRM**2250SAF**	●	○	2	12.5	25	25	200	120	–	19	–	–	TS43	–	②TKY15T	–	SRG25C SRM25C-M	SRG25E SRM25E-M	–
	SRM**2300SNF**	●	–	2	15	30	32	230	150	–	24	–	–	TS55	–	②TKY25T	–	SRG30C SRM30C-M	SRG30E SRM30E-M	–
	SRM**2300SAF**	●	○	2	15	30	32	230	150	–	24	–	–	TS55	–	②TKY25T	–	SRG30C SRM30C-M	SRG30E SRM30E-M	–

∗ Clamp Torque (N • m) : TS25H=1.0, TS25=1.0, TS32=1.0, TS43=3.5, TS55=7.5

● : Inventory maintained in Japan. (10 inserts in one case)

Type	Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm)									Inner, Outer	Peripheral	Inner, Outer	Peripheral	Inner	Outer	Peripheral
		R			PRFRAD	DC	DCON	LF	LH	LU	APMX	B2	B5	Clamp Screw		Wrench		Insert		
Long Neck Cutting Edge	SRM2200SNLF	●	–	4	10	20	20	180	100	–	30	–	–	TS32	TS25	①TKY08D	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-□2
	SRM2200SALF	●	○	4	10	20	20	180	100	–	30	–	–	TS32	TS25	①TKY08D	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-□2
	SRM2250SNLF	●	–	4	12.5	25	25	200	120	–	37	–	–	TS43	TS25	②TKY15T	③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-□2
	SRM2250SALF	●	○	4	12.5	25	25	200	120	–	37	–	–	TS43	TS25	②TKY15T	③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-□2
	SRM2300SNLF	●	–	4	15	30	32	230	150	–	44	–	–	TS55	TS43	②TKY25T	③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-□2
	SRM2300SALF	●	○	4	15	30	32	230	150	–	44	–	–	TS55	TS43	②TKY25T	③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-□2
Extra Long Cutting Edge	SRM2200SNLL	●	–	4	10	20	25	250	120	35	30	1°30′	–	TS32	TS25	①TKY08D	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-□2
	SRM2200SALL	●	○	4	10	20	25	250	120	35	30	1°30′	–	TS32	TS25	①TKY08D	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-□2
	SRM2250SNLL	●	–	4	12.5	25	32	300	170	37	37	1°30′	–	TS43	TS25	②TKY15T	③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-□2
	SRM2250SALL	●	○	4	12.5	25	32	300	170	37	37	1°30′	–	TS43	TS25	②TKY15T	③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-□2
	SRM2300SNLL	●	–	4	15	30	32	350	100	50	44	1°30′	–	TS55	TS43	③TKY25T	③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-□2
	SRM2300SALL	●	○	4	15	30	32	350	100	50	44	1°30′	–	TS55	TS43	③TKY25T	③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-□2

∗ Clamp Torque (N • m) : TS25H=1.0, TS25=1.0, TS32=1.0, TS43=3.5, TS55=7.5

INSERTS

Application	Shape	Order Number	Class	Coated				Dimensions(mm)								Geometry
				F7030	VP15TF			PRFRAD	L	W1	S	BS	RE	AN	B9	
Inner	Strong Cutting Edge Type	SRG16C	G		●			8	16	8.2	3.5	–	–	11°	–	
		SRG20C	G		●			10	19	10.2	4.6	–	–	10°	18°	
		SRG25C	G		●			12.5	24	12.8	5.5	–	–	10°	18°	
		SRG30C	G		●			15	28	15.3	7	–	–	10°	18°	
		SRG32C	G		●			16	28	16.3	7	–	–	10°	18°	
Outer	Strong Cutting Edge Type	SRG16E	G		●			8	13.5	6.7	3.5	–	–	11°	–	
		SRG20E	G		●			10	15.5	8.5	4.6	–	–	9°	–	
		SRG25E	G		●			12.5	20.5	10.2	5.5	–	–	9°	–	
		SRG30E	G		●			15	25.2	12.2	7	–	–	9°	–	
		SRG32E	G		●			16	26.1	13.1	7	–	–	9°	–	
Inner	Low Resistance Type	SRM16C-M	M		●			8	16	8.2	3.5	–	–	11°	–	
		SRM20C-M	M		●			10	19	10.2	4.6	–	–	10°	18°	
		SRM25C-M	M		●			12.5	24	12.8	5.5	–	–	10°	18°	
		SRM30C-M	M		●			15	28	15.3	7	–	–	10°	18°	
		SRM32C-M	M		●			16	28	16.3	7	–	–	10°	18°	
Outer	Low Resistance Type	SRM16E-M	M		●			8	13.5	6.7	3.5	–	–	11°	–	
		SRM20E-M	M		●			10	15.5	8.5	4.6	–	–	9°	–	
		SRM25E-M	M		●			12.5	20.5	10.2	5.5	–	–	9°	–	
		SRM30E-M	M		●			15	25.2	12.2	7	–	–	9°	–	
		SRM32E-M	M		●			16	26.1	13.1	7	–	–	9°	–	
∗ Peripheral	Strong Cutting Edge Type	APMT1135PDER-H2	M	●	●			–	11	6.35	3.5	1.2	0.8	11°	–	
		APMT1604PDER-H2	M	●	●			–	16.5	9.525	4.76	1.4	0.8	11°	–	
	Low Resistance Type	APMT1135PDER-M2	M	●	●			–	11	6.35	3.5	1.2	0.8	11°	–	
		APMT1604PDER-M2	M	●	●			–	16.5	9.525	4.76	1.4	0.8	11°	–	

(Low-resistance inner or outer inserts are precision M class type.)

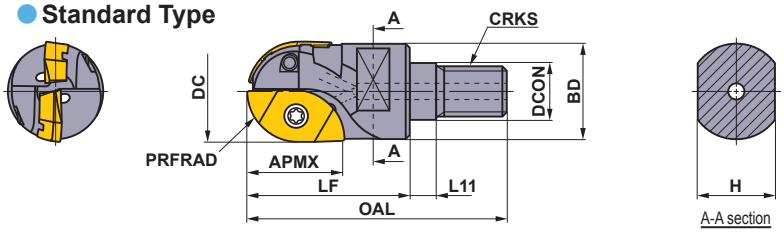
∗ Selection guide for peripheral cutting edges : The first recommendation is the super sharp M breaker (APMT....PDER-M2).
When cutting edge strength is particularly important, use the H breaker (APMT....PDER-H2).

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

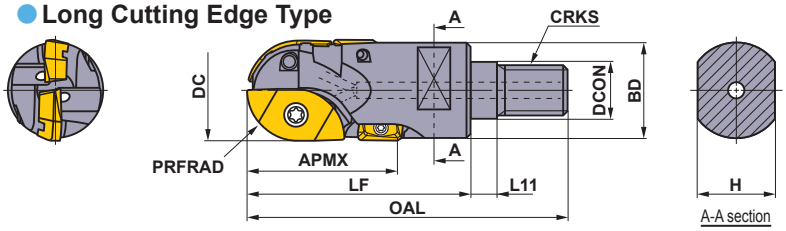




Standard Type



Long Cutting Edge Type



SCREW-IN TYPE

Right hand tool holder only.

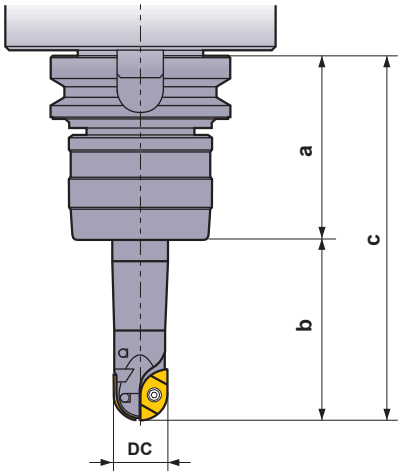
Type	Order Number	Stock R	Coolant Hole	Dimensions (mm) PRFRAD	DC	DCON	BD	OAL	LF	L11	H	CRKS	APMX	*2 WT (kg)	*1 Inner, Outer Clamp Screw	*1 Peripheral Clamp Screw	Wrench	Insert Inner	Insert Outer	Insert Peripheral
Standard	SRM2160AM08S30	●	○	8	16	8.5	14.6	48	30	6	10	M8	12	0.1	TS25H	—	①TKY08D	SRG16C SRM16C-M	SRG16E SRM16E-M	—
	SRM2200AM10S35	●	○	10	20	10.5	18.6	54	35	6	14	M10	14	0.1	TS32	—	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	—
	SRM2250AM12S40	●	○	12.5	25	12.5	23.5	62	40	6	19	M12	19	0.2	TS43	—	②TKY15T	SRG25C SRM25C-M	SRG25E SRM25E-M	—
	SRM2300AM16S45	●	○	15	30	17	28.3	68	45	6	24	M16	24	0.2	TS55	—	②TKY25T	SRG30C SRM30C-M	SRG30E SRM30E-M	—
	SRM2320AM16S45	●	○	16	32	17	30.0	68	45	6	24	M16	28	0.2	TS55	—	②TKY25T	SRG32C SRM32C-M	SRG32E SRM32E-M	—
Long Cutting Edge	SRM2200AM10L45	●	○	10	20	10.5	18.6	64	45	6	14	M10	30	0.2	TS32	TS25	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-□2
	SRM2250AM12L55	●	○	12.5	25	12.5	23.5	77	55	6	19	M12	37	0.3	TS43	TS25	②TKY15T ③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-□2
	SRM2300AM16L60	●	○	15	30	17	28.3	83	60	6	24	M16	44	0.3	TS55	TS43	②TKY25T ③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-□2
	SRM2320AM16L60	●	○	16	32	17	29.0	83	60	6	24	M16	44	0.3	TS55	TS43	②TKY25T ③TKY15F	SRG32C SRM32C-M	SRG32E SRM32E-M	APMT1604 PDER-□2

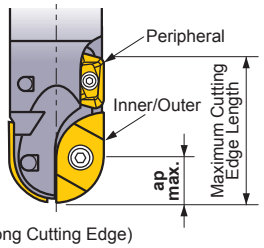
(Note) For screw-in type arbors, refer to page L145—L146.

*1 Clamp Torque (N • m) : TS25H=1.0, TS25=1.0, TS32=1.0, TS43=3.5, TS55=7.5

*2 WT : Tool Weight

RECOMMENDED CUTTING CONDITIONS





(Long Cutting Edge)

Tool Overhang

The recommended cutting conditions are chosen based on deflection, vibration and surface finish when using a BT50 arbor under the conditions below -**"a"**, a length from a gauge line to the arbor end face and **"b"**, a neck length (tool overhang from the arbor).

Cutting Edge Diameter:**DC**	Type	a	b	c
16	Standard	105	50	155
	Long Neck		70	175
	Extra Long		—	—
20	Standard		70	175
	Long Neck		100	205
	Extra Long		150	255
25	Standard		80	185
	Long Neck		120	225
	Extra Long		200	305
30	Standard		100	205
	Long Neck		150	255
	Extra Long		250	355

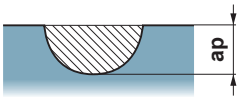
Recommended Depth of Cut for Long Cutting Edge Type

The maximum cutting edge length of the long cutting edge type with a peripheral insert is 1.4-1.5DC. The peripheral insert's main purpose is to remove the small un-machined portions of the pre-machined surface above the main cutting edge. Recommended depth of cut: **Maximum ap** is 0.5DC or below.

● : **Inventory maintained in Japan.**

SLOT MILLING

Cutting Mode



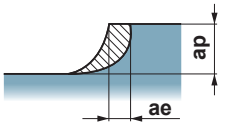
N : Revolution (min^{-1})
F : Table Feed (mm/min)

	Work Material	Hardness	Cutting Speed (m/min)	Insert Grade, Type	Holder Type	ϕ16			ϕ20			ϕ25			ϕ30		
						N	F	ap	N	F	ap	N	F	ap	N	F	ap
P	Carbon Steel Alloy Steel	180–280HB	160 (120–200)	**VP15TF** Low Resistance Type	Standard	3183	382	6	2546	306	8	2037	489	12.5	1698	407	15
					Long Neck	3183	382	4	2546	306	4	2037	489	6	1698	407	7.5
					Extra Long	–	–	–	2546	306	2	2037	489	4	1698	407	3
		280–350HB	140 (120–160)	**VP15TF** Low Resistance Type	Standard	2785	334	6	2228	267	8	1783	428	12.5	1485	357	15
					Long Neck	2785	334	4	2228	267	4	1783	428	6	1485	357	7.5
					Extra Long	–	–	–	2228	267	2	1783	428	4	1485	357	3
	Pre-Hardened Steel	35–45HRC	120 (100–160)	**VP15TF** Low Resistance Type	Standard	2387	286	6	1910	229	8	1528	367	12.5	1273	306	15
					Long Neck	2387	286	4	1910	229	4	1528	367	6	1273	306	7.5
					Extra Long	–	–	–	1910	229	2	1528	367	4	1273	306	3
	Alloy Tool Steel	≤350HB	140 (120–160)	**VP15TF** Low Resistance Type	Standard	2785	334	6	2228	267	8	1783	535	10	1485	594	12
					Long Neck	2785	334	4	2228	267	4	1783	535	5	1485	594	4.5
					Extra Long	–	–	–	2228	267	2	1783	535	2.5	1485	594	1.5
M	Stainless Steel	≤270HB	200 (100–250)	**VP15TF** Low Resistance Type	Standard	3979	477	4	3183	382	5	2546	764	6	2122	849	7.5
					Long Neck	3979	477	3	3183	382	3	2546	611	4	2122	637	4.5
					Extra Long	–	–	–	3183	382	1.5	2546	509	1.5	2122	509	1.5
K	Gray Cast Iron	≤350MPa	200 (150–300)	**VP15TF** Low Resistance Type	Standard	3979	796	6	3183	637	8	2546	1019	12.5	2122	849	15
					Long Neck	3979	796	4	3183	637	4	2546	1019	7.5	2122	849	4.5
					Extra Long	–	–	–	3183	637	2	2546	1019	4	2122	849	3
	Ductile Cast Iron	≤500MPa	180 (150–240)	**VP15TF** Low Resistance Type	Standard	3581	716	6	2865	573	8	2292	917	12.5	1910	764	15
					Long Neck	3581	716	4	2865	573	4	2292	917	7.5	1910	764	4.5
					Extra Long	–	–	–	2865	573	2	2292	917	4	1910	764	1.5
	Ductile Cast Iron	≤800MPa	160 (150–250)	**VP15TF** Low Resistance Type	Standard	3183	637	6	2546	509	8	2037	815	12.5	1698	679	15
					Long Neck	3183	637	4	2546	509	4	2037	815	7.5	1698	679	4.5
					Extra Long	–	–	–	2546	509	2	2037	815	4	1698	679	1.5
H	Hardened Steel	45–50HRC	100 (60–120)	**VP15TF** Strong Cutting Edge Type	Standard	1989	239	4	1591	191	4	1273	255	6	1061	212	7.5
					Long Neck	1989	239	2	1591	191	2	1273	255	4	1061	212	3
					Extra Long	–	–	–	1591	191	1	1273	255	2.5	1061	212	1.5
	Hardened Steel	50–60HRC	60 (40–100)	**VP15TF** Strong Cutting Edge Type	Standard	1194	143	4	955	115	4	764	153	6	637	127	7.5
					Long Neck	1194	143	2	955	115	2	764	153	4	637	127	3
					Extra Long	–	–	–	955	115	1	764	153	2.5	637	127	1.5

SCREW-IN ARBORS ➤ L145
SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

SHOULDER MILLING (Cutting Depth : Small)

Cutting Mode

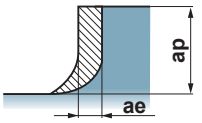


N : Revolution (min^{-1})
F : Table Feed (mm/min)

	Work Material	Hardness	Cutting Speed (m/min)	Insert Grade, Type	Holder Type	ϕ16				ϕ20				ϕ25				ϕ30			
						N	F	ap	ae	N	F	ap	ae	N	F	ap	ae	N	F	ap	ae
P	Carbon Steel Alloy Steel	180–280HB	200 (160–250)	VP15TF Low Resistance Type	Standard	3979	796	4	6	3183	955	5	8	2546	1273	6	10	2122	1273	7.5	10
					Long Neck	3979	637	4	4	3183	637	5	6	2546	1273	6	7.5	2122	1273	7.5	7.5
					Extra Long	—	—	—	—	3183	382	5	4	2546	1019	6	5	2122	637	7.5	3
		280–350HB	160 (120–200)	VP15TF Low Resistance Type	Standard	3183	509	4	6	2546	509	5	8	2037	815	6	10	1698	849	7.5	10
					Long Neck	3183	382	4	4	2546	407	5	6	2037	611	6	7.5	1698	509	7.5	7.5
					Extra Long	—	—	—	—	2546	306	5	4	2037	489	6	5	1698	407	7.5	3
	Pre-Hardened Steel	35–45HRC	160 (120–200)	VP15TF Low Resistance Type	Standard	3183	509	4	6	2546	509	5	8	2037	815	6	10	1698	849	7.5	10
					Long Neck	3183	382	4	4	2546	407	5	6	2037	611	6	7.5	1698	679	7.5	7.5
					Extra Long	—	—	—	—	2546	306	5	4	2037	489	6	5	1698	509	7.5	3
	Alloy Tool Steel	≤350HB	160 (120–200)	VP15TF Low Resistance Type	Standard	3183	509	4	6	2546	509	5	8	2037	815	6	10	1698	849	7.5	10
					Long Neck	3183	382	4	4	2546	407	5	6	2037	611	6	7.5	1698	509	7.5	7.5
					Extra Long	—	—	—	—	2546	306	5	4	2037	489	6	2.5	1698	407	7.5	1.5
M	Stainless Steel	≤270HB	200 (100–250)	VP15TF Low Resistance Type	Standard	3979	477	4	6	3183	509	5	8	2546	764	6	10	2122	849	7.5	10
					Long Neck	3979	477	4	4	3183	382	5	6	2546	611	6	7.5	2122	849	7.5	7.5
					Extra Long	—	—	—	—	3183	382	5	4	2546	509	6	5	2122	424	7.5	1.5
K	Gray Cast Iron	≤350MPa	200 (150–300)	VP15TF Low Resistance Type	Standard	3979	1592	4	8	3183	1592	5	10	2546	1528	6	10	2122	1485	7.5	10
					Long Neck	3979	1194	4	6	3183	1273	5	8	2546	1528	6	10	2122	1485	7.5	6
					Extra Long	—	—	—	—	3183	955	5	6	2546	1273	6	7.5	2122	1061	7.5	3
	Ductile Cast Iron	≤500MPa	200 (150–280)	VP15TF Low Resistance Type	Standard	3979	1592	4	8	3183	1592	5	10	2546	1528	6	10	2122	1273	7.5	10
					Long Neck	3979	1194	4	6	3183	1273	5	8	2546	1528	6	10	2122	1273	7.5	6
					Extra Long	—	—	—	—	3183	955	5	6	2546	1273	6	7.5	2122	1061	7.5	3
	Ductile Cast Iron	≤800MPa	180 (150–250)	VP15TF Low Resistance Type	Standard	3581	1432	4	8	2865	1433	5	10	2292	1375	6	10	1910	1146	7.5	10
					Long Neck	3581	1074	4	6	2865	1146	5	8	2292	1375	6	10	1910	1146	7.5	6
					Extra Long	—	—	—	—	2865	860	5	6	2292	1146	6	7.5	1910	955	7.5	3
H	Hardened Steel	45–50HRC	100 (60–120)	VP15TF Strong Cutting Edge Type	Standard	1989	239	4	4	1591	191	5	5	1273	255	6	7.5	1061	212	7.5	3
					Long Neck	1989	239	4	2	1591	191	5	3	1273	255	6	4	1061	212	7.5	1.5
					Extra Long	—	—	—	—	1591	191	5	2	1273	204	6	1.5	1061	170	7.5	1
	Hardened Steel	50–60HRC	60 (40–100)	VP15TF Strong Cutting Edge Type	Standard	1194	143	4	4	955	115	5	5	764	153	6	7.5	637	127	7.5	3
					Long Neck	1194	143	4	2	955	115	5	3	764	153	6	4	637	127	7.5	1.5
					Extra Long	—	—	—	—	955	115	5	2	764	122	6	1.5	637	102	7.5	1

SHOULDER MILLING (Cutting Depth : Large)

Cutting Mode



N : Revolution (min^{-1})
F : Table Feed (mm/min)

(Note) Machining Stainless Steels

When up-cut milling stainless steels at large depths and widths of cut, the machined surface is liable to burrs and welding due to chip jamming. For stainless steels, down-cutting (climb milling) is recommended.

	Work Material	Hardness	Cutting Speed (m/min)	Insert Grade, Type	Holder Type	ϕ16				ϕ20				ϕ25				ϕ30			
						N	F	ap	ae	N	F	ap	ae	N	F	ap	ae	N	F	ap	ae
P	Carbon Steel Alloy Steel	180–280HB	200 (160–250)	VP15TF Low Resistance Type	Standard	3979	637	8	4	3183	764	10	4	2546	1273	12.5	5	2122	1273	15	4.5
					Long Neck	3979	477	8	3	3183	509	10	3	2546	1019	12.5	4	2122	849	15	3
					Extra Long	—	—	—	—	3183	382	10	2	2546	764	12.5	2.5	2122	849	15	1.5
		280–350HB	160 (120–200)	VP15TF Low Resistance Type	Standard	3183	382	8	4	2546	509	10	4	2037	815	12.5	5	1698	849	15	4.5
					Long Neck	3183	382	8	3	2546	306	10	3	2037	611	12.5	4	1698	509	15	3
					Extra Long	—	—	—	—	2546	306	10	2	2037	489	12.5	2.5	1698	407	15	1.5
	Pre-Hardened Steel	35–45HRC	160 (120–200)	VP15TF Low Resistance Type	Standard	3183	382	8	4	2546	509	10	4	2037	815	12.5	5	1698	849	15	4.5
					Long Neck	3183	382	8	3	2546	306	10	3	2037	611	12.5	4	1698	509	15	3
					Extra Long	—	—	—	—	2546	306	10	2	2037	489	12.5	2.5	1698	407	15	1.5
	Alloy Tool Steel	≤350HB	160 (120–200)	VP15TF Low Resistance Type	Standard	3183	382	8	4	2546	509	10	4	2037	815	12.5	5	1698	849	15	4.5
					Long Neck	3183	382	8	3	2546	306	10	3	2037	611	12.5	2.5	1698	509	15	3
					Extra Long	—	—	—	—	2546	306	10	2	2037	489	12.5	1.5	1698	407	15	1.5
M	Stainless Steel	≤270HB	200 (100–250)	VP15TF Low Resistance Type	Standard	3979	477	8	4	3183	509	10	4	2546	764	12.5	10	2122	849	15	10
					Long Neck	3979	477	8	3	3183	382	10	3	2546	611	12.5	4	2122	509	15	4.5
					Extra Long	—	—	—	—	3183	382	10	2	2546	489	12.5	1.5	2122	340	15	1.5
K	Gray Cast Iron	≤350MPa	200 (150–300)	VP15TF Low Resistance Type	Standard	3979	1194	8	8	3183	1273	10	8	2546	1273	12.5	10	2122	1485	15	10
					Long Neck	3979	955	8	5	3183	955	10	4	2546	1273	12.5	7.5	2122	1061	15	4.5
					Extra Long	—	—	—	—	3183	764	10	2	2546	1019	12.5	1.5	2122	849	15	3
	Ductile Cast Iron	≤500MPa	200 (150–280)	VP15TF Low Resistance Type	Standard	3979	1194	8	8	3183	1273	10	8	2546	1273	12.5	10	2122	1273	15	10
					Long Neck	3979	955	8	5	3183	955	10	4	2546	1273	12.5	7.5	2122	849	15	4.5
					Extra Long	—	—	—	—	3183	764	10	2	2546	1019	12.5	5	2122	849	15	1.5
	Ductile Cast Iron	≤800MPa	180 (150–250)	VP15TF Low Resistance Type	Standard	3581	1074	8	8	2865	1146	10	8	2292	1146	12.5	10	1910	1146	15	10
					Long Neck	3581	859	8	5	2865	860	10	4	2292	1146	12.5	7.5	1910	764	15	4.5
					Extra Long	—	—	—	—	2865	688	10	2	2292	917	12.5	5	1910	764	15	1.5
H	Hardened Steel	45–50HRC	100 (60–120)	VP15TF Strong Cutting Edge Type	Standard	1989	239	8	2	1591	191	10	3	1273	255	12.5	4	1061	212	15	3
					Long Neck	1989	239	8	1	1591	191	10	2	1273	204	12.5	1.5	1061	106	15	1.5
					Extra Long	—	—	—	—	1591	191	10	1	—	—	—	—	—	—	—	—
	Hardened Steel	50–60HRC	60 (40–100)	VP15TF Strong Cutting Edge Type	Standard	1194	143	8	2	955	115	10	3	764	153	12.5	4	637	127	15	3
					Long Neck	1194	143	8	1	955	115	10	2	764	122	12.5	1.5	637	64	15	1.5
					Extra Long	—	—	—	—	955	115	10	1	—	—	—	—	—	—	—	—

BALL NOSE END MILL

Roughing

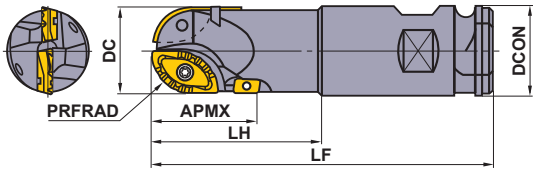
- Best for roughing of moulds.
- Low resistance chipbreaker.
- Highly rigid body.

SRM2 ø40 ø50

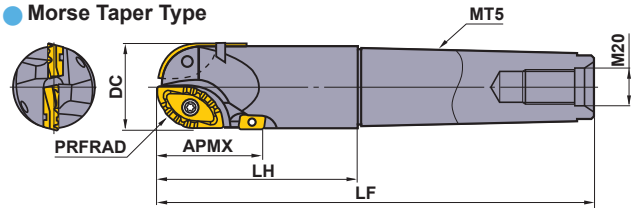
P Steel | M | K Cast Iron | N | S | H



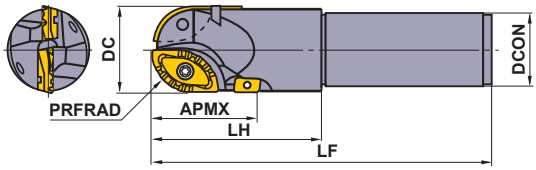
Combination Type



Morse Taper Type



Straight Type

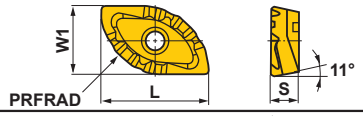
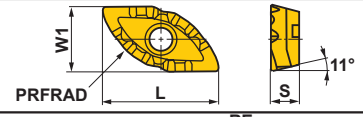
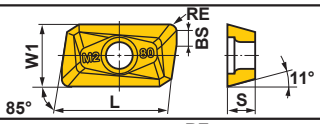
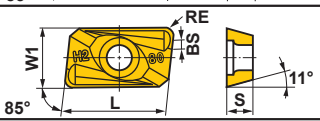


Right hand tool holder only.

Type		Order Number	Stock R	Number of Flutes	Dimensions (mm) PRFRAD	DC	DCON	LF	LH	APMX	* Inner, Outer (Clamp Screw)	* Peripheral (Clamp Screw)	Wrench Inner, Outer	Wrench Peripheral	Insert Inner	Insert Outer	Insert Peripheral
Combination	Standard	SRM2400WNLS	●	2	20	40	50.8	200	120	54	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604 PDER-□2
		SRM2500WNLS	●	2	25	50	50.8	200	120	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-□2
	Long	SRM2400WNLM	●	2	20	40	50.8	250	170	54	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604 PDER-□2
		SRM2500WNLM	●	2	25	50	50.8	250	170	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-□2
	Extra Long	SRM2500WNLL	●	2	25	50	50.8	300	220	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-□2
		SRM2500WNLX	●	2	25	50	50.8	350	270	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-□2
Straight	Standard	SRM2400SNLS	●	2	20	40	42	200	100	54	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604 PDER-□2
		SRM2500SNLS	●	2	25	50	42	200	100	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-□2
	Long	SRM2400SNLM	●	2	20	40	42	250	150	54	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604 PDER-□2
		SRM2500SNLM	●	2	25	50	42	250	100	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-□2
Morse Taper	Standard	SRM2500MNLS	●	2	25	50	—	256	120	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-□2
	Long	SRM2500MNLM	●	2	25	50	—	286	150	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-□2

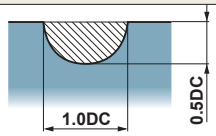
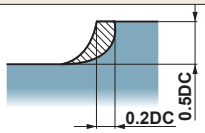
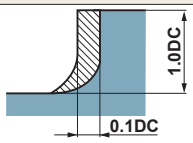
* Clamp Torque (N • m) : TS43=3.5, TS6=10.0, TS6S=10.0

INSERTS

Application	Shape	Order Number	Class	Coated VP15TF	VP20RT	VP30RT	Dimensions (mm) PRFRAD	L	W1	S	BS	RE	Geometry
Inner		* SRG40C	G	●	●	●	20	36	20.5	8.0	—	—	
		* SRG50C	G	●	●	●	25	40	26	8.5	—	—	
Outer		* SRG40E	G	●	●	●	20	32	16.6	8.0	—	—	
		* SRG50E	G	●	●	●	25	35.8	20	8.5	—	—	
Peripheral		APMT1604PDER-M2	M	●			—	16.5	9.525	4.76	1.4	0.8	
	Strong Cutting Edge Type 	APMT1604PDER-H2	M	●			—	16.5	9.525	4.76	1.4	0.8	

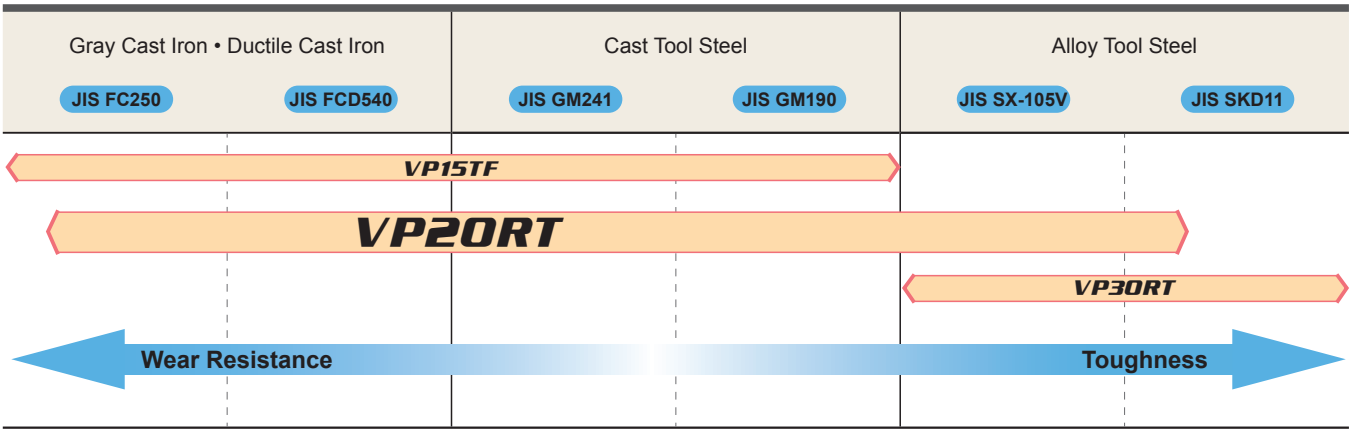
● : Inventory maintained in Japan. (10 inserts in one case)(Inserts with asterisk (*) are available in 2 piece in one case)

RECOMMENDED CUTTING CONDITIONS

Cutting Mode	A : Slot Milling	B : Shoulder Milling (Standard Type)	C : Shoulder Milling (Long Cutting Edge Type)
			

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)	Cutting Mode
P	Alloy Tool Steel	≤250HB	**VP20RT VP30RT**	160 (120—200)	0.12 (0.08—0.2)	A
					0.2 (0.1—0.4)	B
					0.15 (0.1—0.3)	C
	Alloy Tool Steel	≤250HB	**VP20RT VP30RT**	200 (160—250)	0.2 (0.1—0.3)	A
					0.3 (0.1—0.4)	B
					0.2 (0.1—0.4)	C
	Cast Tool Steel	≤235HB	**VP20RT**	200 (160—250)	0.2 (0.1—0.3)	A
					0.3 (0.1—0.4)	B
					0.2 (0.1—0.4)	C
	Cast Tool Steel	≤230HB	**VP15TF VP20RT**	200 (160—300)	0.2 (0.1—0.3)	A
					0.3 (0.1—0.45)	B
					0.2 (0.1—0.4)	C
K	Ductile Cast Iron	Tensile Strength ≤540MPa	**VP15TF VP20RT**	200 (160—300)	0.25 (0.1—0.4)	A
					0.35 (0.1—0.45)	B
					0.25 (0.1—0.45)	C
	Gray Cast Iron	Tensile Strength ≤350MPa	**VP15TF VP20RT**	200 (160—300)	0.25 (0.1—0.4)	A
					0.35 (0.1—0.45)	B
					0.25 (0.1—0.4)	C

GRADE APPLICATION GUIDE



MILLING

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

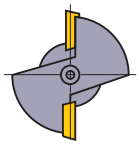
T-SLOT MILLING

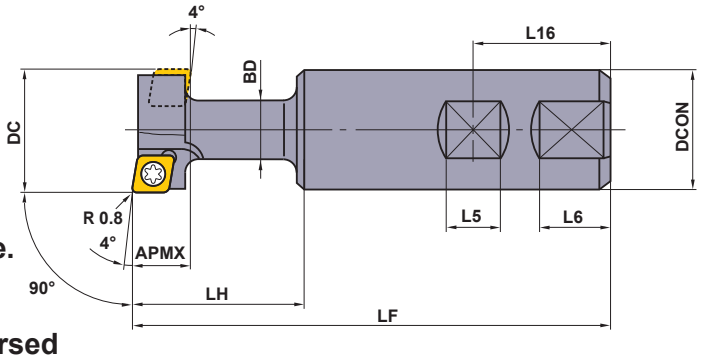
Roughing

TSMP

P	M	K	N	S	H
Steel		Cast Iron			







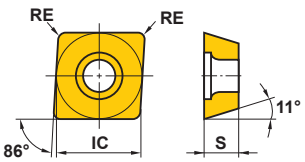
- T-groove order number 14, 18 and 22 are available.
- 86° rhombic shape 11° positive insert.
- Shoulder milling and inversed spot facing are also possible.

Right hand tool holder only.

Order Number	T Slot Nomenclature	Stock	Number of Teeth	Dimensions (mm)									*	① ②	
		R		DC	LF	DCON	BD	LH	L16	L5	L6	APMX	Clamp Screw	Wrench	Insert
TSMPR252S25	14	●	2	25	112	25	12.5	33.2	32	12	17	11	TS3	①TKY08D	MPMW070308
TSMPR**322S32**	18	●	2	32	120	32	16	41.2	36	14	19	14	TS4	②TKY15R	MPMW090308
TSMPR**402S32**	22	●	2	40	130	32	20	51.2	36	14	19	18	TS5	②TKY25R	MPMW120408

∗ Clamp Torque (N • m) : TS3=1.0, TS4=3.5, TS5=7.5

INSERTS

Shape	Order Number	Class	Carbide UTi20T		Dimensions (mm) IC	S	RE	Geometry
	**MPMW070308**	M	●		7.94	3.18	0.8	
	MPMW**090308**	M	●		9.525	3.18	0.8	
	MPMW**120408**	M	●		12.7	4.76	0.8	

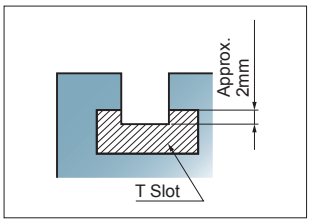
RECOMMENDED CUTTING CONDITIONS

Work Material		Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/rev)
P	Carbon Steel Alloy Steel	180—280HB	UTi20T	130 (100—160)	0.15 (0.1—0.2)
		280—350HB	UTi20T	80 (60—100)	0.1 (0.05—0.15)
K	Cast Iron	Tensile Strength ≤450MPa	UTi20T	100 (80—120)	0.15 (0.1—0.2)

● Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)

CAUTION FOR USE

- When T slot machining steel, the workpiece must be machined as shown in the drawing to ensure smooth chip evacuation.
- Slots to be machined must be free from chips for smooth machining.



● : Inventory maintained in Japan. (10 inserts in one case)

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

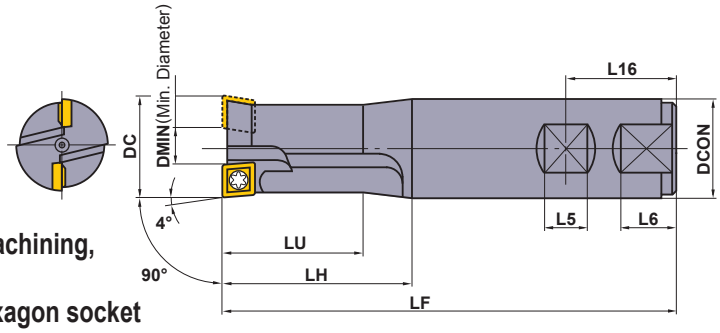
SPOT MILLING

Roughing

CBJP,CBMP

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron			





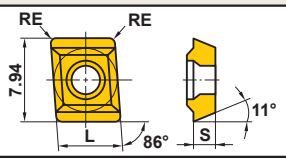
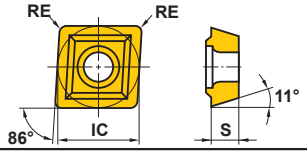
- Capable of spot facing machining, boring and interpolation.
- For seat machining of hexagon socket head bolt (M8-M30).
- 86°rhombic shape 11°positive insert.

Right hand tool holder only.

Order Number	For bolt size	Stock	Number of Teeth	Dimensions (mm)									*	①,②	
		R		DC	DMIN	LF	DCON	LH	LU	L16	L5	L6	Clamp Screw	Wrench	Insert
CBJPR141S25	M8	●	1	14	3.1	108	25	28	21	32	12	17	TS3	①TKY08D	JPMT060204-E
CBJPR172S25	M10	●	2	17.5	5.3	115	25	35	26	32	12	17	TS3	①TKY08D	JPMT060204-E
CBJPR202S25	M12	●	2	20	7.8	120	25	40	30	32	12	17	TS3	①TKY08D	JPMT060204-E
CBJPR232S25	M14	●	2	23	10.8	126	25	46	34.5	32	12	17	TS3	①TKY08D	JPMT060204-E
CBMPR262S32	M16	●	2	26	8.5	132	32	52	39	36	14	19	TS4	②TKY15R	MPMT090308
CBMPR292S32	M18	●	2	29	11.5	138	32	58	43.5	36	14	19	TS4	②TKY15R	MPMT090308
CBMPR322S32	M20	●	2	32	14.5	144	32	64	59	36	14	19	TS4	②TKY15R	MPMT090308
CBMPR352S32	M22	●	2	35	17.5	150	32	70	70	36	14	19	TS4	②TKY15R	MPMT090308
CBMPR392S32	M24	●	2	39	21.5	158	32	78	78	36	14	19	TS4	②TKY15R	MPMT090308
CBMPR432S32	M27	●	2	43	25.5	166	32	86	86	36	14	19	TS4	②TKY15R	MPMT090308
CBMPR482S32	M30	●	2	48	30.5	176	32	96	96	36	14	19	TS4	②TKY15R	MPMT090308

* Clamp Torque (N • m) : TS3=1.0, TS4=3.5

INSERTS

Cutter Type	Shape	Order Number	Class	Coated				Carbide		Dimensions (mm)				Geometry
				VP15TF	UP20M			UTi20T		L	IC	S	RE	
CBJP		**JPMT060204-E**	M	●	●			●		6.5	—	2.38	0.4	
CBMP		**MPMT090308**	M	●	●			●		—	9.525	3.18	0.8	

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	CBJP		CBMP	
				Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)
P	Mild Steel	≤180HB	VP15TF	180 (100—200)	0.16 (0.12—0.2)	180 (100—200)	0.225 (0.15—0.3)
P	Carbon Steel Alloy Steel	180—280HB	VP15TF	180 (100—200)	0.2 (0.15—0.25)	180 (100—200)	0.275 (0.2—0.35)
P	Carbon Steel Alloy Steel	280—350HB	VP15TF	120 (80—160)	0.16 (0.12—0.2)	120 (80—160)	0.225 (0.15—0.3)
M	Stainless Steel	≤200HB	VP15TF	150 (100—200)	0.16 (0.12—0.2)	150 (100—200)	0.225 (0.15—0.3)
K	Cast Iron	Tensile Strength ≤450MPa	VP15TF	160 (100—220)	0.3 (0.2—0.4)	160 (100—220)	0.35 (0.2—0.5)

●Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC) ●Spindle feed (mm/min) = Feed rate x Tool spindle speed
(Note) CBJPR141S25 use feed per revolution 50 % of this table, because only 1 insert on the body.

● : Inventory maintained in Japan. (10 inserts in one case)

SPARE PARTS ➤P001
TECHNICAL DATA ➤Q001

SLOT MILLING

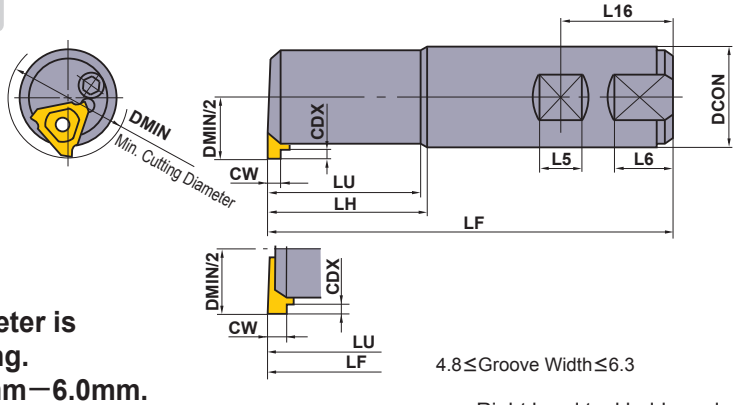
Roughing

KSMG

P	M	K	N	S	H
Steel		Cast Iron			



- Side face grooving tool for machining centers.
- The minimum cutting diameter is ϕ25mm for internal grooving.
- For groove widths of 1.25mm—6.0mm.



Right hand tool holder only.

Order Number	Stock	Number of Teeth	Dimensions (mm)							Geometry of Groove		DMIN (mm)	Insert Number
	R		LF	DCON	LH	LU	L16	L5	L6	CW	CDX		
KSMGR25S25	●	1	115	25	40	36.5	32	12	17	1.25	1.2	25	MGTL33○○○
										1.45	1.5		
										1.5≤CW≤4.0	3.0		
KSMGR40S32	●	1	130	32	50	49	36	14	19	1.25	1.2	40	MGTL43○○○
										1.45	1.5		
										1.5≤CW≤2.3	3.0		
										2.5≤CW≤4.7	4.5		
			131.6	32	51.6	50.6	36	14	19	4.8≤CW≤6.0	4.5	40	MGTL44○○○
KSMGR40S32L	●	1	180	32	100	99	36	14	19	1.25	1.2	40	MGTL43○○
										1.45	1.5		
										1.5≤CW≤2.3	3.0		
										2.5≤CW≤4.7	4.5		
			181.6	32	101.6	100.6	36	14	19	4.8≤CW≤6.0	4.5	40	MGTL44○○○

SPARE PARTS

Tool Holder Number				 *	 ① ②
	Clamp Lever	Spring	Lever Pin	Clamp Screw	Wrench
KSMGR25S25	LLCL13S	HLS2	—	LLCS105	①HKY20F
KSMGR**40S32**	LLCL24	—	LLP14	LLCS108	②HKY30R
KSMGR**40S32L**	LLCL24	—	LLP14	LLCS108	②HKY30R

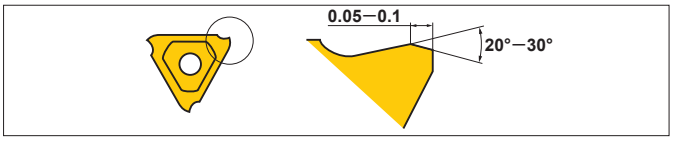
* Clamp Torque (N • m) : LLCS105=1.5, LLCS108=3.3

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
P	Mild Steel	≤180HB	**NX2525 UTi20T**	130 (120—150)	0.225 (0.1—0.35)
			VP20MF	160 (120—200)	0.225 (0.1—0.35)
	Carbon Steel Alloy Steel	180—280HB	**NX2525 UTi20T**	110 (100—120)	0.2 (0.1—0.30)
			VP20MF	120 (100—140)	0.2 (0.1—0.30)
		280—350HB	**UTi20T**	110 (100—120)	0.175 (0.1—0.25)
K	Cast Iron	Tensile Strength ≤450MPa	**UTi20T**	100 (80—125)	0.225 (0.1—0.35)

HONING OF CUTTING EDGE

Supplementary honing when steel cutting gives longer tool life.
Use a diamond file for best results.

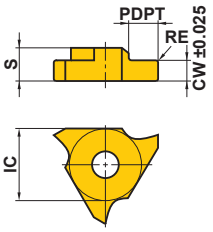


- Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
- Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

● : Inventory maintained in Japan. (10 inserts in one case)

INSERTS

Order Number	Grooving Width	Stock			Dimensions (mm)				Geometry
		Coated	Cermet	Carbide					
		VP20MF	NX2525	UTi20T	IC	S	RE	PDPT	
	CW	L	L	L					
MGTL33125	1.25	●		●	9.525	4.76	0.2	1.2	**MGTL...**
MGTL**33145**	1.45	●		●	9.525	4.76	0.2	1.5	
MGTL**33150**	1.5	●	●	●	9.525	4.76	0.2	3	
MGTL**33175**	1.75	●	●	●	9.525	4.76	0.2	3	
MGTL**33200**	2	●	●	●	9.525	4.76	0.2	3	
MGTL**33230**	2.3	●		●	9.525	4.76	0.2	3	
MGTL**33250**	2.5	●	●	●	9.525	4.76	0.3	3	
MGTL**33270**	2.7	●		●	9.525	4.76	0.3	3	
MGTL**33280**	2.8	●		●	9.525	4.76	0.3	3	
MGTL**33300**	3	●	●	●	9.525	4.76	0.3	3	
MGTL**33320**	3.2	●			9.525	4.76	0.3	3	
MGTL**33330**	3.3	●		●	9.525	4.76	0.3	3	
MGTL**33350**	3.5	●		●	9.525	4.76	0.3	3	
MGTL**33400**	4	●	●	●	9.525	4.76	0.3	3	
MGTL43125	1.25	●	●	●	12.7	4.76	0.2	1.2	
MGTL**43145**	1.45	●	●	●	12.7	4.76	0.2	1.5	
MGTL**43150**	1.5	●	●	●	12.7	4.76	0.2	3	
MGTL**43175**	1.75	●	●	●	12.7	4.76	0.2	3	
MGTL**43200**	2	●	●	●	12.7	4.76	0.2	3	
MGTL**43230**	2.3	●	●	●	12.7	4.76	0.2	3	
MGTL**43250**	2.5	●	●	●	12.7	4.76	0.3	4.5	
MGTL**43260**	2.6	●		●	12.7	4.76	0.3	4.5	
MGTL**43270**	2.7	●		●	12.7	4.76	0.3	4.5	
MGTL**43280**	2.8	●	●	●	12.7	4.76	0.3	4.5	
MGTL**43300**	3	●	●	●	12.7	4.76	0.3	4.5	
MGTL**43320**	3.2			●	12.7	4.76	0.3	4.5	
MGTL**43330**	3.3	●	●	●	12.7	4.76	0.3	4.5	
MGTL**43350**	3.5	●	●	●	12.7	4.76	0.3	4.5	
MGTL**43400**	4	●		●	12.7	4.76	0.3	4.5	
MGTL**43420**	4.2	●		●	12.7	4.76	0.4	4.5	
MGTL**43430**	4.3	●		●	12.7	4.76	0.4	4.5	
MGTL**43450**	4.5	●	●	●	12.7	4.76	0.4	4.5	
MGTL**43470**	4.7	●	●	●	12.7	4.76	0.4	4.5	
MGTL44500	5	●		●	12.7	6.35	0.4	4.5	
MGTL**44600**	6			●	12.7	6.35	0.4	4.5	



SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

VERTICAL FEED MILLING

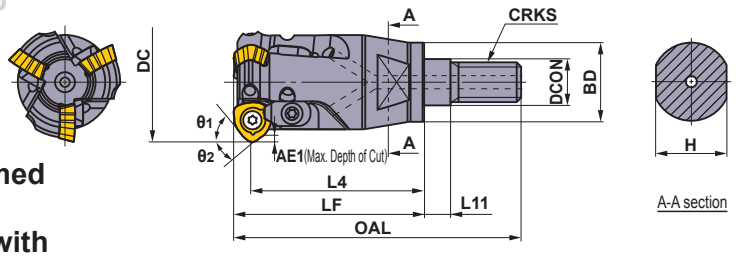
Roughing

PMC

P Steel | M | K Cast Iron | N | S | H



- For under-cutting trimed part of press mould.
- 2 directional cutting with large overhang.



Right hand tool holder only.

Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm)												WT* (kg)	Insert	Shank Arbor
	R			DC	DCON	BD	OAL	LF	L4	L11	H	CRKS	AE1	θ1	θ2			
PMC08R252AM1035	●	○	2	25	10.5	18	58.7	39.7	35	6	14	M10	1.5	40.5°	35°	0.1	JOM□080320 ZZSR-□□	SC20M10S □□□□W
PMC09R323AM1245	●	○	3	32	12.5	21	72.5	50.5	45	6	19	M12	3	40.5°	35°	0.2	JDM□09T320 ZDSR-□□	SC25M12S □□□□W
PMC12R403AM1645	●	○	3	40	17	29	74.4	51.4	45	6	24	M16	3.5	42°	35°	0.3	JDM□120420 ZDSR-□□	SC32M16S □□□□W

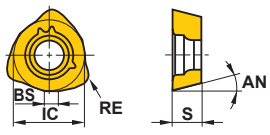
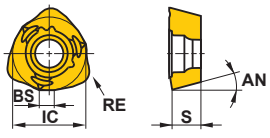
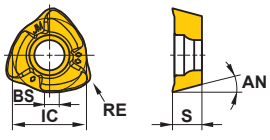
* WT : Tool Weight

SPARE PARTS

Order Number	Clamp Screw *	Clamp Bridge	Clamp Bridge Screw *	Spring	Wrench	Anti-seize Lubricant
PMC08R252AM1035	TS33	AMS3	AJS3010T10	ASS2	②TKY08D ①TKY10R	MK1KS
PMC09R323AM1245	TS351	AMS3	AJS3010T10	ASS2	②TKY10D	MK1KS
PMC12R403AM1645	TS43	AMS4	AJS4012T15	ASS2	②TKY15D	MK1KS

* Clamp Torque (N • m) : TS33=1.5, TS351=2.5, TS43=3.5, AJS3010T10=2.5, AJS4012T15=3.5

INSERTS

Shape	Order Number	Class	Coated				Dimensions (mm)					PMC holder	Geometry
			FH7020	VP15TF	VP30RT		AN	IC	S	BS	RE		
Partial Profile FT Breaker	JOMW080320ZZSR-FT	M	●	●	●		13°	8	3.18	1.4	2	PMC08R252AM1035	
	JDMW09T320ZDSR-FT	M	●	●	●		15°	9.525	3.97	1.8	2	PMC09R323AM1245	
	JDMW120420ZDSR-FT	M	●	●	●		15°	12	4.76	2.5	2	PMC12R403AM1645	
Strong Cutting Edge Type ST Breaker	JDMT120420ZDSR-ST	M	●	●	●		15°	12	4.76	2.5	2	PMC12R403AM1645	
JM Breaker	JOMT080320ZZSR-JM	M	●	●	●		13°	8	3.18	1.4	2	PMC08R252AM1035	
	JDMT09T320ZDSR-JM	M	●	●	●		15°	9.525	3.97	1.8	2	PMC09R323AM1245	
	JDMT120420ZDSR-JM	M	●	●	●		15°	12	4.76	2.5	2	PMC12R403AM1645	

● : Inventory maintained in Japan.

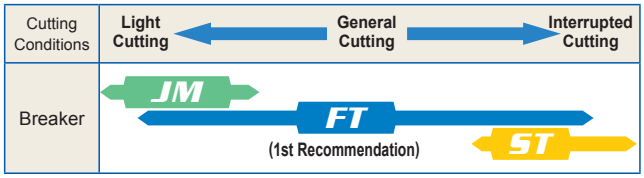
RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Breaker	Diameter (mm)	Number of Teeth	Cutting Speed (m/min)	Feed per Tooth (mm/t.)	Width of Cut (mm)	Pick Feed (mm)
P	Carbon Steel Alloy Steel	≤180HB	VP15TF	FT	ø40	3	250 (200—300)	—0.6	—1.5	—6
					ø32	3	200 (150—220)	—0.55	—1.2	—5
					ø25	2	200 (150—220)	—0.55	—1.0	—5
	Alloy Tool Steel Hardening Tool Steel for Cold Work Dies	≤300HB	VP15TF	FT	ø40	3	250 (200—300)	—0.55	—1.5	—5
					ø32	3	180 (150—200)	—0.5	—1.2	—3
					ø25	2	180 (150—200)	—0.5	—1.0	—3
	Alloy Tool Steel	≤300HB	VP15TF	FT	ø40	3	200 (100—300)	—0.55	—1.5	—5
					ø32	3	150 (80—200)	—0.5	—1.2	—3
					ø25	2	150 (80—200)	—0.5	—1.0	—3
K	Gray Cast Iron	Tensile Strength ≤350MPa	VP15TF	FT	ø40	3	250 (200—300)	—0.6	—1.5	—6
					ø32	3	200 (150—220)	—0.55	—1.2	—5
					ø25	2	200 (150—220)	—0.55	—1.0	—5
	Ductile Cast Iron	Tensile Strength ≤800MPa	VP15TF	FT	ø40	3	250 (200—300)	—0.6	—1.5	—6
					ø32	3	200 (150—220)	—0.55	—1.2	—5
					ø25	2	200 (150—220)	—0.55	—1.0	—5

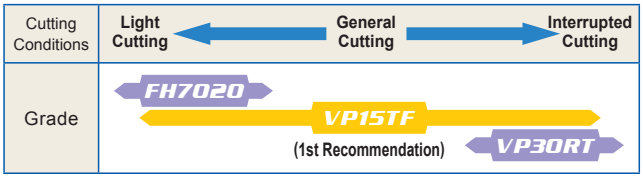
● Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
● Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

(Note 1) The above cutting conditions are general guide lines. Adjustments maybe necessary depending on machine rigidity, workpiece geometry and clamping.
(Note 2) A carbide shank extension is recommended to prevent vibrations.

Application of Breakers



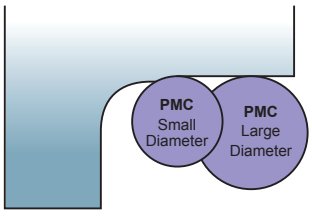
Application of Insert Grades

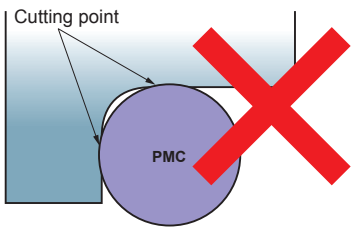


NOTES ON MACHINING METHODS

How to choose an appropriate diameter tool.

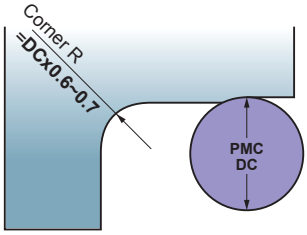
Machine plain surfaces with a larger tool and corner radii with smaller diameter cutters.





Relation of the cutter diameter and corner R size of work piece

A guide for the smallest possible workpiece radius that can be machined is from 0.6—0.7 x diameter of the tool.



Tool diameter **DC**(mm)	Corner R (mm)
ϕ25	R≥17.5
ϕ32	R≥22
ϕ40	R≥24

*Adjust cutting conditions according to the set up.
*Smaller workpiece corner radii (only >0.5 x cutter &) may be possible by reducing the width of cut, speed and pick feed.

ARBORS	➤L145
SPARE PARTS	➤P001
TECHNICAL DATA	➤Q001

VERTICAL FEED MILLING

Finishing

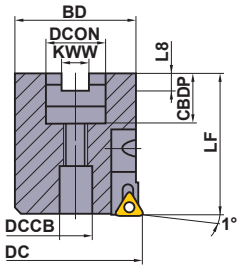
PMF

P Steel | M | K Cast Iron | N | S | H

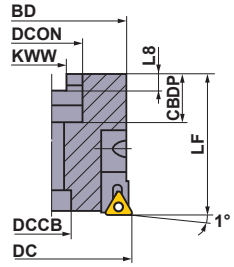


- 2 directional cutting with large overhang.
- Excellent straightness.
- Excellent wall accuracy.

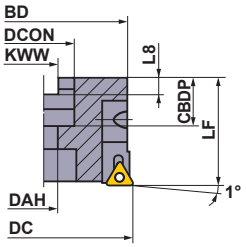
ø50



ø63



ø80



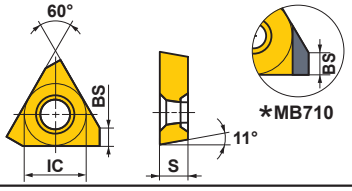
Right hand tool holder only.

Order Number	Stock	Number of Teeth	Dimensions (mm)									Cartridge	Clamp Screw *	Radial Screw	Set Bolt (Cartridge) *	Wrench	Wrench	Set Bolt	Insert
	R		DC	LF	DCON	CBDP	DAH	DCCB	KWW	L8	BD								
PMF05004A22R	●	4	50	63	22	20	—	12	10.4	6.3	48	PMFA13R	TS254	TSS04005	HBH06012	TKY08F	HKY40R HKY50R	①HDS10031	TPEW 1303 ZP□R2
PMF**06306A22R**	●	6	63	63	22	20	—	18	10.4	6.3	60	PMFA13R	TS254	TSS04005	HBH06012	TKY08F	HKY40R	②HSC10050	
PMF**08008A27R**	●	8	80	50	27	23	13.5	—	12.4	7	75	PMFA13R	TS254	TSS04005	HBH06012	TKY08F	HKY40R	②HSC12035	

* Clamp Torque (N • m) : TS254=1.0, HBH06012=8.5

INSERTS

Shape	Order Number	Class	Coated VP15TF	Coated AP10H	Coated	Coated	CBN MB710	CBN	Dimensions (mm) IC	S	BS	Geometry
	TPEW1303ZPER2	E	●	●					7.94	3.18	2	
*	* TPEW**1303ZPTR2**	E					●		7.94	3.18	2	



RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
P	Carbon Steel Alloy Steel	180—280HB	**VP15TF**	250 (150—350)	0.1 (0.05—0.15)
		280—380HB	**VP15TF**	200 (100—300)	
K	Gray Cast Iron	Tensile Strength ≤350MPa	**AP10H**	350 (200—500)	0.1 (0.05—0.15)
			MB710	1500 (1000—2000)	

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
K	Ductile Cast Iron	Tensile Strength 360—500MPa	**AP10H**	250 (150—350)	0.1 (0.05—0.15)
			MB710	1000 (800—1200)	
	Ductile Cast Iron	Tensile Strength 500—800MPa	**AP10H**	200 (100—300)	0.1 (0.05—0.15)
			MB710	1000 (800—1200)	

- Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
- Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

(Note 1) Recommended radial depth of cut is 0.1mm.
(Note 2) 2 directional vertical cutting is recommended for efficiency.
(Note 3) For crossfeed cutting, the feed per tooth should be reduced to less than 0.05(mm/t.).

● : Inventory maintained in Japan.
(10 inserts in one case) (CBN inserts are available in 1 piece in one case.)

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

VERTICAL FEED MILLING

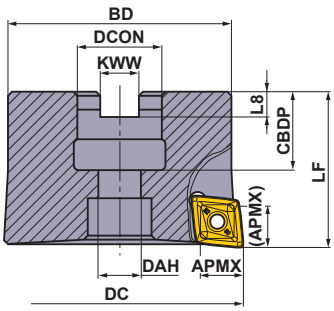
Roughing

PMR

P Steel | M | K Cast Iron | N | S | H

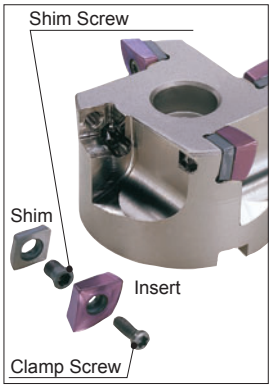


- 1 directional cutting with large overhang.
- Horizontal feed cutting and oblique cutting are also possible.
- Unique shape of curved edge gives high rigidity and low resistance.



Right hand tool holder only.

Type	Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	LF	DCON	CBDP	DAH	BD	KWW	L8	APMX	Insert
Metric	PMR405003A22R	●	3	50	40	22	20	11	45	10.4	6.3	11	CPMT1205ZPEN-M2/3
	PMR406304A22R	●	4	63	40	22	20	11	57	10.4	6.3	11	CPMT1205ZPEN-M2/3
	PMR408005A27R	●	5	80	50	27	23	13	73	12.4	7	11	CPMT1205ZPEN-M2/3
	PMR608004A27R	●	4	80	50	27	23	13	72	12.4	7	17	CPMT1906ZPEN-M2/3
Inch	PMR405003BR	●	3	50	40	22.225	19	11	45	8.4	5	11	CPMT1205ZPEN-M2/3
	PMR406304BR	●	4	63	40	22.225	19	11	57	8.4	5	11	CPMT1205ZPEN-M2/3
	PMR408005DR	●	5	80	63	31.75	32	17	73	12.7	8	11	CPMT1205ZPEN-M2/3
	PMR608004DR	●	4	80	63	31.75	32	17	72	12.7	8	17	CPMT1906ZPEN-M2/3

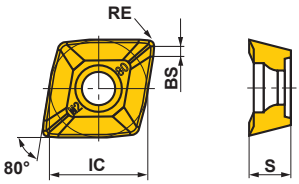
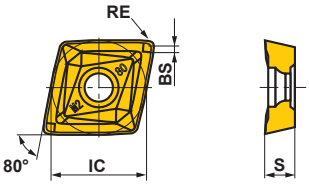


SPARE PARTS

Tool Holder Number	Shim	Shim Screw *	Clamp Screw *	Wrench (Insert)	Wrench (Shim)	Set Bolt
PMR405003A22R	STPMR4N	WCS503507H	①TPS35	①TIP15T	HKY35R	HSC10035
PMR406304A22R	STPMR4N	WCS503507H	①TPS35	①TIP15T	HKY35R	HSC10035
PMR408005A27R	STPMR4N	WCS503507H	①TPS35	①TIP15T	HKY35R	HSC12035
PMR405003BR	STPMR4N	WCS503507H	①TPS35	①TIP15T	HKY35R	HSC10035
PMR406304BR	STPMR4N	WCS503507H	①TPS35	①TIP15T	HKY35R	HSC10035
PMR408005DR	STPMR4N	WCS503507H	①TPS35	①TIP15T	HKY35R	HSC16040
PMR608004A27R	STPMR6N	WCS604010H	②CSF401260T	②TKY20D	HKY40R	HSC12035
PMR608004DR	STPMR6N	WCS604010H	②CSF401260T	②TKY20D	HKY40R	HSC16040

* Clamp Torque (N • m) : TPS35=3.5, CSF401260T=5.0, WCS503507H=5.0, WCS604010H=7.0

INSERTS

Shape	Order Number	Class	Coated VP15TF			Dimensions (mm) IC	S	BS	RE	Geometry
	CPMT1205ZPEN-M2	M	●			12.7	5.56	1.4	0.8	
	CPMT1205ZPEN-M3	M	●			12.7	5.56	1.4	1.2	
	CPMT1906ZPEN-M2	M	●			19.05	6.35	1.4	0.8	
	CPMT1906ZPEN-M3	M	●			19.05	6.35	1.4	1.2	

● : Inventory maintained in Japan. (10 inserts in one case)

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)	pf (mm)
P	Carbon Steel Alloy Steel	180－280HB	**VP15TF**	180 (150－200)	0.2 (0.1－0.3)	≤0.5DC
		280－380HB				
K	Gray Cast Iron	Tensile Strength ≤350MPa	**VP15TF**	180 (150－200)	0.2 (0.1－0.3)	≤0.5DC
	Ductile Cast Iron	Tensile Strength 360－500MPa	**VP15TF**	150 (120－170)	0.2 (0.1－0.3)	≤0.5DC
		Tensile Strength 500－800MPa	**VP15TF**	120 (100－150)	0.2 (0.1－0.3)	≤0.5DC

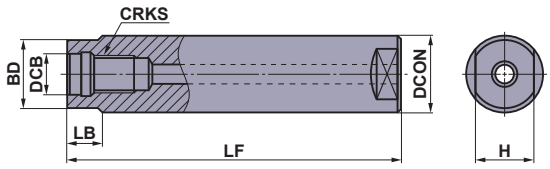
● Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
● Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution
(Note 1) The above conditions are suitable for general machining purposes, it is possible to use conditions that are different from the above.
(Note 2) For horizontal feed machining, please reduce the feed rate by 20－40%.
(Note 3) If vibration occurs when machining, please reduce the depth of cut, and reduce the cutting speed by 20－50%.

ARBORS

ARBORS FOR SCREW-IN TOOLS

STRAIGHT SHANK ARBOR





Type	Order Number	Stock	Dimensions (mm)						
			DCB	DCON	BD	LF	LB	H	CRKS
STEEL SHANK TYPE	SC16M08S100S	●	8.5	16	14.5	100	10	10	M8
	SC16M08S200L	●	8.5	16	14.5	200	10	10	M8
	SC20M10S120S	●	10.5	20	18.5	120	10	14	M10
	SC20M10S220L	●	10.5	20	18.5	220	10	14	M10
	SC25M12S125S	●	12.5	25	23.5	125	10	19	M12
	SC25M12S245L	●	12.5	25	23.5	245	10	19	M12
	SC32M16S140S	●	17	32	28.5	140	15	24	M16
	SC32M16S280L	●	17	32	28.5	280	15	24	M16
CARBIDE SHANK TYPE	SC16M08S100SW	●	8.5	16	14.5	100	10	10	M8
	SC16M08S200LW	●	8.5	16	14.5	200	10	10	M8
	SC20M10S120SW	●	10.5	20	18.5	120	10	14	M10
	SC20M10S220LW	●	10.5	20	18.5	220	10	14	M10
	SC25M12S125SW	●	12.5	25	23.5	125	10	19	M12
	SC25M12S245LW	●	12.5	25	23.5	245	10	19	M12
	SC32M16S140SW	●	17	32	28.5	140	15	24	M16
	SC32M16S280LW	●	17	32	28.5	280	15	24	M16

HOW TO INSTALL THE SCREW-IN HEAD

①Thoroughly clean the clamp section of the head and the arbor with an air blower or brush before installation.

②Tighten the head at the recommended torque and ensure that there is no gap between the head and arbor.



Screw Size	Recommended Torque (N • m)	Wrench Size (mm)
M8	23	10
M10	46	14
M12	80	19
M16	90	24

●Cutting tools become extremely hot during cutting. Never touch them with bare hands after operation as this mayproduce risk of injuries or burns.
●Do not handle the cutting tools with bare hands as this may cause injuries.

CUTTER TYPE

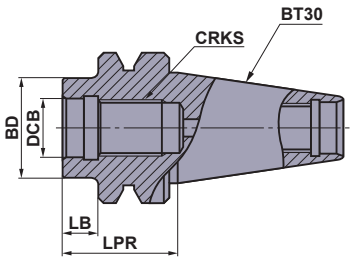
ASX400	➲ L042	ARX	➲ L099
APX3000	➲ L048	SRF	➲ L121
APX4000	➲ L054	SUF	➲ L125
AQX	➲ L078	SRM2	➲ L130
AJX	➲ L088	PMC	➲ L140

● : Inventory maintained in Japan.

SPARE PARTS ➲ P001
TECHNICAL DATA ➲ Q001

BT30 SHANK ARBOR

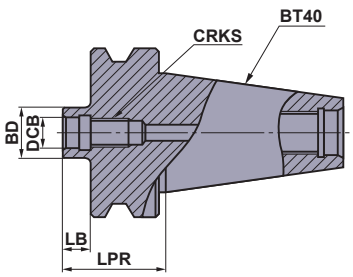




Order Number	Stock	Dimensions (mm)				
		DCB	BD	LPR	LB	CRKS
SC16M08S10-BT30	●	8.5	14.5	32	10	M8
SC20M10S10-BT30	●	10.5	18.5	32	10	M10
SC25M12S10-BT30	●	12.5	23.5	32	10	M12
SC32M16S10-BT30	●	17.0	28.5	32	10	M16

BT40 SHANK ARBOR

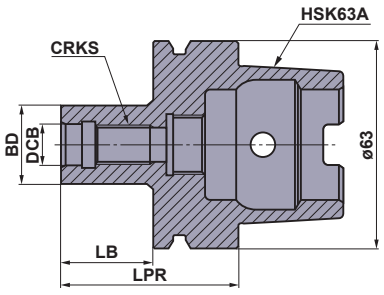




Order Number	Stock	Dimensions (mm)				
		DCB	BD	LPR	LB	CRKS
SC16M08S10-BT40	●	8.5	14.5	37	10	M8
SC20M10S10-BT40	●	10.5	18.5	37	10	M10
SC25M12S10-BT40	●	12.5	23.5	37	10	M12
SC32M16S10-BT40	●	17.0	28.5	37	10	M16

HSK63A SHANK ARBOR





Order Number	Stock	Dimensions (mm)				
		DCB	BD	LPR	LB	CRKS
SC16M08S22-HSK63A	●	8.5	14.5	48	22	M8
SC20M10S24-HSK63A	●	10.5	18.5	50	24	M10
SC25M12S27-HSK63A	●	12.5	23.5	53	27	M12
SC32M16S28-HSK63A	●	17.0	28.5	54	28	M16

CUTTER TYPE

ASX400	➲ L042	ARX	➲ L099
APX3000	➲ L048	SRF	➲ L121
APX4000	➲ L054	SUF	➲ L125
AQX	➲ L078	SRM2	➲ L130
AJX	➲ L088	PMC	➲ L140

● : Inventory maintained in Japan.

SPARE PARTS ➢ P001
TECHNICAL DATA ➢ Q001

FACE MILLING

<HIGH SPEED FINISHING ALUMINIUM ALLOY >

Finishing

V10000

P M K **N** S H

Non-ferrous Metal



- Insert with PCD.
- Light weight, strong aluminium alloy cutter body.
- Anti-Fly insert mechanism enables high speed milling.
- Adjustable cutting edge run-out function.

KAPR :0°
GAMP:+8°
GAMF:+8°

Fig.1
ø63

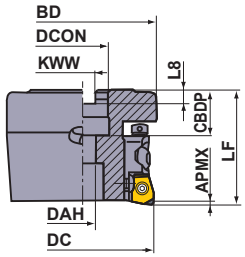
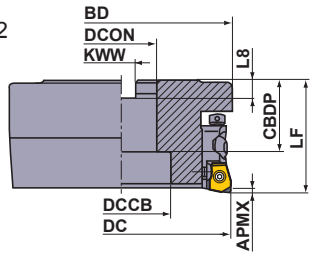


Fig.2
ø80
ø100
ø125

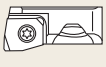


Right hand tool holder only.

Order Number	Stock	Number of Teeth	Dimensions (mm)									WT* (kg)	APMX (mm)	Max. Allowable Revolution (min^{-1})	Type (Fig.)
	R		DC	LF	DCON	CBDP	DAH	DCCB	BD	KWW	L8				
V10000-063A04R	●	4	63	50	22	20	11	—	66.1	10.4	6.3	0.5	1.5	25000	1
V10000R0305C	●	5	80	50	25.4	26	—	38	81.7	9.5	6	0.6	1.5	22300	2
V10000R0406D	●	6	100	50	31.75	32	—	45	100.88	12.7	8	0.9	1.5	20000	2
V10000R0508E	●	8	125	63	38.1	35	—	60	125.22	15.9	10	1.8	1.5	17800	2

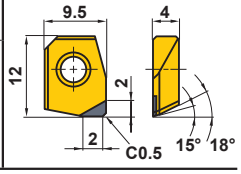
* WT : Tool Weight

SPARE PARTS

Tool Holder Number		 *	 *	 *				
	Cartridge	Cartridge Clamp Screw-A	Cartridge Clamp Screw-B	Insert Clamp Screw	Run-out Adjust Screw	Balance Adjust Screw	Wrench	Wrench
V10000-063A04R ı V10000R0508E	VCT13R	HBH06016	HBH04008	CS350790T	KS1	HSS05005	HKY25R HKY40R	TKY10R

* Clamp Torque (N • m) : CS350790T=3.5, HBH06016=8.0, HBH04008=4.0

INSERTS

Order Number	Class	PCD MD220	Geometry
NP-GDCW1240PDFR2	C	●	

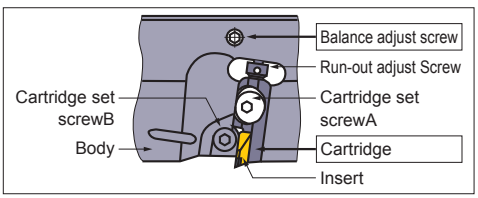
RECOMMENDED CUTTING CONDITIONS

Work Material		Silicon (%)	Cutting Speed (m/min)	Feed per Tooth (mm/t.)	Depth of Cut (mm)
N	Aluminium Alloy	≤16	—6500	—0.2	—0.5
		≥16	—1000		

NOTE ON ROTATIONAL BALANCE

- At the time of shipping, the cutter body is balanced by using a special high accuracy master insert in order that it will conform to balance quality G6.3 based on ISO 1940/1 (approximate value at the maximum revolution for each cutter diameter). In order to keep good rotational balance, do not adjust the balance screw (HSS05005) located on the outer surface of the body.
- Rotational balance will change after exchanging cartridges. If you use the cutter at the same revolution as that of the following table or higher, re-balancing is necessary after exchanging cartridges. Please contact Mitsubishi Materials to re-balance the cutter.

(Note 1) If the revolution is the same as or lower than the value indicated above, the cutter can be used with a standard arbor. (Do not use long shank type arbors or special arbors, as the overhang could make it dangerous to use.)
(Note 2) If the revolution is higher than the value indicated above, please set the balance as follows : (Arbor + cutter)≤G6.3



Diameter of cutter (mm)	Revolution requiring re-balancing (min^{-1})
63	17000
80	14500
100	14000
125	Re-balancing not necessary up to the max. revolution

● : **Inventory maintained in Japan. (1 insert in one case)**

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

FACE MILLING

<For aluminium alloy and cast iron / high feed rate and finishing>

Finishing

NF10000

P | M | **K** Cast Iron | **N** Non-ferrous Metal | S | H



KAPR :0°
GAMP:+10°
GAMF:+5°

- **Suitable for high-speed finishing of light alloy and cast iron.**
- **Adjustable cutting edge run-out function.**

Fig.1
ø80
ø100

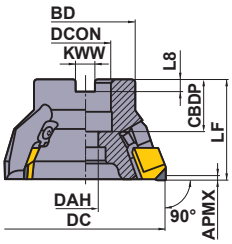
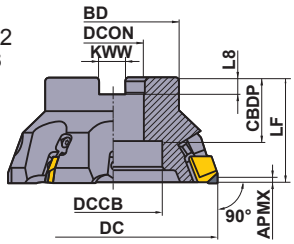


Fig.2
ø125

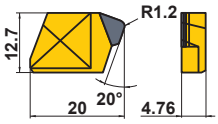
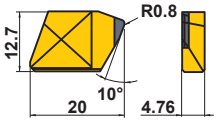


Right hand tool holder only.

Type	Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	LF	DCON	CBDP	DAH	DCCB	BD	KWW	L8	WT *2 (kg)	APMX (mm) PCD	CBN	Max. *1 Allowable Revolution (min^{-1})	Type (Fig.)
Coarse Pitch	**NF10000R0305C**	●	5	80	50	25.4	26	13	—	80.2	9.5	6	1.0	4.0	1.0	16000	1
	NF10000R**0406D**	●	6	100	63	31.75	32	17	—	100.2	12.7	8	1.8	4.0	1.0	14000	1
	NF10000R**0508E**	●	8	125	63	38.1	38	—	60	125.2	15.9	10	2.7	4.0	1.0	12000	2
Fine Pitch	NF10000R**0306C**	●	6	80	50	25.4	26	13	—	80.2	9.5	6	1.0	4.0	1.0	16000	1
	NF10000R**0408D**	●	8	100	63	31.75	32	17	—	100.2	12.7	8	1.8	4.0	1.0	14000	1
	NF10000R**0510E**	●	10	125	63	38.1	38	—	60	125.2	15.9	10	2.7	4.0	1.0	12000	2

*1 Ensure max. spindle speed is achieved under the conditions that the cutter is clamped by a machine clamping force of 18kN with a standard type arbor. (HSK 63A-FMA□□□-60) The figure varies in actual machining depending on cutting conditions, such as the length of overhang or if there is insufficient drawing force from the arbor.
*2 WT : Tool Weight

INSERTS

Order Number	Class	PCD MD220	CBN MB730	Geometry
GDCN2004PDFR3	C	●		
NP-GDCN2004PDSR3	C		●	

SPARE PARTS

Tool Holder Number	Wedge	Clamp Screw *	Wrench
NF10000R0305C ı **NF10000R0510E**	CWAF10R1	LS10T	TKY25T

* Clamp Torque (N • m) : LS10T=8.5

RECOMMENDED CUTTING CONDITIONS

	Work Material	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
N	Aluminium Alloy	**MD220**	3500 (1000—4500)	0.12 (0.05—0.20)
K	Gray Cast Iron	**MB730**	1000 (800—1500)	0.15 (0.05—0.5)

● Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
● Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

● : **Inventory maintained in Japan. (1 insert in one case)**

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

FACE MILLING
<GENERAL HIGH FEED FINISHING>

Finishing

FF3000

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal		



- 11°positive insert.
- 1000—3000mm/min high feed machining.
- For finishing of steel machining.
- Adjustable cutting edge run-out function.

Fig.1

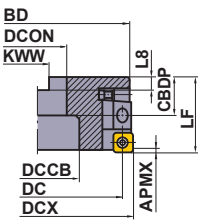
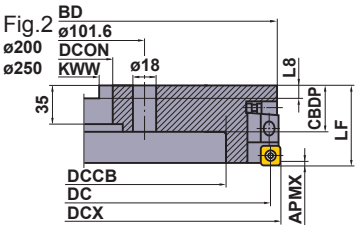


Fig.2



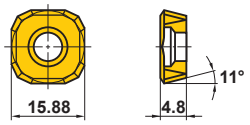
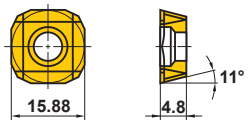
Right hand tool holder only.

KAPR :0°
GAMP:+5° T:+15°
GAMF:-15° I :+5°

Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	DCX	LF	DCON	CBDP	DCCB	BD	KWW	L8	WT* (kg)	APMX (mm)	Type (Fig.)
FF3000R0502E	●	2	125	140.4	75	38.1	38	60	132.8	15.9	10	5.8	0.3	1
FF3000R**0602F**	●	2	160	175.4	75	50.8	38	80	165.6	19.1	11	9.0	0.3	1
FF3000R**0802K**	●	2	200	215.4	75	47.625	45	134	204.1	25.4	14	12.6	0.3	2
FF3000R**1002K**	●	2	250	265.4	75	47.625	45	182	252.8	25.4	14	19.5	0.3	2

* WT : Tool Weight

INSERTS

Geometry	Class	Order Number			Cermet NX2525	Carbide HTi05T
	C	**SPCA53Z**			●	
		Work Material	Steel		○	
			Stainless Steel		◎	
			Cast Iron		○	
			Aluminium Alloy		–	
	C	**SPCG53Z**			●	●
		Work Material	Steel		◎	–
			Stainless Steel		○	–
			Cast Iron		◎	◎
			Aluminium Alloy		–	◎

◎ : 1st Recommendation, ○ : 2nd Recommendation, — : No recommendations

RECOMMENDED CUTTING CONDITIONS

Work Material		Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
P	Mild Steel	≤180HB	**NX2525 (SPCG)**	280 (250—300)	2.25 (2—2.5)
P	Carbon Steel Alloy Steel	180—280HB	**NX2525 (SPCG)**	180 (150—220)	2.25 (2—2.5)
P	High Alloy Steel	200—280HB	**NX2525 (SPCA)**	120 (80—150)	2.25 (2—2.5)
M	Stainless Steel	≤200HB	**NX2525 (SPCA)**	250 (230—280)	3.0 (2.5—3.5)
K	Cast Iron	Tensile Strength ≤450MPa	**NX2525 (SPCG)**	180 (130—200)	2.25 (2—2.5)
K	Cast Iron	Tensile Strength ≤450MPa	**HTi05T**	120 (100—150)	2.25 (2—2.5)
N	Aluminium Alloy	—	**HTi05T**	≤500	0.85 (0.7—1.0)

- Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
- Table Feed (mm/min)
  =Feed per Tooth x Number of Teeth x Cutter Revolution

SPARE PARTS

Tool Holder Number	Cartridge	Shim	Lock Pin *	Cartridge Clamp Screw *	Washer	Radial Spring
FF3000R0502E — FF3000R1002K	FFCSR	FFSS	FFP	HBH08040	FFW	FFRP
Tool Holder Number	Adjusting Wedge	Adjusting Screw	Lever	Lever Screw	Axial Spring	Wrench
FF3000R0502E — FF3000R1002K	FFAWR	LS3	FFL	FFLB	HP3	①HKY25L ②HKY40T

* Clamp Torque (N • m) : FFP=2.2, HBH08040=9.5

● : **Inventory maintained in Japan. (10 inserts in one case)**

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

QUICK CHANGE TYPE
<HIGH FEED CUTTING FOR CAST IRON>

0°

Finishing

FP490

P | M | **K** | N | S | H

Cast Iron



- 11°positive insert.
- Suitable for cast iron finishing.
- Multi insert design.
- For high feed cutting.
- Easy tool exchange.

Fig.1
Q type (Small Diameter)
ø80
ø100
ø125
ø160

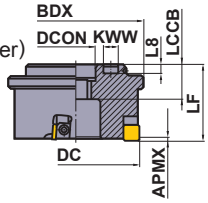


Fig.2
Q type (Large Diameter)
ø200
ø250
ø315
ø355
ø400
ø500

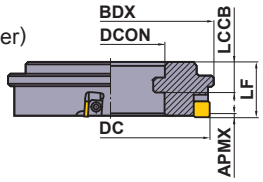
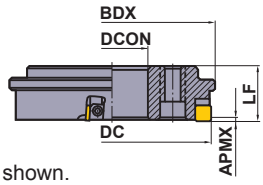


Fig.3
T type
ø250
ø315
ø355
ø400



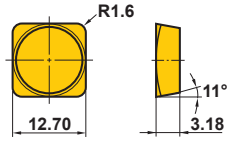
KAPR :0°
GAMP:+5° T:+5°
GAMF:+0° I :0°

Right hand tool holder shown.

Type	Order Number	Number of Teeth	Dimensions (mm) DC	BDX	LF	DCON	LCCB	KWW	L8	WT* (kg)	APMX (mm)	Installation Detail Dimensions	Type (Fig.)
Quick Change Q Type	**FP490R/L0308Q**	8	80	85	50	25.4	26	10.8	7	1.5	0.5	Refer to page M014. (Q Type ϕ80—ϕ160)	1
	FP490R/L**0410Q**	10	100	105	63	31.75	29	12.8	7	2.8	0.5		1
	FP490R/L**0514Q**	14	125	130	63	38.1	29	15.8	7	4.2	0.5		1
	FP490R/L**0618Q**	18	160	165	63	50.8	29	18.8	7	6.7	0.5		1
	FP490R/L**0822Q**	22	200	205	45	125	25	—	—	5.5	0.5	Refer to page M015. (Q Type ϕ200—ϕ500)	2
	FP490R/L**1028Q**	28	250	255	45	175	25	—	—	8.0	0.5		2
	FP490R/L**1236Q**	36	315	320	45	240	25	—	—	10.7	0.5		2
	FP490R/L**1440Q**	40	355	360	45	280	25	—	—	12.2	0.5		2
	FP490R/L**1646Q**	46	400	405	45	325	25	—	—	13.8	0.5		2
	FP490R/L**2056Q**	56	500	505	45	425	25	—	—	17.8	0.5		2
Quick Change T Type	**FP490R/L1028T**	28	250	260	45	110	—	—	—	9.8	0.5	Refer to page M015. (T Type ϕ250—ϕ400)	3
	FP490R/L**1236T**	36	315	325	45	175	—	—	—	12.1	0.5		3
	FP490R/L**1440T**	40	355	365	45	215	—	—	—	14.1	0.5		3
	FP490R/L**1646T**	46	400	410	45	260	—	—	—	15.4	0.5		3

(Note) These are produced to order only.
∗ WT : Tool Weight

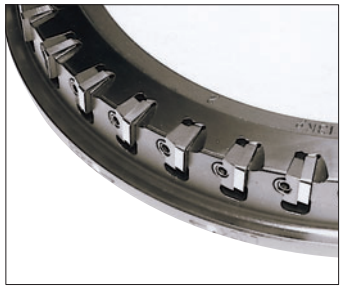
INSERTS

Order Number	Class	Carbide HTi10	Carbide HTi05T	Geometry
SPEN424A	E	●	●	

RECOMMENDED CUTTING CONDITIONS

	Work Material	Tensile Strength	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
K	Gray Cast Iron	≤350MPa	**HTi05T**	125 (100—150)	0.2 (0.1—0.3)

- Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
- Table Feed (mm/min)
  =Feed per Tooth x Number of Teeth x Cutter Revolution



SPARE PARTS

Tool Holder Number	Wedge	Clamp Screw *	Wrench	Wrench (Sold Separately)	Hexagonal Head (Sold Separately)
FP490R/L0308Q ~ **FP490R/L1646T**	CWS42SPR/L	LS14	HKY40T	120QSPK×80 (KANONN-SEIKI CO.)	6.35□×4 (KYOKUTO MFG CO.)

∗ Clamp Torque (N • m) : LS14=8.2

● : Inventory maintained in Japan. (10 inserts in one case)

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

QUICK CHANGE TYPE
<HIGH FEED CUTTING FOR CAST IRON>

Finishing

FP590

P | M | **K** | N | S | H

Cast Iron



- 11°positive insert.
- Suitable for cast iron finishing.
- Multi insert design.
- For high feed cutting.
- Easy tool exchange.

Fig.1
Q type (Small Diameter)
ø125
ø160

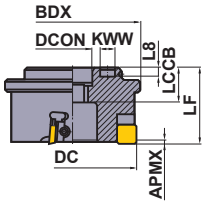


Fig.2
Q type (Large Diameter)
ø200
ø250
ø315
ø355
ø400
ø500

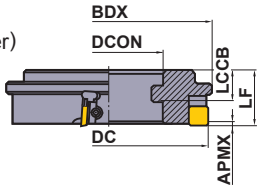
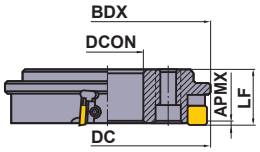


Fig.3
T type
ø250
ø315
ø355
ø400



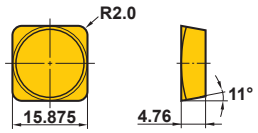
KAPR :0°
GAMP:+5° T :+5°
GAMF:+0° I :0°

Right hand tool holder shown.

Type	Order Number	Number of Teeth	Dimensions(mm) DC	BDX	LF	DCON	LCCB	KWW	L8	WT* (kg)	APMX (mm)	Installation Detail Dimensions	Type (Fig.)
Quick Change Q Type	**FP590R/L0514Q**	14	125	135	63	38.1	29	15.8	7	4.2	0.5	Refer to page M014. (Q Type ø125—ø160)	1
	FP590R/L**0618Q**	18	160	170	63	50.8	29	18.8	7	6.7	0.5		1
	FP590R/L**0822Q**	22	200	210	45	125	25	—	—	5.5	0.5	Refer to page M015. (Q Type ø200—ø500)	2
	FP590R/L**1028Q**	28	250	260	45	175	25	—	—	8.0	0.5		2
	FP590R/L**1236Q**	36	315	325	45	240	25	—	—	10.7	0.5		2
	FP590R/L**1440Q**	40	355	365	45	280	25	—	—	12.2	0.5		2
	FP590R/L**1646Q**	46	400	410	45	325	25	—	—	13.8	0.5		2
	FP590R/L**2056Q**	56	500	510	45	425	25	—	—	17.8	0.5		2
Quick Change T Type	**FP590R/L1028T**	28	250	260	45	110	—	—	—	9.8	0.5	Refer to page M015. (T Type ø250—ø400)	3
	FP590R/L**1236T**	36	315	325	45	175	—	—	—	12.1	0.5		3
	FP590R/L**1440T**	40	355	365	45	215	—	—	—	14.1	0.5		3
	FP590R/L**1646T**	46	400	410	45	260	—	—	—	15.4	0.5		3

(Note) These are produced to order only.
* WT : Tool Weight

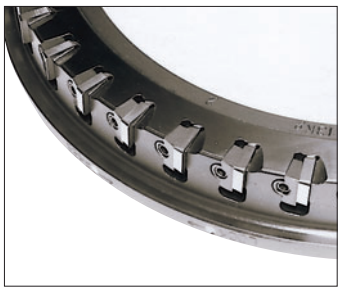
INSERTS

Order Number	Class	Carbide HTi05T	Geometry
SPEN535A	E	●	

RECOMMENDED CUTTING CONDITIONS

	Work Material	Tensile Strength	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
K	Gray Cast Iron	≤350MPa	**HTi05T**	125 (100—150)	0.2 (0.1—0.3)

- Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
- Table Feed (mm/min)
  =Feed per Tooth x Number of Teeth x Cutter Revolution



SPARE PARTS

Tool Holder Number	Wedge	Clamp Screw *	Wrench	Wrench (Sold Separately)	Hexagonal Head (Sold Separately)
FP590R/L0514Q ~ **FP590R/L1646T**	CWS5	LS14	HKY40T	120QSPK×80 (KANONN-SEIKI CO.)	6.35□×4 (KYOKUTO MFG CO.)

* Clamp Torque (N • m) : LS14=8.2

● : Inventory maintained in Japan. (10 inserts in one case)

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

QUICK CHANGE TYPE

<FINISHING FOR ALUMINIUM ALLOY>

4°

Finishing

FE404

P | M | K | **N** | S | H

Non-ferrous Metal



- 21°positive insert.
- High rake and relief angle.
- Suitable for light alloy machining.
- Easy tool exchange.

Fig.1
Q type (Small Diameter)
ø100
ø125
ø160

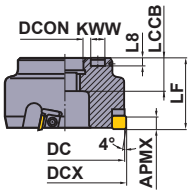


Fig.2
Q type (Large Diameter)
ø200
ø250
ø315
ø355
ø400
ø500

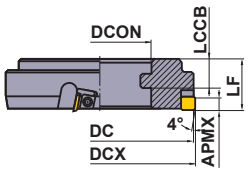
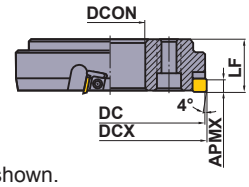


Fig.3
T type
ø250
ø315
ø355
ø400



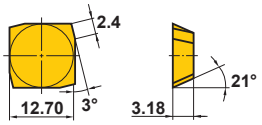
KAPR :4°
GAMP:+11° T:+10°
GAMF:+9° I :+10°

Right hand tool holder shown.

Type	Order Number	Number of Teeth	Dimensions(mm) DC	DCX	LF	DCON	LCCB	KWW	L8	WT* (kg)	APMX (mm)	Installation Detail Dimensions	Type (Fig.)
Quick Change Q Type	**FE404R/L0408Q**	8	100	102	63	31.75	29	12.8	7	3.2	9	Refer to page M014. (Q Type ø100—ø160)	1
	FE404R/L**0510Q**	10	125	127	63	38.1	29	15.8	7	4.7	9		1
	FE404R/L**0612Q**	12	160	162	63	50.8	29	18.8	7	7.6	9		1
	FE404R/L**0816Q**	16	200	202	45	125	25	—	—	6.1	9	Refer to page M015. (Q Type ø200—ø500)	2
	FE404R/L**1020Q**	20	250	252	45	175	25	—	—	7.8	9		2
	FE404R/L**1224Q**	24	315	317	45	240	25	—	—	10.2	9		2
	FE404R/L**1428Q**	28	355	357	45	280	25	—	—	11.8	9		2
	FE404R/L**1632Q**	32	400	402	45	325	25	—	—	13.3	9		2
	FE404R/L**2040Q**	40	500	502	45	425	25	—	—	16.2	9		2
Quick Change T Type	**FE404R/L1020T**	20	250	251	45	110	—	—	—	9.9	9	Refer to page M015. (T Type ø250—ø400)	3
	FE404R/L**1224T**	24	315	316	45	175	—	—	—	12.2	9		3
	FE404R/L**1428T**	28	335	356	45	215	—	—	—	13.7	9		3
	FE404R/L**1632T**	32	400	401	45	260	—	—	—	16.2	9		3

(Note) These are produced to order only.
* WT : Tool Weight

INSERTS

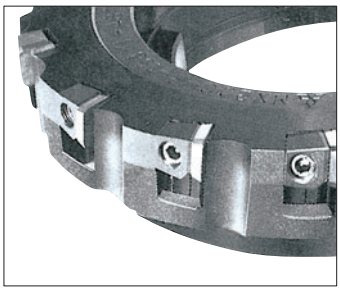
Order Number	Class	Carbide HTi10	Geometry
SEA42C10GR	A	▲	
SEA**42C10GL**	A	▲	

(Note) Use R at a right hand body and L at a left hand body.

RECOMMENDED CUTTING CONDITIONS

Work Material	Silicon (%)	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
N Aluminium Alloy	≤10	**HTi10**	700 (400—1000)	0.15 (0.05—0.25)
	≥10	**HTi10**	400 (200—600)	0.15 (0.05—0.25)

- Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
- Table Feed (mm/min) =Feed per Tooth x Number of Teeth x Cutter Revolution



SPARE PARTS

Tool Holder Number	Wedge	Clamp Screw *	Wrench	Wrench (Sold Separately)	Hexagonal Head (Sold Separately)
FE404R/L0408Q I **FE404R/L1632T**	CWS42SER/L	LS10	HKY40T	120QSPK×80 (KANONN-SEIKI CO.)	6.35□×4 (KYOKUTO MFG CO.)

* Clamp Torque (N • m) : LS10=8.2

▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

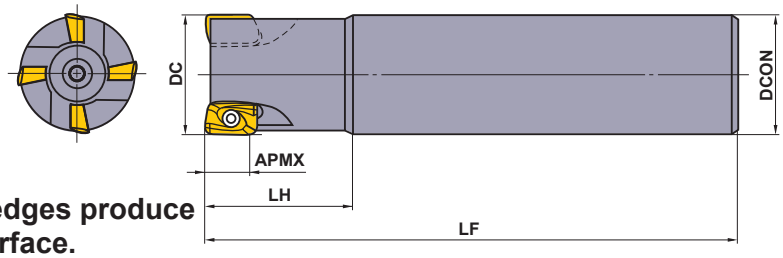
SHOULDER MILLING

Roughing

BAP300

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal	Heat Resistant Alloy	Hardened Steel





- 11° positive insert.
- Inserts with wiper edges produce optimal finished surface.
- Multi insert design for high feed machining.

SHANK TYPE

Right hand tool holder only.

Type	Order Number	Stock	Number of Teeth	Dimensions(mm)					* Clamp Screw	Wrench	Insert
		R		DC	LF	DCON	LH	APMX			
Standard	BAP300R101S16	●	1	10	85	16	25	9	TS25	TKY08F	APG/MT1135PD□R-□□
	BAP300R121S16	●	1	12	85	16	25	9	TS25	TKY08F	
	BAP300R141S16	●	1	14	85	16	25	9	TS25	TKY08F	
	BAP300R162S16	●	2	16	85	16	25	9	TS25	TKY08F	
	BAP300R182S16	●	2	18	85	16	25	9	TS25	TKY08F	
	BAP300R203S20	●	3	20	100	20	30	9	TS25	TKY08F	
	BAP300R223S20	●	3	22	100	20	30	9	TS25	TKY08F	
	BAP300R254S25	●	4	25	115	25	35	9	TS25	TKY08F	
	BAP300R284S25	●	4	28	115	25	35	9	TS25	TKY08F	
	BAP300R304S32	●	4	30	125	32	45	9	TS25	TKY08F	
	BAP300R325S32	●	5	32	125	32	45	9	TS25	TKY08F	
	BAP300R406S32	●	6	40	125	32	45	9	TS25	TKY08F	
	BAP300R507S32	●	7	50	125	32	45	9	TS25	TKY08F	
	BAP300R638S32	●	8	63	125	32	45	9	TS25	TKY08F	
Long	BAP300R202LS20	●	2	20	150	20	60	9	TS25	TKY08F	APG/MT1135PD□R-□□
	BAP300R253LS25	●	3	25	170	25	70	9	TS25	TKY08F	
	BAP300R323LS32	●	3	32	190	32	90	9	TS25	TKY08F	
	BAP300R403LS32	●	3	40	190	32	90	9	TS25	TKY08F	

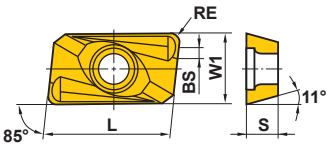
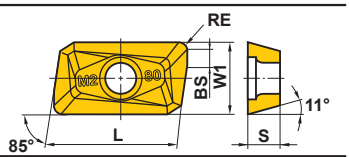
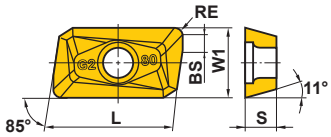
* Clamp Torque (N • m) : TS25=1.0

● : Inventory maintained in Japan. (10 inserts in one case)

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

INSERTS

Work Material			Coated				Cermet		Carbide		Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting Honing : E : Round F : Sharp
	P	Steel	◐	◐			●	◐			
	M	Stainless Steel	◐	◐			○	◐			
	K	Cast Iron		✠			●		◐		
	N	Non-ferrous Metal							◐		
	S	Heat-resistant Alloy, Titanium Alloy		◐							
	H	Hardened Steel		◐							

Shape	Order Number	Class	Honing	Coated F7030	Coated VP15TF			Cermet NX2525	Cermet NX4545	Carbide HTi10		Dimensions(mm) L	W1	S	BS	RE	Geometry
	**APMT1135PDER-H1**	M	E	●	●			●	●	●		11	6.35	3.5	1.5	0.4	
	APMT**1135PDER-H2**	M	E	●	●			●	●	●		11	6.35	3.5	1.2	0.8	
	APMT**1135PDER-H3**	M	E	●								11	6.35	3.5	0.8	1.2	
	APMT**1135PDER-H4**	M	E	●								11	6.35	3.5	0.4	1.6	
	APMT**1135PDER-H6**	M	E	●								11	6.35	3.5	0.4	2.4	
	**APMT1135PDER-M0**	M	E	●								11	6.35	3.5	1.8	0.2	
	APMT**1135PDER-M1**	M	E	●								11	6.35	3.5	1.5	0.4	
	APMT**1135PDER-M2**	M	E	●	●				●			11	6.35	3.5	1.2	0.8	
	**APGT1135PDFR-G2**	G	F							●		11	6.35	3.5	1.2	0.8	

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Breaker	Cutting Mode	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
P	Mild Steel	≤180HB	**NX4545**	**H**	Finish Cutting	160 (120—180)	0.1 (0.05—0.15)
			F7030	**M**	General Cutting	180 (150—200)	0.15 (0.1—0.2)
	Carbon Steel Alloy Steel	180—280HB	**NX4545**	**H**	Finish Cutting	120 (100—160)	0.08 (0.05—0.1)
			F7030	**M**	General Cutting	150 (120—200)	0.15 (0.1—0.2)
			F7030	**H**	Unstable Cutting	120 (100—160)	0.15 (0.1—0.2)
		280—350HB	**NX4545**	**H**	Finish Cutting	100 (80—120)	0.08 (0.05—0.1)
			F7030	**M**	General Cutting	140 (120—160)	0.15 (0.1—0.2)
			F7030	**H**	Unstable Cutting	100 (80—120)	0.2 (0.1—0.25)
M	Stainless Steel	≤200HB	**F7030**	**M**	General Cutting	140 (120—160)	0.15 (0.1—0.2)
			F7030	**H**	Unstable Cutting	120 (80—140)	0.2 (0.1—0.25)
K	Gray Cast Iron	Tensile Strength ≤350MPa	**VP15TF**	**M**	General Cutting	140 (120—160)	0.15 (0.1—0.2)
			HTi10	**H**	General Cutting	120 (100—140)	0.2 (0.1—0.25)
	Ductile Cast Iron (≤JIS FCD450)	Tensile Strength ≤450MPa	**VP15TF**	**M**	General Cutting	120 (100—140)	0.15 (0.1—0.2)
			HTi10	**H**	General Cutting	100 (80—120)	0.2 (0.1—0.25)
	Ductile Cast Iron (≥JIS FCD500)	Tensile Strength 500—800MPa	**VP15TF**	**M**	General Cutting	100 (80—120)	0.1 (0.05—0.15)
			HTi10	**H**	General Cutting	80 (60—100)	0.15 (0.1—0.2)
N	Aluminium Alloy	—	**HTi10**	**G**	General Cutting	500 (200—1000)	0.2 (0.1—0.3)
S	Ti Alloy	≥350HB	**HTi10**	**G**	General Cutting	40 (30—60)	0.2 (0.1—0.3)
	Heat Resistant Alloy	—	**F7030**	**M**	General Cutting	30 (20—40)	0.15 (0.1—0.2)
H	Hardened Steel	≥40HRC	**VP15TF**	**M**	General Cutting	70 (50—100)	0.1 (0.05—0.15)

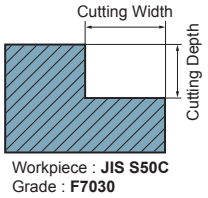
● Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
● Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

CUTTING PERFORMANCE

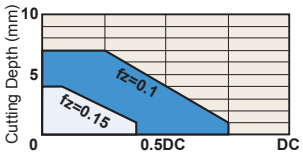
Cemented carbide/Coated carbide

Shoulder Milling

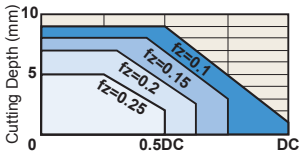


Workpiece : **JIS S50C**
Grade : **F7030**

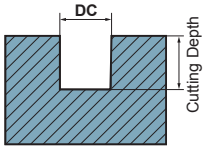
●ϕ10—ϕ14



●ϕ16—ϕ100

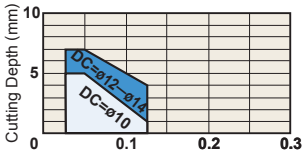


Slot Milling

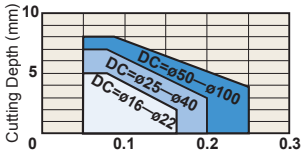


Workpiece : **JIS S50C**
Grade : **F7030**

●ϕ10—ϕ14

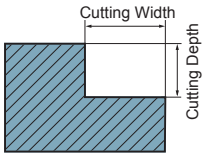


●ϕ16—ϕ100



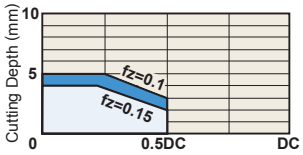
Cermet

Shoulder Milling

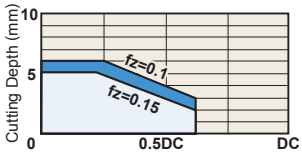


Workpiece : **JIS S50C**
Grade : **NX2525**

●ϕ10—ϕ14



●ϕ16—ϕ100



(Note 1) In each of the adove graphs cutting performance is shown for carbon steel (JIS S50C).
In case of alloy steels, reduce the conditions by 20—30%.
(Note 2) In the case of deep slot milling, air blow should be used.
(Note 3) The diameter "DC" is taken from the tools peripheral cutting edge.

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

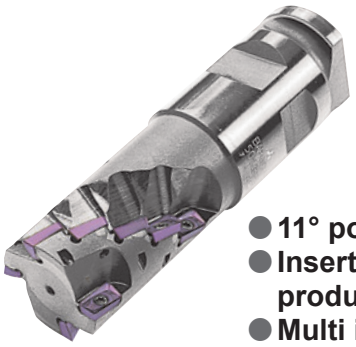
DEEP SHOULDER MILLING

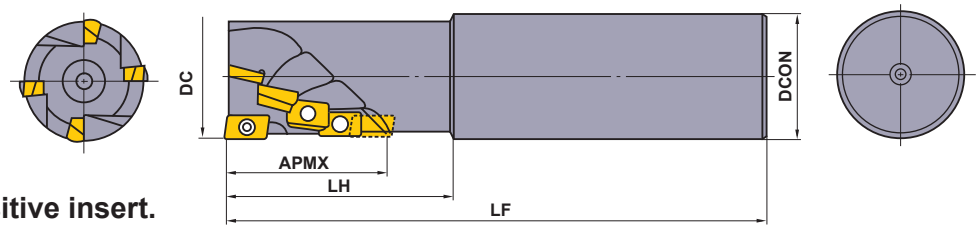
Roughing

BAP300

LONG CUTTING EDGE

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal	Heat Resistant Alloy	Hardened Steel





- 11° positive insert.
- Inserts with wiper edges produce optimal finished surface.
- Multi insert design for high feed machining.

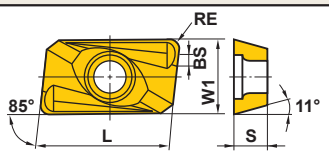
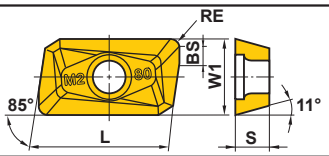
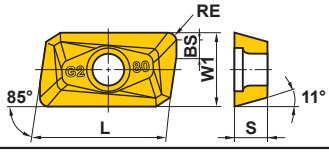
SHANK TYPE

Right hand tool holder only.

Order Number	Stock	Number of Flutes	Total	Dimensions(mm)					*		
	R			DC	LF	DCON	LH	APMX	Clamp Screw	Wrench	Insert
BAP300R2004ES20	●	1	4	20	120	20	40	25	TS25	TKY08F	APG/MT1135 PD□R-M0/□1/□2
BAP300R2508ES25	●	2	8	25	130	25	50	34	TS25	TKY08F	
BAP300R3212ES32	●	2	12	32	140	32	60	43	TS25	TKY08F	
BAP300R4014ES42	●	2	14	40	150	42	70	51	TS25	TKY08F	

* Clamp Torque (N • m) : TS25=1.0

INSERTS

Shape	Order Number	Class	Honing	Coated				Cermet		Carbide		Dimensions(mm)					Geometry
				F7030	VP15TF			NX2525	NX4545	HTi10		L	W1	S	BS	RE	
	APMT1135PDER-H1	M	E	●	●			●	●	●		11	6.35	3.5	1.5	0.4	
	APMT1135PDER-H2	M	E	●	●			●	●	●		11	6.35	3.5	1.2	0.8	
	APMT1135PDER-M0	M	E	●								11	6.35	3.5	1.8	0.2	
	APMT1135PDER-M1	M	E	●								11	6.35	3.5	1.5	0.4	
	APMT1135PDER-M2	M	E	●	●				●			11	6.35	3.5	1.2	0.8	
	APGT1135PDFR-G2	G	F							●		11	6.35	3.5	1.2	0.8	

● : Inventory maintained in Japan. ▲ : Inventory maintained in Japan. To be replaced by new products.
(10 inserts in one case)

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Breaker	Cutting Mode	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
P	Mild Steel	≤180HB	**F7030**	**M**	General Cutting	180 (150—200)	0.15 (0.08—0.2)
P	Carbon Steel Alloy Steel	180—280HB	**F7030**	**M**	General Cutting	150 (120—280)	0.15 (0.08—0.2)
P			**F7030**	**H**	Unstable Cutting	120 (100—160)	0.2 (0.1—0.25)
P		280—350HB	**F7030**	**M**	General Cutting	140 (120—160)	0.1 (0.05—0.15)
P			**F7030**	**H**	Unstable Cutting	100 (80—120)	0.15 (0.08—0.2)
M	Stainless Steel	≤200HB	**F7030**	**M**	General Cutting	140 (120—160)	0.1 (0.08—0.15)
M			**F7030**	**H**	Unstable Cutting	120 (80—140)	0.15 (0.08—0.2)
K	Gray Cast Iron	Tensile Strength ≤350MPa	**VP15TF**	**M**	General Cutting	140 (120—160)	0.15 (0.08—0.2)
K			**HTi10**	**H**	General Cutting	120 (100—140)	0.1 (0.05—0.15)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	**VP15TF**	**M**	General Cutting	120 (100—140)	0.1 (0.05—0.15)
K			**UTi20T**	**H**	General Cutting	100 (80—120)	0.15 (0.08—0.2)
K	Ductile Cast Iron	Tensile Strength 500—800MPa	**VP15TF**	**M**	General Cutting	100 (80—120)	0.08 (0.05—0.1)
K			**HTi10**	**H**	General Cutting	80 (60—100)	0.1 (0.05—0.15)
N	Aluminium Alloy	—	**HTi10**	**G**	General Cutting	500 (200—1000)	0.15 (0.05—0.25)
S	Ti Alloy	≥350HB	**HTi10**	**G**	General Cutting	40 (30—60)	0.15 (0.05—0.25)
S	Heat Resistant Alloy	—	**F7030**	**M**	General Cutting	30 (20—40)	0.1 (0.05—0.15)
H	Hardened Steel	≥40HRC	**VP15TF**	**M**	General Cutting	70 (50—100)	0.08 (0.05—0.1)

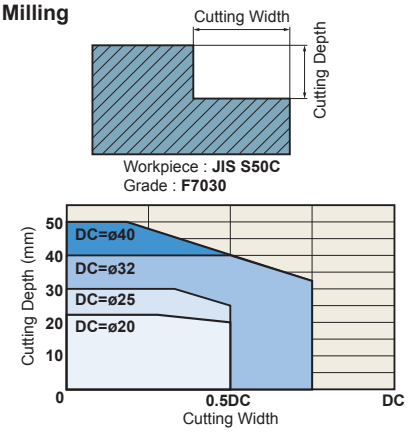
● Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
● Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

SPARE PARTS ➤ P001
TECHNICAL DATA ➤ Q001

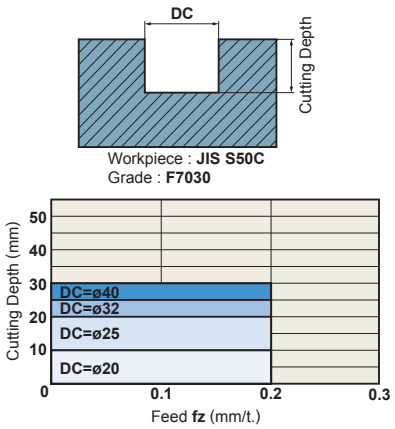
CUTTING PERFORMANCE

Cemented carbide/Coated carbide

Shoulder Milling



Slot Milling

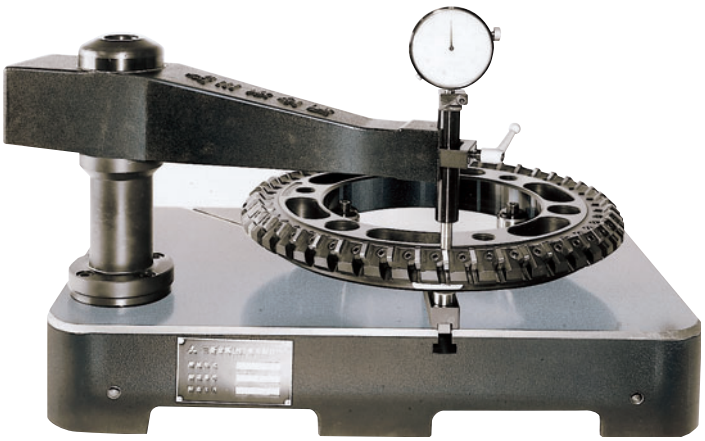


(Note 1) In each of the adove graphs cutting performance is shown for carbon steel (JIS S50C).
In case of alloy steels, reduce the conditions by 20−30%.
(Note 2) In the case of deep slot milling, air blow should be used.
(Note 3) The diameter "DC" is taken from the tools peripheral cutting edge.

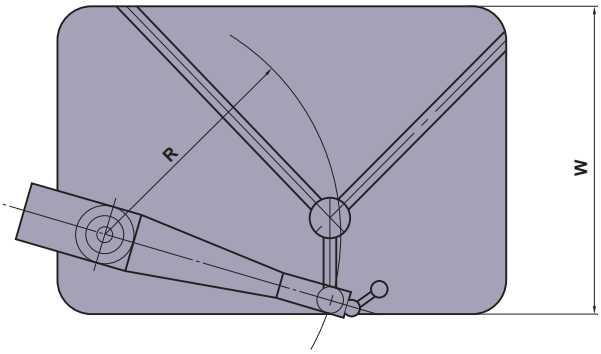
SETTING FIXTURE

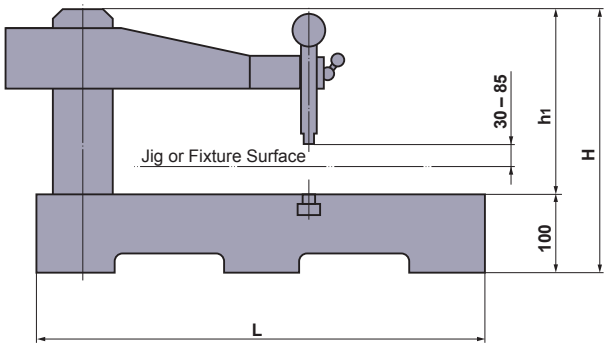
FEATURES OF SETTING FIXTURE

- Compact design.
- Easy set up operation.
- Insert is adjusted from the cutting edge point therefore run-out accuracy is high.



SETTING FIXTURE STANDARD

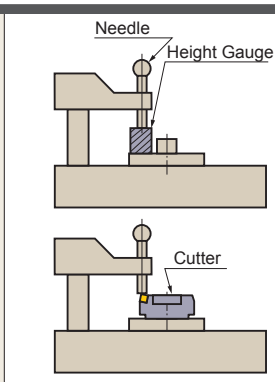




Order Number	R	L	W	H	h1	Cutter Diameter
SEF500	315	600	400	347	247	−ϕ500
SEF700	400	800	500	360	260	ϕ315−ϕ700

(Note 1) Please specify the order number when ordering.
(Note 2) Please contact us regarding special spare parts order.

Method of Insert Setting for One Piece Type.

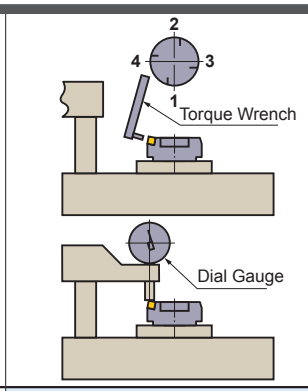


①Set the needle using a height gauge which is the same height as the cutter.

②Move the needle to an insert.

③Slide the insert to the point where it touches the needle Tighten all the inserts lightly. (Use torque wrench.) (1—2N • m)

*Screwing the inserts too tightly results in lower accuracy.



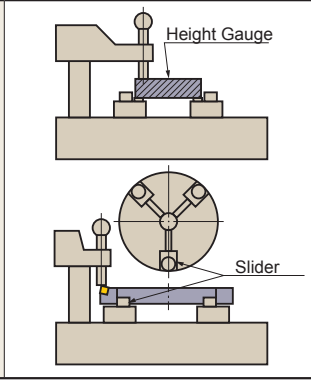
④After temporary tightening, use a torque wrench to tighten firmly. (Use torque wrench.) (8 N • m)

⑤Screw the inserts tightly according to the picture shown on the left.

⑥Check run-out of all the inserts with a dial gauge.

*For general milling, ≤10μm is the standard. For finishing,set the insert run out at≤5μm.

Method of Insert Setting for Two Piece Type.



①Set the height gauge at the same height as the cutter on the liners of slider, then set the needle.

②Put the cutter on the liners of the slider and move the rollers of the slider to the installation holes.

③Make sure that the three rollers are free, then fix the sliders.

*Process of tightening the inserts is the same as the one piece type.

●Note

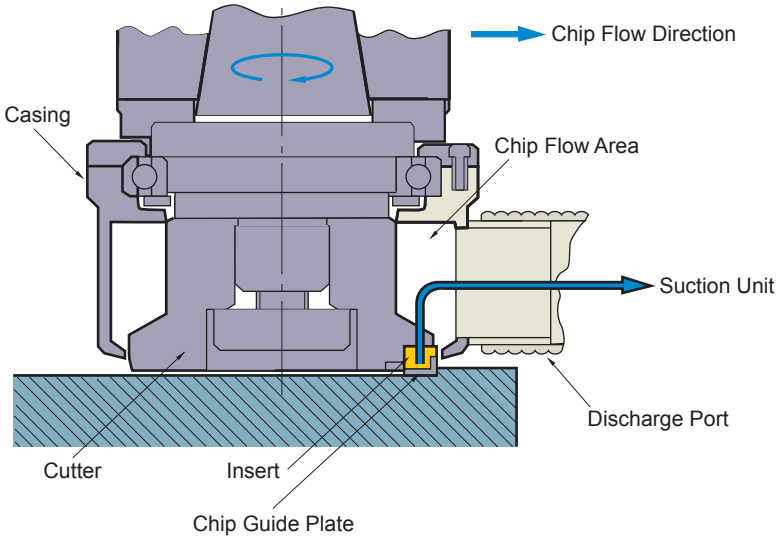
1. After machining, dust off chips on the cutter with air before loosening the wedge.
2. When loosening clamp screws, avoid using a damaged wrench.
3. Alien substances attached to inserts lowers run-out accuracy and damages the cutter body. Therefore, they need to be cleaned throughly.
4. After all the inserts are taken out, clean the cutter body with oil or strong air blow.
5. Use a torque wrench or special wrench for tightening the clamp screws.

Qing SYSTEM

STRUCTURE CHIP COLLECTION METHOD

STRUCTURE

- Automatic continuous intake of chips while machining.
- Eliminates chip handing problems.



1 Cutting is performed by a face mill.

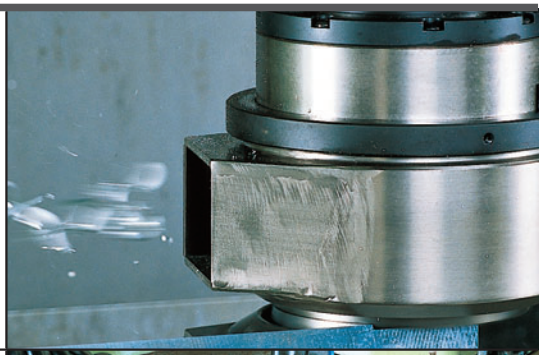
2 Chips are directed into the casing by way of the chip guide plate.

3 Chips are expelled via the discharge port.

CHIP COLLECTION METHOD

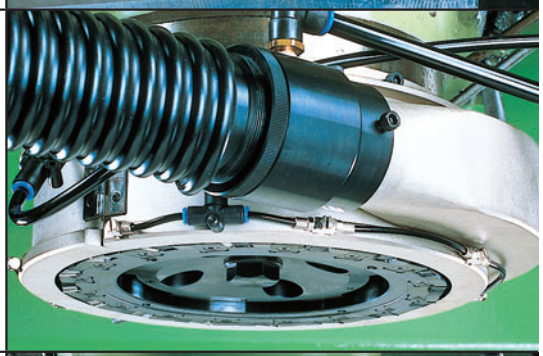
Self Expulsion Type QMC

①Chips are discharged towards the chip conveyor because of the centrifugal force created by the cutter.
②Installation with an ATC(auto tool changer) on machining centers is possible.
③Since there is no need for air or a dust collector, this method provides the lowest initial investment and running costs.
④Chips cannot be transported (carried) directly over long distances.
⑤High speed bearing required to suit high speed machining.



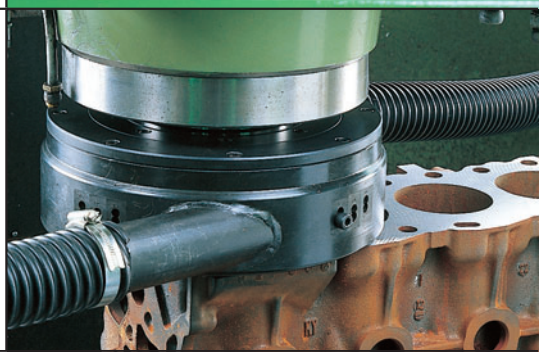
Double Air Type QWA

①Chip recovery using compressed air (factory air).
②Since air is also injected into the casing interior, wet cutting is also possible.
③Achieves the same suction capabilities as a dust collector, thereby enabling low equipment costs.
④Wet cutting is not recommended.



Vacuum Machine Type QSV

①Chip collection by use of a suction machine.
②Chip collection efficiency is high.
③Special equipment is required, such as a mist collector for wet cutting.



MAXIMUM ALLOWABLE REVOLUTION FOR CUTTER

Diameter (mm)	WSX445		ASX445	
	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)
40	19000	3.5	—	—
50	17000	3.5	18000	3.5
63	15000	3.5	16000	3.5
80	14000	3.5	14000	3.5
100	12000	3.5	13000	3.5
125	11000	3.5	12000	3.5
160	9500	3.5	10000	3.5
200	8500	3.5	9000	3.5
250	—	—	8000	3.5
315	—	—	6500	3.5

Diameter (mm)	AHX640S		AHX640W		AOX445		ASX400		SE515	
	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)
40	—	—	—	—	—	—	—	—	—	—
50	—	—	—	—	13000	8	18000	3.5	—	—
63	12000	5	—	—	12000	8	16000	3.5	—	—
80	10000	5	8900	6	11000	8	14000	3.5	—	—
100	8700	5	7800	6	9300	8	13000	3.5	9300	8
125	7500	5	6600	6	8300	8	12000	3.5	8100	8
160	6100	5	5300	6	7200	8	10000	3.5	7000	8
200	5100	5	4100	6	6400	8	9000	3.5	—	—
250	—	—	2900	6	—	—	8000	3.5	—	—
315	—	—	1700	6	—	—	—	—	—	—

Diameter (mm)	AXD4000		AXD7000		BXD4000		V10000		SG20	
	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)	Max. Allowable Revolution (min^{-1})	Clamp Torque (N • m)
20	15000	1.5	—	—	15000	4	—	—	—	—
25	49000	1.5	—	—	38000	4	—	—	—	—
28	48500	1.5	—	—	—	—	—	—	—	—
32	48000	1.5	41000	3.5	33000	4	—	—	—	—
35	45000	1.5	—	—	31000	4	—	—	—	—
40	41000	1.5	36000	3.5	29000	4	—	—	—	—
50	35000	1.5	30000	3.5	24000	4	—	—	—	—
63	30000	1.5	25000	3.5	21000	4	25000	3.5	—	—
80	27000	1.5	23000	3.5	19000	4	22300	3.5	8200	8
100	23000	1.5	19000	3.5	16000	4	20000	3.5	7000	8
125	20000	1.5	16000	3.5	14000	4	17800	3.5	6100	8
160	—	—	—	—	—	—	—	—	5300	8

(Note) All values shown on this chart are based on the insert being properly seated in pocket and torqued to the recommended values.

●For APX3000, please refer to page L046 and L047.
●For APX4000, please refer to page L052 and L053.

LIST OF CUTTING EDGE DIAMETER TOLERANCES

Milling	Cutting edge diameter tolerance (mm)	Milling	Cutting edge diameter tolerance (mm)
APX3000 Arbor Type	−0.1 −0.4	VOX400 Arbor Type	−0.1 −0.4
APX3000 Shank Type	−0.1 −0.2	ASX400	0 −0.3
APX4000 Arbor Type	−0.1 −0.4	AJX	−0.1 −0.4
APX4000 Shank Type	−0.1 −0.2	AQX	−0.1 −0.3
AXD4000 Arbor Type	−0.1 −0.4	SPX	−0.1 −0.3
AXD4000 Shank Type	−0.1 −0.2	OCTACUT	0 −0.3
AXD7000 Arbor Type	−0.1 −0.4	BRP	−0.1 −0.3
AXD7000 Shank Type	−0.1 −0.2	ARX	−0.05 −0.15
BXD4000 Arbor Type	−0.1 −0.4	SRM	−0.05 −0.15
BXD4000 Shank Type	−0.1 −0.2	SRF	0 −0.027
VFX5 Shell Type	−0.1 −0.3	PMR	0 −0.3
VFX6 Shell Type	−0.1 −0.3	PMF	0 −0.3

(Note 1) Cutting edge diameter tolerance when the gauge insert is set.
(Note 2) When setting the insert available, the insert tolerance is added to the above tolerance. (Tolerance when setting the insert for SRF.)

Memo

HOW TO READ THE STANDARD OF TOOLING SYSTEM

●How this section page is organized

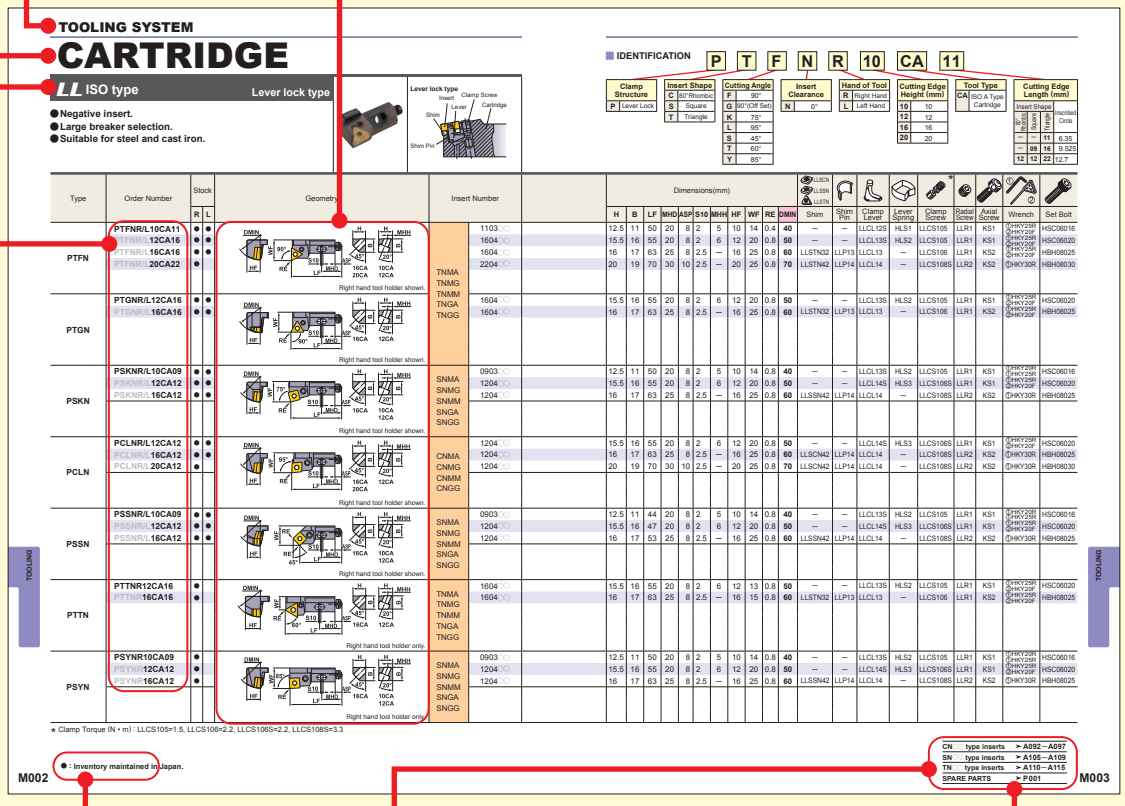
①Organized by product series. (Refer to the index on the next page.)

TYPE/
NAME OF PRODUCT

PRODUCT CATEGORY

PRODUCT SECTION

GEOMETRY



LEGEND FOR STOCK STATUS MARK
is shown on the left hand page of each double-page spread.

REFERENCE PAGE FOR APPLICABLE INSERTS
indicates reference pages for details of inserts that are applicable to the title product.

PAGE REFERENCE ·SPARE PARTS
indicates reference pages, including the above, on the right hand page of each double-page spread.

PRODUCT STANDARDS
indicates order numbers, stock status (per right/left hand), applicable inserts, dimensions, minimum cutting diameters, standard corner radius, and spare parts.

●To Order : Please specify
①order number and hand of tool (right/left).

MILLING TOOLS

TOOLING SYSTEM

CARTRIDGE

- **LL TYPE CARTRIDGE** ····· M002
- **BC TYPE CARTRIDGE** ····· M004
- **SS TYPE CARTRIDGE** ····· M006

BORING UNIT ····· M008

MI TYPE BORING BARS ····· M011

QUICK CHANGE TOOLING SYSTEM

- **CLASSIFICATION OF QUICK CHANGE SYSTEM** ····· M012
- **FACE MILL** ····· M013
- **FACE MILLING ADAPTER** ····· M014
- **SIDE CUTTER** ····· M016
- **BORING TOOL** ····· M017

MODULAR TOOLING SYSTEM

- ABS® License **KOMET**® ····· M018
- **HSK SYSTEM** ····· M022

*Arranged by Alphabetical order

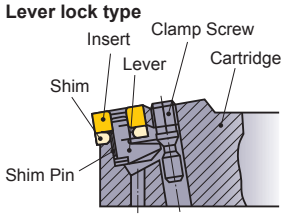
M020 **ABS○○○-ES-M**
M020 **ABS○○○-ES-M1**
M020 **ABS○○○-ES-M3**
M021 **ABS○○○-ES-M4**
M019 **ABS○○○-FS-W**
M020 **ABS○○-ES-M**
M020 **ABS○○-ES-M1**
M020 **ABS○○-ES-M3**
M021 **ABS○○-ES-M4**
M019 **ABS○○-FS-W**
M004 **CSKPR○○CA○○**
M004 **CSSPR○○CA○○**
M004 **CTGPR○○CA○○**
M008 **FA○-FA○○○○**
M008 **FA○-FA○○○○S**
M008 **FV○-FV○○○○**
M008 **FV○-FV○○○○S**
M002 **PCLNR/L○○CA○○**
M002 **PSKNR/L○○CA○○**
M002 **PSSNR/L○○CA○○**
M002 **PSYNR○○CA○○**
M002 **PTFNR/L○○CA○○**
M002 **PTGNR/L○○CA○○**
M002 **PTTNR○○CA○○**
M021 **SBA○○○-ES-M**
M021 **SBA○○○-ES-M1**
M021 **SBA○○-ES-M**
M021 **SBA○○-ES-M1**
M011 **SBR○○○**
M006 **SSKPR○○CA○○**
M006 **SSSPR○○CA○○**
M006 **SSYPR○○CA○○**
M006 **STFPR/L○○CA○○**
M006 **STGPR○○CA○○**
M006 **STTPR○○CA○○**

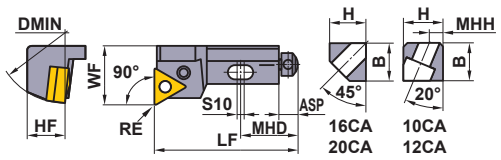
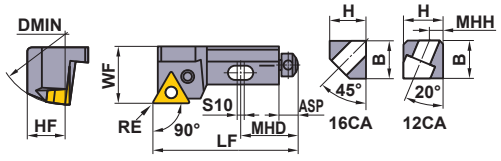
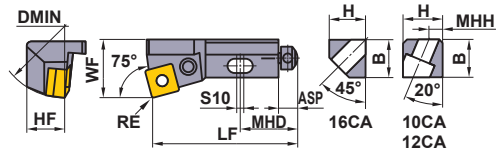
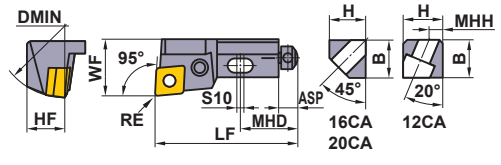
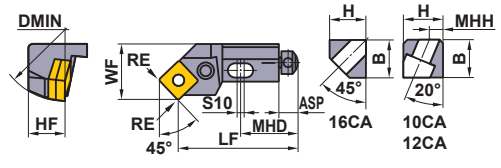
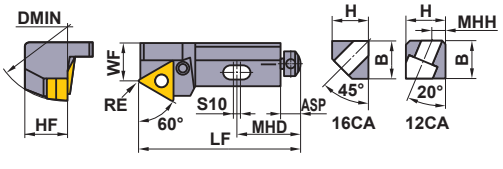
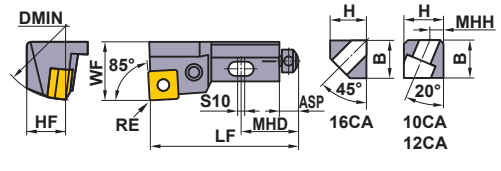
CARTRIDGE

LL ISO type — Lever lock type

- Negative insert.
- Large breaker selection.
- Suitable for steel and cast iron.





Type	Order Number	Stock R	Stock L	Geometry	Insert Number	
PTFN	PTFNR/L10CA11	●	●	 Right hand tool holder shown.	TNMA TNMG TNMM TNGA TNGG	1103○○
	PTFNR/L12CA16	●	●			1604○○
	PTFNR/L16CA16	●	●			1604○○
	PTFNR/L20CA22	●				2204○○
PTGN	PTGNR/L12CA16	●	●	 Right hand tool holder shown.		1604○○
	PTGNR/L16CA16	●	●			1604○○
PSKN	PSKNR/L10CA09	●	●	 Right hand tool holder shown.	SNMA SNMG SNMM SNGA SNGG	0903○○
	PSKNR/L12CA12	●	●			1204○○
	PSKNR/L16CA12	●	●			1204○○
PCLN	PCLNR/L12CA12	●	●	 Right hand tool holder shown.	CNMA CNMG CNMM CNGG	1204○○
	PCLNR/L16CA12	●	●			1204○○
	PCLNR/L20CA12	●				1204○○
PSSN	PSSNR/L10CA09	●	●	 Right hand tool holder shown.	SNMA SNMG SNMM SNGA SNGG	0903○○
	PSSNR/L12CA12	●	●			1204○○
	PSSNR/L16CA12	●	●			1204○○
PTTN	PTTNR12CA16	●		 Right hand tool holder only.	TNMA TNMG TNMM TNGA TNGG	1604○○
	PTTNR16CA16	●				1604○○
PSYN	PSYNR10CA09	●		 Right hand tool holder only.	SNMA SNMG SNMM SNGA SNGG	0903○○
	PSYNR12CA12	●				1204○○
	PSYNR16CA12	●				1204○○

* Clamp Torque (N • m) : LLCS105=1.5, LLCS106=2.2, LLCS106S=2.2, LLCS108S=3.3

● : Inventory maintained in Japan.

IDENTIFICATION

P T F N R 10 CA 11

Clamp Structure	
P	Lever Lock

Insert Shape	
C	80°Rhombic
S	Square
T	Triangle

Cutting Angle	
F	90°
G	90°(Off Set)
K	75°
L	95°
S	45°
T	60°
Y	85°

Insert Clearance	
N	0°

Hand of Tool	
R	Right Hand
L	Left Hand

Cutting Edge Height (mm)	
10	10
12	12
16	16
20	20

Tool Type	
CA	ISO A Type Cartridge

Cutting Edge Length (mm)			
Insert Shape			Inscribed Circle
80° Rhombic	Square	Triangle	
—	—	11	6.35
—	09	16	9.525
12	12	22	12.7

Dimensions(mm)											LLSCN LLSSN LLSTN				 *				
H	B	LF	MHD	ASP	S10	MHH	HF	WF	RE	DMIN	Shim	Shim Pin	Clamp Lever	Lever Spring	Clamp Screw	Radial Screw	Axial Screw	Wrench	Set Bolt
12.5	11	50	20	8	2	5	10	14	0.4	**40**	—	—	LLCL12S	HLS1	LLCS105	LLR1	KS1	①HKY25R ②HKY20F	HSC06016
15.5	16	55	20	8	2	6	12	20	0.8	**50**	—	—	LLCL13S	HLS2	LLCS105	LLR1	KS1	①HKY25R ②HKY20F	HSC06020
16	17	63	25	8	2.5	—	16	25	0.8	**60**	LLSTN32	LLP13	LLCL13	—	LLCS106	LLR1	KS2	①HKY25R ②HKY20F	HBH08025
20	19	70	30	10	2.5	—	20	25	0.8	**70**	LLSTN42	LLP14	LLCL14	—	LLCS108S	LLR2	KS2	①HKY30R	HBH08030
15.5	16	55	20	8	2	6	12	20	0.8	**50**	—	—	LLCL13S	HLS2	LLCS105	LLR1	KS1	①HKY25R ②HKY20F	HSC06020
16	17	63	25	8	2.5	—	16	25	0.8	**60**	LLSTN32	LLP13	LLCL13	—	LLCS106	LLR1	KS2	①HKY25R ②HKY20F	HBH08025
12.5	11	50	20	8	2	5	10	14	0.8	**40**	—	—	LLCL13S	HLS2	LLCS105	LLR1	KS1	①HKY20R ①HKY25R	HSC06016
15.5	16	55	20	8	2	6	12	20	0.8	**50**	—	—	LLCL14S	HLS3	LLCS106S	LLR1	KS1	①HKY25R ②HKY20F	HSC06020
16	17	63	25	8	2.5	—	16	25	0.8	**60**	LLSSN42	LLP14	LLCL14	—	LLCS108S	LLR2	KS2	①HKY30R	HBH08025
15.5	16	55	20	8	2	6	12	20	0.8	**50**	—	—	LLCL14S	HLS3	LLCS106S	LLR1	KS1	①HKY25R ②HKY20F	HSC06020
16	17	63	25	8	2.5	—	16	25	0.8	**60**	LLSCN42	LLP14	LLCL14	—	LLCS108S	LLR2	KS2	①HKY30R	HBH08025
20	19	70	30	10	2.5	—	20	25	0.8	**70**	LLSCN42	LLP14	LLCL14	—	LLCS108S	LLR2	KS2	①HKY30R	HBH08030
12.5	11	44	20	8	2	5	10	14	0.8	**40**	—	—	LLCL13S	HLS2	LLCS105	LLR1	KS1	①HKY20R ①HKY25R	HSC06016
15.5	16	47	20	8	2	6	12	20	0.8	**50**	—	—	LLCL14S	HLS3	LLCS106S	LLR1	KS1	①HKY25R ②HKY20F	HSC06020
16	17	53	25	8	2.5	—	16	25	0.8	**60**	LLSSN42	LLP14	LLCL14	—	LLCS108S	LLR2	KS2	①HKY30R	HBH08025
15.5	16	55	20	8	2	6	12	13	0.8	**50**	—	—	LLCL13S	HLS2	LLCS105	LLR1	KS1	①HKY25R ②HKY20F	HSC06020
16	17	63	25	8	2.5	—	16	15	0.8	**60**	LLSTN32	LLP13	LLCL13	—	LLCS106	LLR1	KS2	①HKY25R ②HKY20F	HBH08025
12.5	11	50	20	8	2	5	10	14	0.8	**40**	—	—	LLCL13S	HLS2	LLCS105	LLR1	KS1	①HKY20R ①HKY25R	HSC06016
15.5	16	55	20	8	2	6	12	20	0.8	**50**	—	—	LLCL14S	HLS3	LLCS106S	LLR1	KS1	①HKY25R ②HKY20F	HSC06020
16	17	63	25	8	2.5	—	16	25	0.8	**60**	LLSSN42	LLP14	LLCL14	—	LLCS108S	LLR2	KS2	①HKY30R	HBH08025

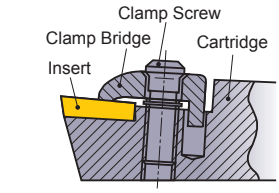
CN□□ type inserts ➤ A092—A097
SN□□ type inserts ➤ A105—A109
TN□□ type inserts ➤ A110—A115
SPARE PARTS ➤ P001

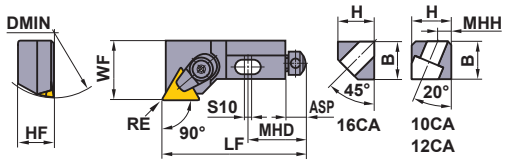
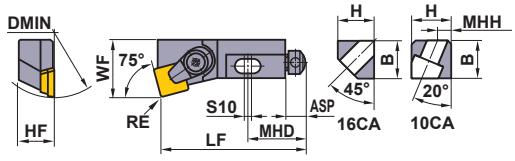
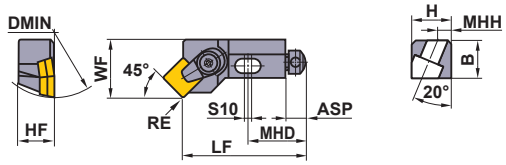
CARTRIDGE

BC ISO type — Clamp on type

- 11°positive insert.
- Suitable for steel, cast iron, aluminium alloys and copper alloys.





Type	Order Number	Stock R	Stock L	Geometry	Insert Number	
CTGP	CTGPR10CA11	●		 Right hand tool holder only.	TPMN TPMR TPGN	1103○○
	CTGPR12CA16	●				1603○○
	CTGPR16CA16	●				1603○○
CSKP	CSKPR10CA09	●		 Right hand tool holder only.	SPMN SPMR SPGN	0903○○
	CSKPR16CA12	●				1203○○
CSSP	CSSPR10CA09	●		 Right hand tool holder only.		0903○○

∗ Clamp Torque (N • m) : BC4=2.5, BC4L=2.5, BC5=5.0, BC6=5.0

● : Inventory maintained in Japan.

IDENTIFICATION

C T G P R 10 CA 11

Clamp Structure	
C	Clamp On

Insert Shape	
S	Square
T	Triangle

Cutting Angle	
F	90°
G	90°(Off Set)
K	75°
S	45°
T	60°
Y	85°

Insert Clearance	
P	11°

Hand of Tool	
R	Right Hand
L	Left Hand

Cutting Edge Height (mm)	
10	10
12	12
16	16

Tool Type	
CA	ISO A Type Cartridge

Cutting Edge Length (mm)		
Insert Shape		Inscribed Circle
Square	Triangle	
–	11	6.35
09	16	9.525
12	22	12.7

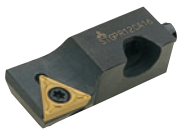
Dimensions(mm)											PS / PT				*		
H	B	LF	MHD	ASP	S10	MHH	HF	WF	RE	DMIN	Shim	Shim Pin	Radial Screw	Axial Screw	Clamp Set	Wrench	Set Bolt
12.5	11	50	20	8	2	5	10	14	0.4	**38**	–	–	TSS05006	KS1	BC4	TKY10R	HSC06016
15.5	16	55	20	8	2	6	12	20	0.8	**50**	–	–	TSS06010	KS1	BC5	TKY20R	HSC06020
16	17	63	25	8	2	–	16	25	0.8	**55**	PT32	BCP201	TSS06010	KS2	BC6	TKY20R	HBH08025
12.5	11	50	20	8	2	5	10	14	0.8	**38**	–	–	TSS05006	KS1	BC4L	TKY10R	HSC06016
16	17	63	25	8	2	–	16	25	0.8	**55**	PS42	BCP251	TSS06010	KS2	BC6	TKY20R	HBH08025
12.5	11	44	20	8	2	5	10	14	0.8	**38**	–	–	TSS05006	KS1	BC4L	TKY10R	HSC06016

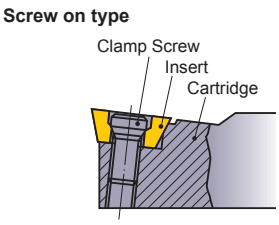
SP○○ type inserts ➤ A160
TP○○ type inserts ➤ A162
SPARE PARTS ➤ P001

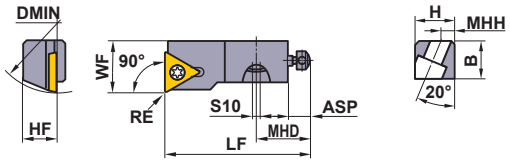
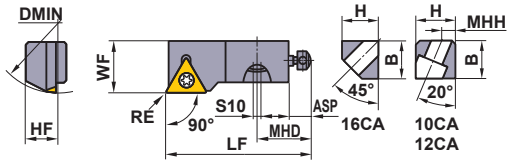
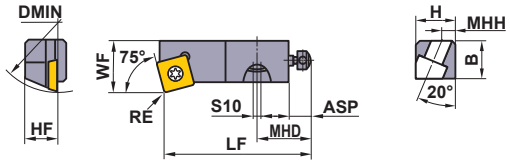
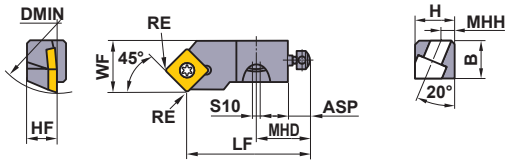
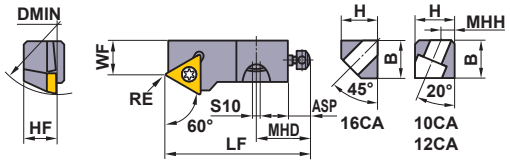
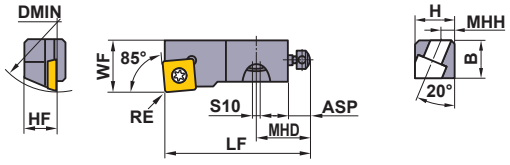
CARTRIDGE

SS ISO type — Screw on type

- 11°positive insert.
- Suitable for steel, cast iron, aluminium alloys and copper alloys.





Type	Order Number	Stock R	Stock L	Geometry	Insert Number	
STFP	STFPR/L10CA11	●	●	 Right hand tool holder shown.	TPMX TPGX	1103○○
	STFPR/L12CA16	●	●		TPMT TPGX	1603○○
STGP	STGPR10CA11	●		 Right hand tool holder only.	TPMX TPGX	1103○○
	STGPR12CA16	●			TPMT TPGX	1603○○
	STGPR16CA16	●			TPMT TPGX	1603○○
SSKP	SSKPR10CA09	●		 Right hand tool holder only.	SPMT SPGX	0903○○
	SSKPR12CA12	●			SPMT SPGX	1203○○
SSSP	SSSPR10CA09	●		 Right hand tool holder only.	SPMT SPGX	0903○○
	SSSPR12CA12	●			SPMT SPGX	1203○○
STTP	STTPR10CA11	●		 Right hand tool holder only.	TPMX TPGX	1103○○
	STTPR12CA16	●			TPMT TPGX	1603○○
	STTPR16CA16	●			TPMT TPGX	1603○○
SSYP	SSYPR10CA09	●		 Right hand tool holder only.	SPMT SPGX	0903○○
	SSYPR12CA12	●			SPMT SPGX	1203○○

∗ Clamp Torque (N • m) : CS300890T=1.0, TS4=3.5, TS5=7.5

● : Inventory maintained in Japan.

IDENTIFICATION

S T F P R 10 CA 11

Clamp Structure	
S	Screw On

Insert Shape	
S	Square
T	Triangle

Cutting Angle	
F	90°
G	90°(Off Set)
K	75°
S	45°
T	60°
Y	85°

Insert Clearance	
P	11°

Hand of Tool	
R	Right Hand
L	Left Hand

Cutting Edge Height (mm)	
10	10
12	12
16	16

Tool Type	
CA	ISO A Type Cartridge

Cutting Edge Length (mm)		
Insert Shape		Inscribed Circle
Square	Triangle	
—	11	6.35
09	16	9.525
12	22	12.7

Dimensions(mm)											*				
H	B	LF	MHD	ASP	S10	MHH	HF	WF	RE	DMIN	Clamp Screw	Radial Screw	Axial Screw	Wrench	Set Bolt
12.5	11	50	20	8	2	5	10	14	0.4	**35**	CS300890T	TSS05006	KS1	TKY08F TKY10F	HSC06016
15.5	16	55	20	8	2	6	12	20	0.8	**50**	TS4	TSS06010	KS1	TKY15F TKY20F	HSC06020
12.5	11	50	20	8	2	5	10	14	0.4	**35**	CS300890T	TSS05006	KS1	TKY08F TKY10F	HSC06016
15.5	16	55	20	8	2	6	12	20	0.8	**50**	TS4	TSS06010	KS1	TKY15F TKY20F	HSC06020
16	17	63	25	8	2	—	16	25	0.8	**55**	TS4	TSS06012	KS2	TKY15F TKY20F	HBH08025
12.5	11	50	20	8	2	5	10	14	0.8	**35**	TS4	TSS05006	KS1	TKY10F TKY15F	HSC06016
15.5	16	55	20	8	2	6	12	20	0.8	**50**	TS5	TSS06010	KS1	TKY20F TKY25F	HSC06020
12.5	11	44	20	8	2	5	10	14	0.8	**35**	TS4	TSS05006	KS1	TKY10F TKY15F	HSC06016
15.5	16	47	20	8	2	6	12	20	0.8	**50**	TS5	TSS06010	KS1	TKY20F TKY25F	HSC06020
12.5	11	50	20	8	2	5	10	9	0.4	**35**	CS300890T	TSS05006	KS1	TKY08F TKY10F	HSC06016
15.5	16	55	20	8	2	6	12	13	0.8	**50**	TS4	TSS06010	KS1	TKY15F TKY20F	HSC06020
16	17	63	25	8	2	—	16	15	0.8	**55**	TS4	TSS06012	KS2	TKY15F TKY20F	HBH08025
12.5	11	50	20	8	2	5	10	14	0.8	**35**	TS4	TSS05006	KS1	TKY10F TKY15F	HSC06016
15.5	16	55	20	8	2	6	12	20	0.8	**50**	TS5	TSS06010	KS1	TKY20F TKY25F	HSC06020

SP○○ type inserts ➤ A140
TP○○ type inserts ➤ A146, A147
SPARE PARTS ➤ P001

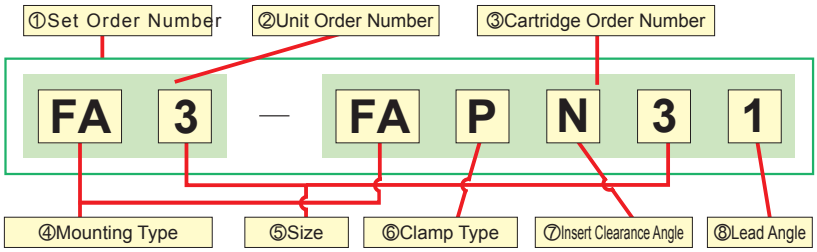
BORING UNIT

FA,FV

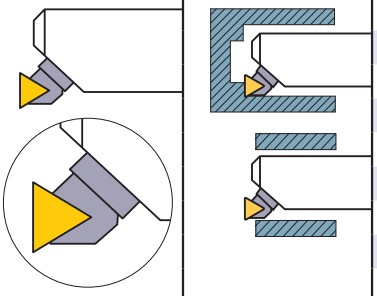
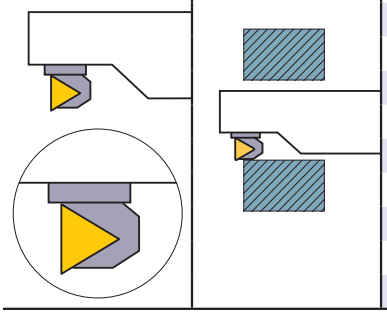


- Precision finish boring unit.
- Facilitates precision adjustment.
- High accuracy.

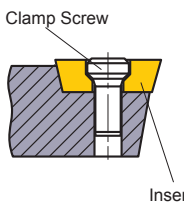
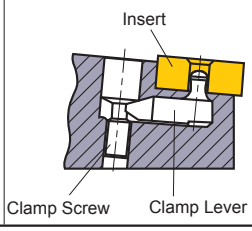
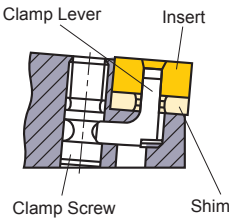
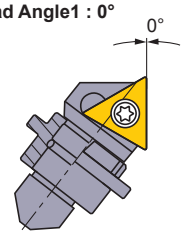
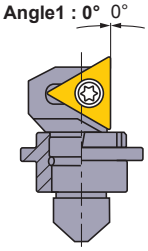
IDENTIFICATION



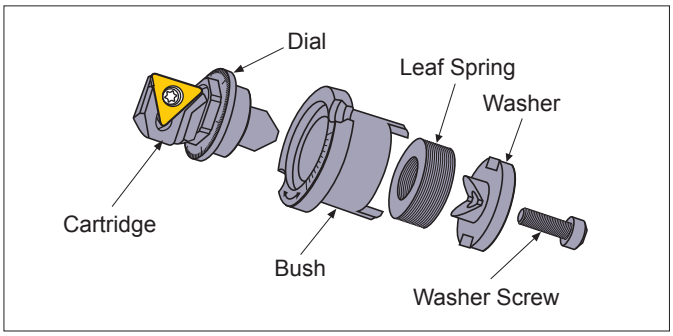
* Sets are delivered with unit and cartridge assembled.

④Mounting Type	Cutting Mode	①Set Order Number *	Stock	②Unit Order Number	Stock	③Cartridge Order Number	Stock	⑤Size		⑥Clamp Type		⑦Insert Clearance Angle	
								Symbol	Min. Cutting Diameter (mm)	Symbol	Type	Symbol	Angle
FA Type (Angular Type)		**FA0-FASC01**	●	**FA0**	●	**FASC01**	●	0	19	S	Screw On	C	7
		FA0-FASC01S	●	**FA0**	●	**FASC01S**	●	0	19	S	Screw On	C	7
		FA1-FASP11	●	**FA1**	●	**FASP11**	●	1	25	S	Screw On	P	11
		FA1-FASP11S	●	**FA1**	●	**FASP11S**	●	1	25	S	Screw On	P	11
		FA2-FASP21	●	**FA2**	●	**FASP21**	●	2	36	S	Screw On	P	11
		FA2-FASP21S	●	**FA2**	●	**FASP21S**	●	2	36	S	Screw On	P	11
		FA2-FAPN21	●	**FA2**	●	**FAPN21**	●	2	36	P	Lever Lock	N	0
		FA3-FASP31	●	**FA3**	●	**FASP31**	●	3	47	S	Screw On	P	11
		FA3-FASP31S	●	**FA3**	●	**FASP31S**	●	3	47	S	Screw On	P	11
		FA3-FAPN31	●	**FA3**	●	**FAPN31**	●	3	47	P	Lever Lock	N	0
		FA4-FAPN41	●	**FA4**	●	**FAPN41**	●	4	73	P	Lever Lock	N	0
FV Type (Vertical Type)		**FV0-FVSC01**	●	**FV0**	●	**FVSC01**	●	0	19	S	Screw On	C	7
		FV0-FVSC01S	●	**FV0**	●	**FVSC01S**	●	0	19	S	Screw On	C	7
		FV1-FVSP11	●	**FV1**	●	**FVSP11**	●	1	25	S	Screw On	P	11
		FV1-FVSP11S	●	**FV1**	●	**FVSP11S**	●	1	25	S	Screw On	P	11
		FV2-FVSP21	●	**FV2**	●	**FVSP21**	●	2	36	S	Screw On	P	11
		FV2-FVSP21S	●	**FV2**	●	**FVSP21S**	●	2	36	S	Screw On	P	11
		FV2-FVPN21	●	**FV2**	●	**FVPN21**	●	2	36	P	Lever Lock	N	0
		FV3-FVSP31	●	**FV3**	●	**FVSP31**	●	3	47	S	Screw On	P	11
		FV3-FVSP31S	●	**FV3**	●	**FVSP31S**	●	3	47	S	Screw On	P	11
		FV3-FVPN31	●	**FV3**	●	**FVPN31**	●	3	47	P	Lever Lock	N	0
		FV4-FVPN41	●	**FV4**	●	**FVPN41**	●	4	73	P	Lever Lock	N	0

* "S" at the end of the order number indicates left hand tool.

⑥Cartridge Clamp Structure			⑧Lead Angle	
S (Screw-on Type)	**P** (Lever Lock Type)	**P** (Lever Lock Type with Shim)	**FA**	**FV**
Applicable Size : 0,1,2,3	**Applicable Size : 2,3**	**Applicable Size : 4**	**Lead Angle1 : 0°**	**Lead Angle1 : 0°** 0°
				

● : Inventory maintained in Japan.



BORING UNIT SPARE PARTS

Unit Order Number	Washer Screw	Unit Screw	Wrench	Bush	Washer	Leaf Spring
FA0	HSC02006	S1	HKY15R			
FV0	HSC02006	S1	HKY15R			
FA1	HSC02506	HY-A1	HKY20R			
FV1	HSC02506	HY-V1	HKY20R			
FA2	HSC03010	HY2	HKY20R,HKY25R			
FV2	HSC03010	HY2	HS-N2,HKY25R			
FA3	HSC04012	HY3	HKY20R,HKY30R			
FV3	HSC04012	HY3	HKY20R,HKY30R			
FA4	HSC05016	HY4	HKY30R,HKY40R			
FV4	HSC05016	HY4	HKY30R,HKY40R			

The parts above are not sold separately as accuracy can only be guaranteed by having the complete set. Please contact us for questions about parts replacement.

CARTRIDGE SPARE PARTS

Cartridge ∗1	Clamp Lever	Lever Spring	Clamp Screw ∗3	Shim	Shim Pin	Spanner ∗2	Wrench	Applicable Insert	
FASC01(S)	—	—	① TS2	—	—	HR00	① TKY06F	TCGT..L-F TCGW	060102 060104
FVSC01(S)	—	—	① TS2	—	—	HR00	① TKY06F		
FASP11(S)	—	—	① CS250T	—	—	HR12	① TKY08F	TPGX TPGX..L/R TPMX..L/R	090204 110304 110308
FVSP11(S)	—	—	① CS250T	—	—	HR12	① TKY08F		
FASP21(S)	—	—	① CS300890T	—	—	HR12	① TKY08F		
FVSP21(S)	—	—	① CS300890T	—	—	HR12	① TKY08F		
FAPN21	LLCL12S	HLS1	② LLCS103	—	—	HR12	② HKY20F	TNGA TNGG..L/R	110304 110308
FVPN21	LLCL12S	HLS1	② LLCS103	—	—	HR12	② HKY20F		
FASP31(S)	—	—	① CS300890T	—	—	HR34	① TKY08F	TPGX TPGX..L/R TPMX..L/R	110304 110308
FVSP31(S)	—	—	① CS300890T	—	—	HR34	① TKY08F		
FAPN31	LLCL12S	HLS1	② LLCS103	—	—	HR34	② HKY20F	TNGA TNGG..L/R	110304 110308 160404 160408 160412
FVPN31	LLCL12S	HLS1	② LLCS103	—	—	HR34	② HKY20F		
FAPN41	LLCL13	—	② LLCS106	LLSTN32	LLP13	HR34	② HKY25F		
FVPN41	LLCL13	—	② LLCS106	LLSTN32	LLP13	HR34	② HKY25F		

(Note) Use left hand inserts in the cartridge for right hand cutting and right hand inserts in the cartridge for left hand cutting.

∗1 "S" at the end of the cartridge number indicates left hand.

∗2 A spanner is only provided when ordered with a set.

∗3 Clamp Torque (N • m) : TS2=0.6, CS250T=1.0, CS300890T=1.0, LLCS103=1.5, LLCS106=2.2

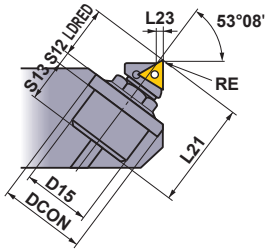
INSERTS

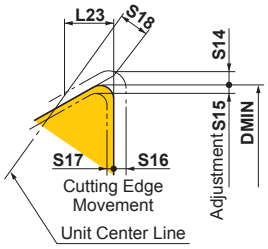
Finish Cutting			Medium Cutting	Flat Top	
TCGT..L/R-F	TPGX..L/R	TPMX..L	TNGG..L/R	TPGX	TNGA
(06) ➲A141	(09,11) ➲A146	(09,11) ➲A146	(11,16) ➲A114	(09,11) ➲A147	(11,16) ➲A115

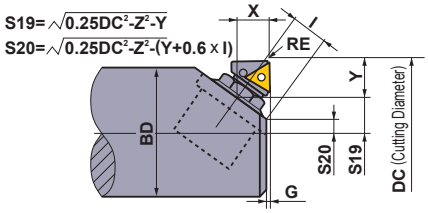
BORING UNIT

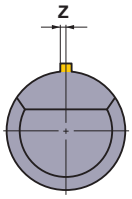
MAIN DIMENSIONS

●FA TYPE (ANGULAR TYPE)





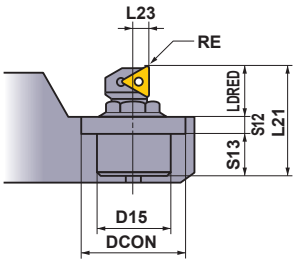


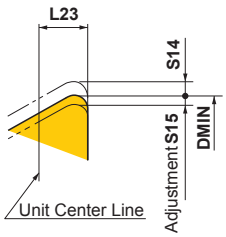


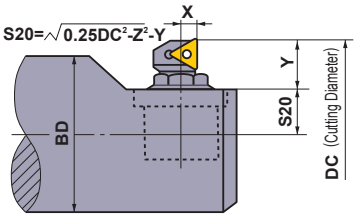
Clockwise (right hand) tool shown.
Minimum cutting diameters (DMIN) correspond to RE0.2 (0 type) and RE0.4 (1—4 type).
Unit : mm

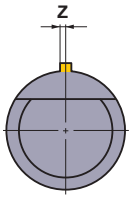
Set Order Number *	RE	DMIN	Adjustment		LDRED	L21	S16	S17	L23	D15	DCON	S12	S13	S18	Z	X	Y	G	I	BD
			S14	S15																Max.
FA0-FASC01(S)	0.2	19	0.32	0.16	9.0	19.9	0.30	0.12	1.5	11.11	15.06	2.7	8.2	1.11	1.2	6.4	6.5	1.0	6.8	DC-2
	0.4	19	0.32	0.16	8.8	19.7	0.30	0.12	1.6	11.11	15.06	2.7	8.2	1.11	1.2	6.4	6.4	1.0	6.8	DC-2
FA1-FASP11(S)	0.4	25	0.5	0.3	11.7	23.9	0.38	0.23	0.8	15.08	19.05	3.2	9.0	0.46	1.0	7.6	9.1	0.9	8.4	DC-2
FA2-FASP21(S)	0.4	36	0.7	0.4	14.9	33.4	0.53	0.30	1.1	19.05	24.58	4.0	14.5	0.7	1.2	9.7	11.5	0.8	11.1	DC-2
	0.8	36	0.7	0.4	14.5	33.0	0.53	0.30	1.3	19.05	24.58	4.0	14.5	0.7	1.2	9.7	11.2	0.8	11.1	DC-2
FA2-FAPN21	0.4	36	0.7	0.4	14.9	33.4	0.53	0.30	1.1	19.05	24.58	4.0	14.5	0.7	2.75	9.7	11.5	0.8	11.1	DC-2
	0.8	36	0.7	0.4	14.5	33.0	0.53	0.30	1.3	19.05	24.58	4.0	14.5	0.7	2.75	9.7	11.2	0.8	11.1	DC-2
FA3-FASP31(S)	0.4	47	1.0	0.6	18.35	42.85	0.75	0.45	0.9	22.225	31.75	4.8	19.7	0.54	1.9	11.7	14.4	1.2	13.1	DC-3
	0.8	47	1.0	0.6	17.95	42.45	0.75	0.45	1.1	22.225	31.75	4.8	19.7	0.54	1.9	11.7	14.1	1.2	13.1	DC-3
FA3-FAPN31	0.4	47	1.0	0.6	18.35	42.85	0.75	0.45	0.9	22.225	31.75	4.8	19.7	0.54	3.21	11.7	14.4	1.2	13.1	DC-3
	0.8	47	1.0	0.6	17.95	42.45	0.75	0.45	1.1	22.225	31.75	4.8	19.7	0.54	3.21	11.7	14.1	1.2	13.1	DC-3
FA4-FAPN41	0.4	73	1.5	0.7	28.0	65.4	1.13	0.53	1.3	31.75	46.02	6.4	31.0	0.86	5.2	17.7	21.9	1.3	20.5	DC-3
	0.8	73	1.5	0.7	27.6	65.0	1.13	0.53	1.5	31.75	46.02	6.4	31.0	0.86	5.2	17.7	21.6	1.3	20.5	DC-3
	1.2	73	1.5	0.7	27.2	64.6	1.13	0.53	1.7	31.75	46.02	6.4	31.0	0.86	5.2	17.7	21.3	1.3	20.5	DC-3

●FV TYPE (VERTICAL TYPE)









Clockwise (right hand) tool shown.
Minimum cutting diameters (DMIN) correspond to RE0.2 (0 type) and RE0.4 (1—4 type).
Unit : mm

Set Order Number *	RE	DMIN	Adjustment		LDRED	L21	L23	D15	DCON	S12	S13	Z	X	Y	BD
			S14	S15											Max.
FV0-FVSC01(S)	0.2	19	0.4	0.2	7.6	18.5	2.6	11.11	15.06	2.7	8.2	1.2	2.6	7.6	DC-2
	0.4	19	0.4	0.2	7.4	18.3	2.6	11.11	15.06	2.7	8.2	1.2	2.6	7.4	DC-2
FV1-FVSP11(S)	0.4	25	0.7	0.3	10.8	23.0	3.6	15.08	20.62	3.2	9.0	1.0	3.6	10.8	DC-2
FV2-FVSP21(S)	0.4	36	0.8	0.6	13.8	32.3	4.0	19.05	24.58	4.0	14.5	1.2	4.0	13.8	DC-2
	0.8	36	0.8	0.6	13.5	32.0	4.0	19.05	24.58	4.0	14.5	1.2	4.0	13.5	DC-2
FV2-FVPN21	0.4	36	0.8	0.6	13.8	32.3	4.0	19.05	24.58	4.0	14.5	2.1	4.0	13.8	DC-2
	0.8	36	0.8	0.6	13.5	32.0	4.0	19.05	24.58	4.0	14.5	2.1	4.0	13.5	DC-2
FV3-FVSP31(S)	0.4	47	1.3	0.7	16.7	41.2	4.8	22.225	31.75	4.8	19.7	1.9	4.8	16.7	DC-3
	0.8	47	1.3	0.7	16.4	40.9	4.8	22.225	31.75	4.8	19.7	1.9	4.8	16.4	DC-3
FV3-FVPN31	0.4	47	1.3	0.7	16.7	41.2	4.8	22.225	31.75	4.8	19.7	3.21	4.8	16.7	DC-3
	0.8	47	1.3	0.7	16.4	40.9	4.8	22.225	31.75	4.8	19.7	3.21	4.8	16.4	DC-3
FV4-FVPN41	0.4	73	1.8	1.0	25.0	62.4	7.1	31.75	46.02	6.4	31.0	5.2	7.1	25.0	DC-3
	0.8	73	1.8	1.0	24.7	62.1	7.1	31.75	46.02	6.4	31.0	5.2	7.1	24.7	DC-3
	1.2	73	1.8	1.0	24.4	61.8	7.1	31.75	46.02	6.4	31.0	5.2	7.1	24.4	DC-3

* "S" at the end of the order number indicates left hand tool.

MI TYPE BORING BARS



IDENTIFICATION

S	B	R	1	08
①	②	③	④	⑤

①Clamp Type

S	Screw On Type

②Boring Bar Name

③Shank Shape

R	Round Shank

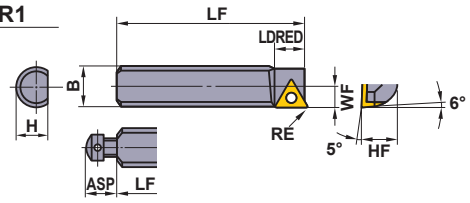
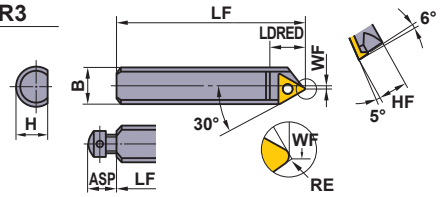
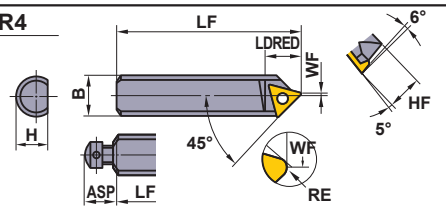
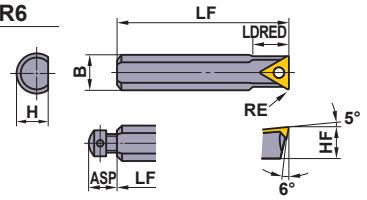
④Lead Angle

1	0°
3	30°
4	45°
6	90°

⑤Shank Size (mm)

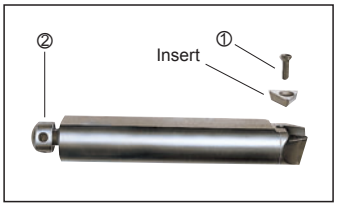
08	8
10	10
12	12
16	16

STANDARD HOLDER

Geometry	Order Number	Stock (For Clockwise)	* Insert Number		Dimensions (mm) H	B	LF	LDRED	ASP	HF	WF	RE
SBR1 	SBR108	●	TPGX TPGX...L TPMX...L	0802○○	7	8	35	9	—	7	3.5	0.4
	SBR110	●		0902○○	9	10	50	11	—	8	4.5	0.4
	SBR112	●		1103○○	10	12	60	12	7	10	5.0	0.4
SBR3 	SBR308	●	TPGX TPGX...L TPMX...L	0802○○	7	8	35	10	—	7	0.7	0.4
	SBR310	●		0902○○	9	10	50	12	—	8	1.0	0.4
	SBR312	●		1103○○	10	12	60	13	7	10	1.0	0.4
SBR4 	SBR408	●	TPGX TPGX...L TPMX...L	0802○○	7	8	35	10	—	7	0.5	0.4
	SBR410	●		0902○○	9	10	50	12	—	8	1.0	0.4
	SBR412	●		1103○○	10	12	60	13	7	10	1.0	0.4
	SBR416	●		1103○○	14	16	80	13	9	14	0	0.8
SBR6 	SBR608	●	TPGX TPGX...L TPMX...L	0802○○	7	8	35	8.5	—	7	—	0.4
	SBR610	●		0902○○	8	10	50	10	—	8	—	0.4
	SBR612	●		1103○○	10	12	60	11	7	10	—	0.4

(Note) When using an insert with a breaker, please use a left hand insert.

SPARE PARTS



Order Number		①Clamp Screw	②Pre-Set Screw	Wrench
SBR1 – SBR6	08	CS200T	—	TKY06F
	10	CS250T	—	TKY08F
	12	CS300890T	KS1S	TKY08F
	16	CS300890T	KS2S	TKY08F

* Clamp Torque (N • m) : CS200T=0.6, CS250T=1.0, CS300890T=1.0

● : Inventory maintained in Japan.

TP○○ type inserts ➤ A146, A147
SPARE PARTS ➤ P001

CLASSIFICATION OF QUICK CHANGE MODULAR TOOLING SYSTEM

Mitsubishi's quick change system is a must for improving efficiency in mass production lines.

- Shorten tool change times and increase machine efficiency.
- Reduce tool weight. Thus, tool change is safer and easier.
- Improve cutting edge accuracy.



QF1000 (Two Piece)



QF2000 (Small Diameter)



QF2000 (Large Diameter)



QC TYPE ADAPTER FOR PIN MILLING CUTTER



QS2000 (Arbor for Side Cutter)

Face Mill and Pin Milling Cutter



QB2000 • QB3000



QB4000

Boring Tool

MITSUBISHI's QUICK CHANGE SYSTEM



ABS License KOMET®



HSK

Connecting System

Special Tooling



SPQH (Spring)



SPQS (Spring+Oil pressure)



Setting Fixture

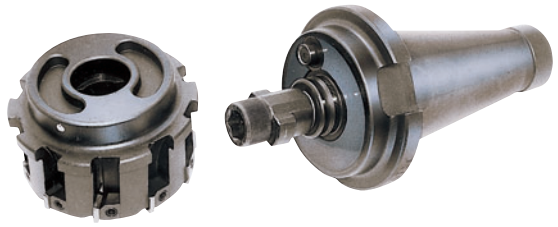


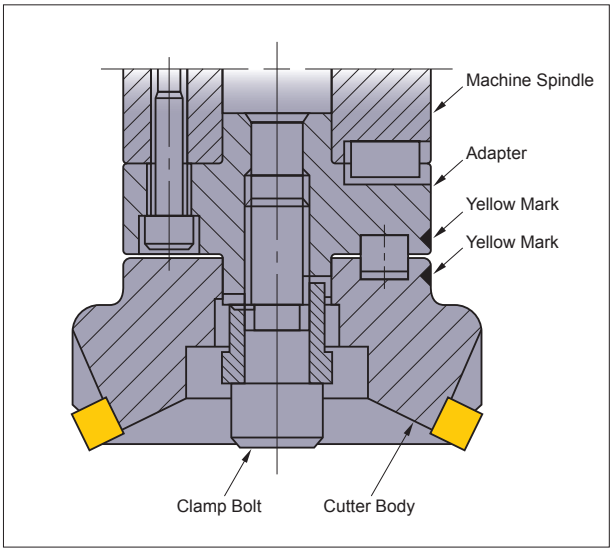
Setting Gauge

FACE MILL

QF2000 (SINGLE BOLT MOUNTING TYPE)

●One Piece Type (≤ϕ160)

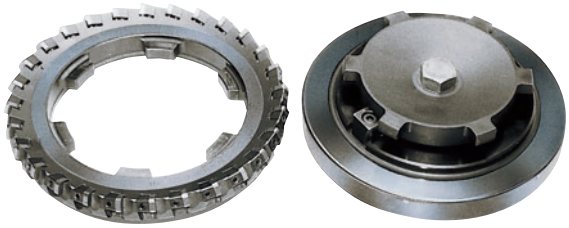


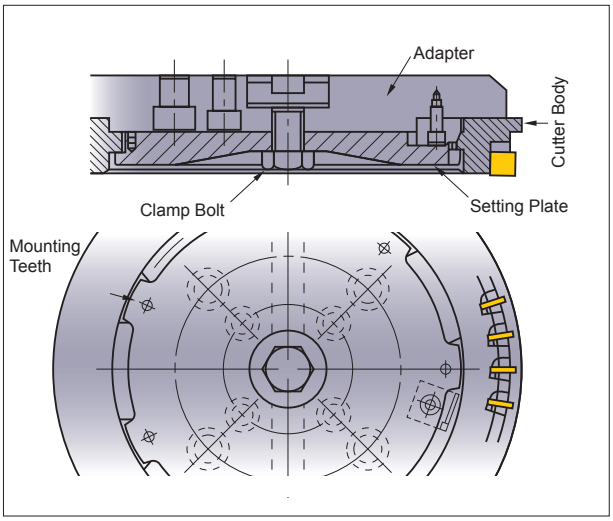


FEATURES

1. Simply turning a clamp bolt fixed to the adapter a few times enables cutter exchange.
2. The cutter needs to be turned 90° before removal. This prevents the cutter from falling free.
3. Applicable to both face milling and boring tools.
4. Cutter exchange time is less than 1 min.

●Two Piece Type (≥ϕ200)





FEATURES

1. Internal diameter of the cutter body has 4—6 mounting teeth. The adapter has the same mounting teeth and a single clamp bolt for installation.
2. The cutter needs to be turned 15° before removal. This prevents the cutter from falling free.
3. Cutter exchange time is less than 1 min.

QF1000 (GOURD SHAPED HOLE TYPE)

●One Piece Type (O Type ϕ200)



●Two Piece Type (T Type ≥ϕ250)



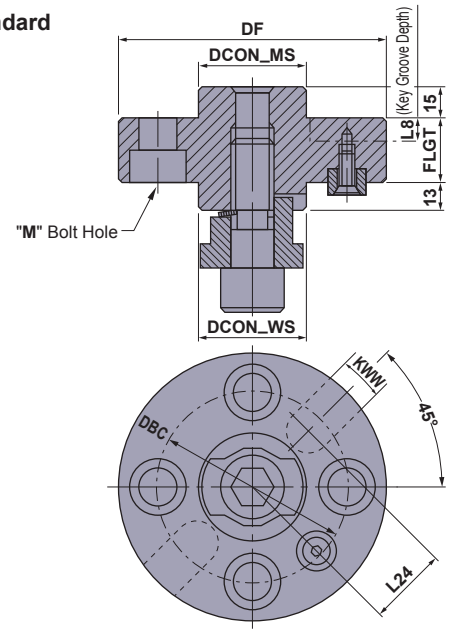
FEATURES

1. Gourd shaped hole type is employed. Turning 4—6 bolts enables cutter exchange.
2. The cutter needs to be turned 15° before removal. This prevents the cutter from falling free.
3. Cutters with ≥Ø250 are made up of 2 parts. Thus, weight at the time of installation is reduced and safety is improved.
4. Standard adapters facilitate installation of cutters with the same diameter and different insert shapes.
5. Cutter exchange time is less than 3—5 min.

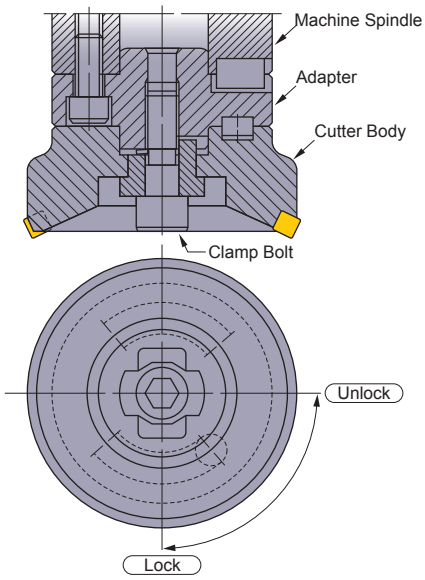
FACE MILLING ADAPTER

Q TYPE (SINGLE BOLT TYPE) ϕ80—ϕ160

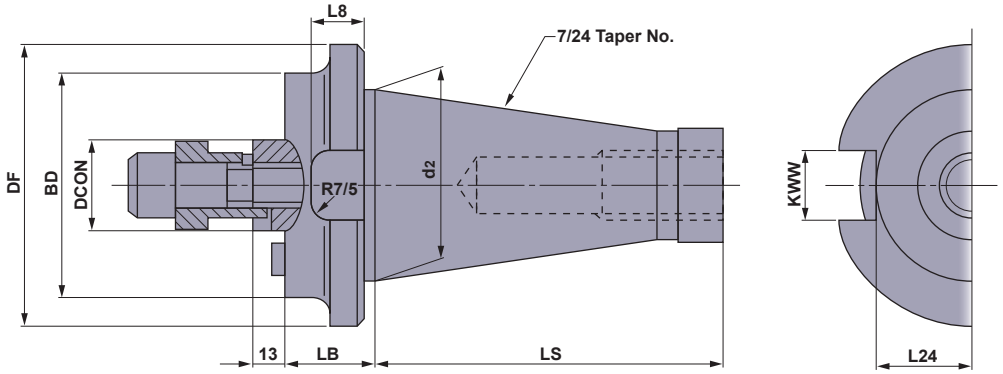
Standard



Installed Condition



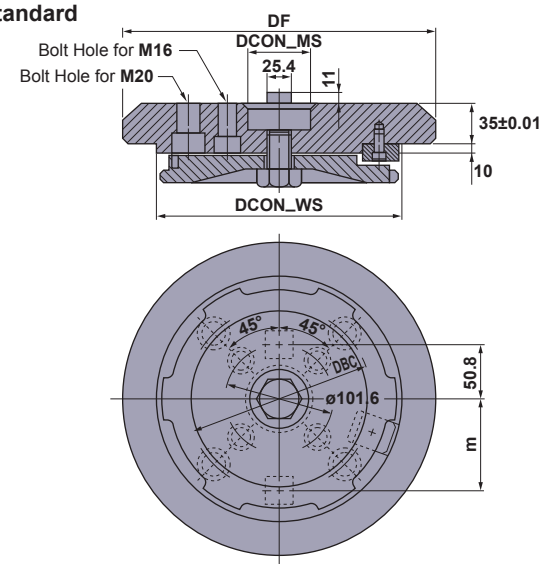
Order Number	Cutter Diameter (DC)	Cutter Dimensions (mm)			Machine Dimensions (mm)						Tool Weight (kg)
		DF	DCON_WS	FLGT	DCON_MS	DBC	M	KWW	L8	L24	
QFA08025BCR/L	80	70	25.4	25	25.4	45	M12	9.5	7	18.4	0.8
QFA10025BDR/L	100	80	31.75	25	31.75	55	M16	12.7	8	23.2	1.2
QFA12530BER/L	125	100	38.1	30	38.1	70	M20	15.9	10	28	2.1
QFA16030BFR/L	160	125	50.8	30	50.8	85	M20	19	11	36	3.2



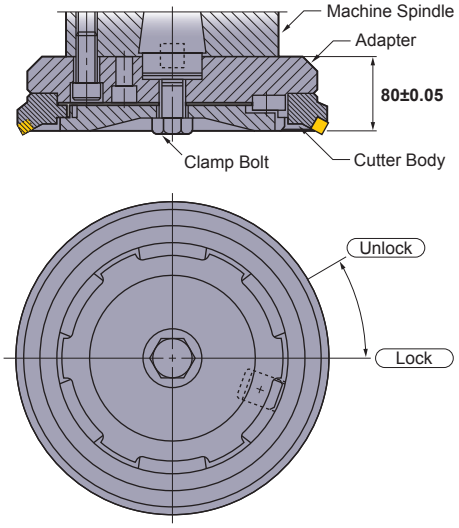
Order Number	Cutter Diameter (DC)	Cutter Dimensions (mm)			Machine Dimensions (mm)							Tool Weight (kg)
		BD	DCON	LB	DF	No.	d2	LS	KWW	L8	L24	
QFA08025N4R/L	80	70	25.4	25	70	40	44.45	93.4	16.1	16	22.5	1.4
QFA10025N4R/L	100	80	31.75	25	80	40	44.45	93.4	16.1	16	22.5	1.7
QFA12530N4R/L	125	100	38.1	30	100	40	44.45	93.4	16.1	16	22.5	2.7
QFA16030N4R/L	160	125	50.8	30	125	40	44.45	93.4	16.1	16	22.5	3.8
QFA08025N5R/L	80	70	25.4	25	100	50	69.85	126.8	25.7	19	35.3	3.2
QFA10025N5R/L	100	80	31.75	25	100	50	69.85	126.8	25.7	19	35.3	3.4
QFA12530N5R/L	125	100	38.1	30	100	50	69.85	126.8	25.7	19	35.3	4.0
QFA16030N5R/L	160	125	50.8	30	125	50	69.85	126.8	25.7	19	35.3	5.1

Q TYPE (SINGLE BOLT TYPE) ϕ200—ϕ500

Standard



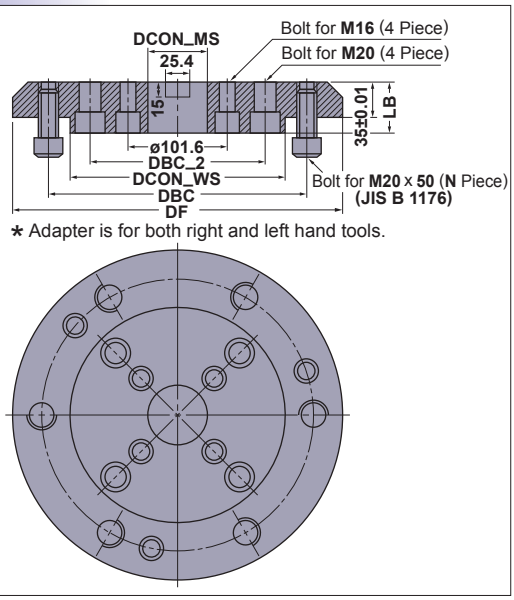
Installed Condition



Order Number	Cutter Diameter (DC)	Cutter Dimensions (mm)		Machine Dimensions (mm)			Tool Weight (kg)
		DCON_WS	DF	DCON_MS	DBC	m	
QFB20035KR/L	200	125	190	47.625	—	—	9
QFB25035KR/L	250	175	240	47.625	—	—	16
QFB31535PR/L	315	240	305	47.625	177.8	88.9	28
QFB35535PR/L	355	280	345	47.625	177.8	88.9	37
QFB40035PR/L	400	325	390	47.625	177.8	88.9	49
QFB50035PR/L	500	425	490	47.625	177.8	88.9	83

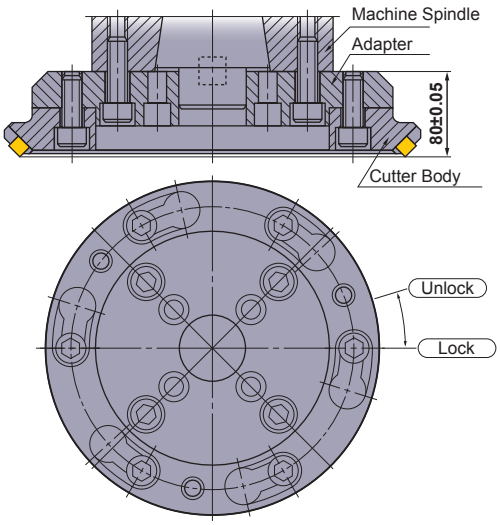
T TYPE (SIX BOLT TYPE) ϕ250—ϕ400

Standard



* Adapter is for both right and left hand tools.

Installed Condition



Order Number	Cutter Diameter (DC)	Cutter Dimensions (mm)					Machine Dimensions (mm)		Tool Weight (kg)
		DCON_WS	DBC	DF	LB	N	DCON_MS	DBC_2	
QFA25035K	250	110	155	230	45	4	47.625	—	9
QFA31535P	315	175	220	295	50	6	47.625	177.8	16
QFA35535P	355	215	260	335	50	6	47.625	177.8	22
QFA40035P	400	260	305	380	50	6	47.625	177.8	29

SIDE CUTTER

QC TYPE ADAPTER FOR PIN MILLING CUTTER

Cutter Body



Adapter Body



FEATURES

1. Makes installation of Pin millng cutter easy, quick, and accurate.
2. Clamping the entire periphery of the cutter body improves rigidity and lateral run-out of the cutting edges.
3. Facilitates stable heavy cutting such as counter weight cutting and prevents sudden insert fracture.

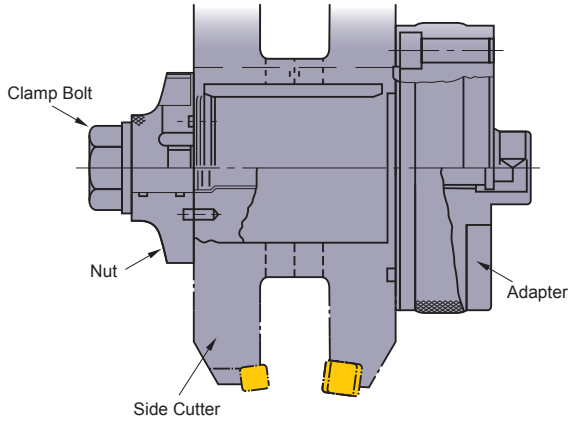
QS2000 (INSTALLATION METHOD FOR SIDE CUTTER)

Appearance



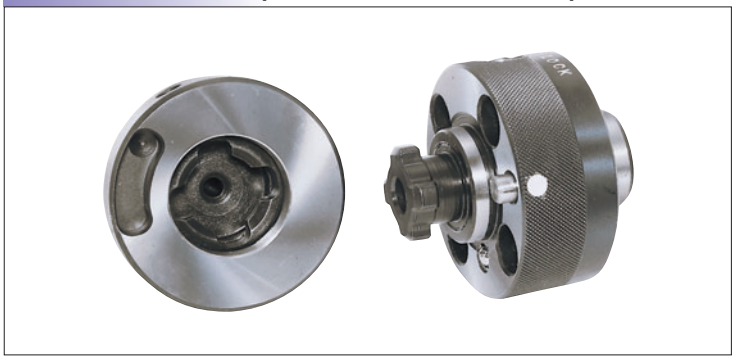
FEATURES

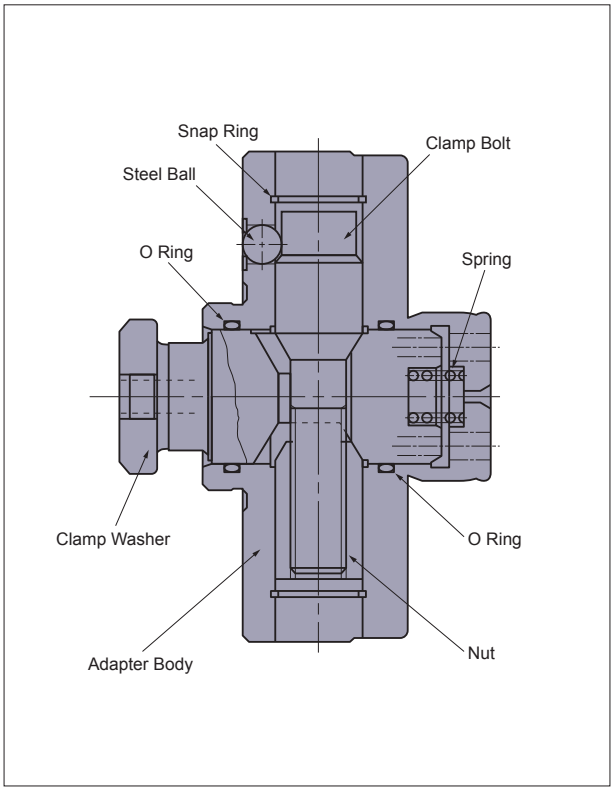
1. Turning the bolt a few times turns nut 45° and enables installation and detachment of the cutter.
2. Installation and detachment of the cutter is possible without taking the bolt and nut off the adapter.
3. The cutter is a solid type. Thus, the rigidity is high.
4. Cutter exchange time is less than 1 min.



BORING TOOL

QB4000 TYPE (SIDE CLAMP TYPE)

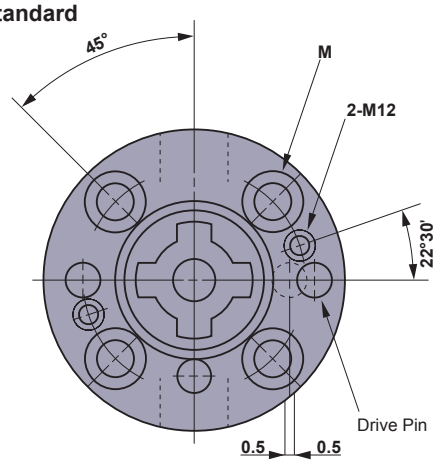


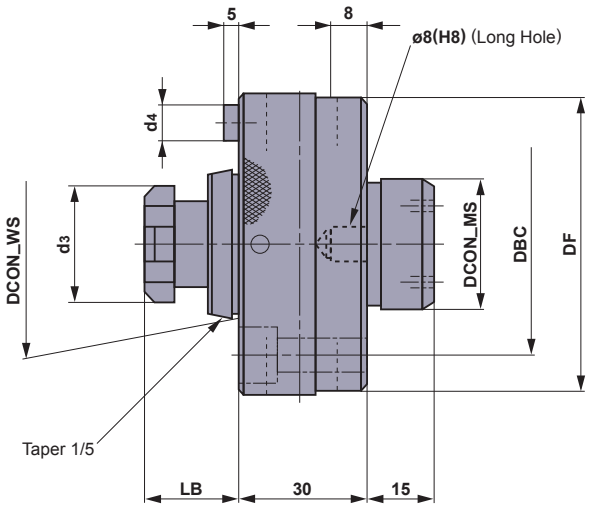


FEATURES

1. Tightening the clamp bolt (or clamp nut) draws the clamp washer in and securely holds the boring head.
2. The clamp washer has mounting teeth at the end. Turning the clamp washer 45° enables installation and detachment of the boring head.
3. Both 1/5 taper and cutter locating faces support the boring head. Thus, clamp rigidity and installation repeatability accuracy are high (2–3μm).
4. A side clamp structure is employed. Thus, a spindle turning stopper is unnecessary. This structure prevents the boring head from falling free.
5. Insert location close to the adapter body allows for convenient head exchange.
6. Suitable for a wide range of boring, from small to large diameters.
7. Head exchange time is less than 1 min.

Installation Standard





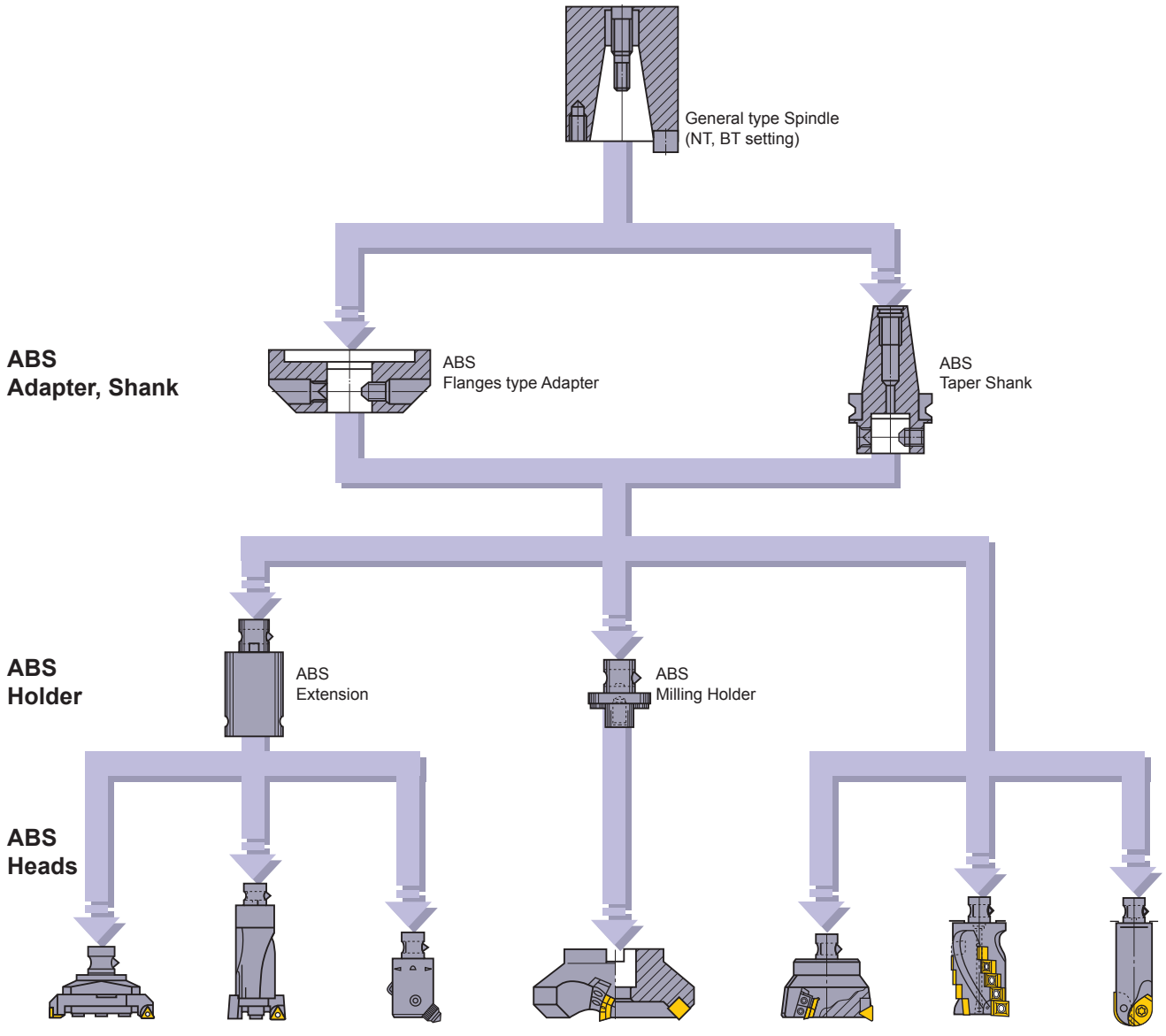
Order Number	DCON_WS	DCON_MS	DF	d3	DBC	M	LB	d4
QB4350070	35	30	70	28	52	M8	22	8
QB4350088	35	30	88	28	70	M8	22	8
QB4400098	40	30	98	34	80	M8	24	8
QB4400118	40	30	118	34	90	M10	24	10
QB4500138	50	40	138	42	110	M12	30	12

ABS® License KOMET®

ABS SYSTEM CHARACTERISTIC

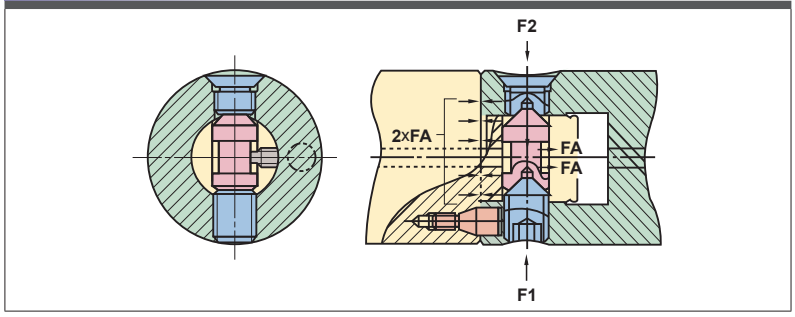
- High rigidity and high coupling strength.
  The taper wedge effects produced by the clamping screw, the taper screw, and the slide pin enable strong and firm coupling between the head and the adapter.
- As the cutting torque acts as torsion force on the axis, 50%—80% improvement is achieved for the clamping strength in the coupled portion axis direction.
- High accuracy is guaranteed.
  An attachment repeat accuracy of 2—3μm is constantly maintained in the coupled portion.
- From small (ϕ20) diameter to large diameter (ϕ200), a wide range of tooling is possible.
- Internal passage of the coolant (air) is possible without modifications to standard machinary.
- Tool head extensions are easy through the use of extension pieces.
- Through the use of reducers, tool head diameters are easily set.

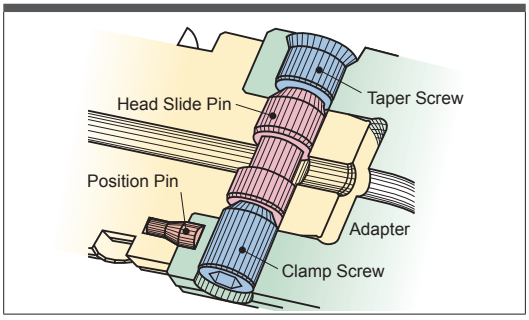
ABS SYSTEM MECHANISM



(Note) The above chart also indicates the KOMET® standard.

ABS SYSTEM COMPONENT

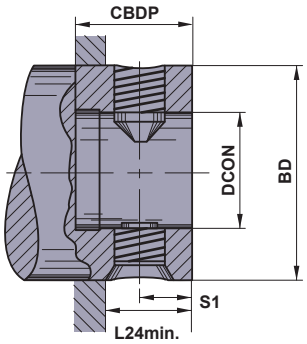




When the force F1 presses on the clamping screw, the slide pin moves in the radial direction and impinges on the taper screw, generation the reaction force F2. Since the centers of the clamping screw, the taper screw, and the slide pin are eccentric, a taper connection is made at sites separated by a 180° phase, with the clamping screw and the slide pin on the taper right impingement portion, and the slide pin and taper pin on the taper left impingement portion. The result is that, a vector analysis of those forces shows, as depicted in the diagram above, that the slides move in an identical direction, and the coupling force FA is doubled and transmitted accordingly. Further, cutting resistance generated during cutting becomes torsion stress and is transmitted accordingly. The forces F1 and F2 generated with the clamping screw and taper screw are expanded, and the coupling (jointing) force FA becomes as even greater force, and is generated accordingly.

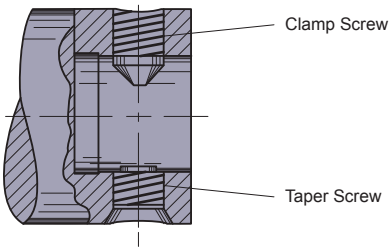
* This system is licensed from KOMET© of Germany. (JP Patent NO.1328669)

ABS SYSTEM SETTING STANDARDS Adapter Dimensions



Order Number	Dimensions(mm)				
	BD	DCON	CBDP	L24	S1
ABS25W	25	13	22	13	8.3
ABS**32W**	32	16	25	16	10.3
ABS**40W**	40	20	30	18.5	11.3
ABS**50W**	50	28	34	22	13.3
ABS**63W**	63	34	41	28	17.4
ABS**80W**	80	46	48	34	20.4
ABS**100W**	100	56	58	40.5	24.4
ABS**125W**	125	70	76	51	30.5

Parts for Adapter



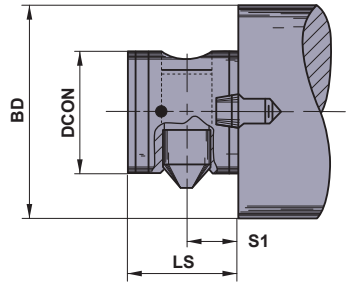
Pack Order Number *	Stock	Clamp Screw	Taper Screw
ABS25-FS-W	●	ABS25-F1	ABS25-F2
ABS**32-FS-W**	●	ABS32-F1	ABS32-F2
ABS**40-FS-W**	●	ABS40-F1	ABS40-F2
ABS**50-FS-W**	●	ABS50-F1	ABS50-F2
ABS**63-FS-W**	●	ABS63-F1	ABS63-F2
ABS**80-FS-W**	●	ABS80-F1	ABS80-F2
ABS**100-FS-W**	●	ABS100-F1	ABS100-F2
ABS**125-FS-W**	●	ABS125-F1	ABS125-F2

* An order of the above type of screw and pin needs to be included in the set. Please use a "Pack Order Number" for your order.

● : **Inventory maintained in Japan.**

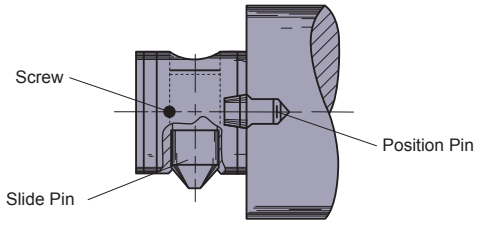
TOOLING

Head Dimensions



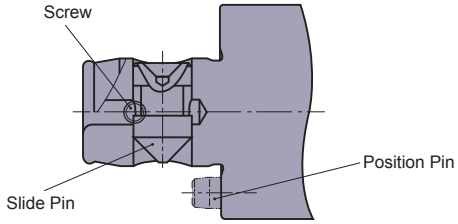
Order Number	Dimensions(mm)			
	BD	DCON	LS	S1
ABS25M	25	13	20	8
ABS32M	32	16	23	10
ABS40M	40	20	26	11
ABS50M	50	28	31	13
ABS63M	63	34	38	17
ABS80M	80	46	43	20
ABS100M	100	56	55	24
ABS125M	125	70	70	30

Parts for Head



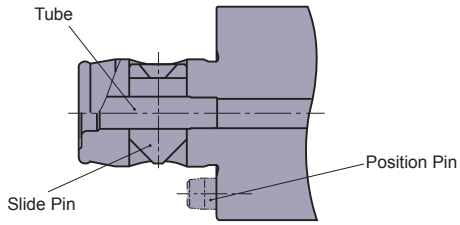
Pack Order Number *	Stock	Slide Pin	Position Pin	Screw
ABS25-ES-M	●	ABS25-E3	ABS25-E4	ABS25-E5
ABS32-ES-M	●	ABS32-E3	ABS32-E4	ABS32-E5
ABS40-ES-M	●	ABS40-E3	ABS40-E4	ABS40-E5
ABS50-ES-M	●	ABS50-E3	ABS50-E4	ABS50-E5
ABS63-ES-M	●	ABS63-E3	ABS63-E4	ABS63-E5
ABS80-ES-M	●	ABS80-E3	ABS80-E4	ABS80-E5
ABS100-ES-M	●	ABS100-E3	ABS100-E4	ABS100-E5
ABS125-ES-M	●	ABS125-E3	ABS125-E4	ABS125-E5

Parts for Head [For Fine Boring]



Pack Order Number *	Stock	Slide Pin	Position Pin	Screw
ABS25-ES-M1	●	ABS25-E3	ABS25-E4.1	ABS25-E5
ABS32-ES-M1	●	ABS32-E3	ABS32-E4.1	ABS32-E5
ABS40-ES-M1	●	ABS40-E3	ABS40-E4.1	ABS40-E5
ABS50-ES-M1	●	ABS50-E3	ABS50-E4.1	ABS50-E5
ABS63-ES-M1	●	ABS63-E3	ABS63-E4.1	ABS63-E5
ABS80-ES-M1	●	ABS80-E3	ABS80-E4.1	ABS80-E5
ABS100-ES-M1	●	ABS100-E3	ABS100-E4.1	ABS100-E5

Parts for Head [For Coolant Hole Type]

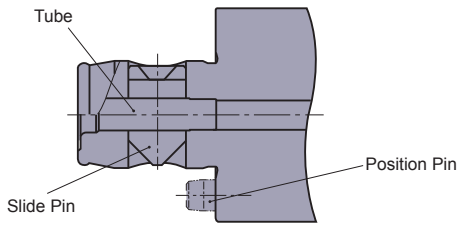


Pack Order Number *	Stock	Slide Pin	Position Pin	Tube
ABS25-ES-M3	●	ABS25-E3.2	ABS25-E4	ABS25-E6
ABS32-ES-M3	●	ABS32-E3.2	ABS32-E4	ABS32-E6
ABS40-ES-M3	●	ABS40-E3.2	ABS40-E4	ABS40-E6
ABS50-ES-M3	●	ABS50-E3.2	ABS50-E4	ABS50-E6
ABS63-ES-M3	●	ABS63-E3.2	ABS63-E4	ABS63-E6
ABS80-ES-M3	●	ABS80-E3.2	ABS80-E4	ABS80-E6
ABS100-ES-M3	●	ABS100-E3.2	ABS100-E4	ABS100-E6
ABS125-ES-M3	●	ABS125-E3.2	ABS125-E4	ABS125-E6

* An order of the above type of screw, pin and tube needs to be included in the set. Please use a "Pack Order Number" for your order.

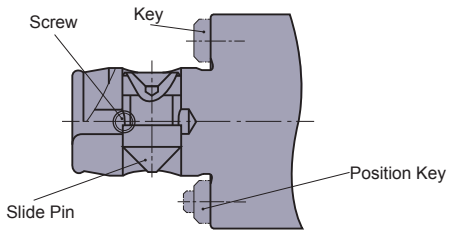
● : Inventory maintained in Japan.

Parts for Head [For Fine Boring with Coolant Hole]



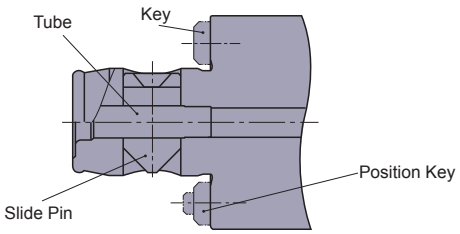
Pack Order Number *	Stock	Slide Pin	Position Pin	Tube
ABS25-ES-M4	●	ABS25-E3.2	ABS25-E4.1	ABS25-E6
ABS32-ES-M4	●	ABS32-E3.2	ABS32-E4.1	ABS32-E6
ABS40-ES-M4	●	ABS40-E3.2	ABS40-E4.1	ABS40-E6
ABS50-ES-M4	●	ABS50-E3.2	ABS50-E4.1	ABS50-E6
ABS63-ES-M4	●	ABS63-E3.2	ABS63-E4.1	ABS63-E6
ABS80-ES-M4	●	ABS80-E3.2	ABS80-E4.1	ABS80-E6
ABS100-ES-M4	●	ABS100-E3.2	ABS100-E4.1	ABS100-E6

Parts for Head [For Key Type]



Pack Order Number *	Stock	Slide Pin	Key	Position Key	Screw
SBA25-ES-M	●	ABS25-E3	SBA25-E4	SBA25-E4.1	ABS25-E5
SBA32-ES-M	●	ABS32-E3	SBA32-E4	SBA32-E4.1	ABS32-E5
SBA40-ES-M	●	ABS40-E3	SBA40-E4	SBA40-E4.1	ABS40-E5
SBA50-ES-M	●	ABS50-E3	SBA50-E4	SBA50-E4.1	ABS50-E5
SBA63-ES-M	●	ABS63-E3	SBA63-E4	SBA63-E4.1	ABS63-E5
SBA80-ES-M	●	ABS80-E3	SBA80-E4	SBA80-E4.1	ABS80-E5
SBA100-ES-M	●	ABS100-E3	SBA100-E4	SBA100-E4.1	ABS100-E5
SBA125-ES-M	●	ABS125-E3	SBA125-E4	SBA125-E4.1	ABS125-E5

Parts for Head [For Key Type with Coolant Hole]



Pack Order Number *	Stock	Slide Pin	Key	Position Key	Tube
SBA25-ES-M1	●	ABS25-E3.2	SBA25-E4	SBA25-E4.1	ABS25-E6
SBA32-ES-M1	●	ABS32-E3.2	SBA32-E4	SBA32-E4.1	ABS32-E6
SBA40-ES-M1	●	ABS40-E3.2	SBA40-E4	SBA40-E4.1	ABS40-E6
SBA50-ES-M1	●	ABS50-E3.2	SBA50-E4	SBA50-E4.1	ABS50-E6
SBA63-ES-M1	●	ABS63-E3.2	SBA63-E4	SBA63-E4.1	ABS63-E6
SBA80-ES-M1	●	ABS80-E3.2	SBA80-E4	SBA80-E4.1	ABS80-E6
SBA100-ES-M1	●	ABS100-E3.2	SBA100-E4	SBA100-E4.1	ABS100-E6
SBA125-ES-M1	●	ABS125-E3.2	SBA125-E4	SBA125-E4.1	ABS125-E6

* An order of the above type of screw, pin and tube needs to be included in the set. Please use a "Pack Order Number" for your order.

HSK SYSTEM

FEATURES OF THE HSK SYSTEM

●Suitable for high speed machining.

When the taper hole is slightly seperated during high speed machining due to centrifugal force, the taper axis is continuously in contact with the taper hole because of elastic deformation. Thus, 2 face holding is maintained.

●Guaranteed high accuracy.

Installation repeatability of 2μm is guaranteed.

●High rigidity.

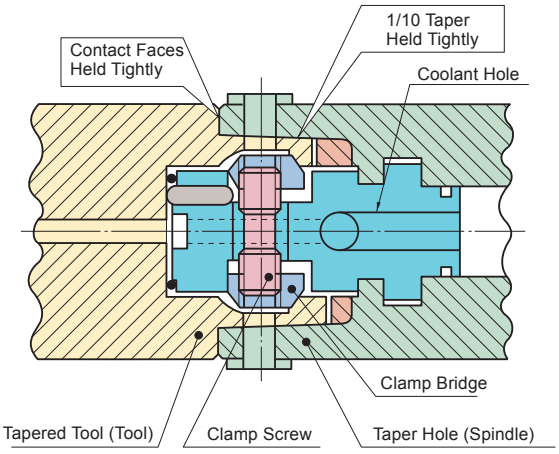
High rigidity in the radial and thrust direction due to the 2 face holding system.

●Easy installation.

Detachable support structure ensures separation of the tool even when the tool has undergone thermal expansion.

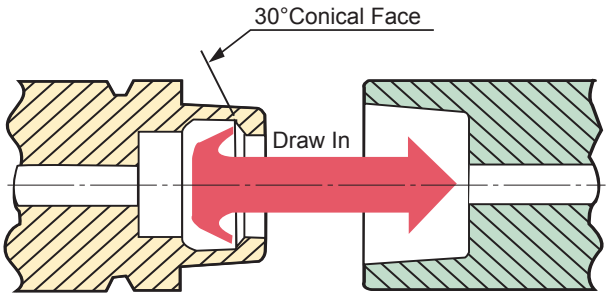
●Coolant system selection.

Center coolant and anglar flow coolant type.



* HSK stands for **H**ohl (Hollow) **S**chaft (axis) **K**egel (taper) in German.

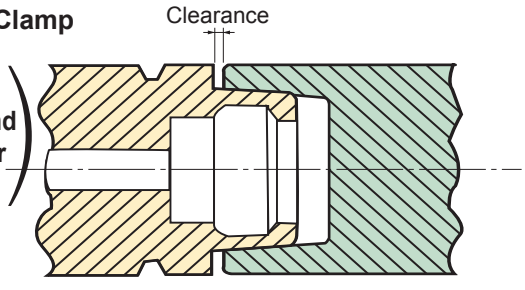
HSK CLAMPING METHOD



●The 30°conical face of the taper axis is pulled in the direction of the tapered hole to clamp.

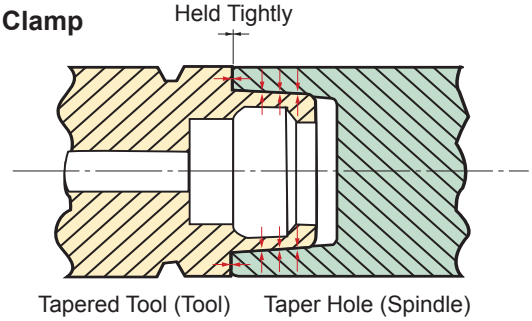
●Temporary Clamp Position

(The spindle taper face and the tool taper face contact.)



●Temporary clamp position has a clearance between the spindle and the tool contact faces.
●Taper clamping force increases as the diameter increases.

●Permanent Clamp Position



●Hollow thin taper axis holds the taper faces and the contact faces tightly due to pressurized elastic deformation.

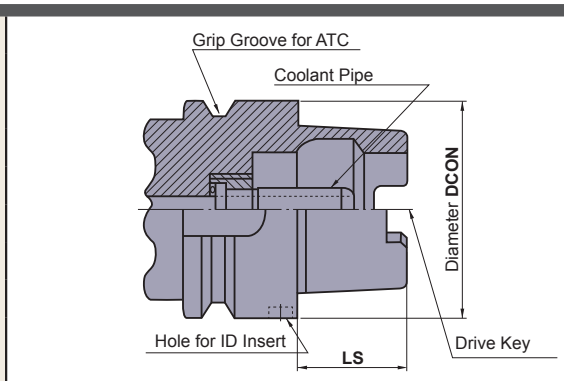
HSK SYSTEM FORM

There are various HSK types.
Mitsubishi Materials produces A, B, C, and D types of taper axis (tool size) and C and D types (manual operation) of taper hole (spindle side).

Type	Application	Tapered Tool (Tool)	Tapered Hole (Spindle)
A Type	Automatic tool change (ATC), center coolant (mainly milling tools)	☐	
B Type	Automatic tool change (ATC), angular flow coolant (mainly turning tools)	☐	
C Type	Manual tool change, center coolant (mainly milling tools)	☐	☐
D Type	Manual tool change, angular flow coolant (mainly turing tools)	☐	☐

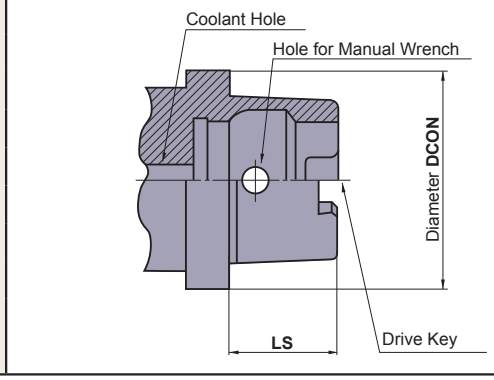
☐ **: Non stock, produced to order only.**

Automatic Tool Change — **A Type** (Center Coolant Type) — Milling Tool



Order Number	Dimensions (mm)	
	DCON	**LS**
HSK-A32M	32	16
HSK-A40M	40	20
HSK-A50M	50	25
HSK-A63M	63	32
HSK-A80M	80	40
HSK-A100M	100	50

Manual Tool Change — **C Type** (Center Coolant Type) — Milling Tool

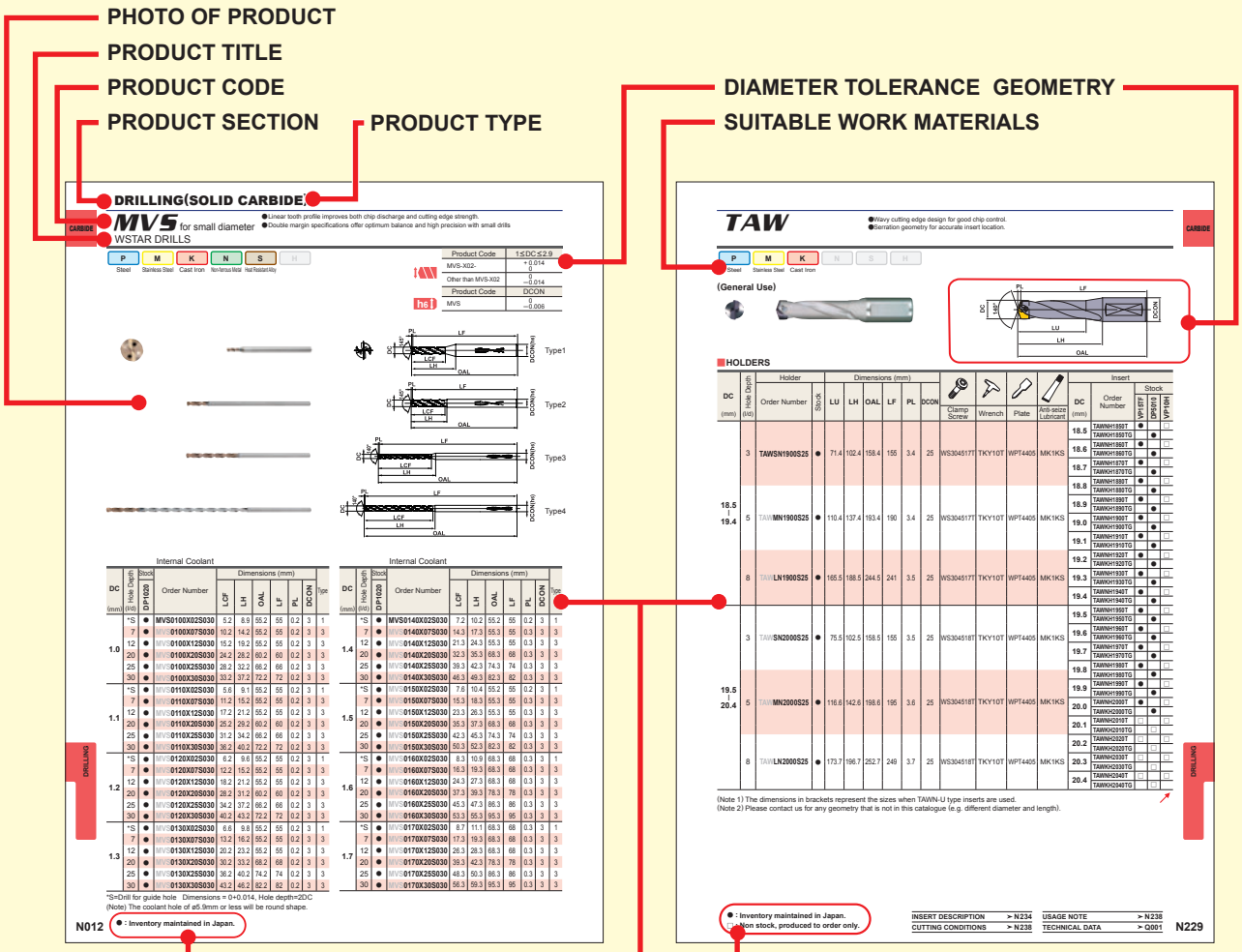


Order Number	Dimensions (mm)	
	DCON	**LS**
HSK-C32M	32	16
HSK-C40M	40	20
HSK-C50M	50	25
HSK-C63M	63	32
HSK-C80M	80	40
HSK-C100M	100	50

HOW TO READ THE STANDARD OF DRILLING TOOLS

●How this section page is organized

①Arranged in order of solid carbide drills, brazed type drills, indexable type drills and high-speed steel drills.



●To Order : For solid-carbide or brazed drills, please specify ①order number and ②grade.
For indexable type drills, please specify ①order number for the drill.
For indexable type drill inserts, please specify ①insert number and ②insert grade.

DRILLING

IDENTIFICATION ····· N002
SYMBOL DESCRIPTIONS ····· N003
DRILLS SELECTION CHART ····· N004

DRILL STANDARD

SOLID CARBIDE
WSTAR DRILLS ····· N012
WSTAR DRILLS (FOR MACHINING OF STEEL AND CAST IRON) ··· N063
WSTAR DRILLS (FOR MACHINING OF STAINLESS STEEL) ··· N070
WSTAR DRILLS (FOR MACHINING OF ALUMINIUM ALLOYS) ··· N077
WSTAR DRILLS (FOR DIE & MOULD MACHINING) ··· N085
MZE/MZS DRILLS ····· N097
MSE DRILLS ····· N120
SOLID GUN DRILL ····· N124
MIRACLE DRILLS ····· N127
MAE/MAS DRILLS ····· N129

High-Speed Steel Solid Type
Violet coated precision drills ··· N137
VIOLET DRILLS ····· N162
HSS MILLING SHANK DRILLS ··· N135
STRAIGHT SHANK DRILLS ····· N166
TAPER SHANK DRILLS ····· N184
TRIANGULAR SHANK DRILLS ···· N197

BRAZED TYPE
BRS/BRM/BRK DRILLS ····· N200
BRSB/BRB DRILLS (FOR BRIDGE CONSTRUCTION) ····· N204
BRA/BRL DRILLS ····· N206

Exchangeable head
TAW DRILLS ····· N220

INDEXABLE TYPE
MVX TYPE DRILLS ····· N212
STAW ····· N220
TAW ····· N229
TAF TYPE DRILLS ····· N240
JUST FIT SLEEVE ····· N246

GUN DRILL • GUN REAMER ····· N249
Diamond coated drills ····· N252

*Arranged by Alphabetical order

N197 **3KD**
N206 **BRA**
N205 **BRB**
N208 **BRL**
N202 **BRM**
N204 **BRMB**
N200 **BRS**
N204 **BRSB**
N256 **DCBSS**
N254 **DCSSM**
N254 **DCSSS**
N183 **EPSS**
N166 **GSD**
N184 **GTD**
N195 **GTTD**
N178 **GWSL**
N176 **GWSS**
N191 **GWTS**
N246 **JFS**
N174 **KSD**
N189 **KTD**
N180 **LSD**
N192 **LTD**
N129 **MAE**
N129 **MAS**
N252 **MCS**
N125 **MGD**
N124 **MGS**
N085 **MHS**
N070 **MMS**
N077 **MNS**
N063 **MQS**
N120 **MSE**
N123 **MSP**
N024 **MVE**
N012 **MVS**
N212 **MVX**
N054 **MWE**
N032 **MWS**
N096 **MZE**
N096 **MZS**
N168 **SD**
N171 **SDLS**
N135 **SEPDM**
N220 **STAW**
N240 **TAF**
N229 **TAW**
N185 **TD**
N196 **TTD**
N142 **VAPDM**
N152 **VAPDMSUS**
N137 **VAPDS**
N159 **VAPDSCB**
N146 **VAPDSSUS**
N128 **VCHSM**
N127 **VCSSS**
N162 **VSD**
N164 **VTDS**

IDENTIFICATION

PRODUCT CODE OF DRILLS



Product name

MV : New generation for general-purpose
MW : General-purpose
MZ : MZE/MZS Drills
MA : MAE/MAS Drills
MS : MSE Drills
MN : For Machining of Aluminium Alloys
MH : For die & mould machining
MM : For Machining of Stainless Steel
MQ : Steel • For high feed cast iron machining

Coolant

E : External Coolant
S : Internal Coolant

Diameter

ex.
0050 → ϕ0.5
0300 → ϕ3.0

l/d

S : 2D
M : 3D
L : 5D (MAE, MAS : 6D)
X : 12D
X＊＊D : ＊＊D

Type of shank

A : Straight shank
B : Integral shank
S＊＊＊ : Shank Diameter (MV Series)

＊Other special types can be ordered.



Product name

VC : Miracle drills
DC : Diamond coated drills
VA : Violet coated precision drills (High Grade, High Speed Steel)
SE : SE High Precision Drill (High-Speed Steel)
V : Violet drills
G : TiN coated drills (High-Speed Steel)
E : Co-HSS drills
B : Blister packed drills
None : High-Speed Steel

Applications

SD : General-purpose straight drill
TD : General-purpose taper drill
S : For steel
H : For high hardness
N : For CN
PD : For high-precision machining
U : For stainless
T : For steel frame
W : For deep hole

Type of shank

S : Straight
T : Taper
3K : Triangular
6K : Hexagonal

Flute length

S : Short
M : Medium
L : Long

Diameter

ex.
D0050 → ϕ0.5
D0300 → ϕ3.0

Others

A＊＊＊ : Overall Length
S＊＊ : Shank Diameter
M＊ : Taper size

＊Other special types can be ordered.

SYMBOL DESCRIPTIONS

Tool material



Ultra micro grain carbide
Ultra micro grain carbide is used as the substrate material.



High grade high alloy HSS
High grade high alloy HSS is used as the substrate material.



Cobalt high speed steel
Cobalt high speed steel is used as the substrate material.



D-STH cobalt high-speed steel
Cobalt high-speed steel is used as the substrate material with D-STH.



High speed steel
High speed steel is used as the substrate material.

Web thinning



X web thinning
X web thinning is used at the drill point.



XR web thinning
XR web thinning is used at the drill point.



C web thinning
C web thinning is used at the drill point.



S web thinning
S web thinning is used at the drill point.



N web thinning
N web thinning is used at the drill point.

Coating



Diamond Coating
Pure Diamond high performance coating excelling in film adhesion to the substrate.



Violet Coating
Increased tool life of 2—3 times that of TiN coated products.



TiN Coating
Increased tool life of 2—3 times that of non coated products.

Angle and sharp corner edge



Point angle
Indicates drill point angle the tip.

DRILLS SELECTION CHART CEMENTED CARBIDE

Tool material	Drill Type (Series Title)	Applications	Product Code	Size Range	Hole Depth (l/d)	Coolant	Coating	Work Material P Steel	Work Material M Stainless Steel	Work Material K Cast Iron	Work Material N Non-ferrous Metal	Work Material S Heat Resistant Alloy	Work Material H Hardened Steel	Shape	Page Number Dimensions	Page Number Cutting Conditions
Solid Drills	WSTAR DRILLS SERIES	New Generation for small diameter	NEW MVS...X02 MIRACLE SIGMA	ϕ1.0 −ϕ2.9	*S	Internal	○	◎	◎	○	○	○			N012	N022
			NEW MVS...X07 MIRACLE SIGMA		7	Internal	○	◎	◎	○	○	○				
			NEW MVS...X12 MIRACLE SIGMA		12	Internal	○	◎	◎	○	○	○				
			NEW MVS...X20 MIRACLE SIGMA		20	Internal	○	◎	◎	○	○	○				
			NEW MVS...X25 MIRACLE SIGMA		25	Internal	○	◎	◎	○	○	○				
			NEW MVS...X30 MIRACLE SIGMA		30	Internal	○	◎	◎	○	○	○				
		New generation for general-purpose	MVE...X02 MIRACLE SIGMA	ϕ3.0 −ϕ20.0	2	External	○	◎	○	◎	○	○	○		N024	N030
			MVE...X03 MIRACLE SIGMA		3	External	○	◎	○	◎	○	○	○			
			MVS...X03 MIRACLE SIGMA		3	Internal	○	◎	◎	◎	○	○			N012	N022
			MVS...X05 MIRACLE SIGMA		5	Internal	○	◎	◎	◎	○	○				
			MVS...X08 MIRACLE SIGMA		8	Internal	○	◎	◎	◎	○	○				
		For small Diameter	MWS...SB	ϕ0.5 −ϕ2.95	1	Internal	○	◎	◎	◎	○	○			N032	N047
			MWS...LB		5	Internal	○	◎	◎	◎	○	○			N032	N048
			MWS...XB		12	Internal	○	◎	◎	◎	○	○				N050
			MWS...X20DB	ϕ1.0 −ϕ2.95	20	Internal	○	◎	◎	◎	○	○			N032	N049
			MWS...X25DB		25	Internal	○	◎	◎	◎	○	○				
			MWS...X30DB		30	Internal	○	◎	◎	◎	○	○				

*S=Drill for guide hole Dimensions = 0+0.014, Hole depth=2DC

Tool material	Drill Type (Series Title)	Applications	Product Code	Size Range	Hole Depth (l/d)	Coolant	Coating	Work Material P Steel	Work Material M Stainless Steel	Work Material K Cast Iron	Work Material N Non-ferrous Metal	Work Material S Heat Resistant Alloy	Work Material H Hardened Steel	Shape	Page Number Dimensions	Page Number Cutting Conditions
Solid Drills	WSTAR DRILLS SERIES	General Drilling	MWE...SA/SB	φ3.0 –φ20.0	2	External	○	◎	○	◎	○	○	○		N054	N061
			MWE...MA/MB		3	External	○	◎	○	◎	○	○	○			
			MWS...MB	φ3.0 –φ25.0	3	Internal	○	◎	◎	◎	○	○			N032	N047
			MWS...LB		5	Internal	○	◎	◎	◎	○	○				
			MWS...X8DB	φ3.0 –φ16.0	8	Internal	○	◎	◎	◎	○	○				
		For deep hole	MWS...X10DB	φ3.0 –φ14.0	10	Internal	○	◎	◎	◎	○	○			N032	N050
			MWS...X15DB		15	Internal	○	◎	◎	◎	○	○				
			MWS...X20DB		20	Internal	○	◎	◎	◎	○	○				
			MWS...X25DB	φ3.0 –φ12.0	25	Internal	○	◎	◎	◎	○	○				
			MWS...X30DB	φ3.0 –φ10.0	30	Internal	○	◎	◎	◎	○	○				
		For Machining Of Steel And Cast Iron	MQS...X3DB	φ3.0 –φ20.0	3	Internal	○	◎		◎					N063	N067
			MQS...X5DB		5	Internal	○	◎		◎						
			MQS...X8DB	φ3.0 –φ16.0	8	Internal	○	◎		◎						
		For Machining Of Stainless Steel	MMS...X3DB	φ3.0 –φ20.0	3	Internal	○		◎						N070	N074
			MMS...X5DB		5	Internal	○		◎							

DRILLS SELECTION CHART CEMENTED CARBIDE

Tool material	Drill Type (Series Title)	Applications	Product Code	Size Range	Hole Depth (l/d)	Coolant	Coating	Work Material P Steel	Work Material M Stainless Steel	Work Material K Cast Iron	Work Material N Non-ferrous Metal	Work Material S Heat Resistant Alloy	Work Material H Hardened Steel	Shape	Page Number Dimensions	Page Number Cutting Conditions
Solid Drills	WSTAR DRILLS SERIES	For Machining Of Aluminium Alloys	MNS...LB	ϕ3.0 –ϕ14.0	5	Internal	–				◎				N077	N082
			MNS...X10DB		10	Internal	–				◎					
			MNS...X20DB		20	Internal	–				◎					
			MNS...X30DB	ϕ3.0 –ϕ10.0	30	Internal	–				◎					
		For Die & Mould Machining	MHS...L020B -L300B	ϕ0.95 –ϕ12.0	1 –30	Internal	○	○	○			○	◎		N085	N093
	DIAMOND COATED DRILLS	For CFRP	MCS	ϕ4.366 –ϕ12.725	3	Internal	○	For CFRP							N252	N253
		For non-ferrous material	DCSSS	ϕ0.2 –ϕ2.0	–	External	–				○				N254	N255
			DCSSM	ϕ2.1 –ϕ3.0	–	External	–				○				N254	N255
		for hard brittle materials	DCBSS	ϕ0.05 –ϕ3.0	–	External	–	Hard brittle materials such as ceramics							N256	N257
	ZET1 DRILLS SERIES	General Drilling	MZE...SA/SB	ϕ1.0 –ϕ20.0	2	External	○ / –	◎	○	◎	○	○	○		N096	N115
			MZE...MA	ϕ3.0 –ϕ20.0	3	External	○ / –	◎	○	◎	○	○	○			
			MZS...MB	ϕ2.0 –ϕ20.0	3	Internal	○	◎	◎	◎	○	○			N096	N115
			MZS...LB	ϕ1.0 –ϕ20.0	5	Internal	○	◎	◎	◎	○	○				
			MZS...XB	ϕ1.0 –ϕ2.9	12	Internal	○	◎	◎	◎	○	○				
		With Chamfered Cutting Edges	MZE...SM	ϕ3.4 –ϕ10.3	2	External	○	◎	○	◎	○	○	○		N113	N115
			MZE...MM		3	External	○	◎	○	◎	○	○	○			
			MZS...SM	ϕ3.4 –ϕ10.3	2	Internal	○	◎	◎	◎	○	○			N113	N115
			MZS...MM		3	Internal	○	◎	◎	◎	○	○				

Tool material	Drill Type (Series Title)	Applications	Product Code	Size Range	Hole Depth (l/d)	Coolant	Coating	Work Material P Steel	Work Material M Stainless Steel	Work Material K Cast Iron	Work Material N Non-ferrous Metal	Work Material S Heat Resistant Alloy	Work Material H Hardened Steel	Shape	Page Number Dimensions	Page Number Cutting Conditions
Solid Drills	MIRACLE MINI STAR DRILL SERIES	For small Diameter	MSE...SB	ϕ0.1 –ϕ0.99	5 –12	External	○	◎	○	◎	○	○	○		N120	N121
			MSP0300SB	—	—	External	○	◎	○	◎	○	○	○		N123	N123
	MGS GUN DRILL SERIES	Deep Hole Drilling	MGS...SB	ϕ0.7 –ϕ3.0	–100	Internal	–	◎	◎	◎	◎	○	○		N124	N125
	MIRACLE DRILLS SERIES	Hardened Steel	VCSSS (3mm shank)	ϕ0.3 –ϕ2.4	5	External	○	○	○	○	○	○	◎		N127	N127
			VCHSM	ϕ2.5 –ϕ16.0	3	External	○					○	◎		N128	N128
	MAE/MAS DRILLS SERIES	Aluminium Alloy, Cast Iron	MAE...MB	ϕ3.0 –ϕ16.0	3	External	–			○	◎				N129	N134
			MAS...MB		3	Internal	–			○	◎					
			MAS...LB		6	Internal	–			○	◎					
Exchangeable-head Drills	WSTAR Insert Type Drill	General Drilling	STAWSS	ϕ10.0 –ϕ18.4	1.5	Internal	–	◎	○	◎	○				N220	N227
			STAWSN		3	Internal	–	◎	○	◎	○					
			STAWMN		5	Internal	–	◎	○	◎	○					
			STAWLN		8	Internal	–	◎	○	◎	○					
			TAWSN(H)	ϕ14.0 –ϕ30.4	3	Internal	–	◎	○	◎					N229	N238
			TAWMN(H)		5	Internal	–	◎	○	◎						
			TAWLN(H)		8	Internal	–	◎	○	◎						
		For Bridge Construction	TAWSB	ϕ24.5 –ϕ26.7	3	Internal	–	◎							N239	N239
			TAWMB		5	Internal	–	◎								

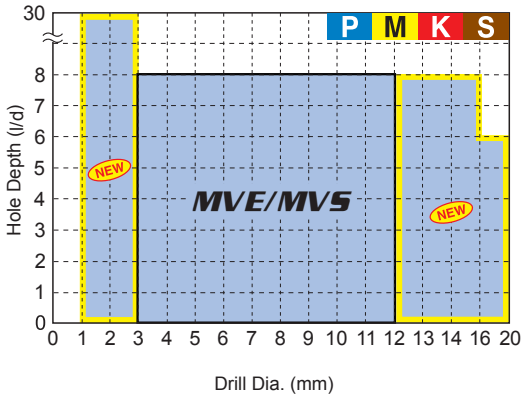
DRILLS SELECTION CHART CEMENTED CARBIDE

Tool material	Drill Type (Series Title)	Applications	Product Code	Size Range	Hole Depth (l/d)	Coolant	Coating	Work Material P Steel	Work Material M Stainless Steel	Work Material K Cast Iron	Work Material N Non-ferrous Metal	Work Material S Heat Resistant Alloy	Work Material H Hardened Steel	Shape	Page Number Dimensions	Page Number Cutting Conditions
Brazed Drills	BRS/BRM DRILLS	General Drilling	BRS	ϕ14.0 –ϕ30.0	3	Internal	–	◎	◎	○					N200	N201
			BRM		5	Internal	–	◎	◎	○					N202	N203
	BRA/BRL DRILLS	For Bridge Construction	BRSB	ϕ24.5 –ϕ26.7	3	Internal	–	◎							N204	N205
			BRMB		5	Internal	–	◎							N204	N205
		General Drilling	BRA	ϕ8.0 –ϕ40.0	3	Internal	–	◎	○	○					N206	N210
		General Drilling (For turning)	BRL		3	Internal	–	◎	○	○					N208	N210
		For Bridge Construction	BRB	ϕ24.5 –ϕ26.7	3	Internal	–	◎							N205	N205
	GUN DRILL	Ultra Deep Holes	–	ϕ2.0 –ϕ30.3	–	Internal	–	◎	○	○	○				N249	–
	GUN REAMER	Ultra Deep Holes	–	ϕ6.0 –ϕ30.0	–	Internal	–	○	○	○	○				N250	–
	GUN REAMER with Diamond Compound	Ultra Deep Holes	–	ϕ6.0 –ϕ30.3	–	Internal	–			◎	◎				N251	–
Indexable Drills	MVX DRILLS SERIES	New generation for general-purpose	MVX...X2	ϕ17.0 –ϕ63.0	2	Internal	–	◎	○	◎					N212	N219
			MVX...X3		3	Internal	–	◎	○	◎						
			MVX...X4		4	Internal	–	◎	○	◎						
			MVX...X5		5	Internal	–	◎	○	◎						
			MVX...X6	ϕ17.0 –ϕ43.0	6	Internal	–	◎	○	◎						
	TAF DRILLS SERIES	General Drilling	TAFS	ϕ12.0 –ϕ56.0	2	Internal	–	◎	◎	◎					N240	N245
			TAFM		3	Internal	–	◎	◎	◎						
			TAFL	ϕ16.0 –ϕ34.0	4	Internal	–	◎	◎	◎						

WSTAR DRILLS SERIES

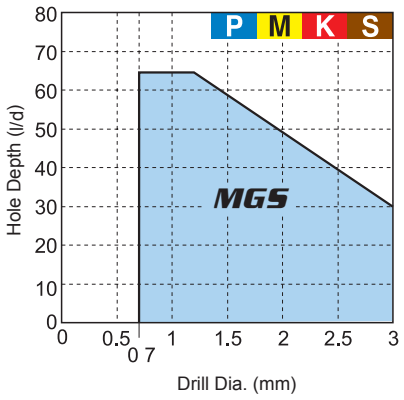
SOLID CARBIDE

MVE/MVS New generation for general-purpose



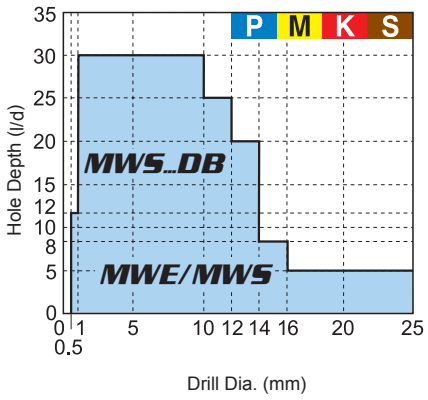
SOLID CARBIDE(For small diameter and deep hole)

MGS



SOLID CARBIDE (General Drilling)

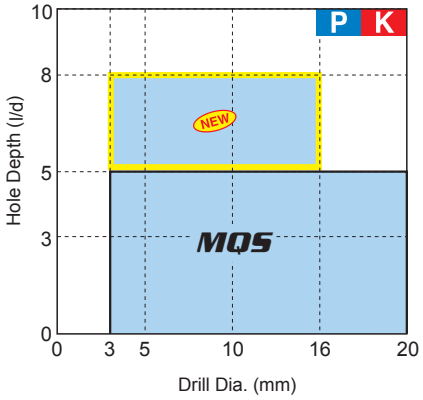
MWE/MWS,MWS...DB(SUPER LONG)



SOLID CARBIDE

MQS Highly efficient drilling, High-precision

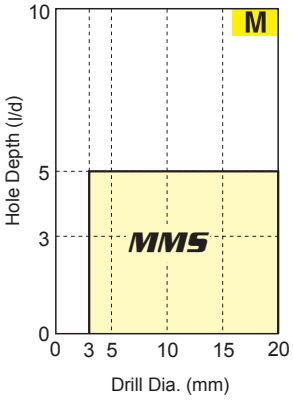
Steel • For high feed cast iron machining



SOLID CARBIDE

MMS Highly efficient drilling,Long tool life

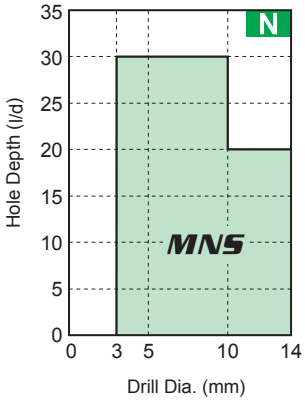
For machining of stainless steel



SOLID CARBIDE

MNS Highly efficient drilling

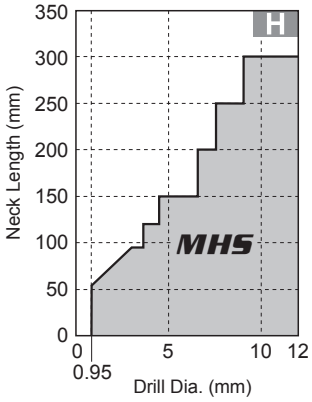
For machining of aluminium alloys



SOLID CARBIDE

MHS High-precision deep hole

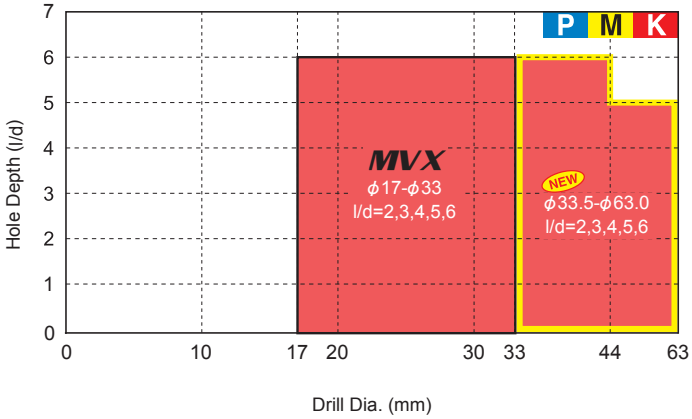
For die & mould machining



Indexable carbide drills

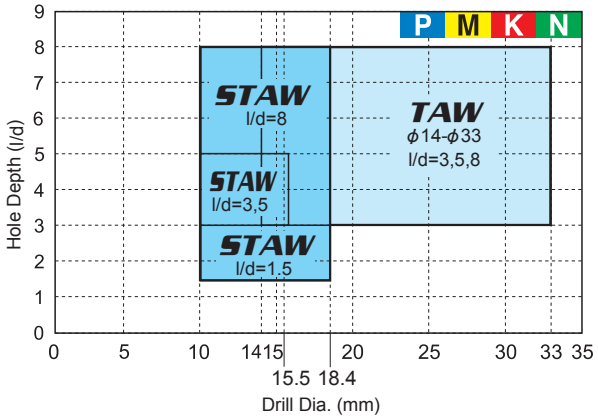
INDEXABLE TYPE

MVX



INDEXABLE HEAD

STAW,TAW



DRILLING

HSS

DRILLS SELECTION CHART HSS

Drill Type (Series Title)	Applications	Product Code	Size Range	Tool material	Coolant	Coating	Work Material P Steel	Work Material M Stainless Steel	Work Material K Cast Iron	Work Material N Non-ferrous Metal	Work Material S Heat Resistant Alloy	Work Material H Hardened Steel	Shape	Page Number Dimensions	Page Number Cutting Conditions
VIOLET COATED DRILLS	General, High Precision	VAPDS	ϕ0.5 –ϕ13.0	High Grade, High Speed Steel	External	V	◎	○	○		○			N137	N141
		VAPDM	ϕ0.5 –ϕ32.0		External	V	◎	○	○		○			N142	N145
	General, High Precision Steel	VAPDSSUS	ϕ0.5 –ϕ20.0	Cobalt High Speed Steel	External	V	○	◎	○	○				N146	N158
		VAPDMSUS	ϕ0.5 –ϕ13.0		External	V	○	◎	○	○				N152	N158
	Spot Milling	VAPDSCB	ϕ3.0 –ϕ32.0	High Grade, High Speed Steel	External	V	◎	○	○	○				N159	N161
VIOLET DRILL	General Drilling	VSD	ϕ0.5 –ϕ13.0	High Speed Steel	External	V	◎	○	○					N162	N163
		VTDS	ϕ6.0 –ϕ32.0		External	V	◎	◎	○					N164	N165
SE High Precision Drill	General Drilling	SEPDM NEW	ϕ0.5 –ϕ4.0	High Speed Steel	External	–	◎		◎	○	○			N135	N136
STRAIGHT SHANK DRILL	General Drilling	GSD	ϕ0.5 –ϕ13.0	High Speed Steel	External	G	◎	○	○	○				N166	N198
		SD	ϕ0.2 –ϕ17.5		External	–	◎	○	○	○				N168	N199
		SD (1/100 Straight)	ϕ0.25 –ϕ5.95		External	–	◎	○	○	○				N170	N199
	Deep Hole Drilling	SDLS NEW	ϕ1.0 –ϕ10.0	High Speed Steel	External	–	◎		○	○	○			N171	N173
	General Drilling	KSD	ϕ1.0 –ϕ13.0	Cobalt High Speed Steel	External	–	◎	◎		○				N174	N199

DRILLING

Drill Type (Series Title)	Applications	Product Code	Size Range	Tool material	Coolant	Coating	Work Material P Steel	Work Material M Stainless Steel	Work Material K Cast Iron	Work Material N Non-ferrous Metal	Work Material S Heat Resistant Alloy	Work Material H Hardened Steel	Shape	Page Number Dimensions	Page Number Cutting Conditions
STRAIGHT SHANK DRILL	Deep Hole Drilling	GWSS	ϕ1.0 –ϕ13.0	Cobalt High Speed Steel	External	G	◎	○	○	○				N176	N198
		GWSL	ϕ2.0 –ϕ13.0		External	G	◎	○	○	○				N178	N198
		LSD	ϕ1.0 –ϕ13.0	High Speed Steel	External	–	○		○	○				N180	N199
	Sheet Steel	EPSS	ϕ2.0 –ϕ13.0	High Speed Steel	External	–	○	○	○	○				N183	–
TAPER SHANK DRILL	General Drilling	GTD	ϕ6.0 –ϕ40.0	High Speed Steel	External	G	◎	○	○	○				N184	N198
		TD	ϕ3.0 –ϕ75.0		External	–	◎	○	○	○				N185	N199
		KTD	ϕ5.0 –ϕ50.0	Cobalt High Speed Steel	External	–	◎	○	○	○				N189	N199
	Deep Hole Drilling	GWTS	ϕ6.0 –ϕ32.0	Cobalt High Speed Steel	External	G	◎	○	○	○				N191	N198
		LTD	ϕ6.0 –ϕ40.0	High Speed Steel	External	–	○		○	○				N192	–
	For steel frame	GTTD	ϕ17.0 –ϕ32.0	High Speed Steel	External	G	◎							N195	N198
		TTD	ϕ17.0 –ϕ32.0	High Speed Steel	External	–	○							N196	N199
TRIANGULAR SHANK DRILL	For General-purpose Electric Drills	3KD	ϕ7.0 –ϕ26.0	High Speed Steel	External	–	○		○	○				N197	–

DRILLING(SOLID CARBIDE)

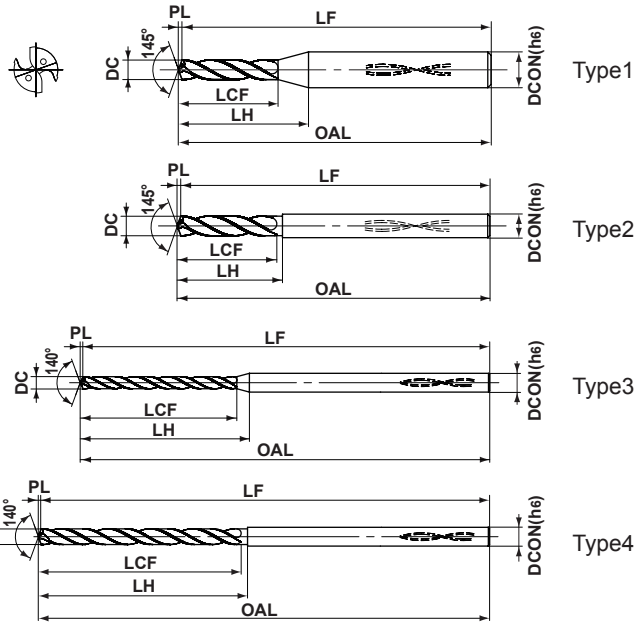
MVS for small diameter
WSTAR DRILLS

- Linear tooth profile improves both chip discharge and cutting edge strength.
- Double margin specifications offer optimum balance and high precision with small drills

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal	Heat Resistant Alloy	

Product Code	1≤DC≤2.9
MVS-X02-	+0.014 0
Other than MVS-X02	0 −0.014
Product Code	**DCON**
MVS	0 −0.006





Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
1.0	*S	●	MVS0100X02S030	5.2	8.9	55.2	55	0.2	3	1
	7	●	MVS0100X07S030	10.2	14.2	55.2	55	0.2	3	3
	12	●	MVS0100X12S030	15.2	19.2	55.2	55	0.2	3	3
	20	●	MVS0100X20S030	24.2	28.2	60.2	60	0.2	3	3
	25	●	MVS0100X25S030	28.2	32.2	66.2	66	0.2	3	3
	30	●	MVS0100X30S030	33.2	37.2	72.2	72	0.2	3	3
1.1	*S	●	MVS0110X02S030	5.6	9.1	55.2	55	0.2	3	1
	7	●	MVS0110X07S030	11.2	15.2	55.2	55	0.2	3	3
	12	●	MVS0110X12S030	17.2	21.2	55.2	55	0.2	3	3
	20	●	MVS0110X20S030	25.2	29.2	60.2	60	0.2	3	3
	25	●	MVS0110X25S030	31.2	34.2	66.2	66	0.2	3	3
	30	●	MVS0110X30S030	36.2	40.2	72.2	72	0.2	3	3
1.2	*S	●	MVS0120X02S030	6.2	9.6	55.2	55	0.2	3	1
	7	●	MVS0120X07S030	12.2	15.2	55.2	55	0.2	3	3
	12	●	MVS0120X12S030	18.2	21.2	55.2	55	0.2	3	3
	20	●	MVS0120X20S030	28.2	31.2	60.2	60	0.2	3	3
	25	●	MVS0120X25S030	34.2	37.2	66.2	66	0.2	3	3
	30	●	MVS0120X30S030	40.2	43.2	72.2	72	0.2	3	3
1.3	*S	●	MVS0130X02S030	6.6	9.8	55.2	55	0.2	3	1
	7	●	MVS0130X07S030	13.2	16.2	55.2	55	0.2	3	3
	12	●	MVS0130X12S030	20.2	23.2	55.2	55	0.2	3	3
	20	●	MVS0130X20S030	30.2	33.2	68.2	68	0.2	3	3
	25	●	MVS0130X25S030	36.2	40.2	74.2	74	0.2	3	3
	30	●	MVS0130X30S030	43.2	46.2	82.2	82	0.2	3	3

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
1.4	*S	●	MVS0140X02S030	7.2	10.2	55.2	55	0.2	3	1
	7	●	MVS0140X07S030	14.3	17.3	55.3	55	0.3	3	3
	12	●	MVS0140X12S030	21.3	24.3	55.3	55	0.3	3	3
	20	●	MVS0140X20S030	32.3	35.3	68.3	68	0.3	3	3
	25	●	MVS0140X25S030	39.3	42.3	74.3	74	0.3	3	3
	30	●	MVS0140X30S030	46.3	49.3	82.3	82	0.3	3	3
1.5	*S	●	MVS0150X02S030	7.6	10.4	55.2	55	0.2	3	1
	7	●	MVS0150X07S030	15.3	18.3	55.3	55	0.3	3	3
	12	●	MVS0150X12S030	23.3	26.3	55.3	55	0.3	3	3
	20	●	MVS0150X20S030	35.3	37.3	68.3	68	0.3	3	3
	25	●	MVS0150X25S030	42.3	45.3	74.3	74	0.3	3	3
	30	●	MVS0150X30S030	50.3	52.3	82.3	82	0.3	3	3
1.6	*S	●	MVS0160X02S030	8.3	10.9	68.3	68	0.3	3	1
	7	●	MVS0160X07S030	16.3	19.3	68.3	68	0.3	3	3
	12	●	MVS0160X12S030	24.3	27.3	68.3	68	0.3	3	3
	20	●	MVS0160X20S030	37.3	39.3	78.3	78	0.3	3	3
	25	●	MVS0160X25S030	45.3	47.3	86.3	86	0.3	3	3
	30	●	MVS0160X30S030	53.3	55.3	95.3	95	0.3	3	3
1.7	*S	●	MVS0170X02S030	8.7	11.1	68.3	68	0.3	3	1
	7	●	MVS0170X07S030	17.3	19.3	68.3	68	0.3	3	3
	12	●	MVS0170X12S030	26.3	28.3	68.3	68	0.3	3	3
	20	●	MVS0170X20S030	39.3	42.3	78.3	78	0.3	3	3
	25	●	MVS0170X25S030	48.3	50.3	86.3	86	0.3	3	3
	30	●	MVS0170X30S030	56.3	59.3	95.3	95	0.3	3	3

*S=Drill for guide hole Dimensions = 0+0.014, Hole depth=2DC
(Note) The coolant hole of ø5.9mm or less will be round shape.

● : Inventory maintained in Japan.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
1.8	*S	●	MVS0180X02S030	9.3	11.5	68.3	68	0.3	3	1
	7	●	MVS0180X07S030	18.3	20.3	68.3	68	0.3	3	3
	12	●	MVS0180X12S030	27.3	29.3	68.3	68	0.3	3	3
	20	●	MVS0180X20S030	41.3	44.3	84.3	84	0.3	3	3
	25	●	MVS0180X25S030	50.3	53.3	94.3	94	0.3	3	3
	30	●	MVS0180X30S030	59.3	62.3	102.3	102	0.3	3	3
1.9	*S	●	MVS0190X02S030	9.7	11.8	68.3	68	0.3	3	1
	7	●	MVS0190X07S030	19.3	21.3	68.3	68	0.3	3	3
	12	●	MVS0190X12S030	29.3	31.3	68.3	68	0.3	3	3
	20	●	MVS0190X20S030	44.3	46.3	84.3	84	0.3	3	3
	25	●	MVS0190X25S030	53.3	55.3	94.3	94	0.3	3	3
	30	●	MVS0190X30S030	63.3	65.3	102.3	102	0.3	3	3
2.0	*S	●	MVS0200X02S030	10.3	12.2	68.3	68	0.3	3	1
	7	●	MVS0200X07S030	20.4	22.4	68.4	68	0.4	3	3
	12	●	MVS0200X12S030	30.4	32.4	68.4	68	0.4	3	3
	20	●	MVS0200X20S030	46.4	48.4	84.4	84	0.4	3	3
	25	●	MVS0200X25S030	56.4	58.4	94.4	94	0.4	3	3
	30	●	MVS0200X30S030	66.4	68.4	102.4	102	0.4	3	3
2.1	*S	●	MVS0210X02S030	10.7	12.4	74.3	74	0.3	3	1
	7	●	MVS0210X07S030	21.4	23.4	74.4	74	0.4	3	3
	12	●	MVS0210X12S030	32.4	34.4	74.4	74	0.4	3	3
	20	●	MVS0210X20S030	48.4	50.4	94.4	94	0.4	3	3
	25	●	MVS0210X25S030	59.4	60.4	107.4	107	0.4	3	3
	30	●	MVS0210X30S030	69.4	71.4	118.4	118	0.4	3	3
2.2	*S	●	MVS0220X02S030	11.3	12.8	74.3	74	0.3	3	1
	7	●	MVS0220X07S030	22.4	23.4	74.4	74	0.4	3	3
	12	●	MVS0220X12S030	33.4	34.4	74.4	74	0.4	3	3
	20	●	MVS0220X20S030	51.4	52.4	94.4	94	0.4	3	3
	25	●	MVS0220X25S030	62.4	63.4	107.4	107	0.4	3	3
	30	●	MVS0220X30S030	73.4	74.4	118.4	118	0.4	3	3
2.3	*S	●	MVS0230X02S030	11.8	13.1	74.4	74	0.4	3	1
	7	●	MVS0230X07S030	23.4	24.4	74.4	74	0.4	3	3
	12	●	MVS0230X12S030	35.4	36.4	74.4	74	0.4	3	3
	20	●	MVS0230X20S030	53.4	54.4	94.4	94	0.4	3	3
	25	●	MVS0230X25S030	64.4	66.4	107.4	107	0.4	3	3
	30	●	MVS0230X30S030	76.4	77.4	118.4	118	0.4	3	3
2.4	*S	●	MVS0240X02S030	12.4	13.5	74.4	74	0.4	3	1
	7	●	MVS0240X07S030	24.4	25.4	74.4	74	0.4	3	3
	12	●	MVS0240X12S030	36.4	37.4	74.4	74	0.4	3	3
	20	●	MVS0240X20S030	55.4	56.4	94.4	94	0.4	3	3
	25	●	MVS0240X25S030	67.4	68.4	107.4	107	0.4	3	3
	30	●	MVS0240X30S030	79.4	80.4	118.4	118	0.4	3	3
2.5	*S	●	MVS0250X02S030	12.8	13.7	74.4	74	0.4	3	1
	7	●	MVS0250X07S030	25.5	26.5	74.5	74	0.5	3	3
	12	●	MVS0250X12S030	38.5	39.5	74.5	74	0.5	3	3
	20	●	MVS0250X20S030	58.5	59.5	94.5	94	0.5	3	3
	25	●	MVS0250X25S030	70.5	71.5	107.5	107	0.5	3	3
	30	●	MVS0250X30S030	83.5	84.5	118.5	118	0.5	3	3

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
2.6	*S	●	MVS0260X02S030	13.4	13.4	81.4	81	0.4	3	2
	7	●	MVS0260X07S030	26.5	26.5	81.5	81	0.5	3	4
	12	●	MVS0260X12S030	39.5	39.5	81.5	81	0.5	3	4
	20	●	MVS0260X20S030	60.5	60.5	103.5	103	0.5	3	4
	25	●	MVS0260X25S030	73.5	73.5	117.5	117	0.5	3	4
	30	●	MVS0260X30S030	86.5	86.5	132.5	132	0.5	3	4
2.7	*S	●	MVS0270X02S030	13.8	13.8	81.4	81	0.4	3	2
	7	●	MVS0270X07S030	27.5	27.5	81.5	81	0.5	3	4
	12	●	MVS0270X12S030	41.5	41.5	81.5	81	0.5	3	4
	20	●	MVS0270X20S030	62.5	62.5	103.5	103	0.5	3	4
	25	●	MVS0270X25S030	76.5	76.5	117.5	117	0.5	3	4
	30	●	MVS0270X30S030	89.5	89.5	132.5	132	0.5	3	4
2.8	*S	●	MVS0280X02S030	14.4	14.4	81.4	81	0.4	3	2
	7	●	MVS0280X07S030	28.5	28.5	81.5	81	0.5	3	4
	12	●	MVS0280X12S030	42.5	42.5	81.5	81	0.5	3	4
	20	●	MVS0280X20S030	64.5	64.5	103.5	103	0.5	3	4
	25	●	MVS0280X25S030	78.5	78.5	117.5	117	0.5	3	4
	30	●	MVS0280X30S030	92.5	92.5	132.5	132	0.5	3	4
2.9	*S	●	MVS0290X02S030	14.9	14.9	81.5	81	0.5	3	2
	7	●	MVS0290X07S030	29.5	29.5	81.5	81	0.5	3	4
	12	●	MVS0290X12S030	44.5	44.5	81.5	81	0.5	3	4
	20	●	MVS0290X20S030	67.5	67.5	103.5	103	0.5	3	4
	25	●	MVS0290X25S030	81.5	81.5	117.5	117	0.5	3	4
	30	●	MVS0290X30S030	96.5	96.5	132.5	132	0.5	3	4

*S=Drill for guide hole Dimensions = 0+0.014, Hole depth=2DC
(Note) The coolant hole of ø5.9mm or less will be round shape.

CUTTING CONDITIONS ➤ N022
TECHNICAL DATA ➤ Q001

DRILLING(SOLID CARBIDE)

MVS
WSTAR DRILLS

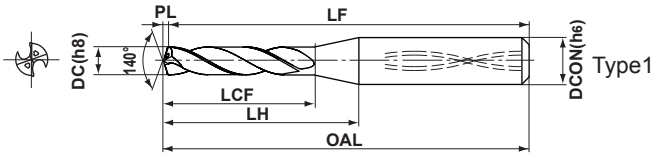
- New grade DP1020 offers long tool life for a wide range of work materials.
- Unique coolant supply technology, TRI-cooling offers high machining efficiency. (on drills over ø6)

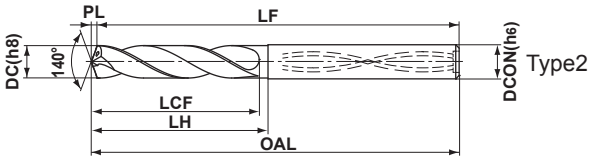
P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal	Heat Resistant Alloy	

	DC=3	3<DC≤6	6<DC≤10	10<DC≤18	18<DC≤20
	0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033
h6	0 −0.006	0 −0.008	0 −0.009	0 −0.011	0 −0.013









Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
3.0	3	●	MVS0300X03S030	21.5	21.5	72.5	72	0.5	3	2
	3	●	MVS0300X03S060	21.5	24.7	72.5	72	0.5	6	1
	5	●	MVS0300X05S030	28.5	28.5	81.5	81	0.5	3	2
	5	●	MVS0300X05S060	28.5	31.7	81.5	81	0.5	6	1
	8	●	MVS0300X08S030	35.5	35.5	81.5	81	0.5	3	2
	8	●	MVS0300X08S060	35.5	38.7	81.5	81	0.5	6	1
3.1	3	●	MVS0310X03S040	21.6	23.6	76.6	76	0.6	4	2
	3	●	MVS0310X03S060	21.6	24.7	76.6	76	0.6	6	1
	5	●	MVS0310X05S040	32.6	32.6	87.6	87	0.6	4	2
	5	●	MVS0310X05S060	32.6	35.7	87.6	87	0.6	6	1
	8	●	MVS0310X08S040	41.6	41.6	87.6	87	0.6	4	2
	8	●	MVS0310X08S060	41.6	44.7	87.6	87	0.6	6	1
3.2	3	●	MVS0320X03S040	21.6	23.6	76.6	76	0.6	4	2
	3	●	MVS0320X03S060	21.6	24.6	76.6	76	0.6	6	1
	5	●	MVS0320X05S040	32.6	32.6	87.6	87	0.6	4	2
	5	●	MVS0320X05S060	32.6	35.6	87.6	87	0.6	6	1
	8	●	MVS0320X08S040	41.6	41.6	87.6	87	0.6	4	2
	8	●	MVS0320X08S060	41.6	44.6	87.6	87	0.6	6	1
3.3	3	●	MVS0330X03S040	21.6	23.6	76.6	76	0.6	4	2
	3	●	MVS0330X03S060	21.6	24.5	76.6	76	0.6	6	1
	5	●	MVS0330X05S040	32.6	32.6	87.6	87	0.6	4	2
	5	●	MVS0330X05S060	32.6	35.5	87.6	87	0.6	6	1
	8	●	MVS0330X08S040	41.6	41.6	87.6	87	0.6	4	2
	8	●	MVS0330X08S060	41.6	44.5	87.6	87	0.6	6	1
3.4	3	●	MVS0340X03S040	21.6	23.6	76.6	76	0.6	4	2
	3	●	MVS0340X03S060	21.6	24.4	76.6	76	0.6	6	1
	5	●	MVS0340X05S040	32.6	32.6	87.6	87	0.6	4	2
	5	●	MVS0340X05S060	32.6	35.4	87.6	87	0.6	6	1
	8	●	MVS0340X08S040	41.6	41.6	87.6	87	0.6	4	2
	8	●	MVS0340X08S060	41.6	44.4	87.6	87	0.6	6	1
3.5	3	●	MVS0350X03S040	21.6	23.6	76.6	76	0.6	4	2
	3	●	MVS0350X03S060	21.6	24.3	76.6	76	0.6	6	1
	5	●	MVS0350X05S040	32.6	32.6	87.6	87	0.6	4	2
	5	●	MVS0350X05S060	32.6	35.3	87.6	87	0.6	6	1
	8	●	MVS0350X08S040	41.6	41.6	87.6	87	0.6	4	2
	8	●	MVS0350X08S060	41.6	44.3	87.6	87	0.6	6	1

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
3.6	3	●	MVS0360X03S040	23.7	23.7	80.7	80	0.7	4	2
	3	●	MVS0360X03S060	23.7	26.3	80.7	80	0.7	6	1
	5	●	MVS0360X05S040	36.7	36.7	92.7	92	0.7	4	2
	5	●	MVS0360X05S060	36.7	39.3	92.7	92	0.7	6	1
	8	●	MVS0360X08S040	46.7	46.7	92.7	92	0.7	4	2
	8	●	MVS0360X08S060	46.7	49.3	92.7	92	0.7	6	1
3.7	3	●	MVS0370X03S040	23.7	23.7	80.7	80	0.7	4	2
	3	●	MVS0370X03S060	23.7	26.2	80.7	80	0.7	6	1
	5	●	MVS0370X05S040	36.7	36.7	92.7	92	0.7	4	2
	5	●	MVS0370X05S060	36.7	39.2	92.7	92	0.7	6	1
	8	●	MVS0370X08S040	46.7	46.7	92.7	92	0.7	4	2
	8	●	MVS0370X08S060	46.7	49.2	92.7	92	0.7	6	1
3.8	3	●	MVS0380X03S040	23.7	23.7	80.7	80	0.7	4	2
	3	●	MVS0380X03S060	23.7	26.1	80.7	80	0.7	6	1
	5	●	MVS0380X05S040	36.7	36.7	92.7	92	0.7	4	2
	5	●	MVS0380X05S060	36.7	39.1	92.7	92	0.7	6	1
	8	●	MVS0380X08S040	46.7	46.7	92.7	92	0.7	4	2
	8	●	MVS0380X08S060	46.7	49.1	92.7	92	0.7	6	1
3.9	3	●	MVS0390X03S040	23.7	23.7	80.7	80	0.7	4	2
	3	●	MVS0390X03S060	23.7	26.0	80.7	80	0.7	6	1
	5	●	MVS0390X05S040	36.7	36.7	92.7	92	0.7	4	2
	5	●	MVS0390X05S060	36.7	39.0	92.7	92	0.7	6	1
	8	●	MVS0390X08S040	46.7	46.7	92.7	92	0.7	4	2
	8	●	MVS0390X08S060	46.7	49.0	92.7	92	0.7	6	1
4.0	3	●	MVS0400X03S040	23.7	23.7	80.7	80	0.7	4	2
	3	●	MVS0400X03S060	23.7	25.8	80.7	80	0.7	6	1
	5	●	MVS0400X05S040	36.7	36.7	92.7	92	0.7	4	2
	5	●	MVS0400X05S060	36.7	38.8	92.7	92	0.7	6	1
	8	●	MVS0400X08S040	46.7	46.7	92.7	92	0.7	4	2
	8	●	MVS0400X08S060	46.7	48.8	92.7	92	0.7	6	1
4.1	3	●	MVS0410X03S050	25.7	25.7	86.7	86	0.7	5	2
	3	●	MVS0410X03S060	25.7	27.7	86.7	86	0.7	6	1
	5	●	MVS0410X05S050	40.7	40.7	100.7	100	0.7	5	2
	5	●	MVS0410X05S060	40.7	42.7	100.7	100	0.7	6	1
	8	●	MVS0410X08S050	52.7	52.7	100.7	100	0.7	5	2
	8	●	MVS0410X08S060	52.7	54.7	100.7	100	0.7	6	1

(Note) The coolant hole of ø5.9mm or less will be round shape.

● : Inventory maintained in Japan.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
4.2	3	●	MVS0420X03S050	25.8	25.8	86.8	86	0.8	5	2
	3	●	MVS0420X03S060	25.8	27.7	86.8	86	0.8	6	1
	5	●	MVS0420X05S050	40.8	40.8	100.8	100	0.8	5	2
	5	●	MVS0420X05S060	40.8	42.7	100.8	100	0.8	6	1
	8	●	MVS0420X08S050	52.8	52.8	100.8	100	0.8	5	2
	8	●	MVS0420X08S060	52.8	54.7	100.8	100	0.8	6	1
4.3	3	●	MVS0430X03S050	25.8	25.8	86.8	86	0.8	5	2
	3	●	MVS0430X03S060	25.8	27.6	86.8	86	0.8	6	1
	5	●	MVS0430X05S050	40.8	40.8	100.8	100	0.8	5	2
	5	●	MVS0430X05S060	40.8	42.6	100.8	100	0.8	6	1
	8	●	MVS0430X08S050	52.8	52.8	100.8	100	0.8	5	2
	8	●	MVS0430X08S060	52.8	54.6	100.8	100	0.8	6	1
4.4	3	●	MVS0440X03S050	25.8	25.8	86.8	86	0.8	5	2
	3	●	MVS0440X03S060	25.8	27.5	86.8	86	0.8	6	1
	5	●	MVS0440X05S050	40.8	40.8	100.8	100	0.8	5	2
	5	●	MVS0440X05S060	40.8	42.5	100.8	100	0.8	6	1
	8	●	MVS0440X08S050	52.8	52.8	100.8	100	0.8	5	2
	8	●	MVS0440X08S060	52.8	54.5	100.8	100	0.8	6	1
4.5	3	●	MVS0450X03S050	25.8	25.8	86.8	86	0.8	5	2
	3	●	MVS0450X03S060	25.8	27.4	86.8	86	0.8	6	1
	5	●	MVS0450X05S050	40.8	40.8	100.8	100	0.8	5	2
	5	●	MVS0450X05S060	40.8	42.4	100.8	100	0.8	6	1
	8	●	MVS0450X08S050	52.8	52.8	100.8	100	0.8	5	2
	8	●	MVS0450X08S060	52.8	54.4	100.8	100	0.8	6	1
4.6	3	●	MVS0460X03S050	28.3	28.3	90.8	90	0.8	5	2
	3	●	MVS0460X03S060	28.3	31.3	90.8	90	0.8	6	2
	5	●	MVS0460X05S050	44.8	44.8	105.8	105	0.8	5	2
	5	●	MVS0460X05S060	44.8	47.8	105.8	105	0.8	6	2
	8	●	MVS0460X08S050	57.8	57.8	105.8	105	0.8	5	2
	8	●	MVS0460X08S060	57.8	60.8	105.8	105	0.8	6	2
4.7	3	●	MVS0470X03S050	28.4	28.4	90.9	90	0.9	5	2
	3	●	MVS0470X03S060	28.4	31.4	90.9	90	0.9	6	2
	5	●	MVS0470X05S050	44.9	44.9	105.9	105	0.9	5	2
	5	●	MVS0470X05S060	44.9	47.9	105.9	105	0.9	6	2
	8	●	MVS0470X08S050	57.9	57.9	105.9	105	0.9	5	2
	8	●	MVS0470X08S060	57.9	60.9	105.9	105	0.9	6	2
4.8	3	●	MVS0480X03S050	28.4	28.4	90.9	90	0.9	5	2
	3	●	MVS0480X03S060	28.4	31.4	90.9	90	0.9	6	2
	5	●	MVS0480X05S050	44.9	44.9	105.9	105	0.9	5	2
	5	●	MVS0480X05S060	44.9	47.9	105.9	105	0.9	6	2
	8	●	MVS0480X08S050	57.9	57.9	105.9	105	0.9	5	2
	8	●	MVS0480X08S060	57.9	60.9	105.9	105	0.9	6	2
4.9	3	●	MVS0490X03S050	28.4	28.4	90.9	90	0.9	5	2
	3	●	MVS0490X03S060	28.4	31.4	90.9	90	0.9	6	2
	5	●	MVS0490X05S050	44.9	44.9	105.9	105	0.9	5	2
	5	●	MVS0490X05S060	44.9	47.9	105.9	105	0.9	6	2
	8	●	MVS0490X08S050	57.9	57.9	105.9	105	0.9	5	2
	8	●	MVS0490X08S060	57.9	60.9	105.9	105	0.9	6	2

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
5.0	3	●	MVS0500X03S050	28.4	28.4	90.9	90	0.9	5	2
	3	●	MVS0500X03S060	28.4	31.4	90.9	90	0.9	6	2
	5	●	MVS0500X05S050	44.9	44.9	105.9	105	0.9	5	2
	5	●	MVS0500X05S060	44.9	47.9	105.9	105	0.9	6	2
	8	●	MVS0500X08S050	57.9	57.9	105.9	105	0.9	5	2
	8	●	MVS0500X08S060	57.9	60.9	105.9	105	0.9	6	2
5.1	3	●	MVS0510X03S060	28.4	30.9	82.9	82	0.9	6	2
	5	●	MVS0510X05S060	44.9	48.9	100.9	100	0.9	6	2
	8	●	MVS0510X08S060	61.9	66.9	118.9	118	0.9	6	2
5.2	3	●	MVS0520X03S060	28.4	30.9	82.9	82	0.9	6	2
	5	●	MVS0520X05S060	44.9	48.9	100.9	100	0.9	6	2
	8	●	MVS0520X08S060	61.9	66.9	118.9	118	0.9	6	2
5.3	3	●	MVS0530X03S060	28.5	31.0	83.0	82	1.0	6	2
	5	●	MVS0530X05S060	45.0	49.0	101.0	100	1.0	6	2
	8	●	MVS0530X08S060	62.0	67.0	119.0	118	1.0	6	2
5.4	3	●	MVS0540X03S060	28.5	31.0	83.0	82	1.0	6	2
	5	●	MVS0540X05S060	45.0	49.0	101.0	100	1.0	6	2
	8	●	MVS0540X08S060	62.0	67.0	119.0	118	1.0	6	2
5.5	3	●	MVS0550X03S060	28.5	31.0	83.0	82	1.0	6	2
	5	●	MVS0550X05S060	45.0	49.0	101.0	100	1.0	6	2
	8	●	MVS0550X08S060	62.0	67.0	119.0	118	1.0	6	2
5.6	3	●	MVS0560X03S060	31.0	31.0	83.0	82	1.0	6	2
	5	●	MVS0560X05S060	49.0	49.0	101.0	100	1.0	6	2
	8	●	MVS0560X08S060	67.0	67.0	119.0	118	1.0	6	2
5.7	3	●	MVS0570X03S060	31.0	31.0	83.0	82	1.0	6	2
	5	●	MVS0570X05S060	49.0	49.0	101.0	100	1.0	6	2
	8	●	MVS0570X08S060	67.0	67.0	119.0	118	1.0	6	2
5.8	3	●	MVS0580X03S060	31.1	31.1	83.1	82	1.1	6	2
	5	●	MVS0580X05S060	49.1	49.1	101.1	100	1.1	6	2
	8	●	MVS0580X08S060	67.1	67.1	119.1	118	1.1	6	2
5.9	3	●	MVS0590X03S060	31.1	31.1	83.1	82	1.1	6	2
	5	●	MVS0590X05S060	49.1	49.1	101.1	100	1.1	6	2
	8	●	MVS0590X08S060	67.1	67.1	119.1	118	1.1	6	2
6.0	3	●	MVS0600X03S060	31.1	31.1	83.1	82	1.1	6	2
	5	●	MVS0600X05S060	49.1	49.1	101.1	100	1.1	6	2
	8	●	MVS0600X08S060	67.1	67.1	119.1	118	1.1	6	2
6.1	3	●	MVS0610X03S070	33.6	36.1	89.1	88	1.1	7	2
	3	●	MVS0610X03S080	33.6	36.1	89.1	88	1.1	8	2
	5	●	MVS0610X05S070	53.1	57.1	110.1	109	1.1	7	2
	5	●	MVS0610X05S080	53.1	57.1	110.1	109	1.1	8	2
	8	●	MVS0610X08S070	73.1	78.1	131.1	130	1.1	7	2
	8	●	MVS0610X08S080	73.1	78.1	131.1	130	1.1	8	2
6.2	3	●	MVS0620X03S070	33.6	36.1	89.1	88	1.1	7	2
	3	●	MVS0620X03S080	33.6	36.1	89.1	88	1.1	8	2
	5	●	MVS0620X05S070	53.1	57.1	110.1	109	1.1	7	2
	5	●	MVS0620X05S080	53.1	57.1	110.1	109	1.1	8	2
	8	●	MVS0620X08S070	73.1	78.1	131.1	130	1.1	7	2
	8	●	MVS0620X08S080	73.1	78.1	131.1	130	1.1	8	2

DRILLING

CUTTING CONDITIONS ➤ N022
TECHNICAL DATA ➤ Q001

MVS

WSTAR DRILLS

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
6.3	3	●	MVS0630X03S070	33.6	36.1	89.1	88	1.1	7	2
	3	●	MVS0630X03S080	33.6	36.1	89.1	88	1.1	8	2
	5	●	MVS0630X05S070	53.1	57.1	110.1	109	1.1	7	2
	5	●	MVS0630X05S080	53.1	57.1	110.1	109	1.1	8	2
	8	●	MVS0630X08S070	73.1	78.1	131.1	130	1.1	7	2
	8	●	MVS0630X08S080	73.1	78.1	131.1	130	1.1	8	2
6.4	3	●	MVS0640X03S070	33.7	36.2	89.2	88	1.2	7	2
	3	●	MVS0640X03S080	33.7	36.2	89.2	88	1.2	8	2
	5	●	MVS0640X05S070	53.2	57.2	110.2	109	1.2	7	2
	5	●	MVS0640X05S080	53.2	57.2	110.2	109	1.2	8	2
	8	●	MVS0640X08S070	73.2	78.2	131.2	130	1.2	7	2
	8	●	MVS0640X08S080	73.2	78.2	131.2	130	1.2	8	2
6.5	3	●	MVS0650X03S070	33.7	36.2	89.2	88	1.2	7	2
	3	●	MVS0650X03S080	33.7	36.2	89.2	88	1.2	8	2
	5	●	MVS0650X05S070	53.2	57.2	110.2	109	1.2	7	2
	5	●	MVS0650X05S080	53.2	57.2	110.2	109	1.2	8	2
	8	●	MVS0650X08S070	73.2	78.2	131.2	130	1.2	7	2
	8	●	MVS0650X08S080	73.2	78.2	131.2	130	1.2	8	2
6.6	3	●	MVS0660X03S070	36.2	36.2	89.2	88	1.2	7	2
	3	●	MVS0660X03S080	36.2	38.2	89.2	88	1.2	8	2
	5	●	MVS0660X05S070	57.2	57.2	110.2	109	1.2	7	2
	5	●	MVS0660X05S080	57.2	59.2	110.2	109	1.2	8	2
	8	●	MVS0660X08S070	78.2	78.2	131.2	130	1.2	7	2
	8	●	MVS0660X08S080	78.2	80.2	131.2	130	1.2	8	2
6.7	3	●	MVS0670X03S070	36.2	36.2	89.2	88	1.2	7	2
	3	●	MVS0670X03S080	36.2	38.2	89.2	88	1.2	8	2
	5	●	MVS0670X05S070	57.2	57.2	110.2	109	1.2	7	2
	5	●	MVS0670X05S080	57.2	59.2	110.2	109	1.2	8	2
	8	●	MVS0670X08S070	78.2	78.2	131.2	130	1.2	7	2
	8	●	MVS0670X08S080	78.2	80.2	131.2	130	1.2	8	2
6.8	3	●	MVS0680X03S070	36.2	36.2	89.2	88	1.2	7	2
	3	●	MVS0680X03S080	36.2	38.2	89.2	88	1.2	8	2
	5	●	MVS0680X05S070	57.2	57.2	110.2	109	1.2	7	2
	5	●	MVS0680X05S080	57.2	59.2	110.2	109	1.2	8	2
	8	●	MVS0680X08S070	78.2	78.2	131.2	130	1.2	7	2
	8	●	MVS0680X08S080	78.2	80.2	131.2	130	1.2	8	2
6.9	3	●	MVS0690X03S070	36.3	36.3	89.3	88	1.3	7	2
	3	●	MVS0690X03S080	36.3	38.3	89.3	88	1.3	8	2
	5	●	MVS0690X05S070	57.3	57.3	110.3	109	1.3	7	2
	5	●	MVS0690X05S080	57.3	59.3	110.3	109	1.3	8	2
	8	●	MVS0690X08S070	78.3	78.3	131.3	130	1.3	7	2
	8	●	MVS0690X08S080	78.3	80.3	131.3	130	1.3	8	2
7.0	3	●	MVS0700X03S070	36.3	36.3	89.3	88	1.3	7	2
	3	●	MVS0700X03S080	36.3	38.3	89.3	88	1.3	8	2
	5	●	MVS0700X05S070	57.3	57.3	110.3	109	1.3	7	2
	5	●	MVS0700X05S080	57.3	59.3	110.3	109	1.3	8	2
	8	●	MVS0700X08S070	78.3	78.3	131.3	130	1.3	7	2
	8	●	MVS0700X08S080	78.3	80.3	131.3	130	1.3	8	2

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
7.1	3	●	MVS0710X03S080	38.8	41.3	95.3	94	1.3	8	2
	5	●	MVS0710X05S080	61.3	65.3	119.3	118	1.3	8	2
	8	●	MVS0710X08S080	84.3	89.3	143.3	142	1.3	8	2
7.2	3	●	MVS0720X03S080	38.8	41.3	95.3	94	1.3	8	2
	5	●	MVS0720X05S080	61.3	65.3	119.3	118	1.3	8	2
	8	●	MVS0720X08S080	84.3	89.3	143.3	142	1.3	8	2
7.3	3	●	MVS0730X03S080	38.8	41.3	95.3	94	1.3	8	2
	5	●	MVS0730X05S080	61.3	65.3	119.3	118	1.3	8	2
	8	●	MVS0730X08S080	84.3	89.3	143.3	142	1.3	8	2
7.4	3	●	MVS0740X03S080	38.8	41.3	95.3	94	1.3	8	2
	5	●	MVS0740X05S080	61.3	65.3	119.3	118	1.3	8	2
	8	●	MVS0740X08S080	84.3	89.3	143.3	142	1.3	8	2
7.5	3	●	MVS0750X03S080	38.9	41.4	95.4	94	1.4	8	2
	5	●	MVS0750X05S080	61.4	65.4	119.4	118	1.4	8	2
	8	●	MVS0750X08S080	84.4	89.4	143.4	142	1.4	8	2
7.6	3	●	MVS0760X03S080	41.4	41.4	95.4	94	1.4	8	2
	5	●	MVS0760X05S080	65.4	65.4	119.4	118	1.4	8	2
	8	●	MVS0760X08S080	89.4	89.4	143.4	142	1.4	8	2
7.7	3	●	MVS0770X03S080	41.4	41.4	95.4	94	1.4	8	2
	5	●	MVS0770X05S080	65.4	65.4	119.4	118	1.4	8	2
	8	●	MVS0770X08S080	89.4	89.4	143.4	142	1.4	8	2
7.8	3	●	MVS0780X03S080	41.4	41.4	95.4	94	1.4	8	2
	5	●	MVS0780X05S080	65.4	65.4	119.4	118	1.4	8	2
	8	●	MVS0780X08S080	89.4	89.4	143.4	142	1.4	8	2
7.9	3	●	MVS0790X03S080	41.4	41.4	95.4	94	1.4	8	2
	5	●	MVS0790X05S080	65.4	65.4	119.4	118	1.4	8	2
	8	●	MVS0790X08S080	89.4	89.4	143.4	142	1.4	8	2
8.0	3	●	MVS0800X03S080	41.5	41.5	95.5	94	1.5	8	2
	5	●	MVS0800X05S080	65.5	65.5	119.5	118	1.5	8	2
	8	●	MVS0800X08S080	89.5	89.5	143.5	142	1.5	8	2
8.1	3	●	MVS0810X03S090	44.0	46.5	101.5	100	1.5	9	2
	3	●	MVS0810X03S100	44.0	46.5	101.5	100	1.5	10	2
	5	●	MVS0810X05S090	69.5	73.5	128.5	127	1.5	9	2
	5	●	MVS0810X05S100	69.5	73.5	128.5	127	1.5	10	2
	8	●	MVS0810X08S090	95.5	100.5	155.5	154	1.5	9	2
	8	●	MVS0810X08S100	95.5	100.5	155.5	154	1.5	10	2
8.2	3	●	MVS0820X03S090	44.0	46.5	101.5	100	1.5	9	2
	3	●	MVS0820X03S100	44.0	46.5	101.5	100	1.5	10	2
	5	●	MVS0820X05S090	69.5	73.5	128.5	127	1.5	9	2
	5	●	MVS0820X05S100	69.5	73.5	128.5	127	1.5	10	2
	8	●	MVS0820X08S090	95.5	100.5	155.5	154	1.5	9	2
	8	●	MVS0820X08S100	95.5	100.5	155.5	154	1.5	10	2
8.3	3	●	MVS0830X03S090	44.0	46.5	101.5	100	1.5	9	2
	3	●	MVS0830X03S100	44.0	46.5	101.5	100	1.5	10	2
	5	●	MVS0830X05S090	69.5	73.5	128.5	127	1.5	9	2
	5	●	MVS0830X05S100	69.5	73.5	128.5	127	1.5	10	2
	8	●	MVS0830X08S090	95.5	100.5	155.5	154	1.5	9	2
	8	●	MVS0830X08S100	95.5	100.5	155.5	154	1.5	10	2

● : Inventory maintained in Japan.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
8.4	3	●	MVS0840X03S090	44.0	46.5	101.5	100	1.5	9	2
	3	●	MVS0840X03S100	44.0	46.5	101.5	100	1.5	10	2
	5	●	MVS0840X05S090	69.5	73.5	128.5	127	1.5	9	2
	5	●	MVS0840X05S100	69.5	73.5	128.5	127	1.5	10	2
	8	●	MVS0840X08S090	95.5	100.5	155.5	154	1.5	9	2
	8	●	MVS0840X08S100	95.5	100.5	155.5	154	1.5	10	2
8.5	3	●	MVS0850X03S090	44.0	46.5	101.5	100	1.5	9	2
	3	●	MVS0850X03S100	44.0	46.5	101.5	100	1.5	10	2
	5	●	MVS0850X05S090	69.5	73.5	128.5	127	1.5	9	2
	5	●	MVS0850X05S100	69.5	73.5	128.5	127	1.5	10	2
	8	●	MVS0850X08S090	95.5	100.5	155.5	154	1.5	9	2
	8	●	MVS0850X08S100	95.5	100.5	155.5	154	1.5	10	2
8.6	3	●	MVS0860X03S090	46.6	46.6	101.6	100	1.6	9	2
	3	●	MVS0860X03S100	46.6	48.6	101.6	100	1.6	10	2
	5	●	MVS0860X05S090	73.6	73.6	128.6	127	1.6	9	2
	5	●	MVS0860X05S100	73.6	75.6	128.6	127	1.6	10	2
	8	●	MVS0860X08S090	100.6	100.6	155.6	154	1.6	9	2
	8	●	MVS0860X08S100	100.6	102.6	155.6	154	1.6	10	2
8.7	3	●	MVS0870X03S090	46.6	46.6	101.6	100	1.6	9	2
	3	●	MVS0870X03S100	46.6	48.6	101.6	100	1.6	10	2
	5	●	MVS0870X05S090	73.6	73.6	128.6	127	1.6	9	2
	5	●	MVS0870X05S100	73.6	75.6	128.6	127	1.6	10	2
	8	●	MVS0870X08S090	100.6	100.6	155.6	154	1.6	9	2
	8	●	MVS0870X08S100	100.6	102.6	155.6	154	1.6	10	2
8.8	3	●	MVS0880X03S090	46.6	46.6	101.6	100	1.6	9	2
	3	●	MVS0880X03S100	46.6	48.6	101.6	100	1.6	10	2
	5	●	MVS0880X05S090	73.6	73.6	128.6	127	1.6	9	2
	5	●	MVS0880X05S100	73.6	75.6	128.6	127	1.6	10	2
	8	●	MVS0880X08S090	100.6	100.6	155.6	154	1.6	9	2
	8	●	MVS0880X08S100	100.6	102.6	155.6	154	1.6	10	2
8.9	3	●	MVS0890X03S090	46.6	46.6	101.6	100	1.6	9	2
	3	●	MVS0890X03S100	46.6	48.6	101.6	100	1.6	10	2
	5	●	MVS0890X05S090	73.6	73.6	128.6	127	1.6	9	2
	5	●	MVS0890X05S100	73.6	75.6	128.6	127	1.6	10	2
	8	●	MVS0890X08S090	100.6	100.6	155.6	154	1.6	9	2
	8	●	MVS0890X08S100	100.6	102.6	155.6	154	1.6	10	2
9.0	3	●	MVS0900X03S090	46.6	46.6	101.6	100	1.6	9	2
	3	●	MVS0900X03S100	46.6	48.6	101.6	100	1.6	10	2
	5	●	MVS0900X05S090	73.6	73.6	128.6	127	1.6	9	2
	5	●	MVS0900X05S100	73.6	75.6	128.6	127	1.6	10	2
	8	●	MVS0900X08S090	100.6	100.6	155.6	154	1.6	9	2
	8	●	MVS0900X08S100	100.6	102.6	155.6	154	1.6	10	2
9.1	3	●	MVS0910X03S100	49.2	51.7	107.7	106	1.7	10	2
	5	●	MVS0910X05S100	77.7	81.7	137.7	136	1.7	10	2
	8	●	MVS0910X08S100	106.7	111.7	167.7	166	1.7	10	2
9.2	3	●	MVS0920X03S100	49.2	51.7	107.7	106	1.7	10	2
	5	●	MVS0920X05S100	77.7	81.7	137.7	136	1.7	10	2
	8	●	MVS0920X08S100	106.7	111.7	167.7	166	1.7	10	2

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
9.3	3	●	MVS0930X03S100	49.2	51.7	107.7	106	1.7	10	2
	5	●	MVS0930X05S100	77.7	81.7	137.7	136	1.7	10	2
	8	●	MVS0930X08S100	106.7	111.7	167.7	166	1.7	10	2
9.4	3	●	MVS0940X03S100	49.2	51.7	107.7	106	1.7	10	2
	5	●	MVS0940X05S100	77.7	81.7	137.7	136	1.7	10	2
	8	●	MVS0940X08S100	106.7	111.7	167.7	166	1.7	10	2
9.5	3	●	MVS0950X03S100	49.2	51.7	107.7	106	1.7	10	2
	5	●	MVS0950X05S100	77.7	81.7	137.7	136	1.7	10	2
	8	●	MVS0950X08S100	106.7	111.7	167.7	166	1.7	10	2
9.6	3	●	MVS0960X03S100	51.7	51.7	107.7	106	1.7	10	2
	5	●	MVS0960X05S100	81.7	81.7	137.7	136	1.7	10	2
	8	●	MVS0960X08S100	111.7	111.7	167.7	166	1.7	10	2
9.7	3	●	MVS0970X03S100	51.8	51.8	107.8	106	1.8	10	2
	5	●	MVS0970X05S100	81.8	81.8	137.8	136	1.8	10	2
	8	●	MVS0970X08S100	111.8	111.8	167.8	166	1.8	10	2
9.8	3	●	MVS0980X03S100	51.8	51.8	107.8	106	1.8	10	2
	5	●	MVS0980X05S100	81.8	81.8	137.8	136	1.8	10	2
	8	●	MVS0980X08S100	111.8	111.8	167.8	166	1.8	10	2
9.9	3	●	MVS0990X03S100	51.8	51.8	107.8	106	1.8	10	2
	5	●	MVS0990X05S100	81.8	81.8	137.8	136	1.8	10	2
	8	●	MVS0990X08S100	111.8	111.8	167.8	166	1.8	10	2
10.0	3	●	MVS1000X03S100	51.8	51.8	107.8	106	1.8	10	2
	5	●	MVS1000X05S100	81.8	81.8	137.8	136	1.8	10	2
	8	●	MVS1000X08S100	111.8	111.8	167.8	166	1.8	10	2
10.1	3	●	MVS1010X03S110	54.3	56.8	117.8	116	1.8	11	2
	3	●	MVS1010X03S120	54.3	56.8	117.8	116	1.8	12	2
	5	●	MVS1010X05S110	85.8	89.8	150.8	149	1.8	11	2
	5	●	MVS1010X05S120	85.8	89.8	150.8	149	1.8	12	2
	8	●	MVS1010X08S110	117.8	122.8	183.8	182	1.8	11	2
	8	●	MVS1010X08S120	117.8	122.8	183.8	182	1.8	12	2
10.2	3	●	MVS1020X03S110	54.4	56.9	117.9	116	1.9	11	2
	3	●	MVS1020X03S120	54.4	56.9	117.9	116	1.9	12	2
	5	●	MVS1020X05S110	85.9	89.9	150.9	149	1.9	11	2
	5	●	MVS1020X05S120	85.9	89.9	150.9	149	1.9	12	2
	8	●	MVS1020X08S110	117.9	122.9	183.9	182	1.9	11	2
	8	●	MVS1020X08S120	117.9	122.9	183.9	182	1.9	12	2
10.3	3	●	MVS1030X03S110	54.4	56.9	117.9	116	1.9	11	2
	3	●	MVS1030X03S120	54.4	56.9	117.9	116	1.9	12	2
	5	●	MVS1030X05S110	85.9	89.9	150.9	149	1.9	11	2
	5	●	MVS1030X05S120	85.9	89.9	150.9	149	1.9	12	2
	8	●	MVS1030X08S110	117.9	122.9	183.9	182	1.9	11	2
	8	●	MVS1030X08S120	117.9	122.9	183.9	182	1.9	12	2
10.4	3	●	MVS1040X03S110	54.4	56.9	117.9	116	1.9	11	2
	3	●	MVS1040X03S120	54.4	56.9	117.9	116	1.9	12	2
	5	●	MVS1040X05S110	85.9	89.9	150.9	149	1.9	11	2
	5	●	MVS1040X05S120	85.9	89.9	150.9	149	1.9	12	2
	8	●	MVS1040X08S110	117.9	122.9	183.9	182	1.9	11	2
	8	●	MVS1040X08S120	117.9	122.9	183.9	182	1.9	12	2

DRILLING

CUTTING CONDITIONS ➤ N022
TECHNICAL DATA ➤ Q001

MVS

WSTAR DRILLS

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
10.5	3	●	MVS1050X03S110	54.4	56.9	117.9	116	1.9	11	2
	3	●	MVS1050X03S120	54.4	56.9	117.9	116	1.9	12	2
	5	●	MVS1050X05S110	85.9	89.9	150.9	149	1.9	11	2
	5	●	MVS1050X05S120	85.9	89.9	150.9	149	1.9	12	2
	8	●	MVS1050X08S110	117.9	122.9	183.9	182	1.9	11	2
	8	●	MVS1050X08S120	117.9	122.9	183.9	182	1.9	12	2
10.6	3	●	MVS1060X03S110	56.9	56.9	117.9	116	1.9	11	2
	3	●	MVS1060X03S120	56.9	57.9	117.9	116	1.9	12	2
	5	●	MVS1060X05S110	89.9	89.9	150.9	149	1.9	11	2
	5	●	MVS1060X05S120	89.9	90.9	150.9	149	1.9	12	2
	8	●	MVS1060X08S110	122.9	122.9	183.9	182	1.9	11	2
	8	●	MVS1060X08S120	122.9	123.9	183.9	182	1.9	12	2
10.7	3	●	MVS1070X03S110	56.9	56.9	117.9	116	1.9	11	2
	3	●	MVS1070X03S120	56.9	57.9	117.9	116	1.9	12	2
	5	●	MVS1070X05S110	89.9	89.9	150.9	149	1.9	11	2
	5	●	MVS1070X05S120	89.9	90.9	150.9	149	1.9	12	2
	8	●	MVS1070X08S110	122.9	122.9	183.9	182	1.9	11	2
	8	●	MVS1070X08S120	122.9	123.9	183.9	182	1.9	12	2
10.8	3	●	MVS1080X03S110	57.0	57.0	118.0	116	2.0	11	2
	3	●	MVS1080X03S120	57.0	58.0	118.0	116	2.0	12	2
	5	●	MVS1080X05S110	90.0	90.0	151.0	149	2.0	11	2
	5	●	MVS1080X05S120	90.0	91.0	151.0	149	2.0	12	2
	8	●	MVS1080X08S110	123.0	123.0	184.0	182	2.0	11	2
	8	●	MVS1080X08S120	123.0	124.0	184.0	182	2.0	12	2
10.9	3	●	MVS1090X03S110	57.0	57.0	118.0	116	2.0	11	2
	3	●	MVS1090X03S120	57.0	58.0	118.0	116	2.0	12	2
	5	●	MVS1090X05S110	90.0	90.0	151.0	149	2.0	11	2
	5	●	MVS1090X05S120	90.0	91.0	151.0	149	2.0	12	2
	8	●	MVS1090X08S110	123.0	123.0	184.0	182	2.0	11	2
	8	●	MVS1090X08S120	123.0	124.0	184.0	182	2.0	12	2
11.0	3	●	MVS1100X03S110	57.0	57.0	118.0	116	2.0	11	2
	3	●	MVS1100X03S120	57.0	58.0	118.0	116	2.0	12	2
	5	●	MVS1100X05S110	90.0	90.0	151.0	149	2.0	11	2
	5	●	MVS1100X05S120	90.0	91.0	151.0	149	2.0	12	2
	8	●	MVS1100X08S110	123.0	123.0	184.0	182	2.0	11	2
	8	●	MVS1100X08S120	123.0	124.0	184.0	182	2.0	12	2
11.1	3	●	MVS1110X03S120	59.5	62.0	124.0	122	2.0	12	2
	5	●	MVS1110X05S120	94.0	98.0	160.0	158	2.0	12	2
	8	●	MVS1110X08S120	129.0	134.0	196.0	194	2.0	12	2
11.2	3	●	MVS1120X03S120	59.5	62.0	124.0	122	2.0	12	2
	5	●	MVS1120X05S120	94.0	98.0	160.0	158	2.0	12	2
	8	●	MVS1120X08S120	129.0	134.0	196.0	194	2.0	12	2
11.3	3	●	MVS1130X03S120	59.6	62.1	124.1	122	2.1	12	2
	5	●	MVS1130X05S120	94.1	98.1	160.1	158	2.1	12	2
	8	●	MVS1130X08S120	129.1	134.1	196.1	194	2.1	12	2
11.4	3	●	MVS1140X03S120	59.6	62.1	124.1	122	2.1	12	2
	5	●	MVS1140X05S120	94.1	98.1	160.1	158	2.1	12	2
	8	●	MVS1140X08S120	129.1	134.1	196.1	194	2.1	12	2

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
11.5	3	●	MVS1150X03S120	59.6	62.1	124.1	122	2.1	12	2
	5	●	MVS1150X05S120	94.1	98.1	160.1	158	2.1	12	2
	8	●	MVS1150X08S120	129.1	134.1	196.1	194	2.1	12	2
11.6	3	●	MVS1160X03S120	62.1	62.1	124.1	122	2.1	12	2
	5	●	MVS1160X05S120	98.1	98.1	160.1	158	2.1	12	2
	8	●	MVS1160X08S120	134.1	134.1	196.1	194	2.1	12	2
11.7	3	●	MVS1170X03S120	62.1	62.1	124.1	122	2.1	12	2
	5	●	MVS1170X05S120	98.1	98.1	160.1	158	2.1	12	2
	8	●	MVS1170X08S120	134.1	134.1	196.1	194	2.1	12	2
11.8	3	●	MVS1180X03S120	62.1	62.1	124.1	122	2.1	12	2
	5	●	MVS1180X05S120	98.1	98.1	160.1	158	2.1	12	2
	8	●	MVS1180X08S120	134.1	134.1	196.1	194	2.1	12	2
11.9	3	●	MVS1190X03S120	62.2	62.2	124.2	122	2.2	12	2
	5	●	MVS1190X05S120	98.2	98.2	160.2	158	2.2	12	2
	8	●	MVS1190X08S120	134.2	134.2	196.2	194	2.2	12	2
12.0	3	●	MVS1200X03S120	62.2	62.2	124.2	122	2.2	12	2
	5	●	MVS1200X05S120	98.2	98.2	160.2	158	2.2	12	2
	8	●	MVS1200X08S120	134.2	134.2	196.2	194	2.2	12	2
NEW 12.1	3	●	MVS1210X03S130	64.7	67.2	130.2	128	2.2	13	2
	3	□	MVS1210X03S140	64.7	67.2	130.2	128	2.2	14	2
	5	●	MVS1210X05S130	102.2	106.2	169.2	167	2.2	13	2
	5	□	MVS1210X05S140	102.2	106.2	169.2	167	2.2	14	2
	8	□	MVS1210X08S130	140.2	145.2	208.2	206	2.2	13	2
	8	□	MVS1210X08S140	140.2	145.2	208.2	206	2.2	14	2
NEW 12.2	3	●	MVS1220X03S130	64.7	67.2	130.2	128	2.2	13	2
	3	□	MVS1220X03S140	64.7	67.2	130.2	128	2.2	14	2
	5	●	MVS1220X05S130	102.2	106.2	169.2	167	2.2	13	2
	5	□	MVS1220X05S140	102.2	106.2	169.2	167	2.2	14	2
	8	□	MVS1220X08S130	140.2	145.2	208.2	206	2.2	13	2
	8	□	MVS1220X08S140	140.2	145.2	208.2	206	2.2	14	2
NEW 12.3	3	●	MVS1230X03S130	64.7	67.2	130.2	128	2.2	13	2
	3	□	MVS1230X03S140	64.7	67.2	130.2	128	2.2	14	2
	5	●	MVS1230X05S130	102.2	106.2	169.2	167	2.2	13	2
	5	□	MVS1230X05S140	102.2	106.2	169.2	167	2.2	14	2
	8	□	MVS1230X08S130	140.2	145.2	208.2	206	2.2	13	2
	8	□	MVS1230X08S140	140.2	145.2	208.2	206	2.2	14	2
NEW 12.4	3	●	MVS1240X03S130	64.8	67.3	130.3	128	2.3	13	2
	3	□	MVS1240X03S140	64.8	67.3	130.3	128	2.3	14	2
	5	●	MVS1240X05S130	102.3	106.3	169.3	167	2.3	13	2
	5	□	MVS1240X05S140	102.3	106.3	169.3	167	2.3	14	2
	8	□	MVS1240X08S130	140.3	145.3	208.3	206	2.3	13	2
	8	□	MVS1240X08S140	140.3	145.3	208.3	206	2.3	14	2
NEW 12.5	3	●	MVS1250X03S130	64.8	67.3	130.3	128	2.3	13	2
	3	□	MVS1250X03S140	64.8	67.3	130.3	128	2.3	14	2
	5	●	MVS1250X05S130	102.3	106.3	169.3	167	2.3	13	2
	5	□	MVS1250X05S140	102.3	106.3	169.3	167	2.3	14	2
	8	●	MVS1250X08S130	140.3	145.3	208.3	206	2.3	13	2
	8	□	MVS1250X08S140	140.3	145.3	208.3	206	2.3	14	2

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
12.6	3	●	MVS1260X03S130	67.3	67.3	130.3	128	2.3	13	2
	3	□	MVS1260X03S140	67.3	67.3	130.3	128	2.3	14	2
	5	●	MVS1260X05S130	106.3	106.3	169.3	167	2.3	13	2
	5	□	MVS1260X05S140	106.3	106.3	169.3	167	2.3	14	2
	8	□	MVS1260X08S130	145.3	145.3	208.3	206	2.3	13	2
	8	□	MVS1260X08S140	145.3	145.3	208.3	206	2.3	14	2
12.7	3	●	MVS1270X03S130	67.3	67.3	130.3	128	2.3	13	2
	3	□	MVS1270X03S140	67.3	67.3	130.3	128	2.3	14	2
	5	●	MVS1270X05S130	106.3	106.3	169.3	167	2.3	13	2
	5	□	MVS1270X05S140	106.3	106.3	169.3	167	2.3	14	2
	8	□	MVS1270X08S130	145.3	145.3	208.3	206	2.3	13	2
	8	□	MVS1270X08S140	145.3	145.3	208.3	206	2.3	14	2
12.8	3	●	MVS1280X03S130	67.3	67.3	130.3	128	2.3	13	2
	3	□	MVS1280X03S140	67.3	67.3	130.3	128	2.3	14	2
	5	●	MVS1280X05S130	106.3	106.3	169.3	167	2.3	13	2
	5	□	MVS1280X05S140	106.3	106.3	169.3	167	2.3	14	2
	8	□	MVS1280X08S130	145.3	145.3	208.3	206	2.3	13	2
	8	□	MVS1280X08S140	145.3	145.3	208.3	206	2.3	14	2
12.9	3	●	MVS1290X03S130	67.3	67.3	130.3	128	2.3	13	2
	3	□	MVS1290X03S140	67.3	67.3	130.3	128	2.3	14	2
	5	●	MVS1290X05S130	106.3	106.3	169.3	167	2.3	13	2
	5	□	MVS1290X05S140	106.3	106.3	169.3	167	2.3	14	2
	8	□	MVS1290X08S130	145.3	145.3	208.3	206	2.3	13	2
	8	□	MVS1290X08S140	145.3	145.3	208.3	206	2.3	14	2
13.0	3	●	MVS1300X03S130	67.4	67.4	130.4	128	2.4	13	2
	3	□	MVS1300X03S140	67.4	67.4	130.4	128	2.4	14	2
	5	●	MVS1300X05S130	106.4	106.4	169.4	167	2.4	13	2
	5	□	MVS1300X05S140	106.4	106.4	169.4	167	2.4	14	2
	8	●	MVS1300X08S130	145.4	145.4	208.4	206	2.4	13	2
	8	□	MVS1300X08S140	145.4	145.4	208.4	206	2.4	14	2
13.1	3	●	MVS1310X03S140	69.9	72.4	136.4	134	2.4	14	2
	5	●	MVS1310X05S140	110.4	114.4	178.4	176	2.4	14	2
	8	□	MVS1310X08S140	151.4	156.4	220.4	218	2.4	14	2
13.2	3	●	MVS1320X03S140	69.9	72.4	136.4	134	2.4	14	2
	5	●	MVS1320X05S140	110.4	114.4	178.4	176	2.4	14	2
	8	□	MVS1320X08S140	151.4	156.4	220.4	218	2.4	14	2
13.3	3	●	MVS1330X03S140	69.9	72.4	136.4	134	2.4	14	2
	5	●	MVS1330X05S140	110.4	114.4	178.4	176	2.4	14	2
	8	□	MVS1330X08S140	151.4	156.4	220.4	218	2.4	14	2
13.4	3	●	MVS1340X03S140	69.9	72.4	136.4	134	2.4	14	2
	5	●	MVS1340X05S140	110.4	114.4	178.4	176	2.4	14	2
	8	□	MVS1340X08S140	151.4	156.4	220.4	218	2.4	14	2
13.5	3	●	MVS1350X03S140	70.0	72.5	136.5	134	2.5	14	2
	5	●	MVS1350X05S140	110.5	114.5	178.5	176	2.5	14	2
	8	●	MVS1350X08S140	151.5	156.5	220.5	218	2.5	14	2
13.6	3	●	MVS1360X03S140	72.5	72.5	136.5	134	2.5	14	2
	5	●	MVS1360X05S140	114.5	114.5	178.5	176	2.5	14	2
	8	□	MVS1360X08S140	156.5	156.5	220.5	218	2.5	14	2

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
13.7	3	●	MVS1370X03S140	72.5	72.5	136.5	134	2.5	14	2
	5	●	MVS1370X05S140	114.5	114.5	178.5	176	2.5	14	2
	8	□	MVS1370X08S140	156.5	156.5	220.5	218	2.5	14	2
13.8	3	●	MVS1380X03S140	72.5	72.5	136.5	134	2.5	14	22
	5	●	MVS1380X05S140	114.5	114.5	178.5	176	2.5	14	2
	8	□	MVS1380X08S140	156.5	156.5	220.5	218	2.5	14	2
13.9	3	●	MVS1390X03S140	72.5	72.5	136.5	134	2.5	14	2
	5	●	MVS1390X05S140	114.5	114.5	178.5	176	2.5	14	2
	8	□	MVS1390X08S140	156.5	156.5	220.5	218	2.5	14	2
14.0	3	●	MVS1400X03S140	72.5	72.5	136.5	134	2.5	14	2
	5	●	MVS1400X05S140	114.5	114.5	178.5	176	2.5	14	2
	8	●	MVS1400X08S140	156.5	156.5	220.5	218	2.5	14	2
14.1	3	●	MVS1410X03S150	75.1	77.6	142.6	140	2.6	15	2
	3	□	MVS1410X03S160	75.1	77.6	142.6	140	2.6	16	2
	5	●	MVS1410X05S150	118.6	122.6	187.6	185	2.6	15	2
	5	□	MVS1410X05S160	118.6	122.6	187.6	185	2.6	16	2
	8	□	MVS1410X08S150	162.6	167.6	227.6	225	2.6	15	2
	8	□	MVS1410X08S160	162.6	167.6	227.6	225	2.6	16	2
14.2	3	●	MVS1420X03S150	75.1	77.6	142.6	140	2.6	15	2
	3	□	MVS1420X03S160	75.1	77.6	142.6	140	2.6	16	2
	5	●	MVS1420X05S150	118.6	122.6	187.6	185	2.6	15	2
	5	□	MVS1420X05S160	118.6	122.6	187.6	185	2.6	16	2
	8	●	MVS1420X08S150	162.6	167.6	227.6	225	2.6	15	2
	8	□	MVS1420X08S160	162.6	167.6	227.6	225	2.6	16	2
14.3	3	●	MVS1430X03S150	75.1	77.6	142.6	140	2.6	15	2
	3	□	MVS1430X03S160	75.1	77.6	142.6	140	2.6	16	2
	5	●	MVS1430X05S150	118.6	122.6	187.6	185	2.6	15	2
	5	□	MVS1430X05S160	118.6	122.6	187.6	185	2.6	16	2
	8	□	MVS1430X08S150	162.6	167.6	227.6	225	2.6	15	2
	8	□	MVS1430X08S160	162.6	167.6	227.6	225	2.6	16	2
14.4	3	●	MVS1440X03S150	75.1	77.6	142.6	140	2.6	15	2
	3	□	MVS1440X03S160	75.1	77.6	142.6	140	2.6	16	2
	5	●	MVS1440X05S150	118.6	122.6	187.6	185	2.6	15	2
	5	□	MVS1440X05S160	118.6	122.6	187.6	185	2.6	16	2
	8	□	MVS1440X08S150	162.6	167.6	227.6	225	2.6	15	2
	8	□	MVS1440X08S160	162.6	167.6	227.6	225	2.6	16	2
14.5	3	●	MVS1450X03S150	75.1	77.6	142.6	140	2.6	15	2
	3	□	MVS1450X03S160	75.1	77.6	142.6	140	2.6	16	2
	5	●	MVS1450X05S150	118.6	122.6	187.6	185	2.6	15	2
	5	□	MVS1450X05S160	118.6	122.6	187.6	185	2.6	16	2
	8	●	MVS1450X08S150	162.6	167.6	227.6	225	2.6	15	2
	8	□	MVS1450X08S160	162.6	167.6	227.6	225	2.6	16	2
14.6	3	●	MVS1460X03S150	77.7	77.7	142.7	140	2.7	15	2
	3	□	MVS1460X03S160	77.7	77.7	142.7	140	2.7	16	2
	5	●	MVS1460X05S150	122.7	122.7	187.7	185	2.7	15	2
	5	□	MVS1460X05S160	122.7	122.7	187.7	185	2.7	16	2
	8	□	MVS1460X08S150	167.7	167.7	227.7	225	2.7	15	2
	8	□	MVS1460X08S160	167.7	167.7	227.7	225	2.7	16	2

CUTTING CONDITIONS ➤ N022
TECHNICAL DATA ➤ Q001

MVS

WSTAR DRILLS

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
14.7	3	●	MVS1470X03S150	77.7	77.7	142.7	140	2.7	15	2
	3	□	MVS1470X03S160	77.7	77.7	142.7	140	2.7	16	2
	5	●	MVS1470X05S150	122.7	122.7	187.7	185	2.7	15	2
	5	□	MVS1470X05S160	122.7	122.7	187.7	185	2.7	16	2
	8	□	MVS1470X08S150	167.7	167.7	227.7	225	2.7	15	2
	8	□	MVS1470X08S160	167.7	167.7	227.7	225	2.7	16	2
14.8	3	●	MVS1480X03S150	77.7	77.7	142.7	140	2.7	15	2
	3	□	MVS1480X03S160	77.7	77.7	142.7	140	2.7	16	2
	5	●	MVS1480X05S150	122.7	122.7	187.7	185	2.7	15	2
	5	□	MVS1480X05S160	122.7	122.7	187.7	185	2.7	16	2
	8	□	MVS1480X08S150	167.7	167.7	227.7	225	2.7	15	2
	8	□	MVS1480X08S160	167.7	167.7	227.7	225	2.7	16	2
14.9	3	●	MVS1490X03S150	77.7	77.7	142.7	140	2.7	15	2
	3	□	MVS1490X03S160	77.7	77.7	142.7	140	2.7	16	2
	5	●	MVS1490X05S150	122.7	122.7	187.7	185	2.7	15	2
	5	□	MVS1490X05S160	122.7	122.7	187.7	185	2.7	16	2
	8	□	MVS1490X08S150	167.7	167.7	227.7	225	2.7	15	2
	8	□	MVS1490X08S160	167.7	167.7	227.7	225	2.7	16	2
15.0	3	●	MVS1500X03S150	77.7	77.7	142.7	140	2.7	15	2
	3	□	MVS1500X03S160	77.7	77.7	142.7	140	2.7	16	2
	5	●	MVS1500X05S150	122.7	122.7	187.7	185	2.7	15	2
	5	□	MVS1500X05S160	122.7	122.7	187.7	185	2.7	16	2
	8	●	MVS1500X08S150	167.7	167.7	227.7	225	2.7	15	2
	8	□	MVS1500X08S160	167.7	167.7	227.7	225	2.7	16	2
15.1	3	●	MVS1510X03S160	80.2	82.7	147.7	145	2.7	16	2
	5	●	MVS1510X05S160	126.7	130.7	195.7	193	2.7	16	2
	8	□	MVS1510X08S160	173.7	183.7	243.7	241	2.7	16	2
15.2	3	●	MVS1520X03S160	80.3	82.8	147.8	145	2.8	16	2
	5	●	MVS1520X05S160	126.8	130.8	195.8	193	2.8	16	2
	8	□	MVS1520X08S160	173.8	183.8	243.8	241	2.8	16	2
15.3	3	●	MVS1530X03S160	80.3	82.8	147.8	145	2.8	16	2
	5	●	MVS1530X05S160	126.8	130.8	195.8	193	2.8	16	2
	8	□	MVS1530X08S160	173.8	183.8	243.8	241	2.8	16	2
15.4	3	●	MVS1540X03S160	80.3	82.8	147.8	145	2.8	16	2
	5	●	MVS1540X05S160	126.8	130.8	195.8	193	2.8	16	2
	8	□	MVS1540X08S160	173.8	183.8	243.8	241	2.8	16	2
15.5	3	●	MVS1550X03S160	80.3	82.8	147.8	145	2.8	16	2
	5	●	MVS1550X05S160	126.8	130.8	195.8	193	2.8	16	2
	8	●	MVS1550X08S160	173.8	183.8	243.8	241	2.8	16	2
15.6	3	●	MVS1560X03S160	82.8	82.8	147.8	145	2.8	16	2
	5	●	MVS1560X05S160	130.8	130.8	195.8	193	2.8	16	2
	8	□	MVS1560X08S160	178.8	183.8	243.8	241	2.8	16	2
15.7	3	●	MVS1570X03S160	82.9	82.9	147.9	145	2.9	16	2
	5	●	MVS1570X05S160	130.9	130.9	195.9	193	2.9	16	2
	8	□	MVS1570X08S160	178.9	183.9	243.9	241	2.9	16	2
15.8	3	●	MVS1580X03S160	82.9	82.9	147.9	145	2.9	16	2
	5	●	MVS1580X05S160	130.9	130.9	195.9	193	2.9	16	2
	8	□	MVS1580X08S160	178.9	183.9	243.9	241	2.9	16	2

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
15.9	3	●	MVS1590X03S160	82.9	82.9	147.9	145	2.9	16	2
	5	●	MVS1590X05S160	130.9	130.9	195.9	193	2.9	16	2
	8	□	MVS1590X08S160	178.9	183.9	243.9	241	2.9	16	2
16.0	3	●	MVS1600X03S160	82.9	82.9	147.9	145	2.9	16	2
	5	●	MVS1600X05S160	130.9	130.9	195.9	193	2.9	16	2
	8	●	MVS1600X08S160	178.9	183.9	243.9	241	2.9	16	2
16.1	3	□	MVS1610X03S170	85.4	87.9	152.9	150	2.9	17	2
	3	□	MVS1610X03S180	85.4	87.9	152.9	150	2.9	18	2
	5	□	MVS1610X05S170	134.9	138.9	203.9	201	2.9	17	2
	5	□	MVS1610X05S180	134.9	138.9	203.9	201	2.9	18	2
16.2	3	□	MVS1620X03S170	85.4	87.9	152.9	150	2.9	17	2
	3	□	MVS1620X03S180	85.4	87.9	152.9	150	2.9	18	2
	5	□	MVS1620X05S170	134.9	138.9	203.9	201	2.9	17	2
	5	□	MVS1620X05S180	134.9	138.9	203.9	201	2.9	18	2
16.3	3	□	MVS1630X03S170	85.5	88.0	153.0	150	3.0	17	2
	3	□	MVS1630X03S180	85.5	88.0	153.0	150	3.0	18	2
	5	□	MVS1630X05S170	135.0	139.0	204.0	201	3.0	17	2
	5	□	MVS1630X05S180	135.0	139.0	204.0	201	3.0	18	2
16.4	3	□	MVS1640X03S170	85.5	88.0	153.0	150	3.0	17	2
	3	□	MVS1640X03S180	85.5	88.0	153.0	150	3.0	18	2
	5	□	MVS1640X05S170	135.0	139.0	204.0	201	3.0	17	2
	5	□	MVS1640X05S180	135.0	139.0	204.0	201	3.0	18	2
16.5	3	●	MVS1650X03S170	85.5	88.0	153.0	150	3.0	17	2
	3	□	MVS1650X03S180	85.5	88.0	153.0	150	3.0	18	2
	5	●	MVS1650X05S170	135.0	139.0	204.0	201	3.0	17	2
	5	□	MVS1650X05S180	135.0	139.0	204.0	201	3.0	18	2
16.6	3	□	MVS1660X03S170	88.0	88.0	153.0	150	3.0	17	2
	3	□	MVS1660X03S180	88.0	88.0	153.0	150	3.0	18	2
	5	□	MVS1660X05S170	139.0	139.0	204.0	201	3.0	17	2
	5	□	MVS1660X05S180	139.0	139.0	204.0	201	3.0	18	2
16.7	3	□	MVS1670X03S170	88.0	88.0	153.0	150	3.0	17	2
	3	□	MVS1670X03S180	88.0	88.0	153.0	150	3.0	18	2
	5	□	MVS1670X05S170	139.0	139.0	204.0	201	3.0	17	2
	5	□	MVS1670X05S180	139.0	139.0	204.0	201	3.0	18	2
16.8	3	□	MVS1680X03S170	88.1	88.1	153.1	150	3.1	17	2
	3	□	MVS1680X03S180	88.1	88.1	153.1	150	3.1	18	2
	5	□	MVS1680X05S170	139.1	139.1	204.1	201	3.1	17	2
	5	□	MVS1680X05S180	139.1	139.1	204.1	201	3.1	18	2
16.9	3	□	MVS1690X03S170	88.1	88.1	153.1	150	3.1	17	2
	3	□	MVS1690X03S180	88.1	88.1	153.1	150	3.1	18	2
	5	□	MVS1690X05S170	139.1	139.1	204.1	201	3.1	17	2
	5	□	MVS1690X05S180	139.1	139.1	204.1	201	3.1	18	2
17.0	3	●	MVS1700X03S170	88.1	88.1	153.1	150	3.1	17	2
	3	□	MVS1700X03S180	88.1	88.1	153.1	150	3.1	18	2
	5	●	MVS1700X05S170	139.1	139.1	204.1	201	3.1	17	2
	5	□	MVS1700X05S180	139.1	139.1	204.1	201	3.1	18	2
17.1	3	□	MVS1710X03S180	90.6	93.1	158.1	155	3.1	18	2
	5	□	MVS1710X05S180	143.1	147.1	212.1	209	3.1	18	2

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
17.2	3	□	MVS1720X03S180	90.6	93.1	158.1	155	3.1	18	2
	5	□	MVS1720X05S180	143.1	147.1	212.1	209	3.1	18	2
17.3	3	□	MVS1730X03S180	90.6	93.1	158.1	155	3.1	18	2
	5	□	MVS1730X05S180	143.1	147.1	212.1	209	3.1	18	2
17.4	3	□	MVS1740X03S180	90.7	93.2	158.2	155	3.2	18	2
	5	□	MVS1740X05S180	143.2	147.2	212.2	209	3.2	18	2
17.5	3	●	MVS1750X03S180	90.7	93.2	158.2	155	3.2	18	2
	5	●	MVS1750X05S180	143.2	147.2	212.2	209	3.2	18	2
17.6	3	□	MVS1760X03S180	93.2	93.2	158.2	155	3.2	18	2
	5	□	MVS1760X05S180	147.2	147.2	212.2	209	3.2	18	2
17.7	3	□	MVS1770X03S180	93.2	93.2	158.2	155	3.2	18	2
	5	□	MVS1770X05S180	147.2	147.2	212.2	209	3.2	18	2
17.8	3	□	MVS1780X03S180	93.2	93.2	158.2	155	3.2	18	2
	5	□	MVS1780X05S180	147.2	147.2	212.2	209	3.2	18	2
17.9	3	□	MVS1790X03S180	93.3	93.3	158.3	155	3.3	18	2
	5	□	MVS1790X05S180	147.3	147.3	212.3	209	3.3	18	2
18.0	3	●	MVS1800X03S180	93.3	93.3	158.3	155	3.3	18	2
	5	●	MVS1800X05S180	147.3	147.3	212.3	209	3.3	18	2
18.1	3	□	MVS1810X03S190	95.8	98.3	163.3	160	3.3	19	2
	3	□	MVS1810X03S200	95.8	98.3	163.3	160	3.3	20	2
	5	□	MVS1810X05S190	151.3	155.3	220.3	217	3.3	19	2
	5	□	MVS1810X05S200	151.3	155.3	220.3	217	3.3	20	2
18.2	3	□	MVS1820X03S190	95.8	98.3	163.3	160	3.3	19	2
	3	□	MVS1820X03S200	95.8	98.3	163.3	160	3.3	20	2
	5	□	MVS1820X05S190	151.3	155.3	220.3	217	3.3	19	2
	5	□	MVS1820X05S200	151.3	155.3	220.3	217	3.3	20	2
18.3	3	□	MVS1830X03S190	95.8	98.3	163.3	160	3.3	19	2
	3	□	MVS1830X03S200	95.8	98.3	163.3	160	3.3	20	2
	5	□	MVS1830X05S190	151.3	155.3	220.3	217	3.3	19	2
	5	□	MVS1830X05S200	151.3	155.3	220.3	217	3.3	20	2
18.4	3	□	MVS1840X03S190	95.8	98.3	163.3	160	3.3	19	2
	3	□	MVS1840X03S200	95.8	98.3	163.3	160	3.3	20	2
	5	□	MVS1840X05S190	151.3	155.3	220.3	217	3.3	19	2
	5	□	MVS1840X05S200	151.3	155.3	220.3	217	3.3	20	2
18.5	3	●	MVS1850X03S190	95.9	98.4	163.4	160	3.4	19	2
	3	□	MVS1850X03S200	95.9	98.4	163.4	160	3.4	20	2
	5	●	MVS1850X05S190	151.4	155.4	220.4	217	3.4	19	2
	5	□	MVS1850X05S200	151.4	155.4	220.4	217	3.4	20	2
18.6	3	□	MVS1860X03S190	98.4	98.4	163.4	160	3.4	19	2
	3	□	MVS1860X03S200	98.4	98.4	163.4	160	3.4	20	2
	5	□	MVS1860X05S190	155.4	155.4	220.4	217	3.4	19	2
	5	□	MVS1860X05S200	155.4	155.4	220.4	217	3.4	20	2
18.7	3	□	MVS1870X03S190	98.4	98.4	163.4	160	3.4	19	2
	3	□	MVS1870X03S200	98.4	98.4	163.4	160	3.4	20	2
	5	□	MVS1870X05S190	155.4	155.4	220.4	217	3.4	19	2
	5	□	MVS1870X05S200	155.4	155.4	220.4	217	3.4	20	2

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
18.8	3	□	MVS1880X03S190	98.4	98.4	163.4	160	3.4	19	2
	3	□	MVS1880X03S200	98.4	98.4	163.4	160	3.4	20	2
	5	□	MVS1880X05S190	155.4	155.4	220.4	217	3.4	19	2
	5	□	MVS1880X05S200	155.4	155.4	220.4	217	3.4	20	2
18.9	3	□	MVS1890X03S190	98.4	98.4	163.4	160	3.4	19	2
	3	□	MVS1890X03S200	98.4	98.4	163.4	160	3.4	20	2
	5	□	MVS1890X05S190	155.4	155.4	220.4	217	3.4	19	2
	5	□	MVS1890X05S200	155.4	155.4	220.4	217	3.4	20	2
19.0	3	●	MVS1900X03S190	98.5	98.5	163.5	160	3.5	19	2
	3	□	MVS1900X03S200	98.5	98.5	163.5	160	3.5	20	2
	5	●	MVS1900X05S190	155.5	155.5	220.5	217	3.5	19	2
	5	□	MVS1900X05S200	155.5	155.5	220.5	217	3.5	20	2
19.1	3	□	MVS1910X03S200	101.0	103.5	168.5	165	3.5	20	2
	5	□	MVS1910X05S200	159.5	163.5	228.5	225	3.5	20	2
19.2	3	□	MVS1920X03S200	101.0	103.5	168.5	165	3.5	20	2
	5	□	MVS1920X05S200	159.5	163.5	228.5	225	3.5	20	2
19.3	3	□	MVS1930X03S200	101.0	103.5	168.5	165	3.5	20	2
	5	□	MVS1930X05S200	159.5	163.5	228.5	225	3.5	20	2
19.4	3	□	MVS1940X03S200	101.0	103.5	168.5	165	3.5	20	2
	5	□	MVS1940X05S200	159.5	163.5	228.5	225	3.5	20	2
19.5	3	●	MVS1950X03S200	101.0	103.5	168.5	165	3.5	20	2
	5	●	MVS1950X05S200	159.5	163.5	228.5	225	3.5	20	2
19.6	3	□	MVS1960X03S200	103.6	103.6	168.6	165	3.6	20	2
	5	□	MVS1960X05S200	163.6	163.6	228.6	225	3.6	20	2
19.7	3	□	MVS1970X03S200	103.6	103.6	168.6	165	3.6	20	2
	5	□	MVS1970X05S200	163.6	163.6	228.6	225	3.6	20	2
19.8	3	□	MVS1980X03S200	103.6	103.6	168.6	165	3.6	20	2
	5	□	MVS1980X05S200	163.6	163.6	228.6	225	3.6	20	2
19.9	3	□	MVS1990X03S200	103.6	103.6	168.6	165	3.6	20	2
	5	□	MVS1990X05S200	163.6	163.6	228.6	225	3.6	20	2
20.0	3	●	MVS2000X03S200	103.6	103.6	168.6	165	3.6	20	2
	5	●	MVS2000X05S200	163.6	163.6	228.6	225	3.6	20	2

DRILLING

CUTTING CONDITIONS ➤ N022
TECHNICAL DATA ➤ Q001

DRILLING(SOLID CARBIDE)

MVS
WSTAR DRILLS

RECOMMENDED CUTTING CONDITIONS

Work Material		Mild Steel (≤180HB) AISI 1010 etc		Carbon steel, Alloy steel (180—280HB) AISI 1045, AISI 4140 etc		Carbon steel, Alloy steel (280—350HB) AISI 4340 etc	
Dia. DC (mm)	L/D	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
1.0	S*,7DC	15900	0.04 (0.02—0.05)	15900	0.04 (0.02—0.05)	12700	0.04 (0.02—0.05)
	≥12D	15900	0.02 (0.01—0.03)	12700	0.02 (0.01—0.03)	9500	0.02 (0.01—0.03)
1.5	S*,7DC	10600	0.05 (0.03—0.08)	10600	0.05 (0.03—0.08)	8400	0.05 (0.03—0.08)
	≥12D	10600	0.05 (0.02—0.08)	8400	0.05 (0.03—0.08)	6300	0.05 (0.02—0.08)
2.0	S*,7DC	7900	0.07 (0.04—0.10)	7900	0.07 (0.04—0.10)	6300	0.07 (0.04—0.10)
	≥12D	7900	0.07 (0.04—0.10)	7900	0.07 (0.04—0.10)	7900	0.07 (0.04—0.10)
2.5	S*,7DC	7600	0.09 (0.05—0.13)	7600	0.09 (0.05—0.13)	6300	0.09 (0.05—0.13)
	≥12D	7600	0.09 (0.06—0.13)	6300	0.09 (0.06—0.13)	6300	0.08 (0.05—0.13)
3.2	3DC,5DC,8DC	8900	0.1 (0.06—0.13)	7900	0.1 (0.06—0.13)	6900	0.1 (0.06—0.13)
4.0	3DC,5DC,8DC	7900	0.12 (0.08—0.16)	7100	0.12 (0.08—0.16)	6300	0.11 (0.07—0.14)
5.0	3DC,5DC,8DC	6300	0.15 (0.10—0.20)	5700	0.15 (0.10—0.20)	5000	0.14 (0.09—0.18)
6.3	3DC,5DC,8DC	5500	0.2 (0.13—0.26)	5000	0.2 (0.13—0.26)	4500	0.18 (0.11—0.24)
8.0	3DC,5DC,8DC	4700	0.23 (0.18—0.28)	4300	0.23 (0.18—0.28)	3900	0.21 (0.16—0.25)
10.0	3DC,5DC,8DC	4100	0.27 (0.22—0.32)	3800	0.27 (0.22—0.32)	3500	0.23 (0.19—0.27)
12.0	3DC,5DC,8DC	3700	0.3 (0.26—0.34)	3400	0.3 (0.26—0.34)	3100	0.26 (0.22—0.29)
16.0	3DC,5DC,8DC	3100	0.33 (0.27—0.38)	2700	0.33 (0.27—0.38)	2500	0.28 (0.23—0.33)
20.0	3DC,5DC,8DC	2500	0.35 (0.30—0.40)	2200	0.35 (0.30—0.40)	2000	0.3 (0.26—0.34)

Work Material		Austenitic Stainless Steel (≤200HB) AISI 304, AISI 316 etc		Gray Cast Iron (≤350MPa) No 45 B etc		Ductile Cast Iron (≤450MPa) 60-40-8 etc	
Dia. DC (mm)	L/D	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
1.0	S*,7DC	9500	0.03 (0.02—0.05)	15900	0.04 (0.02—0.05)	12700	0.04 (0.02—0.05)
	≥12D	9500	0.02 (0.01—0.03)	12700	0.02 (0.01—0.03)	9500	0.02 (0.01—0.03)
1.5	S*,7DC	6300	0.05 (0.03—0.07)	10600	0.05 (0.03—0.08)	8400	0.05 (0.03—0.08)
	≥12D	6300	0.05 (0.02—0.08)	8400	0.05 (0.03—0.08)	6300	0.05 (0.02—0.08)
2.0	S*,7DC	4700	0.06 (0.04—0.08)	7900	0.07 (0.04—0.10)	6300	0.07 (0.04—0.10)
	≥12D	4700	0.07 (0.04—0.10)	7900	0.07 (0.04—0.10)	7900	0.07 (0.04—0.10)
2.5	S*,7DC	5000	0.08 (0.05—0.10)	7600	0.09 (0.05—0.13)	6300	0.09 (0.05—0.13)
	≥12D	3800	0.08 (0.05—0.12)	6300	0.09 (0.06—0.13)	6300	0.08 (0.05—0.12)
3.2	3DC,5DC,8DC	3900	0.08 (0.06—0.10)	8900	0.1 (0.06—0.13)	6400	0.1 (0.06—0.13)
4.0	3DC,5DC,8DC	3100	0.09 (0.06—0.11)	7900	0.12 (0.08—0.16)	5100	0.12 (0.08—0.16)
5.0	3DC,5DC,8DC	2500	0.11 (0.08—0.14)	6300	0.15 (0.10—0.20)	4100	0.15 (0.10—0.20)
6.3	3DC,5DC,8DC	2500	0.14 (0.09—0.18)	5500	0.2 (0.13—0.26)	3500	0.2 (0.13—0.26)
8.0	3DC,5DC,8DC	1900	0.15 (0.10—0.19)	4700	0.25 (0.18—0.31)	2700	0.23 (0.18—0.28)
10.0	3DC,5DC,8DC	1500	0.16 (0.12—0.20)	4100	0.29 (0.22—0.35)	2200	0.27 (0.22—0.32)
12.0	3DC,5DC,8DC	1500	0.18 (0.15—0.21)	3700	0.32 (0.26—0.37)	2300	0.3 (0.26—0.34)
16.0	3DC,5DC,8DC	1100	0.19 (0.14—0.24)	3100	0.35 (0.28—0.42)	1700	0.33 (0.28—0.38)
20.0	3DC,5DC,8DC	900	0.21 (0.15—0.26)	2500	0.37 (0.30—0.44)	1500	0.35 (0.30—0.40)

S*=2DC for cutting a guide hole

Work Material		Aluminium Alloy (Si<5%)		Heat Resistant Alloy Inconel718 etc	
Dia. **DC** (mm)	**L/D**	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
1.0	**S*,7DC**	19000	0.05 (0.03—0.08)	3100	0.02 (0.01—0.03)
	≥12DC	15900	0.05 (0.03—0.08)	3100	0.02 (0.01—0.03)
1.5	**S*,7DC**	16900	0.07 (0.05—0.12)	2100	0.03 (0.02—0.04)
	≥12DC	14800	0.08 (0.05—0.12)	2100	0.03 (0.02—0.04)
2.0	**S*,7DC**	14300	0.1 (0.06—0.15)	2300	0.04 (0.03—0.05)
	≥12DC	12700	0.11 (0.06—0.15)	2300	0.04 (0.03—0.05)
2.5	**S*,7DC**	12700	0.13 (0.08—0.20)	1900	0.05 (0.04—0.06)
	≥12DC	11400	0.14 (0.08—0.20)	1900	0.05 (0.04—0.06)
3.2	**3DC,5DC,8DC**	11900	0.23 (0.10—0.35)	1900	0.07 (0.05—0.09)
4.0	**3DC,5DC,8DC**	9500	0.24 (0.12—0.35)	1500	0.09 (0.06—0.11)
5.0	**3DC,5DC,8DC**	7600	0.25 (0.15—0.35)	1200	0.11 (0.08—0.14)
6.3	**3DC,5DC,8DC**	7500	0.35 (0.20—0.50)	1200	0.13 (0.09—0.16)
8.0	**3DC,5DC,8DC**	5900	0.35 (0.20—0.50)	900	0.14 (0.11—0.17)
10.0	**3DC,5DC,8DC**	4700	0.5 (0.20—0.80)	700	0.15 (0.12—0.17)
12.0	**3DC,5DC,8DC**	4200	0.5 (0.20—0.80)	600	0.16 (0.13—0.18)
16.0	**3DC,5DC,8DC**	3100	0.6 (0.20—1.00)	400	0.18 (0.14—0.21)
20.0	**3DC,5DC,8DC**	2700	0.6 (0.20—1.00)	400	0.19 (0.15—0.22)

S*=2DC for cutting a guide hole

DRILLING(SOLID CARBIDE)

MVE
WSTAR DRILLS

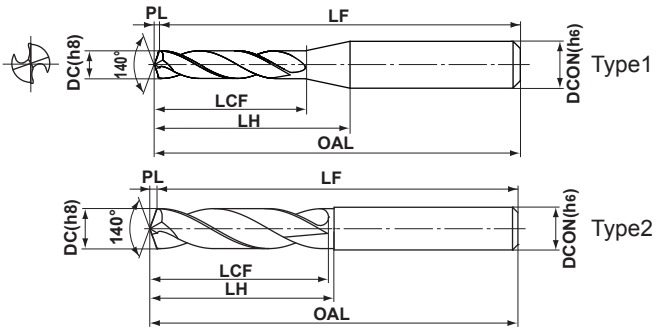
- New grade DP1020 offers long tool life for a wide range of work materials.
- The unique wavy cutting edge provides excellent sharpness and rigidity and helps to control wear at the periphery.

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal	Heat Resistant Alloy	Hardened Steel

	DC=3	3<DC≤6	6<DC≤10	10<DC≤18	18<DC≤20
h6	0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033
	0 −0.006	0 −0.008	0 −0.009	0 −0.011	0 −0.013







External Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
3.0	2	●	MVE0300X02S030	16.5	16.5	55.5	55	0.5	3	2
	2	●	MVE0300X02S060	16.5	19.7	55.5	55	0.5	6	1
	3	●	MVE0300X03S030	21.5	21.5	60.5	60	0.5	3	2
	3	●	MVE0300X03S060	21.5	24.7	60.5	60	0.5	6	1
3.1	2	●	MVE0310X02S040	18.6	20.6	55.6	55	0.6	4	2
	2	●	MVE0310X02S060	18.6	21.7	55.6	55	0.6	6	1
	3	●	MVE0310X03S040	24.6	26.6	60.6	60	0.6	4	2
	3	●	MVE0310X03S060	24.6	27.7	60.6	60	0.6	6	1
3.2	2	●	MVE0320X02S040	18.6	20.6	55.6	55	0.6	4	2
	2	●	MVE0320X02S060	18.6	21.6	55.6	55	0.6	6	1
	3	●	MVE0320X03S040	24.6	26.6	60.6	60	0.6	4	2
	3	●	MVE0320X03S060	24.6	27.6	60.6	60	0.6	6	1
3.3	2	●	MVE0330X02S040	18.6	20.6	55.6	55	0.6	4	2
	2	●	MVE0330X02S060	18.6	21.5	55.6	55	0.6	6	1
	3	●	MVE0330X03S040	24.6	26.6	60.6	60	0.6	4	2
	3	●	MVE0330X03S060	24.6	27.5	60.6	60	0.6	6	1
3.4	2	●	MVE0340X02S040	18.6	20.6	55.6	55	0.6	4	2
	2	●	MVE0340X02S060	18.6	21.4	55.6	55	0.6	6	1
	3	●	MVE0340X03S040	24.6	26.6	60.6	60	0.6	4	2
	3	●	MVE0340X03S060	24.6	27.4	60.6	60	0.6	6	1
3.5	2	●	MVE0350X02S040	18.6	20.6	55.6	55	0.6	4	2
	2	●	MVE0350X02S060	18.6	21.3	55.6	55	0.6	6	1
	3	●	MVE0350X03S040	24.6	26.6	60.6	60	0.6	4	2
	3	●	MVE0350X03S060	24.6	27.3	60.6	60	0.6	6	1
3.6	2	●	MVE0360X02S040	20.7	20.7	55.7	55	0.7	4	2
	2	●	MVE0360X02S060	20.7	23.3	55.7	55	0.7	6	1
	3	●	MVE0360X03S040	27.7	27.7	60.7	60	0.7	4	2
	3	●	MVE0360X03S060	27.7	30.3	60.7	60	0.7	6	1
3.7	2	●	MVE0370X02S040	20.7	20.7	55.7	55	0.7	4	2
	2	●	MVE0370X02S060	20.7	23.2	55.7	55	0.7	6	1
	3	●	MVE0370X03S040	27.7	27.7	60.7	60	0.7	4	2
	3	●	MVE0370X03S060	27.7	30.2	60.7	60	0.7	6	1
3.8	2	●	MVE0380X02S040	20.7	20.7	55.7	55	0.7	4	2
	2	●	MVE0380X02S060	20.7	23.1	55.7	55	0.7	6	1
	3	●	MVE0380X03S040	27.7	27.7	60.7	60	0.7	4	2
	3	●	MVE0380X03S060	27.7	30.1	60.7	60	0.7	6	1
3.9	2	●	MVE0390X02S040	20.7	20.7	55.7	55	0.7	4	2
	2	●	MVE0390X02S060	20.7	23.0	55.7	55	0.7	6	1

External Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
3.9	3	●	MVE0390X03S040	27.7	27.7	60.7	60	0.7	4	2
	3	●	MVE0390X03S060	27.7	30.0	60.7	60	0.7	6	1
4.0	2	●	MVE0400X02S040	20.7	20.7	55.7	55	0.7	4	2
	2	●	MVE0400X02S060	20.7	22.8	55.7	55	0.7	6	1
	3	●	MVE0400X03S040	27.7	27.7	60.7	60	0.7	4	2
	3	●	MVE0400X03S060	27.7	29.8	60.7	60	0.7	6	1
4.1	2	●	MVE0410X02S050	22.7	24.7	62.7	62	0.7	5	2
	2	●	MVE0410X02S060	22.7	24.7	62.7	62	0.7	6	1
	3	●	MVE0410X03S050	29.7	31.7	68.7	68	0.7	5	2
	3	●	MVE0410X03S060	29.7	31.7	68.7	68	0.7	6	1
4.2	2	●	MVE0420X02S050	22.8	24.8	62.8	62	0.8	5	2
	2	●	MVE0420X02S060	22.8	24.7	62.8	62	0.8	6	1
	3	●	MVE0420X03S050	29.8	31.8	68.8	68	0.8	5	2
	3	●	MVE0420X03S060	29.8	31.7	68.8	68	0.8	6	1
4.3	2	●	MVE0430X02S050	22.8	24.8	62.8	62	0.8	5	2
	2	●	MVE0430X02S060	22.8	24.6	62.8	62	0.8	6	1
	3	●	MVE0430X03S050	29.8	31.8	68.8	68	0.8	5	2
	3	●	MVE0430X03S060	29.8	31.6	68.8	68	0.8	6	1
4.4	2	●	MVE0440X02S050	22.8	24.8	62.8	62	0.8	5	2
	2	●	MVE0440X02S060	22.8	24.5	62.8	62	0.8	6	1
	3	●	MVE0440X03S050	29.8	31.8	68.8	68	0.8	5	2
	3	●	MVE0440X03S060	29.8	31.5	68.8	68	0.8	6	1
4.5	2	●	MVE0450X02S050	22.8	24.8	62.8	62	0.8	5	2
	2	●	MVE0450X02S060	22.8	24.4	62.8	62	0.8	6	1
	3	●	MVE0450X03S050	29.8	31.8	68.8	68	0.8	5	2
	3	●	MVE0450X03S060	29.8	31.4	68.8	68	0.8	6	1
4.6	2	●	MVE0460X02S050	24.8	24.8	62.8	62	0.8	5	2
	2	●	MVE0460X02S060	24.8	27.8	62.8	62	0.8	6	2
	3	●	MVE0460X03S050	32.8	32.8	68.8	68	0.8	5	2
	3	●	MVE0460X03S060	32.8	35.8	68.8	68	0.8	6	2
4.7	2	●	MVE0470X02S050	24.9	24.9	62.9	62	0.9	5	2
	2	●	MVE0470X02S060	24.9	27.9	62.9	62	0.9	6	2
	3	●	MVE0470X03S050	32.9	32.9	68.9	68	0.9	5	2
	3	●	MVE0470X03S060	32.9	35.9	68.9	68	0.9	6	2
4.8	2	●	MVE0480X02S050	24.9	24.9	62.9	62	0.9	5	2
	2	●	MVE0480X02S060	24.9	27.9	62.9	62	0.9	6	2
	3	●	MVE0480X03S050	32.9	32.9	68.9	68	0.9	5	2
	3	●	MVE0480X03S060	32.9	35.9	68.9	68	0.9	6	2

● : Inventory maintained in Japan.

External Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
4.9	2	●	MVE0490X02S050	24.9	24.9	62.9	62	0.9	5	2
	2	●	MVE0490X02S060	24.9	27.9	62.9	62	0.9	6	2
	3	●	MVE0490X03S050	32.9	32.9	68.9	68	0.9	5	2
	3	●	MVE0490X03S060	32.9	35.9	68.9	68	0.9	6	2
5.0	2	●	MVE0500X02S050	24.9	24.9	62.9	62	0.9	5	2
	2	●	MVE0500X02S060	24.9	27.9	62.9	62	0.9	6	2
	3	●	MVE0500X03S050	32.9	32.9	68.9	68	0.9	5	2
	3	●	MVE0500X03S060	32.9	35.9	68.9	68	0.9	6	2
5.1	2	●	MVE0510X02S060	26.9	28.9	66.9	66	0.9	6	2
	3	●	MVE0510X03S060	34.9	36.9	74.9	74	0.9	6	2
5.2	2	●	MVE0520X02S060	26.9	28.9	66.9	66	0.9	6	2
	3	●	MVE0520X03S060	34.9	36.9	74.9	74	0.9	6	2
5.3	2	●	MVE0530X02S060	27.0	29.0	67.0	66	1.0	6	2
	3	●	MVE0530X03S060	35.0	37.0	75.0	74	1.0	6	2
5.4	2	●	MVE0540X02S060	27.0	29.0	67.0	66	1.0	6	2
	3	●	MVE0540X03S060	35.0	37.0	75.0	74	1.0	6	2
5.5	2	●	MVE0550X02S060	27.0	29.0	67.0	66	1.0	6	2
	3	●	MVE0550X03S060	35.0	37.0	75.0	74	1.0	6	2
5.6	2	●	MVE0560X02S060	29.0	29.0	67.0	66	1.0	6	2
	3	●	MVE0560X03S060	37.0	37.0	75.0	74	1.0	6	2
5.7	2	●	MVE0570X02S060	29.0	29.0	67.0	66	1.0	6	2
	3	●	MVE0570X03S060	37.0	37.0	75.0	74	1.0	6	2
5.8	2	●	MVE0580X02S060	29.1	29.1	67.1	66	1.1	6	2
	3	●	MVE0580X03S060	37.1	37.1	75.1	74	1.1	6	2
5.9	2	●	MVE0590X02S060	29.1	29.1	67.1	66	1.1	6	2
	3	●	MVE0590X03S060	37.1	37.1	75.1	74	1.1	6	2
6.0	2	●	MVE0600X02S060	29.1	29.1	67.1	66	1.1	6	2
	3	●	MVE0600X03S060	37.1	37.1	75.1	74	1.1	6	2
6.1	2	●	MVE0610X02S070	32.1	35.1	75.1	74	1.1	7	2
	2	●	MVE0610X02S080	32.1	35.1	75.1	74	1.1	8	2
	3	●	MVE0610X03S070	42.1	45.1	84.1	83	1.1	7	2
	3	●	MVE0610X03S080	42.1	45.1	84.1	83	1.1	8	2
6.2	2	●	MVE0620X02S070	32.1	35.1	75.1	74	1.1	7	2
	2	●	MVE0620X02S080	32.1	35.1	75.1	74	1.1	8	2
	3	●	MVE0620X03S070	42.1	45.1	84.1	83	1.1	7	2
	3	●	MVE0620X03S080	42.1	45.1	84.1	83	1.1	8	2
6.3	2	●	MVE0630X02S070	32.1	35.1	75.1	74	1.1	7	2
	2	●	MVE0630X02S080	32.1	35.1	75.1	74	1.1	8	2
	3	●	MVE0630X03S070	42.1	45.1	84.1	83	1.1	7	2
	3	●	MVE0630X03S080	42.1	45.1	84.1	83	1.1	8	2
6.4	2	●	MVE0640X02S070	32.2	35.2	75.2	74	1.2	7	2
	2	●	MVE0640X02S080	32.2	35.2	75.2	74	1.2	8	2
	3	●	MVE0640X03S070	42.2	45.2	84.2	83	1.2	7	2
	3	●	MVE0640X03S080	42.2	45.2	84.2	83	1.2	8	2
6.5	2	●	MVE0650X02S070	32.2	35.2	75.2	74	1.2	7	2
	2	●	MVE0650X02S080	32.2	35.2	75.2	74	1.2	8	2
	3	●	MVE0650X03S070	42.2	45.2	84.2	83	1.2	7	2
	3	●	MVE0650X03S080	42.2	45.2	84.2	83	1.2	8	2
6.6	2	●	MVE0660X02S070	35.2	35.2	75.2	74	1.2	7	2
	2	●	MVE0660X02S080	35.2	37.2	75.2	74	1.2	8	2
	3	●	MVE0660X03S070	44.2	44.2	84.2	83	1.2	7	2
	3	●	MVE0660X03S080	44.2	46.2	84.2	83	1.2	8	2

External Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
6.7	2	●	MVE0670X02S070	35.2	35.2	75.2	74	1.2	7	2
	2	●	MVE0670X02S080	35.2	37.2	75.2	74	1.2	8	2
	3	●	MVE0670X03S070	44.2	44.2	84.2	83	1.2	7	2
	3	●	MVE0670X03S080	44.2	46.2	84.2	83	1.2	8	2
6.8	2	●	MVE0680X02S070	35.2	35.2	75.2	74	1.2	7	2
	2	●	MVE0680X02S080	35.2	37.2	75.2	74	1.2	8	2
	3	●	MVE0680X03S070	44.2	44.2	84.2	83	1.2	7	2
	3	●	MVE0680X03S080	44.2	46.2	84.2	83	1.2	8	2
6.9	2	●	MVE0690X02S070	35.3	35.3	75.3	74	1.3	7	2
	2	●	MVE0690X02S080	35.3	37.3	75.3	74	1.3	8	2
	3	●	MVE0690X03S070	44.3	44.3	84.3	83	1.3	7	2
	3	●	MVE0690X03S080	44.3	46.3	84.3	83	1.3	8	2
7.0	2	●	MVE0700X02S070	35.3	35.3	75.3	74	1.3	7	2
	2	●	MVE0700X02S080	35.3	37.3	75.3	74	1.3	8	2
	3	●	MVE0700X03S070	44.3	44.3	84.3	83	1.3	7	2
	3	●	MVE0700X03S080	44.3	46.3	84.3	83	1.3	8	2
7.1	2	●	MVE0710X02S080	35.3	38.3	80.3	79	1.3	8	2
	3	●	MVE0710X03S080	46.3	49.3	91.3	90	1.3	8	2
7.2	2	●	MVE0720X02S080	35.3	38.3	80.3	79	1.3	8	2
	3	●	MVE0720X03S080	46.3	49.3	91.3	90	1.3	8	2
7.3	2	●	MVE0730X02S080	35.3	38.3	80.3	79	1.3	8	2
	3	●	MVE0730X03S080	46.3	49.3	91.3	90	1.3	8	2
7.4	2	●	MVE0740X02S080	35.3	38.3	80.3	79	1.3	8	2
	3	●	MVE0740X03S080	46.3	49.3	91.3	90	1.3	8	2
7.5	2	●	MVE0750X02S080	35.4	38.4	80.4	79	1.4	8	2
	3	●	MVE0750X03S080	46.4	49.4	91.4	90	1.4	8	2
7.6	2	●	MVE0760X02S080	38.4	38.4	80.4	79	1.4	8	2
	3	●	MVE0760X03S080	49.4	49.4	91.4	90	1.4	8	2
7.7	2	●	MVE0770X02S080	38.4	38.4	80.4	79	1.4	8	2
	3	●	MVE0770X03S080	49.4	49.4	91.4	90	1.4	8	2
7.8	2	●	MVE0780X02S080	38.4	38.4	80.4	79	1.4	8	2
	3	●	MVE0780X03S080	49.4	49.4	91.4	90	1.4	8	2
7.9	2	●	MVE0790X02S080	38.4	38.4	80.4	79	1.4	8	2
	3	●	MVE0790X03S080	49.4	49.4	91.4	90	1.4	8	2
8.0	2	●	MVE0800X02S080	38.5	38.5	80.5	79	1.5	8	2
	3	●	MVE0800X03S080	49.5	49.5	91.5	90	1.5	8	2
8.1	2	●	MVE0810X02S090	38.5	41.5	85.5	84	1.5	9	2
	2	●	MVE0810X02S100	38.5	41.5	85.5	84	1.5	10	2
	3	●	MVE0810X03S090	54.5	57.5	99.5	98	1.5	9	2
	3	●	MVE0810X03S100	54.5	57.5	99.5	98	1.5	10	2
8.2	2	●	MVE0820X02S090	38.5	41.5	85.5	84	1.5	9	2
	2	●	MVE0820X02S100	38.5	41.5	85.5	84	1.5	10	2
	3	●	MVE0820X03S090	54.5	57.5	99.5	98	1.5	9	2
	3	●	MVE0820X03S100	54.5	57.5	99.5	98	1.5	10	2
8.3	2	●	MVE0830X02S090	38.5	41.5	85.5	84	1.5	9	2
	2	●	MVE0830X02S100	38.5	41.5	85.5	84	1.5	10	2
	3	●	MVE0830X03S090	54.5	57.5	99.5	98	1.5	9	2
	3	●	MVE0830X03S100	54.5	57.5	99.5	98	1.5	10	2
8.4	2	●	MVE0840X02S090	38.5	41.5	85.5	84	1.5	9	2
	2	●	MVE0840X02S100	38.5	41.5	85.5	84	1.5	10	2
	3	●	MVE0840X03S090	54.5	57.5	99.5	98	1.5	9	2
	3	●	MVE0840X03S100	54.5	57.5	99.5	98	1.5	10	2

MVE

WSTAR DRILLS

External Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
8.5	2	●	MVE0850X02S090	38.5	41.5	85.5	84	1.5	9	2
	2	●	MVE0850X02S100	38.5	41.5	85.5	84	1.5	10	2
	3	●	MVE0850X03S090	54.5	57.5	99.5	98	1.5	9	2
	3	●	MVE0850X03S100	54.5	57.5	99.5	98	1.5	10	2
8.6	2	●	MVE0860X02S090	41.6	41.6	85.6	84	1.6	9	2
	2	●	MVE0860X02S100	41.6	43.6	85.6	84	1.6	10	2
	3	●	MVE0860X03S090	56.6	56.6	99.6	98	1.6	9	2
	3	●	MVE0860X03S100	56.6	58.6	99.6	98	1.6	10	2
8.7	2	●	MVE0870X02S090	41.6	41.6	85.6	84	1.6	9	2
	2	●	MVE0870X02S100	41.6	43.6	85.6	84	1.6	10	2
	3	●	MVE0870X03S090	56.6	56.6	99.6	98	1.6	9	2
	3	●	MVE0870X03S100	56.6	58.6	99.6	98	1.6	10	2
8.8	2	●	MVE0880X02S090	41.6	41.6	85.6	84	1.6	9	2
	2	●	MVE0880X02S100	41.6	43.6	85.6	84	1.6	10	2
	3	●	MVE0880X03S090	56.6	56.6	99.6	98	1.6	9	2
	3	●	MVE0880X03S100	56.6	58.6	99.6	98	1.6	10	2
8.9	2	●	MVE0890X02S090	41.6	41.6	85.6	84	1.6	9	2
	2	●	MVE0890X02S100	41.6	43.6	85.6	84	1.6	10	2
	3	●	MVE0890X03S090	56.6	56.6	99.6	98	1.6	9	2
	3	●	MVE0890X03S100	56.6	58.6	99.6	98	1.6	10	2
9.0	2	●	MVE0900X02S090	41.6	41.6	85.6	84	1.6	9	2
	2	●	MVE0900X02S100	41.6	43.6	85.6	84	1.6	10	2
	3	●	MVE0900X03S090	56.6	56.6	99.6	98	1.6	9	2
	3	●	MVE0900X03S100	56.6	58.6	99.6	98	1.6	10	2
9.1	2	●	MVE0910X02S100	41.7	44.7	90.7	89	1.7	10	2
	3	●	MVE0910X03S100	59.7	62.7	106.7	105	1.7	10	2
9.2	2	●	MVE0920X02S100	41.7	44.7	90.7	89	1.7	10	2
	3	●	MVE0920X03S100	59.7	62.7	106.7	105	1.7	10	2
9.3	2	●	MVE0930X02S100	41.7	44.7	90.7	89	1.7	10	2
	3	●	MVE0930X03S100	59.7	62.7	106.7	105	1.7	10	2
9.4	2	●	MVE0940X02S100	41.7	44.7	90.7	89	1.7	10	2
	3	●	MVE0940X03S100	59.7	62.7	106.7	105	1.7	10	2
9.5	2	●	MVE0950X02S100	41.7	44.7	90.7	89	1.7	10	2
	3	●	MVE0950X03S100	59.7	62.7	106.7	105	1.7	10	2
9.6	2	●	MVE0960X02S100	44.7	44.7	90.7	89	1.7	10	2
	3	●	MVE0960X03S100	61.7	61.7	106.7	105	1.7	10	2
9.7	2	●	MVE0970X02S100	44.8	44.8	90.8	89	1.8	10	2
	3	●	MVE0970X03S100	61.8	61.8	106.8	105	1.8	10	2
9.8	2	●	MVE0980X02S100	44.8	44.8	90.8	89	1.8	10	2
	3	●	MVE0980X03S100	61.8	61.8	106.8	105	1.8	10	2
9.9	2	●	MVE0990X02S100	44.8	44.8	90.8	89	1.8	10	2
	3	●	MVE0990X03S100	61.8	61.8	106.8	105	1.8	10	2
10.0	2	●	MVE1000X02S100	44.8	44.8	90.8	89	1.8	10	2
	3	●	MVE1000X03S100	61.8	61.8	106.8	105	1.8	10	2
10.1	2	●	MVE1010X02S110	44.8	47.8	96.8	95	1.8	11	2
	2	●	MVE1010X02S120	44.8	47.8	96.8	95	1.8	12	2
	3	●	MVE1010X03S110	67.8	70.8	115.8	114	1.8	11	2
	3	●	MVE1010X03S120	67.8	70.8	115.8	114	1.8	12	2
10.2	2	●	MVE1020X02S110	44.9	47.9	96.9	95	1.9	11	2
	2	●	MVE1020X02S120	44.9	47.9	96.9	95	1.9	12	2
	3	●	MVE1020X03S110	67.9	70.9	115.9	114	1.9	11	2
	3	●	MVE1020X03S120	67.9	70.9	115.9	114	1.9	12	2

External Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
10.3	2	●	MVE1030X02S110	44.9	47.9	96.9	95	1.9	11	2
	2	●	MVE1030X02S120	44.9	47.9	96.9	95	1.9	12	2
	3	●	MVE1030X03S110	67.9	70.9	115.9	114	1.9	11	2
	3	●	MVE1030X03S120	67.9	70.9	115.9	114	1.9	12	2
10.4	2	●	MVE1040X02S110	44.9	47.9	96.9	95	1.9	11	2
	2	●	MVE1040X02S120	44.9	47.9	96.9	95	1.9	12	2
	3	●	MVE1040X03S110	67.9	70.9	115.9	114	1.9	11	2
	3	●	MVE1040X03S120	67.9	70.9	115.9	114	1.9	12	2
10.5	2	●	MVE1050X02S110	44.9	47.9	96.9	95	1.9	11	2
	2	●	MVE1050X02S120	44.9	47.9	96.9	95	1.9	12	2
	3	●	MVE1050X03S110	67.9	70.9	115.9	114	1.9	11	2
	3	●	MVE1050X03S120	67.9	70.9	115.9	114	1.9	12	2
10.6	2	●	MVE1060X02S110	48.9	48.9	96.9	95	1.9	11	2
	2	●	MVE1060X02S120	48.9	49.9	96.9	95	1.9	12	2
	3	●	MVE1060X03S110	69.9	69.9	115.9	114	1.9	11	2
	3	●	MVE1060X03S120	69.9	70.9	115.9	114	1.9	12	2
10.7	2	●	MVE1070X02S110	48.9	48.9	96.9	95	1.9	11	2
	2	●	MVE1070X02S120	48.9	49.9	96.9	95	1.9	12	2
	3	●	MVE1070X03S110	69.9	69.9	115.9	114	1.9	11	2
	3	●	MVE1070X03S120	69.9	70.9	115.9	114	1.9	12	2
10.8	2	●	MVE1080X02S110	49.0	49.0	97.0	95	2.0	11	2
	2	●	MVE1080X02S120	49.0	50.0	97.0	95	2.0	12	2
	3	●	MVE1080X03S110	70.0	70.0	116.0	114	2.0	11	2
	3	●	MVE1080X03S120	70.0	71.0	116.0	114	2.0	12	2
10.9	2	●	MVE1090X02S110	49.0	49.0	97.0	95	2.0	11	2
	2	●	MVE1090X02S120	49.0	50.0	97.0	95	2.0	12	2
	3	●	MVE1090X03S110	70.0	70.0	116.0	114	2.0	11	2
	3	●	MVE1090X03S120	70.0	71.0	116.0	114	2.0	12	2
11.0	2	●	MVE1100X02S110	49.0	49.0	97.0	95	2.0	11	2
	2	●	MVE1100X02S120	49.0	50.0	97.0	95	2.0	12	2
	3	●	MVE1100X03S110	70.0	70.0	116.0	114	2.0	11	2
	3	●	MVE1100X03S120	70.0	71.0	116.0	114	2.0	12	2
11.1	2	●	MVE1110X02S120	49.0	52.0	97.0	95	2.0	12	2
	3	●	MVE1110X03S120	73.0	76.0	123.0	121	2.0	12	2
11.2	2	●	MVE1120X02S120	49.0	52.0	97.0	95	2.0	12	2
	3	●	MVE1120X03S120	73.0	76.0	123.0	121	2.0	12	2
11.3	2	●	MVE1130X02S120	49.1	52.1	97.1	95	2.1	12	2
	3	●	MVE1130X03S120	73.1	76.1	123.1	121	2.1	12	2
11.4	2	●	MVE1140X02S120	49.1	52.1	97.1	95	2.1	12	2
	3	●	MVE1140X03S120	73.1	76.1	123.1	121	2.1	12	2
11.5	2	●	MVE1150X02S120	49.1	52.1	97.1	95	2.1	12	2
	3	●	MVE1150X03S120	73.1	76.1	123.1	121	2.1	12	2
11.6	2	●	MVE1160X02S120	49.1	49.1	97.1	95	2.1	12	2
	3	●	MVE1160X03S120	75.1	75.1	123.1	121	2.1	12	2
11.7	2	●	MVE1170X02S120	49.1	49.1	97.1	95	2.1	12	2
	3	●	MVE1170X03S120	75.1	75.1	123.1	121	2.1	12	2
11.8	2	●	MVE1180X02S120	49.1	49.1	97.1	95	2.1	12	2
	3	●	MVE1180X03S120	75.1	75.1	123.1	121	2.1	12	2
11.9	2	●	MVE1190X02S120	49.2	49.2	97.2	95	2.2	12	2
	3	●	MVE1190X03S120	75.2	75.2	123.2	121	2.2	12	2
12.0	2	●	MVE1200X02S120	49.2	49.2	97.2	95	2.2	12	2
	3	●	MVE1200X03S120	75.2	75.2	123.2	121	2.2	12	2

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

External Coolant

NEW DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
12.1	2	●	MVE1210X02S130	53.2	56.2	104.2	102	2.2	13	2
	2	□	MVE1210X02S140	53.2	56.2	104.2	102	2.2	14	2
	3	●	MVE1210X03S130	78.2	81.2	139.2	137	2.2	13	2
	3	□	MVE1210X03S140	78.2	81.2	139.2	137	2.2	14	2
12.2	2	●	MVE1220X02S130	53.2	56.2	104.2	102	2.2	13	2
	2	□	MVE1220X02S140	53.2	56.2	104.2	102	2.2	14	2
	3	●	MVE1220X03S130	78.2	81.2	139.2	137	2.2	13	2
	3	□	MVE1220X03S140	78.2	81.2	139.2	137	2.2	14	2
12.3	2	●	MVE1230X02S130	53.2	56.2	104.2	102	2.2	13	2
	2	□	MVE1230X02S140	53.2	56.2	104.2	102	2.2	14	2
	3	●	MVE1230X03S130	78.2	81.2	139.2	137	2.2	13	2
	3	□	MVE1230X03S140	78.2	81.2	139.2	137	2.2	14	2
12.4	2	●	MVE1240X02S130	53.3	56.3	104.3	102	2.3	13	2
	2	□	MVE1240X02S140	53.3	56.3	104.3	102	2.3	14	2
	3	●	MVE1240X03S130	78.3	81.3	139.3	137	2.3	13	2
	3	□	MVE1240X03S140	78.3	81.3	139.3	137	2.3	14	2
12.5	2	●	MVE1250X02S130	53.3	56.3	104.3	102	2.3	13	2
	2	□	MVE1250X02S140	53.3	56.3	104.3	102	2.3	14	2
	3	●	MVE1250X03S130	78.3	81.3	139.3	137	2.3	13	2
	3	□	MVE1250X03S140	78.3	81.3	139.3	137	2.3	14	2
12.6	2	●	MVE1260X02S130	53.3	53.3	104.3	102	2.3	13	2
	2	□	MVE1260X02S140	53.3	53.3	104.3	102	2.3	14	2
	3	●	MVE1260X03S130	80.3	80.3	139.3	137	2.3	13	2
	3	□	MVE1260X03S140	80.3	80.3	139.3	137	2.3	14	2
12.7	2	●	MVE1270X02S130	53.3	53.3	104.3	102	2.3	13	2
	2	□	MVE1270X02S140	53.3	53.3	104.3	102	2.3	14	2
	3	●	MVE1270X03S130	80.3	80.3	139.3	137	2.3	13	2
	3	□	MVE1270X03S140	80.3	80.3	139.3	137	2.3	14	2
12.8	2	●	MVE1280X02S130	53.3	53.3	104.3	102	2.3	13	2
	2	□	MVE1280X02S140	53.3	53.3	104.3	102	2.3	14	2
	3	●	MVE1280X03S130	80.3	80.3	139.3	137	2.3	13	2
	3	□	MVE1280X03S140	80.3	80.3	139.3	137	2.3	14	2
12.9	2	●	MVE1290X02S130	53.3	53.3	104.3	102	2.3	13	2
	2	□	MVE1290X02S140	53.3	53.3	104.3	102	2.3	14	2
	3	●	MVE1290X03S130	80.3	80.3	139.3	137	2.3	13	2
	3	□	MVE1290X03S140	80.3	80.3	139.3	137	2.3	14	2
13.0	2	●	MVE1300X02S130	53.4	53.4	104.4	102	2.4	13	2
	2	□	MVE1300X02S140	53.4	53.4	104.4	102	2.4	14	2
	3	●	MVE1300X03S130	80.4	80.4	139.4	137	2.4	13	2
	3	□	MVE1300X03S140	80.4	80.4	139.4	137	2.4	14	2
13.1	2	●	MVE1310X02S140	56.4	59.4	109.4	107	2.4	14	2
	3	●	MVE1310X03S140	86.4	89.4	149.4	147	2.4	14	2
13.2	2	●	MVE1320X02S140	56.4	59.4	109.4	107	2.4	14	2
	3	●	MVE1320X03S140	86.4	89.4	149.4	147	2.4	14	2
13.3	2	●	MVE1330X02S140	56.4	59.4	109.4	107	2.4	14	2
	3	●	MVE1330X03S140	86.4	89.4	149.4	147	2.4	14	2
13.4	2	●	MVE1340X02S140	56.4	59.4	109.4	107	2.4	14	2
	3	●	MVE1340X03S140	86.4	89.4	149.4	147	2.4	14	2
13.5	2	●	MVE1350X02S140	56.5	59.5	109.5	107	2.5	14	2
	3	●	MVE1350X03S140	86.5	89.5	149.5	147	2.5	14	2
13.6	2	●	MVE1360X02S140	56.5	56.5	109.5	107	2.5	14	2
	3	●	MVE1360X03S140	88.5	88.5	149.5	147	2.5	14	2

External Coolant

NEW DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
13.7	2	●	MVE1370X02S140	56.5	56.5	109.5	107	2.5	14	2
	3	●	MVE1370X03S140	88.5	88.5	149.5	147	2.5	14	2
13.8	2	●	MVE1380X02S140	56.5	56.5	109.5	107	2.5	14	2
	3	●	MVE1380X03S140	88.5	88.5	149.5	147	2.5	14	2
13.9	2	●	MVE1390X02S140	56.5	56.5	109.5	107	2.5	14	2
	3	●	MVE1390X03S140	88.5	88.5	149.5	147	2.5	14	2
14.0	2	●	MVE1400X02S140	56.5	56.5	109.5	107	2.5	14	2
	3	●	MVE1400X03S140	88.5	88.5	149.5	147	2.5	14	2
14.1	2	●	MVE1410X02S150	58.6	61.6	113.6	111	2.6	15	2
	2	□	MVE1410X02S160	58.6	61.6	113.6	111	2.6	16	2
	3	●	MVE1410X03S150	91.6	94.6	155.6	153	2.6	15	2
	3	□	MVE1410X03S160	91.6	94.6	155.6	153	2.6	16	2
14.2	2	●	MVE1420X02S150	58.6	61.6	113.6	111	2.6	15	2
	2	□	MVE1420X02S160	58.6	61.6	113.6	111	2.6	16	2
	3	●	MVE1420X03S150	91.6	94.6	155.6	153	2.6	15	2
	3	□	MVE1420X03S160	91.6	94.6	155.6	153	2.6	16	2
14.3	2	□	MVE1430X02S150	58.6	61.6	113.6	111	2.6	15	2
	2	□	MVE1430X02S160	58.6	61.6	113.6	111	2.6	16	2
	3	●	MVE1430X03S150	91.6	94.6	155.6	153	2.6	15	2
	3	□	MVE1430X03S160	91.6	94.6	155.6	153	2.6	16	2
14.4	2	□	MVE1440X02S150	58.6	61.6	113.6	111	2.6	15	2
	2	□	MVE1440X02S160	58.6	61.6	113.6	111	2.6	16	2
	3	●	MVE1440X03S150	91.6	94.6	155.6	153	2.6	15	2
	3	□	MVE1440X03S160	91.6	94.6	155.6	153	2.6	16	2
14.5	2	●	MVE1450X02S150	58.6	61.6	113.6	111	2.6	15	2
	2	□	MVE1450X02S160	58.6	61.6	113.6	111	2.6	16	2
	3	●	MVE1450X03S150	91.6	94.6	155.6	153	2.6	15	2
	3	□	MVE1450X03S160	91.6	94.6	155.6	153	2.6	16	2
14.6	2	□	MVE1460X02S150	58.7	58.7	113.7	111	2.7	15	2
	2	□	MVE1460X02S160	58.7	58.7	113.7	111	2.7	16	2
	3	●	MVE1460X03S150	93.7	93.7	155.7	153	2.7	15	2
	3	□	MVE1460X03S160	93.7	93.7	155.7	153	2.7	16	2
14.7	2	□	MVE1470X02S150	58.7	58.7	113.7	111	2.7	15	2
	2	□	MVE1470X02S160	58.7	58.7	113.7	111	2.7	16	2
	3	●	MVE1470X03S150	93.7	93.7	155.7	153	2.7	15	2
	3	□	MVE1470X03S160	93.7	93.7	155.7	153	2.7	16	2
14.8	2	□	MVE1480X02S150	58.7	58.7	113.7	111	2.7	15	2
	2	□	MVE1480X02S160	58.7	58.7	113.7	111	2.7	16	2
	3	●	MVE1480X03S150	93.7	93.7	155.7	153	2.7	15	2
	3	□	MVE1480X03S160	93.7	93.7	155.7	153	2.7	16	2
14.9	2	□	MVE1490X02S150	58.7	58.7	113.7	111	2.7	15	2
	2	□	MVE1490X02S160	58.7	58.7	113.7	111	2.7	16	2
	3	●	MVE1490X03S150	93.7	93.7	155.7	153	2.7	15	2
	3	□	MVE1490X03S160	93.7	93.7	155.7	153	2.7	16	2
15.0	2	●	MVE1500X02S150	58.7	58.7	113.7	111	2.7	15	2
	2	□	MVE1500X02S160	58.7	58.7	113.7	111	2.7	16	2
	3	●	MVE1500X03S150	93.7	93.7	155.7	153	2.7	15	2
	3	□	MVE1500X03S160	93.7	93.7	155.7	153	2.7	16	2
15.1	2	□	MVE1510X02S160	60.7	63.7	117.7	115	2.7	16	2
	3	●	MVE1510X03S160	96.7	99.7	162.7	160	2.7	16	2
15.2	2	●	MVE1520X02S160	60.8	63.8	117.8	115	2.8	16	2
	3	●	MVE1520X03S160	96.8	99.8	162.8	160	2.8	16	2

DRILLING

CUTTING CONDITIONS ➤ N030 TECHNICAL DATA ➤ Q001

MVE

WSTAR DRILLS

External Coolant

NEW	DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
	15.3	2	□	MVE1530X02S160	60.8	63.8	117.8	115	2.8	16	2
		3	●	MVE1530X03S160	96.8	99.8	162.8	160	2.8	16	2
	15.4	2	□	MVE1540X02S160	60.8	63.8	117.8	115	2.8	16	2
		3	●	MVE1540X03S160	96.8	99.8	162.8	160	2.8	16	2
	15.5	2	●	MVE1550X02S160	60.8	63.8	117.8	115	2.8	16	2
		3	●	MVE1550X03S160	96.8	99.8	162.8	160	2.8	16	2
	15.6	2	□	MVE1560X02S160	60.8	60.8	117.8	115	2.8	16	2
		3	●	MVE1560X03S160	98.8	98.8	162.8	160	2.8	16	2
	15.7	2	□	MVE1570X02S160	60.9	60.9	117.9	115	2.9	16	2
		3	●	MVE1570X03S160	98.9	98.9	162.9	160	2.9	16	2
	15.8	2	□	MVE1580X02S160	60.9	60.9	117.9	115	2.9	16	2
		3	●	MVE1580X03S160	98.9	98.9	162.9	160	2.9	16	2
	15.9	2	□	MVE1590X02S160	60.9	60.9	117.9	115	2.9	16	2
		3	●	MVE1590X03S160	98.9	98.9	162.9	160	2.9	16	2
	16.0	2	●	MVE1600X02S160	60.9	60.9	117.9	115	2.9	16	2
		3	●	MVE1600X03S160	98.9	98.9	162.9	160	2.9	16	2
	16.1	2	□	MVE1610X02S170	62.9	62.9	121.9	119	2.9	17	2
		2	□	MVE1610X02S180	62.9	62.9	121.9	119	2.9	18	2
		3	□	MVE1610X03S170	104.9	104.9	169.9	167	2.9	17	2
		3	□	MVE1610X03S180	104.9	104.9	169.9	167	2.9	18	2
	16.2	2	●	MVE1620X02S170	62.9	62.9	121.9	119	2.9	17	2
		2	□	MVE1620X02S180	62.9	62.9	121.9	119	2.9	18	2
		3	□	MVE1620X03S170	104.9	104.9	169.9	167	2.9	17	2
		3	□	MVE1620X03S180	104.9	104.9	169.9	167	2.9	18	2
	16.3	2	●	MVE1630X02S170	63.0	63.0	122.0	119	3.0	17	2
		2	□	MVE1630X02S180	63.0	63.0	122.0	119	3.0	18	2
		3	□	MVE1630X03S170	105.0	105.0	170.0	167	3.0	17	2
		3	□	MVE1630X03S180	105.0	105.0	170.0	167	3.0	18	2
	16.4	2	□	MVE1640X02S170	63.0	63.0	122.0	119	3.0	17	2
		2	□	MVE1640X02S180	63.0	63.0	122.0	119	3.0	18	2
		3	□	MVE1640X03S170	105.0	105.0	170.0	167	3.0	17	2
		3	□	MVE1640X03S180	105.0	105.0	170.0	167	3.0	18	2
	16.5	2	●	MVE1650X02S170	63.0	63.0	122.0	119	3.0	17	2
		2	□	MVE1650X02S180	63.0	63.0	122.0	119	3.0	18	2
		3	●	MVE1650X03S170	105.0	105.0	170.0	167	3.0	17	2
		3	□	MVE1650X03S180	105.0	105.0	170.0	167	3.0	18	2
	16.6	2	□	MVE1660X02S170	63.0	63.0	122.0	119	3.0	17	2
		2	□	MVE1660X02S180	63.0	63.0	122.0	119	3.0	18	2
		3	□	MVE1660X03S170	105.0	105.0	170.0	167	3.0	17	2
		3	□	MVE1660X03S180	105.0	105.0	170.0	167	3.0	18	2
	16.7	2	□	MVE1670X02S170	63.0	63.0	122.0	119	3.0	17	2
		2	□	MVE1670X02S180	63.0	63.0	122.0	119	3.0	18	2
		3	□	MVE1670X03S170	105.0	105.0	170.0	167	3.0	17	2
		3	□	MVE1670X03S180	105.0	105.0	170.0	167	3.0	18	2
	16.8	2	□	MVE1680X02S170	63.1	63.1	122.1	119	3.1	17	2
		2	□	MVE1680X02S180	63.1	63.1	122.1	119	3.1	18	2
		3	□	MVE1680X03S170	105.1	105.1	170.1	167	3.1	17	2
		3	□	MVE1680X03S180	105.1	105.1	170.1	167	3.1	18	2
	16.9	2	□	MVE1690X02S170	63.1	63.1	122.1	119	3.1	17	2
		2	□	MVE1690X02S180	63.1	63.1	122.1	119	3.1	18	2
		3	□	MVE1690X03S170	105.1	105.1	170.1	167	3.1	17	2
		3	□	MVE1690X03S180	105.1	105.1	170.1	167	3.1	18	2

External Coolant

NEW	DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
	17.0	2	●	MVE1700X02S170	63.1	63.1	122.1	119	3.1	17	2
		2	□	MVE1700X02S180	63.1	63.1	122.1	119	3.1	18	2
		3	●	MVE1700X03S170	105.1	105.1	170.1	167	3.1	17	2
		3	□	MVE1700X03S180	105.1	105.1	170.1	167	3.1	18	2
	17.1	2	□	MVE1710X02S180	65.1	65.1	126.1	123	3.1	18	2
		3	□	MVE1710X03S180	105.1	105.1	170.1	167	3.1	18	2
	17.2	2	□	MVE1720X02S180	65.1	65.1	126.1	123	3.1	18	2
		3	□	MVE1720X03S180	105.1	105.1	170.1	167	3.1	18	2
	17.3	2	□	MVE1730X02S180	65.1	65.1	126.1	123	3.1	18	2
		3	□	MVE1730X03S180	105.1	105.1	170.1	167	3.1	18	2
	17.4	2	□	MVE1740X02S180	65.2	65.2	126.2	123	3.2	18	2
		3	□	MVE1740X03S180	105.2	105.2	170.2	167	3.2	18	2
	17.5	2	●	MVE1750X02S180	65.2	65.2	126.2	123	3.2	18	2
		3	●	MVE1750X03S180	105.2	105.2	170.2	167	3.2	18	2
	17.6	2	□	MVE1760X02S180	65.2	65.2	126.2	123	3.2	18	2
		3	□	MVE1760X03S180	105.2	105.2	170.2	167	3.2	18	2
	17.7	2	□	MVE1770X02S180	65.2	65.2	126.2	123	3.2	18	2
		3	□	MVE1770X03S180	105.2	105.2	170.2	167	3.2	18	2
	17.8	2	●	MVE1780X02S180	65.2	65.2	126.2	123	3.2	18	2
		3	□	MVE1780X03S180	105.2	105.2	170.2	167	3.2	18	2
	17.9	2	□	MVE1790X02S180	65.3	65.3	126.3	123	3.3	18	2
		3	□	MVE1790X03S180	105.3	105.3	170.3	167	3.3	18	2
	18.0	2	●	MVE1800X02S180	65.3	65.3	126.3	123	3.3	18	2
		3	●	MVE1800X03S180	105.3	105.3	170.3	167	3.3	18	2
	18.1	2	□	MVE1810X02S190	67.3	67.3	130.3	127	3.3	19	2
		2	□	MVE1810X02S200	67.3	67.3	130.3	127	3.3	20	2
		3	□	MVE1810X03S190	117.3	117.3	182.3	179	3.3	19	2
		3	□	MVE1810X03S200	117.3	117.3	182.3	179	3.3	20	2
	18.2	2	□	MVE1820X02S190	67.3	67.3	130.3	127	3.3	19	2
		2	□	MVE1820X02S200	67.3	67.3	130.3	127	3.3	20	2
		3	□	MVE1820X03S190	117.3	117.3	182.3	179	3.3	19	2
		3	□	MVE1820X03S200	117.3	117.3	182.3	179	3.3	20	2
	18.3	2	□	MVE1830X02S190	67.3	67.3	130.3	127	3.3	19	2
		2	□	MVE1830X02S200	67.3	67.3	130.3	127	3.3	20	2
		3	□	MVE1830X03S190	117.3	117.3	182.3	179	3.3	19	2
		3	□	MVE1830X03S200	117.3	117.3	182.3	179	3.3	20	2
	18.4	2	□	MVE1840X02S190	67.3	67.3	130.3	127	3.3	19	2
		2	□	MVE1840X02S200	67.3	67.3	130.3	127	3.3	20	2
		3	□	MVE1840X03S190	117.3	117.3	182.3	179	3.3	19	2
		3	□	MVE1840X03S200	117.3	117.3	182.3	179	3.3	20	2
	18.5	2	●	MVE1850X02S190	67.4	67.4	130.4	127	3.4	19	2
		2	□	MVE1850X02S200	67.4	67.4	130.4	127	3.4	20	2
		3	●	MVE1850X03S190	117.4	117.4	182.4	179	3.4	19	2
		3	□	MVE1850X03S200	117.4	117.4	182.4	179	3.4	20	2
	18.6	2	□	MVE1860X02S190	67.4	67.4	130.4	127	3.4	19	2
		2	□	MVE1860X02S200	67.4	67.4	130.4	127	3.4	20	2
		3	□	MVE1860X03S190	117.4	117.4	182.4	179	3.4	19	2
		3	□	MVE1860X03S200	117.4	117.4	182.4	179	3.4	20	2
	18.7	2	□	MVE1870X02S190	67.4	67.4	130.4	127	3.4	19	2
		2	□	MVE1870X02S200	67.4	67.4	130.4	127	3.4	20	2
		3	□	MVE1870X03S190	117.4	117.4	182.4	179	3.4	19	2
		3	□	MVE1870X03S200	117.4	117.4	182.4	179	3.4	20	2

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

External Coolant

DC (mm)	Hole Depth (l/d)	Stock DP1020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
18.8	2	□	MVE1880X02S190	67.4	67.4	130.4	127	3.4	19	2
	2	□	MVE1880X02S200	67.4	67.4	130.4	127	3.4	20	2
	3	□	MVE1880X03S190	117.4	117.4	182.4	179	3.4	19	2
	3	□	MVE1880X03S200	117.4	117.4	182.4	179	3.4	20	2
18.9	2	□	MVE1890X02S190	67.4	67.4	130.4	127	3.4	19	2
	2	□	MVE1890X02S200	67.4	67.4	130.4	127	3.4	20	2
	3	□	MVE1890X03S190	117.4	117.4	182.4	179	3.4	19	2
	3	□	MVE1890X03S200	117.4	117.4	182.4	179	3.4	20	2
19.0	2	●	MVE1900X02S190	67.5	67.5	130.5	127	3.5	19	2
	2	□	MVE1900X02S200	67.5	67.5	130.5	127	3.5	20	2
	3	●	MVE1900X03S190	117.5	117.5	182.5	179	3.5	19	2
	3	□	MVE1900X03S200	117.5	117.5	182.5	179	3.5	20	2
19.1	2	□	MVE1910X02S200	69.5	69.5	134.5	131	3.5	20	2
	3	□	MVE1910X03S200	117.5	117.5	182.5	179	3.5	20	2
19.2	2	□	MVE1920X02S200	69.5	69.5	134.5	131	3.5	20	2
	3	□	MVE1920X03S200	117.5	117.5	182.5	179	3.5	20	2
19.3	2	□	MVE1930X02S200	69.5	69.5	134.5	131	3.5	20	2
	3	□	MVE1930X03S200	117.5	117.5	182.5	179	3.5	20	2
19.4	2	□	MVE1940X02S200	69.5	69.5	134.5	131	3.5	20	2
	3	□	MVE1940X03S200	117.5	117.5	182.5	179	3.5	20	2
19.5	2	●	MVE1950X02S200	69.5	69.5	134.5	131	3.5	20	2
	3	●	MVE1950X03S200	117.5	117.5	182.5	179	3.5	20	2
19.6	2	□	MVE1960X02S200	69.6	69.6	134.6	131	3.6	20	2
	3	□	MVE1960X03S200	117.6	117.6	182.6	179	3.6	20	2
19.7	2	□	MVE1970X02S200	69.6	69.6	134.6	131	3.6	20	2
	3	□	MVE1970X03S200	117.6	117.6	182.6	179	3.6	20	2
19.8	2	□	MVE1980X02S200	69.6	69.6	134.6	131	3.6	20	2
	3	□	MVE1980X03S200	117.6	117.6	182.6	179	3.6	20	2
19.9	2	□	MVE1990X02S200	69.6	69.6	134.6	131	3.6	20	2
	3	□	MVE1990X03S200	117.6	117.6	182.6	179	3.6	20	2
20.0	2	●	MVE2000X02S200	69.6	69.6	134.6	131	3.6	20	2
	3	●	MVE2000X03S200	117.6	117.6	182.6	179	3.6	20	2

MVE

WSTAR DRILLS

RECOMMENDED CUTTING CONDITIONS

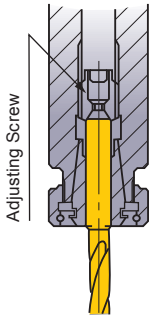
Work Material	Mild Steel (≤180HB) AISI 1010 etc			Carbon steel, Alloy steel (180−280HB) AISI 1045, AISI 4140 etc			Carbon steel, Alloy steel (280−350HB) AISI 4340 etc		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)		Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)		Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)	
3.2	6400	0.1	(0.06−0.13)	5900	0.1	(0.06−0.13)	5400	0.09	(0.06−0.12)
4.0	5500	0.12	(0.08−0.16)	5100	0.12	(0.08−0.16)	4700	0.11	(0.07−0.14)
5.0	4400	0.15	(0.10−0.20)	4100	0.15	(0.10−0.20)	3800	0.14	(0.09−0.18)
6.3	4000	0.2	(0.13−0.26)	3700	0.2	(0.13−0.26)	3500	0.18	(0.11−0.24)
8.0	3300	0.23	(0.18−0.28)	3100	0.23	(0.18−0.28)	2900	0.21	(0.16−0.25)
10.0	2800	0.27	(0.22−0.32)	2700	0.27	(0.22−0.32)	2500	0.23	(0.19−0.27)
12.0	2500	0.31	(0.28−0.34)	2300	0.31	(0.28−0.34)	2200	0.26	(0.23−0.29)
16.0	1900	0.33	(0.28−0.38)	1700	0.33	(0.28−0.38)	1600	0.29	(0.24−0.33)
20.0	1500	0.35	(0.30−0.40)	1400	0.35	(0.30−0.40)	1300	0.3	(0.26−0.34)

Work Material	Austenitic Stainless Steel (≤200HB) AISI 304, AISI 316 etc			Gray Cast Iron (≤350MPa) No 45 B etc			Ductile Cast Iron (≤450MPa) 60-40-8 etc		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)		Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)		Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)	
3.2	1900	0.07	(0.05−0.08)	6900	0.1	(0.06−0.13)	6400	0.1	(0.06−0.13)
4.0	1500	0.08	(0.06−0.10)	5500	0.12	(0.08−0.16)	5100	0.12	(0.08−0.16)
5.0	1200	0.1	(0.07−0.13)	4400	0.15	(0.10−0.20)	4100	0.15	(0.10−0.20)
6.3	1200	0.13	(0.09−0.17)	3700	0.2	(0.13−0.26)	3500	0.2	(0.13−0.26)
8.0	900	0.14	(0.10−0.18)	2900	0.25	(0.18−0.31)	2700	0.23	(0.18−0.28)
10.0	700	0.16	(0.12−0.19)	2300	0.29	(0.22−0.35)	2200	0.27	(0.22−0.32)
12.0	600	0.18	(0.15−0.20)	2100	0.33	(0.28−0.37)	1900	0.31	(0.28−0.34)
16.0	400	0.19	(0.15−0.23)	1500	0.35	(0.28−0.42)	1400	0.33	(0.28−0.38)
20.0	300	0.2	(0.15−0.24)	1300	0.37	(0.30−0.44)	1200	0.35	(0.30−0.40)

Work Material	Aluminium Alloy (Si<5%)			Heat Resistant Alloy Inconel718 etc			Hardened Steel (40−55HRC) AISI H13, L6 etc		
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)		Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)		Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)	
3.2	7900	0.1	(0.06−0.13)	1900	0.07	(0.05−0.09)	1900	0.07	(0.05−0.09)
4.0	6300	0.12	(0.08−0.16)	1500	0.09	(0.06−0.11)	1500	0.09	(0.06−0.11)
5.0	5000	0.15	(0.10−0.20)	1200	0.11	(0.08−0.14)	1200	0.11	(0.08−0.14)
6.3	4500	0.2	(0.13−0.26)	1200	0.14	(0.09−0.19)	1200	0.14	(0.09−0.19)
8.0	3500	0.23	(0.18−0.28)	900	0.14	(0.11−0.17)	900	0.14	(0.11−0.17)
10.0	2800	0.27	(0.22−0.32)	700	0.16	(0.12−0.19)	700	0.16	(0.12−0.19)
12.0	2600	0.31	(0.28−0.34)	600	0.16	(0.13−0.18)	600	0.16	(0.13−0.18)
16.0	1900	0.33	(0.28−0.38)	400	0.18	(0.14−0.21)	400	0.18	(0.14−0.21)
20.0	1700	0.35	(0.30−0.40)	400	0.19	(0.15−0.22)	400	0.19	(0.15−0.22)

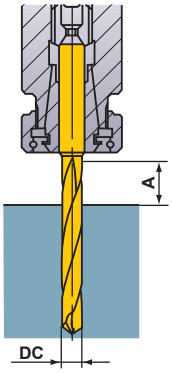
OPERATIONAL GUIDANCE

Drill Holding



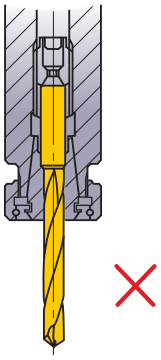
Thrust bearing type collet chuck holds the drill securely.

Drill Length



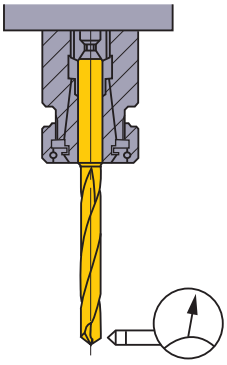
A ≥ DC x 1.5

Drill Installation



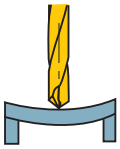
Do not clamp on the flutes.

Installation Tolerance

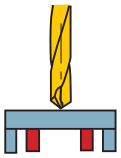


Run-out ≤ 0.03mm

Thin Workpiece

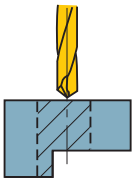


× If Bending Occurs



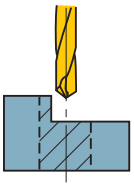
○ Support the Workpiece

Interrupted Cutting



One Process ○

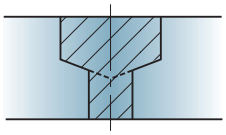
①Lower the feed when drilling the interrupted part.



Requires Prior Machining △

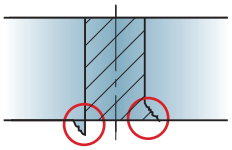
①Spot face with an end mill prior to drilling.

Stepped Holes



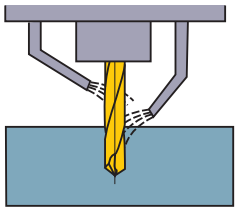
①Divide the two processes.
②Drill the larger hole first.
*A tool for machining both chamfer and spot face can be produced to order.

Burring and Workpiece Chipping



①Lower the feed rate by 50% at the end of through cutting.
②Add a 45°chamfer.
③Change the point angle.

Coolant Method (MVE)

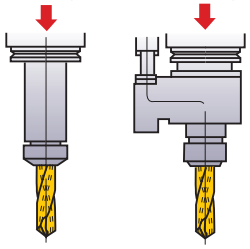


Two coolant positions, at the end and at the center are ideal.

Through Coolant Type (MVS)

Spindles Through Coolant Type

Revolving Coolant Machine Type



Coolant pressure is approx. 0.5—1MPa (<ϕ5:2—3MPa).
Coolant volume is 1.5—4.0l/min.

Coolant Handling

<MVS Type>

1) Small particles of swarf will jam in the oil hole of small diameter drills. Always use a fine mesh filter as a preventative measure.

2) Dirt and dust particles adhere to the oil in old coolant and prevent an efficient flow. Regular coolant exchange is recommended.

DRILLING(SOLID CARBIDE)

MWS
WSTAR DRILLS

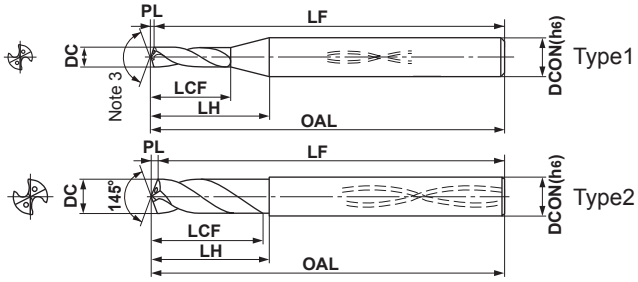
● For high accuracy and efficient drilling of carbon steels through to difficult-to-cut materials.

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal	Heat Resistant Alloy	

	0.5≤DC<1	1≤DC<2.95
h6	+0.009 0	+0.014 0
	0 −0.006	0 −0.006

SB Type
(For pilot holes)





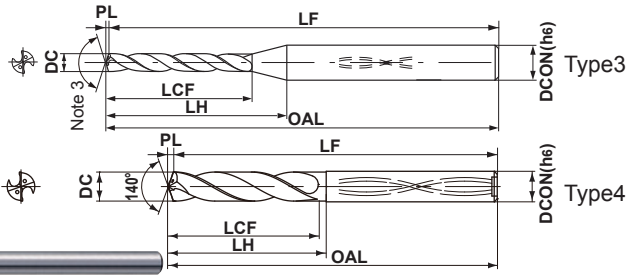
LB/XB Type (ϕ0.50—ϕ2.95)



	0.5≤DC<1	1≤DC<2.95
h6	0 −0.009	0 −0.014
	0 −0.006	0 −0.006

DB Type (ϕ0.50—ϕ2.95)





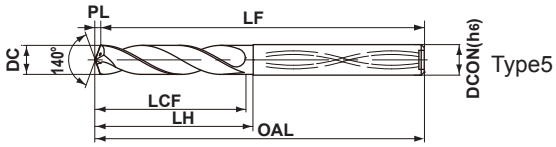
(Note) MWS drills are suitable for use with shrink fit holders.

MB/LB/X8DB Type (ϕ3—ϕ25)

	DC=3	3<DC≤6	6<DC≤10	10<DC≤18	18<DC≤25
h6	0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033
	0 −0.006	0 −0.008	0 −0.009	0 −0.011	0 −0.013



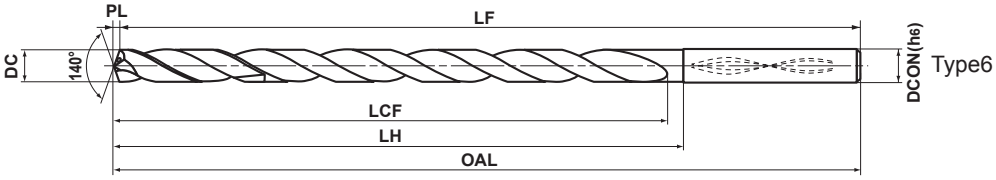
ϕ3.0—ϕ6.0



X10DB/X15DB/X20DB/X25DB/X30DB Type (ϕ3—ϕ14, l/d≥10)

	DC=3	3<DC≤6	6<DC≤10	10<DC≤14
h6	−0.017 −0.031	−0.025 −0.043	−0.033 −0.055	−0.041 −0.068
	0 −0.006	0 −0.008	0 −0.009	0 −0.011





(Note 1) MWS type bigger than ϕ5.0 have a recess in the end face.
(Note 2) MWS drills are suitable for use with shrink fit holders.
(Note 3) Point Angle: Type1 140° for drill diameter ϕ 0.50-2.0 and 145° for ϕ 2.05-2.95.
Type3 135° for drill diameter ϕ 0.50-2.0 and 140° for ϕ 2.05-2.95.

★ To order non-stocked size of the DB Type (ϕ3-ϕ14, l/d>10), please provide the following.
①Drill name
②Workpiece material, drilling depth and required accuracy.
③Drilling mode (through hole, blind hole, cross hole...)
④Drill dimensions (dimensions specified in the drawing above).
Please contact us for inquiries.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
0.50	1	●	MWS0050SB	2.59	7.29	47.09	47	0.09	3	1
	5	●	MWS0050LB	8.09	13.09	47.09	47	0.10	3	3
	12	●	MWS0050XB	16.09	21.09	47.09	47	0.10	3	3
0.51	1	●	MWS0051SB	2.69	7.29	47.09	47	0.09	3	1
	5	●	MWS0051LB	8.09	13.09	47.09	47	0.11	3	3
	12	●	MWS0051XB	16.09	21.09	47.09	47	0.11	3	3
0.52	1	●	MWS0052SB	2.69	7.29	47.09	47	0.09	3	1
	5	●	MWS0052LB	8.09	13.09	47.09	47	0.11	3	3
	12	●	MWS0052XB	16.09	21.09	47.09	47	0.11	3	3
0.53	1	●	MWS0053SB	2.70	7.30	47.10	47	0.10	3	1
	5	●	MWS0053LB	8.10	13.10	47.10	47	0.11	3	3
	12	●	MWS0053XB	16.10	21.10	47.10	47	0.11	3	3
0.54	1	●	MWS0054SB	2.70	7.30	47.10	47	0.10	3	1
	5	●	MWS0054LB	8.10	13.10	47.10	47	0.11	3	3
	12	●	MWS0054XB	16.10	21.10	47.10	47	0.11	3	3
0.55	1	●	MWS0055SB	2.70	7.30	47.10	47	0.10	3	1
	5	●	MWS0055LB	8.10	13.10	47.10	47	0.11	3	3
	12	●	MWS0055XB	16.10	21.10	47.10	47	0.11	3	3
0.56	1	●	MWS0056SB	3.00	7.60	47.10	47	0.10	3	1
	5	●	MWS0056LB	8.10	13.10	47.10	47	0.12	3	3
	12	●	MWS0056XB	16.10	21.10	47.10	47	0.12	3	3
0.57	1	●	MWS0057SB	3.00	7.50	47.10	47	0.10	3	1
	5	●	MWS0057LB	8.10	13.10	47.10	47	0.12	3	3
	12	●	MWS0057XB	16.10	21.10	47.10	47	0.12	3	3
0.58	1	●	MWS0058SB	3.01	7.51	47.11	47	0.11	3	1
	5	●	MWS0058LB	8.11	13.11	47.11	47	0.12	3	3
	12	●	MWS0058XB	16.11	21.11	47.11	47	0.12	3	3
0.59	1	●	MWS0059SB	3.01	7.51	47.11	47	0.11	3	1
	5	●	MWS0059LB	8.11	12.11	47.11	47	0.12	3	3
	12	●	MWS0059XB	16.11	20.11	47.11	47	0.12	3	3
0.60	1	●	MWS0060SB	3.01	7.51	47.11	47	0.11	3	1
	5	●	MWS0060LB	8.11	12.11	47.11	47	0.12	3	3
	12	●	MWS0060XB	16.11	20.11	47.11	47	0.12	3	3
0.61	1	●	MWS0061SB	3.21	7.71	47.11	47	0.11	3	1
	5	●	MWS0061LB	8.11	12.11	47.11	47	0.13	3	3
	12	●	MWS0061XB	16.11	20.11	47.11	47	0.13	3	3
0.62	1	●	MWS0062SB	3.21	7.61	47.11	47	0.11	3	1
	5	●	MWS0062LB	8.11	12.11	47.11	47	0.13	3	3
	12	●	MWS0062XB	16.11	20.11	47.11	47	0.13	3	3
0.63	1	●	MWS0063SB	3.21	7.61	47.11	47	0.11	3	1
	5	●	MWS0063LB	8.11	12.11	47.11	47	0.13	3	3
	12	●	MWS0063XB	16.11	20.11	47.11	47	0.13	3	3
0.64	1	●	MWS0064SB	3.22	7.62	47.12	47	0.12	3	1
	5	●	MWS0064LB	8.12	12.12	47.12	47	0.13	3	3
	12	●	MWS0064XB	16.12	20.12	47.12	47	0.13	3	3
0.65	1	●	MWS0065SB	3.22	7.62	47.12	47	0.12	3	1
	5	●	MWS0065LB	8.12	12.12	47.12	47	0.13	3	3
	12	●	MWS0065XB	16.12	20.12	47.12	47	0.13	3	3
0.66	1	●	MWS0066SB	3.52	7.92	47.12	47	0.12	3	1
	5	●	MWS0066LB	8.12	12.12	47.12	47	0.14	3	3
	12	●	MWS0066XB	16.12	20.12	47.12	47	0.14	3	3

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
0.67	1	●	MWS0067SB	3.52	7.82	47.12	47	0.12	3	1
	5	●	MWS0067LB	8.12	12.12	47.12	47	0.14	3	3
	12	●	MWS0067XB	16.12	20.12	47.12	47	0.14	3	3
0.68	1	●	MWS0068SB	3.52	7.82	47.12	47	0.12	3	1
	5	●	MWS0068LB	8.12	12.12	47.12	47	0.14	3	3
	12	●	MWS0068XB	16.12	20.12	47.12	47	0.14	3	3
0.69	1	●	MWS0069SB	3.53	7.83	47.13	47	0.13	3	1
	5	●	MWS0069LB	8.13	12.13	47.13	47	0.14	3	3
	12	●	MWS0069XB	16.13	20.13	47.13	47	0.14	3	3
0.70	1	●	MWS0070SB	3.53	7.83	47.13	47	0.13	3	1
	5	●	MWS0070LB	8.13	12.13	47.13	47	0.14	3	3
	12	●	MWS0070XB	16.13	20.13	47.13	47	0.14	3	3
0.71	1	●	MWS0071SB	3.73	8.03	50.13	50	0.13	3	1
	5	●	MWS0071LB	10.13	14.13	50.13	50	0.15	3	3
	12	●	MWS0071XB	20.13	24.13	50.13	50	0.15	3	3
0.72	1	●	MWS0072SB	3.73	8.03	50.13	50	0.13	3	1
	5	●	MWS0072LB	10.13	14.13	50.13	50	0.15	3	3
	12	●	MWS0072XB	20.13	24.13	50.13	50	0.15	3	3
0.73	1	●	MWS0073SB	3.73	7.93	50.13	50	0.13	3	1
	5	●	MWS0073LB	10.13	14.13	50.13	50	0.15	3	3
	12	●	MWS0073XB	20.13	24.13	50.13	50	0.15	3	3
0.74	1	●	MWS0074SB	3.73	7.93	50.13	50	0.13	3	1
	5	●	MWS0074LB	10.13	14.13	50.13	50	0.15	3	3
	12	●	MWS0074XB	20.13	24.13	50.13	50	0.15	3	3
0.75	1	●	MWS0075SB	3.74	7.94	50.14	50	0.14	3	1
	5	●	MWS0075LB	10.14	14.14	50.14	50	0.16	3	3
	12	●	MWS0075XB	20.14	24.14	50.14	50	0.16	3	3
0.76	1	●	MWS0076SB	4.04	8.24	50.14	50	0.14	3	1
	5	●	MWS0076LB	10.14	14.14	50.14	50	0.16	3	3
	12	●	MWS0076XB	20.14	24.14	50.14	50	0.16	3	3
0.77	1	●	MWS0077SB	4.04	8.24	50.14	50	0.14	3	1
	5	●	MWS0077LB	10.14	14.14	50.14	50	0.16	3	3
	12	●	MWS0077XB	20.14	24.14	50.14	50	0.16	3	3
0.78	1	●	MWS0078SB	4.04	8.14	50.14	50	0.14	3	1
	5	●	MWS0078LB	10.14	14.14	50.14	50	0.16	3	3
	12	●	MWS0078XB	20.14	24.14	50.14	50	0.16	3	3
0.79	1	●	MWS0079SB	4.04	8.14	50.14	50	0.14	3	1
	5	●	MWS0079LB	10.14	14.14	50.14	50	0.16	3	3
	12	●	MWS0079XB	20.14	24.14	50.14	50	0.16	3	3
0.80	1	●	MWS0080SB	4.05	8.15	50.15	50	0.15	3	1
	5	●	MWS0080LB	10.15	14.15	50.15	50	0.17	3	3
	12	●	MWS0080XB	20.15	24.15	50.15	50	0.17	3	3
0.81	1	●	MWS0081SB	4.25	8.35	50.15	50	0.15	3	1
	5	●	MWS0081LB	10.15	14.15	50.15	50	0.17	3	3
	12	●	MWS0081XB	20.15	24.15	50.15	50	0.17	3	3
0.82	1	●	MWS0082SB	4.25	8.35	50.15	50	0.15	3	1
	5	●	MWS0082LB	10.15	14.15	50.15	50	0.17	3	3
	12	●	MWS0082XB	20.15	24.15	50.15	50	0.17	3	3
0.83	1	●	MWS0083SB	4.25	8.25	50.15	50	0.15	3	1
	5	●	MWS0083LB	10.15	14.15	50.15	50	0.17	3	3
	12	●	MWS0083XB	20.15	24.15	50.15	50	0.17	3	3

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan.

CUTTING CONDITIONS ➤ N047
OPERATION GUIDANCE ➤ N051,N052
TECHNICAL DATA ➤ Q001

MWS

WSTAR DRILLS

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
0.84	1	●	MWS0084SB	4.25	8.25	50.15	50	0.15	3	1
	5	●	MWS0084LB	10.15	14.15	50.15	50	0.17	3	3
	12	●	MWS0084XB	20.15	24.15	50.15	50	0.17	3	3
0.85	1	●	MWS0085SB	4.25	8.25	50.15	50	0.15	3	1
	5	●	MWS0085LB	10.15	14.15	50.15	50	0.18	3	3
	12	●	MWS0085XB	20.15	24.15	50.15	50	0.18	3	3
0.86	1	●	MWS0086SB	4.56	8.56	50.16	50	0.16	3	1
	5	●	MWS0086LB	10.16	14.16	50.16	50	0.18	3	3
	12	●	MWS0086XB	20.16	24.16	50.16	50	0.18	3	3
0.87	1	●	MWS0087SB	4.56	8.56	50.16	50	0.16	3	1
	5	●	MWS0087LB	10.16	14.16	50.16	50	0.18	3	3
	12	●	MWS0087XB	20.16	24.16	50.16	50	0.18	3	3
0.88	1	●	MWS0088SB	4.56	8.56	50.16	50	0.16	3	1
	5	●	MWS0088LB	10.16	14.16	50.16	50	0.18	3	3
	12	●	MWS0088XB	20.16	24.16	50.16	50	0.18	3	3
0.89	1	●	MWS0089SB	4.56	8.46	50.16	50	0.16	3	1
	5	●	MWS0089LB	10.16	14.16	50.16	50	0.18	3	3
	12	●	MWS0089XB	20.16	24.16	50.16	50	0.18	3	3
0.90	1	●	MWS0090SB	4.56	8.46	50.16	50	0.16	3	1
	5	●	MWS0090LB	10.16	14.16	50.16	50	0.19	3	3
	12	●	MWS0090XB	20.16	24.16	50.16	50	0.19	3	3
0.91	1	●	MWS0091SB	4.77	8.67	50.17	50	0.17	3	1
	5	●	MWS0091LB	10.17	14.17	50.17	50	0.19	3	3
	12	●	MWS0091XB	20.17	24.17	50.17	50	0.19	3	3
0.92	1	●	MWS0092SB	4.77	8.67	50.17	50	0.17	3	1
	5	●	MWS0092LB	10.17	14.17	50.17	50	0.19	3	3
	12	●	MWS0092XB	20.17	24.17	50.17	50	0.19	3	3
0.93	1	●	MWS0093SB	4.77	8.67	50.17	50	0.17	3	1
	5	●	MWS0093LB	10.17	14.17	50.17	50	0.19	3	3
	12	●	MWS0093XB	20.17	24.17	50.17	50	0.19	3	3
0.94	1	●	MWS0094SB	4.77	8.57	50.17	50	0.17	3	1
	5	●	MWS0094LB	10.17	14.17	50.17	50	0.19	3	3
	12	●	MWS0094XB	20.17	24.17	50.17	50	0.19	3	3
0.95	1	●	MWS0095SB	4.77	8.57	50.17	50	0.17	3	1
	5	●	MWS0095LB	10.17	14.17	50.17	50	0.20	3	3
	12	●	MWS0095XB	20.17	24.17	50.17	50	0.20	3	3
0.96	1	●	MWS0096SB	5.07	8.87	50.17	50	0.17	3	1
	5	●	MWS0096LB	10.17	14.17	50.17	50	0.20	3	3
	12	●	MWS0096XB	20.17	24.17	50.17	50	0.20	3	3
0.97	1	●	MWS0097SB	5.08	8.88	50.18	50	0.18	3	1
	5	●	MWS0097LB	10.18	14.18	50.18	50	0.20	3	3
	12	●	MWS0097XB	20.18	24.18	50.18	50	0.20	3	3
0.98	1	●	MWS0098SB	5.08	8.88	50.18	50	0.18	3	1
	5	●	MWS0098LB	10.18	14.18	50.18	50	0.20	3	3
	12	●	MWS0098XB	20.18	24.18	50.18	50	0.20	3	3
0.99	1	●	MWS0099SB	5.08	8.88	50.18	50	0.18	3	1
	5	●	MWS0099LB	10.18	14.18	50.18	50	0.21	3	3
	12	●	MWS0099XB	20.18	24.18	50.18	50	0.21	3	3

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
1.00	1	●	MWS0100SB	5.2	8.9	55.2	55	0.2	3	1
	5	●	MWS0100LB	11.2	15.2	55.2	55	0.2	3	3
	12	●	MWS0100XB	23.2	27.2	55.2	55	0.2	3	3
	20	●	MWS0100X20DB	24.2	28.2	60.2	60	0.2	3	3
	25	●	MWS0100X25DB	28.2	32.2	66.2	66	0.2	3	3
	30	●	MWS0100X30DB	33.2	37.2	72.2	72	0.2	3	3
1.05	1	□	MWS0105SB	5.4	9.0	55.2	55	0.2	3	1
	20	□	MWS0105X20DB	24.2	28.2	60.2	60	0.2	3	3
	25	□	MWS0105X25DB	29.2	33.2	66.2	66	0.2	3	3
	30	□	MWS0105X30DB	35.2	38.2	72.2	72	0.2	3	3
1.10	1	●	MWS0110SB	5.6	9.1	55.2	55	0.2	3	1
	5	●	MWS0110LB	17.2	21.2	55.2	55	0.2	3	3
	12	●	MWS0110XB	23.2	27.2	55.2	55	0.2	3	3
	20	●	MWS0110X20DB	25.2	29.2	60.2	60	0.2	3	3
	25	●	MWS0110X25DB	31.2	34.2	66.2	66	0.2	3	3
	30	●	MWS0110X30DB	36.2	40.2	72.2	72	0.2	3	3
1.15	1	□	MWS0115SB	5.8	9.3	55.2	55	0.2	3	1
	20	□	MWS0115X20DB	26.2	30.2	60.2	60	0.2	3	3
	25	□	MWS0115X25DB	32.2	36.2	66.2	66	0.2	3	3
	30	□	MWS0115X30DB	38.2	41.2	72.2	72	0.2	3	3
1.20	1	●	MWS0120SB	6.2	9.6	55.2	55	0.2	3	1
	5	●	MWS0120LB	17.2	20.2	55.2	55	0.3	3	3
	12	●	MWS0120XB	23.2	26.2	55.2	55	0.3	3	3
	20	●	MWS0120X20DB	28.2	31.2	60.2	60	0.3	3	3
	25	●	MWS0120X25DB	34.2	37.2	66.2	66	0.3	3	3
	30	●	MWS0120X30DB	40.2	43.2	72.2	72	0.3	3	3
1.25	1	□	MWS0125SB	6.4	9.7	55.2	55	0.2	3	1
	20	□	MWS0125X20DB	29.2	32.2	68.2	68	0.3	3	3
	25	□	MWS0125X25DB	35.2	38.2	74.2	74	0.3	3	3
	30	□	MWS0125X30DB	41.2	45.2	82.2	82	0.3	3	3
1.30	1	●	MWS0130SB	6.6	9.8	55.2	55	0.2	3	1
	5	●	MWS0130LB	17.2	20.2	55.2	55	0.3	3	3
	12	●	MWS0130XB	23.2	26.2	55.2	55	0.3	3	3
	20	●	MWS0130X20DB	30.2	33.2	68.2	68	0.3	3	3
	25	●	MWS0130X25DB	36.2	40.2	74.2	74	0.3	3	3
	30	●	MWS0130X30DB	43.2	46.2	82.2	82	0.3	3	3
1.35	1	□	MWS0135SB	6.8	9.9	55.2	55	0.3	3	1
	20	□	MWS0135X20DB	31.2	34.2	68.2	68	0.3	3	3
	25	□	MWS0135X25DB	38.2	41.2	74.2	74	0.3	3	3
	30	□	MWS0135X30DB	45.2	48.2	82.2	82	0.3	3	3
1.40	1	●	MWS0140SB	7.3	10.3	55.3	55	0.3	3	1
	5	●	MWS0140LB	17.3	20.3	55.3	55	0.3	3	3
	12	●	MWS0140XB	23.3	26.3	55.3	55	0.3	3	3
	20	●	MWS0140X20DB	32.3	35.3	68.3	68	0.3	3	3
	25	●	MWS0140X25DB	39.3	42.3	74.3	74	0.3	3	3
	30	●	MWS0140X30DB	46.3	49.3	82.3	82	0.3	3	3
1.45	1	□	MWS0145SB	7.5	10.4	55.3	55	0.3	3	1
	20	□	MWS0145X20DB	33.3	36.3	68.3	68	0.3	3	3
	25	□	MWS0145X25DB	41.3	43.3	74.3	74	0.3	3	3
	30	□	MWS0145X30DB	48.3	51.3	82.3	82	0.3	3	3

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
1.50	1	●	MWS0150SB	7.7	10.5	55.3	55	0.3	3	1
	5	●	MWS0150LB	17.3	20.3	55.3	55	0.3	3	3
	12	●	MWS0150XB	23.3	26.3	55.3	55	0.3	3	3
	20	●	MWS0150X20DB	35.3	37.3	68.3	68	0.3	3	3
	25	●	MWS0150X25DB	42.3	45.3	74.3	74	0.3	3	3
	30	●	MWS0150X30DB	50.3	52.3	82.3	82	0.3	3	3
1.55	1	□	MWS0155SB	7.9	10.6	68.3	68	0.3	3	1
	20	□	MWS0155X20DB	36.3	38.3	78.3	78	0.3	3	3
	25	□	MWS0155X25DB	43.3	46.3	86.3	86	0.3	3	3
	30	□	MWS0155X30DB	51.3	54.3	95.3	95	0.3	3	3
1.60	1	●	MWS0160SB	8.3	10.9	68.3	68	0.3	3	1
	5	●	MWS0160LB	22.3	25.3	68.3	68	0.3	3	3
	12	●	MWS0160XB	30.3	33.3	68.3	68	0.3	3	3
	20	●	MWS0160X20DB	37.3	39.3	78.3	78	0.3	3	3
	25	●	MWS0160X25DB	45.3	47.3	86.3	86	0.3	3	3
	30	●	MWS0160X30DB	53.3	55.3	95.3	95	0.3	3	3
1.65	1	□	MWS0165SB	8.5	11.0	68.3	68	0.3	3	1
	20	□	MWS0165X20DB	38.3	40.3	78.3	78	0.3	3	3
	25	□	MWS0165X25DB	46.3	49.3	86.3	86	0.3	3	3
	30	□	MWS0165X30DB	54.3	57.3	95.3	95	0.3	3	3
1.70	1	●	MWS0170SB	8.7	11.1	68.3	68	0.3	3	1
	5	●	MWS0170LB	22.3	24.3	68.3	68	0.4	3	3
	12	●	MWS0170XB	30.3	32.3	68.3	68	0.4	3	3
	20	●	MWS0170X20DB	39.3	42.3	78.3	78	0.4	3	3
	25	●	MWS0170X25DB	48.3	50.3	86.3	86	0.4	3	3
	30	●	MWS0170X30DB	56.3	59.3	95.3	95	0.4	3	3
1.75	1	□	MWS0175SB	8.9	11.2	68.3	68	0.3	3	1
	20	□	MWS0175X20DB	40.3	43.3	84.3	84	0.4	3	3
	25	□	MWS0175X25DB	49.3	51.3	94.3	94	0.4	3	3
	30	□	MWS0175X30DB	58.3	60.3	102.3	102	0.4	3	3
1.80	1	●	MWS0180SB	9.3	11.5	68.3	68	0.3	3	1
	5	●	MWS0180LB	22.3	24.3	68.3	68	0.4	3	3
	12	●	MWS0180XB	30.3	32.3	68.3	68	0.4	3	3
	20	●	MWS0180X20DB	41.3	44.3	84.3	84	0.4	3	3
	25	●	MWS0180X25DB	50.3	53.3	94.3	94	0.4	3	3
	30	●	MWS0180X30DB	59.3	62.3	102.3	102	0.4	3	3
1.85	1	□	MWS0185SB	9.5	11.6	68.3	68	0.3	3	1
	20	□	MWS0185X20DB	43.3	45.3	84.3	84	0.4	3	3
	25	□	MWS0185X25DB	52.3	54.3	94.3	94	0.4	3	3
	30	□	MWS0185X30DB	61.3	63.3	102.3	102	0.4	3	3
1.90	1	●	MWS0190SB	9.7	11.8	68.3	68	0.4	3	1
	5	●	MWS0190LB	22.3	24.3	68.3	68	0.4	3	3
	12	●	MWS0190XB	30.3	32.3	68.3	68	0.4	3	3
	20	●	MWS0190X20DB	44.3	46.3	84.3	84	0.4	3	3
	25	●	MWS0190X25DB	53.3	55.3	94.3	94	0.4	3	3
	30	●	MWS0190X30DB	63.3	65.3	102.3	102	0.4	3	3
1.95	1	□	MWS0195SB	10.0	12.0	68.4	68	0.4	3	1
	20	□	MWS0195X20DB	45.4	47.4	84.4	84	0.4	3	3
	25	□	MWS0195X25DB	55.4	57.4	94.4	94	0.4	3	3
	30	□	MWS0195X30DB	64.4	66.4	102.4	102	0.4	3	3

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
2.00	1	●	MWS0200SB	10.4	12.3	68.4	68	0.4	3	1
	5	●	MWS0200LB	22.4	24.4	68.4	68	0.4	3	3
	12	●	MWS0200XB	30.4	32.4	68.4	68	0.4	3	3
	20	●	MWS0200X20DB	46.4	48.4	84.4	84	0.4	3	3
	25	●	MWS0200X25DB	56.4	58.4	94.4	94	0.4	3	3
	30	●	MWS0200X30DB	66.4	68.4	102.4	102	0.4	3	3
2.05	1	□	MWS0205SB	10.6	12.4	74.4	74	0.3	3	1
	20	□	MWS0205X20DB	47.4	49.4	94.4	94	0.4	3	3
	25	□	MWS0205X25DB	57.4	59.4	107.4	107	0.4	3	3
	30	□	MWS0205X30DB	68.4	69.4	118.4	118	0.4	3	3
2.10	1	●	MWS0210SB	10.8	12.5	74.4	74	0.3	3	1
	5	●	MWS0210LB	28.4	30.4	74.4	74	0.4	3	3
	12	●	MWS0210XB	38.4	40.4	74.4	74	0.4	3	3
	20	●	MWS0210X20DB	48.4	50.4	94.4	94	0.4	3	3
	25	●	MWS0210X25DB	59.4	60.4	107.4	107	0.4	3	3
	30	●	MWS0210X30DB	69.4	71.4	118.4	118	0.4	3	3
2.15	1	□	MWS0215SB	11.0	12.6	74.4	74	0.3	3	1
	20	□	MWS0215X20DB	49.4	51.4	94.4	94	0.4	3	3
	25	□	MWS0215X25DB	60.4	62.4	107.4	107	0.4	3	3
	30	□	MWS0215X30DB	71.4	73.4	118.4	118	0.4	3	3
2.20	1	●	MWS0220SB	11.4	12.9	74.4	74	0.4	3	1
	5	●	MWS0220LB	28.4	29.4	74.4	74	0.4	3	3
	12	●	MWS0220XB	38.4	39.4	74.4	74	0.4	3	3
	20	●	MWS0220X20DB	51.4	52.4	94.4	94	0.4	3	3
	25	●	MWS0220X25DB	62.4	63.4	107.4	107	0.4	3	3
	30	●	MWS0220X30DB	73.4	74.4	118.4	118	0.4	3	3
2.25	1	□	MWS0225SB	11.6	13.0	74.4	74	0.4	3	1
	20	□	MWS0225X20DB	52.4	53.4	94.4	94	0.4	3	3
	25	□	MWS0225X25DB	63.4	64.4	107.4	107	0.4	3	3
	30	□	MWS0225X30DB	74.4	76.4	118.4	118	0.4	3	3
2.30	1	●	MWS0230SB	11.8	13.1	74.4	74	0.4	3	1
	5	●	MWS0230LB	28.4	29.4	74.4	74	0.4	3	3
	12	●	MWS0230XB	38.4	39.4	74.4	74	0.4	3	3
	20	●	MWS0230X20DB	53.4	54.4	94.4	94	0.4	3	3
	25	●	MWS0230X25DB	64.4	66.4	107.4	107	0.4	3	3
	30	●	MWS0230X30DB	76.4	77.4	118.4	118	0.4	3	3
2.35	1	□	MWS0235SB	12.0	13.2	74.4	74	0.4	3	1
	20	□	MWS0235X20DB	54.4	55.4	94.4	94	0.4	3	3
	25	□	MWS0235X25DB	66.4	67.4	107.4	107	0.4	3	3
	30	□	MWS0235X30DB	78.4	79.4	118.4	118	0.4	3	3
2.40	1	●	MWS0240SB	12.4	13.5	74.4	74	0.4	3	1
	5	●	MWS0240LB	28.4	29.4	74.4	74	0.4	3	3
	12	●	MWS0240XB	38.4	39.4	74.4	74	0.4	3	3
	20	●	MWS0240X20DB	55.4	56.4	94.4	94	0.4	3	3
	25	●	MWS0240X25DB	67.4	68.4	107.4	107	0.4	3	3
	30	●	MWS0240X30DB	79.4	80.4	118.4	118	0.4	3	3
2.45	1	□	MWS0245SB	12.6	13.6	74.4	74	0.4	3	1
	20	□	MWS0245X20DB	56.4	57.4	94.4	94	0.5	3	3
	25	□	MWS0245X25DB	69.4	70.4	107.4	107	0.5	3	3
	30	□	MWS0245X30DB	81.4	82.4	118.4	118	0.5	3	3

CUTTING CONDITIONS ➤ N047
OPERATION GUIDANCE ➤ N051,N052
TECHNICAL DATA ➤ Q001

MWS

WSTAR DRILLS

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
2.50	1	●	MWS0250SB	12.9	13.8	74.5	74	0.4	3	1
	5	●	MWS0250LB	28.5	29.5	74.5	74	0.5	3	3
	12	●	MWS0250XB	38.5	39.5	74.5	74	0.5	3	3
	20	●	MWS0250X20DB	58.5	59.5	94.5	94	0.5	3	3
	25	●	MWS0250X25DB	70.5	71.5	107.5	107	0.5	3	3
	30	●	MWS0250X30DB	83.5	84.5	118.5	118	0.5	3	3
2.55	1	□	MWS0255SB	13.1	13.1	81.5	81	0.5	3	2
	20	□	MWS0255X20DB	59.5	59.5	103.5	103	0.5	3	4
	25	□	MWS0255X25DB	71.5	71.5	117.5	117	0.5	3	4
	30	□	MWS0255X30DB	84.5	84.5	132.5	132	0.5	3	4
2.60	1	●	MWS0260SB	13.5	13.5	81.5	81	0.5	3	2
	5	●	MWS0260LB	33.5	33.5	81.5	81	0.5	3	4
	12	●	MWS0260XB	45.5	45.5	81.5	81	0.5	3	4
	20	●	MWS0260X20DB	60.5	60.5	103.5	103	0.5	3	4
	25	●	MWS0260X25DB	73.5	73.5	117.5	117	0.5	3	4
	30	●	MWS0260X30DB	86.5	86.5	132.5	132	0.5	3	4
2.65	1	□	MWS0265SB	13.7	13.7	81.5	81	0.5	3	2
	20	□	MWS0265X20DB	61.5	61.5	103.5	103	0.5	3	4
	25	□	MWS0265X25DB	74.5	74.5	117.5	117	0.5	3	4
	30	□	MWS0265X30DB	87.5	87.5	132.5	132	0.5	3	4
2.70	1	●	MWS0270SB	13.9	13.9	81.5	81	0.5	3	2
	5	●	MWS0270LB	33.5	33.5	81.5	81	0.5	3	4
	12	●	MWS0270XB	45.5	45.5	81.5	81	0.5	3	4
	20	●	MWS0270X20DB	62.5	62.5	103.5	103	0.5	3	4
	25	●	MWS0270X25DB	76.5	76.5	117.5	117	0.5	3	4
	30	●	MWS0270X30DB	89.5	89.5	132.5	132	0.5	3	4
2.75	1	□	MWS0275SB	14.1	14.1	81.5	81	0.5	3	2
	20	□	MWS0275X20DB	63.5	63.5	103.5	103	0.5	3	4
	25	□	MWS0275X25DB	77.5	77.5	117.5	117	0.5	3	4
	30	□	MWS0275X30DB	91.5	91.5	132.5	132	0.5	3	4
2.80	1	●	MWS0280SB	14.5	14.5	81.5	81	0.5	3	2
	5	●	MWS0280LB	33.5	33.5	81.5	81	0.5	3	4
	12	●	MWS0280XB	45.5	45.5	81.5	81	0.5	3	4
	20	●	MWS0280X20DB	64.5	64.5	103.5	103	0.5	3	4
	25	●	MWS0280X25DB	78.5	78.5	117.5	117	0.5	3	4
	30	●	MWS0280X30DB	92.5	92.5	132.5	132	0.5	3	4
2.85	1	□	MWS0285SB	14.7	14.7	81.5	81	0.5	3	2
	20	□	MWS0285X20DB	66.5	66.5	103.5	103	0.5	3	4
	25	□	MWS0285X25DB	80.5	80.5	117.5	117	0.5	3	4
	30	□	MWS0285X30DB	94.5	94.5	132.5	132	0.5	3	4
2.90	1	●	MWS0290SB	14.9	14.9	81.5	81	0.5	3	2
	5	●	MWS0290LB	33.5	33.5	81.5	81	0.5	3	4
	12	●	MWS0290XB	45.5	45.5	81.5	81	0.5	3	4
	20	●	MWS0290X20DB	67.5	67.5	103.5	103	0.5	3	4
	25	●	MWS0290X25DB	81.5	81.5	117.5	117	0.5	3	4
	30	●	MWS0290X30DB	96.5	96.5	132.5	132	0.5	3	4
2.95	1	□	MWS0295SB	15.1	15.1	81.5	81	0.5	3	2
	20	□	MWS0295X20DB	68.5	68.5	103.5	103	0.5	3	4
	25	□	MWS0295X25DB	83.5	83.5	117.5	117	0.5	3	4
	30	□	MWS0295X30DB	97.5	97.5	132.5	132	0.5	3	4

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
3.00	3	●	MWS0300MB	24.5	24.5	72.5	72	0.5	3	5
	5	●	MWS0300LB	33.5	33.5	81.5	81	0.5	3	5
	8	●	MWS0300X8DB	35.5	35.5	81.5	81	0.5	3	5
	10	●	MWS0300X10DB	39.5	42.5	90.5	90	0.5	3	6
	15	●	MWS0300X15DB	54.5	57.5	105.5	105	0.5	3	6
	20	●	MWS0300X20DB	69.5	72.5	120.5	120	0.5	3	6
	25	●	MWS0300X25DB	84.5	87.5	135.5	135	0.5	3	6
	30	●	MWS0300X30DB	99.5	102.5	150.5	150	0.5	3	6
3.10	3	●	MWS0310MB	28.6	28.6	76.6	76	0.6	4	5
	5	●	MWS0310LB	39.6	39.6	87.6	87	0.6	4	5
	8	●	MWS0310X8DB	41.6	41.6	87.6	87	0.6	4	5
	10	●	MWS0310X10DB	46.6	49.6	97.6	97	0.6	4	6
	15	●	MWS0310X15DB	63.6	66.6	114.6	114	0.6	4	6
	20	●	MWS0310X20DB	81.6	84.6	132.6	132	0.6	4	6
	25	●	MWS0310X25DB	98.6	101.6	149.6	149	0.6	4	6
	30	●	MWS0310X30DB	116.6	119.6	167.6	167	0.6	4	6
3.20	3	●	MWS0320MB	28.6	28.6	76.6	76	0.6	4	5
	5	●	MWS0320LB	39.6	39.6	87.6	87	0.6	4	5
	8	●	MWS0320X8DB	41.6	41.6	87.6	87	0.6	4	5
	10	●	MWS0320X10DB	46.6	49.6	97.6	97	0.6	4	6
	15	●	MWS0320X15DB	63.6	66.6	114.6	114	0.6	4	6
	20	●	MWS0320X20DB	81.6	84.6	132.6	132	0.6	4	6
	25	●	MWS0320X25DB	98.6	101.6	149.6	149	0.6	4	6
	30	●	MWS0320X30DB	116.6	119.6	167.6	167	0.6	4	6
3.30	3	●	MWS0330MB	28.6	28.6	76.6	76	0.6	4	5
	5	●	MWS0330LB	39.6	39.6	87.6	87	0.6	4	5
	8	●	MWS0330X8DB	41.6	41.6	87.6	87	0.6	4	5
	10	●	MWS0330X10DB	46.6	49.6	97.6	97	0.6	4	6
	15	●	MWS0330X15DB	63.6	66.6	114.6	114	0.6	4	6
	20	●	MWS0330X20DB	81.6	84.6	132.6	132	0.6	4	6
	25	●	MWS0330X25DB	98.6	101.6	149.6	149	0.6	4	6
	30	●	MWS0330X30DB	116.6	119.6	167.6	167	0.6	4	6
3.40	3	●	MWS0340MB	28.6	28.6	76.6	76	0.6	4	5
	5	●	MWS0340LB	39.6	39.6	87.6	87	0.6	4	5
	8	●	MWS0340X8DB	41.6	41.6	87.6	87	0.6	4	5
	10	●	MWS0340X10DB	46.6	49.6	97.6	97	0.6	4	6
	15	●	MWS0340X15DB	63.6	66.6	114.6	114	0.6	4	6
	20	●	MWS0340X20DB	81.6	84.6	132.6	132	0.6	4	6
	25	●	MWS0340X25DB	98.6	101.6	149.6	149	0.6	4	6
	30	●	MWS0340X30DB	116.6	119.6	167.6	167	0.6	4	6
3.50	3	●	MWS0350MB	28.6	28.6	76.6	76	0.6	4	5
	5	●	MWS0350LB	39.6	39.6	87.6	87	0.6	4	5
	8	●	MWS0350X8DB	41.6	41.6	87.6	87	0.6	4	5
	10	●	MWS0350X10DB	46.6	49.6	97.6	97	0.6	4	6
	15	●	MWS0350X15DB	63.6	66.6	114.6	114	0.6	4	6
	20	●	MWS0350X20DB	81.6	84.6	132.6	132	0.6	4	6
	25	●	MWS0350X25DB	98.6	101.6	149.6	149	0.6	4	6
	30	●	MWS0350X30DB	116.6	119.6	167.6	167	0.6	4	6

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
3.6	3	●	MWS0360MB	32.7	32.7	80.7	80	0.7	4	5
	5	●	MWS0360LB	44.7	44.7	92.7	92	0.7	4	5
	8	●	MWS0360X8DB	46.7	46.7	92.7	92	0.7	4	5
	10	●	MWS0360X10DB	52.7	55.7	103.7	103	0.7	4	6
	15	●	MWS0360X15DB	72.7	75.7	123.7	123	0.7	4	6
	20	●	MWS0360X20DB	92.7	95.7	143.7	143	0.7	4	6
	25	●	MWS0360X25DB	112.7	115.7	163.7	163	0.7	4	6
	30	●	MWS0360X30DB	132.7	135.7	183.7	183	0.7	4	6
3.7	3	●	MWS0370MB	32.7	32.7	80.7	80	0.7	4	5
	5	●	MWS0370LB	44.7	44.7	92.7	92	0.7	4	5
	8	●	MWS0370X8DB	46.7	46.7	92.7	92	0.7	4	5
	10	●	MWS0370X10DB	52.7	55.7	103.7	103	0.7	4	6
	15	●	MWS0370X15DB	72.7	75.7	123.7	123	0.7	4	6
	20	●	MWS0370X20DB	92.7	95.7	143.7	143	0.7	4	6
	25	●	MWS0370X25DB	112.7	115.7	163.7	163	0.7	4	6
	30	●	MWS0370X30DB	132.7	135.7	183.7	183	0.7	4	6
3.8	3	●	MWS0380MB	32.7	32.7	80.7	80	0.7	4	5
	5	●	MWS0380LB	44.7	44.7	92.7	92	0.7	4	5
	8	●	MWS0380X8DB	46.7	46.7	92.7	92	0.7	4	5
	10	●	MWS0380X10DB	52.7	55.7	103.7	103	0.7	4	6
	15	●	MWS0380X15DB	72.7	75.7	123.7	123	0.7	4	6
	20	●	MWS0380X20DB	92.7	95.7	143.7	143	0.7	4	6
	25	●	MWS0380X25DB	112.7	115.7	163.7	163	0.7	4	6
	30	●	MWS0380X30DB	132.7	135.7	183.7	183	0.7	4	6
3.9	3	●	MWS0390MB	32.7	32.7	80.7	80	0.7	4	5
	5	●	MWS0390LB	44.7	44.7	92.7	92	0.7	4	5
	8	●	MWS0390X8DB	46.7	46.7	92.7	92	0.7	4	5
	10	●	MWS0390X10DB	52.7	55.7	103.7	103	0.7	4	6
	15	●	MWS0390X15DB	72.7	75.7	123.7	123	0.7	4	6
	20	●	MWS0390X20DB	92.7	95.7	143.7	143	0.7	4	6
	25	●	MWS0390X25DB	112.7	115.7	163.7	163	0.7	4	6
	30	●	MWS0390X30DB	132.7	135.7	183.7	183	0.7	4	6
4.0	3	●	MWS0400MB	32.7	32.7	80.7	80	0.7	4	5
	5	●	MWS0400LB	44.7	44.7	92.7	92	0.7	4	5
	8	●	MWS0400X8DB	46.7	46.7	92.7	92	0.7	4	5
	10	●	MWS0400X10DB	52.7	55.7	103.7	103	0.7	4	6
	15	●	MWS0400X15DB	72.7	75.7	123.7	123	0.7	4	6
	20	●	MWS0400X20DB	92.7	95.7	143.7	143	0.7	4	6
	25	●	MWS0400X25DB	112.7	115.7	163.7	163	0.7	4	6
	30	●	MWS0400X30DB	132.7	135.7	183.7	183	0.7	4	6
4.1	3	●	MWS0410MB	36.7	36.7	86.7	86	0.7	5	5
	5	●	MWS0410LB	50.7	50.7	100.7	100	0.7	5	5
	8	●	MWS0410X8DB	52.7	52.7	100.7	100	0.7	5	5
	10	●	MWS0410X10DB	59.7	62.7	112.7	112	0.7	5	6
	15	●	MWS0410X15DB	81.7	84.7	134.7	134	0.7	5	6
	20	●	MWS0410X20DB	104.7	107.7	157.7	157	0.7	5	6
	25	●	MWS0410X25DB	126.7	129.7	179.7	179	0.7	5	6
	30	●	MWS0410X30DB	149.7	152.7	202.7	202	0.7	5	6

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
4.2	3	●	MWS0420MB	36.8	36.8	86.8	86	0.8	5	5
	5	●	MWS0420LB	50.8	50.8	100.8	100	0.8	5	5
	8	●	MWS0420X8DB	52.8	52.8	100.8	100	0.8	5	5
	10	●	MWS0420X10DB	59.8	62.8	112.8	112	0.8	5	6
	15	●	MWS0420X15DB	81.8	84.8	134.8	134	0.8	5	6
	20	●	MWS0420X20DB	104.8	107.8	157.8	157	0.8	5	6
	25	●	MWS0420X25DB	126.8	129.8	179.8	179	0.8	5	6
	30	●	MWS0420X30DB	149.8	152.8	202.8	202	0.8	5	6
4.3	3	●	MWS0430MB	36.8	36.8	86.8	86	0.8	5	5
	5	●	MWS0430LB	50.8	50.8	100.8	100	0.8	5	5
	8	●	MWS0430X8DB	52.8	52.8	100.8	100	0.8	5	5
	10	●	MWS0430X10DB	59.8	62.8	112.8	112	0.8	5	6
	15	●	MWS0430X15DB	81.8	84.8	134.8	134	0.8	5	6
	20	●	MWS0430X20DB	104.8	107.8	157.8	157	0.8	5	6
	25	●	MWS0430X25DB	126.8	129.8	179.8	179	0.8	5	6
	30	●	MWS0430X30DB	149.8	152.8	202.8	202	0.8	5	6
4.4	3	●	MWS0440MB	36.8	36.8	86.8	86	0.8	5	5
	5	●	MWS0440LB	50.8	50.8	100.8	100	0.8	5	5
	8	●	MWS0440X8DB	52.8	52.8	100.8	100	0.8	5	5
	10	●	MWS0440X10DB	59.8	62.8	112.8	112	0.8	5	6
	15	●	MWS0440X15DB	81.8	84.8	134.8	134	0.8	5	6
	20	●	MWS0440X20DB	104.8	107.8	157.8	157	0.8	5	6
	25	●	MWS0440X25DB	126.8	129.8	179.8	179	0.8	5	6
	30	●	MWS0440X30DB	149.8	152.8	202.8	202	0.8	5	6
4.5	3	●	MWS0450MB	36.8	36.8	86.8	86	0.8	5	5
	5	●	MWS0450LB	50.8	50.8	100.8	100	0.8	5	5
	8	●	MWS0450X8DB	52.8	52.8	100.8	100	0.8	5	5
	10	●	MWS0450X10DB	59.8	62.8	112.8	112	0.8	5	6
	15	●	MWS0450X15DB	81.8	84.8	134.8	134	0.8	5	6
	20	●	MWS0450X20DB	104.8	107.8	157.8	157	0.8	5	6
	25	●	MWS0450X25DB	126.8	129.8	179.8	179	0.8	5	6
	30	●	MWS0450X30DB	149.8	152.8	202.8	202	0.8	5	6
4.6	3	●	MWS0460MB	40.8	40.8	90.8	90	0.8	5	5
	5	●	MWS0460LB	55.8	55.8	105.8	105	0.8	5	5
	8	●	MWS0460X8DB	57.8	57.8	105.8	105	0.8	5	5
	10	●	MWS0460X10DB	65.8	68.8	118.8	118	0.8	5	6
	15	●	MWS0460X15DB	90.8	93.8	143.8	143	0.8	5	6
	20	●	MWS0460X20DB	115.8	118.8	168.8	168	0.8	5	6
	25	●	MWS0460X25DB	140.8	143.8	193.8	193	0.8	5	6
	30	●	MWS0460X30DB	165.8	168.8	218.8	218	0.8	5	6
4.7	3	●	MWS0470MB	40.9	40.9	90.9	90	0.9	5	5
	5	●	MWS0470LB	55.9	55.9	105.9	105	0.9	5	5
	8	●	MWS0470X8DB	57.9	57.9	105.9	105	0.9	5	5
	10	●	MWS0470X10DB	65.9	68.9	118.9	118	0.9	5	6
	15	●	MWS0470X15DB	90.9	93.9	143.9	143	0.9	5	6
	20	●	MWS0470X20DB	115.9	118.9	168.9	168	0.9	5	6
	25	●	MWS0470X25DB	140.9	143.9	193.9	193	0.9	5	6
	30	●	MWS0470X30DB	165.9	168.9	218.9	218	0.9	5	6

DRILLING

CUTTING CONDITIONS ➤ N047
OPERATION GUIDANCE ➤ N051,N052
TECHNICAL DATA ➤ Q001

MWS

WSTAR DRILLS

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
4.8	3	●	MWS0480MB	40.9	40.9	90.9	90	0.9	5	5
	5	●	MWS0480LB	55.9	55.9	105.9	105	0.9	5	5
	8	●	MWS0480X8DB	57.9	57.9	105.9	105	0.9	5	5
	10	●	MWS0480X10DB	65.9	68.9	118.9	118	0.9	5	6
	15	●	MWS0480X15DB	90.9	93.9	143.9	143	0.9	5	6
	20	●	MWS0480X20DB	115.9	118.9	168.9	168	0.9	5	6
	25	●	MWS0480X25DB	140.9	143.9	193.9	193	0.9	5	6
	30	●	MWS0480X30DB	165.9	168.9	218.9	218	0.9	5	6
4.9	3	●	MWS0490MB	40.9	40.9	90.9	90	0.9	5	5
	5	●	MWS0490LB	55.9	55.9	105.9	105	0.9	5	5
	8	●	MWS0490X8DB	57.9	57.9	105.9	105	0.9	5	5
	10	●	MWS0490X10DB	65.9	68.9	118.9	118	0.9	5	6
	15	●	MWS0490X15DB	90.9	93.9	143.9	143	0.9	5	6
	20	●	MWS0490X20DB	115.9	118.9	168.9	168	0.9	5	6
	25	●	MWS0490X25DB	140.9	143.9	193.9	193	0.9	5	6
	30	●	MWS0490X30DB	165.9	168.9	218.9	218	0.9	5	6
5.0	3	●	MWS0500MB	28.4	30.9	82.9	82	0.9	6	5
	5	●	MWS0500LB	44.9	48.9	100.9	100	0.9	6	5
	8	●	MWS0500X8DB	57.9	57.9	105.9	105	0.9	5	5
	10	●	MWS0500X10DB	65.9	68.9	118.9	118	0.9	5	6
	15	●	MWS0500X15DB	90.9	93.9	143.9	143	0.9	5	6
	20	●	MWS0500X20DB	115.9	118.9	168.9	168	0.9	5	6
	25	●	MWS0500X25DB	140.9	143.9	193.9	193	0.9	5	6
	30	●	MWS0500X30DB	165.9	168.9	218.9	218	0.9	5	6
5.1	3	●	MWS0510MB	28.4	30.9	82.9	82	0.9	6	5
	5	●	MWS0510LB	44.9	48.9	100.9	100	0.9	6	5
	8	●	MWS0510X8DB	61.9	66.9	118.9	118	0.9	6	5
	10	●	MWS0510X10DB	72.9	75.9	127.9	127	0.9	6	6
	15	●	MWS0510X15DB	99.9	102.9	154.9	154	0.9	6	6
	20	●	MWS0510X20DB	127.9	130.9	182.9	182	0.9	6	6
	25	●	MWS0510X25DB	154.9	157.9	209.9	209	0.9	6	6
	30	●	MWS0510X30DB	182.9	185.9	237.9	237	0.9	6	6
5.2	3	●	MWS0520MB	28.4	30.9	82.9	82	0.9	6	5
	5	●	MWS0520LB	44.9	48.9	100.9	100	0.9	6	5
	8	●	MWS0520X8DB	61.9	66.9	118.9	118	0.9	6	5
	10	●	MWS0520X10DB	72.9	75.9	127.9	127	0.9	6	6
	15	●	MWS0520X15DB	99.9	102.9	154.9	154	0.9	6	6
	20	●	MWS0520X20DB	127.9	130.9	182.9	182	0.9	6	6
	25	●	MWS0520X25DB	154.9	157.9	209.9	209	0.9	6	6
	30	●	MWS0520X30DB	182.9	185.9	237.9	237	0.9	6	6
5.3	3	●	MWS0530MB	28.5	31.0	83.0	82	1.0	6	5
	5	●	MWS0530LB	45.0	49.0	101.0	100	1.0	6	5
	8	●	MWS0530X8DB	62.0	67.0	119.0	118	1.0	6	5
	10	●	MWS0530X10DB	73.0	76.0	128.0	127	1.0	6	6
	15	●	MWS0530X15DB	100.0	103.0	155.0	154	1.0	6	6
	20	●	MWS0530X20DB	128.0	131.0	183.0	182	1.0	6	6
	25	●	MWS0530X25DB	155.0	158.0	210.0	209	1.0	6	6
	30	●	MWS0530X30DB	183.0	186.0	238.0	237	1.0	6	6

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
5.4	3	●	MWS0540MB	28.5	31.0	83.0	82	1.0	6	5
	5	●	MWS0540LB	45.0	49.0	101.0	100	1.0	6	5
	8	●	MWS0540X8DB	62.0	67.0	119.0	118	1.0	6	5
	10	●	MWS0540X10DB	73.0	76.0	128.0	127	1.0	6	6
	15	●	MWS0540X15DB	100.0	103.0	155.0	154	1.0	6	6
	20	●	MWS0540X20DB	128.0	131.0	183.0	182	1.0	6	6
	25	●	MWS0540X25DB	155.0	158.0	210.0	209	1.0	6	6
	30	●	MWS0540X30DB	183.0	186.0	238.0	237	1.0	6	6
5.5	3	●	MWS0550MB	28.5	31.0	83.0	82	1.0	6	5
	5	●	MWS0550LB	45.0	49.0	101.0	100	1.0	6	5
	8	●	MWS0550X8DB	62.0	67.0	119.0	118	1.0	6	5
	10	●	MWS0550X10DB	73.0	76.0	128.0	127	1.0	6	6
	15	●	MWS0550X15DB	100.0	103.0	155.0	154	1.0	6	6
	20	●	MWS0550X20DB	128.0	131.0	183.0	182	1.0	6	6
	25	●	MWS0550X25DB	155.0	158.0	210.0	209	1.0	6	6
	30	●	MWS0550X30DB	183.0	186.0	238.0	237	1.0	6	6
5.6	3	●	MWS0560MB	31.0	31.0	83.0	82	1.0	6	5
	5	●	MWS0560LB	49.0	49.0	101.0	100	1.0	6	5
	8	●	MWS0560X8DB	67.0	67.0	119.0	118	1.0	6	5
	10	●	MWS0560X10DB	79.0	82.0	134.0	133	1.0	6	6
	15	●	MWS0560X15DB	109.0	112.0	164.0	163	1.0	6	6
	20	●	MWS0560X20DB	139.0	142.0	194.0	193	1.0	6	6
	25	●	MWS0560X25DB	169.0	172.0	224.0	223	1.0	6	6
	30	●	MWS0560X30DB	199.0	202.0	254.0	253	1.0	6	6
5.7	3	●	MWS0570MB	31.0	31.0	83.0	82	1.0	6	5
	5	●	MWS0570LB	49.0	49.0	101.0	100	1.0	6	5
	8	●	MWS0570X8DB	67.0	67.0	119.0	118	1.0	6	5
	10	●	MWS0570X10DB	79.0	82.0	134.0	133	1.0	6	6
	15	●	MWS0570X15DB	109.0	112.0	164.0	163	1.0	6	6
	20	●	MWS0570X20DB	139.0	142.0	194.0	193	1.0	6	6
	25	●	MWS0570X25DB	169.0	172.0	224.0	223	1.0	6	6
	30	●	MWS0570X30DB	199.0	202.0	254.0	253	1.0	6	6
5.8	3	●	MWS0580MB	31.1	31.1	83.1	82	1.1	6	5
	5	●	MWS0580LB	49.1	49.1	101.1	100	1.1	6	5
	8	●	MWS0580X8DB	67.1	67.1	119.1	118	1.1	6	5
	10	●	MWS0580X10DB	79.1	82.1	134.1	133	1.1	6	6
	15	●	MWS0580X15DB	109.1	112.1	164.1	163	1.1	6	6
	20	●	MWS0580X20DB	139.1	142.1	194.1	193	1.1	6	6
	25	●	MWS0580X25DB	169.1	172.1	224.1	223	1.1	6	6
	30	●	MWS0580X30DB	199.1	202.1	254.1	253	1.1	6	6
5.9	3	●	MWS0590MB	31.1	31.1	83.1	82	1.1	6	5
	5	●	MWS0590LB	49.1	49.1	101.1	100	1.1	6	5
	8	●	MWS0590X8DB	67.1	67.1	119.1	118	1.1	6	5
	10	●	MWS0590X10DB	79.1	82.1	134.1	133	1.1	6	6
	15	●	MWS0590X15DB	109.1	112.1	164.1	163	1.1	6	6
	20	●	MWS0590X20DB	139.1	142.1	194.1	193	1.1	6	6
	25	●	MWS0590X25DB	169.1	172.1	224.1	223	1.1	6	6
	30	●	MWS0590X30DB	199.1	202.1	254.1	253	1.1	6	6

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
6.0	3	●	**MWS0600MB**	31.1	31.1	83.1	82	1.1	6	5
	5	●	MWS**0600LB**	49.1	49.1	101.1	100	1.1	6	5
	8	●	MWS**0600X8DB**	67.1	67.1	119.1	118	1.1	6	5
	10	●	MWS**0600X10DB**	79.1	82.1	134.1	133	1.1	6	6
	15	●	MWS**0600X15DB**	109.1	112.1	164.1	163	1.1	6	6
	20	●	MWS**0600X20DB**	139.1	142.1	194.1	193	1.1	6	6
	25	●	MWS**0600X25DB**	169.1	172.1	224.1	223	1.1	6	6
	30	●	MWS**0600X30DB**	199.1	202.1	254.1	253	1.1	6	6
6.1	3	●	MWS**0610MB**	33.6	36.1	89.1	88	1.1	7	5
	5	●	MWS**0610LB**	53.1	57.1	110.1	109	1.1	7	5
	8	●	MWS**0610X8DB**	73.1	78.1	131.1	130	1.1	7	5
	10	●	MWS**0610X10DB**	86.1	89.1	142.1	141	1.1	7	6
	15	●	MWS**0610X15DB**	118.1	121.1	174.1	173	1.1	7	6
	20	●	MWS**0610X20DB**	151.1	154.1	207.1	206	1.1	7	6
	25	●	MWS**0610X25DB**	183.1	186.1	239.1	238	1.1	7	6
	30	●	MWS**0610X30DB**	216.1	219.1	272.1	271	1.1	7	6
6.2	3	●	MWS**0620MB**	33.6	36.1	89.1	88	1.1	7	5
	5	●	MWS**0620LB**	53.1	57.1	110.1	109	1.1	7	5
	8	●	MWS**0620X8DB**	73.1	78.1	131.1	130	1.1	7	5
	10	●	MWS**0620X10DB**	86.1	89.1	142.1	141	1.1	7	6
	15	●	MWS**0620X15DB**	118.1	121.1	174.1	173	1.1	7	6
	20	●	MWS**0620X20DB**	151.1	154.1	207.1	206	1.1	7	6
	25	●	MWS**0620X25DB**	183.1	186.1	239.1	238	1.1	7	6
	30	●	MWS**0620X30DB**	216.1	219.1	272.1	271	1.1	7	6
6.3	3	●	MWS**0630MB**	33.6	36.1	89.1	88	1.1	7	5
	5	●	MWS**0630LB**	53.1	57.1	110.1	109	1.1	7	5
	8	●	MWS**0630X8DB**	73.1	78.1	131.1	130	1.1	7	5
	10	●	MWS**0630X10DB**	86.1	89.1	142.1	141	1.1	7	6
	15	●	MWS**0630X15DB**	118.1	121.1	174.1	173	1.1	7	6
	20	●	MWS**0630X20DB**	151.1	154.1	207.1	206	1.1	7	6
	25	●	MWS**0630X25DB**	183.1	186.1	239.1	238	1.1	7	6
	30	●	MWS**0630X30DB**	216.1	219.1	272.1	271	1.1	7	6
6.4	3	●	MWS**0640MB**	33.7	36.2	89.2	88	1.2	7	5
	5	●	MWS**0640LB**	53.2	57.2	110.2	109	1.2	7	5
	8	●	MWS**0640X8DB**	73.2	78.2	131.2	130	1.2	7	5
	10	●	MWS**0640X10DB**	86.2	89.2	142.2	141	1.2	7	6
	15	●	MWS**0640X15DB**	118.2	121.2	174.2	173	1.2	7	6
	20	●	MWS**0640X20DB**	151.2	154.2	207.2	206	1.2	7	6
	25	●	MWS**0640X25DB**	183.2	186.2	239.2	238	1.2	7	6
	30	●	MWS**0640X30DB**	216.2	219.2	272.2	271	1.2	7	6
6.5	3	●	MWS**0650MB**	33.7	36.2	89.2	88	1.2	7	5
	5	●	MWS**0650LB**	53.2	57.2	110.2	109	1.2	7	5
	8	●	MWS**0650X8DB**	73.2	78.2	131.2	130	1.2	7	5
	10	●	MWS**0650X10DB**	86.2	89.2	142.2	141	1.2	7	6
	15	●	MWS**0650X15DB**	118.2	121.2	174.2	173	1.2	7	6
	20	●	MWS**0650X20DB**	151.2	154.2	207.2	206	1.2	7	6
	25	●	MWS**0650X25DB**	183.2	186.2	239.2	238	1.2	7	6
	30	●	MWS**0650X30DB**	216.2	219.2	272.2	271	1.2	7	6

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
6.6	3	●	**MWS0660MB**	36.2	36.2	89.2	88	1.2	7	5
	5	●	MWS**0660LB**	57.2	57.2	110.2	109	1.2	7	5
	8	●	MWS**0660X8DB**	78.2	78.2	131.2	130	1.2	7	5
	10	●	MWS**0660X10DB**	92.2	95.2	148.2	147	1.2	7	6
	15	●	MWS**0660X15DB**	127.2	130.2	183.2	182	1.2	7	6
	20	●	MWS**0660X20DB**	162.2	165.2	218.2	217	1.2	7	6
	25	●	MWS**0660X25DB**	197.2	200.2	253.2	252	1.2	7	6
	30	●	MWS**0660X30DB**	232.2	235.2	288.2	287	1.2	7	6
6.7	3	●	MWS**0670MB**	36.2	36.2	89.2	88	1.2	7	5
	5	●	MWS**0670LB**	57.2	57.2	110.2	109	1.2	7	5
	8	●	MWS**0670X8DB**	78.2	78.2	131.2	130	1.2	7	5
	10	●	MWS**0670X10DB**	92.2	95.2	148.2	147	1.2	7	6
	15	●	MWS**0670X15DB**	127.2	130.2	183.2	182	1.2	7	6
	20	●	MWS**0670X20DB**	162.2	165.2	218.2	217	1.2	7	6
	25	●	MWS**0670X25DB**	197.2	200.2	253.2	252	1.2	7	6
	30	●	MWS**0670X30DB**	232.2	235.2	288.2	287	1.2	7	6
6.8	3	●	MWS**0680MB**	36.2	36.2	89.2	88	1.2	7	5
	5	●	MWS**0680LB**	57.2	57.2	110.2	109	1.2	7	5
	8	●	MWS**0680X8DB**	78.2	78.2	131.2	130	1.2	7	5
	10	●	MWS**0680X10DB**	92.2	95.2	148.2	147	1.2	7	6
	15	●	MWS**0680X15DB**	127.2	130.2	183.2	182	1.2	7	6
	20	●	MWS**0680X20DB**	162.2	165.2	218.2	217	1.2	7	6
	25	●	MWS**0680X25DB**	197.2	200.2	253.2	252	1.2	7	6
	30	●	MWS**0680X30DB**	232.2	235.2	288.2	287	1.2	7	6
6.9	3	●	MWS**0690MB**	36.3	36.3	89.3	88	1.3	7	5
	5	●	MWS**0690LB**	57.3	57.3	110.3	109	1.3	7	5
	8	●	MWS**0690X8DB**	78.3	78.3	131.3	130	1.3	7	5
	10	●	MWS**0690X10DB**	92.3	95.3	148.3	147	1.3	7	6
	15	●	MWS**0690X15DB**	127.3	130.3	183.3	182	1.3	7	6
	20	●	MWS**0690X20DB**	162.3	165.3	218.3	217	1.3	7	6
	25	●	MWS**0690X25DB**	197.3	200.3	253.3	252	1.3	7	6
	30	●	MWS**0690X30DB**	232.3	235.3	288.3	287	1.3	7	6
7.0	3	●	MWS**0700MB**	36.3	36.3	89.3	88	1.3	7	5
	5	●	MWS**0700LB**	57.3	57.3	110.3	109	1.3	7	5
	8	●	MWS**0700X8DB**	78.3	78.3	131.3	130	1.3	7	5
	10	●	MWS**0700X10DB**	92.3	95.3	148.3	147	1.3	7	6
	15	●	MWS**0700X15DB**	127.3	130.3	183.3	182	1.3	7	6
	20	●	MWS**0700X20DB**	162.3	165.3	218.3	217	1.3	7	6
	25	●	MWS**0700X25DB**	197.3	200.3	253.3	252	1.3	7	6
	30	●	MWS**0700X30DB**	232.3	235.3	288.3	287	1.3	7	6
7.1	3	●	MWS**0710MB**	38.8	41.3	95.3	94	1.3	8	5
	5	●	MWS**0710LB**	61.3	65.3	119.3	118	1.3	8	5
	8	●	MWS**0710X8DB**	84.3	89.3	143.3	142	1.3	8	5
	10	●	MWS**0710X10DB**	99.3	102.3	156.3	155	1.3	8	6
	15	●	MWS**0710X15DB**	136.3	139.3	193.3	192	1.3	8	6
	20	●	MWS**0710X20DB**	174.3	177.3	231.3	230	1.3	8	6
	25	●	MWS**0710X25DB**	211.3	214.3	268.3	267	1.3	8	6
	30	●	MWS**0710X30DB**	249.3	252.3	306.3	305	1.3	8	6

DRILLING

CUTTING CONDITIONS ➤ N047
OPERATION GUIDANCE ➤ N051,N052
TECHNICAL DATA ➤ Q001

MWS

WSTAR DRILLS

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
7.2	3	●	MWS0720MB	38.8	41.3	95.3	94	1.3	8	5
	5	●	MWS0720LB	61.3	65.3	119.3	118	1.3	8	5
	8	●	MWS0720X8DB	84.3	89.3	143.3	142	1.3	8	5
	10	●	MWS0720X10DB	99.3	102.3	156.3	155	1.3	8	6
	15	●	MWS0720X15DB	136.3	139.3	193.3	192	1.3	8	6
	20	●	MWS0720X20DB	174.3	177.3	231.3	230	1.3	8	6
	25	●	MWS0720X25DB	211.3	214.3	268.3	267	1.3	8	6
	30	●	MWS0720X30DB	249.3	252.3	306.3	305	1.3	8	6
7.3	3	●	MWS0730MB	38.8	41.3	95.3	94	1.3	8	5
	5	●	MWS0730LB	61.3	65.3	119.3	118	1.3	8	5
	8	●	MWS0730X8DB	84.3	89.3	143.3	142	1.3	8	5
	10	●	MWS0730X10DB	99.3	102.3	156.3	155	1.3	8	6
	15	●	MWS0730X15DB	136.3	139.3	193.3	192	1.3	8	6
	20	●	MWS0730X20DB	174.3	177.3	231.3	230	1.3	8	6
	25	●	MWS0730X25DB	211.3	214.3	268.3	267	1.3	8	6
	30	●	MWS0730X30DB	249.3	252.3	306.3	305	1.3	8	6
7.4	3	●	MWS0740MB	38.8	41.3	95.3	94	1.3	8	5
	5	●	MWS0740LB	61.3	65.3	119.3	118	1.3	8	5
	8	●	MWS0740X8DB	84.3	89.3	143.3	142	1.3	8	5
	10	●	MWS0740X10DB	99.3	102.3	156.3	155	1.3	8	6
	15	●	MWS0740X15DB	136.3	139.3	193.3	192	1.3	8	6
	20	●	MWS0740X20DB	174.3	177.3	231.3	230	1.3	8	6
	25	●	MWS0740X25DB	211.3	214.3	268.3	267	1.3	8	6
	30	●	MWS0740X30DB	249.3	252.3	306.3	305	1.3	8	6
7.5	3	●	MWS0750MB	38.9	41.4	95.4	94	1.4	8	5
	5	●	MWS0750LB	61.4	65.4	119.4	118	1.4	8	5
	8	●	MWS0750X8DB	84.4	89.4	143.4	142	1.4	8	5
	10	●	MWS0750X10DB	99.4	102.4	156.4	155	1.4	8	6
	15	●	MWS0750X15DB	136.4	139.4	193.4	192	1.4	8	6
	20	●	MWS0750X20DB	174.4	177.4	231.4	230	1.4	8	6
	25	●	MWS0750X25DB	211.4	214.4	268.4	267	1.4	8	6
	30	●	MWS0750X30DB	249.4	252.4	306.4	305	1.4	8	6
7.6	3	●	MWS0760MB	41.4	41.4	95.4	94	1.4	8	5
	5	●	MWS0760LB	65.4	65.4	119.4	118	1.4	8	5
	8	●	MWS0760X8DB	89.4	89.4	143.4	142	1.4	8	5
	10	●	MWS0760X10DB	105.4	108.4	162.4	161	1.4	8	6
	15	●	MWS0760X15DB	145.4	148.4	202.4	201	1.4	8	6
	20	●	MWS0760X20DB	185.4	188.4	242.4	241	1.4	8	6
	25	●	MWS0760X25DB	225.4	228.4	282.4	281	1.4	8	6
	30	●	MWS0760X30DB	265.4	268.4	322.4	321	1.4	8	6
7.7	3	●	MWS0770MB	41.4	41.4	95.4	94	1.4	8	5
	5	●	MWS0770LB	65.4	65.4	119.4	118	1.4	8	5
	8	●	MWS0770X8DB	89.4	89.4	143.4	142	1.4	8	5
	10	●	MWS0770X10DB	105.4	108.4	162.4	161	1.4	8	6
	15	●	MWS0770X15DB	145.4	148.4	202.4	201	1.4	8	6
	20	●	MWS0770X20DB	185.4	188.4	242.4	241	1.4	8	6
	25	●	MWS0770X25DB	225.4	228.4	282.4	281	1.4	8	6
	30	●	MWS0770X30DB	265.4	268.4	322.4	321	1.4	8	6

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
7.8	3	●	MWS0780MB	41.4	41.4	95.4	94	1.4	8	5
	5	●	MWS0780LB	65.4	65.4	119.4	118	1.4	8	5
	8	●	MWS0780X8DB	89.4	89.4	143.4	142	1.4	8	5
	10	●	MWS0780X10DB	105.4	108.4	162.4	161	1.4	8	6
	15	●	MWS0780X15DB	145.4	148.4	202.4	201	1.4	8	6
	20	●	MWS0780X20DB	185.4	188.4	242.4	241	1.4	8	6
	25	●	MWS0780X25DB	225.4	228.4	282.4	281	1.4	8	6
	30	●	MWS0780X30DB	265.4	268.4	322.4	321	1.4	8	6
7.9	3	●	MWS0790MB	41.4	41.4	95.4	94	1.4	8	5
	5	●	MWS0790LB	65.4	65.4	119.4	118	1.4	8	5
	8	●	MWS0790X8DB	89.4	89.4	143.4	142	1.4	8	5
	10	●	MWS0790X10DB	105.4	108.4	162.4	161	1.4	8	6
	15	●	MWS0790X15DB	145.4	148.4	202.4	201	1.4	8	6
	20	●	MWS0790X20DB	185.4	188.4	242.4	241	1.4	8	6
	25	●	MWS0790X25DB	225.4	228.4	282.4	281	1.4	8	6
	30	●	MWS0790X30DB	265.4	268.4	322.4	321	1.4	8	6
8.0	3	●	MWS0800MB	41.5	41.5	95.5	94	1.5	8	5
	5	●	MWS0800LB	65.5	65.5	119.5	118	1.5	8	5
	8	●	MWS0800X8DB	89.5	89.5	143.5	142	1.5	8	5
	10	●	MWS0800X10DB	105.5	108.5	162.5	161	1.5	8	6
	15	●	MWS0800X15DB	145.5	148.5	202.5	201	1.5	8	6
	20	●	MWS0800X20DB	185.5	188.5	242.5	241	1.5	8	6
	25	●	MWS0800X25DB	225.5	228.5	282.5	281	1.5	8	6
	30	●	MWS0800X30DB	265.5	268.5	322.5	321	1.5	8	6
8.1	3	●	MWS0810MB	44.0	46.5	101.5	100	1.5	9	5
	5	●	MWS0810LB	69.5	73.5	128.5	127	1.5	9	5
	8	●	MWS0810X8DB	95.5	100.5	155.5	154	1.5	9	5
	10	●	MWS0810X10DB	112.5	115.5	170.5	169	1.5	9	6
	15	●	MWS0810X15DB	154.5	157.5	212.5	211	1.5	9	6
	20	●	MWS0810X20DB	197.5	200.5	255.5	254	1.5	9	6
	25	●	MWS0810X25DB	239.5	242.5	297.5	296	1.5	9	6
	30	●	MWS0810X30DB	282.5	285.5	340.5	339	1.5	9	6
8.2	3	●	MWS0820MB	44.0	46.5	101.5	100	1.5	9	5
	5	●	MWS0820LB	69.5	73.5	128.5	127	1.5	9	5
	8	●	MWS0820X8DB	95.5	100.5	155.5	154	1.5	9	5
	10	●	MWS0820X10DB	112.5	115.5	170.5	169	1.5	9	6
	15	●	MWS0820X15DB	154.5	157.5	212.5	211	1.5	9	6
	20	●	MWS0820X20DB	197.5	200.5	255.5	254	1.5	9	6
	25	●	MWS0820X25DB	239.5	242.5	297.5	296	1.5	9	6
	30	●	MWS0820X30DB	282.5	285.5	340.5	339	1.5	9	6
8.3	3	●	MWS0830MB	44.0	46.5	101.5	100	1.5	9	5
	5	●	MWS0830LB	69.5	73.5	128.5	127	1.5	9	5
	8	●	MWS0830X8DB	95.5	100.5	155.5	154	1.5	9	5
	10	●	MWS0830X10DB	112.5	115.5	170.5	169	1.5	9	6
	15	●	MWS0830X15DB	154.5	157.5	212.5	211	1.5	9	6
	20	●	MWS0830X20DB	197.5	200.5	255.5	254	1.5	9	6
	25	●	MWS0830X25DB	239.5	242.5	297.5	296	1.5	9	6
	30	●	MWS0830X30DB	282.5	285.5	340.5	339	1.5	9	6

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
8.4	3	●	**MWS0840MB**	44.0	46.5	101.5	100	1.5	9	5
	5	●	MWS**0840LB**	69.5	73.5	128.5	127	1.5	9	5
	8	●	MWS**0840X8DB**	95.5	100.5	155.5	154	1.5	9	5
	10	●	MWS**0840X10DB**	112.5	115.5	170.5	169	1.5	9	6
	15	●	MWS**0840X15DB**	154.5	157.5	212.5	211	1.5	9	6
	20	●	MWS**0840X20DB**	197.5	200.5	255.5	254	1.5	9	6
	25	●	MWS**0840X25DB**	239.5	242.5	297.5	296	1.5	9	6
	30	●	MWS**0840X30DB**	282.5	285.5	340.5	339	1.5	9	6
8.5	3	●	MWS**0850MB**	44.0	46.5	101.5	100	1.5	9	5
	5	●	MWS**0850LB**	69.5	73.5	128.5	127	1.5	9	5
	8	●	MWS**0850X8DB**	95.5	100.5	155.5	154	1.5	9	5
	10	●	MWS**0850X10DB**	112.5	115.5	170.5	169	1.5	9	6
	15	●	MWS**0850X15DB**	154.5	157.5	212.5	211	1.5	9	6
	20	●	MWS**0850X20DB**	197.5	200.5	255.5	254	1.5	9	6
	25	●	MWS**0850X25DB**	239.5	242.5	297.5	296	1.5	9	6
	30	●	MWS**0850X30DB**	282.5	285.5	340.5	339	1.5	9	6
8.6	3	●	MWS**0860MB**	46.6	46.6	101.6	100	1.6	9	5
	5	●	MWS**0860LB**	73.6	73.6	128.6	127	1.6	9	5
	8	●	MWS**0860X8DB**	100.6	100.6	155.6	154	1.6	9	5
	10	●	MWS**0860X10DB**	118.6	121.6	176.6	175	1.6	9	6
	15	●	MWS**0860X15DB**	163.6	166.6	221.6	220	1.6	9	6
	20	●	MWS**0860X20DB**	208.6	211.6	266.6	265	1.6	9	6
	25	●	MWS**0860X25DB**	253.6	256.6	311.6	310	1.6	9	6
	30	●	MWS**0860X30DB**	298.6	301.6	356.6	355	1.6	9	6
8.7	3	●	MWS**0870MB**	46.6	46.6	101.6	100	1.6	9	5
	5	●	MWS**0870LB**	73.6	73.6	128.6	127	1.6	9	5
	8	●	MWS**0870X8DB**	100.6	100.6	155.6	154	1.6	9	5
	10	●	MWS**0870X10DB**	118.6	121.6	176.6	175	1.6	9	6
	15	●	MWS**0870X15DB**	163.6	166.6	221.6	220	1.6	9	6
	20	●	MWS**0870X20DB**	208.6	211.6	266.6	265	1.6	9	6
	25	●	MWS**0870X25DB**	253.6	256.6	311.6	310	1.6	9	6
	30	●	MWS**0870X30DB**	298.6	301.6	356.6	355	1.6	9	6
8.8	3	●	MWS**0880MB**	46.6	46.6	101.6	100	1.6	9	5
	5	●	MWS**0880LB**	73.6	73.6	128.6	127	1.6	9	5
	8	●	MWS**0880X8DB**	100.6	100.6	155.6	154	1.6	9	5
	10	●	MWS**0880X10DB**	118.6	121.6	176.6	175	1.6	9	6
	15	●	MWS**0880X15DB**	163.6	166.6	221.6	220	1.6	9	6
	20	●	MWS**0880X20DB**	208.6	211.6	266.6	265	1.6	9	6
	25	●	MWS**0880X25DB**	253.6	256.6	311.6	310	1.6	9	6
	30	●	MWS**0880X30DB**	298.6	301.6	356.6	355	1.6	9	6
8.9	3	●	MWS**0890MB**	46.6	46.6	101.6	100	1.6	9	5
	5	●	MWS**0890LB**	73.6	73.6	128.6	127	1.6	9	5
	8	●	MWS**0890X8DB**	100.6	100.6	155.6	154	1.6	9	5
	10	●	MWS**0890X10DB**	118.6	121.6	176.6	175	1.6	9	6
	15	●	MWS**0890X15DB**	163.6	166.6	221.6	220	1.6	9	6
	20	●	MWS**0890X20DB**	208.6	211.6	266.6	265	1.6	9	6
	25	●	MWS**0890X25DB**	253.6	256.6	311.6	310	1.6	9	6
	30	●	MWS**0890X30DB**	298.6	301.6	356.6	355	1.6	9	6

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
9.0	3	●	**MWS0900MB**	46.6	46.6	101.6	100	1.6	9	5
	5	●	MWS**0900LB**	73.6	73.6	128.6	127	1.6	9	5
	8	●	MWS**0900X8DB**	100.6	100.6	155.6	154	1.6	9	5
	10	●	MWS**0900X10DB**	118.6	121.6	176.6	175	1.6	9	6
	15	●	MWS**0900X15DB**	163.6	166.6	221.6	220	1.6	9	6
	20	●	MWS**0900X20DB**	208.6	211.6	266.6	265	1.6	9	6
	25	●	MWS**0900X25DB**	253.6	256.6	311.6	310	1.6	9	6
	30	●	MWS**0900X30DB**	298.6	301.6	356.6	355	1.6	9	6
9.1	3	●	MWS**0910MB**	49.2	51.7	107.7	106	1.7	10	5
	5	●	MWS**0910LB**	77.7	81.7	137.7	136	1.7	10	5
	8	●	MWS**0910X8DB**	106.7	111.7	167.7	166	1.7	10	5
	10	●	MWS**0910X10DB**	125.7	128.7	183.7	182	1.7	10	6
	15	●	MWS**0910X15DB**	172.7	175.7	230.7	229	1.7	10	6
	20	●	MWS**0910X20DB**	220.7	223.7	278.7	277	1.7	10	6
	25	●	MWS**0910X25DB**	267.7	270.7	325.7	324	1.7	10	6
	30	●	MWS**0910X30DB**	315.7	318.7	373.7	372	1.7	10	6
9.2	3	●	MWS**0920MB**	49.2	51.7	107.7	106	1.7	10	5
	5	●	MWS**0920LB**	77.7	81.7	137.7	136	1.7	10	5
	8	●	MWS**0920X8DB**	106.7	111.7	167.7	166	1.7	10	5
	10	●	MWS**0920X10DB**	125.7	128.7	183.7	182	1.7	10	6
	15	●	MWS**0920X15DB**	172.7	175.7	230.7	229	1.7	10	6
	20	●	MWS**0920X20DB**	220.7	223.7	278.7	277	1.7	10	6
	25	●	MWS**0920X25DB**	267.7	270.7	325.7	324	1.7	10	6
	30	●	MWS**0920X30DB**	315.7	318.7	373.7	372	1.7	10	6
9.3	3	●	MWS**0930MB**	49.2	51.7	107.7	106	1.7	10	5
	5	●	MWS**0930LB**	77.7	81.7	137.7	136	1.7	10	5
	8	●	MWS**0930X8DB**	106.7	111.7	167.7	166	1.7	10	5
	10	●	MWS**0930X10DB**	125.7	128.7	183.7	182	1.7	10	6
	15	●	MWS**0930X15DB**	172.7	175.7	230.7	229	1.7	10	6
	20	●	MWS**0930X20DB**	220.7	223.7	278.7	277	1.7	10	6
	25	●	MWS**0930X25DB**	267.7	270.7	325.7	324	1.7	10	6
	30	●	MWS**0930X30DB**	315.7	318.7	373.7	372	1.7	10	6
9.4	3	●	MWS**0940MB**	49.2	51.7	107.7	106	1.7	10	5
	5	●	MWS**0940LB**	77.7	81.7	137.7	136	1.7	10	5
	8	●	MWS**0940X8DB**	106.7	111.7	167.7	166	1.7	10	5
	10	●	MWS**0940X10DB**	125.7	128.7	183.7	182	1.7	10	6
	15	●	MWS**0940X15DB**	172.7	175.7	230.7	229	1.7	10	6
	20	●	MWS**0940X20DB**	220.7	223.7	278.7	277	1.7	10	6
	25	●	MWS**0940X25DB**	267.7	270.7	325.7	324	1.7	10	6
	30	●	MWS**0940X30DB**	315.7	318.7	373.7	372	1.7	10	6
9.5	3	●	MWS**0950MB**	49.2	51.7	107.7	106	1.7	10	5
	5	●	MWS**0950LB**	77.7	81.7	137.7	136	1.7	10	5
	8	●	MWS**0950X8DB**	106.7	111.7	167.7	166	1.7	10	5
	10	●	MWS**0950X10DB**	125.7	128.7	183.7	182	1.7	10	6
	15	●	MWS**0950X15DB**	172.7	175.7	230.7	229	1.7	10	6
	20	●	MWS**0950X20DB**	220.7	223.7	278.7	277	1.7	10	6
	25	●	MWS**0950X25DB**	267.7	270.7	325.7	324	1.7	10	6
	30	●	MWS**0950X30DB**	315.7	318.7	373.7	372	1.7	10	6

DRILLING

CUTTING CONDITIONS ➤ N047
OPERATION GUIDANCE ➤ N051,N052
TECHNICAL DATA ➤ Q001

MWS

WSTAR DRILLS

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
9.6	3	●	MWS0960MB	51.7	51.7	107.7	106	1.7	10	5
	5	●	MWS0960LB	81.7	81.7	137.7	136	1.7	10	5
	8	●	MWS0960X8DB	111.7	111.7	167.7	166	1.7	10	5
	10	●	MWS0960X10DB	131.7	134.7	189.7	188	1.7	10	6
	15	●	MWS0960X15DB	181.7	184.7	239.7	238	1.7	10	6
	20	●	MWS0960X20DB	231.7	234.7	289.7	288	1.7	10	6
	25	●	MWS0960X25DB	281.7	284.7	339.7	338	1.7	10	6
	30	●	MWS0960X30DB	331.7	334.7	389.7	388	1.7	10	6
9.7	3	●	MWS0970MB	51.8	51.8	107.8	106	1.8	10	5
	5	●	MWS0970LB	81.8	81.8	137.8	136	1.8	10	5
	8	●	MWS0970X8DB	111.8	111.8	167.8	166	1.8	10	5
	10	●	MWS0970X10DB	131.8	134.8	189.8	188	1.8	10	6
	15	●	MWS0970X15DB	181.8	184.8	239.8	238	1.8	10	6
	20	●	MWS0970X20DB	231.8	234.8	289.8	288	1.8	10	6
	25	●	MWS0970X25DB	281.8	284.8	339.8	338	1.8	10	6
	30	●	MWS0970X30DB	331.8	334.8	389.8	388	1.8	10	6
9.8	3	●	MWS0980MB	51.8	51.8	107.8	106	1.8	10	5
	5	●	MWS0980LB	81.8	81.8	137.8	136	1.8	10	5
	8	●	MWS0980X8DB	111.8	111.8	167.8	166	1.8	10	5
	10	●	MWS0980X10DB	131.8	134.8	189.8	188	1.8	10	6
	15	●	MWS0980X15DB	181.8	184.8	239.8	238	1.8	10	6
	20	●	MWS0980X20DB	231.8	234.8	289.8	288	1.8	10	6
	25	●	MWS0980X25DB	281.8	284.8	339.8	338	1.8	10	6
	30	●	MWS0980X30DB	331.8	334.8	389.8	388	1.8	10	6
9.9	3	●	MWS0990MB	51.8	51.8	107.8	106	1.8	10	5
	5	●	MWS0990LB	81.8	81.8	137.8	136	1.8	10	5
	8	●	MWS0990X8DB	111.8	111.8	167.8	166	1.8	10	5
	10	●	MWS0990X10DB	131.8	134.8	189.8	188	1.8	10	6
	15	●	MWS0990X15DB	181.8	184.8	239.8	238	1.8	10	6
	20	●	MWS0990X20DB	231.8	234.8	289.8	288	1.8	10	6
	25	●	MWS0990X25DB	281.8	284.8	339.8	338	1.8	10	6
	30	●	MWS0990X30DB	331.8	334.8	389.8	388	1.8	10	6
10.0	3	●	MWS1000MB	51.8	51.8	107.8	106	1.8	10	5
	5	●	MWS1000LB	81.8	81.8	137.8	136	1.8	10	5
	8	●	MWS1000X8DB	111.8	111.8	167.8	166	1.8	10	5
	10	●	MWS1000X10DB	131.8	134.8	189.8	188	1.8	10	6
	15	●	MWS1000X15DB	181.8	184.8	239.8	238	1.8	10	6
	20	●	MWS1000X20DB	231.8	234.8	289.8	288	1.8	10	6
	25	●	MWS1000X25DB	281.8	284.8	339.8	338	1.8	10	6
	30	●	MWS1000X30DB	331.8	334.8	389.8	388	1.8	10	6
10.1	3	●	MWS1010MB	54.3	56.8	117.8	116	1.8	11	5
	5	●	MWS1010LB	85.8	89.8	150.8	149	1.8	11	5
	8	●	MWS1010X8DB	117.8	122.8	183.8	182	1.8	11	5
	10	●	MWS1010X10DB	138.8	141.8	202.8	201	1.8	11	6
	15	●	MWS1010X15DB	190.8	193.8	254.8	253	1.8	11	6
	20	●	MWS1010X20DB	243.8	246.8	307.8	306	1.8	11	6
	25	●	MWS1010X25DB	295.8	298.8	359.8	358	1.8	11	6

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
10.2	3	●	MWS1020MB	54.4	56.9	117.9	116	1.9	11	5
	5	●	MWS1020LB	85.9	89.9	150.9	149	1.9	11	5
	8	●	MWS1020X8DB	117.9	122.9	183.9	182	1.9	11	5
	10	●	MWS1020X10DB	138.9	141.9	202.9	201	1.9	11	6
	15	●	MWS1020X15DB	190.9	193.9	254.9	253	1.9	11	6
	20	●	MWS1020X20DB	243.9	246.9	307.9	306	1.9	11	6
	25	●	MWS1020X25DB	295.9	298.9	359.9	358	1.9	11	6
10.3	3	●	MWS1030MB	54.4	56.9	117.9	116	1.9	11	5
	5	●	MWS1030LB	85.9	89.9	150.9	149	1.9	11	5
	8	●	MWS1030X8DB	117.9	122.9	183.9	182	1.9	11	5
	10	●	MWS1030X10DB	138.9	141.9	202.9	201	1.9	11	6
	15	●	MWS1030X15DB	190.9	193.9	254.9	253	1.9	11	6
	20	●	MWS1030X20DB	243.9	246.9	307.9	306	1.9	11	6
	25	●	MWS1030X25DB	295.9	298.9	359.9	358	1.9	11	6
10.4	3	●	MWS1040MB	54.4	56.9	117.9	116	1.9	11	5
	5	●	MWS1040LB	85.9	89.9	150.9	149	1.9	11	5
	8	●	MWS1040X8DB	117.9	122.9	183.9	182	1.9	11	5
	10	●	MWS1040X10DB	138.9	141.9	202.9	201	1.9	11	6
	15	●	MWS1040X15DB	190.9	193.9	254.9	253	1.9	11	6
	20	●	MWS1040X20DB	243.9	246.9	307.9	306	1.9	11	6
	25	●	MWS1040X25DB	295.9	298.9	359.9	358	1.9	11	6
10.5	3	●	MWS1050MB	54.4	56.9	117.9	116	1.9	11	5
	5	●	MWS1050LB	85.9	89.9	150.9	149	1.9	11	5
	8	●	MWS1050X8DB	117.9	122.9	183.9	182	1.9	11	5
	10	●	MWS1050X10DB	138.9	141.9	202.9	201	1.9	11	6
	15	●	MWS1050X15DB	190.9	193.9	254.9	253	1.9	11	6
	20	●	MWS1050X20DB	243.9	246.9	307.9	306	1.9	11	6
	25	●	MWS1050X25DB	295.9	298.9	359.9	358	1.9	11	6
10.6	3	●	MWS1060MB	56.9	56.9	117.9	116	1.9	11	5
	5	●	MWS1060LB	89.9	89.9	150.9	149	1.9	11	5
	8	●	MWS1060X8DB	122.9	122.9	183.9	182	1.9	11	5
	10	●	MWS1060X10DB	144.9	147.9	208.9	207	1.9	11	6
	15	●	MWS1060X15DB	199.9	202.9	263.9	262	1.9	11	6
	20	●	MWS1060X20DB	254.9	257.9	318.9	317	1.9	11	6
	25	●	MWS1060X25DB	309.9	312.9	373.9	372	1.9	11	6
10.7	3	●	MWS1070MB	56.9	56.9	117.9	116	1.9	11	5
	5	●	MWS1070LB	89.9	89.9	150.9	149	1.9	11	5
	8	●	MWS1070X8DB	122.9	122.9	183.9	182	1.9	11	5
	10	●	MWS1070X10DB	144.9	147.9	208.9	207	1.9	11	6
	15	●	MWS1070X15DB	199.9	202.9	263.9	262	1.9	11	6
	20	●	MWS1070X20DB	254.9	257.9	318.9	317	1.9	11	6
	25	●	MWS1070X25DB	309.9	312.9	373.9	372	1.9	11	6
10.8	3	●	MWS1080MB	57.0	57.0	118.0	116	2.0	11	5
	5	●	MWS1080LB	90.0	90.0	151.0	149	2.0	11	5
	8	●	MWS1080X8DB	123.0	123.0	184.0	182	2.0	11	5
	10	●	MWS1080X10DB	145.0	148.0	209.0	207	2.0	11	6
	15	●	MWS1080X15DB	200.0	203.0	264.0	262	2.0	11	6
	20	●	MWS1080X20DB	255.0	258.0	319.0	317	2.0	11	6
	25	●	MWS1080X25DB	310.0	313.0	374.0	372	2.0	11	6

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
10.9	3	●	MWS1090MB	57.0	57.0	118.0	116	2.0	11	5
	5	●	MWS1090LB	90.0	90.0	151.0	149	2.0	11	5
	8	●	MWS1090X8DB	123.0	123.0	184.0	182	2.0	11	5
	10	●	MWS1090X10DB	145.0	148.0	209.0	207	2.0	11	6
	15	●	MWS1090X15DB	200.0	203.0	264.0	262	2.0	11	6
	20	●	MWS1090X20DB	255.0	258.0	319.0	317	2.0	11	6
	25	●	MWS1090X25DB	310.0	313.0	374.0	372	2.0	11	6
11.0	3	●	MWS1100MB	57.0	57.0	118.0	116	2.0	11	5
	5	●	MWS1100LB	90.0	90.0	151.0	149	2.0	11	5
	8	●	MWS1100X8DB	123.0	123.0	184.0	182	2.0	11	5
	10	●	MWS1100X10DB	145.0	148.0	209.0	207	2.0	11	6
	15	●	MWS1100X15DB	200.0	203.0	264.0	262	2.0	11	6
	20	●	MWS1100X20DB	255.0	258.0	319.0	317	2.0	11	6
	25	●	MWS1100X25DB	310.0	313.0	374.0	372	2.0	11	6
11.1	3	●	MWS1110MB	59.5	62.0	124.0	122	2.0	12	5
	5	●	MWS1110LB	94.0	98.0	160.0	158	2.0	12	5
	8	●	MWS1110X8DB	129.0	134.0	196.0	194	2.0	12	5
	10	●	MWS1110X10DB	152.0	155.0	217.0	215	2.0	12	6
	15	●	MWS1110X15DB	209.0	212.0	274.0	272	2.0	12	6
	20	●	MWS1110X20DB	267.0	270.0	332.0	330	2.0	12	6
	25	●	MWS1110X25DB	324.0	327.0	389.0	387	2.0	12	6
11.2	3	●	MWS1120MB	59.5	62.0	124.0	122	2.0	12	5
	5	●	MWS1120LB	94.0	98.0	160.0	158	2.0	12	5
	8	●	MWS1120X8DB	129.0	134.0	196.0	194	2.0	12	5
	10	●	MWS1120X10DB	152.0	155.0	217.0	215	2.0	12	6
	15	●	MWS1120X15DB	209.0	212.0	274.0	272	2.0	12	6
	20	●	MWS1120X20DB	267.0	270.0	332.0	330	2.0	12	6
	25	●	MWS1120X25DB	324.0	327.0	389.0	387	2.0	12	6
11.3	3	●	MWS1130MB	59.6	62.1	124.1	122	2.1	12	5
	5	●	MWS1130LB	94.1	98.1	160.1	158	2.1	12	5
	8	●	MWS1130X8DB	129.1	134.1	196.1	194	2.1	12	5
	10	●	MWS1130X10DB	152.1	155.1	217.1	215	2.1	12	6
	15	●	MWS1130X15DB	209.1	212.1	274.1	272	2.1	12	6
	20	●	MWS1130X20DB	267.1	270.1	332.1	330	2.1	12	6
	25	●	MWS1130X25DB	324.1	327.1	389.1	387	2.1	12	6
11.4	3	●	MWS1140MB	59.6	62.1	124.1	122	2.1	12	5
	5	●	MWS1140LB	94.1	98.1	160.1	158	2.1	12	5
	8	●	MWS1140X8DB	129.1	134.1	196.1	194	2.1	12	5
	10	●	MWS1140X10DB	152.1	155.1	217.1	215	2.1	12	6
	15	●	MWS1140X15DB	209.1	212.1	274.1	272	2.1	12	6
	20	●	MWS1140X20DB	267.1	270.1	332.1	330	2.1	12	6
	25	●	MWS1140X25DB	324.1	327.1	389.1	387	2.1	12	6
11.5	3	●	MWS1150MB	59.6	62.1	124.1	122	2.1	12	5
	5	●	MWS1150LB	94.1	98.1	160.1	158	2.1	12	5
	8	●	MWS1150X8DB	129.1	134.1	196.1	194	2.1	12	5
	10	●	MWS1150X10DB	152.1	155.1	217.1	215	2.1	12	6
	15	●	MWS1150X15DB	209.1	212.1	274.1	272	2.1	12	6
	20	●	MWS1150X20DB	267.1	270.1	332.1	330	2.1	12	6
	25	●	MWS1150X25DB	324.1	327.1	389.1	387	2.1	12	6

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
11.6	3	●	MWS1160MB	62.1	62.1	124.1	122	2.1	12	5
	5	●	MWS1160LB	98.1	98.1	160.1	158	2.1	12	5
	8	●	MWS1160X8DB	134.1	134.1	196.1	194	2.1	12	5
	10	●	MWS1160X10DB	158.1	161.1	223.1	221	2.1	12	6
	15	●	MWS1160X15DB	218.1	221.1	283.1	281	2.1	12	6
	20	●	MWS1160X20DB	278.1	281.1	343.1	341	2.1	12	6
	25	●	MWS1160X25DB	338.1	341.1	403.1	401	2.1	12	6
11.7	3	●	MWS1170MB	62.1	62.1	124.1	122	2.1	12	5
	5	●	MWS1170LB	98.1	98.1	160.1	158	2.1	12	5
	8	●	MWS1170X8DB	134.1	134.1	196.1	194	2.1	12	5
	10	●	MWS1170X10DB	158.1	161.1	223.1	221	2.1	12	6
	15	●	MWS1170X15DB	218.1	221.1	283.1	281	2.1	12	6
	20	●	MWS1170X20DB	278.1	281.1	343.1	341	2.1	12	6
	25	●	MWS1170X25DB	338.1	341.1	403.1	401	2.1	12	6
11.8	3	●	MWS1180MB	62.1	62.1	124.1	122	2.1	12	5
	5	●	MWS1180LB	98.1	98.1	160.1	158	2.1	12	5
	8	●	MWS1180X8DB	134.1	134.1	196.1	194	2.1	12	5
	10	●	MWS1180X10DB	158.1	161.1	223.1	221	2.1	12	6
	15	●	MWS1180X15DB	218.1	221.1	283.1	281	2.1	12	6
	20	●	MWS1180X20DB	278.1	281.1	343.1	341	2.1	12	6
	25	●	MWS1180X25DB	338.1	341.1	403.1	401	2.1	12	6
11.9	3	●	MWS1190MB	62.2	62.2	124.2	122	2.2	12	5
	5	●	MWS1190LB	98.2	98.2	160.2	158	2.2	12	5
	8	●	MWS1190X8DB	134.2	134.2	196.2	194	2.2	12	5
	10	●	MWS1190X10DB	158.2	161.2	223.2	221	2.2	12	6
	15	●	MWS1190X15DB	218.2	221.2	283.2	281	2.2	12	6
	20	●	MWS1190X20DB	278.2	281.2	343.2	341	2.2	12	6
	25	●	MWS1190X25DB	338.2	341.2	403.2	401	2.2	12	6
12.0	3	●	MWS1200MB	62.2	62.2	124.2	122	2.2	12	5
	5	●	MWS1200LB	98.2	98.2	160.2	158	2.2	12	5
	8	●	MWS1200X8DB	134.2	134.2	196.2	194	2.2	12	5
	10	●	MWS1200X10DB	158.2	161.2	223.2	221	2.2	12	6
	15	●	MWS1200X15DB	218.2	221.2	283.2	281	2.2	12	6
	20	●	MWS1200X20DB	278.2	281.2	343.2	341	2.2	12	6
	25	●	MWS1200X25DB	338.2	341.2	403.2	401	2.2	12	6
12.1	3	●	MWS1210MB	64.7	67.2	130.2	128	2.2	13	5
	5	●	MWS1210LB	102.2	106.2	169.2	167	2.2	13	5
	8	□	MWS1210X8DB	140.2	145.2	208.2	206	2.2	13	5
	10	□	MWS1210X10DB	165.2	168.2	231.2	229	2.2	13	6
	15	□	MWS1210X15DB	227.2	230.2	293.2	291	2.2	13	6
	20	□	MWS1210X20DB	290.2	293.2	356.2	354	2.2	13	6
12.2	3	●	MWS1220MB	64.7	67.2	130.2	128	2.2	13	5
	5	●	MWS1220LB	102.2	106.2	169.2	167	2.2	13	5
	8	□	MWS1220X8DB	140.2	145.2	208.2	206	2.2	13	5
	10	□	MWS1220X10DB	165.2	168.2	231.2	229	2.2	13	6
	15	□	MWS1220X15DB	227.2	230.2	293.2	291	2.2	13	6
	20	□	MWS1220X20DB	290.2	293.2	356.2	354	2.2	13	6

DRILLING

CUTTING CONDITIONS ➤ N047
OPERATION GUIDANCE ➤ N051,N052
TECHNICAL DATA ➤ Q001

MWS

WSTAR DRILLS

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
12.3	3	●	MWS1230MB	64.7	67.2	130.2	128	2.2	13	5
	5	●	MWS1230LB	102.2	106.2	169.2	167	2.2	13	5
	8	□	MWS1230X8DB	140.2	145.2	208.2	206	2.2	13	5
	10	□	MWS1230X10DB	165.2	168.2	231.2	229	2.2	13	6
	15	□	MWS1230X15DB	227.2	230.2	293.2	291	2.2	13	6
	20	□	MWS1230X20DB	290.2	293.2	356.2	354	2.2	13	6
12.4	3	●	MWS1240MB	64.8	67.3	130.3	128	2.3	13	5
	5	●	MWS1240LB	102.3	106.3	169.3	167	2.3	13	5
	8	□	MWS1240X8DB	140.3	145.3	208.3	206	2.3	13	5
	10	□	MWS1240X10DB	165.3	168.3	231.3	229	2.3	13	6
	15	□	MWS1240X15DB	227.3	230.3	293.3	291	2.3	13	6
	20	□	MWS1240X20DB	290.3	293.3	356.3	354	2.3	13	6
12.5	3	●	MWS1250MB	64.8	67.3	130.3	128	2.3	13	5
	5	●	MWS1250LB	102.3	106.3	169.3	167	2.3	13	5
	8	●	MWS1250X8DB	140.3	145.3	208.3	206	2.3	13	5
	10	●	MWS1250X10DB	165.3	168.3	231.3	229	2.3	13	6
	15	●	MWS1250X15DB	227.3	230.3	293.3	291	2.3	13	6
	20	●	MWS1250X20DB	290.3	293.3	356.3	354	2.3	13	6
12.6	3	●	MWS1260MB	67.3	67.3	130.3	128	2.3	13	5
	5	●	MWS1260LB	106.3	106.3	169.3	167	2.3	13	5
	8	□	MWS1260X8DB	145.3	145.3	208.3	206	2.3	13	5
	10	□	MWS1260X10DB	171.3	174.3	237.3	235	2.3	13	6
	15	□	MWS1260X15DB	236.3	239.3	302.3	300	2.3	13	6
	20	□	MWS1260X20DB	301.3	304.3	367.3	365	2.3	13	6
12.7	3	●	MWS1270MB	67.3	67.3	130.3	128	2.3	13	5
	5	●	MWS1270LB	106.3	106.3	169.3	167	2.3	13	5
	8	□	MWS1270X8DB	145.3	145.3	208.3	206	2.3	13	5
	10	□	MWS1270X10DB	171.3	174.3	237.3	235	2.3	13	6
	15	□	MWS1270X15DB	236.3	239.3	302.3	300	2.3	13	6
	20	□	MWS1270X20DB	301.3	304.3	367.3	365	2.3	13	6
12.8	3	●	MWS1280MB	67.3	67.3	130.3	128	2.3	13	5
	5	●	MWS1280LB	106.3	106.3	169.3	167	2.3	13	5
	8	□	MWS1280X8DB	145.3	145.3	208.3	206	2.3	13	5
	10	□	MWS1280X10DB	171.3	174.3	237.3	235	2.3	13	6
	15	□	MWS1280X15DB	236.3	239.3	302.3	300	2.3	13	6
	20	□	MWS1280X20DB	301.3	304.3	367.3	365	2.3	13	6
12.9	3	●	MWS1290MB	67.3	67.3	130.3	128	2.3	13	5
	5	●	MWS1290LB	106.3	106.3	169.3	167	2.3	13	5
	8	□	MWS1290X8DB	145.3	145.3	208.3	206	2.3	13	5
	10	□	MWS1290X10DB	171.3	174.3	237.3	235	2.3	13	6
	15	□	MWS1290X15DB	236.3	239.3	302.3	300	2.3	13	6
	20	□	MWS1290X20DB	301.3	304.3	367.3	365	2.3	13	6
13.0	3	●	MWS1300MB	67.4	67.4	130.4	128	2.4	13	5
	5	●	MWS1300LB	106.4	106.4	169.4	167	2.4	13	5
	8	●	MWS1300X8DB	145.4	145.4	208.4	206	2.4	13	5
	10	●	MWS1300X10DB	171.4	174.4	237.4	235	2.4	13	6
	15	●	MWS1300X15DB	236.4	239.4	302.4	300	2.4	13	6
	20	●	MWS1300X20DB	301.4	304.4	367.4	365	2.4	13	6

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
13.1	3	●	MWS1310MB	89.9	72.4	136.4	134	2.4	14	5
	5	●	MWS1310LB	110.4	114.4	178.4	176	2.4	14	5
	8	□	MWS1310X8DB	151.4	156.4	220.4	218	2.4	14	5
	10	□	MWS1310X10DB	178.4	181.4	245.4	243	2.4	14	6
	15	□	MWS1310X15DB	245.4	248.4	312.4	310	2.4	14	6
	20	□	MWS1310X20DB	313.4	316.4	380.4	378	2.4	14	6
13.2	3	●	MWS1320MB	69.9	72.4	136.4	134	2.4	14	5
	5	●	MWS1320LB	110.4	114.4	178.4	176	2.4	14	5
	8	□	MWS1320X8DB	151.4	156.4	220.4	218	2.4	14	5
	10	□	MWS1320X10DB	178.4	181.4	245.4	243	2.4	14	6
	15	□	MWS1320X15DB	245.4	248.4	312.4	310	2.4	14	6
	20	□	MWS1320X20DB	313.4	316.4	380.4	378	2.4	14	6
13.3	3	●	MWS1330MB	69.9	72.4	136.4	134	2.4	14	5
	5	●	MWS1330LB	110.4	114.4	178.4	176	2.4	14	5
	8	□	MWS1330X8DB	151.4	156.4	220.4	218	2.4	14	5
	10	□	MWS1330X10DB	178.4	181.4	245.4	243	2.4	14	6
	15	□	MWS1330X15DB	245.4	248.4	312.4	310	2.4	14	6
	20	□	MWS1330X20DB	313.4	316.4	380.4	378	2.4	14	6
13.4	3	●	MWS1340MB	69.9	72.4	136.4	134	2.4	14	5
	5	●	MWS1340LB	110.4	114.4	178.4	176	2.4	14	5
	8	□	MWS1340X8DB	151.4	156.4	220.4	218	2.4	14	5
	10	□	MWS1340X10DB	178.4	181.4	245.4	243	2.4	14	6
	15	□	MWS1340X15DB	245.4	248.4	312.4	310	2.4	14	6
	20	□	MWS1340X20DB	313.4	316.4	380.4	378	2.4	14	6
13.5	3	●	MWS1350MB	70.0	72.5	136.5	134	2.5	14	5
	5	●	MWS1350LB	110.5	114.5	178.5	176	2.5	14	5
	8	●	MWS1350X8DB	151.5	156.5	220.5	218	2.5	14	5
	10	●	MWS1350X10DB	178.5	181.5	245.5	243	2.5	14	6
	15	●	MWS1350X15DB	245.5	248.5	312.5	310	2.5	14	6
	20	●	MWS1350X20DB	313.5	316.5	380.5	378	2.5	14	6
13.6	3	●	MWS1360MB	72.5	72.5	136.5	134	2.5	14	5
	5	●	MWS1360LB	114.5	114.5	178.5	176	2.5	14	5
	8	□	MWS1360X8DB	156.5	156.5	220.5	218	2.5	14	5
	10	□	MWS1360X10DB	184.5	187.5	251.5	249	2.5	14	6
	15	□	MWS1360X15DB	254.5	257.5	321.5	319	2.5	14	6
	20	□	MWS1360X20DB	324.5	327.5	391.5	389	2.5	14	6
13.7	3	●	MWS1370MB	72.5	72.5	136.5	134	2.5	14	5
	5	●	MWS1370LB	114.5	114.5	178.5	176	2.5	14	5
	8	□	MWS1370X8DB	156.5	156.5	220.5	218	2.5	14	5
	10	□	MWS1370X10DB	184.5	187.5	251.5	249	2.5	14	6
	15	□	MWS1370X15DB	254.5	257.5	321.5	319	2.5	14	6
	20	□	MWS1370X20DB	324.5	327.5	391.5	389	2.5	14	6
13.8	3	●	MWS1380MB	72.5	72.5	136.5	134	2.5	14	5
	5	●	MWS1380LB	114.5	114.5	178.5	176	2.5	14	5
	8	□	MWS1380X8DB	156.5	156.5	220.5	218	2.5	14	5
	10	□	MWS1380X10DB	184.5	187.5	251.5	249	2.5	14	6
	15	□	MWS1380X15DB	254.5	257.5	321.5	319	2.5	14	6
	20	□	MWS1380X20DB	324.5	327.5	391.5	389	2.5	14	6

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
13.9	3	●	MWS1390MB	72.5	72.5	136.5	134	2.5	14	5
	5	●	MWS1390LB	114.5	114.5	178.5	176	2.5	14	5
	8	□	MWS1390X8DB	156.5	156.5	220.5	218	2.5	14	5
	10	□	MWS1390X10DB	184.5	187.5	251.5	249	2.5	14	6
	15	□	MWS1390X15DB	254.5	257.5	321.5	319	2.5	14	6
	20	□	MWS1390X20DB	324.5	327.5	391.5	389	2.5	14	6
14.0	3	●	MWS1400MB	72.5	72.5	136.5	134	2.5	14	5
	5	●	MWS1400LB	114.5	114.5	178.5	176	2.5	14	5
	8	●	MWS1400X8DB	156.5	156.5	220.5	218	2.5	14	5
	10	●	MWS1400X10DB	184.5	187.5	251.5	249	2.5	14	6
	15	●	MWS1400X15DB	254.5	257.5	321.5	319	2.5	14	6
	20	●	MWS1400X20DB	324.5	327.5	391.5	389	2.5	14	6
14.1	3	●	MWS1410MB	75.1	77.6	142.6	140	2.6	15	5
	5	●	MWS1410LB	118.6	122.6	187.6	185	2.6	15	5
	8	□	MWS1410X8DB	162.6	167.6	227.6	225	2.6	15	5
14.2	3	●	MWS1420MB	75.1	77.6	142.6	140	2.6	15	5
	5	●	MWS1420LB	118.6	122.6	187.6	185	2.6	15	5
	8	●	MWS1420X8DB	162.6	167.6	227.6	225	2.6	15	5
14.3	3	●	MWS1430MB	75.1	77.6	142.6	140	2.6	15	5
	5	●	MWS1430LB	118.6	122.6	187.6	185	2.6	15	5
	8	□	MWS1430X8DB	162.6	167.6	227.6	225	2.6	15	5
14.4	3	●	MWS1440MB	75.1	77.6	142.6	140	2.6	15	5
	5	●	MWS1440LB	118.6	122.6	187.6	185	2.6	15	5
	8	□	MWS1440X8DB	162.6	167.6	227.6	225	2.6	15	5
14.5	3	●	MWS1450MB	75.1	77.6	142.6	140	2.6	15	5
	5	●	MWS1450LB	118.6	122.6	187.6	185	2.6	15	5
	8	●	MWS1450X8DB	162.6	167.6	227.6	225	2.6	15	5
14.6	3	●	MWS1460MB	77.7	77.7	142.7	140	2.7	15	5
	5	●	MWS1460LB	122.7	122.7	187.7	185	2.7	15	5
	8	□	MWS1460X8DB	167.7	167.7	227.7	225	2.7	15	5
14.7	3	●	MWS1470MB	77.7	77.7	142.7	140	2.7	15	5
	5	●	MWS1470LB	122.7	122.7	187.7	185	2.7	15	5
	8	□	MWS1470X8DB	167.7	167.7	227.7	225	2.7	15	5
14.8	3	●	MWS1480MB	77.7	77.7	142.7	140	2.7	15	5
	5	●	MWS1480LB	122.7	122.7	187.7	185	2.7	15	5
	8	□	MWS1480X8DB	167.7	167.7	227.7	225	2.7	15	5
14.9	3	●	MWS1490MB	77.7	77.7	142.7	140	2.7	15	5
	5	●	MWS1490LB	122.7	122.7	187.7	185	2.7	15	5
	8	□	MWS1490X8DB	167.7	167.7	227.7	225	2.7	15	5
15.0	3	●	MWS1500MB	77.7	77.7	142.7	140	2.7	15	5
	5	●	MWS1500LB	122.7	122.7	187.7	185	2.7	15	5
	8	●	MWS1500X8DB	167.7	167.7	227.7	225	2.7	15	5
15.1	3	●	MWS1510MB	80.2	82.7	147.7	145	2.7	16	5
	5	●	MWS1510LB	126.7	130.7	195.7	193	2.7	16	5
	8	□	MWS1510X8DB	173.7	183.7	243.7	241	2.7	16	5
15.2	3	●	MWS1520MB	80.3	82.8	147.8	145	2.8	16	5
	5	●	MWS1520LB	126.8	130.8	195.8	193	2.8	16	5
	8	□	MWS1520X8DB	173.8	183.8	243.8	241	2.8	16	5
15.3	3	●	MWS1530MB	80.3	82.8	147.8	145	2.8	16	5
	5	●	MWS1530LB	126.8	130.8	195.8	193	2.8	16	5
	8	□	MWS1530X8DB	173.8	183.8	243.8	241	2.8	16	5

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
15.4	3	●	MWS1540MB	80.3	82.8	147.8	145	2.8	16	5
	5	●	MWS1540LB	126.8	130.8	195.8	193	2.8	16	5
	8	□	MWS1540X8DB	173.8	183.8	243.8	241	2.8	16	5
15.5	3	●	MWS1550MB	80.3	82.8	147.8	145	2.8	16	5
	5	●	MWS1550LB	126.8	130.8	195.8	193	2.8	16	5
	8	●	MWS1550X8DB	173.8	183.8	243.8	241	2.8	16	5
15.6	3	●	MWS1560MB	82.8	82.8	147.8	145	2.8	16	5
	5	●	MWS1560LB	130.8	130.8	195.8	193	2.8	16	5
	8	□	MWS1560X8DB	178.8	183.8	243.8	241	2.8	16	5
15.7	3	●	MWS1570MB	82.9	82.9	147.9	145	2.9	16	5
	5	●	MWS1570LB	130.9	130.9	195.9	193	2.9	16	5
	8	□	MWS1570X8DB	178.9	183.9	243.9	241	2.9	16	5
15.8	3	●	MWS1580MB	82.9	82.9	147.9	145	2.9	16	5
	5	●	MWS1580LB	130.9	130.9	195.9	193	2.9	16	5
	8	□	MWS1580X8DB	178.9	183.9	243.9	241	2.9	16	5
15.9	3	●	MWS1590MB	82.9	82.9	147.9	145	2.9	16	5
	5	●	MWS1590LB	130.9	130.9	195.9	193	2.9	16	5
	8	□	MWS1590X8DB	178.9	183.9	243.9	241	2.9	16	5
16.0	3	●	MWS1600MB	82.9	82.9	147.9	145	2.9	16	5
	5	●	MWS1600LB	130.9	130.9	195.9	193	2.9	16	5
	8	●	MWS1600X8DB	178.9	183.9	243.9	241	2.9	16	5
16.1	3	□	MWS1610MB	85.4	87.9	152.9	150	2.9	17	5
	5	□	MWS1610LB	134.9	138.9	203.9	201	2.9	17	5
16.2	3	□	MWS1620MB	85.4	87.9	152.9	150	2.9	17	5
	5	□	MWS1620LB	134.9	138.9	203.9	201	2.9	17	5
16.3	3	□	MWS1630MB	85.5	88.0	153.0	150	3.0	17	5
	5	□	MWS1630LB	135.0	139.0	204.0	201	3.0	17	5
16.4	3	□	MWS1640MB	85.5	88.0	153.0	150	3.0	17	5
	5	□	MWS1640LB	135.0	139.0	204.0	201	3.0	17	5
16.5	3	●	MWS1650MB	85.5	88.0	153.0	150	3.0	17	5
	5	●	MWS1650LB	135.0	139.0	204.0	201	3.0	17	5
16.6	3	□	MWS1660MB	88.0	88.0	153.0	150	3.0	17	5
	5	□	MWS1660LB	139.0	139.0	204.0	201	3.0	17	5
16.7	3	□	MWS1670MB	88.0	88.0	153.0	150	3.0	17	5
	5	□	MWS1670LB	139.0	139.0	204.0	201	3.0	17	5
16.8	3	□	MWS1680MB	88.1	88.1	153.1	150	3.1	17	5
	5	□	MWS1680LB	139.1	139.1	204.1	201	3.1	17	5
16.9	3	□	MWS1690MB	88.1	88.1	153.1	150	3.1	17	5
	5	□	MWS1690LB	139.1	139.1	204.1	201	3.1	17	5
17.0	3	●	MWS1700MB	88.1	88.1	153.1	150	3.1	17	5
	5	●	MWS1700LB	139.1	139.1	204.1	201	3.1	17	5
17.1	3	□	MWS1710MB	90.6	93.1	158.1	155	3.1	18	5
	5	□	MWS1710LB	143.1	147.1	212.1	209	3.1	18	5
17.2	3	□	MWS1720MB	90.6	93.1	158.1	155	3.1	18	5
	5	□	MWS1720LB	143.1	147.1	212.1	209	3.1	18	5
17.3	3	□	MWS1730MB	90.6	93.1	158.1	155	3.1	18	5
	5	□	MWS1730LB	143.1	147.1	212.1	209	3.1	18	5
17.4	3	□	MWS1740MB	90.7	93.2	158.2	155	3.2	18	5
	5	□	MWS1740LB	143.2	147.2	212.2	209	3.2	18	5
17.5	3	●	MWS1750MB	90.7	93.2	158.2	155	3.2	18	5
	5	●	MWS1750LB	143.2	147.2	212.2	209	3.2	18	5

DRILLING

CUTTING CONDITIONS ➤ N047

OPERATION GUIDANCE ➤ N051,N052

TECHNICAL DATA ➤ Q001

MWS

WSTAR DRILLS

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
17.6	3	□	MWS1760MB	93.2	93.2	158.2	155	3.2	18	5
	5	□	MWS1760LB	147.2	147.2	212.2	209	3.2	18	5
17.7	3	□	MWS1770MB	93.2	93.2	158.2	155	3.2	18	5
	5	□	MWS1770LB	147.2	147.2	212.2	209	3.2	18	5
17.8	3	□	MWS1780MB	93.2	93.2	158.2	155	3.2	18	5
	5	□	MWS1780LB	147.2	147.2	212.2	209	3.2	18	5
17.9	3	□	MWS1790MB	93.3	93.3	158.3	155	3.3	18	5
	5	□	MWS1790LB	147.3	147.3	212.3	209	3.3	18	5
18.0	3	●	MWS1800MB	93.3	93.3	158.3	155	3.3	18	5
	5	●	MWS1800LB	147.3	147.3	212.3	209	3.3	18	5
18.1	3	□	MWS1810MB	95.8	98.3	163.3	160	3.3	19	5
	5	□	MWS1810LB	151.3	155.3	220.3	217	3.3	19	5
18.2	3	□	MWS1820MB	95.8	98.3	163.3	160	3.3	19	5
	5	□	MWS1820LB	151.3	155.3	220.3	217	3.3	19	5
18.3	3	□	MWS1830MB	95.8	98.3	163.3	160	3.3	19	5
	5	□	MWS1830LB	151.3	155.3	220.3	217	3.3	19	5
18.4	3	□	MWS1840MB	95.8	98.3	163.3	160	3.3	19	5
	5	□	MWS1840LB	151.3	155.3	220.3	217	3.3	19	5
18.5	3	●	MWS1850MB	95.9	98.4	163.4	160	3.4	19	5
	5	●	MWS1850LB	151.4	155.4	220.4	217	3.4	19	5
18.6	3	□	MWS1860MB	98.4	98.4	163.4	160	3.4	19	5
	5	□	MWS1860LB	155.4	155.4	220.4	217	3.4	19	5
18.7	3	□	MWS1870MB	98.4	98.4	163.4	160	3.4	19	5
	5	□	MWS1870LB	155.4	155.4	220.4	217	3.4	19	5
18.8	3	□	MWS1880MB	98.4	98.4	163.4	160	3.4	19	5
	5	□	MWS1880LB	155.4	155.4	220.4	217	3.4	19	5
18.9	3	□	MWS1890MB	98.4	98.4	163.4	160	3.4	19	5
	5	□	MWS1890LB	155.4	155.4	220.4	217	3.4	19	5
19.0	3	●	MWS1900MB	98.5	98.5	163.5	160	3.5	19	5
	5	●	MWS1900LB	155.5	155.5	220.5	217	3.5	19	5
19.1	3	□	MWS1910MB	101.0	103.5	168.5	165	3.5	20	5
	5	□	MWS1910LB	159.5	163.5	228.5	225	3.5	20	5
19.2	3	□	MWS1920MB	101.0	103.5	168.5	165	3.5	20	5
	5	□	MWS1920LB	159.5	163.5	228.5	225	3.5	20	5
19.3	3	□	MWS1930MB	101.0	103.5	168.5	165	3.5	20	5
	5	□	MWS1930LB	159.5	163.5	228.5	225	3.5	20	5
19.4	3	□	MWS1940MB	101.0	103.5	168.5	165	3.5	20	5
	5	□	MWS1940LB	159.5	163.5	228.5	225	3.5	20	5
19.5	3	●	MWS1950MB	101.0	103.5	168.5	165	3.5	20	5
	5	●	MWS1950LB	159.5	163.5	228.5	225	3.5	20	5
19.6	3	□	MWS1960MB	103.6	103.6	168.6	165	3.6	20	5
	5	□	MWS1960LB	163.6	163.6	228.6	225	3.6	20	5
19.7	3	□	MWS1970MB	103.6	103.6	168.6	165	3.6	20	5
	5	□	MWS1970LB	163.6	163.6	228.6	225	3.6	20	5
19.8	3	□	MWS1980MB	103.6	103.6	168.6	165	3.6	20	5
	5	□	MWS1980LB	163.6	163.6	228.6	225	3.6	20	5
19.9	3	□	MWS1990MB	103.6	103.6	168.6	165	3.6	20	5
	5	□	MWS1990LB	163.6	163.6	228.6	225	3.6	20	5
20.0	3	●	MWS2000MB	103.6	103.6	168.6	165	3.6	20	5
	5	●	MWS2000LB	163.6	163.6	228.6	225	3.6	20	5

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
20.5	3	●	MWS2050MB	106.7	108.7	179.7	176	3.7	21	5
	5	●	MWS2050LB	169.7	171.7	242.7	239	3.7	21	5
21.0	3	●	MWS2100MB	108.8	108.8	179.8	176	3.8	21	5
	5	●	MWS2100LB	171.8	171.8	242.8	239	3.8	21	5
21.5	3	●	MWS2150MB	111.9	113.9	185.9	182	3.9	22	5
	5	●	MWS2150LB	177.9	179.9	251.9	248	3.9	22	5
22.0	3	●	MWS2200MB	114.0	114.0	186.0	182	4.0	22	5
	5	●	MWS2200LB	180.0	180.0	252.0	248	4.0	22	5
22.5	3	●	MWS2250MB	117.1	119.1	192.1	188	4.1	23	5
	5	●	MWS2250LB	186.1	188.1	261.1	257	4.1	23	5
23.0	3	●	MWS2300MB	119.2	119.2	192.2	188	4.2	23	5
	5	●	MWS2300LB	188.2	188.2	261.2	257	4.2	23	5
23.5	3	●	MWS2350MB	122.3	124.3	198.3	194	4.3	24	5
	5	●	MWS2350LB	194.3	196.3	270.3	266	4.3	24	5
24.0	3	●	MWS2400MB	124.4	124.4	198.4	194	4.4	24	5
	5	●	MWS2400LB	196.4	196.4	270.4	266	4.4	24	5
24.5	3	●	MWS2450MB	127.5	129.5	204.5	200	4.5	25	5
	5	●	MWS2450LB	202.5	204.5	274.5	270	4.5	25	5
25.0	3	●	MWS2500MB	129.5	129.5	204.5	200	4.5	25	5
	5	●	MWS2500LB	204.5	204.5	274.5	270	4.5	25	5

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

RECOMMENDED CUTTING CONDITIONS

SB/MB/LB/XB/DB Type Drill(l/d<10)

Work Material	Mild Steel (≤180HB) AISI 1010 etc				Carbon Steel·Alloy Steel (180—280HB) AISI 1045, AISI 4140 etc			
Drill Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)
0.5	40	25400	0.01 (0.005—0.015)	250	40	25400	0.01 (0.005—0.015)	250
0.63	40	20200	0.014 (0.008—0.020)	280	40	20200	0.014 (0.008—0.020)	280
0.8	45	17900	0.028 (0.016—0.040)	500	45	17900	0.028 (0.016—0.040)	500
1.0	50	15900	0.035 (0.020—0.050)	555	50	15900	0.035 (0.020—0.050)	555
1.2	50	13200	0.045 (0.030—0.060)	590	50	13200	0.045 (0.030—0.060)	590
1.6	50	9900	0.055 (0.035—0.080)	540	50	9900	0.055 (0.035—0.080)	540
2.0	50	7900	0.07 (0.040—0.100)	550	50	7900	0.07 (0.040—0.100)	550
2.5	60	7600	0.085 (0.050—0.125)	645	60	7600	0.085 (0.050—0.125)	645
3.2	90	8900	0.1 (0.06—0.13)	890	80	7900	0.1 (0.06—0.13)	790
4.0	100	7900	0.12 (0.08—0.16)	945	90	7100	0.12 (0.08—0.16)	850
5.0	100	6300	0.15 (0.10—0.20)	945	90	5700	0.15 (0.10—0.20)	855
6.3	110	5500	0.2 (0.13—0.26)	1100	100	5000	0.2 (0.13—0.26)	1000
8.0	120	4700	0.23 (0.18—0.28)	1080	110	4300	0.23 (0.18—0.28)	985
10.0	130	4100	0.27 (0.22—0.32)	1105	120	3800	0.27 (0.22—0.32)	1025
12.0	140	3700	0.3 (0.26—0.34)	1110	130	3400	0.3 (0.26—0.34)	1020
16.0	160	3100	0.33 (0.27—0.38)	1020	140	2700	0.33 (0.27—0.38)	890
20.0	160	2500	0.35 (0.30—0.40)	875	140	2200	0.35 (0.30—0.40)	770
25.0	160	2000	0.35 (0.30—0.40)	700	140	1700	0.35 (0.30—0.40)	595

Work Material	Carbon Steel·Alloy Steel (280—350HB) AISI 4340 etc				Austenitic Stainless Steel (≤200HB) AISI 304, AISI 316 etc			
Drill Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)
0.5	30	19000	0.01 (0.005—0.015)	190	20	12700	0.008 (0.005—0.010)	100
0.63	30	15100	0.014 (0.008—0.020)	210	20	10100	0.01 (0.008—0.013)	100
0.8	35	13900	0.028 (0.016—0.040)	385	25	9900	0.02 (0.016—0.026)	195
1.0	40	12700	0.035 (0.020—0.050)	440	30	9500	0.03 (0.020—0.044)	285
1.2	40	10600	0.045 (0.030—0.060)	475	30	7900	0.04 (0.030—0.053)	315
1.6	40	7900	0.055 (0.035—0.080)	430	30	5900	0.05 (0.035—0.070)	295
2.0	40	6300	0.07 (0.040—0.100)	440	30	4700	0.06 (0.040—0.080)	280
2.5	50	6300	0.085 (0.050—0.125)	535	40	5000	0.075 (0.050—0.100)	375
3.2	70	6900	0.1 (0.06—0.13)	690	40	3900	0.08 (0.06—0.10)	310
4.0	80	6300	0.11 (0.07—0.14)	690	40	3100	0.09 (0.06—0.11)	275
5.0	80	5000	0.14 (0.09—0.18)	700	40	2500	0.11 (0.08—0.14)	275
6.3	90	4500	0.18 (0.11—0.24)	810	50	2500	0.14 (0.09—0.18)	350
8.0	100	3900	0.21 (0.16—0.25)	815	50	1900	0.15 (0.10—0.19)	285
10.0	110	3500	0.23 (0.19—0.27)	805	50	1500	0.16 (0.12—0.20)	240
12.0	120	3100	0.26 (0.22—0.29)	805	60	1500	0.18 (0.15—0.21)	270
16.0	130	2500	0.28 (0.23—0.33)	700	60	1100	0.19 (0.14—0.24)	205
20.0	130	2000	0.3 (0.26—0.34)	600	60	900	0.21 (0.15—0.26)	185
25.0	130	1600	0.32 (0.28—0.35)	510	60	700	0.21 (0.17—0.25)	145

OPERATION GUIDANCE ➤ N051,N052
TECHNICAL DATA ➤ Q001

DRILLING(SOLID CARBIDE)

MWS

WSTAR DRILLS

Work Material	Gray Cast Iron (≤350MPa) No 45 B etc				Ductile Cast Iron (≤450MPa) 60-40-8 etc			
Drill Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)
0.5	40	25400	0.01 (0.005—0.015)	250	30	19000	0.01 (0.005—0.015)	190
0.63	40	20200	0.014 (0.008—0.020)	280	30	15100	0.014 (0.008—0.020)	210
0.8	45	17900	0.028 (0.016—0.040)	500	35	13900	0.028 (0.016—0.040)	385
1.0	50	15900	0.035 (0.020—0.050)	555	40	12700	0.035 (0.020—0.050)	440
1.2	50	13200	0.045 (0.030—0.060)	590	40	10600	0.045 (0.030—0.060)	475
1.6	50	9900	0.055 (0.035—0.080)	540	40	7900	0.055 (0.035—0.080)	430
2.0	50	7900	0.07 (0.040—0.100)	550	40	6300	0.07 (0.040—0.100)	440
2.5	60	7600	0.085 (0.050—0.125)	645	50	6300	0.085 (0.050—0.125)	535
3.2	90	8900	0.1 (0.06—0.13)	890	65	6400	0.1 (0.06—0.13)	640
4.0	100	7900	0.12 (0.08—0.16)	945	65	5100	0.12 (0.08—0.16)	610
5.0	100	6300	0.15 (0.10—0.20)	945	65	4100	0.15 (0.10—0.20)	615
6.3	110	5500	0.2 (0.13—0.26)	1100	70	3500	0.2 (0.13—0.26)	700
8.0	120	4700	0.25 (0.18—0.31)	1175	70	2700	0.23 (0.18—0.28)	620
10.0	130	4100	0.29 (0.22—0.35)	1185	70	2200	0.27 (0.22—0.32)	590
12.0	140	3700	0.32 (0.26—0.37)	1180	90	2300	0.3 (0.26—0.34)	690
16.0	160	3100	0.35 (0.28—0.42)	1085	90	1700	0.33 (0.28—0.38)	560
20.0	160	2500	0.37 (0.30—0.44)	925	100	1500	0.35 (0.30—0.40)	525
25.0	160	2000	0.37 (0.30—0.44)	740	100	1200	0.35 (0.30—0.40)	420

Work Material	Aluminium Alloy (Si<5%) ASTM A6061, ASTM A7075 etc				Heat Resistant Alloy Inconel718			
Drill Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)
0.5	40	25400	0.014 (0.008—0.020)	355	10	6300	0.006 (0.004—0.008)	35
0.63	40	20200	0.02 (0.012—0.030)	400	10	5000	0.008 (0.007—0.010)	40
0.8	45	17900	0.036 (0.024—0.050)	640	10	3900	0.016 (0.013—0.021)	60
1.0	60	19000	0.05 (0.030—0.075)	950	10	3100	0.02 (0.016—0.027)	60
1.2	70	18500	0.065 (0.045—0.090)	1200	10	2600	0.025 (0.022—0.032)	65
1.6	80	15900	0.085 (0.053—0.120)	1350	10	1900	0.03 (0.025—0.040)	55
2.0	90	14300	0.105 (0.060—0.150)	1500	15	2300	0.04 (0.032—0.050)	90
2.5	100	12700	0.135 (0.075—0.200)	1710	15	1900	0.05 (0.040—0.060)	95
3.2	120	11900	0.23 (0.10—0.35)	2735	20	1900	0.07 (0.05—0.09)	130
4.0	120	9500	0.24 (0.12—0.35)	2280	20	1500	0.09 (0.06—0.11)	135
5.0	120	7600	0.25 (0.15—0.35)	1900	20	1200	0.11 (0.08—0.14)	130
6.3	150	7500	0.35 (0.20—0.50)	2625	25	1200	0.13 (0.09—0.16)	155
8.0	150	5900	0.35 (0.20—0.50)	2065	25	900	0.14 (0.11—0.17)	125
10.0	150	4700	0.5 (0.20—0.80)	2350	25	700	0.15 (0.12—0.17)	105
12.0	160	4200	0.5 (0.20—0.80)	2100	25	600	0.16 (0.13—0.18)	95
16.0	160	3100	0.6 (0.20—1.00)	1860	25	400	0.18 (0.14—0.21)	70
20.0	170	2700	0.6 (0.20—1.00)	1620	30	400	0.19 (0.15—0.22)	75
25.0	170	2100	0.6 (0.20—1.00)	1260	30	300	0.19 (0.15—0.22)	55

RECOMMENDED CUTTING CONDITIONS

DB Type Drill(l/d≥10)

Work Material	Mild Steel (≤180 HB) AISI 1010 etc				Carbon Steel·Alloy Steel (180—280HB) AISI 1045, AISI 4140 etc			
Drill Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)
1.0	50	15900	0.02 (0.010—0.030)	320	40	12700	0.02 (0.010—0.030)	255
1.2	50	13200	0.025 (0.016—0.037)	330	40	10600	0.025 (0.016—0.037)	265
1.6	50	9900	0.055 (0.032—0.080)	545	40	7900	0.055 (0.032—0.080)	435
2.0	60	9500	0.07 (0.040—0.100)	665	50	7900	0.07 (0.040—0.100)	550
2.5	60	7600	0.09 (0.063—0.125)	685	50	6300	0.09 (0.055—0.125)	565
3.2	90	8900	0.1 (0.06—0.13)	890	80	7900	0.1 (0.06—0.13)	790
4.0	90	7100	0.12 (0.08—0.16)	850	80	6300	0.12 (0.08—0.16)	755
5.0	90	5700	0.15 (0.10—0.20)	855	80	5000	0.15 (0.10—0.20)	750
6.3	110	5500	0.2 (0.13—0.26)	1100	90	4500	0.2 (0.13—0.26)	900
8.0	110	4300	0.23 (0.18—0.28)	990	90	3500	0.23 (0.18—0.28)	805
10.0	110	3500	0.26 (0.20—0.32)	910	90	2800	0.26 (0.20—0.32)	730
12.0	130	3400	0.3 (0.25—0.34)	1020	110	2900	0.3 (0.25—0.34)	870
16.0	130	2500	0.31 (0.24—0.38)	775	110	2100	0.31 (0.24—0.38)	650

Work Material	Carbon Steel·Alloy Steel (280—350HB) AISI 4340 etc				Austenitic Stainless Steel (≤200HB) AISI 304, AISI 316 etc			
Drill Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)
1.0	30	9500	0.015 (0.009—0.028)	140	30	9500	0.015 (0.009—0.028)	140
1.2	30	7900	0.02 (0.013—0.035)	160	30	7900	0.02 (0.013—0.035)	155
1.6	30	5900	0.05 (0.027—0.076)	295	30	5900	0.045 (0.025—0.065)	265
2.0	50	7900	0.065 (0.034—0.095)	515	30	4700	0.055 (0.030—0.080)	255
2.5	50	6300	0.08 (0.045—0.120)	505	40	5000	0.06 (0.035—0.085)	300
3.2	70	6900	0.09 (0.05—0.12)	620	40	3900	0.07 (0.05—0.09)	270
4.0	70	5500	0.11 (0.07—0.15)	605	40	3100	0.08 (0.06—0.10)	245
5.0	70	4400	0.14 (0.09—0.19)	615	40	2500	0.1 (0.07—0.12)	250
6.3	80	4000	0.18 (0.11—0.25)	720	50	2500	0.12 (0.08—0.16)	300
8.0	80	3100	0.21 (0.15—0.26)	650	50	1900	0.14 (0.10—0.17)	265
10.0	80	2500	0.23 (0.15—0.30)	575	50	1500	0.15 (0.12—0.18)	225
12.0	90	2300	0.25 (0.19—0.31)	575	60	1500	0.17 (0.14—0.19)	255
16.0	90	1700	0.28 (0.19—0.36)	475	60	1100	0.18 (0.13—0.22)	195

OPERATION GUIDANCE ➤ N051,N052
TECHNICAL DATA ➤ Q001

MWS

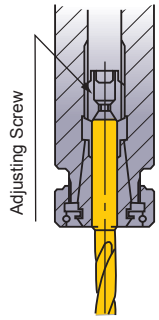
WSTAR DRILLS

Work Material	Gray Cast Iron (≤350MPa) No 45 B etc				Ductile Cast Iron (≤450MPa) 60-40-8 etc			
Drill Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)
1.0	40	12700	0.02 (0.010—0.030)	255	30	9500	0.015 (0.009—0.028)	140
1.2	40	10600	0.025 (0.016—0.037)	265	30	7900	0.02 (0.013—0.035)	160
1.6	40	7900	0.055 (0.032—0.080)	435	30	5900	0.05 (0.027—0.076)	295
2.0	50	7900	0.07 (0.040—0.100)	550	50	7900	0.065 (0.034—0.095)	515
2.5	50	6300	0.09 (0.055—0.125)	565	50	6300	0.08 (0.045—0.120)	505
3.2	90	8900	0.1 (0.06—0.13)	890	50	4900	0.09 (0.05—0.12)	440
4.0	90	7100	0.12 (0.08—0.16)	850	50	3900	0.11 (0.07—0.15)	430
5.0	90	5700	0.15 (0.10—0.20)	855	50	3100	0.14 (0.09—0.19)	435
6.3	110	5500	0.2 (0.13—0.26)	1100	60	3000	0.18 (0.11—0.25)	540
8.0	110	4300	0.23 (0.18—0.28)	990	60	2300	0.21 (0.15—0.26)	480
10.0	110	3500	0.26 (0.20—0.32)	910	60	1900	0.23 (0.15—0.30)	435
12.0	130	3400	0.3 (0.25—0.34)	1020	80	2100	0.25 (0.19—0.31)	525
16.0	130	2500	0.31 (0.24—0.38)	775	80	1500	0.28 (0.19—0.36)	420

Work Material	Aluminium Alloy (Si<5%) ASTM A6061, ASTM A7075 etc				Heat Resistant Alloy Inconel718			
Drill Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)
1.0	50	15900	0.05 (0.030—0.075)	795	10	3100	0.02 (0.016—0.027)	60
1.2	60	15900	0.065 (0.045—0.090)	1035	10	2600	0.025 (0.022—0.032)	65
1.6	70	13900	0.085 (0.053—0.120)	1180	10	1900	0.03 (0.025—0.040)	55
2.0	80	12700	0.105 (0.060—0.150)	1335	15	2300	0.04 (0.032—0.050)	90
2.5	90	11400	0.135 (0.075—0.200)	1540	15	1900	0.05 (0.040—0.060)	95
3.2	100	9900	0.23 (0.10—0.35)	2275	20	1900	0.07 (0.05—0.09)	130
4.0	100	7900	0.24 (0.12—0.35)	1895	20	1500	0.09 (0.06—0.11)	135
5.0	100	6300	0.25 (0.15—0.35)	1575	20	1200	0.11 (0.08—0.14)	130
6.3	130	6500	0.35 (0.20—0.50)	2275	20	1000	0.13 (0.09—0.16)	130
8.0	130	5100	0.35 (0.20—0.50)	1785	20	700	0.14 (0.11—0.16)	100
10.0	130	4100	0.5 (0.20—0.80)	2050	20	600	0.15 (0.12—0.17)	90
12.0	140	3700	0.5 (0.20—0.80)	1850	20	500	0.16 (0.13—0.18)	80
16.0	140	2700	0.5 (0.20—0.80)	1350	20	300	0.17 (0.14—0.19)	50

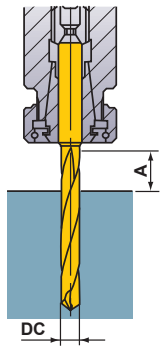
SB/MB/LB/XB Type Drill OPERATIONAL GUIDANCE

Drill Holding



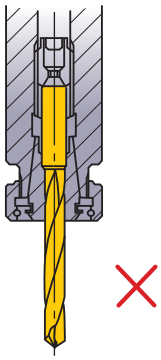
Thrust bearing type collet chuck holds the drill securely.

Drill Length



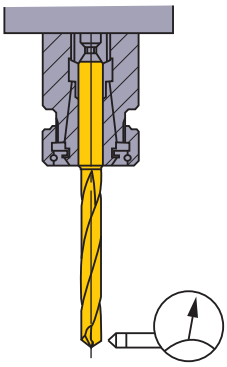
A ≥ DC x 1.5(DC×over 2.0 for DC<3)

Drill Installation



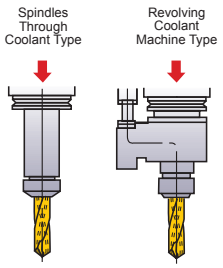
Do not clamp on the flutes.

Installation Tolerance(DC≥3)



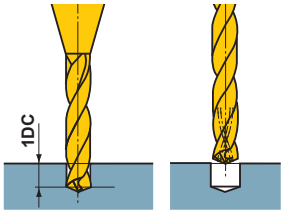
Run-out ≤ 0.03mm

Through Coolant Type(DC≥3)



Coolant pressure is approx. 0.5—1MPa (2-3MPa for DC≤5, 1.5MPa at minimum for DC<3
Recommended coolant pressure:>3Mpa).
Coolant volume is 1.5—4.0l/min. (For DC≥3)

Drill Installation



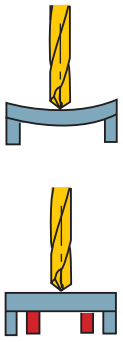
①When machining a prepared hole with the MWE-SB please set the depth to 1DC (DC=drill diameter). For pilot hole drilling when DC is up to 3, use the SB type drill.
②Use the prepared hole as a guide when using a drill with an oil hole. Depending on the cutting conditions, peck feed is recommended.

Coolant Handling

1) Small particles of swarf will jam in the oil hole of small diameter drills. Always use a fine mesh filter as a preventative measure.

2) Dirt and dust particles adhere to the oil in old coolant and prevent an efficient flow. Regular coolant exchange is recommended.

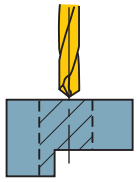
Thin Workpiece



If Bending Occurs ×

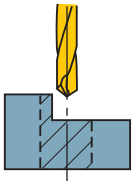
Support the Workpiece ○

Interrupted Cutting(DC≥3)



One Process ○

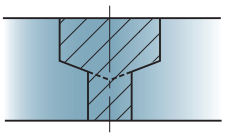
①Lower the feed when drilling the interrupted part.



Requires Prior Machining △

①Spot face with an end mill prior to drilling.

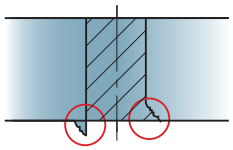
Stepped Holes(DC≥3)



①Divide the two processes.
②Drill the larger hole first.

*A tool for machining both chamfer and spot face can be produced to order.

Burring and Workpiece Chipping(DC≥3)



①Lower the feed rate by 50% at the end of through cutting.
②Add a 45°chamfer.
③Change the point angle.

NOTES ON USE (For DC<3)

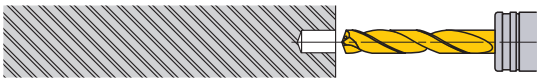
●Please use a fine mesh filter (mesh≤3μm) for coolant to prevent jamming in the oil hole.
●For deep drilling with the long type drill, machining a pilot hole is recommended.
(Otherwise, centrifugal forces may cause drill breakage.)

MWS
WSTAR DRILLS

DB Type Drill(L/D≥10, DC<3) OPERATIONAL GUIDANCE

FLAT FACE DRILLING ●Drilling a blind hole

1. Drilling a pilot hole



①Use the SB type drill.
②Ensure a high precision hole is drilled for the guide.
③Drill depth : Approx 1DC.
(Adjust the pilot hole depth according to the length of the long type drill.)

2. Initial cutting with the long type drill



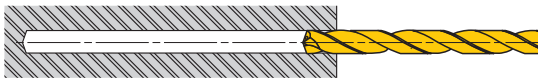
①Penetrate the guide hole at low revolution. (Revolution 1000min^{-1}, feed rate 0.2—0.3mm/rev)
②Stop the long type drill 0.5—1.0mm short of the guide hole bottom.

3. Drill the deep hole



①Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

4. Drill retraction



①After drilling, lower the cutting revolution about 0.5—1.0mm short of the hole end. (Revolution of around 1000min^{-1})
②Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.
③Finally, clear the hole at a cutting speed of 20—30m/min and feed rate of 0.2—0.3mm/rev.

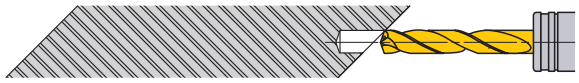
INTERRUPED DRILLING ●Drilling and breaking through on irregular faces or angles

1. Spot facing



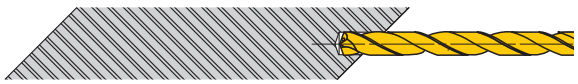
①Machine a flat or the irregular face by using an end mill or slot drill capable of spot facing. Make the spot face diameter the same size as the required deep hole diameter.

2. Drilling a pilot hole



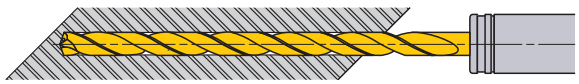
①Use a drill with a larger (flatter) point angle than the long type. TheMWS-SB type is recommended.
②Ensure a high precision hole is drilled for the guide.
③Drill depth : Approx 1DC.
(Adjust the pilot hole depth according to the length of the long type drill.)

3. Initial cutting with the long type drill



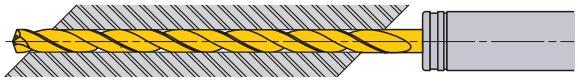
①Penetrate the guide hole at a low revolution. (Revolution 1000min-1, feed rate 0.2—0.3mm/rev)
②Stop the long type drill 0.5—1.0mm short of the guide hole bottom.

4. Drill the deep hole



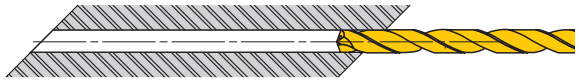
①Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

5. Breaking through



①When breaking through, the cutting edge can be damaged.
②Feed rate should be half the normal feed.

6. Drill retraction

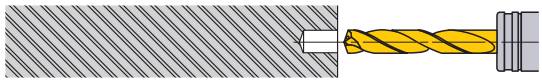


①Finally clear the hole at a revolution speed of 1000min-1 and feed rate of 0.2—0.3mm/rev.
②Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.

OPERATIONAL GUIDANCE FOR THE LONG TYPE DRILL (L/D≥3)

FLAT FACE DRILLING ●Drilling a blind hole

1. Drilling a pilot hole



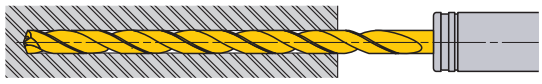
①Use a drill with a larger (flatter) point angle than the super long type. Mitsubishi type MZE, MZS, MWE or MWS is recommended.
②Use a drill with the same diameter as the deep hole drill.
③Drill depth : Approx 1DC or deeper.
④Ensure a high precision hole is drilled for the guide.

2. Initial cutting with the long type drill



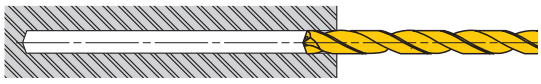
①Penetrate the guide hole at low revolution. (Cutting speed 20–30m/min, feed rate 0.2–0.3mm/rev)
②Stop the long type drill 1–3mm short of the guide hole bottom.

3. Drill the deep hole



①Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

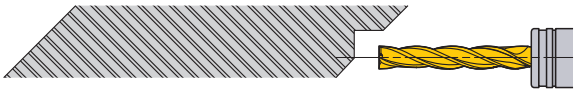
4. Drill retraction



①After drilling, lower the cutting revolution about 1–2mm short of the hole end. (Cutting speed of around 20–30m/min)
②Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.
③Finally, clear the hole at a cutting speed of 20–30m/min and feed rate of 0.2–0.3mm/rev.

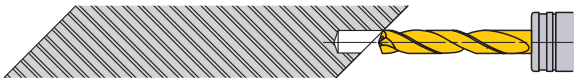
INTERRUPED DRILLING ●Drilling and breaking through on irregular faces or angles

1. Spot facing



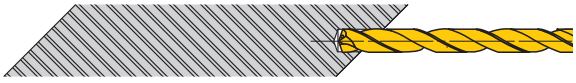
①Machine a flat or the irregular face by using an end mill or slot drill capable of spot facing. Make the spot face diameter the same size as the required deep hole diameter.

2. Drilling a pilot hole



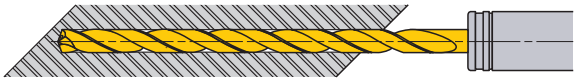
①Use a drill with a larger (flatter) point angle than the super long type. Mitsubishi type MZE, MZS, MWE or MWS is recommended.
②Use a drill with the same diameter as the deep hole drill.
③Drill depth : Approx 1DC or deeper.
④Ensure a high precision hole is drilled for the guide.

3. Initial cutting with the long type drill



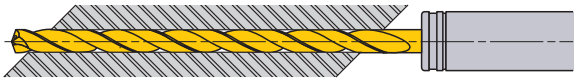
①Penetrate the guide hole at a low revolution. (Cutting speed 20–30m/min, feed rate 0.2–0.3mm/rev)
②Stop the long type drill 1–3mm short of the guide hole bottom.

4. Drill the deep hole



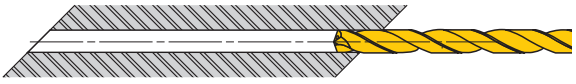
①Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

5. Breaking through



①When breaking through, the cutting edge can be damaged.
②A feed rate of 0.05–0.1mm/rev is recommended.

6. Drill retraction



①Finally clear the hole at a cutting speed of 20–30m/min and feed rate of 0.2–0.3mm/rev.
②Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.

DRILLING(SOLID CARBIDE)

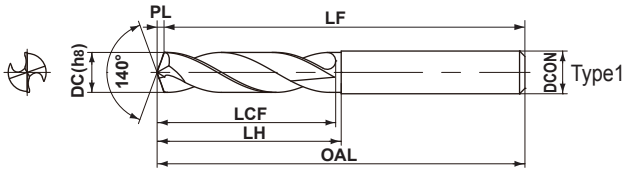
MWE
WSTAR DRILLS

- For high accuracy and efficient drilling of steels, carbon steels and difficult-to-cut materials.
- Also suitable for lower speed applications.

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal	Heat Resistant Alloy	Hardened Steel

	DC=3	3<DC≤6	6<DC≤10	10<DC≤18	18<DC≤25
	0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033
h8 MWE-5A/MA	0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033
h6 MWE-5B/MB	0 −0.006	0 −0.008	0 −0.009	0 −0.011	0 −0.013





(Note 2) MWE-SB/MB drills are suitable for use with shrink fit holders.

External Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
3.0	2	●	MWE0300SA	16.5	16.5	55.5	55	0.5	3.0	1
	2	●	MWE0300SB	16.5	16.5	55.5	55	0.5	3.0	1
	3	●	MWE0300MA	21.5	21.5	60.5	60	0.5	3.0	1
	3	●	MWE0300MB	21.5	21.5	60.5	60	0.5	3.0	1
3.1	2	●	MWE0310SA	18.6	18.6	55.6	55	0.6	3.1	1
	2	□	MWE0310SB	18.6	20.6	55.6	55	0.6	4.0	1
	3	●	MWE0310MA	24.6	24.6	60.6	60	0.6	3.1	1
	3	□	MWE0310MB	24.6	26.6	60.6	60	0.6	4.0	1
3.2	2	●	MWE0320SA	18.6	18.6	55.6	55	0.6	3.2	1
	2	□	MWE0320SB	18.6	20.6	55.6	55	0.6	4.0	1
	3	●	MWE0320MA	24.6	24.6	60.6	60	0.6	3.2	1
	3	□	MWE0320MB	24.6	26.6	60.6	60	0.6	4.0	1
3.3	2	●	MWE0330SA	18.6	18.6	55.6	55	0.6	3.3	1
	2	●	MWE0330SB	18.6	20.6	55.6	55	0.6	4.0	1
	3	●	MWE0330MA	24.6	24.6	60.6	60	0.6	3.3	1
	3	●	MWE0330MB	24.6	26.6	60.6	60	0.6	4.0	1
3.4	2	●	MWE0340SA	20.6	20.6	55.6	55	0.6	3.4	1
	2	●	MWE0340SB	18.6	20.6	55.6	55	0.6	4.0	1
	3	●	MWE0340MA	24.6	24.6	60.6	60	0.6	3.4	1
	3	●	MWE0340MB	24.6	26.6	60.6	60	0.6	4.0	1
3.5	2	●	MWE0350SA	20.6	20.6	55.6	55	0.6	3.5	1
	2	●	MWE0350SB	18.6	20.6	55.6	55	0.6	4.0	1
	3	●	MWE0350MA	24.6	24.6	60.6	60	0.6	3.5	1
	3	●	MWE0350MB	24.6	26.6	60.6	60	0.6	4.0	1
3.6	2	●	MWE0360SA	20.7	20.7	55.7	55	0.7	3.6	1
	2	□	MWE0360SB	20.7	20.7	55.7	55	0.7	4.0	1
	3	●	MWE0360MA	27.7	27.7	60.7	60	0.7	3.6	1
	3	□	MWE0360MB	27.7	27.7	60.7	60	0.7	4.0	1
3.7	2	●	MWE0370SA	20.7	20.7	55.7	55	0.7	3.7	1
	2	●	MWE0370SB	20.7	20.7	55.7	55	0.7	4.0	1
	3	●	MWE0370MA	27.7	27.7	60.7	60	0.7	3.7	1
	3	●	MWE0370MB	27.7	27.7	60.7	60	0.7	4.0	1
3.8	2	●	MWE0380SA	22.7	22.7	55.7	55	0.7	3.8	1
	2	●	MWE0380SB	20.7	20.7	55.7	55	0.7	4.0	1
	3	●	MWE0380MA	27.7	27.7	60.7	60	0.7	3.8	1
	3	●	MWE0380MB	27.7	27.7	60.7	60	0.7	4.0	1

External Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
3.9	2	●	MWE0390SA	22.7	22.7	55.7	55	0.7	3.9	1
	2	●	MWE0390SB	20.7	20.7	55.7	55	0.7	4.0	1
	3	●	MWE0390MA	27.7	27.7	60.7	60	0.7	3.9	1
	3	●	MWE0390MB	27.7	27.7	60.7	60	0.7	4.0	1
4.0	2	●	MWE0400SA	22.7	22.7	55.7	55	0.7	4.0	1
	2	●	MWE0400SB	20.7	20.7	55.7	55	0.7	4.0	1
	3	●	MWE0400MA	27.7	27.7	60.7	60	0.7	4.0	1
	3	●	MWE0400MB	27.7	27.7	60.7	60	0.7	4.0	1
4.1	2	●	MWE0410SA	22.7	22.7	55.7	55	0.7	4.1	1
	2	□	MWE0410SB	22.7	24.7	62.7	62	0.7	5.0	1
	3	●	MWE0410MA	29.7	29.7	63.7	63	0.7	4.1	1
	3	□	MWE0410MB	29.7	31.7	68.7	68	0.7	5.0	1
4.2	2	●	MWE0420SA	22.8	22.8	55.8	55	0.8	4.2	1
	2	●	MWE0420SB	22.8	24.8	62.8	62	0.8	5.0	1
	3	●	MWE0420MA	29.8	29.8	63.8	63	0.8	4.2	1
	3	●	MWE0420MB	29.8	31.8	68.8	68	0.8	5.0	1
4.3	2	●	MWE0430SA	24.8	24.8	58.8	58	0.8	4.3	1
	2	●	MWE0430SB	22.8	24.8	62.8	62	0.8	5.0	1
	3	●	MWE0430MA	29.8	29.8	63.8	63	0.8	4.3	1
	3	●	MWE0430MB	29.8	31.8	68.8	68	0.8	5.0	1
4.4	2	●	MWE0440SA	24.8	24.8	58.8	58	0.8	4.4	1
	2	●	MWE0440SB	22.8	24.8	62.8	62	0.8	5.0	1
	3	●	MWE0440MA	29.8	29.8	63.8	63	0.8	4.4	1
	3	●	MWE0440MB	29.8	31.8	68.8	68	0.8	5.0	1
4.5	2	●	MWE0450SA	24.8	24.8	58.8	58	0.8	4.5	1
	2	●	MWE0450SB	22.8	24.8	62.8	62	0.8	5.0	1
	3	●	MWE0450MA	29.8	29.8	63.8	63	0.8	4.5	1
	3	●	MWE0450MB	29.8	31.8	68.8	68	0.8	5.0	1
4.6	2	●	MWE0460SA	24.8	24.8	58.8	58	0.8	4.6	1
	2	□	MWE0460SB	24.8	24.8	62.8	62	0.8	5.0	1
	3	●	MWE0460MA	32.8	32.8	68.8	68	0.8	4.6	1
	3	□	MWE0460MB	32.8	32.8	68.8	68	0.8	5.0	1
4.7	2	●	MWE0470SA	24.9	24.9	58.9	58	0.9	4.7	1
	2	□	MWE0470SB	24.9	24.9	62.9	62	0.9	5.0	1
	3	●	MWE0470MA	32.9	32.9	68.9	68	0.9	4.7	1
	3	□	MWE0470MB	32.9	32.9	68.9	68	0.9	5.0	1

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

External Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
4.8	2	●	MWE0480SA	26.9	26.9	62.9	62	0.9	4.8	1
	2	□	MWE0480SB	24.9	24.9	62.9	62	0.9	5.0	1
	3	●	MWE0480MA	32.9	32.9	68.9	68	0.9	4.8	1
	3	□	MWE0480MB	32.9	32.9	68.9	68	0.9	5.0	1
4.9	2	●	MWE0490SA	26.9	26.9	62.9	62	0.9	4.9	1
	2	□	MWE0490SB	24.9	24.9	62.9	62	0.9	5.0	1
	3	●	MWE0490MA	32.9	32.9	68.9	68	0.9	4.9	1
	3	□	MWE0490MB	32.9	32.9	68.9	68	0.9	5.0	1
5.0	2	●	MWE0500SA	26.9	26.9	62.9	62	0.9	5.0	1
	2	●	MWE0500SB	24.9	24.9	62.9	62	0.9	5.0	1
	3	●	MWE0500MA	32.9	32.9	68.9	68	0.9	5.0	1
	3	●	MWE0500MB	32.9	32.9	68.9	68	0.9	5.0	1
5.1	2	●	MWE0510SA	26.9	26.9	62.9	62	0.9	5.1	1
	2	●	MWE0510SB	26.9	28.9	66.9	66	0.9	6.0	1
	3	●	MWE0510MA	34.9	34.9	72.9	72	0.9	5.1	1
	3	●	MWE0510MB	34.9	36.9	74.9	74	0.9	6.0	1
5.2	2	●	MWE0520SA	26.9	26.9	62.9	62	0.9	5.2	1
	2	●	MWE0520SB	26.9	28.9	66.9	66	0.9	6.0	1
	3	●	MWE0520MA	34.9	34.9	72.9	72	0.9	5.2	1
	3	●	MWE0520MB	34.9	36.9	74.9	74	0.9	6.0	1
5.3	2	●	MWE0530SA	27.0	27.0	63.0	62	1.0	5.3	1
	2	□	MWE0530SB	27.0	29.0	67.0	66	1.0	6.0	1
	3	●	MWE0530MA	35.0	35.0	73.0	72	1.0	5.3	1
	3	□	MWE0530MB	35.0	37.0	75.0	74	1.0	6.0	1
5.4	2	●	MWE0540SA	29.0	29.0	67.0	66	1.0	5.4	1
	2	□	MWE0540SB	27.0	29.0	67.0	66	1.0	6.0	1
	3	●	MWE0540MA	35.0	35.0	73.0	72	1.0	5.4	1
	3	□	MWE0540MB	35.0	37.0	75.0	74	1.0	6.0	1
5.5	2	●	MWE0550SA	29.0	29.0	67.0	66	1.0	5.5	1
	2	●	MWE0550SB	27.0	29.0	67.0	66	1.0	6.0	1
	3	●	MWE0550MA	35.0	35.0	73.0	72	1.0	5.5	1
	3	●	MWE0550MB	35.0	37.0	75.0	74	1.0	6.0	1
5.6	2	●	MWE0560SA	29.0	29.0	67.0	66	1.0	5.6	1
	2	□	MWE0560SB	29.0	29.0	67.0	66	1.0	6.0	1
	3	●	MWE0560MA	37.0	37.0	75.0	74	1.0	5.6	1
	3	□	MWE0560MB	37.0	37.0	75.0	74	1.0	6.0	1
5.7	2	●	MWE0570SA	29.0	29.0	67.0	66	1.0	5.7	1
	2	□	MWE0570SB	29.0	29.0	67.0	66	1.0	6.0	1
	3	●	MWE0570MA	37.0	37.0	75.0	74	1.0	5.7	1
	3	□	MWE0570MB	37.0	37.0	75.0	74	1.0	6.0	1
5.8	2	●	MWE0580SA	29.1	29.1	67.1	66	1.1	5.8	1
	2	□	MWE0580SB	29.1	29.1	67.1	66	1.1	6.0	1
	3	●	MWE0580MA	37.1	37.1	75.1	74	1.1	5.8	1
	3	□	MWE0580MB	37.1	37.1	75.1	74	1.1	6.0	1
5.9	2	●	MWE0590SA	29.1	29.1	67.1	66	1.1	5.9	1
	2	□	MWE0590SB	29.1	29.1	67.1	66	1.1	6.0	1
	3	●	MWE0590MA	37.1	37.1	75.1	74	1.1	5.9	1
	3	□	MWE0590MB	37.1	37.1	75.1	74	1.1	6.0	1

External Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
6.0	2	●	MWE0600SA	29.1	29.1	67.1	66	1.1	6.0	1
	2	●	MWE0600SB	29.1	29.1	67.1	66	1.1	6.0	1
	3	●	MWE0600MA	42.1	42.1	82.1	81	1.1	6.0	1
	3	●	MWE0600MB	37.1	37.1	75.1	74	1.1	6.0	1
6.1	2	●	MWE0610SA	32.1	32.1	71.1	70	1.1	6.1	1
	2	●	MWE0610SB	32.1	35.1	75.1	74	1.1	7.0	1
	3	●	MWE0610MA	42.1	42.1	82.1	81	1.1	6.1	1
	3	●	MWE0610MB	42.1	45.1	84.1	83	1.1	7.0	1
6.2	2	●	MWE0620SA	32.1	32.1	71.1	70	1.1	6.2	1
	2	●	MWE0620SB	32.1	35.1	75.1	74	1.1	7.0	1
	3	●	MWE0620MA	42.1	42.1	82.1	81	1.1	6.2	1
	3	●	MWE0620MB	42.1	45.1	84.1	83	1.1	7.0	1
6.3	2	●	MWE0630SA	32.1	32.1	71.1	70	1.1	6.3	1
	2	□	MWE0630SB	32.1	35.1	75.1	74	1.1	7.0	1
	3	●	MWE0630MA	42.1	42.1	72.1	81	1.1	6.3	1
	3	□	MWE0630MB	42.1	45.1	84.1	83	1.1	7.0	1
6.4	2	●	MWE0640SA	32.2	32.2	71.2	70	1.2	6.4	1
	2	□	MWE0640SB	32.2	35.2	75.2	74	1.2	7.0	1
	3	●	MWE0640MA	42.2	42.2	82.2	81	1.2	6.4	1
	3	□	MWE0640MB	42.2	45.2	84.2	83	1.2	7.0	1
6.5	2	●	MWE0650SA	32.2	32.2	71.2	70	1.2	6.5	1
	2	●	MWE0650SB	32.2	35.2	75.2	74	1.2	7.0	1
	3	●	MWE0650MA	42.2	42.2	82.2	81	1.2	6.5	1
	3	●	MWE0650MB	42.2	45.2	84.2	83	1.2	7.0	1
6.6	2	●	MWE0660SA	32.2	32.2	71.2	70	1.2	6.6	1
	2	□	MWE0660SB	35.2	35.2	75.2	74	1.2	7.0	1
	3	●	MWE0660MA	44.2	44.2	84.2	83	1.2	6.6	1
	3	□	MWE0660MB	44.2	44.2	84.2	83	1.2	7.0	1
6.7	2	●	MWE0670SA	32.2	32.2	71.2	70	1.2	6.7	1
	2	●	MWE0670SB	35.2	35.2	75.2	74	1.2	7.0	1
	3	●	MWE0670MA	44.2	44.2	84.2	83	1.2	6.7	1
	3	●	MWE0670MB	44.2	44.2	84.2	83	1.2	7.0	1
6.8	2	●	MWE0680SA	35.2	35.2	75.2	74	1.2	6.8	1
	2	●	MWE0680SB	35.2	35.2	75.2	74	1.2	7.0	1
	3	●	MWE0680MA	44.2	44.2	84.2	83	1.2	6.8	1
	3	●	MWE0680MB	44.2	44.2	84.2	83	1.2	7.0	1
6.9	2	●	MWE0690SA	35.3	35.3	75.3	74	1.3	6.9	1
	2	●	MWE0690SB	35.3	35.3	75.3	74	1.3	7.0	1
	3	●	MWE0690MA	44.3	44.3	84.3	83	1.3	6.9	1
	3	●	MWE0690MB	44.3	44.3	84.3	83	1.3	7.0	1
7.0	2	●	MWE0700SA	35.3	35.3	75.3	74	1.3	7.0	1
	2	●	MWE0700SB	35.3	35.3	75.3	74	1.3	7.0	1
	3	●	MWE0700MA	44.3	44.3	84.3	83	1.3	7.0	1
	3	●	MWE0700MB	44.3	44.3	84.3	83	1.3	7.0	1
7.1	2	●	MWE0710SA	35.3	35.3	75.3	74	1.3	7.1	1
	2	□	MWE0710SB	35.3	38.3	80.3	79	1.3	8.0	1
	3	●	MWE0710MA	46.3	46.3	88.3	87	1.3	7.1	1
	3	□	MWE0710MB	46.3	49.3	91.3	90	1.3	8.0	1

CUTTING CONDITIONS ➤ N061
OPERATION GUIDANCE ➤ N062
TECHNICAL DATA ➤ Q001

MWE

WSTAR DRILLS

External Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
7.2	2	●	MWE0720SA	35.3	35.3	75.3	74	1.3	7.2	1
	2	□	MWE0720SB	35.3	38.3	80.3	79	1.3	8.0	1
	3	●	MWE0720MA	46.3	46.3	88.3	87	1.3	7.2	1
	3	□	MWE0720MB	46.3	49.3	91.3	90	1.3	8.0	1
7.3	2	●	MWE0730SA	35.3	35.3	75.3	74	1.3	7.3	1
	2	□	MWE0730SB	35.3	38.3	80.3	79	1.3	8.0	1
	3	●	MWE0730MA	46.3	46.3	88.3	87	1.3	7.3	1
	3	□	MWE0730MB	46.3	49.3	91.3	90	1.3	8.0	1
7.4	2	●	MWE0740SA	35.3	35.3	75.3	74	1.3	7.4	1
	2	□	MWE0740SB	35.3	38.3	80.3	79	1.3	8.0	1
	3	●	MWE0740MA	46.3	46.3	88.3	87	1.3	7.4	1
	3	□	MWE0740MB	46.3	49.3	91.3	90	1.3	8.0	1
7.5	2	●	MWE0750SA	35.4	35.4	75.4	74	1.4	7.5	1
	2	●	MWE0750SB	35.4	38.4	80.4	79	1.4	8.0	1
	3	●	MWE0750MA	46.4	46.4	88.4	87	1.4	7.5	1
	3	●	MWE0750MB	46.4	49.4	91.4	90	1.4	8.0	1
7.6	2	●	MWE0760SA	38.4	38.4	80.4	79	1.4	7.6	1
	2	□	MWE0760SB	38.4	38.4	80.4	79	1.4	8.0	1
	3	●	MWE0760MA	49.4	49.4	91.4	90	1.4	7.6	1
	3	□	MWE0760MB	49.4	49.4	91.4	90	1.4	8.0	1
7.7	2	●	MWE0770SA	38.4	38.4	80.4	79	1.4	7.7	1
	2	●	MWE0770SB	38.4	38.4	80.4	79	1.4	8.0	1
	3	●	MWE0770MA	49.4	49.4	91.4	90	1.4	7.7	1
	3	●	MWE0770MB	49.4	49.4	91.4	90	1.4	8.0	1
7.8	2	●	MWE0780SA	38.4	38.4	80.4	79	1.4	7.8	1
	2	●	MWE0780SB	38.4	38.4	80.4	79	1.4	8.0	1
	3	●	MWE0780MA	49.4	49.4	91.4	90	1.4	7.8	1
	3	●	MWE0780MB	49.4	49.4	91.4	90	1.4	8.0	1
7.9	2	●	MWE0790SA	38.4	38.4	80.4	79	1.4	7.9	1
	2	●	MWE0790SB	38.4	38.4	80.4	79	1.4	8.0	1
	3	●	MWE0790MA	49.4	49.4	91.4	90	1.4	7.9	1
	3	●	MWE0790MB	49.4	49.4	91.4	90	1.4	8.0	1
8.0	2	●	MWE0800SA	38.5	38.5	80.5	79	1.5	8.0	1
	2	●	MWE0800SB	38.5	38.5	80.5	79	1.5	8.0	1
	3	●	MWE0800MA	49.5	49.5	91.5	90	1.5	8.0	1
	3	●	MWE0800MB	49.5	49.5	91.5	90	1.5	8.0	1
8.1	2	●	MWE0810SA	38.5	38.5	80.5	79	1.5	8.1	1
	2	□	MWE0810SB	38.5	41.5	85.5	84	1.5	9.0	1
	3	●	MWE0810MA	54.5	54.5	97.5	96	1.5	8.1	1
	3	□	MWE0810MB	54.5	57.5	99.5	98	1.5	9.0	1
8.2	2	●	MWE0820SA	38.5	38.5	80.5	79	1.5	8.2	1
	2	□	MWE0820SB	38.5	41.5	85.5	84	1.5	9.0	1
	3	●	MWE0820MA	54.5	54.5	97.5	96	1.5	8.2	1
	3	□	MWE0820MB	54.5	57.5	99.5	98	1.5	9.0	1
8.3	2	●	MWE0830SA	38.5	38.5	80.5	79	1.5	8.3	1
	2	□	MWE0830SB	38.5	41.5	85.5	84	1.5	9.0	1
	3	●	MWE0830MA	54.5	54.5	97.5	96	1.5	8.3	1
	3	□	MWE0830MB	54.5	57.5	99.5	98	1.5	9.0	1

External Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
8.4	2	●	MWE0840SA	38.5	38.5	80.5	79	1.5	8.4	1
	2	●	MWE0840SB	38.5	41.5	85.5	84	1.5	9.0	1
	3	●	MWE0840MA	54.5	54.5	97.5	96	1.5	8.4	1
	3	●	MWE0840MB	54.5	57.5	99.5	98	1.5	9.0	1
8.5	2	●	MWE0850SA	38.5	38.5	80.5	79	1.5	8.5	1
	2	●	MWE0850SB	38.5	41.5	85.5	84	1.5	9.0	1
	3	●	MWE0850MA	54.5	54.5	97.5	96	1.5	8.5	1
	3	●	MWE0850MB	54.5	57.5	99.5	98	1.5	9.0	1
8.6	2	●	MWE0860SA	41.6	41.6	85.6	84	1.6	8.6	1
	2	●	MWE0860SB	41.6	41.6	85.6	84	1.6	9.0	1
	3	●	MWE0860MA	56.6	56.6	99.6	98	1.6	8.6	1
	3	●	MWE0860MB	56.6	56.6	99.6	98	1.6	9.0	1
8.7	2	●	MWE0870SA	41.6	41.6	85.6	84	1.6	8.7	1
	2	□	MWE0870SB	41.6	41.6	85.6	84	1.6	9.0	1
	3	●	MWE0870MA	56.6	56.6	99.6	98	1.6	8.7	1
	3	□	MWE0870MB	56.6	56.6	99.6	98	1.6	9.0	1
8.8	2	●	MWE0880SA	41.6	41.6	85.6	84	1.6	8.8	1
	2	□	MWE0880SB	41.6	41.6	85.6	84	1.6	9.0	1
	3	●	MWE0880MA	56.6	56.6	99.6	98	1.6	8.8	1
	3	□	MWE0880MB	56.6	56.6	99.6	98	1.6	9.0	1
8.9	2	●	MWE0890SA	41.6	41.6	85.6	84	1.6	8.9	1
	2	□	MWE0890SB	41.6	41.6	85.6	84	1.6	9.0	1
	3	●	MWE0890MA	56.6	56.6	99.6	98	1.6	8.9	1
	3	□	MWE0890MB	56.6	56.6	99.6	98	1.6	9.0	1
9.0	2	●	MWE0900SA	41.6	41.6	85.6	84	1.6	9.0	1
	2	●	MWE0900SB	41.6	41.6	85.6	84	1.6	9.0	1
	3	●	MWE0900MA	56.6	56.6	99.6	98	1.6	9.0	1
	3	●	MWE0900MB	56.6	56.6	99.6	98	1.6	9.0	1
9.1	2	●	MWE0910SA	41.7	41.7	85.7	84	1.7	9.1	1
	2	□	MWE0910SB	41.7	44.7	90.7	89	1.7	10.0	1
	3	●	MWE0910MA	59.7	59.7	103.7	102	1.7	9.1	1
	3	□	MWE0910MB	59.7	62.7	106.7	105	1.7	10.0	1
9.2	2	●	MWE0920SA	41.7	41.7	85.7	84	1.7	9.2	1
	2	□	MWE0920SB	41.7	44.7	90.7	89	1.7	10.0	1
	3	●	MWE0920MA	59.7	59.7	103.7	102	1.7	9.2	1
	3	□	MWE0920MB	59.7	62.7	106.7	105	1.7	10.0	1
9.3	2	●	MWE0930SA	41.7	41.7	82.7	84	1.7	9.3	1
	2	□	MWE0930SB	41.7	44.7	90.7	89	1.7	10.0	1
	3	●	MWE0930MA	59.7	59.7	103.7	102	1.7	9.3	1
	3	□	MWE0930MB	59.7	62.7	106.7	105	1.7	10.0	1
9.4	2	●	MWE0940SA	41.7	41.7	85.7	84	1.7	9.4	1
	2	●	MWE0940SB	41.7	44.7	90.7	89	1.7	10.0	1
	3	●	MWE0940MA	59.7	59.7	103.7	102	1.7	9.4	1
	3	●	MWE0940MB	59.7	62.7	106.7	105	1.7	10.0	1
9.5	2	●	MWE0950SA	41.7	41.7	85.7	84	1.7	9.5	1
	2	●	MWE0950SB	41.7	44.7	90.7	89	1.7	10.0	1
	3	●	MWE0950MA	59.7	59.7	103.7	102	1.7	9.5	1
	3	●	MWE0950MB	59.7	62.7	106.7	105	1.7	10.0	1

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

External Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
9.6	2	●	MWE0960SA	44.7	44.7	90.7	89	1.7	9.6	1
	2	●	MWE0960SB	44.7	44.7	90.7	89	1.7	10.0	1
	3	●	MWE0960MA	61.7	61.7	106.7	105	1.7	9.6	1
	3	●	MWE0960MB	61.7	61.7	106.7	105	1.7	10.0	1
9.7	2	●	MWE0970SA	44.8	44.8	90.8	89	1.8	9.7	1
	2	□	MWE0970SB	44.8	44.8	90.8	89	1.8	10.0	1
	3	●	MWE0970MA	61.8	61.8	106.8	105	1.8	9.7	1
	3	□	MWE0970MB	61.8	61.8	106.8	105	1.8	10.0	1
9.8	2	●	MWE0980SA	44.8	44.8	90.8	89	1.8	9.8	1
	2	□	MWE0980SB	44.8	44.8	90.8	89	1.8	10.0	1
	3	●	MWE0980MA	61.8	61.8	106.8	105	1.8	9.8	1
	3	□	MWE0980MB	61.8	61.8	106.8	105	1.8	10.0	1
9.9	2	●	MWE0990SA	44.8	44.8	90.8	89	1.8	9.9	1
	2	□	MWE0990SB	44.8	44.8	90.8	89	1.8	10.0	1
	3	●	MWE0990MA	61.8	61.8	106.8	105	1.8	9.9	1
	3	□	MWE0990MB	61.8	61.8	106.8	105	1.8	10.0	1
10.0	2	●	MWE1000SA	44.8	44.8	90.8	89	1.8	10.0	1
	2	●	MWE1000SB	44.8	44.8	90.8	89	1.8	10.0	1
	3	●	MWE1000MA	61.8	61.8	106.8	105	1.8	10.0	1
	3	●	MWE1000MB	61.8	61.8	106.8	105	1.8	10.0	1
10.1	2	●	MWE1010SA	44.8	44.8	90.8	89	1.8	10.1	1
	2	□	MWE1010SB	44.8	47.8	96.8	95	1.8	11.0	1
	3	●	MWE1010MA	67.8	67.8	113.8	112	1.8	10.1	1
	3	□	MWE1010MB	67.8	70.8	115.8	114	1.8	11.0	1
10.2	2	●	MWE1020SA	44.9	44.9	90.9	89	1.9	10.2	1
	2	●	MWE1020SB	44.9	47.9	96.9	95	1.9	11.0	1
	3	●	MWE1020MA	67.9	67.9	113.9	112	1.9	10.2	1
	3	●	MWE1020MB	67.9	70.9	115.9	114	1.9	11.0	1
10.3	2	●	MWE1030SA	44.9	44.9	90.9	89	1.9	10.3	1
	2	●	MWE1030SB	44.9	47.9	96.9	95	1.9	11.0	1
	3	●	MWE1030MA	67.9	67.9	113.9	112	1.9	10.3	1
	3	●	MWE1030MB	67.9	70.9	115.9	114	1.9	11.0	1
10.4	2	●	MWE1040SA	44.9	44.9	90.9	89	1.9	10.4	1
	2	●	MWE1040SB	44.9	47.9	96.9	95	1.9	11.0	1
	3	●	MWE1040MA	67.9	67.9	113.9	112	1.9	10.4	1
	3	●	MWE1040MB	67.9	70.9	115.9	114	1.9	11.0	1
10.5	2	●	MWE1050SA	44.9	44.9	90.9	89	1.9	10.5	1
	2	●	MWE1050SB	44.9	47.9	96.9	95	1.9	11.0	1
	3	●	MWE1050MA	67.9	67.9	113.9	112	1.9	10.5	1
	3	●	MWE1050MB	67.9	70.9	115.9	114	1.9	11.0	1
10.6	2	●	MWE1060SA	44.9	44.9	90.9	89	1.9	10.6	1
	2	□	MWE1060SB	48.9	48.9	96.9	95	1.9	11.0	1
	3	●	MWE1060MA	69.9	69.9	115.9	114	1.9	10.6	1
	3	□	MWE1060MB	69.9	69.9	115.9	114	1.9	11.0	1
10.7	2	●	MWE1070SA	48.9	48.9	96.9	95	1.9	10.7	1
	2	□	MWE1070SB	48.9	48.9	96.9	95	1.9	11.0	1
	3	●	MWE1070MA	69.9	69.9	115.9	114	1.9	10.7	1
	3	□	MWE1070MB	69.9	69.9	115.9	114	1.9	11.0	1

External Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
10.8	2	●	MWE1080SA	49.0	49.0	97.0	95	2.0	10.8	1
	2	□	MWE1080SB	49.0	49.0	97.0	95	2.0	11.0	1
	3	●	MWE1080MA	70.0	70.0	116.0	114	2.0	10.8	1
	3	□	MWE1080MB	70.0	70.0	116.0	114	2.0	11.0	1
10.9	2	●	MWE1090SA	49.0	49.0	97.0	95	2.0	10.9	1
	2	□	MWE1090SB	49.0	49.0	97.0	95	2.0	11.0	1
	3	●	MWE1090MA	70.0	70.0	116.0	114	2.0	10.9	1
	3	□	MWE1090MB	70.0	70.0	116.0	114	2.0	11.0	1
11.0	2	●	MWE1100SA	49.0	49.0	97.0	95	2.0	11.0	1
	2	●	MWE1100SB	49.0	49.0	97.0	95	2.0	11.0	1
	3	●	MWE1100MA	70.0	70.0	116.0	114	2.0	11.0	1
	3	●	MWE1100MB	70.0	70.0	116.0	114	2.0	11.0	1
11.1	2	●	MWE1110SA	49.0	49.0	97.0	95	2.0	11.1	1
	2	□	MWE1110SB	49.0	52.0	97.0	95	2.0	12.0	1
	3	●	MWE1110MA	73.0	73.0	120.0	118	2.0	11.1	1
	3	□	MWE1110MB	73.0	76.0	123.0	121	2.0	12.0	1
11.2	2	●	MWE1120SA	49.0	49.0	97.0	95	2.0	11.2	1
	2	□	MWE1120SB	49.0	52.0	97.0	95	2.0	12.0	1
	3	●	MWE1120MA	73.0	73.0	120.0	118	2.0	11.2	1
	3	□	MWE1120MB	73.0	76.0	123.0	121	2.0	12.0	1
11.3	2	●	MWE1130SA	49.1	49.1	97.1	95	2.1	11.3	1
	2	□	MWE1130SB	49.1	52.1	97.1	95	2.1	12.0	1
	3	●	MWE1130MA	73.1	73.1	120.1	118	2.1	11.3	1
	3	□	MWE1130MB	73.1	76.1	123.1	121	2.1	12.0	1
11.4	2	●	MWE1140SA	49.1	49.1	97.1	95	2.1	11.4	1
	2	□	MWE1140SB	49.1	52.1	97.1	95	2.1	12.0	1
	3	●	MWE1140MA	73.1	73.1	120.1	118	2.1	11.4	1
	3	□	MWE1140MB	73.1	76.1	123.1	121	2.1	12.0	1
11.5	2	●	MWE1150SA	49.1	49.1	97.1	95	2.1	11.5	1
	2	●	MWE1150SB	49.1	52.1	97.1	95	2.1	12.0	1
	3	●	MWE1150MA	73.1	73.1	120.1	118	2.1	11.5	1
	3	●	MWE1150MB	73.1	76.1	123.1	121	2.1	12.0	1
11.6	2	●	MWE1160SA	49.1	49.1	97.1	95	2.1	11.6	1
	2	□	MWE1160SB	49.1	49.1	97.1	95	2.1	12.0	1
	3	●	MWE1160MA	75.1	75.1	123.1	121	2.1	11.6	1
	3	□	MWE1160MB	75.1	75.1	123.1	121	2.1	12.0	1
11.7	2	●	MWE1170SA	49.1	49.1	97.1	95	2.1	11.7	1
	2	□	MWE1170SB	49.1	49.1	97.1	95	2.1	12.0	1
	3	●	MWE1170MA	75.1	75.1	123.1	121	2.1	11.7	1
	3	□	MWE1170MB	75.1	75.1	123.1	121	2.1	12.0	1
11.8	2	●	MWE1180SA	49.1	49.1	97.1	95	2.1	11.8	1
	2	□	MWE1180SB	49.1	49.1	97.1	95	2.1	12.0	1
	3	●	MWE1180MA	75.1	75.1	123.1	121	2.1	11.8	1
	3	□	MWE1180MB	75.1	75.1	123.1	121	2.1	12.0	1
11.9	2	●	MWE1190SA	53.2	53.2	104.2	102	2.2	11.9	1
	2	●	MWE1190SB	49.2	49.2	97.2	95	2.2	12.0	1
	3	●	MWE1190MA	75.2	75.2	123.2	121	2.2	11.9	1
	3	●	MWE1190MB	75.2	75.2	123.2	121	2.2	12.0	1

CUTTING CONDITIONS ➤ N061
OPERATION GUIDANCE ➤ N062
TECHNICAL DATA ➤ Q001

MWE

WSTAR DRILLS

External Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
12.0	2	●	MWE1200SA	53.2	53.2	104.2	102	2.2	12.0	1
	2	●	MWE1200SB	49.2	49.2	97.2	95	2.2	12.0	1
	3	●	MWE1200MA	75.2	75.2	123.2	121	2.2	12.0	1
	3	●	MWE1200MB	75.2	75.2	123.2	121	2.2	12.0	1
12.1	2	●	MWE1210SA	53.2	53.2	104.2	102	2.2	12.1	1
	2	●	MWE1210SB	53.2	56.2	104.2	102	2.2	13.0	1
	3	●	MWE1210MA	78.2	78.2	137.2	135	2.2	12.1	1
	3	●	MWE1210MB	78.2	81.2	139.2	137	2.2	13.0	1
12.2	2	●	MWE1220SA	53.2	53.2	104.2	102	2.2	12.2	1
	2	□	MWE1220SB	53.2	56.2	104.2	102	2.2	13.0	1
	3	●	MWE1220MA	78.2	78.2	137.2	135	2.2	12.2	1
	3	□	MWE1220MB	78.2	81.2	139.2	137	2.2	13.0	1
12.3	2	●	MWE1230SA	53.2	53.2	104.2	102	2.2	12.3	1
	2	□	MWE1230SB	53.2	56.2	104.2	102	2.2	13.0	1
	3	●	MWE1230MA	78.2	78.2	137.2	135	2.2	12.3	1
	3	□	MWE1230MB	78.2	81.2	139.2	137	2.2	13.0	1
12.4	2	●	MWE1240SA	53.3	53.3	104.3	102	2.3	12.4	1
	2	□	MWE1240SB	53.3	56.3	104.3	102	2.3	13.0	1
	3	●	MWE1240MA	78.3	78.3	137.3	135	2.3	12.4	1
	3	□	MWE1240MB	78.3	81.3	139.3	137	2.3	13.0	1
12.5	2	●	MWE1250SA	53.3	53.3	104.3	102	2.3	12.5	1
	2	●	MWE1250SB	53.3	56.3	104.3	102	2.3	13.0	1
	3	●	MWE1250MA	78.3	78.3	137.3	135	2.3	12.5	1
	3	●	MWE1250MB	78.3	81.3	139.3	137	2.3	13.0	1
12.6	2	●	MWE1260SA	53.3	53.3	104.3	102	2.3	12.6	1
	2	□	MWE1260SB	53.3	53.3	104.3	102	2.3	13.0	1
	3	●	MWE1260MA	80.3	80.3	139.3	137	2.3	12.6	1
	3	□	MWE1260MB	80.3	80.3	139.3	137	2.3	13.0	1
12.7	2	●	MWE1270SA	53.3	53.3	104.3	102	2.3	12.7	1
	2	□	MWE1270SB	53.3	53.3	104.3	102	2.3	13.0	1
	3	●	MWE1270MA	80.3	80.3	139.3	137	2.3	12.7	1
	3	□	MWE1270MB	80.3	80.3	139.3	137	2.3	13.0	1
12.8	2	●	MWE1280SA	53.3	53.3	104.3	102	2.3	12.8	1
	2	□	MWE1280SB	53.3	53.3	104.3	102	2.3	13.0	1
	3	●	MWE1280MA	80.3	80.3	139.3	137	2.3	12.8	1
	3	□	MWE1280MB	80.3	80.3	139.3	137	2.3	13.0	1
12.9	2	●	MWE1290SA	53.3	53.3	104.3	102	2.3	12.9	1
	2	□	MWE1290SB	53.3	53.3	104.3	102	2.3	13.0	1
	3	●	MWE1290MA	80.3	80.3	139.3	137	2.3	12.9	1
	3	□	MWE1290MB	80.3	80.3	139.3	137	2.3	13.0	1
13.0	2	●	MWE1300SA	53.4	53.4	104.4	102	2.4	13.0	1
	2	●	MWE1300SB	53.4	53.4	104.4	102	2.4	13.0	1
	3	●	MWE1300MA	80.4	80.4	139.4	137	2.4	13.0	1
	3	●	MWE1300MB	80.4	80.4	139.4	137	2.4	13.0	1
13.1	2	●	MWE1310SA	53.4	53.4	104.4	102	2.4	13.1	1
	2	□	MWE1310SB	56.4	59.4	109.4	107	2.4	14.0	1
	3	●	MWE1310MA	86.4	86.4	146.4	144	2.4	13.1	1
	3	□	MWE1310MB	86.4	89.4	149.4	147	2.4	14.0	1

External Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
13.2	2	●	MWE1320SA	53.4	53.4	104.4	102	2.4	13.2	1
	2	□	MWE1320SB	56.4	59.4	109.4	107	2.4	14.0	1
	3	●	MWE1320MA	86.4	86.4	146.4	144	2.4	13.2	1
	3	□	MWE1320MB	86.4	89.4	149.4	147	2.4	14.0	1
13.3	2	●	MWE1330SA	56.4	56.4	109.4	107	2.4	13.3	1
	2	□	MWE1330SB	56.4	59.4	109.4	107	2.4	14.0	1
	3	●	MWE1330MA	86.4	86.4	146.4	144	2.4	13.3	1
	3	□	MWE1330MB	86.4	89.4	149.4	147	2.4	14.0	1
13.4	2	●	MWE1340SA	56.4	56.4	109.4	107	2.4	13.4	1
	2	□	MWE1340SB	56.4	59.4	109.4	107	2.4	14.0	1
	3	●	MWE1340MA	86.4	86.4	146.4	144	2.4	13.4	1
	3	□	MWE1340MB	86.4	89.4	149.4	147	2.4	14.0	1
13.5	2	●	MWE1350SA	56.5	56.5	109.5	107	2.5	13.5	1
	2	●	MWE1350SB	56.5	59.5	109.5	107	2.5	14.0	1
	3	●	MWE1350MA	86.5	86.5	146.5	144	2.5	13.5	1
	3	●	MWE1350MB	86.5	89.5	149.5	147	2.5	14.0	1
13.6	2	●	MWE1360SA	56.5	56.5	109.5	107	2.5	13.6	1
	2	□	MWE1360SB	56.5	56.5	109.5	107	2.5	14.0	1
	3	●	MWE1360MA	88.5	88.5	149.5	147	2.5	13.6	1
	3	□	MWE1360MB	88.5	88.5	149.5	147	2.5	14.0	1
13.7	2	●	MWE1370SA	56.5	56.5	109.5	107	2.5	13.7	1
	2	□	MWE1370SB	56.5	56.5	109.5	107	2.5	14.0	1
	3	●	MWE1370MA	88.5	88.5	149.5	147	2.5	13.7	1
	3	□	MWE1370MB	88.5	88.5	149.5	147	2.5	14.0	1
13.8	2	●	MWE1380SA	56.5	56.5	109.5	107	2.5	13.8	1
	2	□	MWE1380SB	56.5	56.5	109.5	107	2.5	14.0	1
	3	●	MWE1380MA	88.5	88.5	149.5	147	2.5	13.8	1
	3	□	MWE1380MB	88.5	88.5	149.5	147	2.5	14.0	1
13.9	2	●	MWE1390SA	56.5	56.5	109.5	107	2.5	13.9	1
	2	●	MWE1390SB	56.5	56.5	109.5	107	2.5	14.0	1
	3	●	MWE1390MA	88.5	88.5	149.5	147	2.5	13.9	1
	3	●	MWE1390MB	88.5	88.5	149.5	147	2.5	14.0	1
14.0	2	●	MWE1400SA	56.5	56.5	109.5	107	2.5	14.0	1
	2	●	MWE1400SB	56.5	56.5	109.5	107	2.5	14.0	1
	3	●	MWE1400MA	88.5	88.5	149.5	147	2.5	14.0	1
	3	●	MWE1400MB	88.5	88.5	149.5	147	2.5	14.0	1
14.1	2	●	MWE1410SA	58.6	58.6	113.6	111	2.6	14.1	1
	2	●	MWE1410SB	58.6	61.6	113.6	111	2.6	15.0	1
	3	●	MWE1410MA	91.6	91.6	153.6	151	2.6	14.1	1
	3	●	MWE1410MB	91.6	94.6	155.6	153	2.6	15.0	1
14.2	2	●	MWE1420SA	58.6	58.6	113.6	111	2.6	14.2	1
	2	□	MWE1420SB	58.6	61.6	113.6	111	2.6	15.0	1
	3	●	MWE1420MA	91.6	91.6	153.6	151	2.6	14.2	1
	3	□	MWE1420MB	91.6	94.6	155.6	153	2.6	15.0	1
14.3	2	□	MWE1430SA	58.6	58.6	113.6	111	2.6	14.3	1
	2	□	MWE1430SB	58.6	61.6	113.6	111	2.6	15.0	1
	3	●	MWE1430MA	91.6	91.6	153.6	151	2.6	14.3	1
	3	□	MWE1430MB	91.6	94.6	155.6	153	2.6	15.0	1

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

External Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
14.4	2	□	MWE1440SA	58.6	58.6	113.6	111	2.6	14.4	1
	2	□	MWE1440SB	58.6	61.6	113.6	111	2.6	15.0	1
	3	●	MWE1440MA	91.6	91.6	153.6	151	2.6	14.4	1
	3	□	MWE1440MB	91.6	94.6	155.6	153	2.6	15.0	1
14.5	2	●	MWE1450SA	58.6	58.6	113.6	111	2.6	14.5	1
	2	●	MWE1450SB	58.6	61.6	113.6	111	2.6	15.0	1
	3	●	MWE1450MA	91.6	91.6	153.6	151	2.6	14.5	1
	3	●	MWE1450MB	91.6	94.6	155.6	153	2.6	15.0	1
14.6	2	□	MWE1460SA	58.7	58.7	113.7	111	2.7	14.6	1
	2	□	MWE1460SB	58.7	58.7	113.7	111	2.7	15.0	1
	3	●	MWE1460MA	93.7	93.7	155.7	153	2.7	14.6	1
	3	□	MWE1460MB	93.7	93.7	155.7	153	2.7	15.0	1
14.7	2	□	MWE1470SA	58.7	58.7	113.7	111	2.7	14.7	1
	2	□	MWE1470SB	58.7	58.7	113.7	111	2.7	15.0	1
	3	●	MWE1470MA	93.7	93.7	155.7	153	2.7	14.7	1
	3	□	MWE1470MB	93.7	93.7	155.7	153	2.7	15.0	1
14.8	2	□	MWE1480SA	58.7	58.7	113.7	111	2.7	14.8	1
	2	□	MWE1480SB	58.7	58.7	113.7	111	2.7	15.0	1
	3	●	MWE1480MA	93.7	93.7	155.7	153	2.7	14.8	1
	3	□	MWE1480MB	93.7	93.7	155.7	153	2.7	15.0	1
14.9	2	□	MWE1490SA	58.7	58.7	113.7	111	2.7	14.9	1
	2	□	MWE1490SB	58.7	58.7	113.7	111	2.7	15.0	1
	3	●	MWE1490MA	93.7	93.7	155.7	153	2.7	14.9	1
	3	□	MWE1490MB	93.7	93.7	155.7	153	2.7	15.0	1
15.0	2	●	MWE1500SA	58.7	58.7	113.7	111	2.7	15.0	1
	2	●	MWE1500SB	58.7	58.7	113.7	111	2.7	15.0	1
	3	●	MWE1500MA	93.7	93.7	155.7	153	2.7	15.0	1
	3	●	MWE1500MB	93.7	93.7	155.7	153	2.7	15.0	1
15.1	2	□	MWE1510SA	60.7	60.7	117.7	115	2.7	15.1	1
	2	□	MWE1510SB	60.7	63.7	117.7	115	2.7	16.0	1
	3	●	MWE1510MA	96.7	96.7	159.7	157	2.7	15.1	1
	3	□	MWE1510MB	96.7	99.7	162.7	160	2.7	16.0	1
15.2	2	●	MWE1520SA	60.8	60.8	117.8	115	2.8	15.2	1
	2	□	MWE1520SB	60.8	63.8	117.8	115	2.8	16.0	1
	3	●	MWE1520MA	96.8	96.8	159.8	157	2.8	15.2	1
	3	□	MWE1520MB	96.8	99.8	162.8	160	2.8	16.0	1
15.3	2	□	MWE1530SA	60.8	60.8	117.8	115	2.8	15.3	1
	2	□	MWE1530SB	60.8	63.8	117.8	115	2.8	16.0	1
	3	●	MWE1530MA	96.8	96.8	159.8	157	2.8	15.3	1
	3	□	MWE1530MB	96.8	99.8	162.8	160	2.8	16.0	1
15.4	2	□	MWE1540SA	60.8	60.8	117.8	115	2.8	15.4	1
	2	●	MWE1540SB	60.8	63.8	117.8	115	2.8	16.0	1
	3	●	MWE1540MA	96.8	96.8	159.8	157	2.8	15.4	1
	3	●	MWE1540MB	96.8	99.8	162.8	160	2.8	16.0	1
15.5	2	●	MWE1550SA	60.8	60.8	117.8	115	2.8	15.5	1
	2	●	MWE1550SB	60.8	63.8	117.8	115	2.8	16.0	1
	3	●	MWE1550MA	96.8	96.8	159.8	157	2.8	15.5	1
	3	●	MWE1550MB	96.8	99.8	162.8	160	2.8	16.0	1

External Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
15.6	2	□	MWE1560SA	60.8	60.8	117.8	115	2.8	15.6	1
	2	●	MWE1560SB	60.8	60.8	117.8	115	2.8	16.0	1
	3	●	MWE1560MA	98.8	98.8	162.8	160	2.8	15.6	1
	3	●	MWE1560MB	98.8	98.8	162.8	160	2.8	16.0	1
15.7	2	□	MWE1570SA	60.9	60.9	117.9	115	2.9	15.7	1
	2	□	MWE1570SB	60.9	60.9	117.9	115	2.9	16.0	1
	3	●	MWE1570MA	98.9	98.9	162.9	160	2.9	15.7	1
	3	□	MWE1570MB	98.9	98.9	162.9	160	2.9	16.0	1
15.8	2	□	MWE1580SA	60.9	60.9	117.9	115	2.9	15.8	1
	2	□	MWE1580SB	60.9	60.9	117.9	115	2.9	16.0	1
	3	●	MWE1580MA	98.9	98.9	162.9	160	2.9	15.8	1
	3	□	MWE1580MB	98.9	98.9	162.9	160	2.9	16.0	1
15.9	2	□	MWE1590SA	60.9	60.9	117.9	115	2.9	15.9	1
	2	□	MWE1590SB	60.9	60.9	117.9	115	2.9	16.0	1
	3	●	MWE1590MA	98.9	98.9	162.9	160	2.9	15.9	1
	3	□	MWE1590MB	98.9	98.9	162.9	160	2.9	16.0	1
16.0	2	●	MWE1600SA	60.9	60.9	117.9	115	2.9	16.0	1
	2	●	MWE1600SB	60.9	60.9	117.9	115	2.9	16.0	1
	3	●	MWE1600MA	98.9	98.9	162.9	160	2.9	16.0	1
	3	●	MWE1600MB	98.9	98.9	162.9	160	2.9	16.0	1
16.1	2	□	MWE1610SA	62.9	62.9	121.9	119	2.9	16.1	1
	3	□	MWE1610MA	104.9	104.9	169.9	167	2.9	16.1	1
16.2	2	●	MWE1620SA	62.9	62.9	121.9	119	2.9	16.2	1
	3	□	MWE1620MA	104.9	104.9	169.9	167	2.9	16.2	1
16.3	2	●	MWE1630SA	63.0	63.0	122.0	119	3.0	16.3	1
	3	□	MWE1630MA	105.0	105.0	170.0	167	3.0	16.3	1
16.4	2	□	MWE1640SA	63.0	63.0	122.0	119	3.0	16.4	1
	3	□	MWE1640MA	105.0	105.0	170.0	167	3.0	16.4	1
16.5	2	●	MWE1650SA	63.0	63.0	122.0	119	3.0	16.5	1
	3	●	MWE1650MA	105.0	105.0	170.0	167	3.0	16.5	1
16.6	2	□	MWE1660SA	63.0	63.0	122.0	119	3.0	16.6	1
	3	□	MWE1660MA	105.0	105.0	170.0	167	3.0	16.6	1
16.7	2	□	MWE1670SA	63.0	63.0	122.0	119	3.0	16.7	1
	3	□	MWE1670MA	105.0	105.0	170.0	167	3.0	16.7	1
16.8	2	□	MWE1680SA	63.1	63.1	122.1	119	3.1	16.8	1
	3	□	MWE1680MA	105.1	105.1	170.1	167	3.1	16.8	1
16.9	2	□	MWE1690SA	63.1	63.1	122.1	119	3.1	16.9	1
	3	□	MWE1690MA	105.1	105.1	170.1	167	3.1	16.9	1
17.0	2	●	MWE1700SA	63.1	63.1	122.1	119	3.1	17.0	1
	3	●	MWE1700MA	105.1	105.1	170.1	167	3.1	17.0	1
17.1	2	□	MWE1710SA	65.1	65.1	126.1	123	3.1	17.1	1
	3	□	MWE1710MA	105.1	105.1	170.1	167	3.1	17.1	1
17.2	2	□	MWE1720SA	65.1	65.1	126.1	123	3.1	17.2	1
	3	□	MWE1720MA	105.1	105.1	170.1	167	3.1	17.2	1
17.3	2	□	MWE1730SA	65.1	65.1	126.1	123	3.1	17.3	1
	3	□	MWE1730MA	105.1	105.1	170.1	167	3.1	17.3	1
17.4	2	□	MWE1740SA	65.2	65.2	126.2	123	3.2	17.4	1
	3	□	MWE1740MA	105.2	105.2	170.2	167	3.2	17.4	1

DRILLING

CUTTING CONDITIONS ➤ N061
OPERATION GUIDANCE ➤ N062
TECHNICAL DATA ➤ Q001

MWE

WSTAR DRILLS

External Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
17.5	2	●	MWE1750SA	65.2	65.2	126.2	123	3.2	17.5	1
	3	●	MWE1750MA	105.2	105.2	170.2	167	3.2	17.5	1
17.6	2	□	MWE1760SA	65.2	65.2	126.2	123	3.2	17.6	1
	3	□	MWE1760MA	105.2	105.2	170.2	167	3.2	17.6	1
17.7	2	□	MWE1770SA	65.2	65.2	126.2	123	3.2	17.7	1
	3	□	MWE1770MA	105.2	105.2	170.2	167	3.2	17.7	1
17.8	2	●	MWE1780SA	65.2	65.2	126.2	123	3.2	17.8	1
	3	□	MWE1780MA	105.2	105.2	170.2	167	3.2	17.8	1
17.9	2	□	MWE1790SA	65.3	65.3	126.3	123	3.3	17.9	1
	3	□	MWE1790MA	105.3	105.3	170.3	167	3.3	17.9	1
18.0	2	●	MWE1800SA	65.3	65.3	126.3	123	3.3	18.0	1
	3	●	MWE1800MA	105.3	105.3	170.3	167	3.3	18.0	1
18.1	2	□	MWE1810SA	67.3	67.3	130.3	127	3.3	18.1	1
	3	□	MWE1810MA	117.3	117.3	182.3	179	3.3	18.1	1
18.2	2	□	MWE1820SA	67.3	67.3	130.3	127	3.3	18.2	1
	3	□	MWE1820MA	117.3	117.3	182.3	179	3.3	18.2	1
18.3	2	□	MWE1830SA	67.3	67.3	130.3	127	3.3	18.3	1
	3	□	MWE1830MA	117.3	117.3	182.3	179	3.3	18.3	1
18.4	2	□	MWE1840SA	67.3	67.3	130.3	127	3.3	18.4	1
	3	□	MWE1840MA	117.3	117.3	182.3	179	3.3	18.4	1
18.5	2	●	MWE1850SA	67.4	67.4	130.4	127	3.4	18.5	1
	3	●	MWE1850MA	117.4	117.4	182.4	179	3.4	18.5	1
18.6	2	□	MWE1860SA	67.4	67.4	130.4	127	3.4	18.6	1
	3	□	MWE1860MA	117.4	117.4	182.4	179	3.4	18.6	1
18.7	2	□	MWE1870SA	67.4	67.4	130.4	127	3.4	18.7	1
	3	□	MWE1870MA	117.4	117.4	182.4	179	3.4	18.7	1
18.8	2	□	MWE1880SA	67.4	67.4	130.4	127	3.4	18.8	1
	3	□	MWE1880MA	117.4	117.4	182.4	179	3.4	18.8	1
18.9	2	□	MWE1890SA	67.4	67.4	130.4	127	3.4	18.9	1
	3	□	MWE1890MA	117.4	117.4	182.4	179	3.4	18.9	1
19.0	2	●	MWE1900SA	67.5	67.5	130.5	127	3.5	19.0	1
	3	●	MWE1900MA	117.5	117.5	182.5	179	3.5	19.0	1
19.1	2	□	MWE1910SA	69.5	69.5	134.5	131	3.5	19.1	1
	3	□	MWE1910MA	117.5	117.5	182.5	179	3.5	19.1	1
19.2	2	□	MWE1920SA	69.5	69.5	134.5	131	3.5	19.2	1
	3	□	MWE1920MA	117.5	117.5	182.5	179	3.5	19.2	1
19.3	2	□	MWE1930SA	69.5	69.5	134.5	131	3.5	19.3	1
	3	□	MWE1930MA	117.5	117.5	182.5	179	3.5	19.3	1
19.4	2	□	MWE1940SA	69.5	69.5	134.5	131	3.5	19.4	1
	3	□	MWE1940MA	117.5	117.5	182.5	179	3.5	19.4	1
19.5	2	●	MWE1950SA	69.5	69.5	134.5	131	3.5	19.5	1
	3	●	MWE1950MA	117.5	117.5	182.5	179	3.5	19.5	1
19.6	2	□	MWE1960SA	69.6	69.6	134.6	131	3.6	19.6	1
	3	□	MWE1960MA	117.6	117.6	182.6	179	3.6	19.6	1
19.7	2	□	MWE1970SA	69.6	69.6	134.6	131	3.6	19.7	1
	3	□	MWE1970MA	117.6	117.6	182.6	179	3.6	19.7	1
19.8	2	□	MWE1980SA	69.6	69.6	134.6	131	3.6	19.8	1
	3	□	MWE1980MA	117.6	117.6	182.6	179	3.6	19.8	1

External Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
19.9	2	□	MWE1990SA	69.6	69.6	134.6	131	3.6	19.9	1
	3	□	MWE1990MA	117.6	117.6	182.6	179	3.6	19.9	1
20.0	2	●	MWE2000SA	69.6	69.6	134.6	131	3.6	20.0	1
	3	●	MWE2000MA	117.6	117.6	182.6	179	3.6	20.0	1

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

RECOMMENDED CUTTING CONDITIONS

Work Material	Mild Steel (≤180HB) AISI 1010 etc			Carbon steel, Alloy steel (180−280HB) AISI 1045, AISI 4140 etc			Carbon steel, Alloy steel (280−350HB) AISI 4340 etc		
Drill Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)		Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)		Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	
3.0	6400	0.1	(0.06−0.13)	5900	0.1	(0.06−0.13)	5400	0.09	(0.06−0.12)
4.0	5500	0.12	(0.08−0.16)	5100	0.12	(0.08−0.16)	4700	0.11	(0.07−0.14)
5.0	4400	0.15	(0.10−0.20)	4100	0.15	(0.10−0.20)	3800	0.14	(0.09−0.18)
6.3	4000	0.2	(0.13−0.26)	3700	0.2	(0.13−0.26)	3500	0.18	(0.11−0.24)
8.0	3300	0.23	(0.18−0.28)	3100	0.23	(0.18−0.28)	2900	0.21	(0.16−0.25)
10.0	2800	0.27	(0.22−0.32)	2700	0.27	(0.22−0.32)	2500	0.23	(0.19−0.27)
12.0	2500	0.31	(0.28−0.34)	2300	0.31	(0.28−0.34)	2200	0.26	(0.23−0.29)
16.0	1900	0.33	(0.28−0.38)	1700	0.33	(0.28−0.38)	1600	0.29	(0.24−0.33)
20.0	1500	0.35	(0.30−0.40)	1400	0.35	(0.30−0.40)	1300	0.3	(0.26−0.34)

Work Material	Austenitic Stainless Steel (≤200HB) AISI 304, AISI 316 etc			Gray Cast Iron (≤350MPa) No 45 B etc			Ductile Cast Iron (≤450MPa) 60-40-8 etc		
Drill Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)		Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)		Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	
3.0	1900	0.07	(0.05−0.08)	6900	0.1	(0.06−0.13)	6400	0.1	(0.06−0.13)
4.0	1500	0.08	(0.06−0.10)	5500	0.12	(0.08−0.16)	5100	0.12	(0.08−0.16)
5.0	1200	0.1	(0.07−0.13)	4400	0.15	(0.10−0.20)	4100	0.15	(0.10−0.20)
6.3	1200	0.13	(0.09−0.17)	3700	0.2	(0.13−0.26)	3500	0.2	(0.13−0.26)
8.0	900	0.14	(0.10−0.18)	2900	0.25	(0.18−0.31)	2700	0.23	(0.18−0.28)
10.0	700	0.16	(0.12−0.19)	2300	0.29	(0.22−0.35)	2200	0.27	(0.22−0.32)
12.0	600	0.18	(0.15−0.20)	2100	0.33	(0.28−0.37)	1900	0.31	(0.28−0.34)
16.0	400	0.19	(0.15−0.23)	1500	0.35	(0.28−0.42)	1400	0.33	(0.28−0.38)
20.0	300	0.2	(0.15−0.24)	1300	0.37	(0.30−0.44)	1200	0.35	(0.30−0.40)

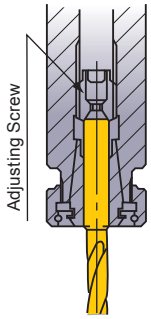
Work Material	Aluminium Alloy (Si<5%)			Heat Resistant Alloy Inconel718 etc			Hardened Steel (40−55HRC) AISI H13, L6 etc		
Drill Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)		Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)		Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	
3.0	7900	0.1	(0.06−0.13)	1900	0.07	(0.05−0.09)	1900	0.07	(0.05−0.09)
4.0	6300	0.12	(0.08−0.16)	1500	0.09	(0.06−0.11)	1500	0.09	(0.06−0.11)
5.0	5000	0.15	(0.10−0.20)	1200	0.11	(0.08−0.14)	1200	0.11	(0.08−0.14)
6.3	4500	0.2	(0.13−0.26)	1200	0.14	(0.09−0.19)	1200	0.14	(0.09−0.19)
8.0	3500	0.23	(0.18−0.28)	900	0.14	(0.11−0.17)	900	0.14	(0.11−0.17)
10.0	2800	0.27	(0.22−0.32)	700	0.16	(0.12−0.19)	700	0.16	(0.12−0.19)
12.0	2600	0.31	(0.28−0.34)	600	0.16	(0.13−0.18)	600	0.16	(0.13−0.18)
16.0	1900	0.33	(0.28−0.38)	400	0.18	(0.14−0.21)	400	0.18	(0.14−0.21)
20.0	1700	0.35	(0.30−0.40)	400	0.19	(0.15−0.22)	400	0.19	(0.15−0.22)

MWE

WSTAR DRILLS

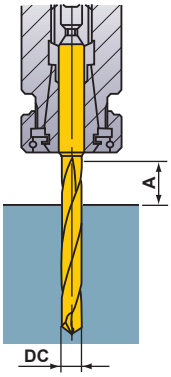
OPERATIONAL GUIDANCE

Drill Holding



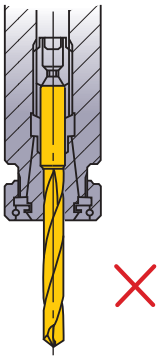
Thrust bearing type collet chuck holds the drill securely.

Drill Length



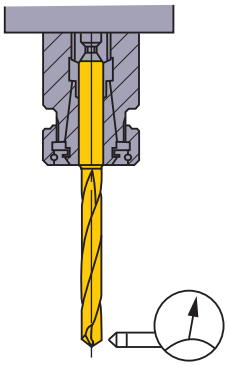
A ≥ DC x 1.5

Drill Installation



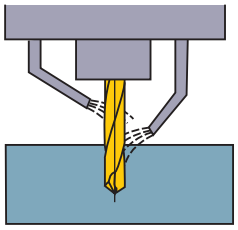
Do not clamp on the flutes.

Installation Tolerance



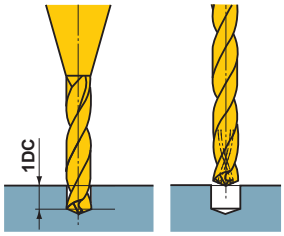
Run-out ≤ 0.03mm

Coolant Method



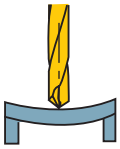
Two coolant positions, at the end and at the center are ideal.

Drill Installation

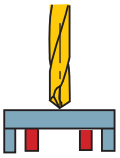


①When machining a prepared hole with the MZE-SB please set the depth to 1DC (DC=drill diameter).
②Use the prepared hole as a guide when using a drill with an oil hole. Depending on the cutting conditions, peck feed is recommended.

Thin Workpiece

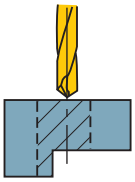


If Bending Occurs ×



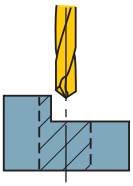
Support the Workpiece ○

Interrupted Cutting



One Process ○

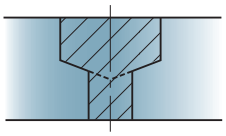
①Lower the feed when drilling the interrupted part.



Requires Prior Machining △

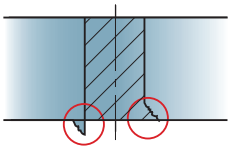
①Spot face with an end mill prior to drilling.

Stepped Holes



①Divide the two processes.
②Drill the larger hole first.
*A tool for machining both chamfer and spot face can be produced to order.

Burring and Workpiece Chipping



①Lower the feed rate by 50% at the end of through cutting.
②Add a 45°chamfer.
③Change the point angle.

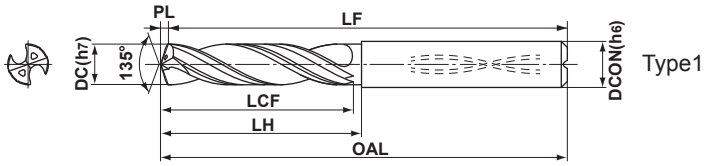
MQS
WSTAR DRILLS

- New grade DP3020, unique coolant system, triple margin.
- High efficiency and high accuracy machining of steel and cast iron is possible.

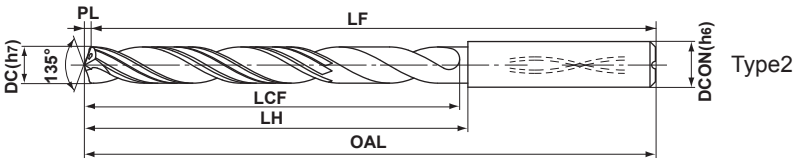
P	M	K	N	S	H
Steel		Cast Iron			

	DC=3	3<DC≤6	6<DC≤10	10<DC≤18	18<DC≤20
	0 −0.012	0 −0.012	0 −0.015	0 −0.018	0 −0.021
h6	0 −0.006	0 −0.008	0 −0.009	0 −0.011	0 −0.013





Type1



Type2

(Note) MQS drills are suitable for use with shrink fit holders.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP3020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
3.0	3	●	MQS0300X3DB	21.6	23.6	70.6	70	0.6	3	1
	5	●	MQS0300X5DB	28.6	31.6	78.6	78	0.6	3	1
NEW	8	●	MQS0300X8DB	35.6	35.6	81.6	81	0.6	3	1
3.1	3	●	MQS0310X3DB	21.6	23.6	70.6	70	0.6	4	1
	5	●	MQS0310X5DB	28.6	31.6	78.6	78	0.6	4	1
3.2	3	●	MQS0320X3DB	21.7	23.7	70.7	70	0.7	4	1
	5	●	MQS0320X5DB	28.7	31.7	78.7	78	0.7	4	1
3.3	3	●	MQS0330X3DB	21.7	23.7	70.7	70	0.7	4	1
	5	●	MQS0330X5DB	28.7	31.7	78.7	78	0.7	4	1
3.4	3	●	MQS0340X3DB	21.7	23.7	70.7	70	0.7	4	1
	5	●	MQS0340X5DB	28.7	31.7	78.7	78	0.7	4	1
3.5	3	●	MQS0350X3DB	21.7	23.7	70.7	70	0.7	4	1
	5	●	MQS0350X5DB	28.7	31.7	78.7	78	0.7	4	1
NEW	8	●	MQS0350X8DB	41.7	41.7	87.7	87	0.7	4	1
3.6	3	●	MQS0360X3DB	22.7	23.7	70.7	70	0.7	4	1
	5	●	MQS0360X5DB	30.7	31.7	78.7	78	0.7	4	1
3.7	3	●	MQS0370X3DB	22.8	23.8	70.8	70	0.8	4	1
	5	●	MQS0370X5DB	30.8	31.8	78.8	78	0.8	4	1
3.8	3	●	MQS0380X3DB	22.8	23.8	70.8	70	0.8	4	1
	5	●	MQS0380X5DB	30.8	31.8	78.8	78	0.8	4	1
3.9	3	●	MQS0390X3DB	22.8	23.8	70.8	70	0.8	4	1
	5	●	MQS0390X5DB	30.8	31.8	78.8	78	0.8	4	1
4.0	3	●	MQS0400X3DB	22.8	23.8	70.8	70	0.8	4	1
	5	●	MQS0400X5DB	30.8	31.8	78.8	78	0.8	4	1
NEW	8	●	MQS0400X8DB	46.8	46.8	92.8	92	0.8	4	1
4.1	3	●	MQS0410X3DB	24.8	26.8	73.8	73	0.8	5	1
	5	●	MQS0410X5DB	33.8	35.8	82.8	82	0.8	5	1
4.2	3	●	MQS0420X3DB	24.9	26.9	73.9	73	0.9	5	1
	5	●	MQS0420X5DB	33.9	35.9	82.9	82	0.9	5	1
4.3	3	●	MQS0430X3DB	24.9	26.9	73.9	73	0.9	5	1
	5	●	MQS0430X5DB	33.9	35.9	82.9	82	0.9	5	1
4.4	3	●	MQS0440X3DB	24.9	26.9	73.9	73	0.9	5	1
	5	●	MQS0440X5DB	33.9	35.9	82.9	82	0.9	5	1
4.5	3	●	MQS0450X3DB	24.9	26.9	73.9	73	0.9	5	1
	5	●	MQS0450X5DB	33.9	35.9	82.9	82	0.9	5	1
NEW	8	●	MQS0450X8DB	52.9	52.9	100.9	100	0.9	5	1

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP3020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
4.6	3	●	MQS0460X3DB	26.0	29.0	76.0	75	1.0	5	1
	5	●	MQS0460X5DB	36.0	39.0	86.0	85	1.0	5	1
4.7	3	●	MQS0470X3DB	26.0	29.0	76.0	75	1.0	5	1
	5	●	MQS0470X5DB	36.0	39.0	86.0	85	1.0	5	1
4.8	3	●	MQS0480X3DB	26.0	29.0	76.0	75	1.0	5	1
	5	●	MQS0480X5DB	36.0	39.0	86.0	85	1.0	5	1
4.9	3	●	MQS0490X3DB	26.0	29.0	76.0	75	1.0	5	1
	5	●	MQS0490X5DB	36.0	39.0	86.0	85	1.0	5	1
5.0	3	●	MQS0500X3DB	26.0	29.0	76.0	75	1.0	5	1
	5	●	MQS0500X5DB	36.0	39.0	86.0	85	1.0	5	1
NEW	8	●	MQS0500X8DB	58.0	58.0	106.0	105	1.0	5	1
5.1	3	●	MQS0510X3DB	29.1	31.1	82.1	81	1.1	6	1
	5	●	MQS0510X5DB	40.1	43.1	90.1	89	1.1	6	1
5.2	3	●	MQS0520X3DB	29.1	31.1	82.1	81	1.1	6	1
	5	●	MQS0520X5DB	40.1	43.1	90.1	89	1.1	6	1
5.3	3	●	MQS0530X3DB	29.1	31.1	82.1	81	1.1	6	1
	5	●	MQS0530X5DB	40.1	43.1	90.1	89	1.1	6	1
5.4	3	●	MQS0540X3DB	29.1	31.1	82.1	81	1.1	6	1
	5	●	MQS0540X5DB	40.1	43.1	90.1	89	1.1	6	1
5.5	3	●	MQS0550X3DB	29.1	31.1	82.1	81	1.1	6	1
	5	●	MQS0550X5DB	40.1	43.1	90.1	89	1.1	6	1
NEW	8	●	MQS0550X8DB	62.1	67.1	119.1	118	1.1	6	1
5.6	3	●	MQS0560X3DB	31.2	31.2	82.2	81	1.2	6	1
	5	●	MQS0560X5DB	43.2	43.2	90.2	89	1.2	6	1
5.7	3	●	MQS0570X3DB	31.2	31.2	82.2	81	1.2	6	1
	5	●	MQS0570X5DB	43.2	43.2	90.2	89	1.2	6	1
5.8	3	●	MQS0580X3DB	31.2	31.2	82.2	81	1.2	6	1
	5	●	MQS0580X5DB	43.2	43.2	90.2	89	1.2	6	1
5.9	3	●	MQS0590X3DB	31.2	31.2	82.2	81	1.2	6	1
	5	●	MQS0590X5DB	43.2	43.2	90.2	89	1.2	6	1
6.0	3	●	MQS0600X3DB	31.2	31.2	82.2	81	1.2	6	1
	5	●	MQS0600X5DB	43.2	43.2	90.2	89	1.2	6	1
NEW	8	●	MQS0600X8DB	67.2	67.2	119.2	118	1.2	6	1
6.1	3	●	MQS0610X3DB	34.3	36.3	87.3	86	1.3	7	1
	5	●	MQS0610X5DB	47.3	49.3	96.3	95	1.3	7	1

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan.

CUTTING CONDITIONS ➤ N067
OPERATION GUIDANCE ➤ N069
TECHNICAL DATA ➤ Q001

MQS

WSTAR DRILLS

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP3020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
6.2	3	●	MQS0620X3DB	34.3	36.3	87.3	86	1.3	7	1
	5	●	MQS0620X5DB	47.3	49.3	96.3	95	1.3	7	1
6.3	3	●	MQS0630X3DB	34.3	36.3	87.3	86	1.3	7	1
	5	●	MQS0630X5DB	47.3	49.3	96.3	95	1.3	7	1
6.4	3	●	MQS0640X3DB	34.3	36.3	87.3	86	1.3	7	1
	5	●	MQS0640X5DB	47.3	49.3	96.3	95	1.3	7	1
6.5	3	●	MQS0650X3DB	34.3	36.3	87.3	86	1.3	7	1
	5	●	MQS0650X5DB	47.3	49.3	96.3	95	1.3	7	1
NEW	8	●	MQS0650X8DB	73.3	78.3	131.3	130	1.3	7	1
6.6	3	●	MQS0660X3DB	36.4	38.4	91.4	90	1.4	7	1
	5	●	MQS0660X5DB	50.4	52.4	99.4	98	1.4	7	1
6.7	3	●	MQS0670X3DB	36.4	38.4	91.4	90	1.4	7	1
	5	●	MQS0670X5DB	50.4	52.4	99.4	98	1.4	7	1
6.8	3	●	MQS0680X3DB	36.4	38.4	91.4	90	1.4	7	1
	5	●	MQS0680X5DB	50.4	52.4	99.4	98	1.4	7	1
6.9	3	●	MQS0690X3DB	36.4	38.4	91.4	90	1.4	7	1
	5	●	MQS0690X5DB	50.4	52.4	99.4	98	1.4	7	1
7.0	3	●	MQS0700X3DB	36.4	38.4	91.4	90	1.4	7	1
	5	●	MQS0700X5DB	50.4	52.4	99.4	98	1.4	7	1
NEW	8	●	MQS0700X8DB	78.4	78.4	131.4	130	1.4	7	1
7.1	3	●	MQS0710X3DB	39.5	40.5	91.5	90	1.5	8	1
	5	●	MQS0710X5DB	54.5	57.5	104.5	103	1.5	8	1
7.2	3	●	MQS0720X3DB	39.5	40.5	91.5	90	1.5	8	1
	5	●	MQS0720X5DB	54.5	57.5	104.5	103	1.5	8	1
7.3	3	●	MQS0730X3DB	39.5	40.5	91.5	90	1.5	8	1
	5	●	MQS0730X5DB	54.5	57.5	104.5	103	1.5	8	1
7.4	3	●	MQS0740X3DB	39.5	40.5	91.5	90	1.5	8	1
	5	●	MQS0740X5DB	54.5	57.5	104.5	103	1.5	8	1
7.5	3	●	MQS0750X3DB	39.6	40.6	91.6	90	1.6	8	1
	5	●	MQS0750X5DB	54.6	57.6	104.6	103	1.6	8	1
NEW	8	●	MQS0750X8DB	84.6	89.6	143.6	142	1.6	8	2
7.6	3	●	MQS0760X3DB	41.6	41.6	91.6	90	1.6	8	1
	5	●	MQS0760X5DB	57.6	57.6	104.6	103	1.6	8	1
7.7	3	●	MQS0770X3DB	41.6	41.6	91.6	90	1.6	8	1
	5	●	MQS0770X5DB	57.6	57.6	104.6	103	1.6	8	1
7.8	3	●	MQS0780X3DB	41.6	41.6	91.6	90	1.6	8	1
	5	●	MQS0780X5DB	57.6	57.6	104.6	103	1.6	8	1
7.9	3	●	MQS0790X3DB	41.6	41.6	91.6	90	1.6	8	1
	5	●	MQS0790X5DB	57.6	57.6	104.6	103	1.6	8	1
8.0	3	●	MQS0800X3DB	41.7	41.7	91.7	90	1.7	8	1
	5	●	MQS0800X5DB	57.7	57.7	104.7	103	1.7	8	1
NEW	8	●	MQS0800X8DB	89.7	89.7	143.7	142	1.7	8	2
8.1	3	●	MQS0810X3DB	44.7	46.7	97.7	96	1.7	9	1
	5	●	MQS0810X5DB	61.7	63.7	114.7	113	1.7	9	1
8.2	3	●	MQS0820X3DB	44.7	46.7	97.7	96	1.7	9	1
	5	●	MQS0820X5DB	61.7	63.7	114.7	113	1.7	9	1
8.3	3	●	MQS0830X3DB	44.7	46.7	97.7	96	1.7	9	1
	5	●	MQS0830X5DB	61.7	63.7	114.7	113	1.7	9	1
8.4	3	●	MQS0840X3DB	44.7	46.7	97.7	96	1.7	9	1
	5	●	MQS0840X5DB	61.7	63.7	114.7	113	1.7	9	1

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP3020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
8.5	3	●	MQS0850X3DB	44.8	46.8	97.8	96	1.8	9	1
	5	●	MQS0850X5DB	61.8	63.8	114.8	113	1.8	9	1
NEW	8	●	MQS0850X8DB	95.8	100.8	155.8	154	1.8	9	2
8.6	3	●	MQS0860X3DB	46.8	48.8	102.8	101	1.8	9	1
	5	●	MQS0860X5DB	64.8	66.8	117.8	116	1.8	9	1
8.7	3	●	MQS0870X3DB	46.8	48.8	102.8	101	1.8	9	1
	5	●	MQS0870X5DB	64.8	66.8	117.8	116	1.8	9	1
8.8	3	●	MQS0880X3DB	46.8	48.8	102.8	101	1.8	9	1
	5	●	MQS0880X5DB	64.8	66.8	117.8	116	1.8	9	1
8.9	3	●	MQS0890X3DB	46.8	48.8	102.8	101	1.8	9	1
	5	●	MQS0890X5DB	64.8	66.8	117.8	116	1.8	9	1
9.0	3	●	MQS0900X3DB	46.9	48.9	102.9	101	1.9	9	1
	5	●	MQS0900X5DB	64.9	66.9	117.9	116	1.9	9	1
NEW	8	●	MQS0900X8DB	100.9	100.9	155.9	154	1.9	9	2
9.1	3	●	MQS0910X3DB	49.9	51.9	102.9	101	1.9	10	1
	5	●	MQS0910X5DB	68.9	71.9	122.9	121	1.9	10	1
9.2	3	●	MQS0920X3DB	49.9	51.9	102.9	101	1.9	10	1
	5	●	MQS0920X5DB	68.9	71.9	122.9	121	1.9	10	1
9.3	3	●	MQS0930X3DB	49.9	51.9	102.9	101	1.9	10	1
	5	●	MQS0930X5DB	68.9	71.9	122.9	121	1.9	10	1
9.4	3	●	MQS0940X3DB	49.9	51.9	102.9	101	1.9	10	1
	5	●	MQS0940X5DB	68.9	71.9	122.9	121	1.9	10	1
9.5	3	●	MQS0950X3DB	50.0	52.0	103.0	101	2.0	10	1
	5	●	MQS0950X5DB	69.0	72.0	123.0	121	2.0	10	1
NEW	8	●	MQS0950X8DB	107.0	112.0	168.0	166	2.0	10	2
9.6	3	●	MQS0960X3DB	52.0	52.0	103.0	101	2.0	10	1
	5	●	MQS0960X5DB	72.0	72.0	123.0	121	2.0	10	1
9.7	3	●	MQS0970X3DB	52.0	52.0	103.0	101	2.0	10	1
	5	●	MQS0970X5DB	72.0	72.0	123.0	121	2.0	10	1
9.8	3	●	MQS0980X3DB	52.0	52.0	103.0	101	2.0	10	1
	5	●	MQS0980X5DB	72.0	72.0	123.0	121	2.0	10	1
9.9	3	●	MQS0990X3DB	52.1	52.1	103.1	101	2.1	10	1
	5	●	MQS0990X5DB	72.1	72.1	123.1	121	2.1	10	1
10.0	3	●	MQS1000X3DB	52.1	52.1	103.1	101	2.1	10	1
	5	●	MQS1000X5DB	72.1	72.1	123.1	121	2.1	10	1
NEW	8	●	MQS1000X8DB	112.1	112.1	168.1	166	2.1	10	2
10.1	3	●	MQS1010X3DB	55.1	57.1	113.1	111	2.1	11	1
	5	●	MQS1010X5DB	76.1	80.1	136.1	134	2.1	11	1
10.2	3	●	MQS1020X3DB	55.1	57.1	113.1	111	2.1	11	1
	5	●	MQS1020X5DB	76.1	80.1	136.1	134	2.1	11	1
10.3	3	●	MQS1030X3DB	55.1	57.1	113.1	111	2.1	11	1
	5	●	MQS1030X5DB	76.1	80.1	136.1	134	2.1	11	1
10.4	3	●	MQS1040X3DB	55.2	57.2	113.2	111	2.2	11	1
	5	●	MQS1040X5DB	76.2	80.2	136.2	134	2.2	11	1
10.5	3	●	MQS1050X3DB	55.2	57.2	113.2	111	2.2	11	1
	5	●	MQS1050X5DB	76.2	80.2	136.2	134	2.2	11	1
NEW	8	●	MQS1050X8DB	118.2	123.2	184.2	182	2.2	11	2
10.6	3	●	MQS1060X3DB	57.2	58.2	118.2	116	2.2	11	1
	5	●	MQS1060X5DB	79.2	80.2	136.2	134	2.2	11	1

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP3020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
10.7	3	●	MQS1070X3DB	57.2	58.2	118.2	116	2.2	11	1
	5	●	MQS1070X5DB	79.2	80.2	136.2	134	2.2	11	1
10.8	3	●	MQS1080X3DB	57.2	58.2	118.2	116	2.2	11	1
	5	●	MQS1080X5DB	79.2	80.2	136.2	134	2.2	11	1
10.9	3	●	MQS1090X3DB	57.3	58.3	118.3	116	2.3	11	1
	5	●	MQS1090X5DB	79.3	80.3	136.3	134	2.3	11	1
11.0	3	●	MQS1100X3DB	57.3	58.3	118.3	116	2.3	11	1
	5	●	MQS1100X5DB	79.3	80.3	136.3	134	2.3	11	1
NEW	8	●	MQS1100X8DB	123.3	123.3	184.3	182	2.3	11	2
11.1	3	●	MQS1110X3DB	60.3	62.3	118.3	116	2.3	12	1
	5	●	MQS1110X5DB	83.3	86.3	142.3	140	2.3	12	1
11.2	3	●	MQS1120X3DB	60.3	62.3	118.3	116	2.3	12	1
	5	●	MQS1120X5DB	83.3	86.3	142.3	140	2.3	12	1
11.3	3	●	MQS1130X3DB	60.3	62.3	118.3	116	2.3	12	1
	5	●	MQS1130X5DB	83.3	86.3	142.3	140	2.3	12	1
11.4	3	●	MQS1140X3DB	60.4	62.4	118.4	116	2.4	12	1
	5	●	MQS1140X5DB	83.4	86.4	142.4	140	2.4	12	1
11.5	3	●	MQS1150X3DB	60.4	62.4	118.4	116	2.4	12	1
	5	●	MQS1150X5DB	83.4	86.4	142.4	140	2.4	12	1
NEW	8	●	MQS1150X8DB	129.4	134.4	196.4	194	2.4	12	2
11.6	3	●	MQS1160X3DB	62.4	62.4	118.4	116	2.4	12	1
	5	●	MQS1160X5DB	86.4	86.4	142.4	140	2.4	12	1
11.7	3	●	MQS1170X3DB	62.4	62.4	118.4	116	2.4	12	1
	5	●	MQS1170X5DB	86.4	86.4	142.4	140	2.4	12	1
11.8	3	●	MQS1180X3DB	62.4	62.4	118.4	116	2.4	12	1
	5	●	MQS1180X5DB	86.4	86.4	142.4	140	2.4	12	1
11.9	3	●	MQS1190X3DB	62.5	62.5	118.5	116	2.5	12	1
	5	●	MQS1190X5DB	86.5	86.5	142.5	140	2.5	12	1
12.0	3	●	MQS1200X3DB	62.5	62.5	118.5	116	2.5	12	1
	5	●	MQS1200X5DB	86.5	86.5	142.5	140	2.5	12	1
NEW	8	●	MQS1200X8DB	134.5	134.5	196.5	194	2.5	12	2
12.1	3	●	MQS1210X3DB	65.5	68.5	124.5	122	2.5	13	1
	5	●	MQS1210X5DB	90.5	94.5	150.5	148	2.5	13	1
12.2	3	●	MQS1220X3DB	65.5	68.5	124.5	122	2.5	13	1
	5	●	MQS1220X5DB	90.5	94.5	150.5	148	2.5	13	1
12.3	3	●	MQS1230X3DB	65.5	68.5	124.5	122	2.5	13	1
	5	●	MQS1230X5DB	90.5	94.5	150.5	148	2.5	13	1
12.4	3	●	MQS1240X3DB	65.6	68.6	124.6	122	2.6	13	1
	5	●	MQS1240X5DB	90.6	94.6	150.6	148	2.6	13	1
12.5	3	●	MQS1250X3DB	65.6	68.6	124.6	122	2.6	13	1
	5	●	MQS1250X5DB	90.6	94.6	150.6	148	2.6	13	1
NEW	8	●	MQS1250X8DB	140.6	145.6	208.6	206	2.6	13	2
12.6	3	●	MQS1260X3DB	67.6	68.6	124.6	122	2.6	13	1
	5	●	MQS1260X5DB	93.6	94.6	150.6	148	2.6	13	1
12.7	3	●	MQS1270X3DB	67.6	68.6	124.6	122	2.6	13	1
	5	●	MQS1270X5DB	93.6	94.6	150.6	148	2.6	13	1
12.8	3	●	MQS1280X3DB	67.7	68.7	124.7	122	2.7	13	1
	5	●	MQS1280X5DB	93.7	94.7	150.7	148	2.7	13	1
12.9	3	●	MQS1290X3DB	67.7	68.7	124.7	122	2.7	13	1
	5	●	MQS1290X5DB	93.7	94.7	150.7	148	2.7	13	1

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP3020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
13.0	3	●	MQS1300X3DB	67.7	68.7	124.7	122	2.7	13	1
	5	●	MQS1300X5DB	93.7	94.7	150.7	148	2.7	13	1
NEW	8	●	MQS1300X8DB	145.7	145.7	208.7	206	2.7	13	2
13.1	3	●	MQS1310X3DB	70.7	72.7	128.7	126	2.7	14	1
	5	●	MQS1310X5DB	97.7	100.7	156.7	154	2.7	14	1
13.2	3	●	MQS1320X3DB	70.7	72.7	128.7	126	2.7	14	1
	5	●	MQS1320X5DB	97.7	100.7	156.7	154	2.7	14	1
13.3	3	●	MQS1330X3DB	70.8	72.8	128.8	126	2.8	14	1
	5	●	MQS1330X5DB	97.8	100.8	156.8	154	2.8	14	1
13.4	3	●	MQS1340X3DB	70.8	72.8	128.8	126	2.8	14	1
	5	●	MQS1340X5DB	97.8	100.8	156.8	154	2.8	14	1
13.5	3	●	MQS1350X3DB	70.8	72.8	128.8	126	2.8	14	1
	5	●	MQS1350X5DB	97.8	100.8	156.8	154	2.8	14	1
NEW	8	●	MQS1350X8DB	151.8	156.8	220.8	218	2.8	14	2
13.6	3	●	MQS1360X3DB	72.8	72.8	128.8	126	2.8	14	1
	5	●	MQS1360X5DB	100.8	100.8	156.8	154	2.8	14	1
13.7	3	●	MQS1370X3DB	72.8	72.8	128.8	126	2.8	14	1
	5	●	MQS1370X5DB	100.8	100.8	156.8	154	2.8	14	1
13.8	3	●	MQS1380X3DB	72.9	72.9	128.9	126	2.9	14	1
	5	●	MQS1380X5DB	100.9	100.9	156.9	154	2.9	14	1
13.9	3	●	MQS1390X3DB	72.9	72.9	128.9	126	2.9	14	1
	5	●	MQS1390X5DB	100.9	100.9	156.9	154	2.9	14	1
14.0	3	●	MQS1400X3DB	72.9	72.9	128.9	126	2.9	14	1
	5	●	MQS1400X5DB	100.9	100.9	156.9	154	2.9	14	1
NEW	8	●	MQS1400X8DB	156.9	156.9	220.9	218	2.9	14	2
14.1	3	●	MQS1410X3DB	75.9	78.9	137.9	135	2.9	15	1
	5	●	MQS1410X5DB	104.9	108.9	167.9	165	2.9	15	1
14.2	3	●	MQS1420X3DB	75.9	78.9	137.9	135	2.9	15	1
	5	●	MQS1420X5DB	104.9	108.9	167.9	165	2.9	15	1
14.3	3	●	MQS1430X3DB	76.0	79.0	138.0	135	3.0	15	1
	5	●	MQS1430X5DB	105.0	109.0	168.0	165	3.0	15	1
14.4	3	●	MQS1440X3DB	76.0	79.0	138.0	135	3.0	15	1
	5	●	MQS1440X5DB	105.0	109.0	168.0	165	3.0	15	1
14.5	3	●	MQS1450X3DB	76.0	79.0	138.0	135	3.0	15	1
	5	●	MQS1450X5DB	105.0	109.0	168.0	165	3.0	15	1
NEW	8	●	MQS1450X8DB	163.0	168.0	228.0	225	3.0	15	2
14.6	3	●	MQS1460X3DB	78.0	79.0	138.0	135	3.0	15	1
	5	●	MQS1460X5DB	108.0	109.0	168.0	165	3.0	15	1
14.7	3	●	MQS1470X3DB	78.0	79.0	138.0	135	3.0	15	1
	5	●	MQS1470X5DB	108.0	109.0	168.0	165	3.0	15	1
14.8	3	●	MQS1480X3DB	78.1	79.1	138.1	135	3.1	15	1
	5	●	MQS1480X5DB	108.1	109.1	168.1	165	3.1	15	1
14.9	3	●	MQS1490X3DB	78.1	79.1	138.1	135	3.1	15	1
	5	●	MQS1490X5DB	108.1	109.1	168.1	165	3.1	15	1
15.0	3	●	MQS1500X3DB	78.1	79.1	138.1	135	3.1	15	1
	5	●	MQS1500X5DB	108.1	109.1	168.1	165	3.1	15	1
NEW	8	●	MQS1500X8DB	168.1	168.1	228.1	225	3.1	15	2
15.1	3	●	MQS1510X3DB	81.1	83.1	142.1	139	3.1	16	1
	5	●	MQS1510X5DB	112.1	115.1	174.1	171	3.1	16	1

DRILLING

CUTTING CONDITIONS ➤ N067
OPERATION GUIDANCE ➤ N069
TECHNICAL DATA ➤ Q001

MQS

WSTAR DRILLS

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP3020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
15.2	3	●	MQS1520X3DB	81.1	83.1	142.1	139	3.1	16	1
	5	●	MQS1520X5DB	112.1	115.1	174.1	171	3.1	16	1
15.3	3	●	MQS1530X3DB	81.2	83.2	142.2	139	3.2	16	1
	5	●	MQS1530X5DB	112.2	115.2	174.2	171	3.2	16	1
15.4	3	●	MQS1540X3DB	81.2	83.2	142.2	139	3.2	16	1
	5	●	MQS1540X5DB	112.2	115.2	174.2	171	3.2	16	1
15.5	3	●	MQS1550X3DB	81.2	83.2	142.2	139	3.2	16	1
	5	●	MQS1550X5DB	112.2	115.2	174.2	171	3.2	16	1
NEW	8	●	MQS1550X8DB	174.2	184.2	244.2	241	3.2	16	2
15.6	3	●	MQS1560X3DB	83.2	83.2	142.2	139	3.2	16	1
	5	●	MQS1560X5DB	115.2	115.2	174.2	171	3.2	16	1
15.7	3	●	MQS1570X3DB	83.3	83.3	142.3	139	3.3	16	1
	5	●	MQS1570X5DB	115.3	115.3	174.3	171	3.3	16	1
15.8	3	●	MQS1580X3DB	83.3	83.3	142.3	139	3.3	16	1
	5	●	MQS1580X5DB	115.3	115.3	174.3	171	3.3	16	1
15.9	3	●	MQS1590X3DB	83.3	83.3	142.3	139	3.3	16	1
	5	●	MQS1590X5DB	115.3	115.3	174.3	171	3.3	16	1
16.0	3	●	MQS1600X3DB	83.3	83.3	142.3	139	3.3	16	1
	5	●	MQS1600X5DB	115.3	115.3	174.3	171	3.3	16	1
NEW	8	●	MQS1600X8DB	179.3	184.3	244.3	241	3.3	16	2
16.1	3	□	MQS1610X3DB	86.3	89.3	148.3	145	3.3	17	1
	5	□	MQS1610X5DB	119.3	123.3	182.3	179	3.3	17	1
16.2	3	□	MQS1620X3DB	86.4	89.4	148.4	145	3.4	17	1
	5	□	MQS1620X5DB	119.4	123.4	182.4	179	3.4	17	1
16.3	3	□	MQS1630X3DB	86.4	89.4	148.4	145	3.4	17	1
	5	□	MQS1630X5DB	119.4	123.4	182.4	179	3.4	17	1
16.4	3	□	MQS1640X3DB	86.4	89.4	148.4	145	3.4	17	1
	5	□	MQS1640X5DB	119.4	123.4	182.4	179	3.4	17	1
16.5	3	●	MQS1650X3DB	86.4	89.4	148.4	145	3.4	17	1
	5	●	MQS1650X5DB	119.4	123.4	182.4	179	3.4	17	1
16.6	3	□	MQS1660X3DB	88.4	89.4	148.4	145	3.4	17	1
	5	□	MQS1660X5DB	122.4	123.4	182.4	179	3.4	17	1
16.7	3	□	MQS1670X3DB	88.5	89.5	148.5	145	3.5	17	1
	5	□	MQS1670X5DB	122.5	123.5	182.5	179	3.5	17	1
16.8	3	□	MQS1680X3DB	88.5	89.5	148.5	145	3.5	17	1
	5	□	MQS1680X5DB	122.5	123.5	182.5	179	3.5	17	1
16.9	3	□	MQS1690X3DB	88.5	89.5	148.5	145	3.5	17	1
	5	□	MQS1690X5DB	122.5	123.5	182.5	179	3.5	17	1
17.0	3	●	MQS1700X3DB	88.5	89.5	148.5	145	3.5	17	1
	5	●	MQS1700X5DB	122.5	123.5	182.5	179	3.5	17	1
17.1	3	□	MQS1710X3DB	91.5	93.5	152.5	149	3.5	18	1
	5	□	MQS1710X5DB	126.5	129.5	188.5	185	3.5	18	1
17.2	3	□	MQS1720X3DB	91.6	93.6	152.6	149	3.6	18	1
	5	□	MQS1720X5DB	126.6	129.6	188.6	185	3.6	18	1
17.3	3	□	MQS1730X3DB	91.6	93.6	152.6	149	3.6	18	1
	5	□	MQS1730X5DB	126.6	129.6	188.6	185	3.6	18	1
17.4	3	□	MQS1740X3DB	91.6	93.6	152.6	149	3.6	18	1
	5	□	MQS1740X5DB	126.6	129.6	188.6	185	3.6	18	1
17.5	3	●	MQS1750X3DB	91.6	93.6	152.6	149	3.6	18	1
	5	●	MQS1750X5DB	126.6	129.6	188.6	185	3.6	18	1

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP3020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
17.6	3	□	MQS1760X3DB	93.6	93.6	152.6	149	3.6	18	1
	5	□	MQS1760X5DB	129.6	129.6	188.6	185	3.6	18	1
17.7	3	□	MQS1770X3DB	93.7	93.7	152.7	149	3.7	18	1
	5	□	MQS1770X5DB	129.7	129.7	188.7	185	3.7	18	1
17.8	3	□	MQS1780X3DB	93.7	93.7	152.7	149	3.7	18	1
	5	□	MQS1780X5DB	129.7	129.7	188.7	185	3.7	18	1
17.9	3	□	MQS1790X3DB	93.7	93.7	152.7	149	3.7	18	1
	5	□	MQS1790X5DB	129.7	129.7	188.7	185	3.7	18	1
18.0	3	●	MQS1800X3DB	93.7	93.7	152.7	149	3.7	18	1
	5	●	MQS1800X5DB	129.7	129.7	188.7	185	3.7	18	1
18.1	3	□	MQS1810X3DB	96.7	99.7	160.7	157	3.7	19	1
	5	□	MQS1810X5DB	133.7	137.7	198.7	195	3.7	19	1
18.2	3	□	MQS1820X3DB	96.8	99.8	160.8	157	3.8	19	1
	5	□	MQS1820X5DB	133.8	137.8	198.8	195	3.8	19	1
18.3	3	□	MQS1830X3DB	96.8	99.8	160.8	157	3.8	19	1
	5	□	MQS1830X5DB	133.8	137.8	198.8	195	3.8	19	1
18.4	3	□	MQS1840X3DB	96.8	99.8	160.8	157	3.8	19	1
	5	□	MQS1840X5DB	133.8	137.8	198.8	195	3.8	19	1
18.5	3	●	MQS1850X3DB	96.8	99.8	160.8	157	3.8	19	1
	5	●	MQS1850X5DB	133.8	137.8	198.8	195	3.8	19	1
18.6	3	□	MQS1860X3DB	98.9	99.9	160.9	157	3.9	19	1
	5	□	MQS1860X5DB	136.9	137.9	198.9	195	3.9	19	1
18.7	3	□	MQS1870X3DB	98.9	99.9	160.9	157	3.9	19	1
	5	□	MQS1870X5DB	136.9	137.9	198.9	195	3.9	19	1
18.8	3	□	MQS1880X3DB	98.9	99.9	160.9	157	3.9	19	1
	5	□	MQS1880X5DB	136.9	137.9	198.9	195	3.9	19	1
18.9	3	□	MQS1890X3DB	98.9	99.9	160.9	157	3.9	19	1
	5	□	MQS1890X5DB	136.9	137.9	198.9	195	3.9	19	1
19.0	3	●	MQS1900X3DB	98.9	99.9	160.9	157	3.9	19	1
	5	●	MQS1900X5DB	136.9	137.9	198.9	195	3.9	19	1
19.1	3	□	MQS1910X3DB	102.0	104.0	165.0	161	4.0	20	1
	5	□	MQS1910X5DB	141.0	144.0	205.0	201	4.0	20	1
19.2	3	□	MQS1920X3DB	102.0	104.0	165.0	161	4.0	20	1
	5	□	MQS1920X5DB	141.0	144.0	205.0	201	4.0	20	1
19.3	3	□	MQS1930X3DB	102.0	104.0	165.0	161	4.0	20	1
	5	□	MQS1930X5DB	141.0	144.0	205.0	201	4.0	20	1
19.4	3	□	MQS1940X3DB	102.0	104.0	165.0	161	4.0	20	1
	5	□	MQS1940X5DB	141.0	144.0	205.0	201	4.0	20	1
19.5	3	●	MQS1950X3DB	102.0	104.0	165.0	161	4.0	20	1
	5	●	MQS1950X5DB	141.0	144.0	205.0	201	4.0	20	1
19.6	3	□	MQS1960X3DB	104.1	104.1	165.1	161	4.1	20	1
	5	□	MQS1960X5DB	144.1	144.1	205.1	201	4.1	20	1
19.7	3	□	MQS1970X3DB	104.1	104.1	165.1	161	4.1	20	1
	5	□	MQS1970X5DB	144.1	144.1	205.1	201	4.1	20	1
19.8	3	□	MQS1980X3DB	104.1	104.1	165.1	161	4.1	20	1
	5	□	MQS1980X5DB	144.1	144.1	205.1	201	4.1	20	1
19.9	3	□	MQS1990X3DB	104.1	104.1	165.1	161	4.1	20	1
	5	□	MQS1990X5DB	144.1	144.1	205.1	201	4.1	20	1
20.0	3	●	MQS2000X3DB	104.1	104.1	165.1	161	4.1	20	1
	5	●	MQS2000X5DB	144.1	144.1	205.1	201	4.1	20	1

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

RECOMMENDED CUTTING CONDITIONS

Internal Coolant

Work Material	Mild Steel (≤180HB) AISI 1010 etc					Carbon steel, Alloy steel (180−280HB) AISI 1045, AISI 4140 etc				
Drill Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)		Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)		Table Feed (mm/min)
3.2	130	12900	0.15	(0.10−0.20)	1935	100	9900	0.15	(0.10−0.20)	1485
4.0	130	10300	0.2	(0.15−0.25)	2060	100	7900	0.2	(0.15−0.25)	1580
5.0	130	8200	0.2	(0.15−0.25)	1640	100	6300	0.2	(0.15−0.25)	1260
6.3	140	7000	0.25	(0.20−0.30)	1750	130	6500	0.25	(0.20−0.30)	1625
8.0	140	5500	0.25	(0.20−0.30)	1375	130	5100	0.25	(0.20−0.30)	1275
10.0	140	4400	0.27	(0.22−0.32)	1185	130	4100	0.27	(0.22−0.32)	1105
12.0	160	4200	0.3	(0.26−0.35)	1260	140	3700	0.3	(0.26−0.35)	1110
16.0	180	3500	0.33	(0.27−0.38)	1155	150	2900	0.33	(0.27−0.38)	955
20.0	180	2800	0.35	(0.30−0.40)	980	150	2300	0.35	(0.30−0.40)	805

Work Material	Carbon steel, Alloy steel (280−350HB) AISI 4340 etc					Gray Cast Iron (≤350MPa) No 45 B etc				
Drill Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)		Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)		Table Feed (mm/min)
3.2	70	6900	0.1	(0.06−0.15)	690	110	10900	0.28	(0.15−0.35)	3050
4.0	80	6300	0.11	(0.07−0.15)	690	110	8700	0.28	(0.15−0.35)	2435
5.0	80	5000	0.14	(0.09−0.18)	700	110	7000	0.3	(0.15−0.40)	2100
6.3	90	4500	0.18	(0.11−0.24)	810	120	6000	0.33	(0.20−0.45)	1980
8.0	100	3900	0.21	(0.16−0.25)	815	120	4700	0.35	(0.20−0.45)	1645
10.0	110	3500	0.23	(0.19−0.27)	805	130	4100	0.4	(0.22−0.45)	1640
12.0	120	3100	0.26	(0.22−0.30)	805	150	3900	0.45	(0.26−0.50)	1755
16.0	130	2500	0.28	(0.23−0.33)	700	160	3100	0.5	(0.28−0.60)	1550
20.0	130	2000	0.3	(0.26−0.35)	600	160	2500	0.5	(0.30−0.60)	1250

Work Material	Ductile Cast Iron (≤450MPa) 60-40-8 etc					Ductile Cast Iron (≤800MPa) 100-70-03 etc				
Drill Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)		Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)		Table Feed (mm/min)
3.2	90	8900	0.25	(0.15−0.32)	2225	75	7400	0.1	(0.06−0.15)	740
4.0	90	7100	0.25	(0.15−0.32)	1775	75	5900	0.1	(0.06−0.15)	590
5.0	90	5700	0.25	(0.15−0.32)	1425	75	4700	0.1	(0.06−0.15)	470
6.3	100	5000	0.3	(0.20−0.38)	1500	85	4200	0.15	(0.10−0.20)	630
8.0	100	3900	0.3	(0.20−0.38)	1170	85	3300	0.2	(0.10−0.25)	660
10.0	100	3100	0.3	(0.22−0.38)	930	85	2700	0.2	(0.10−0.25)	540
12.0	110	2900	0.35	(0.26−0.40)	1015	95	2500	0.25	(0.20−0.30)	625
16.0	120	2300	0.35	(0.28−0.40)	805	110	2100	0.25	(0.20−0.30)	525
20.0	120	1900	0.35	(0.30−0.40)	665	110	1700	0.3	(0.20−0.35)	510

(Note 1) Spindle through & high pressure coolant system is recommended to make stable holes.
(Note 2) Emulsion type of water coolant is recommended.

MQS
WSTAR DRILLS

RECOMMENDED CUTTING CONDITIONS

M.Q.L.

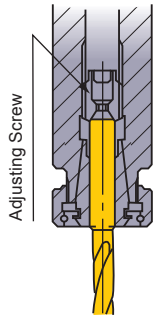
Work Material	Mild Steel (≤180HB) AISI 1010 etc				Carbon steel, Alloy steel (180−280HB) AISI 1045, AISI 4140 etc			
Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)
3.2	100	9900	0.15 (0.10−0.20)	1485	80	7900	0.15 (0.10−0.20)	1185
4.0	100	7900	0.2 (0.15−0.25)	1580	80	6300	0.2 (0.15−0.25)	1260
5.0	100	6300	0.2 (0.15−0.25)	1260	80	5000	0.2 (0.15−0.25)	1000
6.3	110	5500	0.25 (0.20−0.30)	1375	100	5000	0.25 (0.20−0.30)	1250
8.0	110	4300	0.25 (0.20−0.30)	1075	100	3900	0.25 (0.20−0.30)	975
10.0	110	3500	0.27 (0.22−0.32)	945	100	3100	0.27 (0.22−0.32)	835
12.0	130	3400	0.3 (0.26−0.35)	1020	110	2900	0.3 (0.26−0.35)	870
16.0	140	2700	0.33 (0.27−0.38)	890	120	2300	0.33 (0.27−0.38)	755
20.0	140	2200	0.35 (0.30−0.40)	770	120	1900	0.35 (0.30−0.40)	665

Work Material	Carbon steel, Alloy steel (280−350HB) AISI 4340 etc				Gray Cast Iron (≤350MPa) No 45 B etc			
Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)
3.2	60	5900	0.1 (0.06−0.15)	590	90	8900	0.28 (0.15−0.35)	2490
4.0	60	4700	0.11 (0.07−0.15)	515	90	7100	0.28 (0.15−0.35)	1985
5.0	60	3800	0.14 (0.09−0.18)	530	90	5700	0.3 (0.15−0.40)	1710
6.3	60	3000	0.18 (0.11−0.24)	540	100	5000	0.33 (0.20−0.45)	1650
8.0	60	2300	0.21 (0.16−0.25)	480	100	3900	0.35 (0.20−0.45)	1365
10.0	60	1900	0.23 (0.19−0.27)	435	100	3100	0.4 (0.22−0.45)	1240
12.0	80	2100	0.26 (0.22−0.30)	545	120	3100	0.45 (0.26−0.50)	1395
16.0	80	1500	0.28 (0.23−0.33)	420	130	2500	0.5 (0.28−0.60)	1250
20.0	80	1200	0.3 (0.26−0.35)	360	130	2000	0.5 (0.30−0.60)	1000

Work Material	Ductile Cast Iron (≤450MPa) 60-40-8 etc				Ductile Cast Iron (≤800MPa) 100-70-03 etc			
Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)
3.2	70	6900	0.25 (0.15−0.32)	1725	60	5900	0.1 (0.06−0.15)	590
4.0	70	5500	0.25 (0.15−0.32)	1375	60	4700	0.1 (0.06−0.15)	470
5.0	70	4400	0.25 (0.15−0.32)	1100	60	3800	0.1 (0.06−0.15)	380
6.3	80	4000	0.3 (0.20−0.38)	1200	70	3500	0.15 (0.10−0.20)	525
8.0	80	3100	0.3 (0.20−0.38)	930	70	2700	0.2 (0.10−0.25)	540
10.0	80	2500	0.3 (0.22−0.38)	750	70	2200	0.2 (0.10−0.25)	440
12.0	90	2300	0.35 (0.26−0.40)	805	80	2100	0.25 (0.20−0.30)	525
16.0	100	1900	0.35 (0.28−0.40)	665	90	1700	0.25 (0.20−0.30)	425
20.0	100	1500	0.35 (0.30−0.40)	525	90	1400	0.3 (0.20−0.35)	420

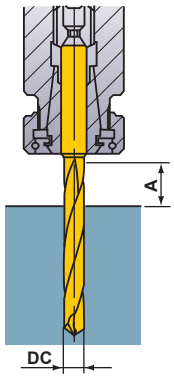
Operation Guidance for....X3DB....X5DB and....X8DB

Drill Holding



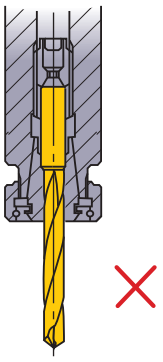
Thrust bearing type collet chuck holds the drill securely.

Drill Length



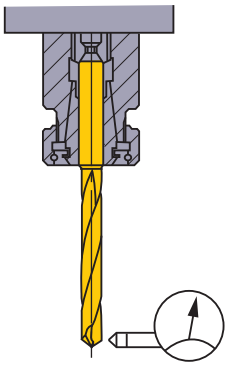
A ≥ DC x 1.5

Drill Installation



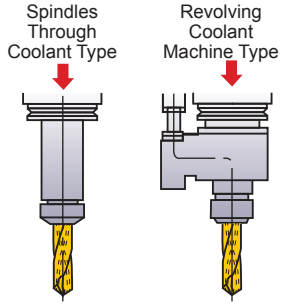
Do not clamp on the flutes.

Installation Tolerance



Run-out ≤ 0.03mm

Through Coolant Type (MQS)



Coolant pressure is approx. 0.5MPa–7MPa

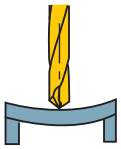
Coolant Handling

<MQS Type>

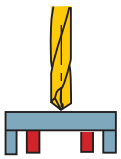
1) Small particles of swarf will jam in the oil hole of small diameter drills. Always use a fine mesh filter as a preventative measure.

2) Dirt and dust particles adhere to the oil in old coolant and prevent an efficient flow. Regular coolant exchange is recommended.

Thin Workpiece

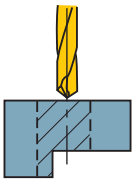


× If Bending Occurs



○ Support the Workpiece

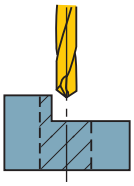
Interrupted Cutting



One Process

○

①Lower the feed when drilling the interrupted part.

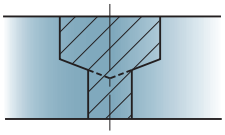


Requires Prior Machining

△

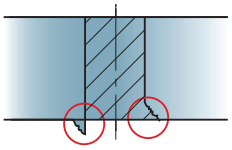
①Spot face with an end mill prior to drilling.

Stepped Holes



①Divide the two processes.
②Drill the larger hole first.
*A tool for machining both chamfer and spot face can be produced to order.

Burring and Workpiece Chipping



①Lower the feed rate by 50% at the end of through cutting.
②Add a 45°chamfer.
③Change the point angle.

DRILLING(SOLID CARBIDE)

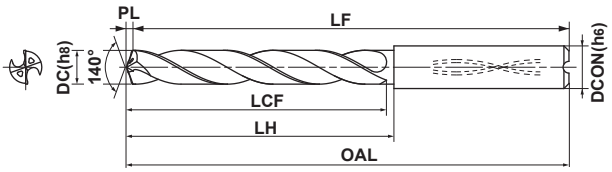
MMS
WSTAR DRILLS

- New grade DP7020, unique coolant system, special fine margin.
- Long tool life and high efficiency drilling for stainless steel.

P	M	K	N	S	H
	Stainless Steel				

	DC=3	3<DC≤6	6<DC≤10	10<DC≤18	18<DC≤20
	0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033
h6		0 −0.008	0 −0.009	0 −0.011	0 −0.013





*When looking at the coating the color can vary depending on the direction of viewing. This does not have any effect on the performance of the drill.

(Note) MMS drills are suitable for use with shrink fit holders.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP7020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON
3.0	3	●	MMS0300X3DB	21.5	23.5	70.5	70	0.5	6
	5	●	MMS0300X5DB	28.5	31.5	78.5	78	0.5	6
3.1	3	●	MMS0310X3DB	21.6	23.6	70.6	70	0.6	6
	5	●	MMS0310X5DB	28.6	31.6	78.6	78	0.6	6
3.2	3	●	MMS0320X3DB	21.6	23.6	70.6	70	0.6	6
	5	●	MMS0320X5DB	28.6	31.6	78.6	78	0.6	6
3.3	3	●	MMS0330X3DB	21.6	23.6	70.6	70	0.6	6
	5	●	MMS0330X5DB	28.6	31.6	78.6	78	0.6	6
3.4	3	●	MMS0340X3DB	21.6	23.6	70.6	70	0.6	6
	5	●	MMS0340X5DB	28.6	31.6	78.6	78	0.6	6
3.5	3	●	MMS0350X3DB	21.6	23.6	70.6	70	0.6	6
	5	●	MMS0350X5DB	28.6	31.6	78.6	78	0.6	6
3.6	3	●	MMS0360X3DB	22.7	23.7	70.7	70	0.7	6
	5	●	MMS0360X5DB	30.7	31.7	78.7	78	0.7	6
3.7	3	●	MMS0370X3DB	22.7	23.7	70.7	70	0.7	6
	5	●	MMS0370X5DB	30.7	31.7	78.7	78	0.7	6
3.8	3	●	MMS0380X3DB	22.7	23.7	70.7	70	0.7	6
	5	●	MMS0380X5DB	30.7	31.7	78.7	78	0.7	6
3.9	3	●	MMS0390X3DB	22.7	23.7	70.7	70	0.7	6
	5	●	MMS0390X5DB	30.7	31.7	78.7	78	0.7	6
4.0	3	●	MMS0400X3DB	22.7	23.7	70.7	70	0.7	6
	5	●	MMS0400X5DB	30.7	31.7	78.7	78	0.7	6
4.1	3	●	MMS0410X3DB	24.7	26.7	73.7	73	0.7	6
	5	●	MMS0410X5DB	33.7	35.7	82.7	82	0.7	6
4.2	3	●	MMS0420X3DB	24.8	26.8	73.8	73	0.8	6
	5	●	MMS0420X5DB	33.8	35.8	82.8	82	0.8	6
4.3	3	●	MMS0430X3DB	24.8	26.8	73.8	73	0.8	6
	5	●	MMS0430X5DB	33.8	35.8	82.8	82	0.8	6
4.4	3	●	MMS0440X3DB	24.8	26.8	73.8	73	0.8	6
	5	●	MMS0440X5DB	33.8	35.8	82.8	82	0.8	6
4.5	3	●	MMS0450X3DB	24.8	26.8	73.8	73	0.8	6
	5	●	MMS0450X5DB	33.8	35.8	82.8	82	0.8	6
4.6	3	●	MMS0460X3DB	25.8	28.8	75.8	75	0.8	6
	5	●	MMS0460X5DB	35.8	38.8	85.8	85	0.8	6
4.7	3	●	MMS0470X3DB	25.9	28.9	75.9	75	0.9	6
	5	●	MMS0470X5DB	35.9	38.9	85.9	85	0.9	6
4.8	3	●	MMS0480X3DB	25.9	28.9	75.9	75	0.9	6
	5	●	MMS0480X5DB	35.9	38.9	85.9	85	0.9	6

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP7020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON
4.9	3	●	MMS0490X3DB	25.9	28.9	75.9	75	0.9	6
	5	●	MMS0490X5DB	35.9	38.9	85.9	85	0.9	6
5.0	3	●	MMS0500X3DB	25.9	28.9	75.9	75	0.9	6
	5	●	MMS0500X5DB	35.9	38.9	85.9	85	0.9	6
5.1	3	●	MMS0510X3DB	28.9	30.9	81.9	81	0.9	6
	5	●	MMS0510X5DB	39.9	42.9	89.9	89	0.9	6
5.2	3	●	MMS0520X3DB	28.9	30.9	81.9	81	0.9	6
	5	●	MMS0520X5DB	39.9	42.9	89.9	89	0.9	6
5.3	3	●	MMS0530X3DB	29.0	31.0	82.0	81	1.0	6
	5	●	MMS0530X5DB	40.0	43.0	90.0	89	1.0	6
5.4	3	●	MMS0540X3DB	29.0	31.0	82.0	81	1.0	6
	5	●	MMS0540X5DB	40.0	43.0	90.0	89	1.0	6
5.5	3	●	MMS0550X3DB	29.0	31.0	82.0	81	1.0	6
	5	●	MMS0550X5DB	40.0	43.0	90.0	89	1.0	6
5.6	3	●	MMS0560X3DB	31.0	31.0	82.0	81	1.0	6
	5	●	MMS0560X5DB	43.0	43.0	90.0	89	1.0	6
5.7	3	●	MMS0570X3DB	31.0	31.0	82.0	81	1.0	6
	5	●	MMS0570X5DB	43.0	43.0	90.0	89	1.0	6
5.8	3	●	MMS0580X3DB	31.1	31.1	82.1	81	1.1	6
	5	●	MMS0580X5DB	43.1	43.1	90.1	89	1.1	6
5.9	3	●	MMS0590X3DB	31.1	31.1	82.1	81	1.1	6
	5	●	MMS0590X5DB	43.1	43.1	90.1	89	1.1	6
6.0	3	●	MMS0600X3DB	31.1	31.1	82.1	81	1.1	6
	5	●	MMS0600X5DB	43.1	43.1	90.1	89	1.1	6
6.1	3	●	MMS0610X3DB	34.1	36.1	87.1	86	1.1	8
	5	●	MMS0610X5DB	47.1	49.1	96.1	95	1.1	8
6.2	3	●	MMS0620X3DB	34.1	36.1	87.1	86	1.1	8
	5	●	MMS0620X5DB	47.1	49.1	96.1	95	1.1	8
6.3	3	●	MMS0630X3DB	34.1	36.1	87.1	86	1.1	8
	5	●	MMS0630X5DB	47.1	49.1	96.1	95	1.1	8
6.4	3	●	MMS0640X3DB	34.2	36.2	87.2	86	1.2	8
	5	●	MMS0640X5DB	47.2	49.2	96.2	95	1.2	8
6.5	3	●	MMS0650X3DB	34.2	36.2	87.2	86	1.2	8
	5	●	MMS0650X5DB	47.2	49.2	96.2	95	1.2	8
6.6	3	●	MMS0660X3DB	36.2	38.2	91.2	90	1.2	8
	5	●	MMS0660X5DB	50.2	52.2	99.2	98	1.2	8
6.7	3	●	MMS0670X3DB	36.2	38.2	91.2	90	1.2	8
	5	●	MMS0670X5DB	50.2	52.2	99.2	98	1.2	8

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP7020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON
6.8	3	●	MMS0680X3DB	36.2	38.2	91.2	90	1.2	8
	5	●	MMS0680X5DB	50.2	52.2	99.2	98	1.2	8
6.9	3	●	MMS0690X3DB	36.3	38.3	91.3	90	1.3	8
	5	●	MMS0690X5DB	50.3	52.3	99.3	98	1.3	8
7.0	3	●	MMS0700X3DB	36.3	38.3	91.3	90	1.3	8
	5	●	MMS0700X5DB	50.3	52.3	99.3	98	1.3	8
7.1	3	●	MMS0710X3DB	39.3	40.3	91.3	90	1.3	8
	5	●	MMS0710X5DB	54.3	57.3	104.3	103	1.3	8
7.2	3	●	MMS0720X3DB	39.3	40.3	91.3	90	1.3	8
	5	●	MMS0720X5DB	54.3	57.3	104.3	103	1.3	8
7.3	3	●	MMS0730X3DB	39.3	40.3	91.3	90	1.3	8
	5	●	MMS0730X5DB	54.3	57.3	104.3	103	1.3	8
7.4	3	●	MMS0740X3DB	39.3	40.3	91.3	90	1.3	8
	5	●	MMS0740X5DB	54.3	57.3	104.3	103	1.3	8
7.5	3	●	MMS0750X3DB	39.4	40.4	91.4	90	1.4	8
	5	●	MMS0750X5DB	54.4	57.4	104.4	103	1.4	8
7.6	3	●	MMS0760X3DB	41.4	41.4	91.4	90	1.4	8
	5	●	MMS0760X5DB	57.4	57.4	104.4	103	1.4	8
7.7	3	●	MMS0770X3DB	41.4	41.4	91.4	90	1.4	8
	5	●	MMS0770X5DB	57.4	57.4	104.4	103	1.4	8
7.8	3	●	MMS0780X3DB	41.4	41.4	91.4	90	1.4	8
	5	●	MMS0780X5DB	57.4	57.4	104.4	103	1.4	8
7.9	3	●	MMS0790X3DB	41.4	41.4	91.4	90	1.4	8
	5	●	MMS0790X5DB	57.4	57.4	104.4	103	1.4	8
8.0	3	●	MMS0800X3DB	41.5	41.5	91.5	90	1.5	8
	5	●	MMS0800X5DB	57.5	57.5	104.5	103	1.5	8
8.1	3	●	MMS0810X3DB	44.5	46.5	97.5	96	1.5	10
	5	●	MMS0810X5DB	61.5	63.5	114.5	113	1.5	10
8.2	3	●	MMS0820X3DB	44.5	46.5	97.5	96	1.5	10
	5	●	MMS0820X5DB	61.5	63.5	114.5	113	1.5	10
8.3	3	●	MMS0830X3DB	44.5	46.5	97.5	96	1.5	10
	5	●	MMS0830X5DB	61.5	63.5	114.5	113	1.5	10
8.4	3	●	MMS0840X3DB	44.5	46.5	97.5	96	1.5	10
	5	●	MMS0840X5DB	61.5	63.5	114.5	113	1.5	10
8.5	3	●	MMS0850X3DB	44.5	46.5	97.5	96	1.5	10
	5	●	MMS0850X5DB	61.5	63.5	114.5	113	1.5	10
8.6	3	●	MMS0860X3DB	46.6	48.6	102.6	101	1.6	10
	5	●	MMS0860X5DB	64.6	66.6	117.6	116	1.6	10
8.7	3	●	MMS0870X3DB	46.6	48.6	102.6	101	1.6	10
	5	●	MMS0870X5DB	64.6	66.6	117.6	116	1.6	10
8.8	3	●	MMS0880X3DB	46.6	48.6	102.6	101	1.6	10
	5	●	MMS0880X5DB	64.6	66.6	117.6	116	1.6	10
8.9	3	●	MMS0890X3DB	46.6	48.6	102.6	101	1.6	10
	5	●	MMS0890X5DB	64.6	66.6	117.6	116	1.6	10
9.0	3	●	MMS0900X3DB	46.6	48.6	102.6	101	1.6	10
	5	●	MMS0900X5DB	64.6	66.6	117.6	116	1.6	10
9.1	3	●	MMS0910X3DB	49.7	51.7	102.7	101	1.7	10
	5	●	MMS0910X5DB	68.7	71.7	122.7	121	1.7	10
9.2	3	●	MMS0920X3DB	49.7	51.7	102.7	101	1.7	10
	5	●	MMS0920X5DB	68.7	71.7	122.7	121	1.7	10

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP7020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON
9.3	3	●	MMS0930X3DB	49.7	51.7	102.7	101	1.7	10
	5	●	MMS0930X5DB	68.7	71.7	122.7	121	1.7	10
9.4	3	●	MMS0940X3DB	49.7	51.7	102.7	101	1.7	10
	5	●	MMS0940X5DB	68.7	71.7	122.7	121	1.7	10
9.5	3	●	MMS0950X3DB	49.7	51.7	102.7	101	1.7	10
	5	●	MMS0950X5DB	68.7	71.7	122.7	121	1.7	10
9.6	3	●	MMS0960X3DB	51.7	51.7	102.7	101	1.7	10
	5	●	MMS0960X5DB	71.7	71.7	122.7	121	1.7	10
9.7	3	●	MMS0970X3DB	51.8	51.8	102.8	101	1.8	10
	5	●	MMS0970X5DB	71.8	71.8	122.8	121	1.8	10
9.8	3	●	MMS0980X3DB	51.8	51.8	102.8	101	1.8	10
	5	●	MMS0980X5DB	71.8	71.8	122.8	121	1.8	10
9.9	3	●	MMS0990X3DB	51.8	51.8	102.8	101	1.8	10
	5	●	MMS0990X5DB	71.8	71.8	122.8	121	1.8	10
10.0	3	●	MMS1000X3DB	51.8	51.8	102.8	101	1.8	10
	5	●	MMS1000X5DB	71.8	71.8	122.8	121	1.8	10
10.1	3	●	MMS1010X3DB	54.8	56.8	112.8	111	1.8	12
	5	●	MMS1010X5DB	75.8	79.8	135.8	134	1.8	12
10.2	3	●	MMS1020X3DB	54.9	56.9	112.9	111	1.9	12
	5	●	MMS1020X5DB	75.9	79.9	135.9	134	1.9	12
10.3	3	●	MMS1030X3DB	54.9	56.9	112.9	111	1.9	12
	5	●	MMS1030X5DB	75.9	79.9	135.9	134	1.9	12
10.4	3	●	MMS1040X3DB	54.9	56.9	112.9	111	1.9	12
	5	●	MMS1040X5DB	75.9	79.9	135.9	134	1.9	12
10.5	3	●	MMS1050X3DB	54.9	56.9	112.9	111	1.9	12
	5	●	MMS1050X5DB	75.9	79.9	135.9	134	1.9	12
10.6	3	●	MMS1060X3DB	56.9	57.9	117.9	116	1.9	12
	5	●	MMS1060X5DB	78.9	79.9	135.9	134	1.9	12
10.7	3	●	MMS1070X3DB	56.9	57.9	117.9	116	1.9	12
	5	●	MMS1070X5DB	78.9	79.9	135.9	134	1.9	12
10.8	3	●	MMS1080X3DB	57.0	58.0	118.0	116	2.0	12
	5	●	MMS1080X5DB	79.0	80.0	136.0	134	2.0	12
10.9	3	●	MMS1090X3DB	57.0	58.0	118.0	116	2.0	12
	5	●	MMS1090X5DB	79.0	80.0	136.0	134	2.0	12
11.0	3	●	MMS1100X3DB	57.0	58.0	118.0	116	2.0	12
	5	●	MMS1100X5DB	79.0	80.0	136.0	134	2.0	12
11.1	3	●	MMS1110X3DB	60.0	62.0	118.0	116	2.0	12
	5	●	MMS1110X5DB	83.0	86.0	142.0	140	2.0	12
11.2	3	●	MMS1120X3DB	60.0	62.0	118.0	116	2.0	12
	5	●	MMS1120X5DB	83.0	86.0	142.0	140	2.0	12
11.3	3	●	MMS1130X3DB	60.1	62.1	118.1	116	2.1	12
	5	●	MMS1130X5DB	83.1	86.1	142.1	140	2.1	12
11.4	3	●	MMS1140X3DB	60.1	62.1	118.1	116	2.1	12
	5	●	MMS1140X5DB	83.1	86.1	142.1	140	2.1	12
11.5	3	●	MMS1150X3DB	60.1	62.1	118.1	116	2.1	12
	5	●	MMS1150X5DB	83.1	86.1	142.1	140	2.1	12
11.6	3	●	MMS1160X3DB	62.1	62.1	118.1	116	2.1	12
	5	●	MMS1160X5DB	86.1	86.1	142.1	140	2.1	12
11.7	3	●	MMS1170X3DB	62.1	62.1	118.1	116	2.1	12
	5	●	MMS1170X5DB	86.1	86.1	142.1	140	2.1	12

DRILLING

CUTTING CONDITIONS ➤ N074
OPERATION GUIDANCE ➤ N076
TECHNICAL DATA ➤ Q001

MMS

WSTAR DRILLS

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP7020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON
11.8	3	●	MMS1180X3DB	62.1	62.1	118.1	116	2.1	12
	5	●	MMS1180X5DB	86.1	86.1	142.1	140	2.1	12
11.9	3	●	MMS1190X3DB	62.2	62.2	118.2	116	2.2	12
	5	●	MMS1190X5DB	86.2	86.2	142.2	140	2.2	12
12.0	3	●	MMS1200X3DB	62.2	62.2	118.2	116	2.2	12
	5	●	MMS1200X5DB	86.2	86.2	142.2	140	2.2	12
12.1	3	●	MMS1210X3DB	65.2	68.2	124.2	122	2.2	14
	5	●	MMS1210X5DB	90.2	94.2	150.2	148	2.2	14
12.2	3	●	MMS1220X3DB	65.2	68.2	124.2	122	2.2	14
	5	●	MMS1220X5DB	90.2	94.2	150.2	148	2.2	14
12.3	3	●	MMS1230X3DB	65.2	68.2	124.2	122	2.2	14
	5	●	MMS1230X5DB	90.2	94.2	150.2	148	2.2	14
12.4	3	●	MMS1240X3DB	65.3	68.3	124.3	122	2.3	14
	5	●	MMS1240X5DB	90.3	94.3	150.3	148	2.3	14
12.5	3	●	MMS1250X3DB	65.3	68.3	124.3	122	2.3	14
	5	●	MMS1250X5DB	90.3	94.3	150.3	148	2.3	14
12.6	3	●	MMS1260X3DB	67.3	68.3	124.3	122	2.3	14
	5	●	MMS1260X5DB	93.3	94.3	150.3	148	2.3	14
12.7	3	●	MMS1270X3DB	67.3	68.3	124.3	122	2.3	14
	5	●	MMS1270X5DB	93.3	94.3	150.3	148	2.3	14
12.8	3	●	MMS1280X3DB	67.3	68.3	124.3	122	2.3	14
	5	●	MMS1280X5DB	93.3	94.3	150.3	148	2.3	14
12.9	3	●	MMS1290X3DB	67.3	68.3	124.3	122	2.3	14
	5	●	MMS1290X5DB	93.3	94.3	150.3	148	2.3	14
13.0	3	●	MMS1300X3DB	67.4	68.4	124.4	122	2.4	14
	5	●	MMS1300X5DB	93.4	94.4	150.4	148	2.4	14
13.1	3	●	MMS1310X3DB	70.4	72.4	128.4	126	2.4	14
	5	●	MMS1310X5DB	97.4	100.4	156.4	154	2.4	14
13.2	3	●	MMS1320X3DB	70.4	72.4	128.4	126	2.4	14
	5	●	MMS1320X5DB	97.4	100.4	156.4	154	2.4	14
13.3	3	●	MMS1330X3DB	70.4	72.4	128.4	126	2.4	14
	5	●	MMS1330X5DB	97.4	100.4	156.4	154	2.4	14
13.4	3	●	MMS1340X3DB	70.4	72.4	128.4	126	2.4	14
	5	●	MMS1340X5DB	97.4	100.4	156.4	154	2.4	14
13.5	3	●	MMS1350X3DB	70.5	72.5	128.5	126	2.5	14
	5	●	MMS1350X5DB	97.5	100.5	156.5	154	2.5	14
13.6	3	●	MMS1360X3DB	72.5	72.5	128.5	126	2.5	14
	5	●	MMS1360X5DB	100.5	100.5	156.5	154	2.5	14
13.7	3	●	MMS1370X3DB	72.5	72.5	128.5	126	2.5	14
	5	●	MMS1370X5DB	100.5	100.5	156.5	154	2.5	14
13.8	3	●	MMS1380X3DB	72.5	72.5	128.5	126	2.5	14
	5	●	MMS1380X5DB	100.5	100.5	156.5	154	2.5	14
13.9	3	●	MMS1390X3DB	72.5	72.5	128.5	126	2.5	14
	5	●	MMS1390X5DB	100.5	100.5	156.5	154	2.5	14
14.0	3	●	MMS1400X3DB	72.5	72.5	128.5	126	2.5	14
	5	●	MMS1400X5DB	100.5	100.5	156.5	154	2.5	14
14.1	3	●	MMS1410X3DB	75.6	78.6	137.6	135	2.6	16
	5	●	MMS1410X5DB	104.6	108.6	167.6	165	2.6	16
14.2	3	●	MMS1420X3DB	75.6	78.6	137.6	135	2.6	16
	5	●	MMS1420X5DB	104.6	108.6	167.6	165	2.6	16

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP7020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON
14.3	3	●	MMS1430X3DB	75.6	78.6	137.6	135	2.6	16
	5	●	MMS1430X5DB	104.6	108.6	167.6	165	2.6	16
14.4	3	●	MMS1440X3DB	75.6	78.6	137.6	135	2.6	16
	5	●	MMS1440X5DB	104.6	108.6	167.6	165	2.6	16
14.5	3	●	MMS1450X3DB	75.6	78.6	137.6	135	2.6	16
	5	●	MMS1450X5DB	104.6	108.6	167.6	165	2.6	16
14.6	3	●	MMS1460X3DB	77.7	78.7	137.7	135	2.7	16
	5	●	MMS1460X5DB	107.7	108.7	167.7	165	2.7	16
14.7	3	●	MMS1470X3DB	77.7	78.7	137.7	135	2.7	16
	5	●	MMS1470X5DB	107.7	108.7	167.7	165	2.7	16
14.8	3	●	MMS1480X3DB	77.7	78.7	137.7	135	2.7	16
	5	●	MMS1480X5DB	107.7	108.7	167.7	165	2.7	16
14.9	3	●	MMS1490X3DB	77.7	78.7	137.7	135	2.7	16
	5	●	MMS1490X5DB	107.7	108.7	167.7	165	2.7	16
15.0	3	●	MMS1500X3DB	77.7	78.7	137.7	135	2.7	16
	5	●	MMS1500X5DB	107.7	108.7	167.7	165	2.7	16
15.1	3	●	MMS1510X3DB	80.7	82.7	141.7	139	2.7	16
	5	●	MMS1510X5DB	111.7	114.7	173.7	171	2.7	16
15.2	3	●	MMS1520X3DB	80.8	82.8	141.8	139	2.8	16
	5	●	MMS1520X5DB	111.8	114.8	173.8	171	2.8	16
15.3	3	●	MMS1530X3DB	80.8	82.8	141.8	139	2.8	16
	5	●	MMS1530X5DB	111.8	114.8	173.8	171	2.8	16
15.4	3	●	MMS1540X3DB	80.8	82.8	141.8	139	2.8	16
	5	●	MMS1540X5DB	111.8	114.8	173.8	171	2.8	16
15.5	3	●	MMS1550X3DB	80.8	82.8	141.8	139	2.8	16
	5	●	MMS1550X5DB	111.8	114.8	173.8	171	2.8	16
15.6	3	●	MMS1560X3DB	82.8	82.8	141.8	139	2.8	16
	5	●	MMS1560X5DB	114.8	114.8	173.8	171	2.8	16
15.7	3	●	MMS1570X3DB	82.9	82.9	141.9	139	2.9	16
	5	●	MMS1570X5DB	114.9	114.9	173.9	171	2.9	16
15.8	3	●	MMS1580X3DB	82.9	82.9	141.9	139	2.9	16
	5	●	MMS1580X5DB	114.9	114.9	173.9	171	2.9	16
15.9	3	●	MMS1590X3DB	82.9	82.9	141.9	139	2.9	16
	5	●	MMS1590X5DB	114.9	114.9	173.9	171	2.9	16
16.0	3	●	MMS1600X3DB	82.9	82.9	141.9	139	2.9	16
	5	●	MMS1600X5DB	114.9	114.9	173.9	171	2.9	16
16.1	3	□	MMS1610X3DB	85.9	88.9	147.9	145	2.9	18
	5	□	MMS1610X5DB	118.9	122.9	181.9	179	2.9	18
16.2	3	□	MMS1620X3DB	85.9	88.9	147.9	145	2.9	18
	5	□	MMS1620X5DB	118.9	122.9	181.9	179	2.9	18
16.3	3	□	MMS1630X3DB	86.0	89.0	148.0	145	3.0	18
	5	□	MMS1630X5DB	119.0	123.0	182.0	179	3.0	18
16.4	3	□	MMS1640X3DB	86.0	89.0	148.0	145	3.0	18
	5	□	MMS1640X5DB	119.0	123.0	182.0	179	3.0	18
16.5	3	●	MMS1650X3DB	86.0	89.0	148.0	145	3.0	18
	5	●	MMS1650X5DB	119.0	123.0	182.0	179	3.0	18
16.6	3	□	MMS1660X3DB	88.0	89.0	148.0	145	3.0	18
	5	□	MMS1660X5DB	122.0	123.0	182.0	179	3.0	18
16.7	3	□	MMS1670X3DB	88.0	89.0	148.0	145	3.0	18
	5	□	MMS1670X5DB	122.0	123.0	182.0	179	3.0	18

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP7020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON
16.8	3	□	MMS1680X3DB	88.1	89.1	148.1	145	3.1	18
	5	□	MMS1680X5DB	122.1	123.1	182.1	179	3.1	18
16.9	3	□	MMS1690X3DB	88.1	89.1	148.1	145	3.1	18
	5	□	MMS1690X5DB	122.1	123.1	182.1	179	3.1	18
17.0	3	●	MMS1700X3DB	88.1	89.1	148.1	145	3.1	18
	5	●	MMS1700X5DB	122.1	123.1	182.1	179	3.1	18
17.1	3	□	MMS1710X3DB	91.1	93.1	152.1	149	3.1	18
	5	□	MMS1710X5DB	126.1	129.1	188.1	185	3.1	18
17.2	3	□	MMS1720X3DB	91.1	93.1	152.1	149	3.1	18
	5	□	MMS1720X5DB	126.1	129.1	188.1	185	3.1	18
17.3	3	□	MMS1730X3DB	91.1	93.1	152.1	149	3.1	18
	5	□	MMS1730X5DB	126.1	129.1	188.1	185	3.1	18
17.4	3	□	MMS1740X3DB	91.2	93.2	152.2	149	3.2	18
	5	□	MMS1740X5DB	126.2	129.2	188.2	185	3.2	18
17.5	3	●	MMS1750X3DB	91.2	93.2	152.2	149	3.2	18
	5	●	MMS1750X5DB	126.2	129.2	188.2	185	3.2	18
17.6	3	□	MMS1760X3DB	93.2	93.2	152.2	149	3.2	18
	5	□	MMS1760X5DB	129.2	129.2	188.2	185	3.2	18
17.7	3	□	MMS1770X3DB	93.2	93.2	152.2	149	3.2	18
	5	□	MMS1770X5DB	129.2	129.2	188.2	185	3.2	18
17.8	3	□	MMS1780X3DB	93.2	93.2	152.2	149	3.2	18
	5	□	MMS1780X5DB	129.2	129.2	188.2	185	3.2	18
17.9	3	□	MMS1790X3DB	93.3	93.3	152.3	149	3.3	18
	5	□	MMS1790X5DB	129.3	129.3	188.3	185	3.3	18
18.0	3	●	MMS1800X3DB	93.3	93.3	152.3	149	3.3	18
	5	●	MMS1800X5DB	129.3	129.3	188.3	185	3.3	18
18.1	3	□	MMS1810X3DB	96.3	99.3	160.3	157	3.3	20
	5	□	MMS1810X5DB	133.3	137.3	198.3	195	3.3	20
18.2	3	□	MMS1820X3DB	96.3	99.3	160.3	157	3.3	20
	5	□	MMS1820X5DB	133.3	137.3	198.3	195	3.3	20
18.3	3	□	MMS1830X3DB	96.3	99.3	160.3	157	3.3	20
	5	□	MMS1830X5DB	133.3	137.3	198.3	195	3.3	20
18.4	3	□	MMS1840X3DB	96.3	99.3	160.3	157	3.3	20
	5	□	MMS1840X5DB	133.3	137.3	198.3	195	3.3	20
18.5	3	●	MMS1850X3DB	96.4	99.4	160.4	157	3.4	20
	5	●	MMS1850X5DB	133.4	137.4	198.4	195	3.4	20
18.6	3	□	MMS1860X3DB	98.4	99.4	160.4	157	3.4	20
	5	□	MMS1860X5DB	136.4	137.4	198.4	195	3.4	20
18.7	3	□	MMS1870X3DB	98.4	99.4	160.4	157	3.4	20
	5	□	MMS1870X5DB	136.4	137.4	198.4	195	3.4	20
18.8	3	□	MMS1880X3DB	98.4	99.4	160.4	157	3.4	20
	5	□	MMS1880X5DB	136.4	137.4	198.4	195	3.4	20
18.9	3	□	MMS1890X3DB	98.4	99.4	160.4	157	3.4	20
	5	□	MMS1890X5DB	136.4	137.4	198.4	195	3.4	20
19.0	3	●	MMS1900X3DB	98.5	99.5	160.5	157	3.5	20
	5	●	MMS1900X5DB	136.5	137.5	198.5	195	3.5	20
19.1	3	□	MMS1910X3DB	101.5	103.5	164.5	161	3.5	20
	5	□	MMS1910X5DB	140.5	143.5	204.5	201	3.5	20
19.2	3	□	MMS1920X3DB	101.5	103.5	164.5	161	3.5	20
	5	□	MMS1920X5DB	140.5	143.5	204.5	201	3.5	20

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock DP7020	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON
19.3	3	□	MMS1930X3DB	101.5	103.5	164.5	161	3.5	20
	5	□	MMS1930X5DB	140.5	143.5	204.5	201	3.5	20
19.4	3	□	MMS1940X3DB	101.5	103.5	164.5	161	3.5	20
	5	□	MMS1940X5DB	140.5	143.5	204.5	201	3.5	20
19.5	3	●	MMS1950X3DB	101.5	103.5	164.5	161	3.5	20
	5	●	MMS1950X5DB	140.5	143.5	204.5	201	3.5	20
19.6	3	□	MMS1960X3DB	103.6	103.6	164.6	161	3.6	20
	5	□	MMS1960X5DB	143.6	143.6	204.6	201	3.6	20
19.7	3	□	MMS1970X3DB	103.6	103.6	164.6	161	3.6	20
	5	□	MMS1970X5DB	143.6	143.6	204.6	201	3.6	20
19.8	3	□	MMS1980X3DB	103.6	103.6	164.6	161	3.6	20
	5	□	MMS1980X5DB	143.6	143.6	204.6	201	3.6	20
19.9	3	□	MMS1990X3DB	103.6	103.6	164.6	161	3.6	20
	5	□	MMS1990X5DB	143.6	143.6	204.6	201	3.6	20
20.0	3	●	MMS2000X3DB	103.6	103.6	164.6	161	3.6	20
	5	●	MMS2000X5DB	143.6	143.6	204.6	201	3.6	20

DRILLING

CUTTING CONDITIONS ➤ N074
OPERATION GUIDANCE ➤ N076
TECHNICAL DATA ➤ Q001

MMS
WSTAR DRILLS

RECOMMENDED CUTTING CONDITIONS

Work Material	Austenitic Stainless Steel (≤200HB) AISI 304, AISI 316 etc					Austenitic Stainless Steel (>200HB) AISI 304LN, AISI 316LN etc				
Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)		Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)		Table Feed (mm/min)
3.2	80	7900	0.13	(0.08—0.18)	1025	60	5900	0.1	(0.05—0.15)	590
4.0	80	6300	0.15	(0.10—0.20)	945	60	4700	0.12	(0.08—0.18)	560
5.0	80	5000	0.15	(0.10—0.20)	750	60	3800	0.12	(0.08—0.18)	455
6.3	80	4000	0.17	(0.12—0.22)	680	60	3000	0.15	(0.1—0.2)	450
8.0	80	3100	0.19	(0.14—0.24)	585	60	2300	0.17	(0.12—0.22)	390
10.0	60	1900	0.2	(0.15—0.25)	380	50	1500	0.18	(0.13—0.23)	270
12.0	60	1500	0.21	(0.16—0.26)	315	50	1300	0.19	(0.14—0.24)	245
16.0	60	1100	0.22	(0.17—0.27)	240	50	900	0.2	(0.15—0.25)	180
20.0	60	900	0.23	(0.18—0.28)	205	50	700	0.21	(0.16—0.26)	145

Work Material	Duplex Steel (≤280HB) AISI 329 etc					Ferritic, Precipitation hardening stainless steel (≤200HB) AISI 410, AISI 430 etc				
Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)		Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)		Table Feed (mm/min)
3.2	50	4900	0.1	(0.05—0.15)	490	80	7900	0.13	(0.08—0.18)	1025
4.0	50	3900	0.12	(0.08—0.18)	465	80	6300	0.15	(0.10—0.20)	945
5.0	50	3100	0.12	(0.08—0.18)	370	80	5000	0.15	(0.10—0.20)	750
6.3	50	2500	0.15	(0.1—0.2)	375	80	4000	0.17	(0.12—0.22)	680
8.0	50	1900	0.17	(0.12—0.22)	320	80	3100	0.19	(0.14—0.24)	585
10.0	40	1200	0.18	(0.13—0.23)	215	60	1900	0.2	(0.15—0.25)	380
12.0	40	1000	0.19	(0.14—0.24)	190	60	1500	0.21	(0.16—0.26)	315
16.0	40	700	0.2	(0.15—0.25)	140	60	1100	0.22	(0.17—0.27)	240
20.0	40	600	0.21	(0.16—0.26)	125	60	900	0.23	(0.18—0.28)	205

Work Material	Ferritic, Precipitation hardening stainless steel (>200HB) AISI 431, AISI 420 etc					Precipitation hardening stainless steel (<450HB) ASTM 630, ASTM 631 etc				
Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)		Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)		Table Feed (mm/min)
3.2	60	5900	0.1	(0.05—0.15)	590	50	4900	0.1	(0.05—0.15)	490
4.0	60	4700	0.12	(0.08—0.18)	560	50	3900	0.12	(0.08—0.18)	465
5.0	60	3800	0.12	(0.08—0.18)	455	50	3100	0.12	(0.08—0.18)	370
6.3	60	3000	0.15	(0.1—0.2)	450	50	2500	0.15	(0.1—0.2)	375
8.0	60	2300	0.17	(0.12—0.22)	390	50	1900	0.17	(0.12—0.22)	320
10.0	50	1500	0.18	(0.13—0.23)	270	40	1200	0.18	(0.13—0.23)	215
12.0	50	1300	0.19	(0.14—0.24)	245	40	1000	0.19	(0.14—0.24)	190
16.0	50	900	0.2	(0.15—0.25)	180	40	700	0.2	(0.15—0.25)	140
20.0	50	700	0.21	(0.16—0.26)	145	40	600	0.21	(0.16—0.26)	125

(Note 1) For stable machining, internal coolant supply with high pressure is recommended.

(Note 2) Emulsion type of water coolant is recommended.

(Note 3) Recommended cutting conditions are for machining under the conditions of favourable machining environment and coolant. Please lower the cutting conditions if there is a problem in the rigidity of machine and workpiece, and coolant property or discharge amount .

Stainless Steel Cross Reference List

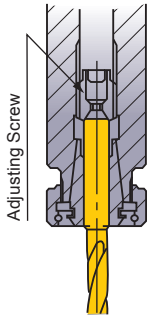
Material		Japan	Germany		USA
		JIS	W-no.	DIN	AISI/SAE
Ferritic, Precipitation hardening stainless steel	≤200HB	SUS416	1.4005	X12CrS3	416
		SUS410	1.4006	X10Cr13	410
		SUS430	1.4016	X6Cr17	430
		SUS434	1.4113	X6CrMo17	434
		SUS430LX	1.4510	X6CrTi17	430Ti
		—	1.4512	X6CrTi12	409
	>200HB	SUS420J1	1.4021	X20Cr13	420
		SUS431	1.4057	X20CrNi17-2	431
		SUS420J2	1.4028	X30Cr13	420
		SUS440C	1.4125	X10CrMo17	440C
Precipitation hardening stainless steel	<450HB	SUS630	1.4542	X5CrNiCuNb16 4	630 (17-4PH)
		—	1.4545	—	S15500 (15-5PH)
		SUS631	1.4568	X7CrNiAl17 7	631 (17-7PH)
Austenitic Stainless Steel	≤200HB	SUS304	1.4301	X5CrNi18 10	304
		SUS305	1.4303	X5CrNi8-12	305
		SUS303	1.4305	X12CrNiS18-9	303
		SUS304L	1.4307	X2CrNi19-11	304L
		SUS316	1.4401	X5CrNiMo17 12 2	316
	>200HB	SUS304LN	1.4311	X2CrNiN18 10	304LN
		SUS316L	1.4404	X2CrNiMo17 12 2	316L
		SUS316LN	1.4406	X2CrNiMoN17 12 2	316LN
		SUS316L	1.4435	X2CrNiMo18 14 3	—
		SUS317L	1.4438	X2CrNiMo18 15 4	317L
		—	1.4529	X1NiCrMoCuN25 20 7	N08926
		SUS321	1.4541	X6CrNiTi18-10	321
		SUS347	1.4550	X6CrNiNb18-10	347
		SUS316Ti	1.4571	X6CrNiMoTi17 12 2	316Ti
Duplex Steel	≤280HB	—	1.4362	X2CrNiN23 4	—
		SCS14A	1.4410	X2CrNiMoN25 7 4	S32750
		SUS329J1	1.4460	X3CrNiMoN27 5 2	329
		SUS329J3L	1.4462	X2CrNiMoN22 5 3	S31803

OPERATION GUIDANCE ➤ N076
TECHNICAL DATA ➤ Q001

MMS
WSTAR DRILLS

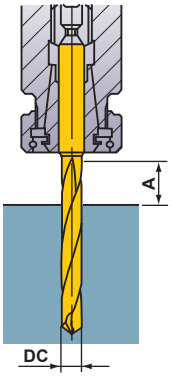
Operation Guidance for....X3DB and....X5DB

Drill Holding



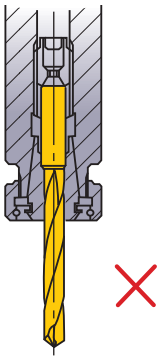
Thrust bearing type collet chuck holds the drill securely.

Drill Length



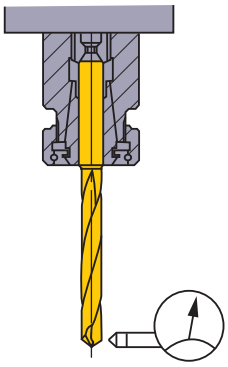
A ≥ DC x 1.5

Drill Installation



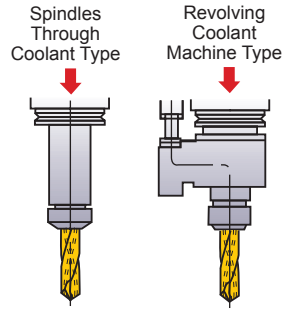
Do not clamp on the flutes.

Installation Tolerance



Run-out ≤ 0.03mm

Through Coolant Type (MQS)



Coolant pressure is approx. 0.5MPa—7MPa

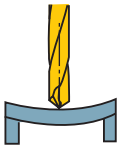
Coolant Handling

<MMS Type>

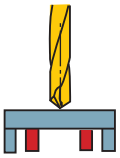
(1)Small particles of swarf will jam in the oil hole. Use a filter as a preventative measure. When using small diameter drills, use a fine mesh filter.

(2)Dirt and dust particles in old coolant can clog the oil hole and prevent effective flow. Regular coolant exchange is recommended.

Thin Workpiece

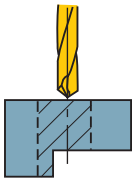


If Bending Occurs ×



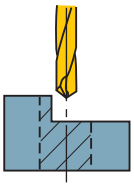
Support the Workpiece ○

Interrupted Cutting



One Process ○

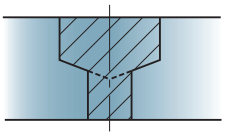
①Lower the feed when drilling the interrupted part.



Requires Prior Machining △

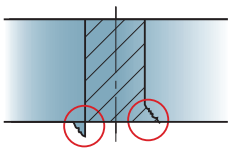
①Spot face with an end mill prior to drilling.

Stepped Holes



①Divide the two processes.
②Drill the larger hole first.
*A tool for machining both chamfer and spot face can be produced to order.

Burring and Workpiece Chipping



①Lower the feed rate by 50% at the end of through cutting.
②Add a 45°chamfer.
③Change the point angle.

SOLID CARBIDE DRILLS FOR MACHINING OF ALUMINIUM ALLOYS

MNS
WSTAR DRILLS

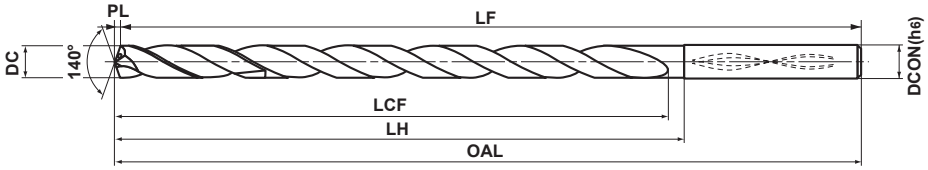
- 4 holes special coolant system, good for resistance to adhesion.
- High efficiency drilling for aluminium alloy.

P | M | K | **N** | S | H

Non-ferrous Metal

	DC=3	3<DC≤6	6<DC≤10	10<DC≤14
h6	$^{0}_{-0.014}$	$^{0}_{-0.018}$	$^{0}_{-0.022}$	$^{0}_{-0.027}$
	$^{0}_{-0.006}$	$^{0}_{-0.008}$	$^{0}_{-0.009}$	$^{0}_{-0.011}$





(Note 1) MNS drills are suitable for use with shrink fit holders.
(Note 2) 4.5 or smaller diameter drills are designed with 2 colant holes.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock TF15	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON
3.0	5	●	MNS0300LB	33.5	33.5	81.5	81	0.5	3
	10	●	MNS0300X10DB	39.5	42.5	90.5	90	0.5	3
	20	●	MNS0300X20DB	69.5	72.5	120.5	120	0.5	3
	30	●	MNS0300X30DB	99.5	102.5	150.5	150	0.5	3
3.1	5	●	MNS0310LB	39.6	39.6	87.6	87	0.6	4
	10	□	MNS0310X10DB	46.6	49.6	97.6	97	0.6	4
	20	□	MNS0310X20DB	81.6	84.6	132.6	132	0.6	4
	30	□	MNS0310X30DB	116.6	119.6	167.6	167	0.6	4
3.2	5	●	MNS0320LB	39.6	39.6	87.6	87	0.6	4
	10	●	MNS0320X10DB	46.6	49.6	97.6	97	0.6	4
	20	●	MNS0320X20DB	81.6	84.6	132.6	132	0.6	4
	30	●	MNS0320X30DB	116.6	119.6	167.6	167	0.6	4
3.3	5	●	MNS0330LB	39.6	39.6	87.6	87	0.6	4
	10	□	MNS0330X10DB	46.6	49.6	97.6	97	0.6	4
	20	□	MNS0330X20DB	81.6	84.6	132.6	132	0.6	4
	30	□	MNS0330X30DB	116.6	119.6	167.6	167	0.6	4
3.4	5	●	MNS0340LB	39.6	39.6	87.6	87	0.6	4
	10	●	MNS0340X10DB	46.6	49.6	97.6	97	0.6	4
	20	●	MNS0340X20DB	81.6	84.6	132.6	132	0.6	4
	30	●	MNS0340X30DB	116.6	119.6	167.6	167	0.6	4
3.5	5	●	MNS0350LB	39.6	39.6	87.6	87	0.6	4
	10	□	MNS0350X10DB	46.6	49.6	97.6	97	0.6	4
	20	□	MNS0350X20DB	81.6	84.6	132.6	132	0.6	4
	30	□	MNS0350X30DB	116.6	119.6	167.6	167	0.6	4
3.6	5	●	MNS0360LB	44.7	44.7	92.7	92	0.7	4
	10	●	MNS0360X10DB	52.7	55.7	103.7	103	0.7	4
	20	●	MNS0360X20DB	92.7	95.7	143.7	143	0.7	4
	30	●	MNS0360X30DB	132.7	135.7	183.7	183	0.7	4
3.7	5	●	MNS0370LB	44.7	44.7	92.7	92	0.7	4
	10	□	MNS0370X10DB	52.7	55.7	103.7	103	0.7	4
	20	□	MNS0370X20DB	92.7	95.7	143.7	143	0.7	4
	30	□	MNS0370X30DB	132.7	135.7	183.7	183	0.7	4

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock TF15	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON
3.8	5	●	MNS0380LB	44.7	44.7	92.7	92	0.7	4
	10	□	MNS0380X10DB	52.7	55.7	103.7	103	0.7	4
	20	□	MNS0380X20DB	92.7	95.7	143.7	143	0.7	4
	30	□	MNS0380X30DB	132.7	135.7	183.7	183	0.7	4
3.9	5	●	MNS0390LB	44.7	44.7	92.7	92	0.7	4
	10	●	MNS0390X10DB	52.7	55.7	103.7	103	0.7	4
	20	●	MNS0390X20DB	92.7	95.7	143.7	143	0.7	4
	30	●	MNS0390X30DB	132.7	135.7	183.7	183	0.7	4
4.0	5	●	MNS0400LB	44.7	44.7	92.7	92	0.7	4
	10	●	MNS0400X10DB	52.7	55.7	103.7	103	0.7	4
	20	●	MNS0400X20DB	92.7	95.7	143.7	143	0.7	4
	30	●	MNS0400X30DB	132.7	135.7	183.7	183	0.7	4
4.1	5	●	MNS0410LB	50.7	50.7	100.7	100	0.7	5
	10	□	MNS0410X10DB	59.7	62.7	112.7	112	0.7	5
	20	□	MNS0410X20DB	104.7	107.7	157.7	157	0.7	5
	30	□	MNS0410X30DB	149.7	152.7	202.7	202	0.7	5
4.2	5	●	MNS0420LB	50.8	50.8	100.8	100	0.8	5
	10	□	MNS0420X10DB	59.8	62.8	112.8	112	0.8	5
	20	□	MNS0420X20DB	104.8	107.8	157.8	157	0.8	5
	30	□	MNS0420X30DB	149.8	152.8	202.8	202	0.8	5
4.3	5	●	MNS0430LB	50.8	50.8	100.8	100	0.8	5
	10	□	MNS0430X10DB	59.8	62.8	112.8	112	0.8	5
	20	□	MNS0430X20DB	104.8	107.8	157.8	157	0.8	5
	30	□	MNS0430X30DB	149.8	152.8	202.8	202	0.8	5
4.4	5	●	MNS0440LB	50.8	50.8	100.8	100	0.8	5
	10	□	MNS0440X10DB	59.8	62.8	112.8	112	0.8	5
	20	□	MNS0440X20DB	104.8	107.8	157.8	157	0.8	5
	30	□	MNS0440X30DB	149.8	152.8	202.8	202	0.8	5
4.5	5	●	MNS0450LB	50.8	50.8	100.8	100	0.8	5
	10	□	MNS0450X10DB	59.8	62.8	112.8	112	0.8	5
	20	□	MNS0450X20DB	104.8	107.8	157.8	157	0.8	5
	30	□	MNS0450X30DB	149.8	152.8	202.8	202	0.8	5

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

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CUTTING CONDITIONS ➤ N082
OPERATION GUIDANCE ➤ N083
TECHNICAL DATA ➤ Q001

MNS

WSTAR DRILLS

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock TF15	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON
4.6	5	●	MNS0460LB	55.8	55.8	105.8	105	0.8	5
	10	□	MNS0460X10DB	65.8	68.8	118.8	118	0.8	5
	20	□	MNS0460X20DB	115.8	118.8	168.8	168	0.8	5
	30	□	MNS0460X30DB	165.8	168.8	218.8	218	0.8	5
4.7	5	●	MNS0470LB	55.9	55.9	105.9	105	0.9	5
	10	□	MNS0470X10DB	65.9	68.9	118.9	118	0.9	5
	20	□	MNS0470X20DB	115.9	118.9	168.9	168	0.9	5
	30	□	MNS0470X30DB	165.9	168.9	218.9	218	0.9	5
4.8	5	●	MNS0480LB	55.9	55.9	105.9	105	0.9	5
	10	□	MNS0480X10DB	65.9	68.9	118.9	118	0.9	5
	20	□	MNS0480X20DB	115.9	118.9	168.9	168	0.9	5
	30	□	MNS0480X30DB	165.9	168.9	218.9	218	0.9	5
4.9	5	●	MNS0490LB	55.9	55.9	105.9	105	0.9	5
	10	●	MNS0490X10DB	65.9	68.9	118.9	118	0.9	5
	20	●	MNS0490X20DB	115.9	118.9	168.9	168	0.9	5
	30	●	MNS0490X30DB	165.9	168.9	218.9	218	0.9	5
5.0	5	●	MNS0500LB	44.9	44.9	100.9	100	0.9	6
	10	●	MNS0500X10DB	65.9	68.9	118.9	118	0.9	5
	20	●	MNS0500X20DB	115.9	118.9	168.9	168	0.9	5
	30	●	MNS0500X30DB	165.9	168.9	218.9	218	0.9	5
5.1	5	●	MNS0510LB	44.9	44.9	100.9	100	0.9	6
	10	●	MNS0510X10DB	72.9	75.9	127.9	127	0.9	6
	20	●	MNS0510X20DB	127.9	130.9	182.9	182	0.9	6
	30	●	MNS0510X30DB	182.9	185.9	237.9	237	0.9	6
5.2	5	●	MNS0520LB	44.9	44.9	100.9	100	0.9	6
	10	□	MNS0520X10DB	72.9	75.9	127.9	127	0.9	6
	20	□	MNS0520X20DB	127.9	130.9	182.9	182	0.9	6
	30	□	MNS0520X30DB	182.9	185.9	237.9	237	0.9	6
5.3	5	●	MNS0530LB	45.0	45.0	101.0	100	1.0	6
	10	□	MNS0530X10DB	73.0	76.0	128.0	127	1.0	6
	20	□	MNS0530X20DB	128.0	131.0	183.0	182	1.0	6
	30	□	MNS0530X30DB	183.0	186.0	238.0	237	1.0	6
5.4	5	●	MNS0540LB	45.0	45.0	101.0	100	1.0	6
	10	□	MNS0540X10DB	73.0	76.0	128.0	127	1.0	6
	20	□	MNS0540X20DB	128.0	131.0	183.0	182	1.0	6
	30	□	MNS0540X30DB	183.0	186.0	238.0	237	1.0	6
5.5	5	●	MNS0550LB	45.0	45.0	101.0	100	1.0	6
	10	●	MNS0550X10DB	73.0	76.0	128.0	127	1.0	6
	20	●	MNS0550X20DB	128.0	131.0	183.0	182	1.0	6
	30	●	MNS0550X30DB	183.0	186.0	238.0	237	1.0	6
5.6	5	●	MNS0560LB	49.0	49.0	101.0	100	1.0	6
	10	□	MNS0560X10DB	79.0	82.0	134.0	133	1.0	6
	20	□	MNS0560X20DB	139.0	142.0	194.0	193	1.0	6
	30	□	MNS0560X30DB	199.0	202.0	254.0	253	1.0	6
5.7	5	●	MNS0570LB	49.0	49.0	101.0	100	1.0	6
	10	□	MNS0570X10DB	79.0	82.0	134.0	133	1.0	6
	20	□	MNS0570X20DB	139.0	142.0	194.0	193	1.0	6
	30	□	MNS0570X30DB	199.0	202.0	254.0	253	1.0	6

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock TF15	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON
5.8	5	●	MNS0580LB	49.1	49.1	101.1	100	1.1	6
	10	□	MNS0580X10DB	79.1	82.1	134.1	133	1.1	6
	20	□	MNS0580X20DB	139.1	142.1	194.1	193	1.1	6
	30	□	MNS0580X30DB	199.1	202.1	254.1	253	1.1	6
5.9	5	●	MNS0590LB	49.1	49.1	101.1	100	1.1	6
	10	□	MNS0590X10DB	79.1	82.1	134.1	133	1.1	6
	20	□	MNS0590X20DB	139.1	142.1	194.1	193	1.1	6
	30	□	MNS0590X30DB	199.1	202.1	254.1	253	1.1	6
6.0	5	●	MNS0600LB	49.1	49.1	101.1	100	1.1	6
	10	●	MNS0600X10DB	79.1	82.1	134.1	133	1.1	6
	20	●	MNS0600X20DB	139.1	142.1	194.1	193	1.1	6
	30	●	MNS0600X30DB	199.1	202.1	254.1	253	1.1	6
6.1	5	●	MNS0610LB	53.1	53.1	110.1	109	1.1	7
	10	●	MNS0610X10DB	86.1	89.1	142.1	141	1.1	7
	20	●	MNS0610X20DB	151.1	154.1	207.1	206	1.1	7
	30	●	MNS0610X30DB	216.1	219.1	272.1	271	1.1	7
6.2	5	●	MNS0620LB	53.1	53.1	110.1	109	1.1	7
	10	□	MNS0620X10DB	86.1	89.1	142.1	141	1.1	7
	20	□	MNS0620X20DB	151.1	154.1	207.1	206	1.1	7
	30	□	MNS0620X30DB	216.1	219.1	272.1	271	1.1	7
6.3	5	●	MNS0630LB	53.1	53.1	110.1	109	1.1	7
	10	□	MNS0630X10DB	86.1	89.1	142.1	141	1.1	7
	20	□	MNS0630X20DB	151.1	154.1	207.1	206	1.1	7
	30	□	MNS0630X30DB	216.1	219.1	272.1	271	1.1	7
6.4	5	●	MNS0640LB	53.2	53.2	110.2	109	1.2	7
	10	□	MNS0640X10DB	86.2	89.2	142.2	141	1.2	7
	20	□	MNS0640X20DB	151.2	154.2	207.2	206	1.2	7
	30	□	MNS0640X30DB	216.2	219.2	272.2	271	1.2	7
6.5	5	●	MNS0650LB	53.2	53.2	110.2	109	1.2	7
	10	●	MNS0650X10DB	86.2	89.2	142.2	141	1.2	7
	20	●	MNS0650X20DB	151.2	154.2	207.2	206	1.2	7
	30	●	MNS0650X30DB	216.2	219.2	272.2	271	1.2	7
6.6	5	●	MNS0660LB	57.2	57.2	110.2	109	1.2	7
	10	□	MNS0660X10DB	92.2	95.2	148.2	147	1.2	7
	20	□	MNS0660X20DB	162.2	165.2	218.2	217	1.2	7
	30	□	MNS0660X30DB	232.2	235.2	288.2	287	1.2	7
6.7	5	●	MNS0670LB	57.2	57.2	110.2	109	1.2	7
	10	●	MNS0670X10DB	92.2	95.2	148.2	147	1.2	7
	20	●	MNS0670X20DB	162.2	165.2	218.2	217	1.2	7
	30	●	MNS0670X30DB	232.2	235.2	288.2	287	1.2	7
6.8	5	●	MNS0680LB	57.2	57.2	110.2	109	1.2	7
	10	□	MNS0680X10DB	92.2	95.2	148.2	147	1.2	7
	20	□	MNS0680X20DB	162.2	165.2	218.2	217	1.2	7
	30	□	MNS0680X30DB	232.2	235.2	288.2	287	1.2	7
6.9	5	●	MNS0690LB	57.3	57.3	110.3	109	1.3	7
	10	□	MNS0690X10DB	92.3	95.3	148.3	147	1.3	7
	20	□	MNS0690X20DB	162.3	165.3	218.3	217	1.3	7
	30	□	MNS0690X30DB	232.3	235.3	288.3	287	1.3	7

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Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock TF15	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON
7.0	5	●	MNS0700LB	57.3	57.3	110.3	109	1.3	7
	10	●	MNS0700X10DB	92.3	95.3	148.3	147	1.3	7
	20	●	MNS0700X20DB	162.3	165.3	218.3	217	1.3	7
	30	●	MNS0700X30DB	232.3	235.3	288.3	287	1.3	7
7.1	5	●	MNS0710LB	61.3	65.3	119.3	118	1.3	8
	10	□	MNS0710X10DB	99.3	102.3	156.3	155	1.3	8
	20	□	MNS0710X20DB	174.3	177.3	231.3	230	1.3	8
	30	□	MNS0710X30DB	249.3	252.3	306.3	305	1.3	8
7.2	5	●	MNS0720LB	61.3	65.3	119.3	118	1.3	8
	10	●	MNS0720X10DB	99.3	102.3	156.3	155	1.3	8
	20	●	MNS0720X20DB	174.3	177.3	231.3	230	1.3	8
	30	●	MNS0720X30DB	249.3	252.3	306.3	305	1.3	8
7.3	5	●	MNS0730LB	61.3	65.3	119.3	118	1.3	8
	10	□	MNS0730X10DB	99.3	102.3	156.3	155	1.3	8
	20	□	MNS0730X20DB	174.3	177.3	231.3	230	1.3	8
	30	□	MNS0730X30DB	249.3	252.3	306.3	305	1.3	8
7.4	5	●	MNS0740LB	61.3	65.3	119.3	118	1.3	8
	10	□	MNS0740X10DB	99.3	102.3	156.3	155	1.3	8
	20	□	MNS0740X20DB	174.3	177.3	231.3	230	1.3	8
	30	□	MNS0740X30DB	249.3	252.3	306.3	305	1.3	8
7.5	5	●	MNS0750LB	61.4	65.4	119.4	118	1.4	8
	10	□	MNS0750X10DB	99.4	102.4	156.4	155	1.4	8
	20	□	MNS0750X20DB	174.4	177.4	231.4	230	1.4	8
	30	□	MNS0750X30DB	249.4	252.4	306.4	305	1.4	8
7.6	5	●	MNS0760LB	65.4	65.4	119.4	118	1.4	8
	10	□	MNS0760X10DB	105.4	108.4	162.4	161	1.4	8
	20	□	MNS0760X20DB	185.4	188.4	242.4	241	1.4	8
	30	□	MNS0760X30DB	265.4	268.4	322.4	321	1.4	8
7.7	5	●	MNS0770LB	65.4	65.4	119.4	118	1.4	8
	10	□	MNS0770X10DB	105.4	108.4	162.4	161	1.4	8
	20	□	MNS0770X20DB	185.4	188.4	242.4	241	1.4	8
	30	□	MNS0770X30DB	265.4	268.4	322.4	321	1.4	8
7.8	5	●	MNS0780LB	65.4	65.4	119.4	118	1.4	8
	10	●	MNS0780X10DB	105.4	108.4	162.4	161	1.4	8
	20	●	MNS0780X20DB	185.4	188.4	242.4	241	1.4	8
	30	●	MNS0780X30DB	265.4	268.4	322.4	321	1.4	8
7.9	5	●	MNS0790LB	65.4	65.4	119.4	118	1.4	8
	10	□	MNS0790X10DB	105.4	108.4	162.4	161	1.4	8
	20	□	MNS0790X20DB	185.4	188.4	242.4	241	1.4	8
	30	□	MNS0790X30DB	265.4	268.4	322.4	321	1.4	8
8.0	5	●	MNS0800LB	65.5	65.5	119.5	118	1.5	8
	10	●	MNS0800X10DB	105.5	108.5	162.5	161	1.5	8
	20	●	MNS0800X20DB	185.5	188.5	242.5	241	1.5	8
	30	●	MNS0800X30DB	265.5	268.5	322.5	321	1.5	8
8.1	5	●	MNS0810LB	69.5	73.5	128.5	127	1.5	9
	10	□	MNS0810X10DB	112.5	115.5	170.5	169	1.5	9
	20	□	MNS0810X20DB	197.5	200.5	255.5	254	1.5	9
	30	□	MNS0810X30DB	282.5	285.5	340.5	339	1.5	9

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock TF15	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON
8.2	5	●	MNS0820LB	69.5	73.5	128.5	127	1.5	9
	10	□	MNS0820X10DB	112.5	115.5	170.5	169	1.5	9
	20	□	MNS0820X20DB	197.5	200.5	255.5	254	1.5	9
	30	□	MNS0820X30DB	282.5	285.5	340.5	339	1.5	9
8.3	5	●	MNS0830LB	69.5	73.5	128.5	127	1.5	9
	10	□	MNS0830X10DB	112.5	115.5	170.5	169	1.5	9
	20	□	MNS0830X20DB	197.5	200.5	255.5	254	1.5	9
	30	□	MNS0830X30DB	282.5	285.5	340.5	339	1.5	9
8.4	5	●	MNS0840LB	69.5	73.5	128.5	127	1.5	9
	10	□	MNS0840X10DB	112.5	115.5	170.5	169	1.5	9
	20	□	MNS0840X20DB	197.5	200.5	255.5	254	1.5	9
	30	□	MNS0840X30DB	282.5	285.5	340.5	339	1.5	9
8.5	5	●	MNS0850LB	69.5	73.5	128.5	127	1.5	9
	10	□	MNS0850X10DB	112.5	115.5	170.5	169	1.5	9
	20	□	MNS0850X20DB	197.5	200.5	255.5	254	1.5	9
	30	□	MNS0850X30DB	282.5	285.5	340.5	339	1.5	9
8.6	5	●	MNS0860LB	73.6	73.6	128.6	127	1.6	9
	10	□	MNS0860X10DB	118.6	121.6	176.6	175	1.6	9
	20	□	MNS0860X20DB	208.6	211.6	266.6	265	1.6	9
	30	□	MNS0860X30DB	298.6	301.6	356.6	355	1.6	9
8.7	5	●	MNS0870LB	73.6	73.6	128.6	127	1.6	9
	10	□	MNS0870X10DB	118.6	121.6	176.6	175	1.6	9
	20	□	MNS0870X20DB	208.6	211.6	266.6	265	1.6	9
	30	□	MNS0870X30DB	298.6	301.6	356.6	355	1.6	9
8.8	5	●	MNS0880LB	73.6	73.6	128.6	127	1.6	9
	10	□	MNS0880X10DB	118.6	121.6	176.6	175	1.6	9
	20	□	MNS0880X20DB	208.6	211.6	266.6	265	1.6	9
	30	□	MNS0880X30DB	298.6	301.6	356.6	355	1.6	9
8.9	5	●	MNS0890LB	73.6	73.6	128.6	127	1.6	9
	10	□	MNS0890X10DB	118.6	121.6	176.6	175	1.6	9
	20	□	MNS0890X20DB	208.6	211.6	266.6	265	1.6	9
	30	□	MNS0890X30DB	298.6	301.6	356.6	355	1.6	9
9.0	5	●	MNS0900LB	73.6	73.6	128.6	127	1.6	9
	10	●	MNS0900X10DB	118.6	121.6	176.6	175	1.6	9
	20	●	MNS0900X20DB	208.6	211.6	266.6	265	1.6	9
	30	●	MNS0900X30DB	298.6	301.6	356.6	355	1.6	9
9.1	5	●	MNS0910LB	77.7	81.7	137.7	136	1.7	10
	10	□	MNS0910X10DB	125.7	128.7	183.7	182	1.7	10
	20	□	MNS0910X20DB	220.7	223.7	278.7	277	1.7	10
	30	□	MNS0910X30DB	315.7	318.7	373.7	372	1.7	10
9.2	5	●	MNS0920LB	77.7	81.7	137.7	136	1.7	10
	10	□	MNS0920X10DB	125.7	128.7	183.7	182	1.7	10
	20	□	MNS0920X20DB	220.7	223.7	278.7	277	1.7	10
	30	□	MNS0920X30DB	315.7	318.7	373.7	372	1.7	10
9.3	5	●	MNS0930LB	77.7	81.7	137.7	136	1.7	10
	10	□	MNS0930X10DB	125.7	128.7	183.7	182	1.7	10
	20	□	MNS0930X20DB	220.7	223.7	278.7	277	1.7	10
	30	□	MNS0930X30DB	315.7	318.7	373.7	372	1.7	10

CUTTING CONDITIONS ➤ N082
OPERATION GUIDANCE ➤ N083
TECHNICAL DATA ➤ Q001

MNS

WSTAR DRILLS

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock TF15	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON
9.4	5	●	MNS0940LB	77.7	81.7	137.7	136	1.7	10
	10	□	MNS0940X10DB	125.7	128.7	183.7	182	1.7	10
	20	□	MNS0940X20DB	220.7	223.7	278.7	277	1.7	10
	30	□	MNS0940X30DB	315.7	318.7	373.7	372	1.7	10
9.5	5	●	MNS0950LB	77.7	81.7	137.7	136	1.7	10
	10	□	MNS0950X10DB	125.7	128.7	183.7	182	1.7	10
	20	□	MNS0950X20DB	220.7	223.7	278.7	277	1.7	10
	30	□	MNS0950X30DB	315.7	318.7	373.7	372	1.7	10
9.6	5	●	MNS0960LB	81.7	81.7	137.7	136	1.7	10
	10	□	MNS0960X10DB	131.7	134.7	189.7	188	1.7	10
	20	□	MNS0960X20DB	231.7	234.7	289.7	288	1.7	10
	30	□	MNS0960X30DB	331.7	334.7	389.7	388	1.7	10
9.7	5	●	MNS0970LB	81.8	81.8	137.8	136	1.8	10
	10	□	MNS0970X10DB	131.8	134.8	189.8	188	1.8	10
	20	□	MNS0970X20DB	231.8	234.8	289.8	288	1.8	10
	30	□	MNS0970X30DB	331.8	334.8	389.8	388	1.8	10
9.8	5	●	MNS0980LB	81.8	81.8	137.8	136	1.8	10
	10	●	MNS0980X10DB	131.8	134.8	189.8	188	1.8	10
	20	●	MNS0980X20DB	231.8	234.8	289.8	288	1.8	10
	30	●	MNS0980X30DB	331.8	334.8	389.8	388	1.8	10
9.9	5	●	MNS0990LB	81.8	81.8	137.8	136	1.8	10
	10	□	MNS0990X10DB	131.8	134.8	189.8	188	1.8	10
	20	□	MNS0990X20DB	231.8	234.8	289.8	288	1.8	10
	30	□	MNS0990X30DB	331.8	334.8	389.8	388	1.8	10
10.0	5	●	MNS1000LB	81.8	81.8	137.8	136	1.8	10
	10	●	MNS1000X10DB	131.8	134.8	189.8	188	1.8	10
	20	●	MNS1000X20DB	231.8	234.8	289.8	288	1.8	10
	30	●	MNS1000X30DB	331.8	334.8	389.8	388	1.8	10
10.1	5	●	MNS1010LB	85.8	89.8	150.8	149	1.8	11
	10	□	MNS1010X10DB	138.8	141.8	202.8	201	1.8	11
	20	□	MNS1010X20DB	243.8	246.8	307.8	306	1.8	11
10.2	5	●	MNS1020LB	85.9	89.9	150.9	149	1.9	11
	10	□	MNS1020X10DB	138.9	141.9	202.9	201	1.9	11
	20	□	MNS1020X20DB	243.9	246.9	307.9	306	1.9	11
10.3	5	●	MNS1030LB	85.9	89.9	150.9	149	1.9	11
	10	□	MNS1030X10DB	138.9	141.9	202.9	201	1.9	11
	20	□	MNS1030X20DB	243.9	246.9	307.9	306	1.9	11
10.4	5	●	MNS1040LB	85.9	89.9	150.9	149	1.9	11
	10	□	MNS1040X10DB	138.9	141.9	202.9	201	1.9	11
	20	□	MNS1040X20DB	243.9	246.9	307.9	306	1.9	11
10.5	5	●	MNS1050LB	85.9	89.9	150.9	149	1.9	11
	10	●	MNS1050X10DB	138.9	141.9	202.9	201	1.9	11
	20	●	MNS1050X20DB	243.9	246.9	307.9	306	1.9	11
10.6	5	●	MNS1060LB	89.9	89.9	150.9	149	1.9	11
	10	□	MNS1060X10DB	144.9	147.9	208.9	207	1.9	11
	20	□	MNS1060X20DB	254.9	257.9	318.9	317	1.9	11
10.7	5	●	MNS1070LB	89.9	89.9	150.9	149	1.9	11
	10	□	MNS1070X10DB	144.9	147.9	208.9	207	1.9	11
	20	□	MNS1070X20DB	254.9	257.9	318.9	317	1.9	11

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock TF15	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON
10.8	5	●	MNS1080LB	90.0	90.0	151.0	149	2.0	11
	10	□	MNS1080X10DB	145.0	148.0	209.0	207	2.0	11
	20	□	MNS1080X20DB	255.0	258.0	319.0	317	2.0	11
10.9	5	●	MNS1090LB	90.0	90.0	151.0	149	2.0	11
	10	□	MNS1090X10DB	145.0	148.0	209.0	207	2.0	11
	20	□	MNS1090X20DB	255.0	258.0	319.0	317	2.0	11
11.0	5	●	MNS1100LB	90.0	90.0	151.0	149	2.0	11
	10	●	MNS1100X10DB	145.0	148.0	209.0	207	2.0	11
	20	●	MNS1100X20DB	255.0	258.0	319.0	317	2.0	11
11.1	5	●	MNS1110LB	94.0	98.0	160.0	158	2.0	12
	10	□	MNS1110X10DB	152.0	155.0	217.0	215	2.0	12
	20	□	MNS1110X20DB	267.0	270.0	332.0	330	2.0	12
11.2	5	●	MNS1120LB	94.0	98.0	160.0	158	2.0	12
	10	□	MNS1120X10DB	152.0	155.0	217.0	215	2.0	12
	20	□	MNS1120X20DB	267.0	270.0	332.0	330	2.0	12
11.3	5	●	MNS1130LB	94.1	98.1	160.1	158	2.1	12
	10	□	MNS1130X10DB	152.1	155.1	217.1	215	2.1	12
	20	□	MNS1130X20DB	267.1	270.1	332.1	330	2.1	12
11.4	5	●	MNS1140LB	94.1	98.1	160.1	158	2.1	12
	10	□	MNS1140X10DB	152.1	155.1	217.1	215	2.1	12
	20	□	MNS1140X20DB	267.1	270.1	332.1	330	2.1	12
11.5	5	●	MNS1150LB	94.1	98.1	160.1	158	2.1	12
	10	□	MNS1150X10DB	152.1	155.1	217.1	215	2.1	12
	20	□	MNS1150X20DB	267.1	270.1	332.1	330	2.1	12
11.6	5	●	MNS1160LB	98.1	98.1	160.1	158	2.1	12
	10	□	MNS1160X10DB	158.1	161.1	223.1	221	2.1	12
	20	□	MNS1160X20DB	278.1	281.1	343.1	341	2.1	12
11.7	5	●	MNS1170LB	98.1	98.1	160.1	158	2.1	12
	10	□	MNS1170X10DB	158.1	161.1	223.1	221	2.1	12
	20	□	MNS1170X20DB	278.1	281.1	343.1	341	2.1	12
11.8	5	●	MNS1180LB	98.1	98.1	160.1	158	2.1	12
	10	□	MNS1180X10DB	158.1	161.1	223.1	221	2.1	12
	20	□	MNS1180X20DB	278.1	281.1	343.1	341	2.1	12
11.9	5	●	MNS1190LB	98.2	98.2	160.2	158	2.2	12
	10	□	MNS1190X10DB	158.2	161.2	223.2	221	2.2	12
	20	□	MNS1190X20DB	278.2	281.2	343.2	341	2.2	12
12.0	5	●	MNS1200LB	98.2	98.2	160.2	158	2.2	12
	10	●	MNS1200X10DB	158.2	161.2	223.2	221	2.2	12
	20	●	MNS1200X20DB	278.2	281.2	343.2	341	2.2	12
12.1	5	●	MNS1210LB	102.2	106.2	169.2	167	2.2	13
	10	□	MNS1210X10DB	165.2	168.2	231.2	229	2.2	13
	20	□	MNS1210X20DB	290.2	293.2	356.2	354	2.2	13
12.2	5	●	MNS1220LB	102.2	106.2	169.2	167	2.2	13
	10	□	MNS1220X10DB	165.2	168.2	231.2	229	2.2	13
	20	□	MNS1220X20DB	290.2	293.2	356.2	354	2.2	13
12.3	5	●	MNS1230LB	102.2	106.2	169.2	167	2.2	13
	10	□	MNS1230X10DB	165.2	168.2	231.2	229	2.2	13
	20	□	MNS1230X20DB	290.2	293.2	356.2	354	2.2	13

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock TF15	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON
	5	●	**MNS1240LB**	102.3	106.3	169.3	167	2.3	13
12.4	10	□	**MNS1240X10DB**	165.3	168.3	231.3	229	2.3	13
	20	□	**MNS1240X20DB**	290.3	293.3	356.3	354	2.3	13
	5	●	**MNS1250LB**	102.3	106.3	169.3	167	2.3	13
12.5	10	□	**MNS1250X10DB**	165.3	168.3	231.3	229	2.3	13
	20	□	**MNS1250X20DB**	290.3	293.3	356.3	354	2.3	13
	5	●	**MNS1260LB**	106.3	106.3	169.3	167	2.3	13
12.6	10	□	**MNS1260X10DB**	171.3	174.3	237.3	235	2.3	13
	20	□	**MNS1260X20DB**	301.3	304.3	367.3	365	2.3	13
	5	●	**MNS1270LB**	106.3	106.3	169.3	167	2.3	13
12.7	10	□	**MNS1270X10DB**	171.3	174.3	237.3	235	2.3	13
	20	□	**MNS1270X20DB**	301.3	304.3	367.3	365	2.3	13
	5	●	**MNS1280LB**	106.3	106.3	169.3	167	2.3	13
12.8	10	□	**MNS1280X10DB**	171.3	174.3	237.3	235	2.3	13
	20	□	**MNS1280X20DB**	301.3	304.3	367.3	365	2.3	13
	5	●	**MNS1290LB**	106.3	106.3	169.3	167	2.3	13
12.9	10	□	**MNS1290X10DB**	171.3	174.3	237.3	235	2.3	13
	20	□	**MNS1290X20DB**	301.3	304.3	367.3	365	2.3	13
	5	●	**MNS1300LB**	106.4	106.4	169.4	167	2.4	13
13.0	10	●	**MNS1300X10DB**	171.4	174.4	237.4	235	2.4	13
	20	●	**MNS1300X20DB**	301.4	304.4	367.4	365	2.4	13
	5	●	**MNS1310LB**	110.4	114.4	178.4	176	2.4	14
13.1	10	□	**MNS1310X10DB**	178.4	181.4	245.4	243	2.4	14
	20	□	**MNS1310X20DB**	313.4	316.4	380.4	378	2.4	14
	5	●	**MNS1320LB**	110.4	114.4	178.4	176	2.4	14
13.2	10	□	**MNS1320X10DB**	178.4	181.4	245.4	243	2.4	14
	20	□	**MNS1320X20DB**	313.4	316.4	380.4	378	2.4	14
	5	●	**MNS1330LB**	110.4	114.4	178.4	176	2.4	14
13.3	10	□	**MNS1330X10DB**	178.4	181.4	245.4	243	2.4	14
	20	□	**MNS1330X20DB**	313.4	316.4	380.4	378	2.4	14
	5	●	**MNS1340LB**	110.4	114.4	178.4	176	2.4	14
13.4	10	□	**MNS1340X10DB**	178.4	181.4	245.4	243	2.4	14
	20	□	**MNS1340X20DB**	313.4	316.4	380.4	378	2.4	14
	5	●	**MNS1350LB**	110.5	114.5	178.5	176	2.5	14
13.5	10	□	**MNS1350X10DB**	178.5	181.5	245.5	243	2.5	14
	20	□	**MNS1350X20DB**	313.5	316.5	380.5	378	2.5	14
	5	●	**MNS1360LB**	114.5	114.5	178.5	176	2.5	14
13.6	10	□	**MNS1360X10DB**	184.5	187.5	251.5	249	2.5	14
	20	□	**MNS1360X20DB**	324.5	327.5	391.5	389	2.5	14
	5	●	**MNS1370LB**	114.5	114.5	178.5	176	2.5	14
13.7	10	□	**MNS1370X10DB**	184.5	187.5	251.5	249	2.5	14
	20	□	**MNS1370X20DB**	324.5	327.5	391.5	389	2.5	14
	5	●	**MNS1380LB**	114.5	114.5	178.5	176	2.5	14
13.8	10	□	**MNS1380X10DB**	184.5	187.5	251.5	249	2.5	14
	20	□	**MNS1380X20DB**	324.5	327.5	391.5	389	2.5	14
	5	●	**MNS1390LB**	114.5	114.5	178.5	176	2.5	14
13.9	10	□	**MNS1390X10DB**	184.5	187.5	251.5	249	2.5	14
	20	□	**MNS1390X20DB**	324.5	327.5	391.5	389	2.5	14
	5	●	**MNS1400LB**	114.5	114.5	178.5	176	2.5	14
14.0	10	●	**MNS1400X10DB**	184.5	187.5	251.5	249	2.5	14
	20	●	**MNS1400X20DB**	324.5	327.5	391.5	389	2.5	14

CUTTING CONDITIONS ➤ N082
OPERATION GUIDANCE ➤ N083
TECHNICAL DATA ➤ Q001

MNS
WSTAR DRILLS

RECOMMENDED CUTTING CONDITIONS

LB Type Drill

Work material	Aluminium Alloy (Si<5%) ASTM A6061, ASTM A7075 etc		Aluminium Alloy (5%≤Si≤10%) ASTM 333.0 etc		Aluminium Alloy (Si>10%) ASTM 383.0, ASTM A390.0 etc	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
3.2	11900	0.1 (0.11—0.16)	11900	0.15 (0.16—0.21)	11900	0.15 (0.16—0.21)
4.0	9500	0.15 (0.13—0.20)	9500	0.2 (0.20—0.27)	9500	0.2 (0.20—0.27)
5.0	7600	0.2 (0.17—0.25)	7600	0.25 (0.25—0.33)	7600	0.25 (0.25—0.33)
6.3	7500	0.25 (0.21—0.32)	7500	0.35 (0.32—0.42)	7500	0.35 (0.32—0.42)
8.0	5900	0.3 (0.27—0.40)	5900	0.45 (0.40—0.53)	5900	0.45 (0.40—0.53)
10.0	4700	0.4 (0.33—0.50)	4700	0.55 (0.50—0.67)	4700	0.55 (0.50—0.67)
12.0	5300	0.5 (0.40—0.60)	5300	0.7 (0.60—0.80)	5300	0.7 (0.60—0.80)
14.0	4500	0.5 (0.40—0.60)	4500	0.7 (0.60—0.80)	4500	0.7 (0.60—0.80)

(Note 1) When using the drill with a length over l/d 10, it is necessary to use a prep holes as a guide. (If no prep-hole is used then drill breakage can occur)
(Note 2) For pilot hole drilling, Mitsubishi Materials MNS-LB, MAE-MB or MAS-MB drill is recommended.

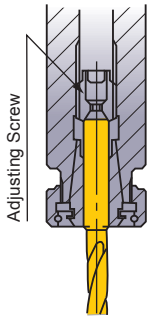
DB Type Drill

Work material	Aluminium Alloy (Si<5%) ASTM A6061, ASTM A7075 etc		Aluminium Alloy (5%≤Si≤10%) ASTM 333.0 etc		Aluminium Alloy (Si>10%) ASTM 383.0, ASTM A390.0 etc	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
3.2	8900	0.1 (0.11—0.16)	8900	0.15 (0.16—0.21)	8900	0.15 (0.16—0.21)
4.0	7100	0.15 (0.13—0.20)	7100	0.2 (0.20—0.27)	7100	0.2 (0.20—0.27)
5.0	5700	0.2 (0.17—0.25)	5700	0.25 (0.25—0.33)	5700	0.25 (0.25—0.33)
6.3	6000	0.25 (0.21—0.32)	6000	0.35 (0.32—0.42)	6000	0.35 (0.32—0.42)
8.0	4700	0.3 (0.27—0.40)	4700	0.45 (0.40—0.53)	4700	0.45 (0.40—0.53)
10.0	3800	0.4 (0.33—0.50)	3800	0.55 (0.50—0.67)	3800	0.55 (0.50—0.67)
12.0	4200	0.5 (0.40—0.60)	4200	0.7 (0.60—0.80)	4200	0.7 (0.60—0.80)
14.0	3600	0.5 (0.40—0.60)	3600	0.7 (0.60—0.80)	3600	0.7 (0.60—0.80)

(Note 1) When using the drill with a length over l/d 10, it is necessary to use a prep holes as a guide. (If no prep-hole is used then drill breakage can occur)
(Note 2) For pilot hole drilling, Mitsubishi Materials MNS-LB, MAE-MB or MAS-MB drill is recommended.

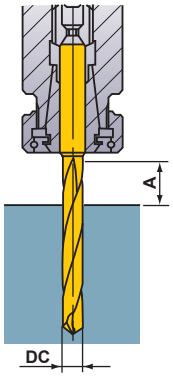
OPERATIONAL GUIDANCE

Drill Holding



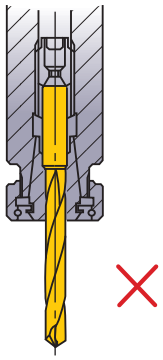
Thrust bearing type collet chuck holds the drill securely.

Drill Length



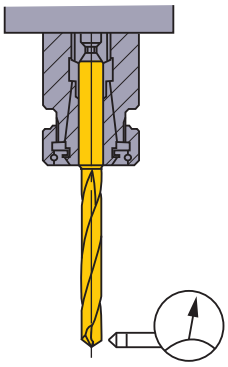
A ≥ DC x 1.5

Drill Installation



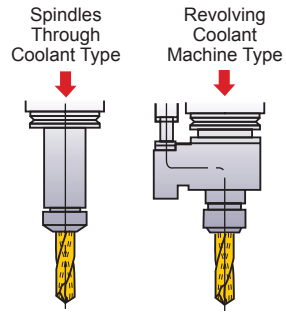
Do not clamp on the flutes.

Installation Tolerance



Run-out ≤ 0.03mm

Through Coolant Type



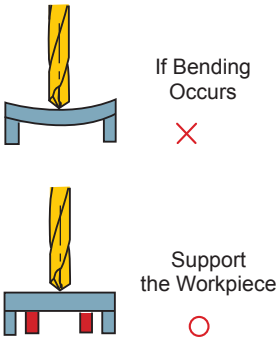
Coolant pressure is approx. 0.5MPa–7MPa

Coolant Handling

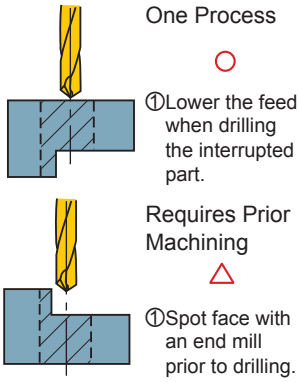
1) Small particles of swarf will jam in the oil hole of small diameter drills. Always use a fine mesh filter as a preventative measure.

2) Dirt and dust particles adhere to the oil in old coolant and prevent an efficient flow. Regular coolant exchange is recommended.

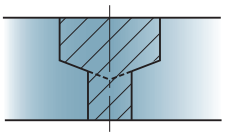
Thin Workpiece



Interrupted Cutting

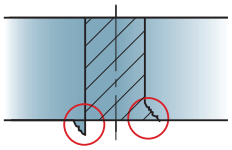


Stepped Holes



①Divide the two processes.
②Drill the larger hole first.
*A tool for machining both chamfer and spot face can be produced to order.

Burring and Workpiece Chipping



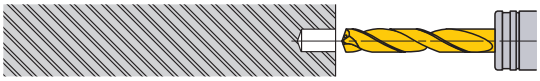
①Lower the feed rate by 50% at the end of through cutting.
②Add a 45°chamfer.
③Change the point angle.

MNS
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OPERATIONAL GUIDANCE FOR MNS...DB DRILLS

FLAT FACE DRILLING ●Drilling a blind hole

1. Drilling a pilot hole



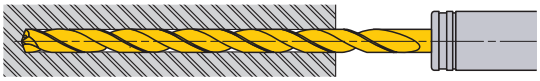
①Use a drill with a larger (flatter) point angle than the super long type. Mitsubishi type MNS-LB, MAE-MB or MAS-MB drill is recommended.
②Ensure a high precision hole is drilled for the guide.
③Drill depth : Approx 1DC.
(Adjust the pilot hole depth according to the length of the long type drill.)

2. Initial cutting with the long type drill



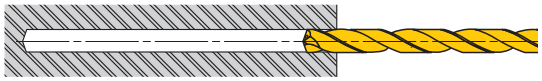
①Penetrate the guide hole at low revolution. (Cutting speed 20—30m/min, feed rate 0.2—0.3mm/rev)
②Stop the long type drill 1—3mm short of the guide hole bottom.

3. Drill the deep hole



①Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

4. Drill retraction



①After drilling, lower the cutting revolution about 1—2mm short of the hole end. (Cutting speed of around 20—30m/min)
②Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.
③Finally, clear the hole at a cutting speed of 20—30m/min and feed rate of 0.2—0.3mm/rev.

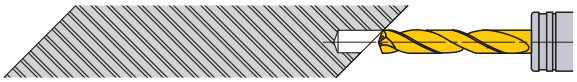
INTERRUPED DRILLING ●Drilling and breaking through on irregular faces or angles

1. Spot facing



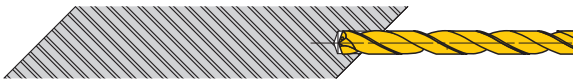
①Machine a flat or the irregular face by using an end mill or slot drill capable of spot facing. Make the spot face diameter the same size as the required deep hole diameter.

2. Drilling a pilot hole



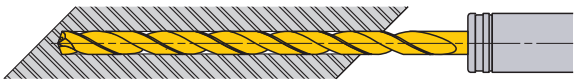
①Use a drill with a larger (flatter) point angle than the super long type. Mitsubishi type MNS-LB, MAE-MB or MAS-MB drill is recommended.
②Ensure a high precision hole is drilled for the guide.
③Drill depth : Approx 1DC.
(Adjust the pilot hole depth according to the length of the long type drill.)

3. Initial cutting with the long type drill



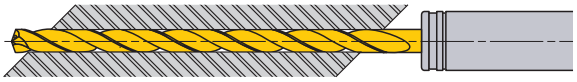
①Penetrate the guide hole at a low revolution. (Cutting speed 20—30m/min, feed rate 0.2—0.3mm/rev)
②Stop the long type drill 1—3mm short of the guide hole bottom.

4. Drill the deep hole



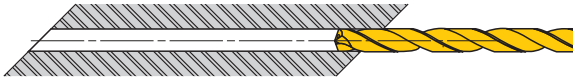
①Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

5. Breaking through



①When breaking through, the cutting edge can be damaged.
②A feed rate of 0.05—0.1mm/rev is recommended.

6. Drill retraction



①Finally clear the hole at a cutting speed of 20—30m/min and feed rate of 0.2—0.3mm/rev.
②Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.

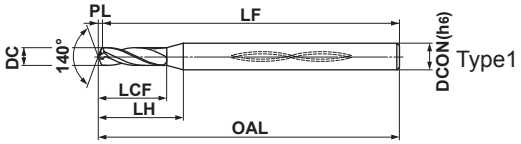
MHS
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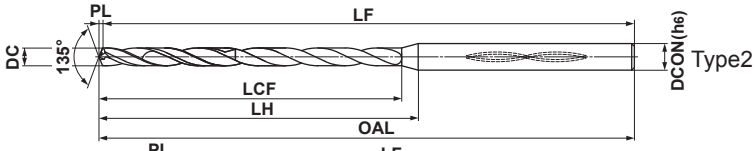
- High backling strength and unique double margin.
- Non-step drilling with long tool life for high hardness steel,35HRC-55HRC

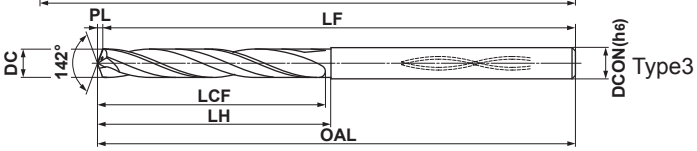
P	M	K	N	S	H
Steel	Stainless Steel			Heat Resistant Alloy	Hardened Steel

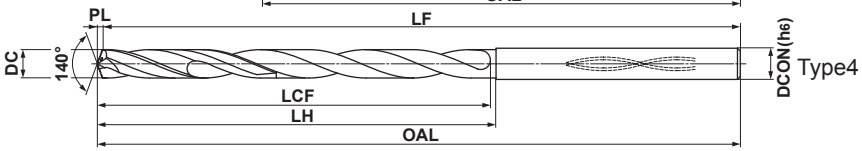
	DC≤3	3<DC≤6	6<DC≤10	10<DC≤12
	+0.010 −0.002	+0.010 −0.002	+0.010 −0.005	+0.010 −0.008
h6	0 −0.006	0 −0.008	0 −0.009	0 −0.011











(Note 1) MHS drills are suitable for use with shrink fit holders.
(Note 2) Use the shortest type in the respective diameter as a pilot drill.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
	3	●	MHS0095L006B	6.17	9.97	60.17	60	0.17	3	1
	6	●	MHS0095L009B	9.17	12.97	60.17	60	0.17	3	2
0.95	13	●	MHS0095L015B	15.17	18.97	60.17	60	0.17	3	2
	23	●	MHS0095L025B	25.17	28.97	60.17	60	0.17	3	2
	30	●	MHS0095L035B	35.17	38.97	80.17	80	0.17	3	2
	3	●	MHS0100L006B	6.2	9.9	60.2	60	0.2	3	1
	6	●	MHS0100L009B	9.2	12.9	60.2	60	0.2	3	2
1.00	12	●	MHS0100L015B	15.2	18.9	60.2	60	0.2	3	2
	22	●	MHS0100L025B	25.2	28.9	60.2	60	0.2	3	2
	30	●	MHS0100L035B	35.2	38.9	80.2	80	0.2	3	2
	2	●	MHS0110L006B	6.2	9.7	60.2	60	0.2	3	1
	5	●	MHS0110L009B	9.2	12.7	60.2	60	0.2	3	2
1.10	11	●	MHS0110L015B	15.2	18.7	60.2	60	0.2	3	2
	20	●	MHS0110L025B	25.2	28.7	60.2	60	0.2	3	2
	29	●	MHS0110L035B	35.2	38.7	80.2	80	0.2	3	2
	2	●	MHS0120L006B	6.2	9.6	60.2	60	0.2	3	1
	5	●	MHS0120L009B	9.2	12.6	60.2	60	0.2	3	2
1.20	10	●	MHS0120L015B	15.2	18.6	60.2	60	0.2	3	2
	18	●	MHS0120L025B	25.2	28.6	60.2	60	0.2	3	2
	26	●	MHS0120L035B	35.2	38.6	80.2	80	0.2	3	2
	2	●	MHS0130L007B	7.2	10.4	60.2	60	0.2	3	1
	5	●	MHS0130L011B	11.3	14.5	60.3	60	0.3	3	2
1.30	12	●	MHS0130L020B	20.3	23.5	60.3	60	0.3	3	2
	20	●	MHS0130L030B	30.3	33.5	80.3	80	0.3	3	2
	30	●	MHS0130L045B	45.3	48.5	80.3	80	0.3	3	2

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
	2	●	MHS0140L007B	7.3	10.3	60.3	60	0.3	3	1
	5	●	MHS0140L011B	11.3	14.3	60.3	60	0.3	3	2
1.40	11	●	MHS0140L020B	20.3	23.3	60.3	60	0.3	3	2
	18	●	MHS0140L030B	30.3	33.3	80.3	80	0.3	3	2
	29	●	MHS0140L045B	45.3	48.3	80.3	80	0.3	3	2
	3	●	MHS0145L008B	8.3	11.2	60.3	60	0.3	3	1
	6	●	MHS0145L013B	13.3	16.2	60.3	60	0.3	3	2
1.45	11	●	MHS0145L020B	20.3	23.2	60.3	60	0.3	3	2
	21	●	MHS0145L035B	35.3	38.2	80.3	80	0.3	3	2
	30	●	MHS0145L055B	55.3	58.2	100.3	100	0.3	3	2
	2	●	MHS0150L008B	8.3	11.1	60.3	60	0.3	3	1
	6	●	MHS0150L013B	13.3	16.1	60.3	60	0.3	3	2
1.50	10	●	MHS0150L020B	20.3	23.1	60.3	60	0.3	3	2
	20	●	MHS0150L035B	35.3	38.1	80.3	80	0.3	3	2
	30	●	MHS0150L055B	55.3	58.1	100.3	100	0.3	3	2
	2	●	MHS0160L008B	8.3	10.9	60.3	60	0.3	3	1
	5	●	MHS0160L013B	13.3	15.9	60.3	60	0.3	3	2
1.60	10	●	MHS0160L020B	20.3	22.9	60.3	60	0.3	3	2
	19	●	MHS0160L035B	35.3	37.9	80.3	80	0.3	3	2
	30	●	MHS0160L055B	55.3	57.9	100.3	100	0.3	3	2
	2	●	MHS0170L008B	8.3	10.7	60.3	60	0.3	3	1
	5	●	MHS0170L013B	13.4	15.8	60.4	60	0.4	3	2
1.70	9	●	MHS0170L020B	20.4	22.8	60.4	60	0.4	3	2
	18	●	MHS0170L035B	35.4	37.8	80.4	80	0.4	3	2
	29	●	MHS0170L055B	55.4	57.8	100.4	100	0.4	3	2

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan.

CUTTING CONDITIONS ➤ N093
OPERATION GUIDANCE ➤ N094
TECHNICAL DATA ➤ Q001

MHS

WSTAR DRILLS

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
1.80	3	●	MHS0180L010B	10.3	12.5	60.3	60	0.3	3	1
	5	●	MHS0180L015B	15.4	17.6	60.4	60	0.4	3	2
	11	●	MHS0180L025B	25.4	27.6	60.4	60	0.4	3	2
	22	●	MHS0180L045B	45.4	47.6	80.4	80	0.4	3	2
	30	●	MHS0180L065B	65.4	67.6	100.4	100	0.4	3	2
1.90	2	●	MHS0190L010B	10.3	12.4	60.3	60	0.3	3	1
	5	●	MHS0190L015B	15.4	17.5	60.4	60	0.4	3	2
	10	●	MHS0190L025B	25.4	27.5	60.4	60	0.4	3	2
	21	●	MHS0190L045B	45.4	47.5	80.4	80	0.4	3	2
	30	●	MHS0190L065B	65.4	67.5	100.4	100	0.4	3	2
1.95	2	●	MHS0195L010B	10.4	12.4	60.4	60	0.4	3	1
	5	●	MHS0195L015B	15.4	17.4	60.4	60	0.4	3	2
	10	●	MHS0195L025B	25.4	27.4	60.4	60	0.4	3	2
	20	●	MHS0195L045B	45.4	47.4	80.4	80	0.4	3	2
	30	●	MHS0195L065B	65.4	67.4	100.4	100	0.4	3	2
2.00	2	●	MHS0200L010B	10.4	12.3	60.4	60	0.4	3	1
	5	●	MHS0200L015B	15.4	17.3	60.4	60	0.4	3	2
	9	●	MHS0200L025B	25.4	27.3	60.4	60	0.4	3	2
	20	●	MHS0200L045B	45.4	47.3	80.4	80	0.4	3	2
	30	●	MHS0200L065B	65.4	67.3	100.4	100	0.4	3	2
2.10	3	●	MHS0210L012B	12.4	14.1	60.4	60	0.4	3	1
	7	●	MHS0210L020B	20.4	22.1	60.4	60	0.4	3	2
	11	●	MHS0210L030B	30.4	32.1	80.4	80	0.4	3	2
	23	●	MHS0210L055B	55.4	57.1	100.4	100	0.4	3	2
	30	●	MHS0210L075B	75.4	77.1	120.4	120	0.4	3	2
2.20	2	●	MHS0220L012B	12.4	13.9	60.4	60	0.4	3	1
	6	●	MHS0220L020B	20.5	22.0	60.5	60	0.5	3	2
	11	●	MHS0220L030B	30.5	32.0	80.5	80	0.5	3	2
	22	●	MHS0220L055B	55.5	57.0	100.5	100	0.5	3	2
	30	●	MHS0220L075B	75.5	77.0	120.5	120	0.5	3	2
2.30	2	●	MHS0230L012B	12.4	13.7	60.4	60	0.4	3	1
	6	●	MHS0230L020B	20.5	21.8	60.5	60	0.5	3	2
	10	●	MHS0230L030B	30.5	31.8	80.5	80	0.5	3	2
	21	●	MHS0230L055B	55.5	56.8	100.5	100	0.5	3	2
	30	●	MHS0230L075B	75.5	76.8	120.5	120	0.5	3	2
2.40	2	●	MHS0240L012B	12.4	13.5	60.4	60	0.4	3	1
	5	●	MHS0240L020B	20.5	21.6	60.5	60	0.5	3	2
	9	●	MHS0240L030B	30.5	31.6	80.5	80	0.5	3	2
	20	●	MHS0240L055B	55.5	56.6	100.5	100	0.5	3	2
	28	●	MHS0240L075B	75.5	76.6	120.5	120	0.5	3	2
2.45	2	●	MHS0245L013B	13.4	14.4	70.4	70	0.4	4	1
	5	●	MHS0245L020B	20.5	21.5	70.5	70	0.5	4	2
	11	●	MHS0245L035B	35.5	36.5	90.5	90	0.5	4	2
	24	●	MHS0245L065B	65.5	66.5	110.5	110	0.5	4	2
	30	●	MHS0245L090B	90.5	91.5	140.5	140	0.5	4	2
2.50	2	●	MHS0250L013B	13.5	16.3	70.5	70	0.5	4	1
	5	●	MHS0250L020B	20.5	23.3	70.5	70	0.5	4	2
	11	●	MHS0250L035B	35.5	38.3	90.5	90	0.5	4	2
	23	●	MHS0250L065B	65.5	68.3	110.5	110	0.5	4	2
	30	●	MHS0250L090B	90.5	93.3	140.5	140	0.5	4	2

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
2.60	2	●	MHS0260L013B	13.5	16.1	70.5	70	0.5	4	1
	5	●	MHS0260L020B	20.5	23.1	70.5	70	0.5	4	2
	10	●	MHS0260L035B	35.5	38.1	90.5	90	0.5	4	2
	22	●	MHS0260L065B	65.5	68.1	110.5	110	0.5	4	2
	30	●	MHS0260L090B	90.5	93.1	140.5	140	0.5	4	2
2.70	2	●	MHS0270L013B	13.5	15.9	70.5	70	0.5	4	1
	4	●	MHS0270L020B	20.6	23.0	70.6	70	0.6	4	2
	10	●	MHS0270L035B	35.6	38.0	90.6	90	0.6	4	2
	21	●	MHS0270L065B	65.6	68.0	110.6	110	0.6	4	2
	30	●	MHS0270L090B	90.6	93.0	140.6	140	0.6	4	2
2.80	2	●	MHS0280L014B	14.5	16.7	70.5	70	0.5	4	1
	4	●	MHS0280L020B	20.6	22.8	70.6	70	0.6	4	2
	9	●	MHS0280L035B	35.6	37.8	90.6	90	0.6	4	2
	20	●	MHS0280L065B	65.6	67.8	110.6	110	0.6	4	2
	29	●	MHS0280L090B	90.6	92.8	140.6	140	0.6	4	2
2.90	2	●	MHS0290L014B	14.5	16.6	70.5	70	0.5	4	1
	4	●	MHS0290L020B	20.6	22.7	70.6	70	0.6	4	2
	9	●	MHS0290L035B	35.6	37.7	90.6	90	0.6	4	2
	19	●	MHS0290L065B	65.6	67.7	110.6	110	0.6	4	2
	28	●	MHS0290L090B	90.6	92.7	140.6	140	0.6	4	2
2.95	2	●	MHS0295L014B	14.5	16.5	70.5	70	0.5	4	1
	4	●	MHS0295L020B	20.6	22.6	70.6	70	0.6	4	2
	9	●	MHS0295L035B	35.6	37.6	90.6	90	0.6	4	2
	19	●	MHS0295L065B	65.6	67.6	110.6	110	0.6	4	2
	28	●	MHS0295L090B	90.6	92.6	140.6	140	0.6	4	2
3.0	4	●	MHS0300L020B	19.5	20.5	70.5	70	0.5	4	3
	10	●	MHS0300L040B	39.5	40.5	90.5	90	0.5	4	4
	17	●	MHS0300L060B	59.5	60.5	110.5	110	0.5	4	4
	27	●	MHS0300L090B	89.5	90.5	140.5	140	0.5	4	4
3.1	4	□	MHS0310L020B	20.0	20.5	70.5	70	0.5	4	3
	10	□	MHS0310L040B	40.1	40.6	90.6	90	0.6	4	4
	17	□	MHS0310L060B	60.1	60.6	110.6	110	0.6	4	4
	26	□	MHS0310L090B	90.1	90.6	140.6	140	0.6	4	4
3.2	4	□	MHS0320L020B	20.1	20.6	70.6	70	0.6	4	3
	10	□	MHS0320L040B	40.1	40.6	90.6	90	0.6	4	4
	16	□	MHS0320L060B	60.1	60.6	110.6	110	0.6	4	4
	25	□	MHS0320L090B	90.1	90.6	140.6	140	0.6	4	4
3.3	3	□	MHS0330L020B	20.1	20.6	70.6	70	0.6	4	3
	9	□	MHS0330L040B	40.1	40.6	90.6	90	0.6	4	4
	16	□	MHS0330L060B	60.1	60.6	110.6	110	0.6	4	4
	25	□	MHS0330L090B	90.1	90.6	140.6	140	0.6	4	4
3.4	3	□	MHS0340L020B	20.1	20.6	70.6	70	0.6	4	3
	9	□	MHS0340L040B	40.1	40.6	90.6	90	0.6	4	4
	15	□	MHS0340L060B	60.1	60.6	110.6	110	0.6	4	4
	24	□	MHS0340L090B	90.1	90.6	140.6	140	0.6	4	4
3.5	3	●	MHS0350L020B	20.1	20.6	70.6	70	0.6	4	3
	9	●	MHS0350L040B	40.1	40.6	90.6	90	0.6	4	4
	14	●	MHS0350L060B	60.1	60.6	110.6	110	0.6	4	4
	23	●	MHS0350L090B	90.1	90.6	140.6	140	0.6	4	4

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
3.6	3	□	MHS0360L020B	20.6	20.6	70.6	70	0.6	4	3
	9	□	MHS0360L040B	40.7	40.7	90.7	90	0.7	4	4
	14	□	MHS0360L060B	60.7	60.7	110.7	110	0.7	4	4
	22	□	MHS0360L090B	90.7	90.7	140.7	140	0.7	4	4
	30	□	MHS0360L120B	120.7	120.7	170.7	170	0.7	4	4
3.7	3	□	MHS0370L020B	20.6	20.6	70.6	70	0.6	4	3
	8	□	MHS0370L040B	40.7	40.7	90.7	90	0.7	4	4
	14	□	MHS0370L060B	60.7	60.7	110.7	110	0.7	4	4
	22	□	MHS0370L090B	90.7	90.7	140.7	140	0.7	4	4
	30	□	MHS0370L120B	120.7	120.7	170.7	170	0.7	4	4
3.8	3	●	MHS0380L020B	20.7	20.7	70.7	70	0.7	4	3
	8	●	MHS0380L040B	40.7	40.7	90.7	90	0.7	4	4
	13	●	MHS0380L060B	60.7	60.7	110.7	110	0.7	4	4
	21	●	MHS0380L090B	90.7	90.7	140.7	140	0.7	4	4
	29	●	MHS0380L120B	120.7	120.7	170.7	170	0.7	4	4
3.9	3	□	MHS0390L020B	20.7	20.7	70.7	70	0.7	4	3
	8	□	MHS0390L040B	40.7	40.7	90.7	90	0.7	4	4
	13	□	MHS0390L060B	60.7	60.7	110.7	110	0.7	4	4
	21	□	MHS0390L090B	90.7	90.7	140.7	140	0.7	4	4
	28	□	MHS0390L120B	120.7	120.7	170.7	170	0.7	4	4
4.0	2	●	MHS0400L020B	20.7	20.7	70.7	70	0.7	4	3
	7	●	MHS0400L040B	40.7	40.7	90.7	90	0.7	4	4
	12	●	MHS0400L060B	60.7	60.7	110.7	110	0.7	4	4
	20	●	MHS0400L090B	90.7	90.7	140.7	140	0.7	4	4
	27	●	MHS0400L120B	120.7	120.7	170.7	170	0.7	4	4
4.1	2	□	MHS0410L020B	19.2	20.7	70.7	70	0.7	6	3
	7	□	MHS0410L040B	39.2	40.7	90.7	90	0.7	6	4
	12	□	MHS0410L060B	59.2	60.7	110.7	110	0.7	6	4
	19	□	MHS0410L090B	89.2	90.7	140.7	140	0.7	6	4
	26	□	MHS0410L120B	119.2	120.7	170.7	170	0.7	6	4
4.2	2	□	MHS0420L020B	19.2	20.7	70.7	70	0.7	6	3
	7	□	MHS0420L040B	39.3	40.8	90.8	90	0.8	6	4
	11	□	MHS0420L060B	59.3	60.8	110.8	110	0.8	6	4
	19	□	MHS0420L090B	89.3	90.8	140.8	140	0.8	6	4
	26	□	MHS0420L120B	119.3	120.8	170.8	170	0.8	6	4
4.3	2	□	MHS0430L020B	19.2	20.7	70.7	70	0.7	6	3
	6	□	MHS0430L040B	39.3	40.8	90.8	90	0.8	6	4
	11	□	MHS0430L060B	59.3	60.8	110.8	110	0.8	6	4
	18	□	MHS0430L090B	89.3	90.8	140.8	140	0.8	6	4
	25	□	MHS0430L120B	119.3	120.8	170.8	170	0.8	6	4
4.4	2	□	MHS0440L020B	19.3	20.8	70.8	70	0.8	6	3
	6	□	MHS0440L040B	39.3	40.8	90.8	90	0.8	6	4
	11	□	MHS0440L060B	59.3	60.8	110.8	110	0.8	6	4
	18	□	MHS0440L090B	89.3	90.8	140.8	140	0.8	6	4
	24	□	MHS0440L120B	119.3	120.8	170.8	170	0.8	6	4
4.5	2	●	MHS0450L020B	19.3	20.8	70.8	70	0.8	6	3
	6	●	MHS0450L040B	39.3	40.8	90.8	90	0.8	6	4
	10	●	MHS0450L060B	59.3	60.8	110.8	110	0.8	6	4
	17	●	MHS0450L090B	89.3	90.8	140.8	140	0.8	6	4
	24	●	MHS0450L120B	119.3	120.8	170.8	170	0.8	6	4

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
4.6	2	□	MHS0460L020B	19.8	20.8	70.8	70	0.8	6	3
	6	□	MHS0460L040B	39.8	40.8	90.8	90	0.8	6	4
	10	□	MHS0460L060B	59.8	60.8	110.8	110	0.8	6	4
	17	□	MHS0460L090B	89.8	90.8	140.8	140	0.8	6	4
	23	□	MHS0460L120B	119.8	120.8	170.8	170	0.8	6	4
	30	□	MHS0460L150B	149.8	150.8	200.8	200	0.8	6	4
4.7	2	□	MHS0470L020B	19.8	20.8	70.8	70	0.8	6	3
	6	□	MHS0470L040B	39.9	40.9	90.9	90	0.9	6	4
	10	□	MHS0470L060B	59.9	60.9	110.9	110	0.9	6	4
	16	□	MHS0470L090B	89.9	90.9	140.9	140	0.9	6	4
	23	□	MHS0470L120B	119.9	120.9	170.9	170	0.9	6	4
	29	□	MHS0470L150B	149.9	150.9	200.9	200	0.9	6	4
4.8	1	●	MHS0480L020B	19.8	20.8	70.8	70	0.8	6	3
	6	●	MHS0480L040B	39.9	40.9	90.9	90	0.9	6	4
	10	●	MHS0480L060B	59.9	60.9	110.9	110	0.9	6	4
	16	●	MHS0480L090B	89.9	90.9	140.9	140	0.9	6	4
	22	●	MHS0480L120B	119.9	120.9	170.9	170	0.9	6	4
	29	●	MHS0480L150B	149.9	150.9	200.9	200	0.9	6	4
4.9	1	□	MHS0490L020B	19.8	20.8	70.8	70	0.8	6	3
	5	□	MHS0490L040B	39.9	40.9	90.9	90	0.9	6	4
	10	□	MHS0490L060B	59.9	60.9	110.9	110	0.9	6	4
	16	□	MHS0490L090B	89.9	90.9	140.9	140	0.9	6	4
	22	□	MHS0490L120B	119.9	120.9	170.9	170	0.9	6	4
	28	□	MHS0490L150B	149.9	150.9	200.9	200	0.9	6	4
5.0	1	●	MHS0500L020B	19.9	20.9	70.9	70	0.9	6	3
	5	●	MHS0500L040B	39.9	40.9	90.9	90	0.9	6	4
	9	●	MHS0500L060B	59.9	60.9	110.9	110	0.9	6	4
	15	●	MHS0500L090B	89.9	90.9	140.9	140	0.9	6	4
	21	●	MHS0500L120B	119.9	120.9	170.9	170	0.9	6	4
	27	●	MHS0500L150B	149.9	150.9	200.9	200	0.9	6	4
5.1	3	□	MHS0510L030B	30.4	30.9	80.9	80	0.9	6	3
	9	□	MHS0510L060B	60.4	60.9	110.9	110	0.9	6	4
	15	□	MHS0510L090B	90.4	90.9	140.9	140	0.9	6	4
	21	□	MHS0510L120B	120.4	120.9	170.9	170	0.9	6	4
	27	□	MHS0510L150B	150.4	150.9	200.9	200	0.9	6	4
5.2	3	□	MHS0520L030B	30.4	30.9	80.9	80	0.9	6	3
	9	□	MHS0520L060B	60.4	60.9	110.9	110	0.9	6	4
	15	□	MHS0520L090B	90.4	90.9	140.9	140	0.9	6	4
	20	□	MHS0520L120B	120.4	120.9	170.9	170	0.9	6	4
	26	□	MHS0520L150B	150.4	150.9	200.9	200	0.9	6	4
5.3	3	□	MHS0530L030B	30.4	30.9	80.9	80	0.9	6	3
	9	□	MHS0530L060B	60.5	61.0	111.0	110	1.0	6	4
	14	□	MHS0530L090B	90.5	91.0	141.0	140	1.0	6	4
	20	□	MHS0530L120B	120.5	121.0	171.0	170	1.0	6	4
	26	□	MHS0530L150B	150.5	151.0	201.0	200	1.0	6	4
5.4	3	□	MHS0540L030B	30.4	30.9	80.9	80	0.9	6	3
	9	□	MHS0540L060B	60.5	61.0	111.0	110	1.0	6	4
	14	□	MHS0540L090B	90.5	91.0	141.0	140	1.0	6	4
	20	□	MHS0540L120B	120.5	121.0	171.0	170	1.0	6	4
	25	□	MHS0540L150B	150.5	151.0	201.0	200	1.0	6	4

CUTTING CONDITIONS ➤ N093
OPERATION GUIDANCE ➤ N094
TECHNICAL DATA ➤ Q001

MHS

WSTAR DRILLS

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
5.5	3	●	MHS0550L030B	30.4	30.9	80.9	80	0.9	6	3
	8	●	MHS0550L060B	60.5	61.0	111.0	110	1.0	6	4
	14	●	MHS0550L090B	90.5	91.0	141.0	140	1.0	6	4
	19	●	MHS0550L120B	120.5	121.0	171.0	170	1.0	6	4
	25	●	MHS0550L150B	150.5	151.0	201.0	200	1.0	6	4
5.6	3	□	MHS0560L030B	31.0	31.0	81.0	80	1.0	6	3
	8	□	MHS0560L060B	61.0	61.0	111.0	110	1.0	6	4
	14	□	MHS0560L090B	91.0	91.0	141.0	140	1.0	6	4
	19	□	MHS0560L120B	121.0	121.0	171.0	170	1.0	6	4
	24	□	MHS0560L150B	151.0	151.0	201.0	200	1.0	6	4
5.7	3	□	MHS0570L030B	31.0	31.0	81.0	80	1.0	6	3
	8	□	MHS0570L060B	61.0	61.0	111.0	110	1.0	6	4
	13	□	MHS0570L090B	91.0	91.0	141.0	140	1.0	6	4
	19	□	MHS0570L120B	121.0	121.0	171.0	170	1.0	6	4
	24	□	MHS0570L150B	151.0	151.0	201.0	200	1.0	6	4
5.8	3	●	MHS0580L030B	31.0	31.0	81.0	80	1.0	6	3
	8	●	MHS0580L060B	61.1	61.1	111.1	110	1.1	6	4
	13	●	MHS0580L090B	91.1	91.1	141.1	140	1.1	6	4
	18	●	MHS0580L120B	121.1	121.1	171.1	170	1.1	6	4
	23	●	MHS0580L150B	151.1	151.1	201.1	200	1.1	6	4
5.9	3	□	MHS0590L030B	31.0	31.0	81.0	80	1.0	6	3
	8	□	MHS0590L060B	61.1	61.1	111.1	110	1.1	6	4
	13	□	MHS0590L090B	91.1	91.1	141.1	140	1.1	6	4
	18	□	MHS0590L120B	121.1	121.1	171.1	170	1.1	6	4
	23	□	MHS0590L150B	151.1	151.1	201.1	200	1.1	6	4
6.0	2	●	MHS0600L030B	31.0	31.0	81.0	80	1.0	6	3
	7	●	MHS0600L060B	61.1	61.1	111.1	110	1.1	6	4
	12	●	MHS0600L090B	91.1	91.1	141.1	140	1.1	6	4
	17	●	MHS0600L120B	121.1	121.1	171.1	170	1.1	6	4
	22	●	MHS0600L150B	151.1	151.1	201.1	200	1.1	6	4
6.1	2	□	MHS0610L030B	29.6	31.1	81.1	80	1.1	8	3
	7	□	MHS0610L060B	59.6	61.1	111.1	110	1.1	8	4
	12	□	MHS0610L090B	89.6	91.1	141.1	140	1.1	8	4
	17	□	MHS0610L120B	119.6	121.1	171.1	170	1.1	8	4
	22	□	MHS0610L150B	149.6	151.1	201.1	200	1.1	8	4
6.2	2	□	MHS0620L030B	29.6	31.1	81.1	80	1.1	8	3
	7	□	MHS0620L060B	59.6	61.1	111.1	110	1.1	8	4
	12	□	MHS0620L090B	89.6	91.1	141.1	140	1.1	8	4
	17	□	MHS0620L120B	119.6	121.1	171.1	170	1.1	8	4
	21	□	MHS0620L150B	149.6	151.1	201.1	200	1.1	8	4
6.3	2	□	MHS0630L030B	29.6	31.1	81.1	80	1.1	8	3
	7	□	MHS0630L060B	59.6	61.1	111.1	110	1.1	8	4
	12	□	MHS0630L090B	89.6	91.1	141.1	140	1.1	8	4
	16	□	MHS0630L120B	119.6	121.1	171.1	170	1.1	8	4
	21	□	MHS0630L150B	149.6	151.1	201.1	200	1.1	8	4
6.4	2	□	MHS0640L030B	29.6	31.1	81.1	80	1.1	8	3
	7	□	MHS0640L060B	59.7	61.2	111.2	110	1.2	8	4
	11	□	MHS0640L090B	89.7	91.2	141.2	140	1.2	8	4
	16	□	MHS0640L120B	119.7	121.2	171.2	170	1.2	8	4
	21	□	MHS0640L150B	149.7	151.2	201.2	200	1.2	8	4

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
6.5	2	●	MHS0650L030B	29.6	31.1	81.1	80	1.1	8	3
	6	●	MHS0650L060B	59.7	61.2	111.2	110	1.2	8	4
	11	●	MHS0650L090B	89.7	91.2	141.2	140	1.2	8	4
	16	●	MHS0650L120B	119.7	121.2	171.2	170	1.2	8	4
	20	●	MHS0650L150B	149.7	151.2	201.2	200	1.2	8	4
6.6	2	□	MHS0660L030B	30.1	31.1	81.1	80	1.1	8	3
	6	□	MHS0660L060B	60.2	61.2	111.2	110	1.2	8	4
	11	□	MHS0660L090B	90.2	91.2	141.2	140	1.2	8	4
	16	□	MHS0660L120B	120.2	121.2	171.2	170	1.2	8	4
	20	□	MHS0660L150B	150.2	151.2	201.2	200	1.2	8	4
	28	□	MHS0660L200B	200.2	201.2	251.2	250	1.2	8	4
6.7	2	□	MHS0670L030B	30.2	31.2	81.2	80	1.2	8	3
	6	□	MHS0670L060B	60.2	61.2	111.2	110	1.2	8	4
	11	□	MHS0670L090B	90.2	91.2	141.2	140	1.2	8	4
	15	□	MHS0670L120B	120.2	121.2	171.2	170	1.2	8	4
	20	□	MHS0670L150B	150.2	151.2	201.2	200	1.2	8	4
	27	□	MHS0670L200B	200.2	201.2	251.2	250	1.2	8	4
6.8	2	●	MHS0680L030B	30.2	31.2	81.2	80	1.2	8	3
	6	●	MHS0680L060B	60.2	61.2	111.2	110	1.2	8	4
	11	●	MHS0680L090B	90.2	91.2	141.2	140	1.2	8	4
	15	●	MHS0680L120B	120.2	121.2	171.2	170	1.2	8	4
	19	●	MHS0680L150B	150.2	151.2	201.2	200	1.2	8	4
	27	●	MHS0680L200B	200.2	201.2	251.2	250	1.2	8	4
6.9	2	□	MHS0690L030B	30.2	31.2	81.2	80	1.2	8	3
	6	□	MHS0690L060B	60.3	61.3	111.3	110	1.3	8	4
	10	□	MHS0690L090B	90.3	91.3	141.3	140	1.3	8	4
	15	□	MHS0690L120B	120.3	121.3	171.3	170	1.3	8	4
	19	□	MHS0690L150B	150.3	151.3	201.3	200	1.3	8	4
	26	□	MHS0690L200B	200.3	201.3	251.3	250	1.3	8	4
7.0	2	●	MHS0700L030B	30.2	31.2	81.2	80	1.2	8	3
	6	●	MHS0700L060B	60.3	61.3	111.3	110	1.3	8	4
	10	●	MHS0700L090B	90.3	91.3	141.3	140	1.3	8	4
	14	●	MHS0700L120B	120.3	121.3	171.3	170	1.3	8	4
	19	●	MHS0700L150B	150.3	151.3	201.3	200	1.3	8	4
	26	●	MHS0700L200B	200.3	201.3	251.3	250	1.3	8	4
7.1	2	□	MHS0710L030B	30.7	31.2	81.2	80	1.2	8	3
	6	□	MHS0710L060B	60.8	61.3	111.3	110	1.3	8	4
	10	□	MHS0710L090B	90.8	91.3	141.3	140	1.3	8	4
	14	□	MHS0710L120B	120.8	121.3	171.3	170	1.3	8	4
	19	□	MHS0710L150B	150.8	151.3	201.3	200	1.3	8	4
	26	□	MHS0710L200B	200.8	201.3	251.3	250	1.3	8	4
7.2	2	□	MHS0720L030B	30.7	31.2	81.2	80	1.2	8	3
	6	□	MHS0720L060B	60.8	61.3	111.3	110	1.3	8	4
	10	□	MHS0720L090B	90.8	91.3	141.3	140	1.3	8	4
	14	□	MHS0720L120B	120.8	121.3	171.3	170	1.3	8	4
	18	□	MHS0720L150B	150.8	151.3	201.3	200	1.3	8	4
	25	□	MHS0720L200B	200.8	201.3	251.3	250	1.3	8	4

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
7.3	2	□	MHS0730L030B	30.8	31.3	81.3	80	1.3	8	3
	6	□	MHS0730L060B	60.8	61.3	111.3	110	1.3	8	4
	10	□	MHS0730L090B	90.8	91.3	141.3	140	1.3	8	4
	14	□	MHS0730L120B	120.8	121.3	171.3	170	1.3	8	4
	18	□	MHS0730L150B	150.8	151.3	201.3	200	1.3	8	4
	25	□	MHS0730L200B	200.8	201.3	251.3	250	1.3	8	4
7.4	1	□	MHS0740L030B	30.8	31.3	81.3	80	1.3	8	3
	6	□	MHS0740L060B	60.8	61.3	111.3	110	1.3	8	4
	10	□	MHS0740L090B	90.8	91.3	141.3	140	1.3	8	4
	14	□	MHS0740L120B	120.8	121.3	171.3	170	1.3	8	4
	18	□	MHS0740L150B	150.8	151.3	201.3	200	1.3	8	4
	24	□	MHS0740L200B	200.8	201.3	251.3	250	1.3	8	4
7.5	1	●	MHS0750L030B	30.8	31.3	81.3	80	1.3	8	3
	5	●	MHS0750L060B	60.9	61.4	111.4	110	1.4	8	4
	9	●	MHS0750L090B	90.9	91.4	141.4	140	1.4	8	4
	13	●	MHS0750L120B	120.9	121.4	171.4	170	1.4	8	4
	17	●	MHS0750L150B	150.9	151.4	201.4	200	1.4	8	4
	24	●	MHS0750L200B	200.9	201.4	251.4	250	1.4	8	4
7.6	1	□	MHS0760L030B	31.3	31.3	81.3	80	1.3	8	3
	5	□	MHS0760L060B	61.4	61.4	111.4	110	1.4	8	4
	9	□	MHS0760L090B	91.4	91.4	141.4	140	1.4	8	4
	13	□	MHS0760L120B	121.4	121.4	171.4	170	1.4	8	4
	17	□	MHS0760L150B	151.4	151.4	201.4	200	1.4	8	4
	24	□	MHS0760L200B	201.4	201.4	251.4	250	1.4	8	4
	30	□	MHS0760L250B	251.4	251.4	301.4	300	1.4	8	4
7.7	1	□	MHS0770L030B	31.3	31.3	81.3	80	1.3	8	3
	5	□	MHS0770L060B	61.4	61.4	111.4	110	1.4	8	4
	9	□	MHS0770L090B	91.4	91.4	141.4	140	1.4	8	4
	13	□	MHS0770L120B	121.4	121.4	171.4	170	1.4	8	4
	17	□	MHS0770L150B	151.4	151.4	201.4	200	1.4	8	4
	23	□	MHS0770L200B	201.4	201.4	251.4	250	1.4	8	4
	30	□	MHS0770L250B	251.4	251.4	301.4	300	1.4	8	4
7.8	1	●	MHS0780L030B	31.3	31.3	81.3	80	1.3	8	3
	5	●	MHS0780L060B	61.4	61.4	111.4	110	1.4	8	4
	9	●	MHS0780L090B	91.4	91.4	141.4	140	1.4	8	4
	13	●	MHS0780L120B	121.4	121.4	171.4	170	1.4	8	4
	17	●	MHS0780L150B	151.4	151.4	201.4	200	1.4	8	4
	23	●	MHS0780L200B	201.4	201.4	251.4	250	1.4	8	4
	30	●	MHS0780L250B	251.4	251.4	301.4	300	1.4	8	4
7.9	1	□	MHS0790L030B	31.4	31.4	81.4	80	1.4	8	3
	5	□	MHS0790L060B	61.4	61.4	111.4	110	1.4	8	4
	9	□	MHS0790L090B	91.4	91.4	141.4	140	1.4	8	4
	13	□	MHS0790L120B	121.4	121.4	171.4	170	1.4	8	4
	16	□	MHS0790L150B	151.4	151.4	201.4	200	1.4	8	4
	23	□	MHS0790L200B	201.4	201.4	251.4	250	1.4	8	4
	29	□	MHS0790L250B	251.4	251.4	301.4	300	1.4	8	4

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
8.0	1	●	MHS0800L030B	31.4	31.4	81.4	80	1.4	8	3
	5	●	MHS0800L060B	61.5	61.5	111.5	110	1.5	8	4
	9	●	MHS0800L090B	91.5	91.5	141.5	140	1.5	8	4
	12	●	MHS0800L120B	121.5	121.5	171.5	170	1.5	8	4
	16	●	MHS0800L150B	151.5	151.5	201.5	200	1.5	8	4
	22	●	MHS0800L200B	201.5	201.5	251.5	250	1.5	8	4
	29	●	MHS0800L250B	251.5	251.5	301.5	300	1.5	8	4
8.1	2	□	MHS0810L040B	39.9	41.4	101.4	100	1.4	10	3
	8	□	MHS0810L090B	90.0	91.5	151.5	150	1.5	10	4
	12	□	MHS0810L120B	120.0	121.5	181.5	180	1.5	10	4
	16	□	MHS0810L150B	150.0	151.5	211.5	210	1.5	10	4
	22	□	MHS0810L200B	200.0	201.5	261.5	260	1.5	10	4
	28	□	MHS0810L250B	250.0	251.5	311.5	310	1.5	10	4
8.2	2	□	MHS0820L040B	39.9	41.4	101.4	100	1.4	10	3
	8	□	MHS0820L090B	90.0	91.5	151.5	150	1.5	10	4
	12	□	MHS0820L120B	120.0	121.5	181.5	180	1.5	10	4
	16	□	MHS0820L150B	150.0	151.5	211.5	210	1.5	10	4
	22	□	MHS0820L200B	200.0	201.5	261.5	260	1.5	10	4
	28	□	MHS0820L250B	250.0	251.5	311.5	310	1.5	10	4
8.3	2	□	MHS0830L040B	39.9	41.4	101.4	100	1.4	10	3
	8	□	MHS0830L090B	90.0	91.5	151.5	150	1.5	10	4
	12	□	MHS0830L120B	120.0	121.5	181.5	180	1.5	10	4
	15	□	MHS0830L150B	150.0	151.5	211.5	210	1.5	10	4
	21	□	MHS0830L200B	200.0	201.5	261.5	260	1.5	10	4
	27	□	MHS0830L250B	250.0	251.5	311.5	310	1.5	10	4
8.4	2	□	MHS0840L040B	39.9	41.4	101.4	100	1.4	10	3
	8	□	MHS0840L090B	90.0	91.5	151.5	150	1.5	10	4
	12	□	MHS0840L120B	120.0	121.5	181.5	180	1.5	10	4
	15	□	MHS0840L150B	150.0	151.5	211.5	210	1.5	10	4
	21	□	MHS0840L200B	200.0	201.5	261.5	260	1.5	10	4
	27	□	MHS0840L250B	250.0	251.5	311.5	310	1.5	10	4
8.5	2	●	MHS0850L040B	40.0	41.5	101.5	100	1.5	10	3
	8	●	MHS0850L090B	90.0	91.5	151.5	150	1.5	10	4
	11	●	MHS0850L120B	120.0	121.5	181.5	180	1.5	10	4
	15	●	MHS0850L150B	150.0	151.5	211.5	210	1.5	10	4
	21	●	MHS0850L200B	200.0	201.5	261.5	260	1.5	10	4
	27	●	MHS0850L250B	250.0	251.5	311.5	310	1.5	10	4
8.6	2	□	MHS0860L040B	40.5	41.5	101.5	100	1.5	10	3
	8	□	MHS0860L090B	90.6	91.6	151.6	150	1.6	10	4
	11	□	MHS0860L120B	120.6	121.6	181.6	180	1.6	10	4
	15	□	MHS0860L150B	150.6	151.6	211.6	210	1.6	10	4
	21	□	MHS0860L200B	200.6	201.6	261.6	260	1.6	10	4
	26	□	MHS0860L250B	250.6	251.6	311.6	310	1.6	10	4
8.7	2	□	MHS0870L040B	40.5	41.5	101.5	100	1.5	10	3
	8	□	MHS0870L090B	90.6	91.6	151.6	150	1.6	10	4
	11	□	MHS0870L120B	120.6	121.6	181.6	180	1.6	10	4
	15	□	MHS0870L150B	150.6	151.6	211.6	210	1.6	10	4
	20	□	MHS0870L200B	200.6	201.6	261.6	260	1.6	10	4
	26	□	MHS0870L250B	250.6	251.6	311.6	310	1.6	10	4

DRILLING

CUTTING CONDITIONS ➤ N093
OPERATION GUIDANCE ➤ N094
TECHNICAL DATA ➤ Q001

MHS

WSTAR DRILLS

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
8.8	2	●	MHS0880L040B	40.5	41.5	101.5	100	1.5	10	3
	8	●	MHS0880L090B	90.6	91.6	151.6	150	1.6	10	4
	11	●	MHS0880L120B	120.6	121.6	181.6	180	1.6	10	4
	14	●	MHS0880L150B	150.6	151.6	211.6	210	1.6	10	4
	20	●	MHS0880L200B	200.6	201.6	261.6	260	1.6	10	4
	26	●	MHS0880L250B	250.6	251.6	311.6	310	1.6	10	4
8.9	2	□	MHS0890L040B	40.5	41.5	101.5	100	1.5	10	3
	7	□	MHS0890L090B	90.6	91.6	151.6	150	1.6	10	4
	11	□	MHS0890L120B	120.6	121.6	181.6	180	1.6	10	4
	14	□	MHS0890L150B	150.6	151.6	211.6	210	1.6	10	4
	20	□	MHS0890L200B	200.6	201.6	261.6	260	1.6	10	4
	25	□	MHS0890L250B	250.6	251.6	311.6	310	1.6	10	4
9.0	2	●	MHS0900L040B	40.5	41.5	101.5	100	1.5	10	3
	7	●	MHS0900L090B	90.6	91.6	151.6	150	1.6	10	4
	11	●	MHS0900L120B	120.6	121.6	181.6	180	1.6	10	4
	14	●	MHS0900L150B	150.6	151.6	211.6	210	1.6	10	4
	20	●	MHS0900L200B	200.6	201.6	261.6	260	1.6	10	4
	25	●	MHS0900L250B	250.6	251.6	311.6	310	1.6	10	4
9.1	2	□	MHS0910L040B	41.1	41.6	101.6	100	1.6	10	3
	7	□	MHS0910L090B	91.2	91.7	151.7	150	1.7	10	4
	11	□	MHS0910L120B	121.2	121.7	181.7	180	1.7	10	4
	14	□	MHS0910L150B	151.2	151.7	211.7	210	1.7	10	4
	19	□	MHS0910L200B	201.2	201.7	261.7	260	1.7	10	4
	25	□	MHS0910L250B	251.2	251.7	311.7	310	1.7	10	4
	30	□	MHS0910L300B	301.2	301.7	361.7	360	1.7	10	4
9.2	2	□	MHS0920L040B	41.1	41.6	101.6	100	1.6	10	3
	7	□	MHS0920L090B	91.2	91.7	151.7	150	1.7	10	4
	10	□	MHS0920L120B	121.2	121.7	181.7	180	1.7	10	4
	14	□	MHS0920L150B	151.2	151.7	211.7	210	1.7	10	4
	19	□	MHS0920L200B	201.2	201.7	261.7	260	1.7	10	4
	25	□	MHS0920L250B	251.2	251.7	311.7	310	1.7	10	4
	30	□	MHS0920L300B	301.2	301.7	361.7	360	1.7	10	4
9.3	2	□	MHS0930L040B	41.1	41.6	101.6	100	1.6	10	3
	7	□	MHS0930L090B	91.2	91.7	151.7	150	1.7	10	4
	10	□	MHS0930L120B	121.2	121.7	181.7	180	1.7	10	4
	14	□	MHS0930L150B	151.2	151.7	211.7	210	1.7	10	4
	19	□	MHS0930L200B	201.2	201.7	261.7	260	1.7	10	4
	24	□	MHS0930L250B	251.2	251.7	311.7	310	1.7	10	4
	30	□	MHS0930L300B	301.2	301.7	361.7	360	1.7	10	4
9.4	2	□	MHS0940L040B	41.1	41.6	101.6	100	1.6	10	3
	7	□	MHS0940L090B	91.2	91.7	151.7	150	1.7	10	4
	10	□	MHS0940L120B	121.2	121.7	181.7	180	1.7	10	4
	13	□	MHS0940L150B	151.2	151.7	211.7	210	1.7	10	4
	19	□	MHS0940L200B	201.2	201.7	261.7	260	1.7	10	4
	24	□	MHS0940L250B	251.2	251.7	311.7	310	1.7	10	4
	29	□	MHS0940L300B	301.2	301.7	361.7	360	1.7	10	4

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
9.5	2	●	MHS0950L040B	41.1	41.6	101.6	100	1.6	10	3
	7	●	MHS0950L090B	91.2	91.7	151.7	150	1.7	10	4
	10	●	MHS0950L120B	121.2	121.7	181.7	180	1.7	10	4
	13	●	MHS0950L150B	151.2	151.7	211.7	210	1.7	10	4
	18	●	MHS0950L200B	201.2	201.7	261.7	260	1.7	10	4
	24	●	MHS0950L250B	251.2	251.7	311.7	310	1.7	10	4
	29	●	MHS0950L300B	301.2	301.7	361.7	360	1.7	10	4
9.6	2	□	MHS0960L040B	41.7	41.7	101.7	100	1.7	10	3
	7	□	MHS0960L090B	91.7	91.7	151.7	150	1.7	10	4
	10	□	MHS0960L120B	121.7	121.7	181.7	180	1.7	10	4
	13	□	MHS0960L150B	151.7	151.7	211.7	210	1.7	10	4
	18	□	MHS0960L200B	201.7	201.7	261.7	260	1.7	10	4
	24	□	MHS0960L250B	251.7	251.7	311.7	310	1.7	10	4
	29	□	MHS0960L300B	301.7	301.7	361.7	360	1.7	10	4
9.7	2	□	MHS0970L040B	41.7	41.7	101.7	100	1.7	10	3
	7	□	MHS0970L090B	91.8	91.8	151.8	150	1.8	10	4
	10	□	MHS0970L120B	121.8	121.8	181.8	180	1.8	10	4
	13	□	MHS0970L150B	151.8	151.8	211.8	210	1.8	10	4
	18	□	MHS0970L200B	201.8	201.8	261.8	260	1.8	10	4
	23	□	MHS0970L250B	251.8	251.8	311.8	310	1.8	10	4
	28	□	MHS0970L300B	301.8	301.8	361.8	360	1.8	10	4
9.8	2	●	MHS0980L040B	41.7	41.7	101.7	100	1.7	10	3
	7	●	MHS0980L090B	91.8	91.8	151.8	150	1.8	10	4
	10	●	MHS0980L120B	121.8	121.8	181.8	180	1.8	10	4
	13	●	MHS0980L150B	151.8	151.8	211.8	210	1.8	10	4
	18	●	MHS0980L200B	201.8	201.8	261.8	260	1.8	10	4
	23	●	MHS0980L250B	251.8	251.8	311.8	310	1.8	10	4
	28	●	MHS0980L300B	301.8	301.8	361.8	360	1.8	10	4
9.9	2	□	MHS0990L040B	41.7	41.7	101.7	100	1.7	10	3
	7	□	MHS0990L090B	91.8	91.8	151.8	150	1.8	10	4
	10	□	MHS0990L120B	121.8	121.8	181.8	180	1.8	10	4
	13	□	MHS0990L150B	151.8	151.8	211.8	210	1.8	10	4
	18	□	MHS0990L200B	201.8	201.8	261.8	260	1.8	10	4
	23	□	MHS0990L250B	251.8	251.8	311.8	310	1.8	10	4
	28	□	MHS0990L300B	301.8	301.8	361.8	360	1.8	10	4
10.0	1	●	MHS1000L040B	41.7	41.7	101.7	100	1.7	10	3
	6	●	MHS1000L090B	91.8	91.8	151.8	150	1.8	10	4
	9	●	MHS1000L120B	121.8	121.8	181.8	180	1.8	10	4
	12	●	MHS1000L150B	151.8	151.8	211.8	210	1.8	10	4
	17	●	MHS1000L200B	201.8	201.8	261.8	260	1.8	10	4
	22	●	MHS1000L250B	251.8	251.8	311.8	310	1.8	10	4
	27	●	MHS1000L300B	301.8	301.8	361.8	360	1.8	10	4
10.1	1	□	MHS1010L040B	40.2	41.7	101.7	100	1.7	12	3
	6	□	MHS1010L090B	90.3	91.8	151.8	150	1.8	12	4
	9	□	MHS1010L120B	120.3	121.8	181.8	180	1.8	12	4
	12	□	MHS1010L150B	150.3	151.8	211.8	210	1.8	12	4
	17	□	MHS1010L200B	200.3	201.8	261.8	260	1.8	12	4
	22	□	MHS1010L250B	250.3	251.8	311.8	310	1.8	12	4
	27	□	MHS1010L300B	300.3	301.8	361.8	360	1.8	12	4

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
10.2	1	□	MHS1020L040B	40.3	41.8	101.8	100	1.8	12	3
	6	□	MHS1020L090B	90.4	91.9	151.9	150	1.9	12	4
	9	□	MHS1020L120B	120.4	121.9	181.9	180	1.9	12	4
	12	□	MHS1020L150B	150.4	151.9	211.9	210	1.9	12	4
	17	□	MHS1020L200B	200.4	201.9	261.9	260	1.9	12	4
	22	□	MHS1020L250B	250.4	251.9	311.9	310	1.9	12	4
	27	□	MHS1020L300B	300.4	301.9	361.9	360	1.9	12	4
10.3	1	□	MHS1030L040B	40.3	41.8	101.8	100	1.8	12	3
	6	□	MHS1030L090B	90.4	91.9	151.9	150	1.9	12	4
	9	□	MHS1030L120B	120.4	121.9	181.9	180	1.9	12	4
	12	□	MHS1030L150B	150.4	151.9	211.9	210	1.9	12	4
	17	□	MHS1030L200B	200.4	201.9	261.9	260	1.9	12	4
	22	□	MHS1030L250B	250.4	251.9	311.9	310	1.9	12	4
	26	□	MHS1030L300B	300.4	301.9	361.9	360	1.9	12	4
10.4	1	□	MHS1040L040B	40.3	41.8	101.8	100	1.8	12	3
	6	□	MHS1040L090B	90.4	91.9	151.9	150	1.9	12	4
	9	□	MHS1040L120B	120.4	121.9	181.9	180	1.9	12	4
	12	□	MHS1040L150B	150.4	151.9	211.9	210	1.9	12	4
	17	□	MHS1040L200B	200.4	201.9	261.9	260	1.9	12	4
	21	□	MHS1040L250B	250.4	251.9	311.9	310	1.9	12	4
	26	□	MHS1040L300B	300.4	301.9	361.9	360	1.9	12	4
10.5	1	●	MHS1050L040B	40.3	41.8	101.8	100	1.8	12	3
	6	●	MHS1050L090B	90.4	91.9	151.9	150	1.9	12	4
	9	●	MHS1050L120B	120.4	121.9	181.9	180	1.9	12	4
	12	●	MHS1050L150B	150.4	151.9	211.9	210	1.9	12	4
	16	●	MHS1050L200B	200.4	201.9	261.9	260	1.9	12	4
	21	●	MHS1050L250B	250.4	251.9	311.9	310	1.9	12	4
	26	●	MHS1050L300B	300.4	301.9	361.9	360	1.9	12	4
10.6	1	□	MHS1060L040B	40.8	41.8	101.8	100	1.8	12	3
	6	□	MHS1060L090B	90.9	91.9	151.9	150	1.9	12	4
	9	□	MHS1060L120B	120.9	121.9	181.9	180	1.9	12	4
	12	□	MHS1060L150B	150.9	151.9	211.9	210	1.9	12	4
	16	□	MHS1060L200B	200.9	201.9	261.9	260	1.9	12	4
	21	□	MHS1060L250B	250.9	251.9	311.9	310	1.9	12	4
	26	□	MHS1060L300B	300.9	301.9	361.9	360	1.9	12	4
10.7	1	□	MHS1070L040B	40.8	41.8	101.8	100	1.8	12	3
	6	□	MHS1070L090B	90.9	91.9	151.9	150	1.9	12	4
	9	□	MHS1070L120B	120.9	121.9	181.9	180	1.9	12	4
	11	□	MHS1070L150B	150.9	151.9	211.9	210	1.9	12	4
	16	□	MHS1070L200B	200.9	201.9	261.9	260	1.9	12	4
	21	□	MHS1070L250B	250.9	251.9	311.9	310	1.9	12	4
	25	□	MHS1070L300B	300.9	301.9	361.9	360	1.9	12	4
10.8	1	●	MHS1080L040B	40.9	41.9	101.9	100	1.9	12	3
	6	●	MHS1080L090B	91.0	92.0	152.0	150	2.0	12	4
	9	●	MHS1080L120B	121.0	122.0	182.0	180	2.0	12	4
	11	●	MHS1080L150B	151.0	152.0	212.0	210	2.0	12	4
	16	●	MHS1080L200B	201.0	202.0	262.0	260	2.0	12	4
	21	●	MHS1080L250B	251.0	252.0	312.0	310	2.0	12	4
	25	●	MHS1080L300B	301.0	302.0	362.0	360	2.0	12	4

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
10.9	1	□	MHS1090L040B	40.9	41.9	101.9	100	1.9	12	3
	6	□	MHS1090L090B	91.0	92.0	152.0	150	2.0	12	4
	8	□	MHS1090L120B	121.0	122.0	182.0	180	2.0	12	4
	11	□	MHS1090L150B	151.0	152.0	212.0	210	2.0	12	4
	16	□	MHS1090L200B	201.0	202.0	262.0	260	2.0	12	4
	20	□	MHS1090L250B	251.0	252.0	312.0	310	2.0	12	4
	25	□	MHS1090L300B	301.0	302.0	362.0	360	2.0	12	4
11.0	1	●	MHS1100L040B	40.9	41.9	101.9	100	1.9	12	3
	6	●	MHS1100L090B	91.0	92.0	152.0	150	2.0	12	4
	8	●	MHS1100L120B	121.0	122.0	182.0	180	2.0	12	4
	11	●	MHS1100L150B	151.0	152.0	212.0	210	2.0	12	4
	16	●	MHS1100L200B	201.0	202.0	262.0	260	2.0	12	4
	20	●	MHS1100L250B	251.0	252.0	312.0	310	2.0	12	4
	25	●	MHS1100L300B	301.0	302.0	362.0	360	2.0	12	4
11.1	1	□	MHS1110L040B	41.4	41.9	101.9	100	1.9	12	3
	6	□	MHS1110L090B	91.5	92.0	152.0	150	2.0	12	4
	8	□	MHS1110L120B	121.5	122.0	182.0	180	2.0	12	4
	11	□	MHS1110L150B	151.5	152.0	212.0	210	2.0	12	4
	15	□	MHS1110L200B	201.5	202.0	262.0	260	2.0	12	4
	20	□	MHS1110L250B	251.5	252.0	312.0	310	2.0	12	4
	24	□	MHS1110L300B	301.5	302.0	362.0	360	2.0	12	4
11.2	1	□	MHS1120L040B	41.4	41.9	101.9	100	1.9	12	3
	5	□	MHS1120L090B	91.5	92.0	152.0	150	2.0	12	4
	8	□	MHS1120L120B	121.5	122.0	182.0	180	2.0	12	4
	11	□	MHS1120L150B	151.5	152.0	212.0	210	2.0	12	4
	15	□	MHS1120L200B	201.5	202.0	262.0	260	2.0	12	4
	20	□	MHS1120L250B	251.5	252.0	312.0	310	2.0	12	4
	24	□	MHS1120L300B	301.5	302.0	362.0	360	2.0	12	4
11.3	1	□	MHS1130L040B	41.4	41.9	101.9	100	1.9	12	3
	5	□	MHS1130L090B	91.6	92.1	152.1	150	2.1	12	4
	8	□	MHS1130L120B	121.6	122.1	182.1	180	2.1	12	4
	11	□	MHS1130L150B	151.6	152.1	212.1	210	2.1	12	4
	15	□	MHS1130L200B	201.6	202.1	262.1	260	2.1	12	4
	20	□	MHS1130L250B	251.6	252.1	312.1	310	2.1	12	4
	24	□	MHS1130L300B	301.6	302.1	362.1	360	2.1	12	4
11.4	1	□	MHS1140L040B	41.5	42.0	102.0	100	2.0	12	3
	5	□	MHS1140L090B	91.6	92.1	152.1	150	2.1	12	4
	8	□	MHS1140L120B	121.6	122.1	182.1	180	2.1	12	4
	11	□	MHS1140L150B	151.6	152.1	212.1	210	2.1	12	4
	15	□	MHS1140L200B	201.6	202.1	262.1	260	2.1	12	4
	19	□	MHS1140L250B	251.6	252.1	312.1	310	2.1	12	4
	24	□	MHS1140L300B	301.6	302.1	362.1	360	2.1	12	4
11.5	1	●	MHS1150L040B	41.5	42.0	102.0	100	2.0	12	3
	5	●	MHS1150L090B	91.6	92.1	152.1	150	2.1	12	4
	8	●	MHS1150L120B	121.6	122.1	182.1	180	2.1	12	4
	10	●	MHS1150L150B	151.6	152.1	212.1	210	2.1	12	4
	15	●	MHS1150L200B	201.6	202.1	262.1	260	2.1	12	4
	19	●	MHS1150L250B	251.6	252.1	312.1	310	2.1	12	4
	24	●	MHS1150L300B	301.6	302.1	362.1	360	2.1	12	4

DRILLING

CUTTING CONDITIONS ➤ N093
OPERATION GUIDANCE ➤ N094
TECHNICAL DATA ➤ Q001

MHS

WSTAR DRILLS

Internal Coolant

DC (mm)	Hole Depth (l/d)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
	1	□	**MHS1160L040B**	42.0	42.0	102.0	100	2.0	12	3
	5	□	MHS**1160L090B**	92.1	92.1	152.1	150	2.1	12	4
	8	□	MHS**1160L120B**	122.1	122.1	182.1	180	2.1	12	4
11.6	10	□	MHS**1160L150B**	152.1	152.1	212.1	210	2.1	12	4
	15	□	MHS**1160L200B**	202.1	202.1	262.1	260	2.1	12	4
	19	□	MHS**1160L250B**	252.1	252.1	312.1	310	2.1	12	4
	23	□	MHS**1160L300B**	302.1	302.1	362.1	360	2.1	12	4
	1	□	MHS**1170L040B**	42.0	42.0	102.0	100	2.0	12	3
	5	□	MHS**1170L090B**	92.1	92.1	152.1	150	2.1	12	4
	8	□	MHS**1170L120B**	122.1	122.1	182.1	180	2.1	12	4
11.7	10	□	MHS**1170L150B**	152.1	152.1	212.1	210	2.1	12	4
	15	□	MHS**1170L200B**	202.1	202.1	262.1	260	2.1	12	4
	19	□	MHS**1170L250B**	252.1	252.1	312.1	310	2.1	12	4
	23	□	MHS**1170L300B**	302.1	302.1	362.1	360	2.1	12	4
	1	●	MHS**1180L040B**	42.0	42.0	102.0	100	2.0	12	3
	5	●	MHS**1180L090B**	92.1	92.1	152.1	150	2.1	12	4
	8	●	MHS**1180L120B**	122.1	122.1	182.1	180	2.1	12	4
11.8	10	●	MHS**1180L150B**	152.1	152.1	212.1	210	2.1	12	4
	14	●	MHS**1180L200B**	202.1	202.1	262.1	260	2.1	12	4
	19	●	MHS**1180L250B**	252.1	252.1	312.1	310	2.1	12	4
	23	●	MHS**1180L300B**	302.1	302.1	362.1	360	2.1	12	4
	1	□	MHS**1190L040B**	42.0	42.0	102.0	100	2.0	12	3
	5	□	MHS**1190L090B**	92.2	92.2	152.2	150	2.2	12	4
	8	□	MHS**1190L120B**	122.2	122.2	182.2	180	2.2	12	4
11.9	10	□	MHS**1190L150B**	152.2	152.2	212.2	210	2.2	12	4
	14	□	MHS**1190L200B**	202.2	202.2	262.2	260	2.2	12	4
	19	□	MHS**1190L250B**	252.2	252.2	312.2	310	2.2	12	4
	23	□	MHS**1190L300B**	302.2	302.2	362.2	360	2.2	12	4
	1	●	MHS**1200L040B**	42.1	42.1	102.1	100	2.1	12	3
	5	●	MHS**1200L090B**	92.2	92.2	152.2	150	2.2	12	4
	7	●	MHS**1200L120B**	122.2	122.2	182.2	180	2.2	12	4
12.0	10	●	MHS**1200L150B**	152.2	152.2	212.2	210	2.2	12	4
	14	●	MHS**1200L200B**	202.2	202.2	262.2	260	2.2	12	4
	18	●	MHS**1200L250B**	252.2	252.2	312.2	310	2.2	12	4
	22	●	MHS**1200L300B**	302.2	302.2	362.2	360	2.2	12	4

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

RECOMMENDED CUTTING CONDITIONS

Work Material	Mild Steel (≤180HB), Carbon steel, Alloy steel (180−280HB) AISI 1010, AISI 1045, AISI 4140 etc				Ferritic, Precipitation hardening stainless steel (>200HB) AISI 431, AISI 420 etc			
Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)
1.0	40	12700	0.030 (0.020−0.040)	380	20	6400	0.030 (0.020−0.040)	190
1.2	50	13300	0.035 (0.025−0.050)	465	30	8000	0.035 (0.025−0.050)	280
1.6	60	11900	0.050 (0.030−0.065)	595	40	8000	0.050 (0.030−0.065)	400
2.0	70	11100	0.060 (0.040−0.080)	665	50	8000	0.060 (0.040−0.080)	480
2.5	80	10200	0.075 (0.050−0.100)	765	60	7600	0.075 (0.050−0.100)	570
3.2	80	8000	0.100 (0.070−0.130)	800	60	6000	0.100 (0.070−0.130)	600
4.0	80	6400	0.100 (0.090−0.110)	640	60	4800	0.090 (0.080−0.090)	430
5.0	80	5100	0.130 (0.110−0.140)	665	60	3800	0.110 (0.100−0.120)	420
6.3	80	4000	0.160 (0.140−0.180)	640	60	3000	0.140 (0.130−0.150)	420
8.0	80	3200	0.200 (0.180−0.230)	640	60	2400	0.170 (0.160−0.190)	410
10.0	80	2600	0.250 (0.220−0.280)	650	60	1900	0.220 (0.200−0.230)	420
12.0	80	2100	0.300 (0.270−0.340)	630	60	1600	0.260 (0.240−0.280)	415

Work Material	Pre-hardened steel (35−45HRC), Alloy tool steel (≤350) AISI P21, AISI P20, ASTM H13, AISI L6 etc				Hardened Steel (40−55HRC), Precipitation hardening stainless steel (<450HB) AISI 431, AISI 420, S17400, S17700 etc			
Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)
1.0	20	6400	0.025 (0.020−0.030)	160	40	12700	0.020 (0.015−0.025)	255
1.2	30	8000	0.030 (0.020−0.035)	240	40	10600	0.025 (0.020−0.030)	265
1.6	40	8000	0.040 (0.030−0.045)	320	50	10000	0.035 (0.025−0.040)	350
2.0	50	8000	0.045 (0.035−0.060)	360	50	8000	0.040 (0.030−0.050)	320
2.5	60	7600	0.060 (0.045−0.075)	455	60	7600	0.050 (0.040−0.065)	380
3.2	60	6000	0.080 (0.060−0.090)	480	60	6000	0.060 (0.050−0.080)	360
4.0	60	4800	0.080 (0.070−0.100)	385	60	4800	0.080 (0.060−0.100)	385
5.0	60	3800	0.110 (0.090−0.130)	420	60	3800	0.100 (0.080−0.130)	380
6.3	60	3000	0.130 (0.110−0.160)	390	60	3000	0.110 (0.090−0.130)	330
8.0	60	2400	0.170 (0.140−0.200)	410	60	2400	0.140 (0.120−0.160)	335
10.0	60	1900	0.210 (0.170−0.250)	400	60	1900	0.170 (0.140−0.200)	325
12.0	60	1600	0.250 (0.210−0.300)	400	60	1600	0.210 (0.170−0.240)	335

Work Material	Hardened Steel (40−55HRC), Heat Resistant Alloy AISI H13, L6, Inconel718 etc			
Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)
1.0	10	3200	0.015 (0.015−0.020)	50
1.2	10	2700	0.020 (0.015−0.025)	55
1.6	10	2000	0.025 (0.020−0.030)	50
2.0	20	3200	0.035 (0.025−0.040)	110
2.5	20	2600	0.040 (0.030−0.050)	105
3.2	20	2000	0.050 (0.040−0.070)	100
4.0	30	2400	0.070 (0.050−0.080)	170
5.0	30	1900	0.080 (0.060−0.100)	150
6.3	30	1500	0.090 (0.080−0.110)	135
8.0	40	1600	0.120 (0.100−0.130)	190
10.0	40	1300	0.150 (0.130−0.170)	195
12.0	40	1100	0.180 (0.150−0.200)	200

(Note 1) When using the drill with a length over l/d 10, it is necessary to use a prep holes as a guide. (If no prep-hole is used then drill breakage can occur)

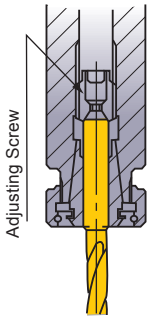
(Note 2) Setting of the diameter tolerance differs from general-purpose drills. MHS shortest flute drills are recommended for prep hole machining.

OPERATION GUIDANCE ➤ N094
TECHNICAL DATA ➤ Q001

MHS
WSTAR DRILLS

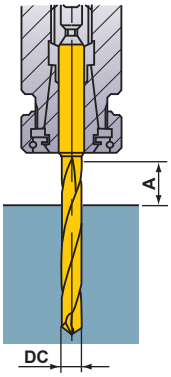
OPERATIONAL GUIDANCE

Drill Holding



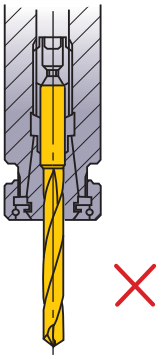
Thrust bearing type collet chuck holds the drill securely.

Drill Length



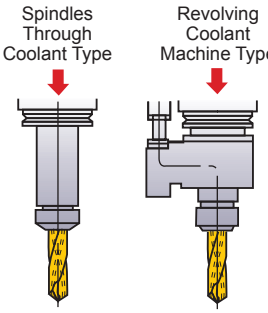
A ≥ DC x 2

Drill Installation



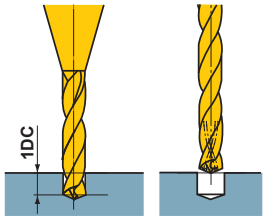
Do not clamp on the flutes.

Coolant Method



Coolant pressure is approx. 1.5MPa–7MPa
Recommended coolant pressure: ≥3Mpa

Drill Installation



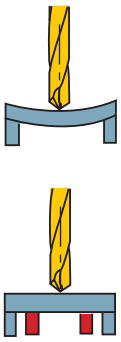
1) Make approx. 1DC(DC=drill diameter) pilot hole by using the MHS with the shortest flutes.
2) Use the pilot hole as a guide and machine by the drill with coolant hole. Depending on the application, carry out pecking.

Coolant Handling

1) Small particles of swarf will jam in the oil hole of small diameter drills. Always use a fine mesh filter as a preventative measure.

2) Dirt and dust particles adhere to the oil in old coolant and prevent an efficient flow. Regular coolant exchange is recommended.

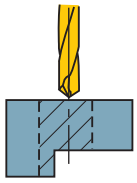
Thin Workpiece



If Bending Occurs ×

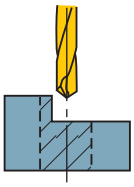
Support the Workpiece ○

Interrupted Cutting



One Process ○

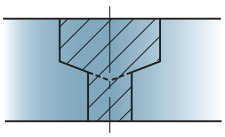
①Lower the feed when drilling the interrupted part.



Requires Prior Machining △

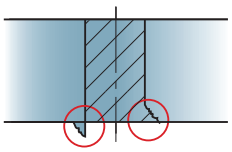
①Spot face with an end mill prior to drilling.

Stepped Holes



①Divide the two processes.
②Drill the larger hole first.
*A tool for machining both chamfer and spot face can be produced to order.

Burring and Workpiece Chipping

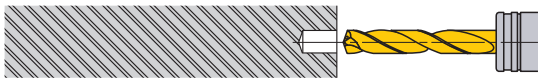


①Lower the feed rate by 50% at the end of through cutting.
②Change the point angle.

OPERATIONAL GUIDANCE FOR THE MHS LONG TYPE DRILL (L/D≥10)

FLAT FACE DRILLING ●Drilling a blind hole

1. Drilling a pilot hole



①Use a drill with a larger (flatter) point angle than the super long type. Use the shortest flute possible.
②Ensure a high precision hole is drilled for the guide.
③Drill depth : Approx 1DC.
(Adjust the pilot hole depth according to the length of the long type drill.)

2. Initial cutting with the long type drill



①Penetrate the guide hole at low revolution. (Revolution 1000min^{-1}, feed rate 0.2—0.3mm/rev)
②Stop the long type drill 1—3mm short of the guide hole bottom.

3. Drill the deep hole



①Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

4. Drill retraction



①After drilling, lower the cutting revolution about 0.5—1mm short of the hole end. (Revolution of around 1000min^{-1})
②Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.
③Finally, clear the hole at a cutting speed of 20—30m/min and feed rate of 0.2—0.3mm/rev.

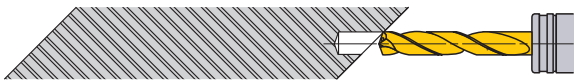
INTERRUPED DRILLING ●Drilling and breaking through on irregular faces or angles

1. Spot facing



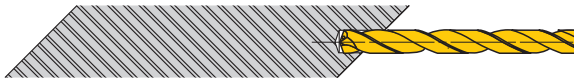
①Machine a flat or the irregular face by using an end mill or slot drill capable of spot facing. Make the spot face diameter the same size as the required deep hole diameter.

2. Drilling a pilot hole



①Use a drill with a larger (flatter) point angle than the super long type. Use the shortest flute possible.
②Ensure a high precision hole is drilled for the guide.
③Drill depth : Approx 1DC.
(Adjust the pilot hole depth according to the length of the long type drill.)

3. Initial cutting with the long type drill



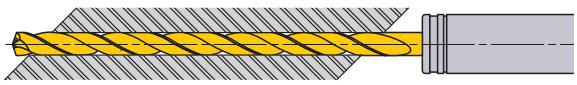
①Penetrate the guide hole at a low revolution. (Revolution 1000min^{-1}, feed rate 0.2—0.3mm/rev)
②Stop the long type drill 0.5—1mm short of the guide hole bottom.

4. Drill the deep hole



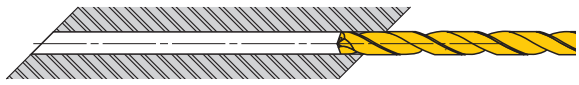
①Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

5. Breaking through



①When breaking through, the cutting edge can be damaged.
②Lower the feed rate when penetrating.

6. Drill retraction



①Finally clear the hole at a cutting speed of 20—30m/min and feed rate of 0.2—0.3mm/rev.
②Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.

DRILLING(SOLID CARBIDE)

MZE/MZS

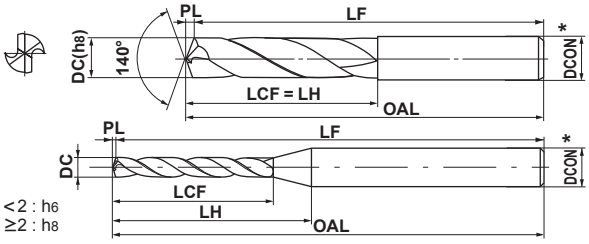
●Helical coolant hole enables high speed machining (MZS type).

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal	Heat Resistant Alloy	Hardened Steel (MZE only)

	DC<2	2≤DC≤3	3<DC≤6	6<DC≤10	10<DC≤18	18<DC≤20
	0 −0.014	0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033
h6,h8 MZE		0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033
h6 MZS		0 −0.006	0 −0.008	0 −0.009	0 −0.011	0 −0.013

MZE (External coolant)



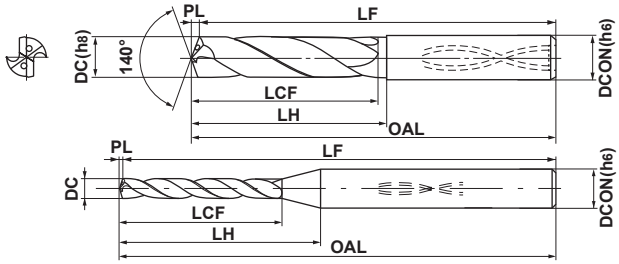


Type1

* DCON <2 : h6
DCON ≥2 : h8

MZS (Internal coolant)





Type2

(Note) MZS drills are suitable for use with shrink fit holders.

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
1.0	2	Ext.	●	MZE0100SB	6.2	8.2	55.2	55	0.2	2.0	1
	5	Int.	●	MZS0100LB	11.2	15.2	55.2	55	0.2	3.0	2
	12	Int.	□	MZS0100XB	23.2	27.2	55.2	55	0.2	3.0	2
1.1	2	Ext.	●	MZE0110SB	7.2	9.2	55.2	55	0.2	2.0	1
	5	Int.	●	MZS0110LB	17.2	21.2	55.2	55	0.2	3.0	2
	12	Int.	□	MZS0110XB	23.2	27.2	55.2	55	0.2	3.0	2
1.2	2	Ext.	●	MZE0120SB	8.2	9.2	55.2	55	0.2	2.0	1
	5	Int.	●	MZS0120LB	17.2	20.2	55.2	55	0.2	3.0	2
	12	Int.	□	MZS0120XB	23.2	26.2	55.2	55	0.2	3.0	2
1.3	2	Ext.	●	MZE0130SB	8.2	9.2	55.2	55	0.2	2.0	1
	5	Int.	●	MZS0130LB	17.2	20.2	55.2	55	0.2	3.0	2
	12	Int.	□	MZS0130XB	23.2	26.2	55.2	55	0.2	3.0	2
1.4	2	Ext.	●	MZE0140SB	9.3	10.3	55.3	55	0.3	2.0	1
	5	Int.	●	MZS0140LB	17.3	20.3	55.3	55	0.3	3.0	2
	12	Int.	□	MZS0140XB	23.3	26.3	55.3	55	0.3	3.0	2
1.5	2	Ext.	●	MZE0150SB	9.3	10.3	55.3	55	0.3	2.0	1
	5	Int.	●	MZS0150LB	17.3	20.3	55.3	55	0.3	3.0	2
	12	Int.	□	MZS0150XB	23.3	26.3	55.3	55	0.3	3.0	2
1.6	2	Ext.	●	MZE0160SB	10.3	10.3	55.3	55	0.3	2.0	1
	5	Int.	●	MZS0160LB	22.3	25.3	68.3	68	0.3	3.0	2
	12	Int.	□	MZS0160XB	30.3	33.3	68.3	68	0.3	3.0	2
1.7	2	Ext.	●	MZE0170SB	10.3	10.3	55.3	55	0.3	2.0	1
	5	Int.	●	MZS0170LB	22.3	24.3	68.3	68	0.3	3.0	2
	12	Int.	□	MZS0170XB	30.3	32.3	68.3	68	0.3	3.0	2
1.8	2	Ext.	●	MZE0180SB	11.3	11.3	55.3	55	0.3	2.0	1
	5	Int.	●	MZS0180LB	22.3	24.3	68.3	68	0.3	3.0	2
	12	Int.	□	MZS0180XB	30.3	32.3	68.3	68	0.3	3.0	2
1.9	2	Ext.	●	MZE0190SB	11.3	11.3	55.3	55	0.3	2.0	1
	5	Int.	●	MZS0190LB	22.3	24.3	68.3	68	0.3	3.0	2
	12	Int.	□	MZS0190XB	30.3	32.3	68.3	68	0.3	3.0	2

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
2.0	2	Ext.	●	**MZE0200SA**	12.4	12.4	55.4	55	0.4	2.0	1
	3	Ext.	●	**MZE0200MA**	16.4	16.4	55.4	55	0.4	2.0	1
	3	Int.	●	**MZS0200MB**	16.4	18.4	62.4	62	0.4	3.0	2
	5	Int.	●	**MZS0200LB**	22.4	24.4	68.4	68	0.4	3.0	2
	12	Int.	□	**MZS0200XB**	30.4	32.4	68.4	68	0.4	3.0	2
2.1	2	Ext.	●	**MZE0210SA**	12.4	12.4	55.4	55	0.4	2.1	1
	3	Ext.	●	**MZE0210MA**	16.4	16.4	55.4	55	0.4	2.1	1
	3	Int.	●	**MZS0210MB**	20.4	22.4	66.4	66	0.4	3.0	2
	5	Int.	●	**MZS0210LB**	28.4	30.4	74.4	74	0.4	3.0	2
	12	Int.	□	**MZS0210XB**	38.4	40.4	74.4	74	0.4	3.0	2
2.2	2	Ext.	●	**MZE0220SA**	13.4	13.4	55.4	55	0.4	2.2	1
	3	Ext.	●	**MZE0220MA**	18.4	18.4	55.4	55	0.4	2.2	1
	3	Int.	●	**MZS0220MB**	20.4	21.4	66.4	66	0.4	3.0	2
	5	Int.	●	**MZS0220LB**	28.4	29.4	74.4	74	0.4	3.0	2
	12	Int.	□	**MZS0220XB**	38.4	39.4	74.4	74	0.4	3.0	2
2.3	2	Ext.	●	**MZE0230SA**	13.4	13.4	55.4	55	0.4	2.3	1
	3	Ext.	●	**MZE0230MA**	18.4	18.4	55.4	55	0.4	2.3	1
	3	Int.	●	**MZS0230MB**	20.4	21.4	66.4	66	0.4	3.0	2
	5	Int.	●	**MZS0230LB**	28.4	29.4	74.4	74	0.4	3.0	2
	12	Int.	□	**MZS0230XB**	38.4	39.4	74.4	74	0.4	3.0	2
2.4	2	Ext.	●	**MZE0240SA**	16.4	16.4	55.4	55	0.4	2.4	1
	3	Ext.	●	**MZE0240MA**	20.4	20.4	55.4	55	0.4	2.4	1
	3	Int.	●	**MZS0240MB**	20.4	21.4	66.4	66	0.4	3.0	2
	5	Int.	●	**MZS0240LB**	28.4	29.4	74.4	74	0.4	3.0	2
	12	Int.	□	**MZS0240XB**	38.4	39.4	74.4	74	0.4	3.0	2
2.5	2	Ext.	●	**MZE0250SA**	16.5	16.5	55.5	55	0.5	2.5	1
	3	Ext.	●	**MZE0250MA**	20.5	20.5	55.5	55	0.5	2.5	1
	3	Int.	●	**MZS0250MB**	20.5	21.5	66.5	66	0.5	3.0	2
	5	Int.	●	**MZS0250LB**	28.5	29.5	74.5	74	0.5	3.0	2
	12	Int.	□	**MZS0250XB**	38.5	39.5	74.5	74	0.5	3.0	2
2.6	2	Ext.	●	**MZE0260SA**	16.5	16.5	55.5	55	0.5	2.6	1
	3	Ext.	●	**MZE0260MA**	20.5	20.5	55.5	55	0.5	2.6	1
	3	Int.	●	**MZS0260MB**	24.5	24.5	72.5	72	0.5	3.0	2
	5	Int.	●	**MZS0260LB**	33.5	33.5	81.5	81	0.5	3.0	2
	12	Int.	□	**MZS0260XB**	45.5	45.5	81.5	81	0.5	3.0	2
2.7	2	Ext.	●	**MZE0270SA**	16.5	16.5	55.5	55	0.5	2.7	1
	3	Ext.	●	**MZE0270MA**	20.5	20.5	55.5	55	0.5	2.7	1
	3	Int.	●	**MZS0270MB**	24.5	24.5	72.5	72	0.5	3.0	2
	5	Int.	●	**MZS0270LB**	33.5	33.5	81.5	81	0.5	3.0	2
	12	Int.	□	**MZS0270XB**	45.5	45.5	81.5	81	0.5	3.0	2
2.8	2	Ext.	●	**MZE0280SA**	16.5	16.5	55.5	55	0.5	2.8	1
	3	Ext.	●	**MZE0280MA**	21.5	21.5	60.5	60	0.5	2.8	1
	3	Int.	●	**MZS0280MB**	24.5	24.5	72.5	72	0.5	3.0	2
	5	Int.	●	**MZS0280LB**	33.5	33.5	81.5	81	0.5	3.0	2
	12	Int.	□	**MZS0280XB**	45.5	45.5	81.5	81	0.5	3.0	2

CUTTING CONDITIONS ➤ N115
OPERATION GUIDANCE ➤ N119
TECHNICAL DATA ➤ Q001

MZE/MZS

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
2.9	2	Ext.	●	MZE0290SA	16.5	16.5	55.5	55	0.5	2.9	1
	3	Ext.	●	MZE0290MA	21.5	21.5	60.5	60	0.5	2.9	1
	3	Int.	●	MZS0290MB	24.5	24.5	72.5	72	0.5	3.0	2
	5	Int.	●	MZS0290LB	33.5	33.5	81.5	81	0.5	3.0	2
	12	Int.	□	MZS0290XB	45.5	45.5	81.5	81	0.5	3.0	2
3.0	2	Ext.	●	MZE0300SA	16.5	16.5	55.5	55	0.5	3.0	1
	3	Ext.	●	MZE0300MA	21.5	21.5	60.5	60	0.5	3.0	1
	3	Int.	●	MZS0300MB	24.5	24.5	72.5	72	0.5	3.0	2
	5	Int.	●	MZS0300LB	33.5	33.5	81.5	81	0.5	3.0	2
3.1	2	Ext.	●	MZE0310SA	18.6	18.6	55.6	55	0.6	3.1	1
	3	Ext.	●	MZE0310MA	24.6	24.6	60.6	60	0.6	3.1	1
	3	Int.	●	MZS0310MB	28.6	28.6	76.6	76	0.6	4.0	2
	5	Int.	●	MZS0310LB	39.6	39.6	87.6	87	0.6	4.0	2
3.2	2	Ext.	●	MZE0320SA	18.6	18.6	55.6	55	0.6	3.2	1
	3	Ext.	●	MZE0320MA	24.6	24.6	60.6	60	0.6	3.2	1
	3	Int.	●	MZS0320MB	28.6	28.6	76.6	76	0.6	4.0	2
	5	Int.	●	MZS0320LB	39.6	39.6	87.6	87	0.6	4.0	2
3.3	2	Ext.	●	MZE0330SA	18.6	18.6	55.6	55	0.6	3.3	1
	3	Ext.	●	MZE0330MA	24.6	24.6	60.6	60	0.6	3.3	1
	3	Int.	●	MZS0330MB	28.6	28.6	76.6	76	0.6	4.0	2
	5	Int.	●	MZS0330LB	39.6	39.6	87.6	87	0.6	4.0	2
3.4	2	Ext.	●	MZE0340SA	20.6	20.6	55.6	55	0.6	3.4	1
	3	Ext.	●	MZE0340MA	24.6	24.6	60.6	60	0.6	3.4	1
	3	Int.	●	MZS0340MB	28.6	28.6	76.6	76	0.6	4.0	2
	5	Int.	●	MZS0340LB	39.6	39.6	87.6	87	0.6	4.0	2
3.5	2	Ext.	●	MZE0350SA	20.6	20.6	55.6	55	0.6	3.5	1
	3	Ext.	●	MZE0350MA	24.6	24.6	60.6	60	0.6	3.5	1
	3	Int.	●	MZS0350MB	28.6	28.6	76.6	76	0.6	4.0	2
	5	Int.	●	MZS0350LB	39.6	39.6	87.6	87	0.6	4.0	2
3.6	2	Ext.	●	MZE0360SA	20.7	20.7	55.7	55	0.7	3.6	1
	3	Ext.	●	MZE0360MA	27.7	27.7	60.7	60	0.7	3.6	1
	3	Int.	●	MZS0360MB	32.7	32.7	80.7	80	0.7	4.0	2
	5	Int.	●	MZS0360LB	44.7	44.7	92.7	92	0.7	4.0	2
3.7	2	Ext.	●	MZE0370SA	20.7	20.7	55.7	55	0.7	3.7	1
	3	Ext.	●	MZE0370MA	27.7	27.7	60.7	60	0.7	3.7	1
	3	Int.	●	MZS0370MB	32.7	32.7	80.7	80	0.7	4.0	2
	5	Int.	●	MZS0370LB	44.7	44.7	92.7	92	0.7	4.0	2
3.8	2	Ext.	●	MZE0380SA	22.7	22.7	55.7	55	0.7	3.8	1
	3	Ext.	●	MZE0380MA	27.7	27.7	60.7	60	0.7	3.8	1
	3	Int.	●	MZS0380MB	32.7	32.7	80.7	80	0.7	4.0	2
	5	Int.	●	MZS0380LB	44.7	44.7	92.7	92	0.7	4.0	2
3.9	2	Ext.	●	MZE0390SA	22.7	22.7	55.7	55	0.7	3.9	1
	3	Ext.	●	MZE0390MA	27.7	27.7	60.7	60	0.7	3.9	1
	3	Int.	●	MZS0390MB	32.7	32.7	80.7	80	0.7	4.0	2
	5	Int.	●	MZS0390LB	44.7	44.7	92.7	92	0.7	4.0	2
4.0	2	Ext.	●	MZE0400SA	22.7	22.7	55.7	55	0.7	4.0	1
	3	Ext.	●	MZE0400MA	27.7	27.7	60.7	60	0.7	4.0	1
	3	Int.	●	MZS0400MB	32.7	32.7	80.7	80	0.7	4.0	2
	5	Int.	●	MZS0400LB	44.7	44.7	92.7	92	0.7	4.0	2

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
4.1	2	Ext.	●	**MZE0410SA**	22.7	22.7	55.7	55	0.7	4.1	1
	3	Ext.	●	**MZE0410MA**	29.7	29.7	63.7	63	0.7	4.1	1
	3	Int.	●	**MZS0410MB**	36.7	36.7	86.7	86	0.7	5.0	2
	5	Int.	●	**MZS0410LB**	50.7	50.7	100.7	100	0.7	5.0	2
4.2	2	Ext.	●	**MZE0420SA**	22.8	22.8	55.8	55	0.8	4.2	1
	3	Ext.	●	**MZE0420MA**	29.8	29.8	63.8	63	0.8	4.2	1
	3	Int.	●	**MZS0420MB**	36.8	36.8	86.8	86	0.8	5.0	2
	5	Int.	●	**MZS0420LB**	50.8	50.8	100.8	100	0.8	5.0	2
4.3	2	Ext.	●	**MZE0430SA**	24.8	24.8	58.8	58	0.8	4.3	1
	3	Ext.	●	**MZE0430MA**	29.8	29.8	63.8	63	0.8	4.3	1
	3	Int.	●	**MZS0430MB**	36.8	36.8	86.8	86	0.8	5.0	2
	5	Int.	●	**MZS0430LB**	50.8	50.8	100.8	100	0.8	5.0	2
4.4	2	Ext.	●	**MZE0440SA**	24.8	24.8	58.8	58	0.8	4.4	1
	3	Ext.	●	**MZE0440MA**	29.8	29.8	63.8	63	0.8	4.4	1
	3	Int.	●	**MZS0440MB**	36.8	36.8	86.8	86	0.8	5.0	2
	5	Int.	●	**MZS0440LB**	50.8	50.8	100.8	100	0.8	5.0	2
4.5	2	Ext.	●	**MZE0450SA**	24.8	24.8	58.8	58	0.8	4.5	1
	3	Ext.	●	**MZE0450MA**	29.8	29.8	63.8	63	0.8	4.5	1
	3	Int.	●	**MZS0450MB**	36.8	36.8	86.8	86	0.8	5.0	2
	5	Int.	●	**MZS0450LB**	50.8	50.8	100.8	100	0.8	5.0	2
4.6	2	Ext.	●	**MZE0460SA**	24.8	24.8	58.8	58	0.8	4.6	1
	3	Ext.	●	**MZE0460MA**	32.8	32.8	68.8	68	0.8	4.6	1
	3	Int.	●	**MZS0460MB**	40.8	40.8	90.8	90	0.8	5.0	2
	5	Int.	●	**MZS0460LB**	55.8	55.8	105.8	105	0.8	5.0	2
4.7	2	Ext.	●	**MZE0470SA**	24.9	24.9	58.9	58	0.9	4.7	1
	3	Ext.	●	**MZE0470MA**	32.9	32.9	68.9	68	0.9	4.7	1
	3	Int.	●	**MZS0470MB**	40.9	40.9	90.9	90	0.9	5.0	2
	5	Int.	●	**MZS0470LB**	55.9	55.9	105.9	105	0.9	5.0	2
4.8	2	Ext.	●	**MZE0480SA**	26.9	26.9	62.9	62	0.9	4.8	1
	3	Ext.	●	**MZE0480MA**	32.9	32.9	68.9	68	0.9	4.8	1
	3	Int.	●	**MZS0480MB**	40.9	40.9	90.9	90	0.9	5.0	2
	5	Int.	●	**MZS0480LB**	55.9	55.9	105.9	105	0.9	5.0	2
4.9	2	Ext.	●	**MZE0490SA**	26.9	26.9	62.9	62	0.9	4.9	1
	3	Ext.	●	**MZE0490MA**	32.9	32.9	68.9	68	0.9	4.9	1
	3	Int.	●	**MZS0490MB**	40.9	40.9	90.9	90	0.9	5.0	2
	5	Int.	●	**MZS0490LB**	55.9	55.9	105.9	105	0.9	5.0	2
5.0	2	Ext.	●	**MZE0500SA**	26.9	26.9	62.9	62	0.9	5.0	1
	3	Ext.	●	**MZE0500MA**	32.9	32.9	68.9	68	0.9	5.0	1
	3	Int.	●	**MZS0500MB**	28.4	30.9	82.9	82	0.9	6.0	2
	5	Int.	●	**MZS0500LB**	44.9	48.9	100.9	100	0.9	6.0	2
5.1	2	Ext.	●	**MZE0510SA**	26.9	26.9	62.9	62	0.9	5.1	1
	3	Ext.	●	**MZE0510MA**	34.9	34.9	72.9	72	0.9	5.1	1
	3	Int.	●	**MZS0510MB**	28.4	30.9	82.9	82	0.9	6.0	2
	5	Int.	●	**MZS0510LB**	44.9	48.9	100.9	100	0.9	6.0	2
5.2	2	Ext.	●	**MZE0520SA**	26.9	26.9	62.9	62	0.9	5.2	1
	3	Ext.	●	**MZE0520MA**	34.9	34.9	72.9	72	0.9	5.2	1
	3	Int.	●	**MZS0520MB**	28.4	30.9	82.9	82	0.9	6.0	2
	5	Int.	●	**MZS0520LB**	44.9	48.9	100.9	100	0.9	6.0	2

DRILLING

CUTTING CONDITIONS ➤ N115
OPERATION GUIDANCE ➤ N119
TECHNICAL DATA ➤ Q001

MZE/MZS

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
5.3	2	Ext.	●	MZE0530SA	27.0	27.0	63.0	62	1.0	5.3	1
	3	Ext.	●	MZE0530MA	35.0	35.0	73.0	72	1.0	5.3	1
	3	Int.	●	MZS0530MB	28.5	31.0	83.0	82	1.0	6.0	2
	5	Int.	●	MZS0530LB	45.0	49.0	101.0	100	1.0	6.0	2
5.4	2	Ext.	●	MZE0540SA	29.0	29.0	67.0	66	1.0	5.4	1
	3	Ext.	●	MZE0540MA	35.0	35.0	73.0	72	1.0	5.4	1
	3	Int.	●	MZS0540MB	28.5	31.0	83.0	82	1.0	6.0	2
	5	Int.	●	MZS0540LB	45.0	49.0	101.0	100	1.0	6.0	2
5.5	2	Ext.	●	MZE0550SA	29.0	29.0	67.0	66	1.0	5.5	1
	3	Ext.	●	MZE0550MA	35.0	35.0	73.0	72	1.0	5.5	1
	3	Int.	●	MZS0550MB	28.5	31.0	83.0	82	1.0	6.0	2
	5	Int.	●	MZS0550LB	45.0	49.0	101.0	100	1.0	6.0	2
5.6	2	Ext.	●	MZE0560SA	29.0	29.0	67.0	66	1.0	5.6	1
	3	Ext.	●	MZE0560MA	37.0	37.0	75.0	74	1.0	5.6	1
	3	Int.	●	MZS0560MB	31.0	31.0	83.0	82	1.0	6.0	2
	5	Int.	●	MZS0560LB	49.0	49.0	101.0	100	1.0	6.0	2
5.7	2	Ext.	●	MZE0570SA	29.0	29.0	67.0	66	1.0	5.7	1
	3	Ext.	●	MZE0570MA	37.0	37.0	75.0	74	1.0	5.7	1
	3	Int.	●	MZS0570MB	31.0	31.0	83.0	82	1.0	6.0	2
	5	Int.	●	MZS0570LB	49.0	49.0	101.0	100	1.0	6.0	2
5.8	2	Ext.	●	MZE0580SA	29.1	29.1	67.1	66	1.1	5.8	1
	3	Ext.	●	MZE0580MA	37.1	37.1	75.1	74	1.1	5.8	1
	3	Int.	●	MZS0580MB	31.1	31.1	83.1	82	1.1	6.0	2
	5	Int.	●	MZS0580LB	49.1	49.1	101.1	100	1.1	6.0	2
5.9	2	Ext.	●	MZE0590SA	29.1	29.1	67.1	66	1.1	5.9	1
	3	Ext.	●	MZE0590MA	37.1	37.1	75.1	74	1.1	5.9	1
	3	Int.	●	MZS0590MB	31.1	31.1	83.1	82	1.1	6.0	2
	5	Int.	●	MZS0590LB	49.1	49.1	101.1	100	1.1	6.0	2
6.0	2	Ext.	●	MZE0600SA	29.1	29.1	67.1	66	1.1	6.0	1
	3	Ext.	●	MZE0600MA	42.1	42.1	82.1	81	1.1	6.0	1
	3	Int.	●	MZS0600MB	31.1	31.1	83.1	82	1.1	6.0	2
	5	Int.	●	MZS0600LB	49.1	49.1	101.1	100	1.1	6.0	2
6.1	2	Ext.	●	MZE0610SA	32.1	32.1	71.1	70	1.1	6.1	1
	3	Ext.	●	MZE0610MA	42.1	42.1	82.1	81	1.1	6.1	1
	3	Int.	●	MZS0610MB	33.6	36.1	89.1	88	1.1	7.0	2
	5	Int.	●	MZS0610LB	53.1	57.1	110.1	109	1.1	7.0	2
6.2	2	Ext.	●	MZE0620SA	32.1	32.1	71.1	70	1.1	6.2	1
	3	Ext.	●	MZE0620MA	42.1	42.1	82.1	81	1.1	6.2	1
	3	Int.	●	MZS0620MB	33.6	36.1	89.1	88	1.1	7.0	2
	5	Int.	●	MZS0620LB	53.1	57.1	110.1	109	1.1	7.0	2
6.3	2	Ext.	●	MZE0630SA	32.1	32.1	71.1	70	1.1	6.3	1
	3	Ext.	●	MZE0630MA	42.1	42.1	82.1	81	1.1	6.3	1
	3	Int.	●	MZS0630MB	33.6	36.1	89.1	88	1.1	7.0	2
	5	Int.	●	MZS0630LB	53.1	57.1	110.1	109	1.1	7.0	2
6.4	2	Ext.	●	MZE0640SA	32.2	32.2	71.2	70	1.2	6.4	1
	3	Ext.	●	MZE0640MA	42.2	42.2	82.2	81	1.2	6.4	1
	3	Int.	●	MZS0640MB	33.7	36.2	89.2	88	1.2	7.0	2
	5	Int.	●	MZS0640LB	53.2	57.2	110.2	109	1.2	7.0	2

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan.

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
6.5	2	Ext.	●	**MZE0650SA**	32.2	32.2	71.2	70	1.2	6.5	1
	3	Ext.	●	**MZE0650MA**	42.2	42.2	82.2	81	1.2	6.5	1
	3	Int.	●	**MZS0650MB**	33.7	36.2	89.2	88	1.2	7.0	2
	5	Int.	●	**MZS0650LB**	53.2	57.2	110.2	109	1.2	7.0	2
6.6	2	Ext.	●	**MZE0660SA**	32.2	32.2	71.2	70	1.2	6.6	1
	3	Ext.	●	**MZE0660MA**	44.2	44.2	84.2	83	1.2	6.6	1
	3	Int.	●	**MZS0660MB**	36.2	36.2	89.2	88	1.2	7.0	2
	5	Int.	●	**MZS0660LB**	57.2	57.2	110.2	109	1.2	7.0	2
6.7	2	Ext.	●	**MZE0670SA**	32.2	32.2	71.2	70	1.2	6.7	1
	3	Ext.	●	**MZE0670MA**	44.2	44.2	84.2	83	1.2	6.7	1
	3	Int.	●	**MZS0670MB**	36.2	36.2	89.2	88	1.2	7.0	2
	5	Int.	●	**MZS0670LB**	57.2	57.2	110.2	109	1.2	7.0	2
6.8	2	Ext.	●	**MZE0680SA**	35.2	35.2	75.2	74	1.2	6.8	1
	3	Ext.	●	**MZE0680MA**	44.2	44.2	84.2	83	1.2	6.8	1
	3	Int.	●	**MZS0680MB**	36.2	36.2	89.2	88	1.2	7.0	2
	5	Int.	●	**MZS0680LB**	57.2	57.2	110.2	109	1.2	7.0	2
6.9	2	Ext.	●	**MZE0690SA**	35.3	35.3	75.3	74	1.3	6.9	1
	3	Ext.	●	**MZE0690MA**	44.3	44.3	84.3	83	1.3	6.9	1
	3	Int.	●	**MZS0690MB**	36.3	36.3	89.3	88	1.3	7.0	2
	5	Int.	●	**MZS0690LB**	57.3	57.3	110.3	109	1.3	7.0	2
7.0	2	Ext.	●	**MZE0700SA**	35.3	35.3	75.3	74	1.3	7.0	1
	3	Ext.	●	**MZE0700MA**	44.3	44.3	84.3	83	1.3	7.0	1
	3	Int.	●	**MZS0700MB**	36.3	36.3	89.3	88	1.3	7.0	2
	5	Int.	●	**MZS0700LB**	57.3	57.3	110.3	109	1.3	7.0	2
7.1	2	Ext.	●	**MZE0710SA**	35.3	35.3	75.3	74	1.3	7.1	1
	3	Ext.	●	**MZE0710MA**	46.3	46.3	88.3	87	1.3	7.1	1
	3	Int.	●	**MZS0710MB**	38.8	41.3	95.3	94	1.3	8.0	2
	5	Int.	●	**MZS0710LB**	61.3	65.3	119.3	118	1.3	8.0	2
7.2	2	Ext.	●	**MZE0720SA**	35.3	35.3	75.3	74	1.3	7.2	1
	3	Ext.	●	**MZE0720MA**	46.3	46.3	88.3	87	1.3	7.2	1
	3	Int.	●	**MZS0720MB**	38.8	41.3	95.3	94	1.3	8.0	2
	5	Int.	●	**MZS0720LB**	61.3	65.3	119.3	118	1.3	8.0	2
7.3	2	Ext.	●	**MZE0730SA**	35.3	35.3	75.3	74	1.3	7.3	1
	3	Ext.	●	**MZE0730MA**	46.3	46.3	88.3	87	1.3	7.3	1
	3	Int.	●	**MZS0730MB**	38.8	41.3	95.3	94	1.3	8.0	2
	5	Int.	●	**MZS0730LB**	61.3	65.3	119.3	118	1.3	8.0	2
7.4	2	Ext.	●	**MZE0740SA**	35.3	35.3	75.3	74	1.3	7.4	1
	3	Ext.	●	**MZE0740MA**	46.3	46.3	88.3	87	1.3	7.4	1
	3	Int.	●	**MZS0740MB**	38.8	41.3	95.3	94	1.3	8.0	2
	5	Int.	●	**MZS0740LB**	61.3	65.3	119.3	118	1.3	8.0	2
7.5	2	Ext.	●	**MZE0750SA**	35.4	35.4	75.4	74	1.4	7.5	1
	3	Ext.	●	**MZE0750MA**	46.4	46.4	88.4	87	1.4	7.5	1
	3	Int.	●	**MZS0750MB**	38.9	41.4	95.4	94	1.4	8.0	2
	5	Int.	●	**MZS0750LB**	61.4	65.4	119.4	118	1.4	8.0	2
7.6	2	Ext.	●	**MZE0760SA**	38.4	38.4	80.4	79	1.4	7.6	1
	3	Ext.	●	**MZE0760MA**	49.4	49.4	91.4	90	1.4	7.6	1
	3	Int.	●	**MZS0760MB**	41.4	41.4	95.4	94	1.4	8.0	2
	5	Int.	●	**MZS0760LB**	65.4	65.4	119.4	118	1.4	8.0	2

DRILLING

CUTTING CONDITIONS ➤ N115
OPERATION GUIDANCE ➤ N119
TECHNICAL DATA ➤ Q001

MZE/MZS

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
7.7	2	Ext.	●	MZE0770SA	38.4	38.4	80.4	79	1.4	7.7	1
	3	Ext.	●	MZE0770MA	49.4	49.4	91.4	90	1.4	7.7	1
	3	Int.	●	MZS0770MB	41.4	41.4	95.4	94	1.4	8.0	2
	5	Int.	●	MZS0770LB	65.4	65.4	119.4	118	1.4	8.0	2
7.8	2	Ext.	●	MZE0780SA	38.4	38.4	80.4	79	1.4	7.8	1
	3	Ext.	●	MZE0780MA	49.4	49.4	91.4	90	1.4	7.8	1
	3	Int.	●	MZS0780MB	41.4	41.4	95.4	94	1.4	8.0	2
	5	Int.	●	MZS0780LB	65.4	65.4	119.4	118	1.4	8.0	2
7.9	2	Ext.	●	MZE0790SA	38.4	38.4	80.4	79	1.4	7.9	1
	3	Ext.	●	MZE0790MA	49.4	49.4	91.4	90	1.4	7.9	1
	3	Int.	●	MZS0790MB	41.4	41.4	95.4	94	1.4	8.0	2
	5	Int.	●	MZS0790LB	65.4	65.4	119.4	118	1.4	8.0	2
8.0	2	Ext.	●	MZE0800SA	38.5	38.5	80.5	79	1.5	8.0	1
	3	Ext.	●	MZE0800MA	49.5	49.5	91.5	90	1.5	8.0	1
	3	Int.	●	MZS0800MB	41.5	41.5	95.5	94	1.5	8.0	2
	5	Int.	●	MZS0800LB	65.5	65.5	119.5	118	1.5	8.0	2
8.1	2	Ext.	●	MZE0810SA	38.5	38.5	80.5	79	1.5	8.1	1
	3	Ext.	●	MZE0810MA	54.5	54.5	97.5	96	1.5	8.1	1
	3	Int.	●	MZS0810MB	44.0	46.5	101.5	100	1.5	9.0	2
	5	Int.	●	MZS0810LB	69.5	73.5	128.5	127	1.5	9.0	2
8.2	2	Ext.	●	MZE0820SA	38.5	38.5	80.5	79	1.5	8.2	1
	3	Ext.	●	MZE0820MA	54.5	54.5	97.5	96	1.5	8.2	1
	3	Int.	●	MZS0820MB	44.0	46.5	101.5	100	1.5	9.0	2
	5	Int.	●	MZS0820LB	69.5	73.5	128.5	127	1.5	9.0	2
8.3	2	Ext.	●	MZE0830SA	38.5	38.5	80.5	79	1.5	8.3	1
	3	Ext.	●	MZE0830MA	54.5	54.5	97.5	96	1.5	8.3	1
	3	Int.	●	MZS0830MB	44.0	46.5	101.5	100	1.5	9.0	2
	5	Int.	●	MZS0830LB	69.5	73.5	128.5	127	1.5	9.0	2
8.4	2	Ext.	●	MZE0840SA	38.5	38.5	80.5	79	1.5	8.4	1
	3	Ext.	●	MZE0840MA	54.5	54.5	97.5	96	1.5	8.4	1
	3	Int.	●	MZS0840MB	44.0	46.5	101.5	100	1.5	9.0	2
	5	Int.	●	MZS0840LB	69.5	73.5	128.5	127	1.5	9.0	2
8.5	2	Ext.	●	MZE0850SA	38.5	38.5	80.5	79	1.5	8.5	1
	3	Ext.	●	MZE0850MA	54.5	54.5	97.5	96	1.5	8.5	1
	3	Int.	●	MZS0850MB	44.0	46.5	101.5	100	1.5	9.0	2
	5	Int.	●	MZS0850LB	69.5	73.5	128.5	127	1.5	9.0	2
8.6	2	Ext.	●	MZE0860SA	41.6	41.6	85.6	84	1.6	8.6	1
	3	Ext.	●	MZE0860MA	56.6	56.6	99.6	98	1.6	8.6	1
	3	Int.	●	MZS0860MB	46.6	46.6	101.6	100	1.6	9.0	2
	5	Int.	●	MZS0860LB	73.6	73.6	128.6	127	1.6	9.0	2
8.7	2	Ext.	●	MZE0870SA	41.6	41.6	85.6	84	1.6	8.7	1
	3	Ext.	●	MZE0870MA	56.6	56.6	99.6	98	1.6	8.7	1
	3	Int.	●	MZS0870MB	46.6	46.6	101.6	100	1.6	9.0	2
	5	Int.	●	MZS0870LB	73.6	73.6	128.6	127	1.6	9.0	2
8.8	2	Ext.	●	MZE0880SA	41.6	41.6	85.6	84	1.6	8.8	1
	3	Ext.	●	MZE0880MA	56.6	56.6	99.6	98	1.6	8.8	1
	3	Int.	●	MZS0880MB	46.6	46.6	101.6	100	1.6	9.0	2
	5	Int.	●	MZS0880LB	73.6	73.6	128.6	127	1.6	9.0	2

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan.

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
8.9	2	Ext.	●	**MZE0890SA**	41.6	41.6	85.6	84	1.6	8.9	1
	3	Ext.	●	**MZE0890MA**	56.6	56.6	99.6	98	1.6	8.9	1
	3	Int.	●	**MZS0890MB**	46.6	46.6	101.6	100	1.6	9.0	2
	5	Int.	●	**MZS0890LB**	73.6	73.6	128.6	127	1.6	9.0	2
9.0	2	Ext.	●	**MZE0900SA**	41.6	41.6	85.6	84	1.6	9.0	1
	3	Ext.	●	**MZE0900MA**	56.6	56.6	99.6	98	1.6	9.0	1
	3	Int.	●	**MZS0900MB**	46.6	46.6	101.6	100	1.6	9.0	2
	5	Int.	●	**MZS0900LB**	73.6	73.6	128.6	127	1.6	9.0	2
9.1	2	Ext.	●	**MZE0910SA**	41.7	41.7	85.7	84	1.7	9.1	1
	3	Ext.	●	**MZE0910MA**	59.7	59.7	103.7	102	1.7	9.1	1
	3	Int.	●	**MZS0910MB**	49.2	51.7	107.7	106	1.7	10.0	2
	5	Int.	●	**MZS0910LB**	77.7	81.7	137.7	136	1.7	10.0	2
9.2	2	Ext.	●	**MZE0920SA**	41.7	41.7	85.7	84	1.7	9.2	1
	3	Ext.	●	**MZE0920MA**	59.7	59.7	103.7	102	1.7	9.2	1
	3	Int.	●	**MZS0920MB**	49.2	51.7	107.7	106	1.7	10.0	2
	5	Int.	●	**MZS0920LB**	77.7	81.7	137.7	136	1.7	10.0	2
9.3	2	Ext.	●	**MZE0930SA**	41.7	41.7	85.7	84	1.7	9.3	1
	3	Ext.	●	**MZE0930MA**	59.7	59.7	103.7	102	1.7	9.3	1
	3	Int.	●	**MZS0930MB**	49.2	51.7	107.7	106	1.7	10.0	2
	5	Int.	●	**MZS0930LB**	77.7	81.7	137.7	136	1.7	10.0	2
9.4	2	Ext.	●	**MZE0940SA**	41.7	41.7	85.7	84	1.7	9.4	1
	3	Ext.	●	**MZE0940MA**	59.7	59.7	103.7	102	1.7	9.4	1
	3	Int.	●	**MZS0940MB**	49.2	51.7	107.7	106	1.7	10.0	2
	5	Int.	●	**MZS0940LB**	77.7	81.7	137.7	136	1.7	10.0	2
9.5	2	Ext.	●	**MZE0950SA**	41.7	41.7	85.7	84	1.7	9.5	1
	3	Ext.	●	**MZE0950MA**	59.7	59.7	103.7	102	1.7	9.5	1
	3	Int.	●	**MZS0950MB**	49.2	51.7	107.7	106	1.7	10.0	2
	5	Int.	●	**MZS0950LB**	77.7	81.7	137.7	136	1.7	10.0	2
9.6	2	Ext.	●	**MZE0960SA**	44.7	44.7	90.7	89	1.7	9.6	1
	3	Ext.	●	**MZE0960MA**	61.7	61.7	106.7	105	1.7	9.6	1
	3	Int.	●	**MZS0960MB**	51.7	51.7	107.7	106	1.7	10.0	2
	5	Int.	●	**MZS0960LB**	81.7	81.7	137.7	136	1.7	10.0	2
9.7	2	Ext.	●	**MZE0970SA**	44.8	44.8	90.8	89	1.8	9.7	1
	3	Ext.	●	**MZE0970MA**	61.8	61.8	106.8	105	1.8	9.7	1
	3	Int.	●	**MZS0970MB**	51.8	51.8	107.8	106	1.8	10.0	2
	5	Int.	●	**MZS0970LB**	81.8	81.8	137.8	136	1.8	10.0	2
9.8	2	Ext.	●	**MZE0980SA**	44.8	44.8	90.8	89	1.8	9.8	1
	3	Ext.	●	**MZE0980MA**	61.8	61.8	106.8	105	1.8	9.8	1
	3	Int.	●	**MZS0980MB**	51.8	51.8	107.8	106	1.8	10.0	2
	5	Int.	●	**MZS0980LB**	81.8	81.8	137.8	136	1.8	10.0	2
9.9	2	Ext.	●	**MZE0990SA**	44.8	44.8	90.8	89	1.8	9.9	1
	3	Ext.	●	**MZE0990MA**	61.8	61.8	106.8	105	1.8	9.9	1
	3	Int.	●	**MZS0990MB**	51.8	51.8	107.8	106	1.8	10.0	2
	5	Int.	●	**MZS0990LB**	81.8	81.8	137.8	136	1.8	10.0	2
10.0	2	Ext.	●	**MZE1000SA**	44.8	44.8	90.8	89	1.8	10.0	1
	3	Ext.	●	**MZE1000MA**	61.8	61.8	106.8	105	1.8	10.0	1
	3	Int.	●	**MZS1000MB**	51.8	51.8	107.8	106	1.8	10.0	2
	5	Int.	●	**MZS1000LB**	81.8	81.8	137.8	136	1.8	10.0	2

DRILLING

CUTTING CONDITIONS ➤ N115
OPERATION GUIDANCE ➤ N119
TECHNICAL DATA ➤ Q001

MZE/MZS

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
10.1	2	Ext.	●	MZE1010SA	44.8	44.8	90.8	89	1.8	10.1	1
	3	Ext.	●	MZE1010MA	67.8	67.8	113.8	112	1.8	10.1	1
	3	Int.	●	MZS1010MB	54.3	56.8	117.8	116	1.8	11.0	2
	5	Int.	●	MZS1010LB	85.8	89.8	150.8	149	1.8	11.0	2
10.2	2	Ext.	●	MZE1020SA	44.9	44.9	90.9	89	1.9	10.2	1
	3	Ext.	●	MZE1020MA	67.9	67.9	113.9	112	1.9	10.2	1
	3	Int.	●	MZS1020MB	54.4	56.9	117.9	116	1.9	11.0	2
	5	Int.	●	MZS1020LB	85.9	89.9	150.9	149	1.9	11.0	2
10.3	2	Ext.	●	MZE1030SA	44.9	44.9	90.9	89	1.9	10.3	1
	3	Ext.	●	MZE1030MA	67.9	67.9	113.9	112	1.9	10.3	1
	3	Int.	●	MZS1030MB	54.4	56.9	117.9	116	1.9	11.0	2
	5	Int.	●	MZS1030LB	85.9	89.9	150.9	149	1.9	11.0	2
10.4	2	Ext.	●	MZE1040SA	44.9	44.9	90.9	89	1.9	10.4	1
	3	Ext.	●	MZE1040MA	67.9	67.9	113.9	112	1.9	10.4	1
	3	Int.	●	MZS1040MB	54.4	56.9	117.9	116	1.9	11.0	2
	5	Int.	●	MZS1040LB	85.9	89.9	150.9	149	1.9	11.0	2
10.5	2	Ext.	●	MZE1050SA	44.9	44.9	90.9	89	1.9	10.5	1
	3	Ext.	●	MZE1050MA	67.9	67.9	113.9	112	1.9	10.5	1
	3	Int.	●	MZS1050MB	54.4	56.9	117.9	116	1.9	11.0	2
	5	Int.	●	MZS1050LB	85.9	89.9	150.9	149	1.9	11.0	2
10.6	2	Ext.	●	MZE1060SA	44.9	44.9	90.9	89	1.9	10.6	1
	3	Ext.	●	MZE1060MA	69.9	69.9	115.9	114	1.9	10.6	1
	3	Int.	●	MZS1060MB	56.9	56.9	117.9	116	1.9	11.0	2
	5	Int.	●	MZS1060LB	89.9	89.9	150.9	149	1.9	11.0	2
10.7	2	Ext.	●	MZE1070SA	48.9	48.9	96.9	95	1.9	10.7	1
	3	Ext.	●	MZE1070MA	69.9	69.9	115.9	114	1.9	10.7	1
	3	Int.	●	MZS1070MB	56.9	56.9	117.9	116	1.9	11.0	2
	5	Int.	●	MZS1070LB	89.9	89.9	150.9	149	1.9	11.0	2
10.8	2	Ext.	●	MZE1080SA	49.0	49.0	97.0	95	2.0	10.8	1
	3	Ext.	●	MZE1080MA	70.0	70.0	116.0	114	2.0	10.8	1
	3	Int.	●	MZS1080MB	57.0	57.0	118.0	116	2.0	11.0	2
	5	Int.	●	MZS1080LB	90.0	90.0	151.0	149	2.0	11.0	2
10.9	2	Ext.	●	MZE1090SA	49.0	49.0	97.0	95	2.0	10.9	1
	3	Ext.	●	MZE1090MA	70.0	70.0	116.0	114	2.0	10.9	1
	3	Int.	●	MZS1090MB	57.0	57.0	118.0	116	2.0	11.0	2
	5	Int.	●	MZS1090LB	90.0	90.0	151.0	149	2.0	11.0	2
11.0	2	Ext.	●	MZE1100SA	49.0	49.0	97.0	95	2.0	11.0	1
	3	Ext.	●	MZE1100MA	70.0	70.0	116.0	114	2.0	11.0	1
	3	Int.	●	MZS1100MB	57.0	57.0	118.0	116	2.0	11.0	2
	5	Int.	●	MZS1100LB	90.0	90.0	151.0	149	2.0	11.0	2
11.1	2	Ext.	●	MZE1110SA	49.0	49.0	97.0	95	2.0	11.1	1
	3	Ext.	●	MZE1110MA	73.0	73.0	120.0	118	2.0	11.1	1
	3	Int.	●	MZS1110MB	59.5	62.0	124.0	122	2.0	12.0	2
	5	Int.	●	MZS1110LB	94.0	98.0	160.0	158	2.0	12.0	2
11.2	2	Ext.	●	MZE1120SA	49.0	49.0	97.0	95	2.0	11.2	1
	3	Ext.	●	MZE1120MA	73.0	73.0	120.0	118	2.0	11.2	1
	3	Int.	●	MZS1120MB	59.5	62.0	124.0	122	2.0	12.0	2
	5	Int.	●	MZS1120LB	94.0	98.0	160.0	158	2.0	12.0	2

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan.

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
11.3	2	Ext.	●	**MZE1130SA**	49.1	49.1	97.1	95	2.1	11.3	1
	3	Ext.	●	**MZE1130MA**	73.1	73.1	120.1	118	2.1	11.3	1
	3	Int.	●	**MZS1130MB**	59.6	62.1	124.1	122	2.1	12.0	2
	5	Int.	●	**MZS1130LB**	94.1	98.1	160.1	158	2.1	12.0	2
11.4	2	Ext.	●	**MZE1140SA**	49.1	49.1	97.1	95	2.1	11.4	1
	3	Ext.	●	**MZE1140MA**	73.1	73.1	120.1	118	2.1	11.4	1
	3	Int.	●	**MZS1140MB**	59.6	62.1	124.1	122	2.1	12.0	2
	5	Int.	●	**MZS1140LB**	94.1	98.1	160.1	158	2.1	12.0	2
11.5	2	Ext.	●	**MZE1150SA**	49.1	49.1	97.1	95	2.1	11.5	1
	3	Ext.	●	**MZE1150MA**	73.1	73.1	120.1	118	2.1	11.5	1
	3	Int.	●	**MZS1150MB**	59.6	62.1	124.1	122	2.1	12.0	2
	5	Int.	●	**MZS1150LB**	94.1	98.1	160.1	158	2.1	12.0	2
11.6	2	Ext.	●	**MZE1160SA**	49.1	49.1	97.1	95	2.1	11.6	1
	3	Ext.	●	**MZE1160MA**	75.1	75.1	123.1	121	2.1	11.6	1
	3	Int.	●	**MZS1160MB**	62.1	62.1	124.1	122	2.1	12.0	2
	5	Int.	●	**MZS1160LB**	98.1	98.1	160.1	158	2.1	12.0	2
11.7	2	Ext.	●	**MZE1170SA**	49.1	49.1	97.1	95	2.1	11.7	1
	3	Ext.	●	**MZE1170MA**	75.1	75.1	123.1	121	2.1	11.7	1
	3	Int.	●	**MZS1170MB**	62.1	62.1	124.1	122	2.1	12.0	2
	5	Int.	●	**MZS1170LB**	98.1	98.1	160.1	158	2.1	12.0	2
11.8	2	Ext.	●	**MZE1180SA**	49.1	49.1	97.1	95	2.1	11.8	1
	3	Ext.	●	**MZE1180MA**	75.1	75.1	123.1	121	2.1	11.8	1
	3	Int.	●	**MZS1180MB**	62.1	62.1	124.1	122	2.1	12.0	2
	5	Int.	●	**MZS1180LB**	98.1	98.1	160.1	158	2.1	12.0	2
11.9	2	Ext.	●	**MZE1190SA**	53.2	53.2	104.2	102	2.2	11.9	1
	3	Ext.	●	**MZE1190MA**	75.2	75.2	123.2	121	2.2	11.9	1
	3	Int.	●	**MZS1190MB**	62.2	62.2	124.2	122	2.2	12.0	2
	5	Int.	●	**MZS1190LB**	98.2	98.2	160.2	158	2.2	12.0	2
12.0	2	Ext.	●	**MZE1200SA**	53.2	53.2	104.2	102	2.2	12.0	1
	3	Ext.	●	**MZE1200MA**	75.2	75.2	123.2	121	2.2	12.0	1
	3	Int.	●	**MZS1200MB**	62.2	62.2	124.2	122	2.2	12.0	2
	5	Int.	●	**MZS1200LB**	98.2	98.2	160.2	158	2.2	12.0	2
12.1	2	Ext.	●	**MZE1210SA**	53.2	53.2	104.2	102	2.2	12.1	1
	3	Ext.	●	**MZE1210MA**	78.2	78.2	137.2	135	2.2	12.1	1
	3	Int.	●	**MZS1210MB**	64.7	67.2	130.2	128	2.2	13.0	2
	5	Int.	●	**MZS1210LB**	102.2	106.2	169.2	167	2.2	13.0	2
12.2	2	Ext.	●	**MZE1220SA**	53.2	53.2	104.2	102	2.2	12.2	1
	3	Ext.	●	**MZE1220MA**	78.2	78.2	137.2	135	2.2	12.2	1
	3	Int.	●	**MZS1220MB**	64.7	67.2	130.2	128	2.2	13.0	2
	5	Int.	●	**MZS1220LB**	102.2	106.2	169.2	167	2.2	13.0	2
12.3	2	Ext.	●	**MZE1230SA**	53.2	53.2	104.2	102	2.2	12.3	1
	3	Ext.	●	**MZE1230MA**	78.2	78.2	137.2	135	2.2	12.3	1
	3	Int.	●	**MZS1230MB**	64.7	67.2	130.2	128	2.2	13.0	2
	5	Int.	●	**MZS1230LB**	102.2	106.2	169.2	167	2.2	13.0	2
12.4	2	Ext.	●	**MZE1240SA**	53.3	53.3	104.3	102	2.3	12.4	1
	3	Ext.	●	**MZE1240MA**	78.3	78.3	137.3	135	2.3	12.4	1
	3	Int.	●	**MZS1240MB**	64.8	67.3	130.3	128	2.3	13.0	2
	5	Int.	●	**MZS1240LB**	102.3	106.3	169.3	167	2.3	13.0	2

CUTTING CONDITIONS ➤ N115
OPERATION GUIDANCE ➤ N119
TECHNICAL DATA ➤ Q001

MZE/MZS

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
12.5	2	Ext.	●	MZE1250SA	53.3	53.3	104.3	102	2.3	12.5	1
	3	Ext.	●	MZE1250MA	78.3	78.3	137.3	135	2.3	12.5	1
	3	Int.	●	MZS1250MB	64.8	67.3	130.3	128	2.3	13.0	2
	5	Int.	●	MZS1250LB	102.3	106.3	169.3	167	2.3	13.0	2
12.6	2	Ext.	●	MZE1260SA	53.3	53.3	104.3	102	2.3	12.6	1
	3	Ext.	●	MZE1260MA	80.3	80.3	139.3	137	2.3	12.6	1
	3	Int.	●	MZS1260MB	67.3	67.3	130.3	128	2.3	13.0	2
	5	Int.	●	MZS1260LB	106.3	106.3	169.3	167	2.3	13.0	2
12.7	2	Ext.	●	MZE1270SA	53.3	53.3	104.3	102	2.3	12.7	1
	3	Ext.	●	MZE1270MA	80.3	80.3	139.3	137	2.3	12.7	1
	3	Int.	●	MZS1270MB	67.3	67.3	130.3	128	2.3	13.0	2
	5	Int.	●	MZS1270LB	106.3	106.3	169.3	167	2.3	13.0	2
12.8	2	Ext.	●	MZE1280SA	53.3	53.3	104.3	102	2.3	12.8	1
	3	Ext.	●	MZE1280MA	80.3	80.3	139.3	137	2.3	12.8	1
	3	Int.	●	MZS1280MB	67.3	67.3	130.3	128	2.3	13.0	2
	5	Int.	●	MZS1280LB	106.3	106.3	169.3	167	2.3	13.0	2
12.9	2	Ext.	●	MZE1290SA	53.3	53.3	104.3	102	2.3	12.9	1
	3	Ext.	●	MZE1290MA	80.3	80.3	139.3	137	2.3	12.9	1
	3	Int.	●	MZS1290MB	67.3	67.3	130.3	128	2.3	13.0	2
	5	Int.	●	MZS1290LB	106.3	106.3	169.3	167	2.3	13.0	2
13.0	2	Ext.	●	MZE1300SA	53.4	53.4	104.4	102	2.4	13.0	1
	3	Ext.	●	MZE1300MA	80.4	80.4	139.4	137	2.4	13.0	1
	3	Int.	●	MZS1300MB	67.4	67.4	130.4	128	2.4	13.0	2
	5	Int.	●	MZS1300LB	106.4	106.4	169.4	167	2.4	13.0	2
13.1	2	Ext.	●	MZE1310SA	53.4	53.4	104.4	102	2.4	13.1	1
	3	Ext.	●	MZE1310MA	86.4	86.4	146.4	144	2.4	13.1	1
	3	Int.	●	MZS1310MB	69.9	72.4	136.4	134	2.4	14.0	2
	5	Int.	●	MZS1310LB	110.4	114.4	178.4	176	2.4	14.0	2
13.2	2	Ext.	●	MZE1320SA	53.4	53.4	104.4	102	2.4	13.2	1
	3	Ext.	●	MZE1320MA	86.4	86.4	146.4	144	2.4	13.2	1
	3	Int.	●	MZS1320MB	69.9	72.4	136.4	134	2.4	14.0	2
	5	Int.	●	MZS1320LB	110.4	114.4	178.4	176	2.4	14.0	2
13.3	2	Ext.	●	MZE1330SA	56.4	56.4	109.4	107	2.4	13.3	1
	3	Ext.	●	MZE1330MA	86.4	86.4	146.4	144	2.4	13.3	1
	3	Int.	●	MZS1330MB	69.9	72.4	136.4	134	2.4	14.0	2
	5	Int.	●	MZS1330LB	110.4	114.4	178.4	176	2.4	14.0	2
13.4	2	Ext.	●	MZE1340SA	56.4	56.4	109.4	107	2.4	13.4	1
	3	Ext.	●	MZE1340MA	86.4	86.4	146.4	144	2.4	13.4	1
	3	Int.	●	MZS1340MB	69.9	72.4	136.4	134	2.4	14.0	2
	5	Int.	●	MZS1340LB	110.4	114.4	178.4	176	2.4	14.0	2
13.5	2	Ext.	●	MZE1350SA	56.5	56.5	109.5	107	2.5	13.5	1
	3	Ext.	●	MZE1350MA	86.5	86.5	146.5	144	2.5	13.5	1
	3	Int.	●	MZS1350MB	70.0	72.5	136.5	134	2.5	14.0	2
	5	Int.	●	MZS1350LB	110.5	114.5	178.5	176	2.5	14.0	2
13.6	2	Ext.	●	MZE1360SA	56.5	56.5	109.5	107	2.5	13.6	1
	3	Ext.	●	MZE1360MA	88.5	88.5	149.5	147	2.5	13.6	1
	3	Int.	●	MZS1360MB	72.5	72.5	136.5	134	2.5	14.0	2
	5	Int.	●	MZS1360LB	114.5	114.5	178.5	176	2.5	14.0	2

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
13.7	2	Ext.	●	**MZE1370SA**	56.5	56.5	109.5	107	2.5	13.7	1
	3	Ext.	●	**MZE1370MA**	88.5	88.5	149.5	147	2.5	13.7	1
	3	Int.	●	**MZS1370MB**	72.5	72.5	136.5	134	2.5	14.0	2
	5	Int.	●	**MZS1370LB**	114.5	114.5	178.5	176	2.5	14.0	2
13.8	2	Ext.	●	**MZE1380SA**	56.5	56.5	109.5	107	2.5	13.8	1
	3	Ext.	●	**MZE1380MA**	88.5	88.5	149.5	147	2.5	13.8	1
	3	Int.	●	**MZS1380MB**	72.5	72.5	136.5	134	2.5	14.0	2
	5	Int.	●	**MZS1380LB**	114.5	114.5	178.5	176	2.5	14.0	2
13.9	2	Ext.	●	**MZE1390SA**	56.5	56.5	109.5	107	2.5	13.9	1
	3	Ext.	●	**MZE1390MA**	88.5	88.5	149.5	147	2.5	13.9	1
	3	Int.	●	**MZS1390MB**	72.5	72.5	136.5	134	2.5	14.0	2
	5	Int.	●	**MZS1390LB**	114.5	114.5	178.5	176	2.5	14.0	2
14.0	2	Ext.	●	**MZE1400SA**	56.5	56.5	109.5	107	2.5	14.0	1
	3	Ext.	●	**MZE1400MA**	88.5	88.5	149.5	147	2.5	14.0	1
	3	Int.	●	**MZS1400MB**	72.5	72.5	136.5	134	2.5	14.0	2
	5	Int.	●	**MZS1400LB**	114.5	114.5	178.5	176	2.5	14.0	2
14.1	2	Ext.	●	**MZE1410SA**	58.6	58.6	113.6	111	2.6	14.1	1
	3	Ext.	●	**MZE1410MA**	91.6	91.6	153.6	151	2.6	14.1	1
	3	Int.	●	**MZS1410MB**	75.1	77.6	142.6	140	2.6	15.0	2
	5	Int.	●	**MZS1410LB**	118.6	122.6	187.6	185	2.6	15.0	2
14.2	2	Ext.	●	**MZE1420SA**	58.6	58.6	113.6	111	2.6	14.2	1
	3	Ext.	●	**MZE1420MA**	91.6	91.6	153.6	151	2.6	14.2	1
	3	Int.	●	**MZS1420MB**	75.1	77.6	142.6	140	2.6	15.0	2
	5	Int.	●	**MZS1420LB**	118.6	122.6	187.6	185	2.6	15.0	2
14.3	2	Ext.	□	**MZE1430SA**	58.6	58.6	113.6	111	2.6	14.3	1
	3	Ext.	●	**MZE1430MA**	91.6	91.6	153.6	151	2.6	14.3	1
	3	Int.	●	**MZS1430MB**	75.1	77.6	142.6	140	2.6	15.0	2
	5	Int.	●	**MZS1430LB**	118.6	122.6	187.6	185	2.6	15.0	2
14.4	2	Ext.	□	**MZE1440SA**	58.6	58.6	113.6	111	2.6	14.4	1
	3	Ext.	●	**MZE1440MA**	91.6	91.6	153.6	151	2.6	14.4	1
	3	Int.	●	**MZS1440MB**	75.1	77.6	142.6	140	2.6	15.0	2
	5	Int.	●	**MZS1440LB**	118.6	122.6	187.6	185	2.6	15.0	2
14.5	2	Ext.	●	**MZE1450SA**	58.6	58.6	113.6	111	2.6	14.5	1
	3	Ext.	●	**MZE1450MA**	91.6	91.6	153.6	151	2.6	14.5	1
	3	Int.	●	**MZS1450MB**	75.1	77.6	142.6	140	2.6	15.0	2
	5	Int.	●	**MZS1450LB**	118.6	122.6	187.6	185	2.6	15.0	2
14.6	2	Ext.	□	**MZE1460SA**	58.7	58.7	113.7	111	2.7	14.6	1
	3	Ext.	●	**MZE1460MA**	93.7	93.7	155.7	153	2.7	14.6	1
	3	Int.	●	**MZS1460MB**	77.7	77.7	142.7	140	2.7	15.0	2
	5	Int.	●	**MZS1460LB**	122.7	122.7	187.7	185	2.7	15.0	2
14.7	2	Ext.	□	**MZE1470SA**	58.7	58.7	113.7	111	2.7	14.7	1
	3	Ext.	●	**MZE1470MA**	93.7	93.7	155.7	153	2.7	14.7	1
	3	Int.	●	**MZS1470MB**	77.7	77.7	142.7	140	2.7	15.0	2
	5	Int.	●	**MZS1470LB**	122.7	122.7	187.7	185	2.7	15.0	2
14.8	2	Ext.	□	**MZE1480SA**	58.7	58.7	113.7	111	2.7	14.8	1
	3	Ext.	●	**MZE1480MA**	93.7	93.7	155.7	153	2.7	14.8	1
	3	Int.	●	**MZS1480MB**	77.7	77.7	142.7	140	2.7	15.0	2
	5	Int.	●	**MZS1480LB**	122.7	122.7	187.7	185	2.7	15.0	2

DRILLING

CUTTING CONDITIONS ➤ N115
OPERATION GUIDANCE ➤ N119
TECHNICAL DATA ➤ Q001

MZE/MZS

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
14.9	2	Ext.	□	MZE1490SA	58.7	58.7	113.7	111	2.7	14.9	1
	3	Ext.	●	MZE1490MA	93.7	93.7	155.7	153	2.7	14.9	1
	3	Int.	●	MZS1490MB	77.7	77.7	142.7	140	2.7	15.0	2
	5	Int.	●	MZS1490LB	122.7	122.7	187.7	185	2.7	15.0	2
15.0	2	Ext.	●	MZE1500SA	58.7	58.7	113.7	111	2.7	15.0	1
	3	Ext.	●	MZE1500MA	93.7	93.7	155.7	153	2.7	15.0	1
	3	Int.	●	MZS1500MB	77.7	77.7	142.7	140	2.7	15.0	2
	5	Int.	●	MZS1500LB	122.7	122.7	187.7	185	2.7	15.0	2
15.1	2	Ext.	□	MZE1510SA	60.7	60.7	117.7	115	2.7	15.1	1
	3	Ext.	●	MZE1510MA	96.7	96.7	159.7	157	2.7	15.1	1
	3	Int.	●	MZS1510MB	80.2	82.7	147.7	145	2.7	16.0	2
	5	Int.	●	MZS1510LB	126.7	130.7	195.7	193	2.7	16.0	2
15.2	2	Ext.	●	MZE1520SA	60.8	60.8	117.8	115	2.8	15.2	1
	3	Ext.	●	MZE1520MA	96.8	96.8	159.8	157	2.8	15.2	1
	3	Int.	●	MZS1520MB	80.3	82.8	147.8	145	2.8	16.0	2
	5	Int.	●	MZS1520LB	126.8	130.8	195.8	193	2.8	16.0	2
15.3	2	Ext.	□	MZE1530SA	60.8	60.8	117.8	115	2.8	15.3	1
	3	Ext.	●	MZE1530MA	96.8	96.8	159.8	157	2.8	15.3	1
	3	Int.	●	MZS1530MB	80.3	82.8	147.8	145	2.8	16.0	2
	5	Int.	●	MZS1530LB	126.8	130.8	195.8	193	2.8	16.0	2
15.4	2	Ext.	□	MZE1540SA	60.8	60.8	117.8	115	2.8	15.4	1
	3	Ext.	●	MZE1540MA	96.8	96.8	159.8	157	2.8	15.4	1
	3	Int.	●	MZS1540MB	80.3	82.8	147.8	145	2.8	16.0	2
	5	Int.	●	MZS1540LB	126.8	130.8	195.8	193	2.8	16.0	2
15.5	2	Ext.	●	MZE1550SA	60.8	60.8	117.8	115	2.8	15.5	1
	3	Ext.	●	MZE1550MA	96.8	96.8	159.8	157	2.8	15.5	1
	3	Int.	●	MZS1550MB	80.3	82.8	147.8	145	2.8	16.0	2
	5	Int.	●	MZS1550LB	126.8	130.8	195.8	193	2.8	16.0	2
15.6	2	Ext.	□	MZE1560SA	60.8	60.8	117.8	115	2.8	15.6	1
	3	Ext.	●	MZE1560MA	98.8	98.8	162.8	160	2.8	15.6	1
	3	Int.	●	MZS1560MB	82.8	82.8	147.8	145	2.8	16.0	2
	5	Int.	●	MZS1560LB	130.8	130.8	195.8	193	2.8	16.0	2
15.7	2	Ext.	□	MZE1570SA	60.9	60.9	117.9	115	2.9	15.7	1
	3	Ext.	●	MZE1570MA	98.9	98.9	162.9	160	2.9	15.7	1
	3	Int.	●	MZS1570MB	82.9	82.9	147.9	145	2.9	16.0	2
	5	Int.	●	MZS1570LB	130.9	130.9	195.9	193	2.9	16.0	2
15.8	2	Ext.	□	MZE1580SA	60.9	60.9	117.9	115	2.9	15.8	1
	3	Ext.	●	MZE1580MA	98.9	98.9	162.9	160	2.9	15.8	1
	3	Int.	●	MZS1580MB	82.9	82.9	147.9	145	2.9	16.0	2
	5	Int.	●	MZS1580LB	130.9	130.9	195.9	193	2.9	16.0	2
15.9	2	Ext.	□	MZE1590SA	60.9	60.9	117.9	115	2.9	15.9	1
	3	Ext.	●	MZE1590MA	98.9	98.9	162.9	160	2.9	15.9	1
	3	Int.	●	MZS1590MB	82.9	82.9	147.9	145	2.9	16.0	2
	5	Int.	●	MZS1590LB	130.9	130.9	195.9	193	2.9	16.0	2
16.0	2	Ext.	●	MZE1600SA	60.9	60.9	117.9	115	2.9	16.0	1
	3	Ext.	●	MZE1600MA	98.9	98.9	162.9	160	2.9	16.0	1
	3	Int.	●	MZS1600MB	82.9	82.9	147.9	145	2.9	16.0	2
	5	Int.	●	MZS1600LB	130.9	130.9	195.9	193	2.9	16.0	2

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
16.1	2	Ext.	□	**MZE1610SA**	62.9	62.9	121.9	119	2.9	16.1	1
	3	Ext.	□	**MZE1610MA**	104.9	104.9	169.9	167	2.9	16.1	1
	3	Int.	□	**MZS1610MB**	85.4	87.9	152.9	150	2.9	17.0	2
	5	Int.	□	**MZS1610LB**	134.9	138.9	203.9	201	2.9	17.0	2
16.2	2	Ext.	●	**MZE1620SA**	62.9	62.9	121.9	119	2.9	16.2	1
	3	Ext.	□	**MZE1620MA**	104.9	104.9	169.9	167	2.9	16.2	1
	3	Int.	□	**MZS1620MB**	85.4	87.9	152.9	150	2.9	17.0	2
	5	Int.	□	**MZS1620LB**	134.9	138.9	203.9	201	2.9	17.0	2
16.3	2	Ext.	●	**MZE1630SA**	63.0	63.0	122.0	119	3.0	16.3	1
	3	Ext.	□	**MZE1630MA**	105.0	105.0	170.0	167	3.0	16.3	1
	3	Int.	□	**MZS1630MB**	85.5	88.0	153.0	150	3.0	17.0	2
	5	Int.	□	**MZS1630LB**	135.0	139.0	204.0	201	3.0	17.0	2
16.4	2	Ext.	□	**MZE1640SA**	63.0	63.0	122.0	119	3.0	16.4	1
	3	Ext.	□	**MZE1640MA**	105.0	105.0	170.0	167	3.0	16.4	1
	3	Int.	□	**MZS1640MB**	85.5	88.0	153.0	150	3.0	17.0	2
	5	Int.	□	**MZS1640LB**	135.0	139.0	204.0	201	3.0	17.0	2
16.5	2	Ext.	●	**MZE1650SA**	63.0	63.0	122.0	119	3.0	16.5	1
	3	Ext.	●	**MZE1650MA**	105.0	105.0	170.0	167	3.0	16.5	1
	3	Int.	●	**MZS1650MB**	85.5	88.0	153.0	150	3.0	17.0	2
	5	Int.	●	**MZS1650LB**	135.0	139.0	204.0	201	3.0	17.0	2
16.6	2	Ext.	□	**MZE1660SA**	63.0	63.0	122.0	119	3.0	16.6	1
	3	Ext.	□	**MZE1660MA**	105.0	105.0	170.0	167	3.0	16.6	1
	3	Int.	□	**MZS1660MB**	88.0	88.0	153.0	150	3.0	17.0	2
	5	Int.	□	**MZS1660LB**	139.0	139.0	204.0	201	3.0	17.0	2
16.7	2	Ext.	□	**MZE1670SA**	63.0	63.0	122.0	119	3.0	16.7	1
	3	Ext.	□	**MZE1670MA**	105.0	105.0	170.0	167	3.0	16.7	1
	3	Int.	□	**MZS1670MB**	88.0	88.0	153.0	150	3.0	17.0	2
	5	Int.	□	**MZS1670LB**	139.0	139.0	204.0	201	3.0	17.0	2
16.8	2	Ext.	□	**MZE1680SA**	63.1	63.1	122.1	119	3.1	16.8	1
	3	Ext.	□	**MZE1680MA**	105.1	105.1	170.1	167	3.1	16.8	1
	3	Int.	□	**MZS1680MB**	88.1	88.1	153.1	150	3.1	17.0	2
	5	Int.	□	**MZS1680LB**	139.1	139.1	204.1	201	3.1	17.0	2
16.9	2	Ext.	□	**MZE1690SA**	63.1	63.1	122.1	119	3.1	16.9	1
	3	Ext.	□	**MZE1690MA**	105.1	105.1	170.1	167	3.1	16.9	1
	3	Int.	□	**MZS1690MB**	88.1	88.1	153.1	150	3.1	17.0	2
	5	Int.	□	**MZS1690LB**	139.1	139.1	204.1	201	3.1	17.0	2
17.0	2	Ext.	●	**MZE1700SA**	63.1	63.1	122.1	119	3.1	17.0	1
	3	Ext.	●	**MZE1700MA**	105.1	105.1	170.1	167	3.1	17.0	1
	3	Int.	●	**MZS1700MB**	88.1	88.1	153.1	150	3.1	17.0	2
	5	Int.	●	**MZS1700LB**	139.1	139.1	204.1	201	3.1	17.0	2
17.1	2	Ext.	□	**MZE1710SA**	65.1	65.1	126.1	123	3.1	17.1	1
	3	Ext.	□	**MZE1710MA**	105.1	105.1	170.1	167	3.1	17.1	1
	3	Int.	□	**MZS1710MB**	90.6	93.1	158.1	155	3.1	18.0	2
	5	Int.	□	**MZS1710LB**	143.1	147.1	212.1	209	3.1	18.0	2
17.2	2	Ext.	□	**MZE1720SA**	65.1	65.1	126.1	123	3.1	17.2	1
	3	Ext.	□	**MZE1720MA**	105.1	105.1	170.1	167	3.1	17.2	1
	3	Int.	□	**MZS1720MB**	90.6	93.1	158.1	155	3.1	18.0	2
	5	Int.	□	**MZS1720LB**	143.1	147.1	212.1	209	3.1	18.0	2

DRILLING

CUTTING CONDITIONS ➤ N115
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MZE/MZS

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
17.3	2	Ext.	□	MZE1730SA	65.1	65.1	126.1	123	3.1	17.3	1
	3	Ext.	□	MZE1730MA	105.1	105.1	170.1	167	3.1	17.3	1
	3	Int.	□	MZS1730MB	90.6	93.1	158.1	155	3.1	18.0	2
	5	Int.	□	MZS1730LB	143.1	147.1	212.1	209	3.1	18.0	2
17.4	2	Ext.	□	MZE1740SA	65.2	65.2	126.2	123	3.2	17.4	1
	3	Ext.	□	MZE1740MA	105.2	105.2	170.2	167	3.2	17.4	1
	3	Int.	□	MZS1740MB	90.7	93.2	158.2	155	3.2	18.0	2
	5	Int.	□	MZS1740LB	143.2	147.2	212.2	209	3.2	18.0	2
17.5	2	Ext.	●	MZE1750SA	65.2	65.2	126.2	123	3.2	17.5	1
	3	Ext.	●	MZE1750MA	105.2	105.2	170.2	167	3.2	17.5	1
	3	Int.	●	MZS1750MB	90.7	93.2	158.2	155	3.2	18.0	2
	5	Int.	●	MZS1750LB	143.2	147.2	212.2	209	3.2	18.0	2
17.6	2	Ext.	□	MZE1760SA	65.2	65.2	126.2	123	3.2	17.6	1
	3	Ext.	□	MZE1760MA	105.2	105.2	170.2	167	3.2	17.6	1
	3	Int.	□	MZS1760MB	93.2	93.2	158.2	155	3.2	18.0	2
	5	Int.	□	MZS1760LB	147.2	147.2	212.2	209	3.2	18.0	2
17.7	2	Ext.	□	MZE1770SA	65.2	65.2	126.2	123	3.2	17.7	1
	3	Ext.	□	MZE1770MA	105.2	105.2	170.2	167	3.2	17.7	1
	3	Int.	□	MZS1770MB	93.2	93.2	158.2	155	3.2	18.0	2
	5	Int.	□	MZS1770LB	147.2	147.2	212.2	209	3.2	18.0	2
17.8	2	Ext.	●	MZE1780SA	65.2	65.2	126.2	123	3.2	17.8	1
	3	Ext.	□	MZE1780MA	105.2	105.2	170.2	167	3.2	17.8	1
	3	Int.	□	MZS1780MB	93.2	93.2	158.2	155	3.2	18.0	2
	5	Int.	□	MZS1780LB	147.2	147.2	212.2	209	3.2	18.0	2
17.9	2	Ext.	□	MZE1790SA	65.3	65.3	126.3	123	3.3	17.9	1
	3	Ext.	□	MZE1790MA	105.3	105.3	170.3	167	3.3	17.9	1
	3	Int.	□	MZS1790MB	93.3	93.3	158.3	155	3.3	18.0	2
	5	Int.	□	MZS1790LB	147.3	147.3	212.3	209	3.3	18.0	2
18.0	2	Ext.	●	MZE1800SA	65.3	65.3	126.3	123	3.3	18.0	1
	3	Ext.	●	MZE1800MA	105.3	105.3	170.3	167	3.3	18.0	1
	3	Int.	●	MZS1800MB	93.3	93.3	158.3	155	3.3	18.0	2
	5	Int.	●	MZS1800LB	147.3	147.3	212.3	209	3.3	18.0	2
18.1	2	Ext.	□	MZE1810SA	67.3	67.3	130.3	127	3.3	18.1	1
	3	Ext.	□	MZE1810MA	117.3	117.3	182.3	179	3.3	18.1	1
	3	Int.	□	MZS1810MB	95.8	98.3	163.3	160	3.3	19.0	2
	5	Int.	□	MZS1810LB	151.3	155.3	220.3	217	3.3	19.0	2
18.2	2	Ext.	□	MZE1820SA	67.3	67.3	130.3	127	3.3	18.2	1
	3	Ext.	□	MZE1820MA	117.3	117.3	182.3	179	3.3	18.2	1
	3	Int.	□	MZS1820MB	95.8	98.3	163.3	160	3.3	19.0	2
	5	Int.	□	MZS1820LB	151.3	155.3	220.3	217	3.3	19.0	2
18.3	2	Ext.	□	MZE1830SA	67.3	67.3	130.3	127	3.3	18.3	1
	3	Ext.	□	MZE1830MA	117.3	117.3	182.3	179	3.3	18.3	1
	3	Int.	□	MZS1830MB	95.8	98.3	163.3	160	3.3	19.0	2
	5	Int.	□	MZS1830LB	151.3	155.3	220.3	217	3.3	19.0	2
18.4	2	Ext.	□	MZE1840SA	67.3	67.3	130.3	127	3.3	18.4	1
	3	Ext.	□	MZE1840MA	117.3	117.3	182.3	179	3.3	18.4	1
	3	Int.	□	MZS1840MB	95.8	98.3	163.3	160	3.3	19.0	2
	5	Int.	□	MZS1840LB	151.3	155.3	220.3	217	3.3	19.0	2

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
18.5	2	Ext.	●	**MZE1850SA**	67.4	67.4	130.4	127	3.4	18.5	1
	3	Ext.	●	**MZE1850MA**	117.4	117.4	182.4	179	3.4	18.5	1
	3	Int.	●	**MZS1850MB**	95.9	98.4	163.4	160	3.4	19.0	2
	5	Int.	●	**MZS1850LB**	151.4	155.4	220.4	217	3.4	19.0	2
18.6	2	Ext.	□	**MZE1860SA**	67.4	67.4	130.4	127	3.4	18.6	1
	3	Ext.	□	**MZE1860MA**	117.4	117.4	182.4	179	3.4	18.6	1
	3	Int.	□	**MZS1860MB**	98.4	98.4	163.4	160	3.4	19.0	2
	5	Int.	□	**MZS1860LB**	155.4	155.4	220.4	217	3.4	19.0	2
18.7	2	Ext.	□	**MZE1870SA**	67.4	67.4	130.4	127	3.4	18.7	1
	3	Ext.	□	**MZE1870MA**	117.4	117.4	182.4	179	3.4	18.7	1
	3	Int.	□	**MZS1870MB**	98.4	98.4	163.4	160	3.4	19.0	2
	5	Int.	□	**MZS1870LB**	155.4	155.4	220.4	217	3.4	19.0	2
18.8	2	Ext.	□	**MZE1880SA**	67.4	67.4	130.4	127	3.4	18.8	1
	3	Ext.	□	**MZE1880MA**	117.4	117.4	182.4	179	3.4	18.8	1
	3	Int.	□	**MZS1880MB**	98.4	98.4	163.4	160	3.4	19.0	2
	5	Int.	□	**MZS1880LB**	155.4	155.4	220.4	217	3.4	19.0	2
18.9	2	Ext.	□	**MZE1890SA**	67.4	67.4	130.4	127	3.4	18.9	1
	3	Ext.	□	**MZE1890MA**	117.4	117.4	182.4	179	3.4	18.9	1
	3	Int.	□	**MZS1890MB**	98.4	98.4	163.4	160	3.4	19.0	2
	5	Int.	□	**MZS1890LB**	155.4	155.4	220.4	217	3.4	19.0	2
19.0	2	Ext.	●	**MZE1900SA**	67.5	67.5	130.5	127	3.5	19.0	1
	3	Ext.	●	**MZE1900MA**	117.5	117.5	182.5	179	3.5	19.0	1
	3	Int.	●	**MZS1900MB**	98.5	98.5	163.5	160	3.5	19.0	2
	5	Int.	●	**MZS1900LB**	155.5	155.5	220.5	217	3.5	19.0	2
19.1	2	Ext.	□	**MZE1910SA**	69.5	69.5	134.5	131	3.5	19.1	1
	3	Ext.	□	**MZE1910MA**	117.5	117.5	182.5	179	3.5	19.1	1
	3	Int.	□	**MZS1910MB**	101.0	103.5	168.5	165	3.5	20.0	2
	5	Int.	□	**MZS1910LB**	159.5	163.5	228.5	225	3.5	20.0	2
19.2	2	Ext.	□	**MZE1920SA**	69.5	69.5	134.5	131	3.5	19.2	1
	3	Ext.	□	**MZE1920MA**	117.5	117.5	182.5	179	3.5	19.2	1
	3	Int.	□	**MZS1920MB**	101.0	103.5	168.5	165	3.5	20.0	2
	5	Int.	□	**MZS1920LB**	159.5	163.5	228.5	225	3.5	20.0	2
19.3	2	Ext.	□	**MZE1930SA**	69.5	69.5	134.5	131	3.5	19.3	1
	3	Ext.	□	**MZE1930MA**	117.5	117.5	182.5	179	3.5	19.3	1
	3	Int.	□	**MZS1930MB**	101.0	103.5	168.5	165	3.5	20.0	2
	5	Int.	□	**MZS1930LB**	159.5	163.5	228.5	225	3.5	20.0	2
19.4	2	Ext.	□	**MZE1940SA**	69.5	69.5	134.5	131	3.5	19.4	1
	3	Ext.	□	**MZE1940MA**	117.5	117.5	182.5	179	3.5	19.4	1
	3	Int.	□	**MZS1940MB**	101.0	103.5	168.5	165	3.5	20.0	2
	5	Int.	□	**MZS1940LB**	159.5	163.5	228.5	225	3.5	20.0	2
19.5	2	Ext.	●	**MZE1950SA**	69.5	69.5	134.5	131	3.5	19.5	1
	3	Ext.	●	**MZE1950MA**	117.5	117.5	182.5	179	3.5	19.5	1
	3	Int.	●	**MZS1950MB**	101.0	103.5	168.5	165	3.5	20.0	2
	5	Int.	●	**MZS1950LB**	159.5	163.5	228.5	225	3.5	20.0	2
19.6	2	Ext.	□	**MZE1960SA**	69.6	69.6	134.6	131	3.6	19.6	1
	3	Ext.	□	**MZE1960MA**	117.6	117.6	182.6	179	3.6	19.6	1
	3	Int.	□	**MZS1960MB**	103.6	103.6	168.6	165	3.6	20.0	2
	5	Int.	□	**MZS1960LB**	163.6	163.6	228.6	225	3.6	20.0	2

DRILLING

CUTTING CONDITIONS ➤ N115
OPERATION GUIDANCE ➤ N119
TECHNICAL DATA ➤ Q001

MZE/MZS

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
19.7	2	Ext.	□	**MZE1970SA**	69.6	69.6	134.6	131	3.6	19.7	1
	3	Ext.	□	**MZE1970MA**	117.6	117.6	182.6	179	3.6	19.7	1
	3	Int.	□	**MZS1970MB**	103.6	103.6	168.6	165	3.6	20.0	2
	5	Int.	□	**MZS1970LB**	163.6	163.6	228.6	225	3.6	20.0	2
19.8	2	Ext.	□	**MZE1980SA**	69.6	69.6	134.6	131	3.6	19.8	1
	3	Ext.	□	**MZE1980MA**	117.6	117.6	182.6	179	3.6	19.8	1
	3	Int.	□	**MZS1980MB**	103.6	103.6	168.6	165	3.6	20.0	2
	5	Int.	□	**MZS1980LB**	163.6	163.6	228.6	225	3.6	20.0	2
19.9	2	Ext.	□	**MZE1990SA**	69.6	69.6	134.6	131	3.6	19.9	1
	3	Ext.	□	**MZE1990MA**	117.6	117.6	182.6	179	3.6	19.9	1
	3	Int.	□	**MZS1990MB**	103.6	103.6	168.6	165	3.6	20.0	2
	5	Int.	□	**MZS1990LB**	163.6	163.6	228.6	225	3.6	20.0	2
20.0	2	Ext.	●	**MZE2000SA**	69.6	69.6	134.6	131	3.6	20.0	1
	3	Ext.	●	**MZE2000MA**	117.6	117.6	182.6	179	3.6	20.0	1
	3	Int.	●	**MZS2000MB**	103.6	103.6	168.6	165	3.6	20.0	2
	5	Int.	●	**MZS2000LB**	163.6	163.6	228.6	225	3.6	20.0	2

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

MZE/MZS

STEP DRILLS

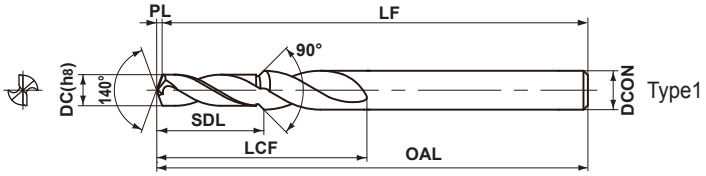
- Pre-hole drilling for metric screw thread.
- Helical coolant hole enables high speed machining (MZS type).

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal	Heat Resistant Alloy	Hardened Steel (MZE only)

	3<DC≤6	6<DC≤10	10<DC≤18
	0 −0.018	0 −0.022	0 −0.027
MZE	0 −0.018	0 −0.022	0 −0.027
MZS	0 −0.008	0 −0.009	0 −0.011

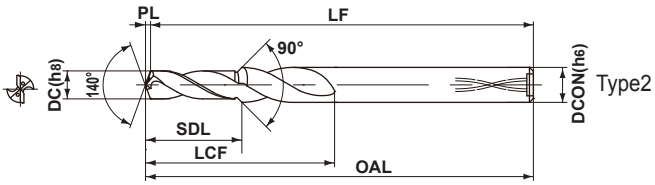
MZE (External coolant)





MZS (Internal coolant)





(Note 1) MZS type bigger than ϕ5.0 have a recess in the end face.
(Note 2) Spot face drilling is not possible (chamfering only).
(Note 3) For metric coarse thread.
(Note 4) MZS type also available for shrink fit holder.

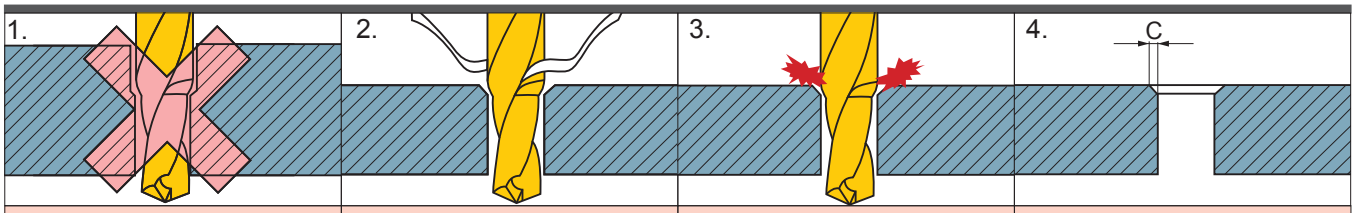
DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Order Number	Thread Size	Stock VP15TF	Dimensions (mm) SDL	LCF	OAL	LF	PL	DCON	Type
3.4	2	Ext.	**MZE0340SM04**	M4	●	8.6	21.6	73.6	73	0.6	6.0	1
	2	Int.	**MZS0340SM04**	M4	●	8.6	21.6	73.6	73	0.6	6.0	2
	3	Ext.	**MZE0340MM04**	M4	●	12.6	25.6	77.6	77	0.6	6.0	1
	3	Int.	**MZS0340MM04**	M4	●	12.6	25.6	77.6	77	0.6	6.0	2
4.3	2	Ext.	**MZE0430SM05**	M5	●	10.8	26.8	79.8	79	0.8	7.0	1
	2	Int.	**MZS0430SM05**	M5	●	10.8	26.8	79.8	79	0.8	7.0	2
	3	Ext.	**MZE0430MM05**	M5	●	15.8	31.8	84.8	84	0.8	7.0	1
	3	Int.	**MZS0430MM05**	M5	●	15.8	31.8	84.8	84	0.8	7.0	2
5.1	2	Ext.	**MZE0510SM06**	M6	●	12.9	30.9	84.9	84	0.9	8.0	1
	2	Int.	**MZS0510SM06**	M6	●	12.9	30.9	84.9	84	0.9	8.0	2
	3	Ext.	**MZE0510MM06**	M6	●	18.9	36.9	90.9	90	0.9	8.0	1
	3	Int.	**MZS0510MM06**	M6	●	18.9	36.9	90.9	90	0.9	8.0	2
6.8	2	Ext.	**MZE0680SM08**	M8	●	17.2	41.2	97.2	96	1.2	10.0	1
	2	Int.	**MZS0680SM08**	M8	●	17.2	41.2	97.2	96	1.2	10.0	2
	3	Ext.	**MZE0680MM08**	M8	●	25.2	49.2	105.2	104	1.2	10.0	1
	3	Int.	**MZS0680MM08**	M8	●	25.2	49.2	105.2	104	1.2	10.0	2
8.5	2	Ext.	**MZE0850SM10**	M10	●	21.5	51.5	113.5	112	1.5	12.0	1
	2	Int.	**MZS0850SM10**	M10	●	21.5	51.5	113.5	112	1.5	12.0	2
	3	Ext.	**MZE0850MM10**	M10	●	31.5	61.5	123.5	122	1.5	12.0	1
	3	Int.	**MZS0850MM10**	M10	●	31.5	61.5	123.5	122	1.5	12.0	2
10.3	2	Ext.	**MZE1030SM12**	M12	●	25.9	61.9	125.9	124	1.9	14.0	1
	2	Int.	**MZS1030SM12**	M12	●	25.9	61.9	125.9	124	1.9	14.0	2
	3	Ext.	**MZE1030MM12**	M12	●	37.9	73.9	137.9	136	1.9	14.0	1
	3	Int.	**MZS1030MM12**	M12	●	37.9	73.9	137.9	136	1.9	14.0	2

(Note) Please contact us for any geometry that is not in the catalogue (e.g. different diameter and length).

MZE/MZS

STEP DRILLS

CAUTION FOR USE



1.	2.	3.	4.
Spot facing as shown above is not possible due to the large diameter not having a back taper. Please contact us if spot face drills are required.	Chips from the chamfer machining tend to be elongated and may cause jamming. It is recommended to pick feed to reduce the length of chips.	Cutting resistance increases on initial contact with the chamfer. Reduce feed at this point.	The width of the chamfer is C1.0 for M4—M6, and C1.5 for M8—M12. For widths other than those stated above please contact us.

DRILL SIZE AND HOLE DIAMETERS FOR TAPPING

For Metric Coarse Screw Thread				
Thread Size	Initial Thread Diameter Tolerance		MZE/MZS Drill Application **DC**	Reference HSS Drill
	max.	min.		
M2.5x0.45	2.138	2.013	2.1	2.1
M3x0.5	2.599	2.459	2.5	2.5
M3.5x0.6	3.010	2.850	2.9	2.9
M4x0.7	3.422	3.242	3.4	3.3
M4.5x0.75	3.878	3.688	3.8	3.8
M5x0.8	4.334	4.134	4.3	4.2
M6x1	5.153	4.917	5.1	5.0
M7x1.25	6.153	5.917	6.1	6.0
M8x1.25	6.912	6.647	6.8	6.8

For Metric Coarse Screw Thread				
Thread Size	Initial Thread Diameter Tolerance		MZE/MZS Drill Application **DC**	Reference HSS Drill
	max.	min.		
M9x1.25	7.912	7.647	7.8	7.8
M10x1.5	8.676	8.376	8.5	8.5
M11x1.5	9.676	9.376	9.5	9.5
M12x1.75	10.441	10.106	10.3	10.3
M14x2	12.210	11.835	12.0	12.0
M16x2	14.210	13.835	14.0	14.0
M18x2.5	15.744	15.294	15.5	15.5
M20x2.5	17.744	17.294	17.5	17.5
M22x2.5	19.744	19.294	19.5	19.5

(Note) Holes drilled with an MZE type drill should be +0.01—+0.03mm oversize.
For thread tapping and replacement of HSS drills, a drill approximately 0.1mm bigger is recommended.

RECOMMENDED CUTTING CONDITIONS OF MZE/MZS DRILLS

MZE (External coolant)

Work Material	Mild Steel (≤180HB) AISI 1010 etc		Carbon steel, Alloy steel (180−280HB) AISI 1045, AISI 4140 etc		Carbon steel, Alloy steel (280−350HB) AISI 4340 etc	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)
1.0	12700	0.035 (0.020−0.050)	11100	0.035 (0.020−0.050)	9500	0.035 (0.020−0.050)
1.2	10600	0.045 (0.030−0.060)	9200	0.045 (0.030−0.060)	7900	0.045 (0.030−0.060)
1.6	8900	0.055 (0.035−0.080)	7900	0.055 (0.035−0.080)	6900	0.055 (0.035−0.080)
2.0	7100	0.07 (0.040−0.100)	6300	0.07 (0.040−0.100)	5500	0.07 (0.040−0.100)
2.5	5700	0.085 (0.050−0.125)	5000	0.085 (0.050−0.125)	4400	0.085 (0.050−0.125)
3.2	4400	0.1 (0.060−0.13)	3900	0.1 (0.06−0.13)	3400	0.09 (0.06−0.12)
4.0	3500	0.12 (0.080−0.16)	3100	0.12 (0.08−0.16)	2700	0.11 (0.07−0.14)
5.0	2800	0.15 (0.100−0.20)	2500	0.15 (0.10−0.20)	2200	0.14 (0.09−0.18)
6.3	2700	0.2 (0.13−0.26)	2500	0.2 (0.13−0.26)	2200	0.18 (0.11−0.24)
8.0	2100	0.23 (0.18−0.28)	1900	0.23 (0.18−0.28)	1700	0.21 (0.16−0.25)
10.0	1700	0.27 (0.22−0.32)	1500	0.27 (0.22−0.32)	1400	0.23 (0.19−0.27)
12.0	1700	0.31 (0.28−0.34)	1500	0.31 (0.28−0.34)	1400	0.26 (0.23−0.29)
16.0	1300	0.33 (0.28−0.38)	1200	0.33 (0.28−0.38)	1100	0.29 (0.24−0.33)
20.0	1100	0.35 (0.30−0.40)	1000	0.35 (0.30−0.40)	900	0.3 (0.26−0.34)

Work Material	Austenitic Stainless Steel (≤200HB) AISI 304, AISI 316 etc		Gray Cast Iron (≤350MPa) No 45 B etc		Ductile Cast Iron (≤450MPa) 60-40-8 etc	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)
1.0	4700	0.03 (0.020−0.044)	14300	0.035 (0.020−0.050)	12700	0.035 (0.020−0.050)
1.2	3900	0.04 (0.030−0.053)	11900	0.045 (0.030−0.060)	10600	0.045 (0.030−0.060)
1.6	3900	0.05 (0.035−0.070)	9900	0.055 (0.035−0.080)	8900	0.055 (0.035−0.080)
2.0	3100	0.06 (0.040−0.080)	7900	0.07 (0.040−0.100)	7100	0.07 (0.040−0.100)
2.5	2500	0.075 (0.050−0.100)	6300	0.085 (0.050−0.125)	5700	0.085 (0.050−0.125)
3.2	1900	0.07 (0.05−0.08)	4900	0.1 (0.06−0.13)	4400	0.1 (0.06−0.13)
4.0	1500	0.08 (0.06−0.10)	3900	0.12 (0.08−0.16)	3500	0.12 (0.08−0.16)
5.0	1200	0.1 (0.07−0.13)	3100	0.15 (0.10−0.20)	2800	0.15 (0.10−0.20)
6.3	1200	0.13 (0.09−0.17)	3000	0.2 (0.13−0.26)	2700	0.2 (0.13−0.26)
8.0	900	0.14 (0.10−0.18)	2300	0.25 (0.18−0.31)	2100	0.23 (0.18−0.28)
10.0	700	0.16 (0.12−0.19)	1900	0.29 (0.22−0.35)	1700	0.27 (0.22−0.32)
12.0	600	0.18 (0.15−0.20)	1800	0.33 (0.28−0.37)	1700	0.31 (0.28−0.34)
16.0	400	0.19 (0.15−0.23)	1300	0.35 (0.28−0.42)	1300	0.33 (0.28−0.38)
20.0	300	0.2 (0.15−0.24)	1100	0.37 (0.30−0.44)	1100	0.35 (0.30−0.40)

MZE/MZS

STEP DRILLS

MZE (External coolant)

Work Material	Aluminium Alloy (Si<5%)		Heat Resistant Alloy Inconel718 etc		Hardened Steel (40−55HRC) AISI H13, L6 etc	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)
1.0	15900	0.05 (0.030−0.075)	3100	0.02 (0.016−0.027)	3100	0.02 (0.016−0.031)
1.2	13200	0.065 (0.045−0.090)	2600	0.025 (0.022−0.032)	2600	0.03 (0.022−0.037)
1.6	11900	0.085 (0.053−0.120)	1900	0.03 (0.025−0.040)	1900	0.03 (0.025−0.040)
2.0	9500	0.105 (0.060−0.150)	2300	0.04 (0.032−0.050)	2300	0.04 (0.032−0.050)
2.5	8900	0.135 (0.075−0.200)	1900	0.05 (0.040−0.060)	1900	0.05 (0.040−0.060)
3.2	7900	0.1 (0.06−0.13)	1900	0.07 (0.05−0.09)	1900	0.07 (0.05−0.09)
4.0	6300	0.12 (0.08−0.16)	1500	0.09 (0.06−0.11)	1500	0.09 (0.06−0.11)
5.0	5000	0.15 (0.10−0.20)	1200	0.11 (0.08−0.14)	1200	0.11 (0.08−0.14)
6.3	4500	0.2 (0.13−0.26)	1200	0.14 (0.09−0.19)	1200	0.14 (0.09−0.19)
8.0	3500	0.23 (0.18−0.28)	900	0.14 (0.11−0.17)	900	0.14 (0.11−0.17)
10.0	2800	0.27 (0.22−0.32)	700	0.16 (0.12−0.19)	700	0.16 (0.12−0.19)
12.0	2600	0.31 (0.28−0.34)	600	0.16 (0.13−0.18)	600	0.16 (0.13−0.18)
16.0	2100	0.33 (0.28−0.38)	400	0.18 (0.14−0.21)	500	0.18 (0.14−0.21)
20.0	1700	0.35 (0.30−0.40)	400	0.19 (0.15−0.22)	400	0.19 (0.15−0.22)

MZS (Internal coolant)

Work Material	Mild Steel (≤180HB) AISI 1010 etc		Carbon steel, Alloy steel (180−280HB) AISI 1045, AISI 4140 etc		Carbon steel, Alloy steel (280−350HB) AISI 4340 etc	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)
1.0	12700	0.035 (0.020−0.050)	9500	0.035 (0.020−0.050)	9500	0.035 (0.020−0.050)
1.2	10600	0.045 (0.030−0.060)	7900	0.045 (0.030−0.060)	7900	0.045 (0.030−0.060)
1.6	8900	0.055 (0.035−0.080)	6900	0.055 (0.035−0.080)	6900	0.055 (0.035−0.080)
2.0	7900	0.07 (0.040−0.100)	6300	0.07 (0.040−0.100)	6300	0.07 (0.040−0.100)
2.5	6300	0.085 (0.050−0.125)	5700	0.085 (0.050−0.125)	5000	0.085 (0.050−0.125)
3.2	7900	0.1 (0.06−0.13)	6900	0.1 (0.06−0.13)	5900	0.1 (0.06−0.13)
4.0	6300	0.12 (0.08−0.16)	6300	0.12 (0.08−0.16)	5100	0.11 (0.07−0.14)
5.0	5700	0.15 (0.10−0.20)	5700	0.15 (0.10−0.20)	4400	0.14 (0.09−0.18)
6.3	5000	0.2 (0.13−0.26)	4500	0.2 (0.13−0.26)	3500	0.18 (0.11−0.24)
8.0	4300	0.23 (0.18−0.28)	3900	0.23 (0.18−0.28)	3100	0.21 (0.16−0.25)
10.0	3800	0.27 (0.22−0.32)	3500	0.27 (0.22−0.32)	2500	0.23 (0.19−0.27)
12.0	3400	0.3 (0.26−0.34)	3100	0.3 (0.28−0.34)	2300	0.26 (0.22−0.29)
16.0	2700	0.33 (0.27−0.38)	2500	0.33 (0.28−0.38)	1700	0.28 (0.23−0.33)
20.0	2300	0.35 (0.30−0.40)	2200	0.35 (0.30−0.40)	1500	0.3 (0.26−0.34)

Work Material	Austenitic Stainless Steel (≤200HB) AISI 304, AISI 316 etc		Gray Cast Iron (≤350MPa) No 45 B etc		Ductile Cast Iron (≤450MPa) 60-40-8 etc	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)
1.0	6300	0.03 (0.020−0.044)	12700	0.035 (0.020−0.050)	9500	0.035 (0.020−0.050)
1.2	5300	0.04 (0.030−0.053)	10600	0.045 (0.030−0.060)	7900	0.045 (0.030−0.060)
1.6	4900	0.05 (0.035−0.070)	8900	0.055 (0.035−0.080)	6900	0.055 (0.035−0.080)
2.0	4700	0.06 (0.040−0.080)	7900	0.07 (0.040−0.100)	6300	0.07 (0.040−0.100)
2.5	3800	0.075 (0.050−0.100)	6300	0.085 (0.050−0.125)	5000	0.085 (0.050−0.125)
3.2	2900	0.08 (0.06−0.10)	7900	0.1 (0.06−0.13)	5900	0.1 (0.06−0.13)
4.0	3100	0.09 (0.06−0.11)	6300	0.12 (0.08−0.16)	5100	0.12 (0.08−0.16)
5.0	2500	0.11 (0.08−0.14)	5700	0.15 (0.10−0.20)	4400	0.15 (0.10−0.20)
6.3	2200	0.14 (0.09−0.18)	5000	0.2 (0.13−0.26)	3500	0.2 (0.13−0.26)
8.0	1900	0.15 (0.10−0.19)	4300	0.25 (0.18−0.31)	3100	0.23 (0.18−0.28)
10.0	1500	0.16 (0.12−0.20)	3800	0.29 (0.22−0.35)	2500	0.27 (0.22−0.32)
12.0	1500	0.18 (0.15−0.21)	3400	0.32 (0.26−0.37)	2300	0.3 (0.26−0.34)
16.0	1200	0.19 (0.14−0.24)	2700	0.35 (0.27−0.42)	1700	0.33 (0.28−0.38)
20.0	1100	0.21 (0.15−0.26)	2300	0.37 (0.30−0.44)	1500	0.35 (0.30−0.40)

MZE/MZS

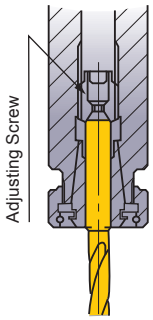
STEP DRILLS

MZS (Internal coolant)

Work Material	Aluminium Alloy (Si<5%)		Heat Resistant Alloy Inconel718 etc	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)
1.0	19000	0.05 (0.030—0.075)	3100	0.02 (0.016—0.027)
1.2	15900	0.065 (0.045—0.090)	2600	0.025 (0.022—0.032)
1.6	13900	0.085 (0.053—0.120)	1900	0.03 (0.025—0.040)
2.0	11100	0.105 (0.060—0.150)	1500	0.04 (0.032—0.050)
2.5	10100	0.135 (0.075—0.200)	1200	0.05 (0.040—0.060)
3.2	9900	0.23 (0.10—0.35)	1400	0.07 (0.05—0.09)
4.0	7900	0.24 (0.12—0.35)	1100	0.09 (0.06—0.11)
5.0	7000	0.25 (0.15—0.35)	1200	0.11 (0.08—0.14)
6.3	6000	0.35 (0.20—0.50)	1200	0.13 (0.09—0.16)
8.0	4700	0.35 (0.20—0.50)	900	0.14 (0.11—0.17)
10.0	4100	0.5 (0.20—0.80)	700	0.15 (0.12—0.17)
12.0	3900	0.5 (0.20—0.80)	600	0.16 (0.13—0.18)
16.0	3300	0.6 (0.20—1.00)	500	0.18 (0.14—0.21)
20.0	2700	0.6 (0.20—1.00)	400	0.19 (0.15—0.22)

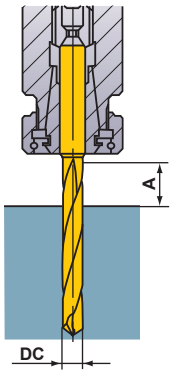
OPERATIONAL GUIDANCE

Drill Holding



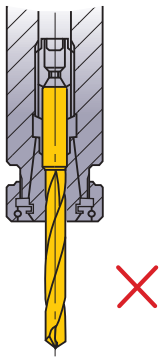
Thrust bearing type collet chuck holds the drill securely.

Drill Length



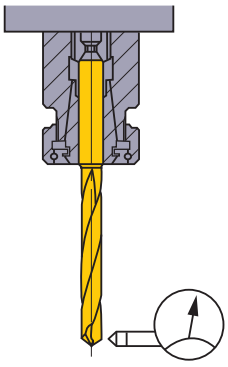
A ≥ DC x 1.5

Drill Installation



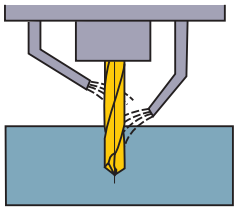
Do not clamp on the flutes.

Installation Tolerance



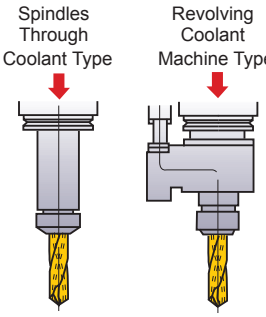
Run-out ≤ 0.03mm

Coolant Method (MZE)



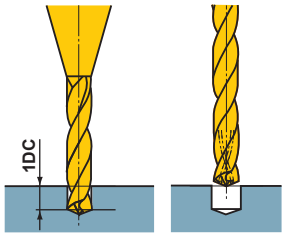
Two coolant positions, at the end and at the center are ideal.

Through Coolant Type (MZS)



Coolant pressure is approx. 0.5–1MPa (<φ5:2–3MPa). Coolant volume is 1.5–4.0l/min.

Drill Installation



①When machining a prepared hole with the MZE-SA please set the depth to 1DC (DC=drill diameter).
②Use the prepared hole as a guide when using a drill with an oil hole. Depending on the cutting conditions, peck feed is recommended.

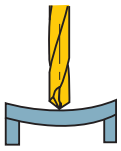
Coolant Handling

<MZS Type>

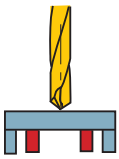
1) Small particles of swarf will jam in the oil hole of small diameter drills. Always use a fine mesh filter as a preventative measure.

2) Dirt and dust particles adhere to the oil in old coolant and prevent an efficient flow. Regular coolant exchange is recommended.

Thin Workpiece

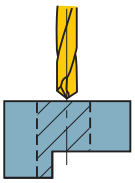


If Bending Occurs ×



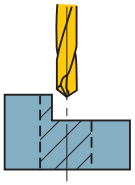
Support the Workpiece ○

Interrupted Cutting



One Process ○

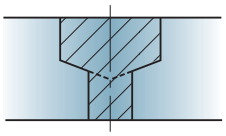
①Lower the feed when drilling the interrupted part.



Requires Prior Machining △

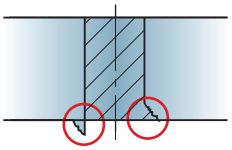
①Spot face with an end mill prior to drilling.

Stepped Holes



①Divide the two processes.
②Drill the larger hole first.
*A tool for machining both chamfer and spot face can be produced to order.

Burring and Workpiece Chipping



①Lower the feed rate by 50% at the end of through cutting.
②Add a 45°chamfer.
③Change the point angle.

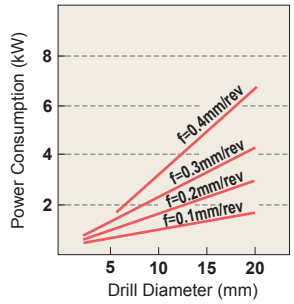
CAUTION TO USE MZS TYPE (Drill Diameter ≤ φ3)

- Please use a fine mesh filter (mesh≤3μm) for coolant to prevent jamming in the oil hole.
- For deep drilling (l/d>3), machining guiding hole is recommended. (Use MZE□□□□SA type for guiding hole.)
- Pick drilling is also effective.

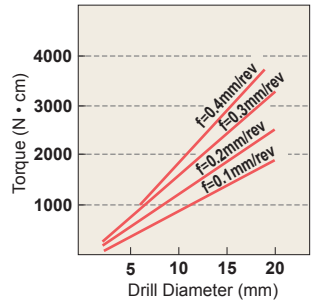
CUTTING RESISTANCE

Workpiece : JIS SCM440(300HB) Cutting Speed : 50m/min

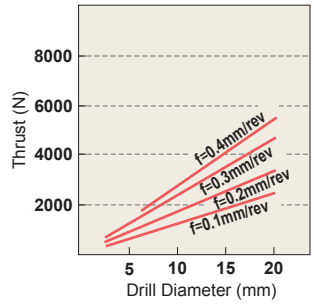
Power Consumption



Torque



Thrust



MSE

MIRACLE MINI STAR DRILL

- Wide flute for preventing chip jamming.
- Stable, small diameter machining.

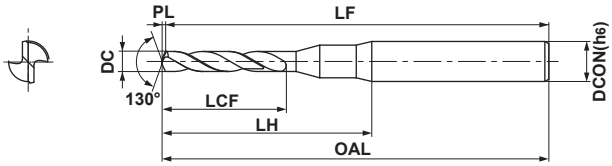
P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal	Heat Resistant Alloy	Hardened Steel

0.10≤DC≤0.99

h6 $^{0}_{-0.009}$

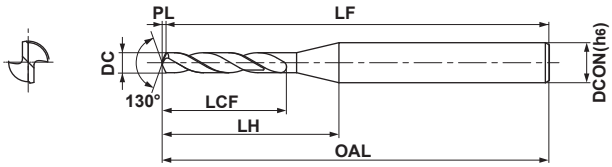
$^{0}_{-0.006}$





Type1





Type2

(Note) MSE drills are suitable for use with shrink fit holders.

External Coolant

DC (mm)	Stock VP20MF	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
0.10	●		MSE0010SB	1.22	9.72	38.02	38	0.02	3	1
0.11	●		MSE0011SB	1.23	9.73	38.03	38	0.03	3	1
0.12	●		MSE0012SB	1.43	9.73	38.03	38	0.03	3	1
0.13	●		MSE0013SB	1.43	9.73	38.03	38	0.03	3	1
0.14	●		MSE0014SB	2.03	9.73	38.03	38	0.03	3	1
0.15	●		MSE0015SB	2.03	9.73	38.03	38	0.03	3	1
0.16	●		MSE0016SB	2.04	9.74	38.04	38	0.04	3	1
0.17	●		MSE0017SB	2.04	9.74	38.04	38	0.04	3	1
0.18	●		MSE0018SB	2.04	9.74	38.04	38	0.04	3	1
0.19	●		MSE0019SB	2.04	9.74	38.04	38	0.04	3	1
0.20	●		MSE0020SB	2.55	9.75	38.05	38	0.05	3	1
0.21	●		MSE0021SB	2.55	9.75	38.05	38	0.05	3	1
0.22	●		MSE0022SB	2.55	9.75	38.05	38	0.05	3	1
0.23	●		MSE0023SB	2.55	9.75	38.05	38	0.05	3	1
0.24	●		MSE0024SB	3.06	9.76	38.06	38	0.06	3	1
0.25	●		MSE0025SB	3.06	9.76	38.06	38	0.06	3	1
0.26	●		MSE0026SB	3.06	9.76	38.06	38	0.06	3	1
0.27	●		MSE0027SB	3.06	9.76	38.06	38	0.06	3	1
0.28	●		MSE0028SB	3.07	9.77	38.07	38	0.07	3	1
0.29	●		MSE0029SB	3.07	9.77	38.07	38	0.07	3	1
0.30		●	MSE0030SB	5.07	10.27	38.07	38	0.07	3	2
0.31		●	MSE0031SB	5.07	10.27	38.07	38	0.07	3	2
0.32		●	MSE0032SB	5.07	10.27	38.07	38	0.07	3	2
0.33		●	MSE0033SB	5.08	10.28	38.08	38	0.08	3	2
0.34		●	MSE0034SB	6.08	11.28	38.08	38	0.08	3	2
0.35		●	MSE0035SB	6.08	11.18	38.08	38	0.08	3	2
0.36		●	MSE0036SB	6.08	11.18	38.08	38	0.08	3	2
0.37		●	MSE0037SB	6.09	11.19	38.09	38	0.09	3	2
0.38		●	MSE0038SB	6.09	11.19	38.09	38	0.09	3	2
0.39		●	MSE0039SB	6.09	11.19	38.09	38	0.09	3	2
0.40		●	MSE0040SB	7.09	12.19	38.09	38	0.09	3	2
0.41		●	MSE0041SB	7.10	12.10	38.10	38	0.10	3	2
0.42		●	MSE0042SB	7.10	12.10	38.10	38	0.10	3	2
0.43		●	MSE0043SB	7.10	12.10	38.10	38	0.10	3	2

External Coolant

DC (mm)	Stock VP20MF	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
0.44		●	MSE0044SB	7.10	12.10	38.10	38	0.10	3	2
0.45		●	MSE0045SB	7.10	12.10	38.10	38	0.10	3	2
0.46		●	MSE0046SB	7.11	12.01	38.11	38	0.11	3	2
0.47		●	MSE0047SB	7.11	12.01	38.11	38	0.11	3	2
0.48		●	MSE0048SB	7.11	12.01	38.11	38	0.11	3	2
0.49		●	MSE0049SB	7.11	12.01	38.11	38	0.11	3	2
0.50		●	MSE0050SB	7.12	12.02	38.12	38	0.12	3	2
0.51		●	MSE0051SB	7.12	11.92	38.12	38	0.12	3	2
0.52		●	MSE0052SB	7.12	11.92	38.12	38	0.12	3	2
0.53		●	MSE0053SB	7.12	11.92	38.12	38	0.12	3	2
0.54		●	MSE0054SB	7.13	11.93	38.13	38	0.13	3	2
0.55		●	MSE0055SB	7.13	11.93	38.13	38	0.13	3	2
0.56		●	MSE0056SB	7.13	11.93	38.13	38	0.13	3	2
0.57		●	MSE0057SB	7.13	11.83	38.13	38	0.13	3	2
0.58		●	MSE0058SB	7.14	11.84	38.14	38	0.14	3	2
0.59		●	MSE0059SB	7.14	11.84	38.14	38	0.14	3	2
0.60		●	MSE0060SB	7.14	11.84	38.14	38	0.14	3	2
0.61		●	MSE0061SB	7.14	11.84	38.14	38	0.14	3	2
0.62		●	MSE0062SB	7.14	11.74	38.14	38	0.14	3	2
0.63		●	MSE0063SB	7.15	11.75	38.15	38	0.15	3	2
0.64		●	MSE0064SB	7.15	11.75	38.15	38	0.15	3	2
0.65		●	MSE0065SB	7.15	11.75	38.15	38	0.15	3	2
0.66		●	MSE0066SB	7.15	11.75	38.15	38	0.15	3	2
0.67		●	MSE0067SB	7.16	11.66	38.16	38	0.16	3	2
0.68		●	MSE0068SB	7.16	11.66	38.16	38	0.16	3	2
0.69		●	MSE0069SB	7.16	11.66	38.16	38	0.16	3	2
0.70		●	MSE0070SB	8.16	12.66	38.16	38	0.16	3	2
0.71		●	MSE0071SB	8.17	12.67	38.17	38	0.17	3	2
0.72		●	MSE0072SB	8.17	12.67	38.17	38	0.17	3	2
0.73		●	MSE0073SB	8.17	12.57	38.17	38	0.17	3	2
0.74		●	MSE0074SB	8.17	12.57	38.17	38	0.17	3	2
0.75		●	MSE0075SB	8.17	12.57	38.17	38	0.17	3	2
0.76		●	MSE0076SB	8.18	12.58	38.18	38	0.18	3	2
0.77		●	MSE0077SB	8.18	12.58	38.18	38	0.18	3	2

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan.

External Coolant

DC (mm)	Stock VP20MF	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
0.78		●	MSE0078SB	8.18	12.48	38.18	38	0.18	3	2
0.79		●	MSE0079SB	8.18	12.48	38.18	38	0.18	3	2
0.80		●	MSE0080SB	10.19	14.49	38.19	38	0.19	3	2
0.81		●	MSE0081SB	10.19	14.49	38.19	38	0.19	3	2
0.82		●	MSE0082SB	10.19	14.49	38.19	38	0.19	3	2
0.83		●	MSE0083SB	10.19	14.49	38.19	38	0.19	3	2
0.84		●	MSE0084SB	10.20	14.40	38.20	38	0.20	3	2
0.85		●	MSE0085SB	10.20	14.40	38.20	38	0.20	3	2
0.86		●	MSE0086SB	10.20	14.40	38.20	38	0.20	3	2
0.87		●	MSE0087SB	10.20	14.40	38.20	38	0.20	3	2
0.88		●	MSE0088SB	10.21	14.41	38.21	38	0.21	3	2

External Coolant

DC (mm)	Stock VP20MF	Stock VP15TF	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON	Type
0.89		●	MSE0089SB	10.21	14.31	38.21	38	0.21	3	2
0.90		●	MSE0090SB	10.21	14.31	38.21	38	0.21	3	2
0.91		●	MSE0091SB	10.21	14.31	38.21	38	0.21	3	2
0.92		●	MSE0092SB	10.21	14.31	38.21	38	0.21	3	2
0.93		●	MSE0093SB	10.22	14.32	38.22	38	0.22	3	2
0.94		●	MSE0094SB	10.22	14.22	38.22	38	0.22	3	2
0.95		●	MSE0095SB	10.22	14.22	38.22	38	0.22	3	2
0.96		●	MSE0096SB	10.22	14.22	38.22	38	0.22	3	2
0.97		●	MSE0097SB	10.23	14.23	38.23	38	0.23	3	2
0.98		●	MSE0098SB	10.23	14.23	38.23	38	0.23	3	2
0.99		●	MSE0099SB	10.23	14.23	38.23	38	0.23	3	2

RECOMMENDED CUTTING CONDITIONS

Work Material	Mild Steel (≤180HB) AISI 1010 etc					Carbon steel, Alloy steel (180−280HB) AISI 1045, AISI 4140 etc				
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)	Step (mm)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)	Step (mm)	Table Feed (mm/min)
0.1	6	20000	0.002 (0.001−0.003)	0.02	40	6	20000	0.002 (0.001−0.003)	0.02	40
0.12	8	20000	0.002 (0.001−0.003)	0.02	40	8	20000	0.002 (0.001−0.003)	0.02	40
0.16	10	20000	0.002 (0.001−0.003)	0.02	40	10	20000	0.002 (0.001−0.003)	0.02	40
0.2	13	20000	0.003 (0.002−0.004)	0.04	60	13	20000	0.003 (0.002−0.004)	0.04	60
0.25	16	20000	0.003 (0.002−0.004)	0.04	60	16	20000	0.003 (0.002−0.004)	0.04	60
0.32	20	20000	0.004 (0.003−0.005)	0.05	80	20	20000	0.004 (0.003−0.005)	0.05	80
0.4	25	20000	0.004 (0.003−0.005)	0.05	80	25	20000	0.004 (0.003−0.005)	0.05	80
0.5	31	20000	0.006 (0.005−0.007)	0.1	120	31	20000	0.006 (0.005−0.007)	0.1	120
0.63	40	20000	0.008 (0.006−0.01)	0.1	160	40	20000	0.008 (0.006−0.01)	0.1	160
0.8	50	20000	0.02 (0.015−0.025)	0.3	400	50	20000	0.015 (0.012−0.018)	0.3	300
0.99	62	20000	0.04 (0.03−0.05)	0.3	800	62	20000	0.02 (0.015−0.025)	0.3	400

Work Material	Carbon steel, Alloy steel (280−350HB) AISI 4340 etc					Pre-Hardened Steel (35−45HRC) AISI P21, AISI P20 etc				
Dia. DC (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)	Step (mm)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.−Max.) (mm/rev)	Step (mm)	Table Feed (mm/min)
0.1	6	20000	0.002 (0.001−0.003)	0.02	40	6	20000	0.002 (0.001−0.003)	0.02	40
0.12	8	20000	0.002 (0.001−0.003)	0.02	40	8	20000	0.002 (0.001−0.003)	0.02	40
0.16	10	20000	0.002 (0.001−0.003)	0.02	40	10	20000	0.002 (0.001−0.003)	0.02	40
0.2	13	20000	0.003 (0.002−0.004)	0.04	60	13	20000	0.003 (0.002−0.004)	0.04	60
0.25	16	20000	0.003 (0.002−0.004)	0.04	60	16	20000	0.003 (0.002−0.004)	0.04	60
0.32	20	20000	0.004 (0.003−0.005)	0.05	80	20	20000	0.004 (0.003−0.005)	0.05	80
0.4	25	20000	0.004 (0.003−0.005)	0.05	80	25	20000	0.004 (0.003−0.005)	0.05	80
0.5	31	20000	0.006 (0.005−0.007)	0.1	120	31	20000	0.006 (0.005−0.007)	0.1	120
0.63	40	20000	0.008 (0.006−0.01)	0.1	160	40	20000	0.008 (0.006−0.01)	0.1	160
0.8	50	20000	0.015 (0.012−0.018)	0.3	300	50	20000	0.015 (0.012−0.018)	0.3	300
0.99	62	20000	0.02 (0.015−0.025)	0.3	400	62	20000	0.02 (0.015−0.025)	0.3	400

1) When drilling holes up to ϕ0.3mm, the use of a spot drill is recommended.
(Order number : MSP0300SB, Cutting conditions : See below.)
2) Change cutting conditions depending on your machine and workpiece rigidity.
3) When machining holes over 5D, reduce the step stated above.
4) The use of water-soluble fluid (diluted by 20 times) is recommended for drilling under the cutting conditions above.
Lower the revolutions if you use oil fluid or mist.

DRILLING(SOLID CARBIDE)

MSE

MIRACLE MINI STAR DRILL

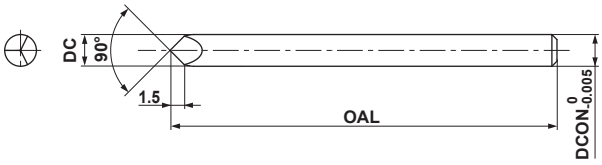
Work Material	Austenitic Stainless Steel (≤200HB) AISI 304, AISI 316 etc					Gray Cast Iron (≤350MPa) No 45 B etc				
Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Step (mm)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Step (mm)	Table Feed (mm/min)
0.1	6	20000	0.002 (0.001—0.003)	0.02	40	6	20000	0.002 (0.001—0.003)	0.02	40
0.12	8	20000	0.002 (0.001—0.003)	0.02	40	8	20000	0.002 (0.001—0.003)	0.02	40
0.16	10	20000	0.002 (0.001—0.003)	0.02	40	10	20000	0.002 (0.001—0.003)	0.02	40
0.2	11	18000	0.003 (0.002—0.004)	0.04	54	13	20000	0.003 (0.002—0.004)	0.04	60
0.25	14	18000	0.003 (0.002—0.004)	0.04	54	16	20000	0.003 (0.002—0.004)	0.04	60
0.32	15	15000	0.004 (0.003—0.005)	0.05	60	20	20000	0.004 (0.003—0.005)	0.05	80
0.4	19	15000	0.004 (0.003—0.005)	0.05	60	25	20000	0.004 (0.003—0.005)	0.05	80
0.5	16	10000	0.006 (0.005—0.007)	0.1	60	31	20000	0.006 (0.005—0.007)	0.1	120
0.63	20	10000	0.008 (0.006—0.01)	0.1	80	40	20000	0.008 (0.006—0.01)	0.1	160
0.8	15	6000	0.015 (0.012—0.018)	0.2	90	50	20000	0.02 (0.015—0.025)	0.3	400
0.99	19	6000	0.02 (0.015—0.025)	0.2	120	62	20000	0.04 (0.03—0.05)	0.3	800

Work Material	Aluminium Alloy (Si<5%)					Heat Resistant Alloy Inconel718 etc				
Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Step (mm)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Step (mm)	Table Feed (mm/min)
0.1	6	20000	0.002 (0.001—0.003)	0.05	40	2	7000	0.001 (0.0005—0.001)	0.02	7
0.12	8	20000	0.003 (0.002—0.004)	0.05	60	3	7000	0.001 (0.0005—0.001)	0.02	7
0.16	10	20000	0.004 (0.003—0.005)	0.05	80	4	7000	0.001 (0.0005—0.001)	0.02	7
0.2	13	20000	0.006 (0.005—0.007)	0.1	120	3	5000	0.002 (0.001—0.002)	0.04	10
0.25	16	20000	0.008 (0.006—0.01)	0.1	160	4	5000	0.002 (0.001—0.002)	0.04	10
0.32	20	20000	0.01 (0.008—0.012)	0.3	200	4	4000	0.002 (0.001—0.002)	0.05	8
0.4	25	20000	0.02 (0.015—0.025)	0.3	400	5	4000	0.002 (0.001—0.002)	0.05	8
0.5	31	20000	0.03 (0.025—0.035)	0.5	600	5	3000	0.003 (0.001—0.003)	0.1	9
0.63	40	20000	0.04 (0.035—0.045)	0.5	800	6	3000	0.004 (0.002—0.004)	0.1	12
0.8	50	20000	0.05 (0.045—0.055)	0.8	1000	5	1800	0.006 (0.004—0.006)	0.2	10.8
0.99	62	20000	0.06 (0.055—0.065)	0.8	1200	6	1800	0.01 (0.008—0.01)	0.2	18

1) When drilling holes up to ϕ0.3mm, the use of a spot drill is recommended.
   (Order number : MSP0300SB, Cutting conditions : See below.)
2) Change cutting conditions depending on your machine and workpiece rigidity.
3) When machining holes over 5D, reduce the step stated above.
4) The use of water-soluble fluid (diluted by 20 times) is recommended for drilling under the cutting conditions above.
   Lower the revolutions if you use oil fluid or mist.

MSP
SPOT DRILL





Order Number	Grade	Stock	Dimensions (mm)			Diameter Range (mm)
			DC	OAL	DCON	
MSP0300SB	**VP15TF**	●	3	38	3	**0.1—3.0**

RECOMMENDED CUTTING CONDITIONS

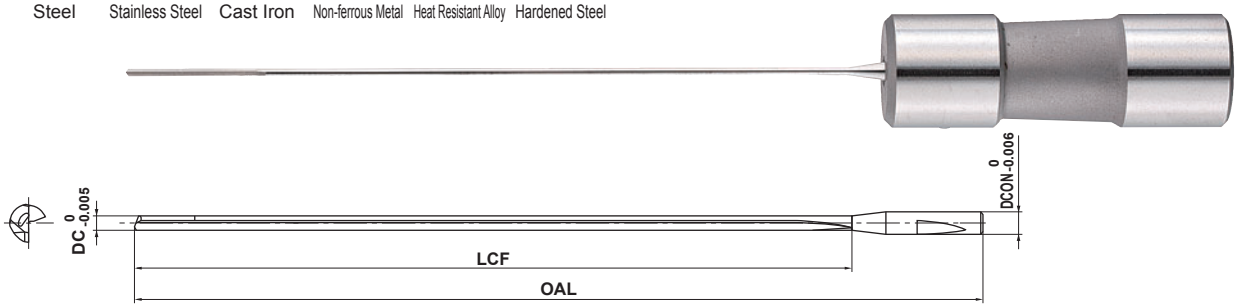
Hole Size Range (mm)	Revolution (min^{-1})	Feed rate (Min.—Max.) (mm/rev)	Table Feed (mm/min)
0.1—3.0	10000	0.0005 (0.00025—0.001)	5

● : Inventory maintained in Japan.

MGS
SOLID GUN DRILL

- Micro deep hole drilling is possible.
- Excellent run-out accuracy ensures high precision drilling.

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal	Heat Resistant Alloy	Hardened Steel



(Note) MGS drills are suitable for use with shrink fit holders.

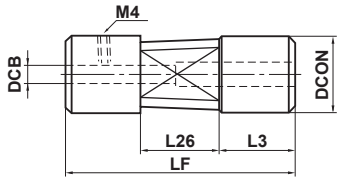
DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock HTi10	Order Number	Dimensions (mm) LCF	OAL	DCON
0.7	50	Int.	●	MGS0070L040B	40	80	3
	80	Int.	●	MGS0070L060B	60	100	3
0.8	45	Int.	●	MGS0080L040B	40	80	3
	70	Int.	●	MGS0080L060B	60	100	3
0.9	40	Int.	●	MGS0090L040B	40	80	3
	60	Int.	●	MGS0090L060B	60	100	3
1.0	35	Int.	●	MGS0100L040B	40	80	3
	55	Int.	●	MGS0100L060B	60	100	3
	75	Int.	●	MGS0100L080B	80	120	3
1.1	30	Int.	●	MGS0110L040B	40	80	3
	50	Int.	●	MGS0110L060B	60	100	3
	65	Int.	●	MGS0110L080B	80	120	3
1.2	30	Int.	●	MGS0120L040B	40	80	3
	45	Int.	●	MGS0120L060B	60	100	3
	60	Int.	●	MGS0120L080B	80	120	3
1.3	40	Int.	●	MGS0130L060B	60	100	3
	55	Int.	●	MGS0130L080B	80	120	3
	70	Int.	●	MGS0130L100B	100	140	3
1.4	35	Int.	●	MGS0140L060B	60	100	3
	50	Int.	●	MGS0140L080B	80	120	3
	65	Int.	●	MGS0140L100B	100	140	3
1.5	35	Int.	●	MGS0150L060B	60	100	3
	50	Int.	●	MGS0150L080B	80	120	3
	60	Int.	●	MGS0150L100B	100	140	3
1.6	30	Int.	●	MGS0160L060B	60	100	3
	45	Int.	●	MGS0160L080B	80	120	3
	55	Int.	●	MGS0160L100B	100	140	3
1.7	30	Int.	●	MGS0170L060B	60	100	3
	40	Int.	●	MGS0170L080B	80	120	3
	55	Int.	●	MGS0170L100B	100	140	3

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock HTi10	Order Number	Dimensions (mm) LCF	OAL	DCON
1.8	30	Int.	●	MGS0180L060B	60	100	3
	40	Int.	●	MGS0180L080B	80	120	3
	50	Int.	●	MGS0180L100B	100	140	3
1.9	25	Int.	●	MGS0190L060B	60	100	3
	35	Int.	●	MGS0190L080B	80	120	3
	45	Int.	●	MGS0190L100B	100	140	3
2.0	25	Int.	●	MGS0200L060B	60	100	3
	35	Int.	●	MGS0200L080B	80	120	3
	45	Int.	●	MGS0200L100B	100	140	3
2.1	35	Int.	●	MGS0210L080B	80	120	3
	40	Int.	●	MGS0210L100B	100	140	3
2.2	30	Int.	●	MGS0220L080B	80	120	3
	40	Int.	●	MGS0220L100B	100	140	3
2.3	30	Int.	●	MGS0230L080B	80	120	3
	40	Int.	●	MGS0230L100B	100	140	3
2.4	30	Int.	●	MGS0240L080B	80	120	3
	35	Int.	●	MGS0240L100B	100	140	3
2.5	25	Int.	●	MGS0250L080B	80	120	3
	35	Int.	●	MGS0250L100B	100	140	3
2.6	25	Int.	●	MGS0260L080B	80	120	3
	35	Int.	●	MGS0260L100B	100	140	3
2.7	25	Int.	●	MGS0270L080B	80	120	3
	30	Int.	●	MGS0270L100B	100	140	3
2.8	25	Int.	●	MGS0280L080B	80	120	3
	30	Int.	●	MGS0280L100B	100	140	3
2.9	20	Int.	●	MGS0290L080B	80	120	3
	30	Int.	●	MGS0290L100B	100	140	3
3.0	20	Int.	●	MGS0300L080B	80	120	3
	30	Int.	●	MGS0300L100B	100	140	3

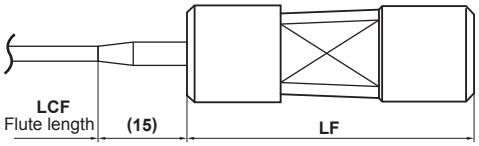
(Note) Please consult us regarding coated type drills (***VP***, ***GP*** and ***UP*** coated carbide).

● : Inventory maintained in Japan.

DRIVER



WHEN CONNECTED WITH A DRIVER



Order Number	Stock	Dimensions (mm)						
		DCON	DCB	LF	L3	L26	Set Screw	Wrench
MGD38	●	12.7	3.0	38.1	12.6	12.7	HSS04004	HKY20F
MGD70	●	12.7	3.0	70.0	25.0	20.0	HSS04004	HKY20F

RECOMMENDED CUTTING CONDITIONS

Work Material	Mild Steel (≤180HB) AISI 1010 etc				Carbon steel, Alloy steel (180−280HB) AISI 1045, AISI 4140 etc			
Recommended grinding fluid	Water insoluble				Water insoluble			
Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)
0.8	50	19800	0.01 (0.005−0.016)	195	40	15900	0.01 (0.005−0.016)	155
1.0	50	15900	0.01 (0.007−0.020)	155	40	12700	0.01 (0.007−0.020)	125
1.2	60	15900	0.015 (0.008−0.024)	235	50	13200	0.015 (0.008−0.024)	195
1.6	60	11900	0.02 (0.011−0.032)	235	50	9900	0.02 (0.011−0.032)	195
2.0	60	9500	0.025 (0.013−0.040)	235	50	7900	0.025 (0.013−0.040)	195
2.5	70	8900	0.03 (0.017−0.050)	265	60	7600	0.03 (0.017−0.050)	225
3.0	70	7400	0.04 (0.020−0.060)	295	60	6300	0.04 (0.020−0.060)	250

Work Material	Carbon steel, Alloy steel (280−350HB) AISI 4340 etc				Austenitic Stainless Steel (≤200HB) AISI 304, AISI 316 etc			
Recommended grinding fluid	Water insoluble				Water insoluble			
Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)
0.8	30	11900	0.005 (0.004−0.005)	55	30	11900	0.01 (0.005−0.016)	115
1.0	30	9500	0.005 (0.005−0.007)	45	30	9500	0.01 (0.007−0.020)	95
1.2	40	10600	0.005 (0.006−0.008)	50	30	7900	0.015 (0.008−0.024)	115
1.6	40	7900	0.01 (0.008−0.011)	75	40	7900	0.02 (0.011−0.032)	155
2.0	40	6300	0.01 (0.010−0.013)	60	40	6300	0.025 (0.013−0.040)	155
2.5	50	6300	0.015 (0.013−0.017)	90	40	5000	0.03 (0.017−0.050)	150
3.0	50	5300	0.015 (0.015−0.020)	75	40	4200	0.04 (0.020−0.060)	165

Work Material	Gray Cast Iron (≤350MPa) No 45 B etc				Ductile Cast Iron (≤450MPa) 60-40-8 etc			
Recommended grinding fluid	Water insoluble Water soluble				Water insoluble Water soluble			
Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)
0.8	50	19800	0.01 (0.008−0.016)	195	40	15900	0.005 (0.005−0.008)	75
1.0	50	15900	0.015 (0.010−0.020)	235	40	12700	0.005 (0.007−0.010)	60
1.2	60	15900	0.015 (0.012−0.024)	235	50	13200	0.01 (0.008−0.012)	130
1.6	60	11900	0.02 (0.016−0.032)	235	50	9900	0.01 (0.011−0.016)	95
2.0	60	9500	0.03 (0.020−0.040)	285	50	7900	0.015 (0.013−0.020)	115
2.5	70	8900	0.035 (0.025−0.050)	310	60	7600	0.02 (0.017−0.025)	150
3.0	70	7400	0.045 (0.030−0.060)	330	60	6300	0.025 (0.020−0.030)	155

1) For safety and success, high pressure coolant is required. (Minimum coolant pressure=1,000PSI)
2) Coolant filter must be less than 5 microns. Fine filtration is necessary to prevent blockage of the coolant holes.
3) A pilot hole or guide bushing is required.

MGS
SOLID GUN DRILL

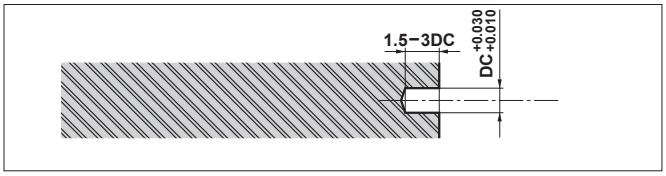
Work Material	Aluminium Alloy (Si<5%)				Copper, Copper alloy			
Recommended grinding fluid	Water insoluble Water soluble				Water insoluble Water soluble			
Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (Min.–Max.) (mm/rev)	Table Feed (mm/min)
0.8	50	19800	0.01 (0.008—0.016)	195	40	15900	0.01 (0.008—0.016)	155
1.0	60	19000	0.015 (0.010—0.020)	285	50	15900	0.015 (0.010—0.020)	235
1.2	70	18500	0.015 (0.012—0.024)	275	60	15900	0.015 (0.012—0.024)	235
1.6	80	15900	0.02 (0.016—0.032)	315	70	13900	0.02 (0.016—0.032)	275
2.0	90	14300	0.03 (0.020—0.040)	425	80	12700	0.03 (0.020—0.040)	380
2.5	100	12700	0.035 (0.025—0.050)	440	90	11400	0.035 (0.025—0.050)	395
3.0	100	10600	0.045 (0.030—0.060)	475	100	10600	0.045 (0.030—0.060)	475

1) For safety and success, high pressure coolant is required. (Minimum coolant pressure=1,000PSI)
2) Coolant filter must be less than 5 microns. Fine filtration is necessary to prevent blockage of the coolant holes.
3) A pilot hole or guide bushing is required.

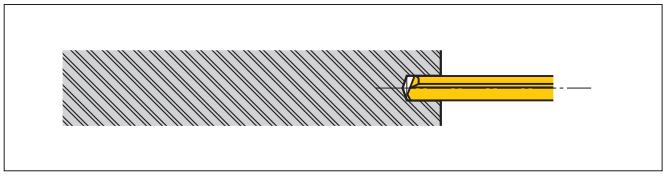
SPECIAL APPLICATION NOTES

- For safety and success, high pressure coolant is required. (Minimum coolant pressure=1,000PSI)
- Coolant filter must be less than 5 microns. Fine filtration is necessary to prevent blockage of the coolant holes.
- A pilot hole or guide bushing is required.

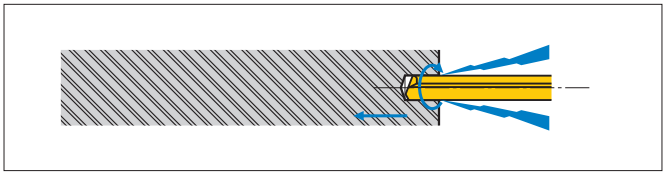
HOW TO USE



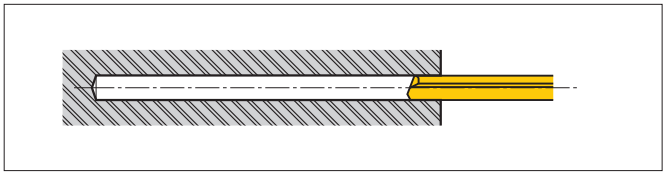
1. Pilot hole drilling. (Mitsubishi's MZE, MZS, MWE or MWS is recommended.)



2. Drill is inserted into the pilot hole with the MSG drill rotation stopped or rotating CCW at 300rpm or less.
● UP to 1-2mm before hole bottom.



3. Coolant is turned ON, raise cutting speed and feed to the recommended cutting condition.



4. Return to "Pos 2" after drilling end, coolant turned OFF and drill rotation is stopped.

VCSSS

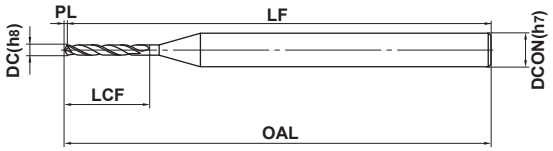
Short, For steel (3mm shank series)

UWC | VC | 130° DC≤0.6 | 120° DC≥0.7 | X Thinning

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal	Heat Resistant Alloy	Hardened Steel

DC≤2.4
h7: 0 / −0.014
0 / −0.010





● First recommendation for pilot hole drilling of hardened material.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VCSSSD0030	0.3	3.07	38.07	38	0.07	3	●
VCSSSD0040	0.4	4.09	38.09	38	0.09	3	●
VCSSSD0050	0.5	4.12	38.12	38	0.12	3	●
VCSSSD0060	0.6	5.14	38.14	38	0.14	3	●
VCSSSD0070	0.7	5.20	38.20	38	0.20	3	●
VCSSSD0080	0.8	6.23	38.23	38	0.23	3	●
VCSSSD0090	0.9	6.26	38.26	38	0.26	3	●
VCSSSD0100	1.0	8.3	38.3	38	0.3	3	●
VCSSSD0110	1.1	8.3	38.3	38	0.3	3	●
VCSSSD0120	1.2	8.4	38.4	38	0.4	3	●
VCSSSD0130	1.3	8.4	38.4	38	0.4	3	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VCSSSD0140	1.4	8.4	38.4	38	0.4	3	●
VCSSSD0150	1.5	10.4	45.4	45	0.4	3	●
VCSSSD0160	1.6	10.5	45.5	45	0.5	3	●
VCSSSD0170	1.7	10.5	45.5	45	0.5	3	●
VCSSSD0180	1.8	10.5	45.5	45	0.5	3	●
VCSSSD0190	1.9	10.6	45.6	45	0.6	3	●
VCSSSD0200	2.0	12.6	45.6	45	0.6	3	●
VCSSSD0210	2.1	12.6	45.6	45	0.6	3	●
VCSSSD0220	2.2	12.6	45.6	45	0.6	3	●
VCSSSD0230	2.3	12.7	45.7	45	0.7	3	●
VCSSSD0240	2.4	12.7	45.7	45	0.7	3	●

RECOMMENDED CUTTING CONDITIONS

Work Material	Heat-treated steel AISI H13, AISI 4140 etc. (40–50HRC)			Hardened steel AISI H13, AISI 420 etc. (50–55HRC)			Hardened steel AISI D2, Powder high-speed steel etc. (55–60HRC)		
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Step feed (mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Step feed (mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Step feed (mm)
0.3	21000	0.005	0.03	16000	0.005	0.03	11000	0.005	0.03
0.5	13000	0.005	0.05	9600	0.005	0.05	6400	0.005	0.05
0.8	8000	0.008	0.08	6000	0.008	0.08	4000	0.008	0.08
1.0	6400	0.01	0.10	4800	0.01	0.10	3200	0.01	0.10
1.2	5300	0.01	0.15	4000	0.01	0.15	2700	0.01	0.10
1.5	4200	0.02	0.20	3200	0.01	0.20	2100	0.01	0.20
1.8	3500	0.03	0.25	2700	0.01	0.25	1800	0.01	0.20
2.0	3200	0.04	0.30	2400	0.02	0.30	1600	0.02	0.30
2.2	2900	0.04	0.40	2200	0.02	0.40	1400	0.02	0.30
2.4	2700	0.05	0.50	2000	0.02	0.50	1300	0.02	0.30

1) Please use a machine with a high accuracy spindle.
2) A collet chuck is recommended to maintain shank condition.
3) Use emulsion as a cutting fluid.

● : Inventory maintained in Japan.

CARBIDE

VCHSM

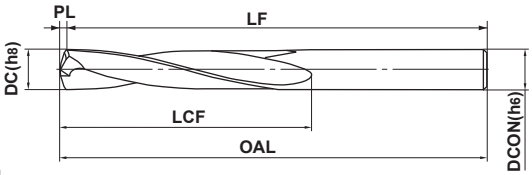
Medium, For hardened material

UWC VC 130° (DC<6) 120° 140° (DC≥6) X Thinning

P M K N **S** Heat Resistant Alloy **H** Hardened Steel

h6	DC≤3	3<DC≤6	6<DC≤10	10<DC≤16
	0 −0.014	0 −0.018	0 −0.022	0 −0.027
	0 −0.009	0 −0.012	0 −0.015	0 −0.018





● A suitable geometry for high hardness (60 HRC) material drilling.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VCHSMD0250	2.5	20.6	55.6	55	0.6	2.5	●
VCHSM**D0260**	2.6	20.6	55.6	55	0.6	2.6	●
VCHSM**D0270**	2.7	20.6	55.6	55	0.6	2.7	●
VCHSM**D0280**	2.8	21.7	60.7	60	0.7	2.8	●
VCHSM**D0290**	2.9	21.7	60.7	60	0.7	2.9	●
VCHSM**D0300**	3.0	21.7	60.7	60	0.7	3.0	●
VCHSM**D0310**	3.1	24.7	60.7	60	0.7	3.1	●
VCHSM**D0320**	3.2	24.7	60.7	60	0.7	3.2	●
VCHSM**D0330**	3.3	24.8	60.8	60	0.8	3.3	●
VCHSM**D0340**	3.4	24.8	60.8	60	0.8	3.4	●
VCHSM**D0350**	3.5	24.8	60.8	60	0.8	3.5	●
VCHSM**D0360**	3.6	27.8	60.8	60	0.8	3.6	●
VCHSM**D0370**	3.7	27.9	60.9	60	0.9	3.7	●
VCHSM**D0380**	3.8	27.9	60.9	60	0.9	3.8	●
VCHSM**D0390**	3.9	27.9	60.9	60	0.9	3.9	●
VCHSM**D0400**	4.0	27.9	60.9	60	0.9	4.0	●
VCHSM**D0410**	4.1	30.0	64.0	63	1.0	4.1	●
VCHSM**D0420**	4.2	30.0	64.0	63	1.0	4.2	●
VCHSM**D0430**	4.3	30.0	64.0	63	1.0	4.3	●
VCHSM**D0440**	4.4	30.0	64.0	63	1.0	4.4	●
VCHSM**D0450**	4.5	30.0	64.0	63	1.0	4.5	●
VCHSM**D0460**	4.6	33.1	69.1	68	1.1	4.6	●
VCHSM**D0470**	4.7	33.1	69.1	68	1.1	4.7	●
VCHSM**D0480**	4.8	33.1	69.1	68	1.1	4.8	●
VCHSM**D0490**	4.9	33.1	69.1	68	1.1	4.9	●
VCHSM**D0500**	5.0	33.2	69.2	68	1.2	5.0	●
VCHSM**D0510**	5.1	35.2	73.2	72	1.2	5.1	●
VCHSM**D0520**	5.2	35.2	73.2	72	1.2	5.2	●
VCHSM**D0530**	5.3	35.2	73.2	72	1.2	5.3	●
VCHSM**D0540**	5.4	35.3	73.3	72	1.3	5.4	●
VCHSM**D0550**	5.5	35.3	73.3	72	1.3	5.5	●
VCHSM**D0560**	5.6	37.3	75.3	74	1.3	5.6	●
VCHSM**D0570**	5.7	37.3	75.3	74	1.3	5.7	●
VCHSM**D0580**	5.8	37.4	75.4	74	1.4	5.8	●
VCHSM**D0590**	5.9	37.4	75.4	74	1.4	5.9	●
VCHSM**D0600**	6.0	42.2	82.2	81	1.2	6.0	●
VCHSM**D0650**	6.5	42.3	82.3	81	1.3	6.5	●
VCHSM**D0690**	6.9	44.4	84.4	83	1.4	6.9	●
VCHSM**D0700**	7.0	44.4	84.4	83	1.4	7.0	●
VCHSM**D0750**	7.5	46.5	88.5	87	1.5	7.5	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VCHSMD0800	8.0	49.6	91.6	90	1.6	8.0	●
VCHSM**D0850**	8.5	54.7	97.7	96	1.7	8.5	●
VCHSM**D0860**	8.6	56.7	99.7	98	1.7	8.6	●
VCHSM**D0900**	9.0	56.8	99.8	98	1.8	9.0	●
VCHSM**D0950**	9.5	59.9	103.9	102	1.9	9.5	●
VCHSM**D1000**	10.0	62.0	107.0	105	2.0	10.0	●
VCHSM**D1040**	10.4	68.1	114.1	112	2.1	10.4	●
VCHSM**D1050**	10.5	68.1	114.1	112	2.1	10.5	●
VCHSM**D1100**	11.0	70.2	116.2	114	2.2	11.0	●
VCHSM**D1150**	11.5	73.3	120.3	118	2.3	11.5	●
VCHSM**D1200**	12.0	75.4	123.4	121	2.4	12.0	●
VCHSM**D1250**	12.5	78.5	137.5	135	2.5	12.5	●
VCHSM**D1300**	13.0	80.6	139.6	137	2.6	13.0	●
VCHSM**D1350**	13.5	86.7	146.7	144	2.7	13.5	●
VCHSM**D1400**	14.0	88.8	149.8	147	2.8	14.0	●
VCHSM**D1450**	14.5	91.9	153.9	151	2.9	14.5	●
VCHSM**D1500**	15.0	94.0	156.0	153	3.0	15.0	●
VCHSM**D1550**	15.5	97.2	160.2	157	3.2	15.5	●
VCHSM**D1600**	16.0	99.3	163.3	160	3.3	16.0	●

RECOMMENDED CUTTING CONDITIONS

Work Material	Hardened steel AISI H13, AISI 420 etc. (50—55HRC)		Hardened steel AISI D2, Powder high-speed steel etc. (55—60HRC)	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
2.5	1900	0.06	1300	0.04
3.0	1600	0.06	1100	0.04
4.0	1200	0.06	800	0.04
5.0	1000	0.06	600	0.04
6.0	800	0.06	530	0.04
8.0	600	0.07	400	0.05
10.0	480	0.07	320	0.05
12.0	400	0.07	270	0.05
14.0	340	0.07	230	0.05
16.0	300	0.07	200	0.05

1) Use rigid machines.
2) Collet chuck is recommended to maintain shank condition.
3) Use emulsion as cutting fluid.
4) Recommended depth of drilling is 3DC (DC:drill diameter) under these cutting conditions.

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

DRILLING

MAE/MAS

- Specially for aluminium and cast iron drilling.
- High hole accuracy.
- Pre-hole drilling for roll taps.
- Helical through coolant hole enables high speed machining (MAS type).

P	M	K	N	S	H
		Cast Iron	Non-ferrous Metal		

MAE (External coolant)



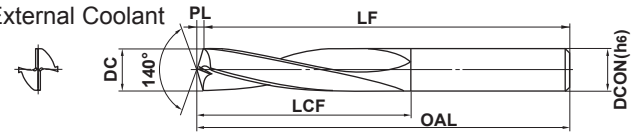
MAS (Internal coolant)



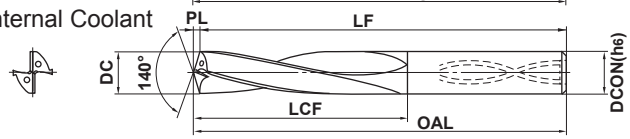
(Note 1) MAS type bigger than ϕ5.0 have a recess in the end face.
(Note 2) MAE/MAS drills are suitable for use with shrink fit holders.

	DC=3	3<DC≤6	6<DC≤10	10<DC≤16
h6	+0.005 0	+0.005 0	+0.005 0	+0.005 0
	0 −0.006	0 −0.008	0 −0.009	0 −0.011

External Coolant



Internal Coolant



DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock HTi10	Order Number	Dimensions (mm) LCF	OAL	LF	PL	DCON
3.0	3	Ext.	●	MAE0300MB	21.5	61.5	61	0.5	3
	3	Int.	□	MAS0300MB	21.5	61.5	61	0.5	3
	6	Int.	●	MAS0300LB	30.5	70.5	70	0.5	3
3.1	3	Ext.	●	MAE0310MB	24.6	64.6	64	0.6	4
	3	Int.	□	MAS0310MB	24.6	64.6	64	0.6	4
	6	Int.	●	MAS0310LB	34.6	74.6	74	0.6	4
3.2	3	Ext.	●	MAE0320MB	24.6	64.6	64	0.6	4
	3	Int.	□	MAS0320MB	24.6	64.6	64	0.6	4
	6	Int.	●	MAS0320LB	34.6	74.6	74	0.6	4
3.3	3	Ext.	●	MAE0330MB	24.6	64.6	64	0.6	4
	3	Int.	□	MAS0330MB	24.6	64.6	64	0.6	4
	6	Int.	●	MAS0330LB	34.6	74.6	74	0.6	4
3.4	3	Ext.	●	MAE0340MB	24.6	64.6	64	0.6	4
	3	Int.	□	MAS0340MB	24.6	64.6	64	0.6	4
	6	Int.	●	MAS0340LB	34.6	74.6	74	0.6	4
3.5	3	Ext.	●	MAE0350MB	24.6	64.6	64	0.6	4
	3	Int.	□	MAS0350MB	24.6	64.6	64	0.6	4
	6	Int.	●	MAS0350LB	34.6	74.6	74	0.6	4
3.6	3	Ext.	●	MAE0360MB	28.7	68.7	68	0.7	4
	3	Int.	□	MAS0360MB	28.7	68.7	68	0.7	4
	6	Int.	●	MAS0360LB	40.7	80.7	80	0.7	4
3.65	3	Ext.	●	*MAE0365MB	28.7	68.7	68	0.7	4
	3	Int.	□	*MAS0365MB	28.7	68.7	68	0.7	4
	6	Int.	●	*MAS0365LB	40.7	80.7	80	0.7	4
3.7	3	Ext.	●	MAE0370MB	28.7	68.7	68	0.7	4
	3	Int.	□	MAS0370MB	28.7	68.7	68	0.7	4
	6	Int.	●	MAS0370LB	40.7	80.7	80	0.7	4
3.8	3	Ext.	●	MAE0380MB	28.7	68.7	68	0.7	4
	3	Int.	□	MAS0380MB	28.7	68.7	68	0.7	4
	6	Int.	●	MAS0380LB	40.7	80.7	80	0.7	4
3.9	3	Ext.	●	MAE0390MB	28.7	68.7	68	0.7	4
	3	Int.	□	MAS0390MB	28.7	68.7	68	0.7	4
	6	Int.	●	MAS0390LB	40.7	80.7	80	0.7	4
4.0	3	Ext.	●	MAE0400MB	28.7	68.7	68	0.7	4
	3	Int.	□	MAS0400MB	28.7	68.7	68	0.7	4
	6	Int.	●	MAS0400LB	40.7	80.7	80	0.7	4
4.1	3	Ext.	●	MAE0410MB	31.7	71.7	71	0.7	5
	3	Int.	□	MAS0410MB	31.7	71.7	71	0.7	5
	6	Int.	●	MAS0410LB	44.7	84.7	84	0.7	5
4.2	3	Ext.	●	MAE0420MB	31.8	71.8	71	0.8	5
	3	Int.	□	MAS0420MB	31.8	71.8	71	0.8	5
	6	Int.	●	MAS0420LB	44.8	84.8	84	0.8	5
4.3	3	Ext.	●	MAE0430MB	31.8	71.8	71	0.8	5
	3	Int.	□	MAS0430MB	31.8	71.8	71	0.8	5
	6	Int.	●	MAS0430LB	44.8	84.8	84	0.8	5
4.4	3	Ext.	●	MAE0440MB	31.8	71.8	71	0.8	5
	3	Int.	□	MAS0440MB	31.8	71.8	71	0.8	5
	6	Int.	●	MAS0440LB	44.8	84.8	84	0.8	5
4.5	3	Ext.	●	MAE0450MB	31.8	71.8	71	0.8	5
	3	Int.	□	MAS0450MB	31.8	71.8	71	0.8	5
	6	Int.	●	MAS0450LB	44.8	84.8	84	0.8	5
4.6	3	Ext.	●	*MAE0460MB	33.8	73.8	73	0.8	5
	3	Int.	□	*MAS0460MB	33.8	73.8	73	0.8	5
	6	Int.	●	*MAS0460LB	48.8	88.8	88	0.8	5
4.7	3	Ext.	●	MAE0470MB	33.9	73.9	73	0.9	5
	3	Int.	□	MAS0470MB	33.9	73.9	73	0.9	5
	6	Int.	●	MAS0470LB	48.9	88.9	88	0.9	5
4.8	3	Ext.	●	MAE0480MB	33.9	73.9	73	0.9	5
	3	Int.	□	MAS0480MB	33.9	73.9	73	0.9	5
	6	Int.	●	MAS0480LB	48.9	88.9	88	0.9	5
4.9	3	Ext.	●	MAE0490MB	33.9	73.9	73	0.9	5
	3	Int.	□	MAS0490MB	33.9	73.9	73	0.9	5
	6	Int.	●	MAS0490LB	48.9	88.9	88	0.9	5
5.0	3	Ext.	●	MAE0500MB	33.9	73.9	73	0.9	5
	3	Int.	●	MAS0500MB	33.9	73.9	73	0.9	5
	6	Int.	●	MAS0500LB	48.9	88.9	88	0.9	5
5.1	3	Ext.	●	MAE0510MB	36.9	76.9	76	0.9	6
	3	Int.	□	MAS0510MB	36.9	76.9	76	0.9	6
	6	Int.	●	MAS0510LB	52.9	92.9	92	0.9	6
5.2	3	Ext.	●	MAE0520MB	36.9	76.9	76	0.9	6
	3	Int.	□	MAS0520MB	36.9	76.9	76	0.9	6
	6	Int.	●	MAS0520LB	52.9	92.9	92	0.9	6
5.3	3	Ext.	●	MAE0530MB	37.0	77.0	76	1.0	6
	3	Int.	□	MAS0530MB	37.0	77.0	76	1.0	6
	6	Int.	●	MAS0530LB	53.0	93.0	92	1.0	6
5.4	3	Ext.	●	MAE0540MB	37.0	77.0	76	1.0	6
	3	Int.	□	MAS0540MB	37.0	77.0	76	1.0	6
	6	Int.	●	MAS0540LB	53.0	93.0	92	1.0	6

* Standard hole size for rolled thread taps.

CUTTING CONDITIONS ➤ N134
TECHNICAL DATA ➤ Q001

MAE/MAS

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock HTi10	Order Number	Dimensions (mm) LCF	OAL	LF	PL	DCON
5.5	3	Ext.	●	*MAE0550MB	37.0	77.0	76	1.0	6
	3	Int.	●	*MAS0550MB	37.0	77.0	76	1.0	6
	6	Int.	●	*MAS0550LB	53.0	93.0	92	1.0	6
5.6	3	Ext.	●	MAE0560MB	40.0	80.0	79	1.0	6
	3	Int.	□	MAS0560MB	40.0	80.0	79	1.0	6
	6	Int.	●	MAS0560LB	58.0	98.0	97	1.0	6
5.7	3	Ext.	●	MAE0570MB	40.0	80.0	79	1.0	6
	3	Int.	□	MAS0570MB	40.0	80.0	79	1.0	6
	6	Int.	●	MAS0570LB	58.0	98.0	97	1.0	6
5.8	3	Ext.	●	MAE0580MB	40.1	80.1	79	1.1	6
	3	Int.	□	MAS0580MB	40.1	80.1	79	1.1	6
	6	Int.	●	MAS0580LB	58.1	98.1	97	1.1	6
5.9	3	Ext.	●	MAE0590MB	40.1	80.1	79	1.1	6
	3	Int.	□	MAS0590MB	40.1	80.1	79	1.1	6
	6	Int.	●	MAS0590LB	58.1	98.1	97	1.1	6
6.0	3	Ext.	●	MAE0600MB	40.1	80.1	79	1.1	6
	3	Int.	●	MAS0600MB	40.1	80.1	79	1.1	6
	6	Int.	●	MAS0600LB	58.1	98.1	97	1.1	6
6.1	3	Ext.	●	MAE0610MB	43.1	85.1	84	1.1	7
	3	Int.	□	MAS0610MB	43.1	85.1	84	1.1	7
	6	Int.	●	MAS0610LB	63.1	105.1	104	1.1	7
6.2	3	Ext.	●	MAE0620MB	43.1	85.1	84	1.1	7
	3	Int.	□	MAS0620MB	43.1	85.1	84	1.1	7
	6	Int.	●	MAS0620LB	63.1	105.1	104	1.1	7
6.3	3	Ext.	●	MAE0630MB	43.1	85.1	84	1.1	7
	3	Int.	□	MAS0630MB	43.1	85.1	84	1.1	7
	6	Int.	●	MAS0630LB	63.1	105.1	104	1.1	7
6.4	3	Ext.	●	MAE0640MB	43.2	85.2	84	1.2	7
	3	Int.	□	MAS0640MB	43.2	85.2	84	1.2	7
	6	Int.	●	MAS0640LB	63.2	105.2	104	1.2	7
6.5	3	Ext.	●	MAE0650MB	43.2	85.2	84	1.2	7
	3	Int.	●	MAS0650MB	43.2	85.2	84	1.2	7
	6	Int.	●	MAS0650LB	63.2	105.2	104	1.2	7
6.6	3	Ext.	●	MAE0660MB	43.2	85.2	84	1.2	7
	3	Int.	□	MAS0660MB	43.2	85.2	84	1.2	7
	6	Int.	●	MAS0660LB	66.2	108.2	107	1.2	7
6.7	3	Ext.	●	MAE0670MB	43.2	85.2	84	1.2	7
	3	Int.	□	MAS0670MB	43.2	85.2	84	1.2	7
	6	Int.	●	MAS0670LB	66.2	108.2	107	1.2	7
6.8	3	Ext.	●	MAE0680MB	43.2	85.2	84	1.2	7
	3	Int.	●	MAS0680MB	43.2	85.2	84	1.2	7
	6	Int.	●	MAS0680LB	66.2	108.2	107	1.2	7
6.9	3	Ext.	●	MAE0690MB	43.3	85.3	84	1.3	7
	3	Int.	□	MAS0690MB	43.3	85.3	84	1.3	7
	6	Int.	●	MAS0690LB	66.3	108.3	107	1.3	7
7.0	3	Ext.	●	MAE0700MB	43.3	85.3	84	1.3	7
	3	Int.	●	MAS0700MB	43.3	85.3	84	1.3	7
	6	Int.	●	MAS0700LB	66.3	108.3	107	1.3	7
7.1	3	Ext.	●	MAE0710MB	49.3	91.3	90	1.3	8
	3	Int.	□	MAS0710MB	49.3	91.3	90	1.3	8
	6	Int.	●	MAS0710LB	69.3	111.3	110	1.3	8
7.2	3	Ext.	●	MAE0720MB	49.3	91.3	90	1.3	8
	3	Int.	□	MAS0720MB	49.3	91.3	90	1.3	8
	6	Int.	●	MAS0720LB	69.3	111.3	110	1.3	8
7.3	3	Ext.	●	MAE0730MB	49.3	91.3	90	1.3	8
	3	Int.	□	MAS0730MB	49.3	91.3	90	1.3	8
	6	Int.	●	MAS0730LB	69.3	111.3	110	1.3	8
7.35	3	Ext.	●	*MAE0735MB	49.3	91.3	90	1.3	8
	3	Int.	●	*MAS0735MB	49.3	91.3	90	1.3	8
	6	Int.	●	*MAS0735LB	69.3	111.3	110	1.3	8
7.4	3	Ext.	●	MAE0740MB	49.3	91.3	90	1.3	8
	3	Int.	□	MAS0740MB	49.3	91.3	90	1.3	8
	6	Int.	●	MAS0740LB	69.3	111.3	110	1.3	8
7.5	3	Ext.	●	MAE0750MB	49.4	91.4	90	1.4	8
	3	Int.	□	MAS0750MB	49.4	91.4	90	1.4	8
	6	Int.	●	MAS0750LB	69.4	111.4	110	1.4	8
7.6	3	Ext.	●	MAE0760MB	49.4	91.4	90	1.4	8
	3	Int.	□	MAS0760MB	49.4	91.4	90	1.4	8
	6	Int.	●	MAS0760LB	73.4	115.4	114	1.4	8
7.7	3	Ext.	●	MAE0770MB	49.4	91.4	90	1.4	8
	3	Int.	□	MAS0770MB	49.4	91.4	90	1.4	8
	6	Int.	●	MAS0770LB	73.4	115.4	114	1.4	8
7.8	3	Ext.	●	MAE0780MB	49.4	91.4	90	1.4	8
	3	Int.	□	MAS0780MB	49.4	91.4	90	1.4	8
	6	Int.	●	MAS0780LB	73.4	115.4	114	1.4	8
7.9	3	Ext.	●	MAE0790MB	49.4	91.4	90	1.4	8
	3	Int.	□	MAS0790MB	49.4	91.4	90	1.4	8
	6	Int.	●	MAS0790LB	73.4	115.4	114	1.4	8
8.0	3	Ext.	●	MAE0800MB	49.5	91.5	90	1.5	8
	3	Int.	●	MAS0800MB	49.5	91.5	90	1.5	8
	6	Int.	●	MAS0800LB	73.5	115.5	114	1.5	8
8.1	3	Ext.	●	MAE0810MB	51.5	95.5	94	1.5	9
	3	Int.	□	MAS0810MB	51.5	95.5	94	1.5	9
	6	Int.	●	MAS0810LB	76.5	120.5	119	1.5	9
8.2	3	Ext.	●	MAE0820MB	51.5	95.5	94	1.5	9
	3	Int.	□	MAS0820MB	51.5	95.5	94	1.5	9
	6	Int.	●	MAS0820LB	76.5	120.5	119	1.5	9
8.3	3	Ext.	●	MAE0830MB	51.5	95.5	94	1.5	9
	3	Int.	□	MAS0830MB	51.5	95.5	94	1.5	9
	6	Int.	●	MAS0830LB	76.5	120.5	119	1.5	9
8.4	3	Ext.	●	MAE0840MB	51.5	95.5	94	1.5	9
	3	Int.	□	MAS0840MB	51.5	95.5	94	1.5	9
	6	Int.	●	MAS0840LB	76.5	120.5	119	1.5	9
8.5	3	Ext.	●	MAE0850MB	51.5	95.5	94	1.5	9
	3	Int.	●	MAS0850MB	51.5	95.5	94	1.5	9
	6	Int.	●	MAS0850LB	76.5	120.5	119	1.5	9

* Standard hole size for rolled thread taps.

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock HTi10	Order Number	Dimensions (mm) LCF	OAL	LF	PL	DCON
	3	Ext.	●	MAE0860MB	51.6	95.6	94	1.6	9
8.6	3	Int.	□	MAS0860MB	51.6	95.6	94	1.6	9
	6	Int.	●	MAS0860LB	78.6	122.6	121	1.6	9
	3	Ext.	●	MAE0870MB	51.6	95.6	94	1.6	9
8.7	3	Int.	□	MAS0870MB	51.6	95.6	94	1.6	9
	6	Int.	●	MAS0870LB	78.6	122.6	121	1.6	9
	3	Ext.	●	MAE0880MB	51.6	95.6	94	1.6	9
8.8	3	Int.	□	MAS0880MB	51.6	95.6	94	1.6	9
	6	Int.	●	MAS0880LB	78.6	122.6	121	1.6	9
	3	Ext.	●	MAE0890MB	51.6	95.6	94	1.6	9
8.9	3	Int.	□	MAS0890MB	51.6	95.6	94	1.6	9
	6	Int.	●	MAS0890LB	78.6	122.6	121	1.6	9
	3	Ext.	●	MAE0900MB	51.6	95.6	94	1.6	9
9.0	3	Int.	●	MAS0900MB	51.6	95.6	94	1.6	9
	6	Int.	●	MAS0900LB	78.6	122.6	121	1.6	9
	3	Ext.	●	MAE0910MB	54.7	98.7	97	1.7	10
9.1	3	Int.	□	MAS0910MB	54.7	98.7	97	1.7	10
	6	Int.	●	MAS0910LB	82.7	126.7	125	1.7	10
	3	Ext.	●	MAE0920MB	54.7	98.7	97	1.7	10
9.2	3	Int.	□	MAS0920MB	54.7	98.7	97	1.7	10
	6	Int.	●	MAS0920LB	82.7	126.7	125	1.7	10
	3	Ext.	●	*MAE0921MB	54.7	98.7	97	1.7	10
9.21	3	Int.	●	*MAS0921MB	54.7	98.7	97	1.7	10
	6	Int.	●	*MAS0921LB	82.7	126.7	125	1.7	10
	3	Ext.	●	MAE0930MB	54.7	98.7	97	1.7	10
9.3	3	Int.	□	MAS0930MB	54.7	98.7	97	1.7	10
	6	Int.	●	MAS0930LB	82.7	126.7	125	1.7	10
	3	Ext.	●	MAE0940MB	54.7	98.7	97	1.7	10
9.4	3	Int.	□	MAS0940MB	54.7	98.7	97	1.7	10
	6	Int.	●	MAS0940LB	82.7	126.7	125	1.7	10
	3	Ext.	●	MAE0950MB	54.7	98.7	97	1.7	10
9.5	3	Int.	●	MAS0950MB	54.7	98.7	97	1.7	10
	6	Int.	●	MAS0950LB	82.7	126.7	125	1.7	10
	3	Ext.	●	MAE0960MB	54.7	98.7	97	1.7	10
9.6	3	Int.	□	MAS0960MB	54.7	98.7	97	1.7	10
	6	Int.	●	MAS0960LB	82.7	126.7	125	1.7	10
	3	Ext.	●	MAE0970MB	54.8	98.8	97	1.8	10
9.7	3	Int.	□	MAS0970MB	54.8	98.8	97	1.8	10
	6	Int.	●	MAS0970LB	82.8	126.8	125	1.8	10
	3	Ext.	●	MAE0980MB	54.8	98.8	97	1.8	10
9.8	3	Int.	□	MAS0980MB	54.8	98.8	97	1.8	10
	6	Int.	●	MAS0980LB	82.8	126.8	125	1.8	10
	3	Ext.	●	MAE0990MB	54.8	98.8	97	1.8	10
9.9	3	Int.	□	MAS0990MB	54.8	98.8	97	1.8	10
	6	Int.	●	MAS0990LB	82.8	126.8	125	1.8	10
	3	Ext.	●	MAE1000MB	54.8	98.8	97	1.8	10
10.0	3	Int.	●	MAS1000MB	54.8	98.8	97	1.8	10
	6	Int.	●	MAS1000LB	82.8	126.8	125	1.8	10

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock HTi10	Order Number	Dimensions (mm) LCF	OAL	LF	PL	DCON
	3	Ext.	□	MAE1010MB	56.8	102.8	101	1.8	11
10.1	3	Int.	□	MAS1010MB	56.8	102.8	101	1.8	11
	6	Int.	□	MAS1010LB	90.8	136.8	135	1.8	11
	3	Ext.	□	MAE1020MB	56.9	102.9	101	1.9	11
10.2	3	Int.	□	MAS1020MB	56.9	102.9	101	1.9	11
	6	Int.	□	MAS1020LB	90.9	136.9	135	1.9	11
	3	Ext.	●	MAE1030MB	56.9	102.9	101	1.9	11
10.3	3	Int.	●	MAS1030MB	56.9	102.9	101	1.9	11
	6	Int.	●	MAS1030LB	90.9	136.9	135	1.9	11
	3	Ext.	□	MAE1040MB	56.9	102.9	101	1.9	11
10.4	3	Int.	□	MAS1040MB	56.9	102.9	101	1.9	11
	6	Int.	□	MAS1040LB	90.9	136.9	135	1.9	11
	3	Ext.	●	MAE1050MB	56.9	102.9	101	1.9	11
10.5	3	Int.	●	MAS1050MB	56.9	102.9	101	1.9	11
	6	Int.	●	MAS1050LB	90.9	136.9	135	1.9	11
	3	Ext.	□	MAE1060MB	56.9	102.9	101	1.9	11
10.6	3	Int.	□	MAS1060MB	56.9	102.9	101	1.9	11
	6	Int.	□	MAS1060LB	90.9	136.9	135	1.9	11
	3	Ext.	□	MAE1070MB	56.9	102.9	101	1.9	11
10.7	3	Int.	□	MAS1070MB	56.9	102.9	101	1.9	11
	6	Int.	□	MAS1070LB	90.9	136.9	135	1.9	11
	3	Ext.	□	MAE1080MB	57.0	103.0	101	2.0	11
10.8	3	Int.	□	MAS1080MB	57.0	103.0	101	2.0	11
	6	Int.	□	MAS1080LB	91.0	137.0	135	2.0	11
	3	Ext.	□	MAE1090MB	57.0	103.0	101	2.0	11
10.9	3	Int.	□	MAS1090MB	57.0	103.0	101	2.0	11
	6	Int.	□	MAS1090LB	91.0	137.0	135	2.0	11
	3	Ext.	●	MAE1100MB	57.0	103.0	101	2.0	11
11.0	3	Int.	●	MAS1100MB	57.0	103.0	101	2.0	11
	6	Int.	●	MAS1100LB	91.0	137.0	135	2.0	11
	3	Ext.	●	*MAE1108MB	62.0	108.0	106	2.0	12
11.08	3	Int.	●	*MAS1108MB	62.0	108.0	106	2.0	12
	6	Int.	●	*MAS1108LB	96.0	142.0	140	2.0	12
	3	Ext.	□	MAE1110MB	62.0	108.0	106	2.0	12
11.1	3	Int.	□	MAS1110MB	62.0	108.0	106	2.0	12
	6	Int.	□	MAS1110LB	96.0	142.0	140	2.0	12
	3	Ext.	□	MAE1120MB	62.0	108.0	106	2.0	12
11.2	3	Int.	□	MAS1120MB	62.0	108.0	106	2.0	12
	6	Int.	□	MAS1120LB	96.0	142.0	140	2.0	12
	3	Ext.	□	MAE1130MB	62.1	108.1	106	2.1	12
11.3	3	Int.	□	MAS1130MB	62.1	108.1	106	2.1	12
	6	Int.	□	MAS1130LB	96.1	142.1	140	2.1	12
	3	Ext.	□	MAE1140MB	62.1	108.1	106	2.1	12
11.4	3	Int.	□	MAS1140MB	62.1	108.1	106	2.1	12
	6	Int.	□	MAS1140LB	96.1	142.1	140	2.1	12
	3	Ext.	□	MAE1150MB	62.1	108.1	106	2.1	12
11.5	3	Int.	□	MAS1150MB	62.1	108.1	106	2.1	12
	6	Int.	□	MAS1150LB	96.1	142.1	140	2.1	12

* Standard hole size for rolled thread taps.

CUTTING CONDITIONS ➤ N134
TECHNICAL DATA ➤ Q001

MAE/MAS

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock HTi10	Order Number	Dimensions (mm) LCF	OAL	LF	PL	DCON
	3	Ext.	□	MAE1160MB	62.1	108.1	106	2.1	12
11.6	3	Int.	□	MAS1160MB	62.1	108.1	106	2.1	12
	6	Int.	□	MAS1160LB	96.1	142.1	140	2.1	12
	3	Ext.	□	MAE1170MB	62.1	108.1	106	2.1	12
11.7	3	Int.	□	MAS1170MB	62.1	108.1	106	2.1	12
	6	Int.	□	MAS1170LB	96.1	142.1	140	2.1	12
	3	Ext.	□	MAE1180MB	62.1	108.1	106	2.1	12
11.8	3	Int.	□	MAS1180MB	62.1	108.1	106	2.1	12
	6	Int.	□	MAS1180LB	96.1	142.1	140	2.1	12
	3	Ext.	□	MAE1190MB	62.2	108.2	106	2.2	12
11.9	3	Int.	□	MAS1190MB	62.2	108.2	106	2.2	12
	6	Int.	□	MAS1190LB	96.2	142.2	140	2.2	12
	3	Ext.	●	MAE1200MB	62.2	108.2	106	2.2	12
12.0	3	Int.	●	MAS1200MB	62.2	108.2	106	2.2	12
	6	Int.	●	MAS1200LB	96.2	142.2	140	2.2	12
	3	Ext.	□	MAE1210MB	67.2	117.2	115	2.2	13
12.1	3	Int.	□	MAS1210MB	67.2	117.2	115	2.2	13
	6	Int.	□	MAS1210LB	102.2	152.2	150	2.2	13
	3	Ext.	□	MAE1220MB	67.2	117.2	115	2.2	13
12.2	3	Int.	□	MAS1220MB	67.2	117.2	115	2.2	13
	6	Int.	□	MAS1220LB	102.2	152.2	150	2.2	13
	3	Ext.	□	MAE1230MB	67.2	117.2	115	2.2	13
12.3	3	Int.	□	MAS1230MB	67.2	117.2	115	2.2	13
	6	Int.	□	MAS1230LB	102.2	152.2	150	2.2	13
	3	Ext.	□	MAE1240MB	67.3	117.3	115	2.3	13
12.4	3	Int.	□	MAS1240MB	67.3	117.3	115	2.3	13
	6	Int.	□	MAS1240LB	102.3	152.3	150	2.3	13
	3	Ext.	●	MAE1250MB	67.3	117.3	115	2.3	13
12.5	3	Int.	●	MAS1250MB	67.3	117.3	115	2.3	13
	6	Int.	●	MAS1250LB	102.3	152.3	150	2.3	13
	3	Ext.	□	MAE1260MB	67.3	117.3	115	2.3	13
12.6	3	Int.	□	MAS1260MB	67.3	117.3	115	2.3	13
	6	Int.	□	MAS1260LB	102.3	152.3	150	2.3	13
	3	Ext.	□	MAE1270MB	67.3	117.3	115	2.3	13
12.7	3	Int.	□	MAS1270MB	67.3	117.3	115	2.3	13
	6	Int.	□	MAS1270LB	102.3	152.3	150	2.3	13
	3	Ext.	□	MAE1280MB	67.3	117.3	115	2.3	13
12.8	3	Int.	□	MAS1280MB	67.3	117.3	115	2.3	13
	6	Int.	□	MAS1280LB	102.3	152.3	150	2.3	13
	3	Ext.	□	MAE1290MB	67.3	117.3	115	2.3	13
12.9	3	Int.	□	MAS1290MB	67.3	117.3	115	2.3	13
	6	Int.	□	MAS1290LB	102.3	152.3	150	2.3	13
	3	Ext.	●	*MAE1296MB	67.4	117.4	115	2.4	13
12.96	3	Int.	●	*MAS1296MB	67.4	117.4	115	2.4	13
	6	Int.	●	*MAS1296LB	102.4	152.4	150	2.4	13
	3	Ext.	●	MAE1300MB	67.4	117.4	115	2.4	13
13.0	3	Int.	●	MAS1300MB	67.4	117.4	115	2.4	13
	6	Int.	●	MAS1300LB	102.4	152.4	150	2.4	13

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock HTi10	Order Number	Dimensions (mm) LCF	OAL	LF	PL	DCON
	3	Ext.	□	MAE1310MB	72.4	122.4	120	2.4	14
13.1	3	Int.	□	MAS1310MB	72.4	122.4	120	2.4	14
	6	Int.	□	MAS1310LB	112.4	162.4	160	2.4	14
	3	Ext.	□	MAE1320MB	72.4	122.4	120	2.4	14
13.2	3	Int.	□	MAS1320MB	72.4	122.4	120	2.4	14
	6	Int.	□	MAS1320LB	112.4	162.4	160	2.4	14
	3	Ext.	□	MAE1330MB	72.4	122.4	120	2.4	14
13.3	3	Int.	□	MAS1330MB	72.4	122.4	120	2.4	14
	6	Int.	□	MAS1330LB	112.4	162.4	160	2.4	14
	3	Ext.	□	MAE1340MB	72.4	122.4	120	2.4	14
13.4	3	Int.	□	MAS1340MB	72.4	122.4	120	2.4	14
	6	Int.	□	MAS1340LB	112.4	162.4	160	2.4	14
	3	Ext.	●	MAE1350MB	72.5	122.5	120	2.5	14
13.5	3	Int.	●	MAS1350MB	72.5	122.5	120	2.5	14
	6	Int.	●	MAS1350LB	112.5	162.5	160	2.5	14
	3	Ext.	□	MAE1360MB	72.5	122.5	120	2.5	14
13.6	3	Int.	□	MAS1360MB	72.5	122.5	120	2.5	14
	6	Int.	□	MAS1360LB	112.5	162.5	160	2.5	14
	3	Ext.	□	MAE1370MB	72.5	122.5	120	2.5	14
13.7	3	Int.	□	MAS1370MB	72.5	122.5	120	2.5	14
	6	Int.	□	MAS1370LB	112.5	162.5	160	2.5	14
	3	Ext.	□	MAE1380MB	72.5	122.5	120	2.5	14
13.8	3	Int.	□	MAS1380MB	72.5	122.5	120	2.5	14
	6	Int.	□	MAS1380LB	112.5	162.5	160	2.5	14
	3	Ext.	□	MAE1390MB	72.5	122.5	120	2.5	14
13.9	3	Int.	□	MAS1390MB	72.5	122.5	120	2.5	14
	6	Int.	□	MAS1390LB	112.5	162.5	160	2.5	14
	3	Ext.	●	MAE1400MB	72.5	122.5	120	2.5	14
14.0	3	Int.	●	MAS1400MB	72.5	122.5	120	2.5	14
	6	Int.	●	MAS1400LB	112.5	162.5	160	2.5	14
	3	Ext.	□	MAE1410MB	74.6	132.6	130	2.6	15
14.1	3	Int.	□	MAS1410MB	74.6	132.6	130	2.6	15
	6	Int.	□	MAS1410LB	117.6	175.6	173	2.6	15
	3	Ext.	□	MAE1420MB	74.6	132.6	130	2.6	15
14.2	3	Int.	□	MAS1420MB	74.6	132.6	130	2.6	15
	6	Int.	□	MAS1420LB	117.6	175.6	173	2.6	15
	3	Ext.	□	MAE1430MB	74.6	132.6	130	2.6	15
14.3	3	Int.	□	MAS1430MB	74.6	132.6	130	2.6	15
	6	Int.	□	MAS1430LB	117.6	175.6	173	2.6	15
	3	Ext.	□	MAE1440MB	74.6	132.6	130	2.6	15
14.4	3	Int.	□	MAS1440MB	74.6	132.6	130	2.6	15
	6	Int.	□	MAS1440LB	117.6	175.6	173	2.6	15
	3	Ext.	□	MAE1450MB	74.6	132.6	130	2.6	15
14.5	3	Int.	□	MAS1450MB	74.6	132.6	130	2.6	15
	6	Int.	□	MAS1450LB	117.6	175.6	173	2.6	15
	3	Ext.	□	MAE1460MB	74.7	132.7	130	2.7	15
14.6	3	Int.	□	MAS1460MB	74.7	132.7	130	2.7	15
	6	Int.	□	MAS1460LB	117.7	175.7	173	2.7	15

* Standard hole size for rolled thread taps.

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

DC (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock HTi10	Order Number	Dimensions (mm) LCF	OAL	LF	PL	DCON
	3	Ext.	□	**MAE1470MB**	74.7	132.7	130	2.7	15
14.7	3	Int.	□	**MAS1470MB**	74.7	132.7	130	2.7	15
	6	Int.	□	**MAS1470LB**	117.7	175.7	173	2.7	15
	3	Ext.	□	**MAE1480MB**	74.7	132.7	130	2.7	15
14.8	3	Int.	□	**MAS1480MB**	74.7	132.7	130	2.7	15
	6	Int.	□	**MAS1480LB**	117.7	175.7	173	2.7	15
	3	Ext.	□	**MAE1490MB**	74.7	132.7	130	2.7	15
14.9	3	Int.	□	**MAS1490MB**	74.7	132.7	130	2.7	15
	6	Int.	□	**MAS1490LB**	117.7	175.7	173	2.7	15
	3	Ext.	●	***MAE1496MB**	74.7	132.7	130	2.7	15
14.96	3	Int.	●	***MAS1496MB**	74.7	132.7	130	2.7	15
	6	Int.	●	***MAS1496LB**	117.7	175.7	173	2.7	15
	3	Ext.	●	**MAE1500MB**	74.7	132.7	130	2.7	15
15.0	3	Int.	●	**MAS1500MB**	74.7	132.7	130	2.7	15
	6	Int.	●	**MAS1500LB**	117.7	175.7	173	2.7	15
	3	Ext.	□	**MAE1510MB**	78.7	136.7	134	2.7	16
15.1	3	Int.	□	**MAS1510MB**	78.7	136.7	134	2.7	16
	6	Int.	□	**MAS1510LB**	122.7	180.7	178	2.7	16
	3	Ext.	□	**MAE1520MB**	78.8	136.8	134	2.8	16
15.2	3	Int.	□	**MAS1520MB**	78.8	136.8	134	2.8	16
	6	Int.	□	**MAS1520LB**	122.8	180.8	178	2.8	16
	3	Ext.	□	**MAE1530MB**	78.8	136.8	134	2.8	16
15.3	3	Int.	□	**MAS1530MB**	78.8	136.8	134	2.8	16
	6	Int.	□	**MAS1530LB**	122.8	180.8	178	2.8	16
	3	Ext.	□	**MAE1540MB**	78.8	136.8	134	2.8	16
15.4	3	Int.	□	**MAS1540MB**	78.8	136.8	134	2.8	16
	6	Int.	□	**MAS1540LB**	122.8	180.8	178	2.8	16
	3	Ext.	□	**MAE1550MB**	78.8	136.8	134	2.8	16
15.5	3	Int.	□	**MAS1550MB**	78.8	136.8	134	2.8	16
	6	Int.	□	**MAS1550LB**	122.8	180.8	178	2.8	16
	3	Ext.	□	**MAE1560MB**	78.8	136.8	134	2.8	16
15.6	3	Int.	□	**MAS1560MB**	78.8	136.8	134	2.8	16
	6	Int.	□	**MAS1560LB**	122.8	180.8	178	2.8	16
	3	Ext.	□	**MAE1570MB**	78.9	136.9	134	2.9	16
15.7	3	Int.	□	**MAS1570MB**	78.9	136.9	134	2.9	16
	6	Int.	□	**MAS1570LB**	122.9	180.9	178	2.9	16
	3	Ext.	□	**MAE1580MB**	78.9	136.9	134	2.9	16
15.8	3	Int.	□	**MAS1580MB**	78.9	136.9	134	2.9	16
	6	Int.	□	**MAS1580LB**	122.9	180.9	178	2.9	16
	3	Ext.	□	**MAE1590MB**	78.9	136.9	134	2.9	16
15.9	3	Int.	□	**MAS1590MB**	78.9	136.9	134	2.9	16
	6	Int.	□	**MAS1590LB**	122.9	180.9	178	2.9	16
	3	Ext.	●	**MAE1600MB**	78.9	136.9	134	2.9	16
16.0	3	Int.	●	**MAS1600MB**	78.9	136.9	134	2.9	16
	6	Int.	●	**MAS1600LB**	122.9	180.9	178	2.9	16

* Standard hole size for rolled thread taps.

CUTTING CONDITIONS ➤ N134
TECHNICAL DATA ➤ Q001

MAE/MAS

RECOMMENDED CUTTING CONDITIONS

Type		Work Material	Drill Dia. ϕ3.0—ϕ6.0		Drill Dia. ϕ6.1—ϕ10.0		Drill Dia. ϕ10.1—ϕ16.0	
			Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)
MAE	N	Aluminium Alloy Casting	90 (40—140)	0.15 (0.05—0.3)	100 (50—150)	0.2 (0.1—0.3)	120 (60—170)	0.25 (0.1—0.4)
		Aluminium Alloy Die Casting	100 (60—150)	0.12 (0.05—0.25)	110 (70—160)	0.15 (0.05—0.25)	130 (80—180)	0.2 (0.1—0.3)
	K	Gray Cast Iron	40 (20—60)	0.15 (0.1—0.2)	60 (40—80)	0.2 (0.1—0.3)	80 (60—100)	0.3 (0.2—0.4)
		Ductile Cast Iron	30 (20—40)	0.1 (0.05—0.15)	40 (20—60)	0.12 (0.05—0.2)	60 (40—80)	0.2 (0.1—0.3)
MAS	N	Aluminium Alloy Casting	100 (60—150)	0.15 (0.05—0.3)	120 (80—170)	0.2 (0.1—0.3)	150 (100—200)	0.25 (0.1—0.4)
		Aluminium Alloy Die Casting	120 (80—170)	0.12 (0.05—0.25)	150 (100—180)	0.15 (0.05—0.25)	160 (120—200)	0.2 (0.1—0.3)
	K	Gray Cast Iron	60 (40—80)	0.15 (0.1—0.2)	80 (60—110)	0.2 (0.1—0.3)	100 (70—130)	0.3 (0.2—0.4)
		Ductile Cast Iron	45 (30—60)	0.1 (0.05—0.15)	60 (40—80)	0.12 (0.05—0.2)	80 (60—100)	0.2 (0.1—0.3)

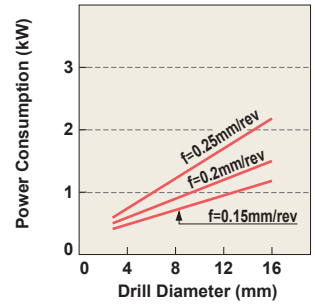
HOLE AND DRILL DIAMETERS FOR THREAD TAPPING

Thread Size	Thread Tapping			Rolled Thread Tapping		
	Drill Diameter (DC)	Hole Diameter Tolerance		Drill Diameter (DC)	Hole Diameter Tolerance	
		max.	min.		max.	min.
M4x0.7	**3.3**	3.242	3.422	**3.65**	3.65	3.70
M5x0.8	**4.2**	4.134	4.334	**4.60**	4.59	4.66
M6x1.0	**5.0**	4.917	5.153	**5.50**	5.48	5.57
M8x1.25	**6.8**	6.647	6.912	**7.35**	7.34	7.41
M10x1.5	**8.5**	8.376	8.676	**9.21**	9.18	9.28
M12x1.75	**10.3**	10.106	10.441	**11.08**	11.05	11.15
M14x2	**12.0**	11.835	12.210	**12.96**	12.92	13.04
M16x2	**14.0**	13.835	14.210	**14.96**	14.92	15.04

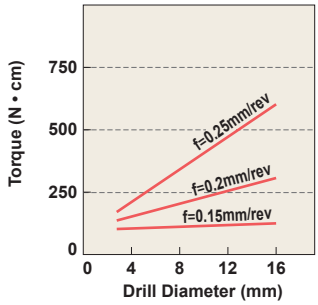
CUTTING RESISTANCE

Workpiece : JIS AC4B-T6 Drilled Depth : l/d=3(Through Hole) Cutting Speed : 100m/min WSO (10%)

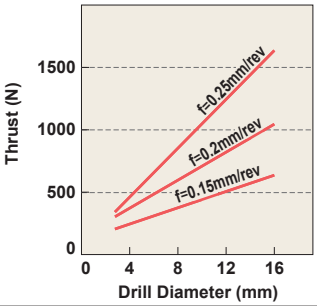
Power Consumption



Torque



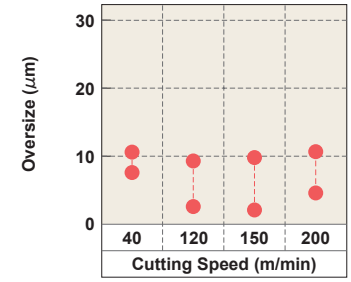
Thrust



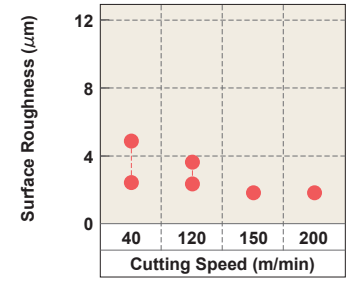
MACHINED HOLE ACCURACY

Tool : MAS1100MB Workpiece : JIS AC4B-T6 Feed : 0.35mm/rev Drilled Depth : 33mm WSO (10%)

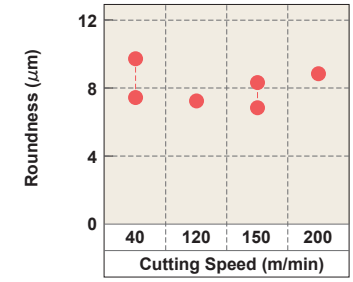
Oversize



Surface Roughness



Roundness



HSS MILLING SHANK DRILLS

SEPDM NEW

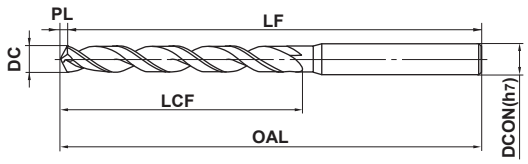
SE High Precision Drill (M)

CO HSS D-STH | 118° DC<4 | 135° DC=4 | X Thinning

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal		

0.5≤DC≤3	3.1≤DC≤4
0 −0.006	0 −0.008





● Unique D-STH process dramatically improves sharpness and welding resistance and smooth chip discharge.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
SEPDMD0050	0.50	6.15	50.15	50	0.15	3	●
SEPDM**D0055**	0.55	6.17	50.17	50	0.17	3	●
SEPDM**D0060**	0.60	8.18	50.18	50	0.18	3	●
SEPDM**D0065**	0.65	8.20	50.20	50	0.20	3	●
SEPDM**D0070**	0.70	10.21	50.21	50	0.21	3	●
SEPDM**D0075**	0.75	10.23	50.23	50	0.23	3	●
SEPDM**D0080**	0.80	10.24	50.24	50	0.24	3	●
SEPDM**D0085**	0.85	10.26	50.26	50	0.26	3	●
SEPDM**D0090**	0.90	12.27	50.27	50	0.27	3	●
SEPDM**D0095**	0.95	12.29	50.29	50	0.29	3	●
SEPDM**D0100**	1.0	12.3	60.3	60	0.3	3	●
SEPDM**D0110**	1.1	16.3	60.3	60	0.3	3	●
SEPDM**D0120**	1.2	16.4	60.4	60	0.4	3	●
SEPDM**D0130**	1.3	16.4	60.4	60	0.4	3	●
SEPDM**D0140**	1.4	18.4	60.4	60	0.4	3	●
SEPDM**D0150**	1.5	18.5	60.5	60	0.5	3	●
SEPDM**D0160**	1.6	20.5	60.5	60	0.5	3	●
SEPDM**D0170**	1.7	20.5	60.5	60	0.5	3	●
SEPDM**D0180**	1.8	22.5	60.5	60	0.5	3	●
SEPDM**D0190**	1.9	22.6	60.6	60	0.6	3	●
SEPDM**D0200**	2.0	23.6	70.6	70	0.6	3	●
SEPDM**D0210**	2.1	23.6	70.6	70	0.6	3	●
SEPDM**D0220**	2.2	26.7	70.7	70	0.7	3	●
SEPDM**D0230**	2.3	26.7	70.7	70	0.7	3	●
SEPDM**D0240**	2.4	29.7	70.7	70	0.7	3	●
SEPDM**D0250**	2.5	29.8	70.8	70	0.8	3	●
SEPDM**D0260**	2.6	29.8	70.8	70	0.8	3	●
SEPDM**D0270**	2.7	32.8	70.8	70	0.8	3	●
SEPDM**D0280**	2.8	32.8	70.8	70	0.8	3	●
SEPDM**D0290**	2.9	32.9	70.9	70	0.9	3	●
SEPDM**D0300**	3.0	32.9	70.9	70	0.9	3	●
SEPDM**D0310**	3.1	35.9	85.9	85	0.9	4	●
SEPDM**D0320**	3.2	36.0	86.0	85	1.0	4	●
SEPDM**D0330**	3.3	36.0	86.0	85	1.0	4	●
SEPDM**D0340**	3.4	39.0	86.0	85	1.0	4	●
SEPDM**D0350**	3.5	39.1	86.1	85	1.1	4	●
SEPDM**D0360**	3.6	39.1	86.1	85	1.1	4	●
SEPDM**D0370**	3.7	39.1	86.1	85	1.1	4	●
SEPDM**D0380**	3.8	43.1	86.1	85	1.1	4	●
SEPDM**D0390**	3.9	43.2	86.2	85	1.2	4	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
SEPDMD0400	4.0	42.8	85.8	85	0.8	4	●

● : Inventory maintained in Japan.

CUTTING CONDITIONS ➤ N136
TECHNICAL DATA ➤ Q001

HSS MILLING SHANK DRILLS

SEPDM NEW

SE High Precision Drill (M)

RECOMMENDED CUTTING CONDITIONS

Work material	Mild Steel (≤180HB), Aluminium Alloy (Si<5%) AISI 1010 etc				Carbon Steel, Alloy Steel (180—280HB), Gray Cast Iron (≤350MPa), Copper, Copper Alloys AISI 1045, AISI 4140, No 45 B etc			
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Table Feed (mm/min)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Table Feed (mm/min)
0.5	24	15000	0.02	300	18	11250	0.01	110
0.65	28	13700	0.03	410	22	10700	0.02	210
0.8	33	13100	0.04	520	27	10700	0.03	320
1.0	38	12000	0.05	600	31	10000	0.05	500
1.2	38	10000	0.06	600	31	8200	0.06	490
1.6	40	8000	0.08	640	33	6500	0.08	520
2.0	40	6400	0.09	575	35	5500	0.09	495
2.5	40	5100	0.11	560	35	4400	0.11	480
3.2	40	4000	0.13	520	34	3400	0.13	440
4.0	40	3200	0.15	480	35	2800	0.15	420

Work material	Alloy tool steel (≤250HB) Ferritic, Precipitation hardening stainless steel (≤200HB) AISI D2, AISI 410, AISI 430 etc				Austenitic Stainless Steel (≤200HB) AISI 304LN, AISI 316LN etc			
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Table Feed (mm/min)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Table Feed (mm/min)
0.5	13	8000	0.01	80	10	6600	0.01	65
0.65	14	6800	0.02	135	11	5300	0.012	60
0.8	14	5500	0.03	165	11	4300	0.015	60
1.0	16	5000	0.05	250	12	3800	0.02	75
1.2	17	4500	0.05	225	12	3100	0.025	75
1.6	18	3500	0.06	210	14	2700	0.03	80
2.0	18	2900	0.06	170	15	2400	0.04	95
2.5	18	2300	0.08	180	15	1900	0.05	95
3.2	18	1800	0.09	160	15	1500	0.07	105
4.0	18	1400	0.10	140	15	1200	0.09	105

Work material	Alloy tool steel (≤30HRC) ASTM H13, AISI L6 etc			
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Table Feed (mm/min)
0.5	10	6600	0.01	65
0.65	11	5300	0.012	60
0.8	11	4300	0.015	60
1.0	12	3800	0.02	75
1.2	12	3100	0.023	70
1.6	14	2700	0.03	80
2.0	15	2400	0.04	95
2.5	15	1900	0.04	75
3.2	15	1500	0.05	75
4.0	15	1200	0.07	80

1) Please reduce the revolution and feed rate depending on the drilling situation when the installation of workpiece or machine lacks rigidity.
2) Please use a collet type drill chuck or a milling chuck.
3) Use sufficient cutting fluid.
4) VAPDM is recommended when the work material hardness exceeds 30HRC.
5) WSTAR drill(MWE, MWS) are recommended for Precipitation hardening stainless steel (JIS-SUS630/ISO-L-No58X5CrNiCuNb16-4/ASTM-S17400, JIS-SUS631/DIN-X7CrNiAl177/ASTM-S17700)
6) When drilling holes greater than 4 x drill diameter hole depths, please use a peck feed.
7) The above-mentioned cutting condition is standard when using water-soluble cutting fluid.
Please reduce the revolution when using water-insoluble cutting fluid.
8) The intermediate diameter revolution is not tabulated. It is matched to the large diameter side and closest drill diameter conditions or by calculating the cutting speed of the closest drill diameter. Set the feedrate per revolution to a suitable value with the recommended feedrate of the closest drill diameter as the standard.

VIOLET DRILLS

VAPDS

Short, High precision

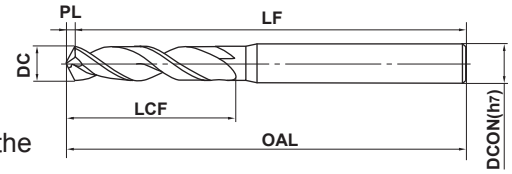
HG HSS | V | 118° DC<2 | 135° DC≥2 | X Thinning

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron		Heat Resistant Alloy	

0.5≤DC≤3	3<DC≤6	6<DC≤10	10<DC≤13
0 −0.014	0 −0.018	0 −0.022	0 −0.027

*All drills except those with intervals of 0.1mm and under dia. 2.0mm have a tolerance of 0−-0.009mm.





● Highly efficient drilling and long tool life have been achieved with the newly developed Violet coating.
(Standard drill depth : less than 3 times the drill diameter)

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDSD0050	0.50	3.15	50.15	50	0.15	3	●
VAPDSD0051	0.51	3.15	50.15	50	0.15	3	●
VAPDSD0052	0.52	3.16	50.16	50	0.16	3	●
VAPDSD0053	0.53	3.16	50.16	50	0.16	3	●
VAPDSD0054	0.54	3.16	50.16	50	0.16	3	●
VAPDSD0055	0.55	3.17	50.17	50	0.17	3	●
VAPDSD0056	0.56	4.17	50.17	50	0.17	3	●
VAPDSD0057	0.57	4.17	50.17	50	0.17	3	●
VAPDSD0058	0.58	4.17	50.17	50	0.17	3	●
VAPDSD0059	0.59	4.18	50.18	50	0.18	3	●
VAPDSD0060	0.60	5.18	50.18	50	0.18	3	●
VAPDSD0061	0.61	5.18	50.18	50	0.18	3	●
VAPDSD0062	0.62	5.19	50.19	50	0.19	3	●
VAPDSD0063	0.63	5.19	50.19	50	0.19	3	●
VAPDSD0064	0.64	5.19	50.19	50	0.19	3	●
VAPDSD0065	0.65	5.20	50.20	50	0.20	3	●
VAPDSD0066	0.66	5.20	50.20	50	0.20	3	●
VAPDSD0067	0.67	5.20	50.20	50	0.20	3	●
VAPDSD0068	0.68	5.20	50.20	50	0.20	3	●
VAPDSD0069	0.69	5.21	50.21	50	0.21	3	●
VAPDSD0070	0.70	5.21	50.21	50	0.21	3	●
VAPDSD0071	0.71	5.21	50.21	50	0.21	3	●
VAPDSD0072	0.72	5.22	50.22	50	0.22	3	●
VAPDSD0073	0.73	5.22	50.22	50	0.22	3	●
VAPDSD0074	0.74	5.22	50.22	50	0.22	3	●
VAPDSD0075	0.75	5.23	50.23	50	0.23	3	●
VAPDSD0076	0.76	5.23	50.23	50	0.23	3	●
VAPDSD0077	0.77	5.23	50.23	50	0.23	3	●
VAPDSD0078	0.78	5.23	50.23	50	0.23	3	●
VAPDSD0079	0.79	5.24	50.24	50	0.24	3	●
VAPDSD0080	0.80	5.24	50.24	50	0.24	3	●
VAPDSD0081	0.81	5.24	50.24	50	0.24	3	●
VAPDSD0082	0.82	5.25	50.25	50	0.25	3	●
VAPDSD0083	0.83	5.25	50.25	50	0.25	3	●
VAPDSD0084	0.84	5.25	50.25	50	0.25	3	●
VAPDSD0085	0.85	5.26	50.26	50	0.26	3	●
VAPDSD0086	0.86	6.26	50.26	50	0.26	3	●
VAPDSD0087	0.87	6.26	50.26	50	0.26	3	●
VAPDSD0088	0.88	6.26	50.26	50	0.26	3	●
VAPDSD0089	0.89	6.27	50.27	50	0.27	3	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDSD0090	0.90	6.27	50.27	50	0.27	3	●
VAPDSD0091	0.91	6.27	50.27	50	0.27	3	●
VAPDSD0092	0.92	6.28	50.28	50	0.28	3	●
VAPDSD0093	0.93	6.28	50.28	50	0.28	3	●
VAPDSD0094	0.94	6.28	50.28	50	0.28	3	●
VAPDSD0095	0.95	6.29	50.29	50	0.29	3	●
VAPDSD0096	0.96	6.29	50.29	50	0.29	3	●
VAPDSD0097	0.97	6.29	50.29	50	0.29	3	●
VAPDSD0098	0.98	6.29	50.29	50	0.29	3	●
VAPDSD0099	0.99	6.30	50.30	50	0.30	3	●
VAPDSD0100	1.00	6.3	50.3	50	0.3	3	●
VAPDSD0101	1.01	6.3	50.3	50	0.3	3	●
VAPDSD0102	1.02	6.3	50.3	50	0.3	3	●
VAPDSD0103	1.03	6.3	50.3	50	0.3	3	●
VAPDSD0104	1.04	6.3	50.3	50	0.3	3	●
VAPDSD0105	1.05	6.3	50.3	50	0.3	3	●
VAPDSD0106	1.06	6.3	50.3	50	0.3	3	●
VAPDSD0107	1.07	8.3	55.3	55	0.3	3	●
VAPDSD0108	1.08	8.3	55.3	55	0.3	3	●
VAPDSD0109	1.09	8.3	55.3	55	0.3	3	●
VAPDSD0110	1.10	8.3	55.3	55	0.3	3	●
VAPDSD0111	1.11	8.3	55.3	55	0.3	3	●
VAPDSD0112	1.12	8.3	55.3	55	0.3	3	●
VAPDSD0113	1.13	8.3	55.3	55	0.3	3	●
VAPDSD0114	1.14	8.3	55.3	55	0.3	3	●
VAPDSD0115	1.15	8.4	55.4	55	0.4	3	●
VAPDSD0116	1.16	8.4	55.4	55	0.4	3	●
VAPDSD0117	1.17	8.4	55.4	55	0.4	3	●
VAPDSD0118	1.18	8.4	55.4	55	0.4	3	●
VAPDSD0119	1.19	8.4	55.4	55	0.4	3	●
VAPDSD0120	1.20	8.4	55.4	55	0.4	3	●
VAPDSD0121	1.21	8.4	55.4	55	0.4	3	●
VAPDSD0122	1.22	8.4	55.4	55	0.4	3	●
VAPDSD0123	1.23	8.4	55.4	55	0.4	3	●
VAPDSD0124	1.24	8.4	55.4	55	0.4	3	●
VAPDSD0125	1.25	8.4	55.4	55	0.4	3	●
VAPDSD0126	1.26	8.4	55.4	55	0.4	3	●
VAPDSD0127	1.27	8.4	55.4	55	0.4	3	●
VAPDSD0128	1.28	8.4	55.4	55	0.4	3	●
VAPDSD0129	1.29	8.4	55.4	55	0.4	3	●

● : Inventory maintained in Japan.

VIOLET DRILLS

VAPDS

Short, High precision

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDSD0130	1.30	9.4	55.4	55	0.4	3	●
VAPDSD0131	1.31	9.4	55.4	55	0.4	3	●
VAPDSD0132	1.32	9.4	55.4	55	0.4	3	●
VAPDSD0133	1.33	9.4	55.4	55	0.4	3	●
VAPDSD0134	1.34	9.4	55.4	55	0.4	3	●
VAPDSD0135	1.35	9.4	55.4	55	0.4	3	●
VAPDSD0136	1.36	9.4	55.4	55	0.4	3	●
VAPDSD0137	1.37	9.4	55.4	55	0.4	3	●
VAPDSD0138	1.38	9.4	55.4	55	0.4	3	●
VAPDSD0139	1.39	9.4	55.4	55	0.4	3	●
VAPDSD0140	1.40	9.4	55.4	55	0.4	3	●
VAPDSD0141	1.41	9.4	55.4	55	0.4	3	●
VAPDSD0142	1.42	9.4	55.4	55	0.4	3	●
VAPDSD0143	1.43	9.4	55.4	55	0.4	3	●
VAPDSD0144	1.44	9.4	55.4	55	0.4	3	●
VAPDSD0145	1.45	9.4	55.4	55	0.4	3	●
VAPDSD0146	1.46	9.4	55.4	55	0.4	3	●
VAPDSD0147	1.47	9.4	55.4	55	0.4	3	●
VAPDSD0148	1.48	9.4	55.4	55	0.4	3	●
VAPDSD0149	1.49	9.5	55.5	55	0.5	3	●
VAPDSD0150	1.50	9.5	55.5	55	0.5	3	●
VAPDSD0151	1.51	11.5	55.5	55	0.5	3	●
VAPDSD0152	1.52	11.5	55.5	55	0.5	3	●
VAPDSD0153	1.53	11.5	55.5	55	0.5	3	●
VAPDSD0154	1.54	11.5	55.5	55	0.5	3	●
VAPDSD0155	1.55	11.5	55.5	55	0.5	3	●
VAPDSD0156	1.56	11.5	55.5	55	0.5	3	●
VAPDSD0157	1.57	11.5	55.5	55	0.5	3	●
VAPDSD0158	1.58	11.5	55.5	55	0.5	3	●
VAPDSD0159	1.59	11.5	55.5	55	0.5	3	●
VAPDSD0160	1.60	11.5	55.5	55	0.5	3	●
VAPDSD0161	1.61	11.5	55.5	55	0.5	3	●
VAPDSD0162	1.62	11.5	55.5	55	0.5	3	●
VAPDSD0163	1.63	11.5	55.5	55	0.5	3	●
VAPDSD0164	1.64	11.5	55.5	55	0.5	3	●
VAPDSD0165	1.65	11.5	55.5	55	0.5	3	●
VAPDSD0166	1.66	11.5	55.5	55	0.5	3	●
VAPDSD0167	1.67	11.5	55.5	55	0.5	3	●
VAPDSD0168	1.68	11.5	55.5	55	0.5	3	●
VAPDSD0169	1.69	11.5	55.5	55	0.5	3	●
VAPDSD0170	1.70	11.5	55.5	55	0.5	3	●
VAPDSD0171	1.71	11.5	55.5	55	0.5	3	●
VAPDSD0172	1.72	11.5	55.5	55	0.5	3	●
VAPDSD0173	1.73	11.5	55.5	55	0.5	3	●
VAPDSD0174	1.74	11.5	55.5	55	0.5	3	●
VAPDSD0175	1.75	11.5	55.5	55	0.5	3	●
VAPDSD0176	1.76	11.5	55.5	55	0.5	3	●
VAPDSD0177	1.77	11.5	55.5	55	0.5	3	●
VAPDSD0178	1.78	11.5	55.5	55	0.5	3	●
VAPDSD0179	1.79	11.5	55.5	55	0.5	3	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDSD0180	1.80	11.5	55.5	55	0.5	3	●
VAPDSD0181	1.81	11.5	55.5	55	0.5	3	●
VAPDSD0182	1.82	11.6	55.6	55	0.6	3	●
VAPDSD0183	1.83	11.6	55.6	55	0.6	3	●
VAPDSD0184	1.84	11.6	55.6	55	0.6	3	●
VAPDSD0185	1.85	11.6	55.6	55	0.6	3	●
VAPDSD0186	1.86	11.6	55.6	55	0.6	3	●
VAPDSD0187	1.87	11.6	55.6	55	0.6	3	●
VAPDSD0188	1.88	11.6	55.6	55	0.6	3	●
VAPDSD0189	1.89	11.6	55.6	55	0.6	3	●
VAPDSD0190	1.90	12.6	55.6	55	0.6	3	●
VAPDSD0191	1.91	12.6	60.6	60	0.6	3	●
VAPDSD0192	1.92	12.6	60.6	60	0.6	3	●
VAPDSD0193	1.93	12.6	60.6	60	0.6	3	●
VAPDSD0194	1.94	12.6	60.6	60	0.6	3	●
VAPDSD0195	1.95	12.6	60.6	60	0.6	3	●
VAPDSD0196	1.96	12.6	60.6	60	0.6	3	●
VAPDSD0197	1.97	12.6	60.6	60	0.6	3	●
VAPDSD0198	1.98	12.6	60.6	60	0.6	3	●
VAPDSD0199	1.99	12.6	60.6	60	0.6	3	●
VAPDSD0200	2.00	12.4	60.4	60	0.4	3	●
VAPDSD0205	2.05	12.4	60.4	60	0.4	3	●
VAPDSD0210	2.10	12.4	60.4	60	0.4	3	●
VAPDSD0215	2.15	12.5	60.5	60	0.5	3	●
VAPDSD0220	2.20	12.5	60.5	60	0.5	3	●
VAPDSD0225	2.25	12.5	60.5	60	0.5	3	●
VAPDSD0230	2.30	13.5	60.5	60	0.5	3	●
VAPDSD0235	2.35	13.5	60.5	60	0.5	3	●
VAPDSD0240	2.40	13.5	60.5	60	0.5	3	●
VAPDSD0245	2.45	13.5	60.5	60	0.5	3	●
VAPDSD0250	2.50	13.5	60.5	60	0.5	3	●
VAPDSD0255	2.55	13.5	60.5	60	0.5	3	●
VAPDSD0260	2.60	15.5	60.5	60	0.5	3	●
VAPDSD0265	2.65	15.6	60.6	60	0.6	3	●
VAPDSD0270	2.70	15.6	60.6	60	0.6	3	●
VAPDSD0275	2.75	15.6	60.6	60	0.6	3	●
VAPDSD0280	2.80	15.6	60.6	60	0.6	3	●
VAPDSD0285	2.85	15.6	60.6	60	0.6	3	●
VAPDSD0290	2.90	15.6	60.6	60	0.6	3	●
VAPDSD0295	2.95	15.6	60.6	60	0.6	3	●
VAPDSD0300	3.00	15.6	60.6	60	0.6	3	●
VAPDSD0305	3.05	17.6	70.6	70	0.6	4	●
VAPDSD0310	3.10	17.6	70.6	70	0.6	4	●
VAPDSD0315	3.15	17.7	70.7	70	0.7	4	●
VAPDSD0320	3.20	17.7	70.7	70	0.7	4	●
VAPDSD0325	3.25	17.7	70.7	70	0.7	4	●
VAPDSD0330	3.30	19.7	70.7	70	0.7	4	●
VAPDSD0335	3.35	19.7	70.7	70	0.7	4	●
VAPDSD0340	3.40	19.7	70.7	70	0.7	4	●
VAPDSD0345	3.45	19.7	70.7	70	0.7	4	●

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDSD0350	3.50	19.7	70.7	70	0.7	4	●
VAPDSD0355	3.55	19.7	70.7	70	0.7	4	●
VAPDSD0360	3.60	21.8	70.8	70	0.8	4	●
VAPDSD0365	3.65	21.8	70.8	70	0.8	4	●
VAPDSD0370	3.70	21.8	70.8	70	0.8	4	●
VAPDSD0375	3.75	21.8	70.8	70	0.8	4	●
VAPDSD0380	3.80	21.8	70.8	70	0.8	4	●
VAPDSD0385	3.85	21.8	70.8	70	0.8	4	●
VAPDSD0390	3.90	21.8	70.8	70	0.8	4	●
VAPDSD0395	3.95	21.8	70.8	70	0.8	4	●
VAPDSD0400	4.00	21.8	70.8	70	0.8	4	●
VAPDSD0405	4.05	21.8	80.8	80	0.8	6	●
VAPDSD0410	4.10	21.9	80.9	80	0.9	6	●
VAPDSD0415	4.15	21.9	80.9	80	0.9	6	●
VAPDSD0420	4.20	21.9	80.9	80	0.9	6	●
VAPDSD0425	4.25	21.9	80.9	80	0.9	6	●
VAPDSD0430	4.30	23.9	80.9	80	0.9	6	●
VAPDSD0435	4.35	23.9	80.9	80	0.9	6	●
VAPDSD0440	4.40	23.9	80.9	80	0.9	6	●
VAPDSD0445	4.45	23.9	80.9	80	0.9	6	●
VAPDSD0450	4.50	23.9	80.9	80	0.9	6	●
VAPDSD0455	4.55	23.9	80.9	80	0.9	6	●
VAPDSD0460	4.60	26.0	81.0	80	1.0	6	●
VAPDSD0465	4.65	26.0	81.0	80	1.0	6	●
VAPDSD0470	4.70	26.0	81.0	80	1.0	6	●
VAPDSD0475	4.75	26.0	81.0	80	1.0	6	●
VAPDSD0480	4.80	26.0	81.0	80	1.0	6	●
VAPDSD0485	4.85	26.0	81.0	80	1.0	6	●
VAPDSD0490	4.90	26.0	81.0	80	1.0	6	●
VAPDSD0495	4.95	26.0	81.0	80	1.0	6	●
VAPDSD0500	5.00	26.0	81.0	80	1.0	6	●
VAPDSD0505	5.05	26.1	81.1	80	1.1	6	●
VAPDSD0510	5.10	26.1	81.1	80	1.1	6	●
VAPDSD0515	5.15	26.1	81.1	80	1.1	6	●
VAPDSD0520	5.20	26.1	81.1	80	1.1	6	●
VAPDSD0525	5.25	26.1	81.1	80	1.1	6	●
VAPDSD0530	5.30	26.1	81.1	80	1.1	6	●
VAPDSD0535	5.35	28.1	81.1	80	1.1	6	●
VAPDSD0540	5.40	28.1	81.1	80	1.1	6	●
VAPDSD0545	5.45	28.1	81.1	80	1.1	6	●
VAPDSD0550	5.50	28.1	81.1	80	1.1	6	●
VAPDSD0555	5.55	28.2	81.2	80	1.2	6	●
VAPDSD0560	5.60	28.2	81.2	80	1.2	6	●
VAPDSD0565	5.65	28.2	81.2	80	1.2	6	●
VAPDSD0570	5.70	28.2	81.2	80	1.2	6	●
VAPDSD0575	5.75	28.2	81.2	80	1.2	6	●
VAPDSD0580	5.80	28.2	81.2	80	1.2	6	●
VAPDSD0585	5.85	28.2	81.2	80	1.2	6	●
VAPDSD0590	5.90	28.2	81.2	80	1.2	6	●
VAPDSD0595	5.95	28.2	81.2	80	1.2	6	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDSD0600	6.00	28.2	81.2	80	1.2	6	●
VAPDSD0605	6.05	31.3	81.3	80	1.3	8	●
VAPDSD0610	6.10	31.3	81.3	80	1.3	8	●
VAPDSD0615	6.15	31.3	81.3	80	1.3	8	●
VAPDSD0620	6.20	31.3	81.3	80	1.3	8	●
VAPDSD0625	6.25	31.3	81.3	80	1.3	8	●
VAPDSD0630	6.30	31.3	81.3	80	1.3	8	●
VAPDSD0635	6.35	31.3	81.3	80	1.3	8	●
VAPDSD0640	6.40	31.3	81.3	80	1.3	8	●
VAPDSD0645	6.45	31.3	81.3	80	1.3	8	●
VAPDSD0650	6.50	31.4	81.4	80	1.4	8	●
VAPDSD0655	6.55	31.4	81.4	80	1.4	8	●
VAPDSD0660	6.60	31.4	81.4	80	1.4	8	●
VAPDSD0665	6.65	31.4	81.4	80	1.4	8	●
VAPDSD0670	6.70	31.4	81.4	80	1.4	8	●
VAPDSD0675	6.75	33.4	81.4	80	1.4	8	●
VAPDSD0680	6.80	33.4	81.4	80	1.4	8	●
VAPDSD0685	6.85	33.4	81.4	80	1.4	8	●
VAPDSD0690	6.90	33.4	81.4	80	1.4	8	●
VAPDSD0695	6.95	33.4	81.4	80	1.4	8	●
VAPDSD0700	7.00	33.5	81.5	80	1.5	8	●
VAPDSD0705	7.05	33.5	81.5	80	1.5	8	●
VAPDSD0710	7.10	33.5	81.5	80	1.5	8	●
VAPDSD0715	7.15	33.5	81.5	80	1.5	8	●
VAPDSD0720	7.20	33.5	81.5	80	1.5	8	●
VAPDSD0725	7.25	33.5	81.5	80	1.5	8	●
VAPDSD0730	7.30	33.5	81.5	80	1.5	8	●
VAPDSD0735	7.35	33.5	81.5	80	1.5	8	●
VAPDSD0740	7.40	33.5	81.5	80	1.5	8	●
VAPDSD0745	7.45	33.5	81.5	80	1.5	8	●
VAPDSD0750	7.50	33.6	81.6	80	1.6	8	●
VAPDSD0755	7.55	36.6	86.6	85	1.6	8	●
VAPDSD0760	7.60	36.6	86.6	85	1.6	8	●
VAPDSD0765	7.65	36.6	86.6	85	1.6	8	●
VAPDSD0770	7.70	36.6	86.6	85	1.6	8	●
VAPDSD0775	7.75	36.6	86.6	85	1.6	8	●
VAPDSD0780	7.80	36.6	86.6	85	1.6	8	●
VAPDSD0785	7.85	36.6	86.6	85	1.6	8	●
VAPDSD0790	7.90	36.6	86.6	85	1.6	8	●
VAPDSD0795	7.95	36.7	86.7	85	1.7	8	●
VAPDSD0800	8.00	36.7	86.7	85	1.7	8	●
VAPDSD0805	8.05	36.7	91.7	90	1.7	10	●
VAPDSD0810	8.10	36.7	91.7	90	1.7	10	●
VAPDSD0815	8.15	36.7	91.7	90	1.7	10	●
VAPDSD0820	8.20	36.7	91.7	90	1.7	10	●
VAPDSD0825	8.25	36.7	91.7	90	1.7	10	●
VAPDSD0830	8.30	36.7	91.7	90	1.7	10	●
VAPDSD0835	8.35	36.7	91.7	90	1.7	10	●
VAPDSD0840	8.40	36.7	91.7	90	1.7	10	●
VAPDSD0845	8.45	36.8	91.8	90	1.8	10	●

VIOLET DRILLS

VAPDS

Short, High precision

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDSD0850	8.50	36.8	91.8	90	1.8	10	●
VAPDSD0855	8.55	39.8	94.8	93	1.8	10	●
VAPDSD0860	8.60	39.8	94.8	93	1.8	10	●
VAPDSD0865	8.65	39.8	94.8	93	1.8	10	●
VAPDSD0870	8.70	39.8	94.8	93	1.8	10	●
VAPDSD0875	8.75	39.8	94.8	93	1.8	10	●
VAPDSD0880	8.80	39.8	94.8	93	1.8	10	●
VAPDSD0885	8.85	39.8	94.8	93	1.8	10	●
VAPDSD0890	8.90	39.8	94.8	93	1.8	10	●
VAPDSD0895	8.95	39.9	94.9	93	1.9	10	●
VAPDSD0900	9.00	39.9	94.9	93	1.9	10	●
VAPDSD0905	9.05	39.9	94.9	93	1.9	10	●
VAPDSD0910	9.10	39.9	94.9	93	1.9	10	●
VAPDSD0915	9.15	39.9	94.9	93	1.9	10	●
VAPDSD0920	9.20	39.9	94.9	93	1.9	10	●
VAPDSD0925	9.25	39.9	94.9	93	1.9	10	●
VAPDSD0930	9.30	39.9	94.9	93	1.9	10	●
VAPDSD0935	9.35	39.9	94.9	93	1.9	10	●
VAPDSD0940	9.40	40.0	95.0	93	2.0	10	●
VAPDSD0945	9.45	40.0	95.0	93	2.0	10	●
VAPDSD0950	9.50	40.0	95.0	93	2.0	10	●
VAPDSD0955	9.55	43.0	98.0	96	2.0	10	●
VAPDSD0960	9.60	43.0	98.0	96	2.0	10	●
VAPDSD0965	9.65	43.0	98.0	96	2.0	10	●
VAPDSD0970	9.70	43.0	98.0	96	2.0	10	●
VAPDSD0975	9.75	43.0	98.0	96	2.0	10	●
VAPDSD0980	9.80	43.0	98.0	96	2.0	10	●
VAPDSD0985	9.85	43.0	98.0	96	2.0	10	●
VAPDSD0990	9.90	43.1	98.1	96	2.1	10	●
VAPDSD0995	9.95	43.1	98.1	96	2.1	10	●
VAPDSD1000	10.00	43.1	98.1	96	2.1	10	●
VAPDSD1005	10.05	43.1	103.1	101	2.1	12	●
VAPDSD1010	10.10	43.1	103.1	101	2.1	12	●
VAPDSD1015	10.15	43.1	103.1	101	2.1	12	●
VAPDSD1020	10.20	43.1	103.1	101	2.1	12	●
VAPDSD1025	10.25	43.1	103.1	101	2.1	12	●
VAPDSD1030	10.30	43.1	103.1	101	2.1	12	●
VAPDSD1035	10.35	43.1	103.1	101	2.1	12	●
VAPDSD1040	10.40	43.2	103.2	101	2.2	12	●
VAPDSD1045	10.45	43.2	103.2	101	2.2	12	●
VAPDSD1050	10.50	43.2	103.2	101	2.2	12	●
VAPDSD1055	10.55	43.2	103.2	101	2.2	12	●
VAPDSD1060	10.60	43.2	103.2	101	2.2	12	●
VAPDSD1065	10.65	47.2	107.2	105	2.2	12	●
VAPDSD1070	10.70	47.2	107.2	105	2.2	12	●
VAPDSD1075	10.75	47.2	107.2	105	2.2	12	●
VAPDSD1080	10.80	47.2	107.2	105	2.2	12	●
VAPDSD1085	10.85	47.3	107.3	105	2.3	12	●
VAPDSD1090	10.90	47.3	107.3	105	2.3	12	●
VAPDSD1095	10.95	47.3	107.3	105	2.3	12	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDSD1100	11.00	47.3	107.3	105	2.3	12	●
VAPDSD1105	11.05	47.3	107.3	105	2.3	12	●
VAPDSD1110	11.10	47.3	107.3	105	2.3	12	●
VAPDSD1115	11.15	47.3	107.3	105	2.3	12	●
VAPDSD1120	11.20	47.3	107.3	105	2.3	12	●
VAPDSD1125	11.25	47.3	107.3	105	2.3	12	●
VAPDSD1130	11.30	47.3	107.3	105	2.3	12	●
VAPDSD1135	11.35	47.4	107.4	105	2.4	12	●
VAPDSD1140	11.40	47.4	107.4	105	2.4	12	●
VAPDSD1145	11.45	47.4	107.4	105	2.4	12	●
VAPDSD1150	11.50	47.4	107.4	105	2.4	12	●
VAPDSD1155	11.55	47.4	107.4	105	2.4	12	●
VAPDSD1160	11.60	47.4	107.4	105	2.4	12	●
VAPDSD1165	11.65	47.4	107.4	105	2.4	12	●
VAPDSD1170	11.70	47.4	107.4	105	2.4	12	●
VAPDSD1175	11.75	47.4	107.4	105	2.4	12	●
VAPDSD1180	11.80	47.4	107.4	105	2.4	12	●
VAPDSD1185	11.85	51.5	111.5	109	2.5	12	●
VAPDSD1190	11.90	51.5	111.5	109	2.5	12	●
VAPDSD1195	11.95	51.5	111.5	109	2.5	12	●
VAPDSD1200	12.0	51.5	111.5	109	2.5	12	●
VAPDSD1210	12.1	51.5	111.5	109	2.5	12	●
VAPDSD1220	12.2	51.5	111.5	109	2.5	12	●
VAPDSD1230	12.3	51.6	111.6	109	2.6	12	●
VAPDSD1240	12.4	51.6	111.6	109	2.6	12	●
VAPDSD1250	12.5	51.6	111.6	109	2.6	12	●
VAPDSD1260	12.6	51.6	111.6	109	2.6	12	●
VAPDSD1270	12.7	51.6	111.6	109	2.6	12	●
VAPDSD1280	12.8	51.7	111.7	109	2.7	12	●
VAPDSD1290	12.9	51.7	111.7	109	2.7	12	●
VAPDSD1300	13.0	51.7	111.7	109	2.7	12	●

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS (Standard drilling depth : 3 times or below the drill diameter)

Work material	Structural steel		Carbon steel AISI 1049 Alloy steel SCM Cast iron FC		Alloy tool steel AISI D2 (Low-hardness materials) Ferritic stainless steel AISI 430, AISI 405 Martensitic stainless steel AISI 420, AISI 440		Alloy tool steel AISI H13 (−40HRC) Precipitation hardening stainless steel ASTM 630, ASTM 631	
Drill Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	18000	0.02	16000	0.02	9000	0.02	8200	0.02
1.0	12000	0.05	10000	0.05	6300	0.05	5500	0.04
2.0	6400	0.09	5500	0.09	3200	0.09	2900	0.05
3.0	4300	0.13	3700	0.13	2100	0.13	1900	0.06
4.0	3200	0.15	2800	0.15	1600	0.15	1400	0.08
5.0	2600	0.18	2200	0.18	1300	0.18	1100	0.10
6.0	2100	0.19	1800	0.19	1100	0.20	950	0.11
8.0	1600	0.24	1400	0.24	800	0.22	720	0.13
10.0	1300	0.28	1100	0.28	640	0.25	570	0.15
12.0	1100	0.34	930	0.34	530	0.30	480	0.17
13.0	980	0.36	860	0.36	490	0.32	440	0.19

1) Please reduce the revolution and feed rate depending on the drilling situation when the installation of workpiece or machine lacks rigidity.
2) Please use a collet type drill chuck or a milling chuck.
3) Use sufficient cutting fluid.
4) VAPDSSUS are recommended for austenitic stainless steels (AISI 304).
5) When drilling holes greater than 4 x drill diameter hole depths, please use a peck feed.

The above-mentioned cutting condition is standard when using water-soluble cutting fluid.
Please reduce the revolution when using non-water-soluble cutting fluid.

VIOLET DRILLS

VAPDM

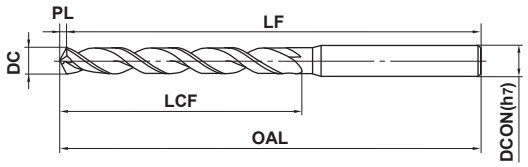
Medium, High precision

HG HSS | V | 118° DC<2 | 135° DC≥2 | X Thinning

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron		Heat Resistant Alloy	



0.5≤DC≤3	3<DC≤6	6<DC≤10	10<DC≤18	18<DC≤30	30<DC≤32
0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033	0 −0.039



● Highly efficient drilling and long tool life have been achieved with the newly developed Violet coating.
(Standard drill depth : less than 5 times the drill diameter)

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDMD0050	0.50	6.15	50.15	50	0.15	3	●
VAPDMD0055	0.55	6.17	50.17	50	0.17	3	●
VAPDMD0060	0.60	8.18	50.18	50	0.18	3	●
VAPDMD0065	0.65	8.20	50.20	50	0.20	3	●
VAPDMD0070	0.70	10.21	50.21	50	0.21	3	●
VAPDMD0075	0.75	10.23	50.23	50	0.23	3	●
VAPDMD0080	0.80	10.24	50.24	50	0.24	3	●
VAPDMD0085	0.85	10.26	50.26	50	0.26	3	●
VAPDMD0090	0.90	12.27	50.27	50	0.27	3	●
VAPDMD0095	0.95	12.29	50.29	50	0.29	3	●
VAPDMD0100	1.00	12.3	60.3	60	0.3	3	●
VAPDMD0105	1.05	12.3	60.3	60	0.3	3	●
VAPDMD0110	1.10	16.3	60.3	60	0.3	3	●
VAPDMD0115	1.15	16.4	60.4	60	0.4	3	●
VAPDMD0120	1.20	16.4	60.4	60	0.4	3	●
VAPDMD0125	1.25	16.4	60.4	60	0.4	3	●
VAPDMD0130	1.30	16.4	60.4	60	0.4	3	●
VAPDMD0135	1.35	18.4	60.4	60	0.4	3	●
VAPDMD0140	1.40	18.4	60.4	60	0.4	3	●
VAPDMD0145	1.45	18.4	60.4	60	0.4	3	●
VAPDMD0150	1.50	18.5	60.5	60	0.5	3	●
VAPDMD0155	1.55	20.5	60.5	60	0.5	3	●
VAPDMD0160	1.60	20.5	60.5	60	0.5	3	●
VAPDMD0165	1.65	20.5	60.5	60	0.5	3	●
VAPDMD0170	1.70	20.5	60.5	60	0.5	3	●
VAPDMD0175	1.75	20.5	60.5	60	0.5	3	●
VAPDMD0180	1.80	22.5	60.5	60	0.5	3	●
VAPDMD0185	1.85	22.6	60.6	60	0.6	3	●
VAPDMD0190	1.90	22.6	60.6	60	0.6	3	●
VAPDMD0195	1.95	23.6	60.6	60	0.6	3	●
VAPDMD0200	2.00	23.4	70.4	70	0.4	3	●
VAPDMD0205	2.05	23.4	70.4	70	0.4	3	●
VAPDMD0210	2.10	23.4	70.4	70	0.4	3	●
VAPDMD0215	2.15	23.5	70.5	70	0.5	3	●
VAPDMD0220	2.20	26.5	70.5	70	0.5	3	●
VAPDMD0225	2.25	26.5	70.5	70	0.5	3	●
VAPDMD0230	2.30	26.5	70.5	70	0.5	3	●
VAPDMD0235	2.35	26.5	70.5	70	0.5	3	●
VAPDMD0240	2.40	29.5	70.5	70	0.5	3	●
VAPDMD0245	2.45	29.5	70.5	70	0.5	3	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDMD0250	2.50	29.5	70.5	70	0.5	3	●
VAPDMD0255	2.55	29.5	70.5	70	0.5	3	●
VAPDMD0260	2.60	29.5	70.5	70	0.5	3	●
VAPDMD0265	2.65	29.6	70.6	70	0.6	3	●
VAPDMD0270	2.70	32.6	70.6	70	0.6	3	●
VAPDMD0275	2.75	32.6	70.6	70	0.6	3	●
VAPDMD0280	2.80	32.6	70.6	70	0.6	3	●
VAPDMD0285	2.85	32.6	70.6	70	0.6	3	●
VAPDMD0290	2.90	32.6	70.6	70	0.6	3	●
VAPDMD0295	2.95	32.6	70.6	70	0.6	3	●
VAPDMD0300	3.00	32.6	70.6	70	0.6	3	●
VAPDMD0305	3.05	35.6	85.6	85	0.6	4	●
VAPDMD0310	3.10	35.6	85.6	85	0.6	4	●
VAPDMD0315	3.15	35.7	85.7	85	0.7	4	●
VAPDMD0320	3.20	35.7	85.7	85	0.7	4	●
VAPDMD0325	3.25	35.7	85.7	85	0.7	4	●
VAPDMD0330	3.30	35.7	85.7	85	0.7	4	●
VAPDMD0335	3.35	35.7	85.7	85	0.7	4	●
VAPDMD0340	3.40	38.7	85.7	85	0.7	4	●
VAPDMD0345	3.45	38.7	85.7	85	0.7	4	●
VAPDMD0350	3.50	38.7	85.7	85	0.7	4	●
VAPDMD0355	3.55	38.7	85.7	85	0.7	4	●
VAPDMD0360	3.60	38.8	85.8	85	0.8	4	●
VAPDMD0365	3.65	38.8	85.8	85	0.8	4	●
VAPDMD0370	3.70	38.8	85.8	85	0.8	4	●
VAPDMD0375	3.75	42.8	85.8	85	0.8	4	●
VAPDMD0380	3.80	42.8	85.8	85	0.8	4	●
VAPDMD0385	3.85	42.8	85.8	85	0.8	4	●
VAPDMD0390	3.90	42.8	85.8	85	0.8	4	●
VAPDMD0395	3.95	42.8	85.8	85	0.8	4	●
VAPDMD0400	4.00	42.8	85.8	85	0.8	4	●
VAPDMD0405	4.05	42.8	100.8	100	0.8	6	●
VAPDMD0410	4.10	42.9	100.9	100	0.9	6	●
VAPDMD0415	4.15	42.9	100.9	100	0.9	6	●
VAPDMD0420	4.20	42.9	100.9	100	0.9	6	●
VAPDMD0425	4.25	46.9	100.9	100	0.9	6	●
VAPDMD0430	4.30	46.9	100.9	100	0.9	6	●
VAPDMD0435	4.35	46.9	100.9	100	0.9	6	●
VAPDMD0440	4.40	46.9	100.9	100	0.9	6	●
VAPDMD0445	4.45	46.9	100.9	100	0.9	6	●

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDMD0450	4.50	46.9	100.9	100	0.9	6	●
VAPDMD0455	4.55	46.9	100.9	100	0.9	6	●
VAPDMD0460	4.60	47.0	101.0	100	1.0	6	●
VAPDMD0465	4.65	47.0	101.0	100	1.0	6	●
VAPDMD0470	4.70	47.0	101.0	100	1.0	6	●
VAPDMD0475	4.75	47.0	101.0	100	1.0	6	●
VAPDMD0480	4.80	52.0	101.0	100	1.0	6	●
VAPDMD0485	4.85	52.0	101.0	100	1.0	6	●
VAPDMD0490	4.90	52.0	101.0	100	1.0	6	●
VAPDMD0495	4.95	52.0	101.0	100	1.0	6	●
VAPDMD0500	5.00	52.0	101.0	100	1.0	6	●
VAPDMD0505	5.05	52.1	101.1	100	1.1	6	●
VAPDMD0510	5.10	52.1	101.1	100	1.1	6	●
VAPDMD0515	5.15	52.1	101.1	100	1.1	6	●
VAPDMD0520	5.20	52.1	101.1	100	1.1	6	●
VAPDMD0525	5.25	52.1	101.1	100	1.1	6	●
VAPDMD0530	5.30	52.1	101.1	100	1.1	6	●
VAPDMD0535	5.35	57.1	107.1	106	1.1	6	●
VAPDMD0540	5.40	57.1	107.1	106	1.1	6	●
VAPDMD0545	5.45	57.1	107.1	106	1.1	6	●
VAPDMD0550	5.50	57.1	107.1	106	1.1	6	●
VAPDMD0555	5.55	57.2	107.2	106	1.2	6	●
VAPDMD0560	5.60	57.2	107.2	106	1.2	6	●
VAPDMD0565	5.65	57.2	107.2	106	1.2	6	●
VAPDMD0570	5.70	57.2	107.2	106	1.2	6	●
VAPDMD0575	5.75	57.2	107.2	106	1.2	6	●
VAPDMD0580	5.80	57.2	107.2	106	1.2	6	●
VAPDMD0585	5.85	57.2	107.2	106	1.2	6	●
VAPDMD0590	5.90	57.2	107.2	106	1.2	6	●
VAPDMD0595	5.95	57.2	107.2	106	1.2	6	●
VAPDMD0600	6.00	57.2	107.2	106	1.2	6	●
VAPDMD0605	6.05	63.3	113.3	112	1.3	8	●
VAPDMD0610	6.10	63.3	113.3	112	1.3	8	●
VAPDMD0615	6.15	63.3	113.3	112	1.3	8	●
VAPDMD0620	6.20	63.3	113.3	112	1.3	8	●
VAPDMD0625	6.25	63.3	113.3	112	1.3	8	●
VAPDMD0630	6.30	63.3	113.3	112	1.3	8	●
VAPDMD0635	6.35	63.3	113.3	112	1.3	8	●
VAPDMD0640	6.40	63.3	113.3	112	1.3	8	●
VAPDMD0645	6.45	63.3	113.3	112	1.3	8	●
VAPDMD0650	6.50	63.4	113.4	112	1.4	8	●
VAPDMD0655	6.55	63.4	113.4	112	1.4	8	●
VAPDMD0660	6.60	63.4	113.4	112	1.4	8	●
VAPDMD0665	6.65	63.4	113.4	112	1.4	8	●
VAPDMD0670	6.70	63.4	113.4	112	1.4	8	●
VAPDMD0675	6.75	68.4	118.4	117	1.4	8	●
VAPDMD0680	6.80	68.4	118.4	117	1.4	8	●
VAPDMD0685	6.85	68.4	118.4	117	1.4	8	●
VAPDMD0690	6.90	68.4	118.4	117	1.4	8	●
VAPDMD0695	6.95	68.4	118.4	117	1.4	8	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDMD0700	7.00	68.5	118.5	117	1.5	8	●
VAPDMD0705	7.05	68.5	118.5	117	1.5	8	●
VAPDMD0710	7.10	68.5	118.5	117	1.5	8	●
VAPDMD0715	7.15	68.5	118.5	117	1.5	8	●
VAPDMD0720	7.20	68.5	118.5	117	1.5	8	●
VAPDMD0725	7.25	68.5	118.5	117	1.5	8	●
VAPDMD0730	7.30	68.5	118.5	117	1.5	8	●
VAPDMD0735	7.35	68.5	118.5	117	1.5	8	●
VAPDMD0740	7.40	68.5	118.5	117	1.5	8	●
VAPDMD0745	7.45	68.5	118.5	117	1.5	8	●
VAPDMD0750	7.50	68.6	118.6	117	1.6	8	●
VAPDMD0755	7.55	74.6	124.6	123	1.6	8	●
VAPDMD0760	7.60	74.6	124.6	123	1.6	8	●
VAPDMD0765	7.65	74.6	124.6	123	1.6	8	●
VAPDMD0770	7.70	74.6	124.6	123	1.6	8	●
VAPDMD0775	7.75	74.6	124.6	123	1.6	8	●
VAPDMD0780	7.80	74.6	124.6	123	1.6	8	●
VAPDMD0785	7.85	74.6	124.6	123	1.6	8	●
VAPDMD0790	7.90	74.6	124.6	123	1.6	8	●
VAPDMD0795	7.95	74.7	124.7	123	1.7	8	●
VAPDMD0800	8.00	74.7	124.7	123	1.7	8	●
VAPDMD0805	8.05	74.7	129.7	128	1.7	10	●
VAPDMD0810	8.10	74.7	129.7	128	1.7	10	●
VAPDMD0815	8.15	74.7	129.7	128	1.7	10	●
VAPDMD0820	8.20	74.7	129.7	128	1.7	10	●
VAPDMD0825	8.25	74.7	129.7	128	1.7	10	●
VAPDMD0830	8.30	74.7	129.7	128	1.7	10	●
VAPDMD0835	8.35	74.7	129.7	128	1.7	10	●
VAPDMD0840	8.40	74.7	129.7	128	1.7	10	●
VAPDMD0845	8.45	74.8	129.8	128	1.8	10	●
VAPDMD0850	8.50	74.8	129.8	128	1.8	10	●
VAPDMD0855	8.55	80.8	135.8	134	1.8	10	●
VAPDMD0860	8.60	80.8	135.8	134	1.8	10	●
VAPDMD0865	8.65	80.8	135.8	134	1.8	10	●
VAPDMD0870	8.70	80.8	135.8	134	1.8	10	●
VAPDMD0875	8.75	80.8	135.8	134	1.8	10	●
VAPDMD0880	8.80	80.8	135.8	134	1.8	10	●
VAPDMD0885	8.85	80.8	135.8	134	1.8	10	●
VAPDMD0890	8.90	80.8	135.8	134	1.8	10	●
VAPDMD0895	8.95	80.9	135.9	134	1.9	10	●
VAPDMD0900	9.00	80.9	135.9	134	1.9	10	●
VAPDMD0910	9.10	80.9	135.9	134	1.9	10	●
VAPDMD0920	9.20	80.9	135.9	134	1.9	10	●
VAPDMD0930	9.30	80.9	135.9	134	1.9	10	●
VAPDMD0940	9.40	81.0	136.0	134	2.0	10	●
VAPDMD0950	9.50	81.0	136.0	134	2.0	10	●
VAPDMD0960	9.60	87.0	142.0	140	2.0	10	●
VAPDMD0970	9.70	87.0	142.0	140	2.0	10	●
VAPDMD0980	9.80	87.0	142.0	140	2.0	10	●
VAPDMD0990	9.90	87.1	142.1	140	2.1	10	●

CUTTING CONDITIONS ➤N145

VIOLET DRILLS

VAPDM

Medium, High precision

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDMD1000	10.0	87.1	142.1	140	2.1	10	●
VAPDMD1010	10.1	87.1	147.1	145	2.1	12	●
VAPDMD1020	10.2	87.1	147.1	145	2.1	12	●
VAPDMD1030	10.3	87.1	147.1	145	2.1	12	●
VAPDMD1040	10.4	87.2	147.2	145	2.2	12	●
VAPDMD1050	10.5	87.2	147.2	145	2.2	12	●
VAPDMD1060	10.6	87.2	147.2	145	2.2	12	●
VAPDMD1070	10.7	94.2	154.2	152	2.2	12	●
VAPDMD1080	10.8	94.2	154.2	152	2.2	12	●
VAPDMD1090	10.9	94.3	154.3	152	2.3	12	●
VAPDMD1100	11.0	94.3	154.3	152	2.3	12	●
VAPDMD1110	11.1	94.3	154.3	152	2.3	12	●
VAPDMD1120	11.2	94.3	154.3	152	2.3	12	●
VAPDMD1130	11.3	94.3	154.3	152	2.3	12	●
VAPDMD1140	11.4	94.4	154.4	152	2.4	12	●
VAPDMD1150	11.5	94.4	154.4	152	2.4	12	●
VAPDMD1160	11.6	94.4	154.4	152	2.4	12	●
VAPDMD1170	11.7	94.4	154.4	152	2.4	12	●
VAPDMD1180	11.8	94.4	154.4	152	2.4	12	●
VAPDMD1190	11.9	101.5	161.5	159	2.5	12	●
VAPDMD1200	12.0	101.5	161.5	159	2.5	12	●
VAPDMD1210	12.1	101.5	161.5	159	2.5	12	●
VAPDMD1220	12.2	101.5	161.5	159	2.5	12	●
VAPDMD1230	12.3	101.6	161.6	159	2.6	12	●
VAPDMD1240	12.4	101.6	161.6	159	2.6	12	●
VAPDMD1250	12.5	101.6	161.6	159	2.6	12	●
VAPDMD1260	12.6	101.6	161.6	159	2.6	12	●
VAPDMD1270	12.7	101.6	161.6	159	2.6	12	●
VAPDMD1280	12.8	101.7	161.7	159	2.7	12	●
VAPDMD1290	12.9	101.7	161.7	159	2.7	12	●
VAPDMD1300	13.0	101.7	161.7	159	2.7	12	●
VAPDMD1350	13.5	102.8	162.8	160	2.8	16	●
VAPDMD1400	14.0	102.9	162.9	160	2.9	16	●
VAPDMD1410	14.1	107.9	167.9	165	2.9	16	●
VAPDMD1420	14.2	107.9	167.9	165	2.9	16	●
VAPDMD1450	14.5	108.0	168.0	165	3.0	16	●
VAPDMD1500	15.0	108.1	168.1	165	3.1	16	●
VAPDMD1550	15.5	113.2	173.2	170	3.2	16	●
VAPDMD1560	15.6	113.2	173.2	170	3.2	16	●
VAPDMD1570	15.7	113.3	173.3	170	3.3	16	●
VAPDMD1600	16.0	113.3	173.3	170	3.3	16	●
VAPDMD1650	16.5	113.4	178.4	175	3.4	20	●
VAPDMD1700	17.0	113.5	178.5	175	3.5	20	●
VAPDMD1750	17.5	118.6	183.6	180	3.6	20	●
VAPDMD1760	17.6	118.7	183.7	180	3.7	20	●
VAPDMD1770	17.7	118.7	183.7	180	3.7	20	●
VAPDMD1800	18.0	118.7	183.7	180	3.7	20	●
VAPDMD1850	18.5	123.8	188.8	185	3.8	20	●
VAPDMD1900	19.0	123.9	188.9	185	3.9	20	●
VAPDMD1950	19.5	124.0	189.0	185	4.0	20	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDMD1960	19.6	124.1	189.1	185	4.1	20	●
VAPDMD1970	19.7	124.1	189.1	185	4.1	20	●
VAPDMD2000	20.0	124.1	189.1	185	4.1	20	●
VAPDMD2050	20.5	129.3	204.3	200	4.3	25	●
VAPDMD2100	21.0	129.4	204.4	200	4.4	25	●
VAPDMD2110	21.1	129.4	204.4	200	4.4	25	●
VAPDMD2120	21.2	129.4	204.4	200	4.4	25	●
VAPDMD2150	21.5	129.5	204.5	200	4.5	25	●
VAPDMD2200	22.0	129.6	204.6	200	4.6	25	●
VAPDMD2250	22.5	134.7	209.7	205	4.7	25	●
VAPDMD2300	23.0	134.8	209.8	205	4.8	25	●
VAPDMD2350	23.5	134.9	209.9	205	4.9	25	●
VAPDMD2400	24.0	140.0	215.0	210	5.0	25	●
VAPDMD2450	24.5	140.1	215.1	210	5.1	25	●
VAPDMD2500	25.0	140.2	215.2	210	5.2	25	●
VAPDMD2550	25.5	145.3	225.3	220	5.3	32	●
VAPDMD2600	26.0	145.4	225.4	220	5.4	32	●
VAPDMD2650	26.5	145.5	225.5	220	5.5	32	●
VAPDMD2700	27.0	145.6	225.6	220	5.6	32	●
VAPDMD2800	28.0	145.8	225.8	220	5.8	32	●
VAPDMD2900	29.0	151.0	231.0	225	6.0	32	●
VAPDMD3000	30.0	151.2	231.2	225	6.2	32	●
VAPDMD3100	31.0	156.4	236.4	230	6.4	32	●
VAPDMD3200	32.0	161.6	241.6	235	6.6	32	●

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS (Standard drilling depth : 5 times or below the drill diameter)

Work material	Structural steel		Carbon steel AISI 1049 Alloy steel SCM Cast iron FC		Alloy tool steel AISI D2 (Low-hardness materials) Ferritic stainless steel AISI 430, AISI 405 Martensitic stainless steel AISI 420, AISI 440		Alloy tool steel AISI H13 (−40HRC) Precipitation hardening stainless steel ASTM 630, ASTM 631	
Drill Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	17000	0.01	12800	0.01	8000	0.01	6600	0.01
1.0	11000	0.05	8300	0.05	5000	0.05	4100	0.04
2.0	6400	0.09	4800	0.09	2900	0.06	2400	0.05
3.0	4300	0.13	3200	0.13	1900	0.10	1600	0.06
4.0	3200	0.15	2400	0.15	1400	0.10	1200	0.08
5.0	2600	0.18	1900	0.18	1100	0.13	950	0.10
6.0	2100	0.19	1600	0.20	950	0.15	800	0.11
8.0	1600	0.24	1200	0.22	720	0.18	600	0.13
10.0	1300	0.28	950	0.25	570	0.21	480	0.15
12.0	1100	0.34	800	0.30	480	0.25	400	0.17
14.0	910	0.39	680	0.35	410	0.30	340	0.21
15.0	850	0.40	640	0.36	380	0.31	320	0.22
16.0	800	0.42	600	0.38	360	0.32	300	0.23
18.0	710	0.44	530	0.40	320	0.34	270	0.24
20.0	570	0.44	450	0.40	250	0.34	220	0.24
22.0	520	0.46	410	0.42	230	0.36	200	0.25
24.0	480	0.48	370	0.44	210	0.37	190	0.26
26.0	440	0.51	340	0.46	200	0.39	170	0.28
28.0	410	0.53	320	0.48	180	0.41	160	0.29
30.0	380	0.55	300	0.50	170	0.43	150	0.30
32.0	360	0.55	280	0.50	160	0.43	140	0.30

1) Please reduce the revolution and feed rate depending on the drilling situation when the installation of workpiece or machine lacks rigidity.
2) Please use a collet type drill chuck or a milling chuck.
3) Use sufficient cutting fluid.
4) VAPDMSUS are recommended for austenitic stainless steels (AISI 304).
5) When drilling holes greater than 4 x drill diameter hole depths, please use a peck feed.

The above-mentioned cutting condition is standard when using water-soluble cutting fluid.
Please reduce the revolution when using non-water-soluble cutting fluid.

VIOLET DRILLS

VAPDSSUS

Short, High precision, For stainless steel

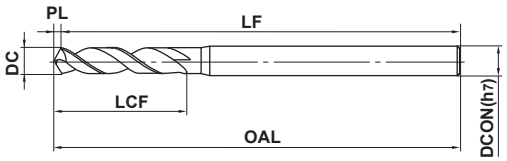
CO HSS | V | 135° | X Thinning DC≥1

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal		

0.5≤DC≤3	3<DC≤6	6<DC≤10	10<DC≤18	18<DC≤20
0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033

✱All drills except those with intervals of 0.1mm and under dia. 4.0mm have a tolerance of 0—0.009mm.





● New design and the Violet coating combination enable high efficiency drilling and long tool life for drilling of stainless steels.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDSSUSD0050	0.50	3.10	50.10	50	0.10	3	●
VAPDSSUSD0051	0.51	3.11	50.11	50	0.11	3	●
VAPDSSUSD0052	0.52	3.11	50.11	50	0.11	3	●
VAPDSSUSD0053	0.53	3.11	50.11	50	0.11	3	●
VAPDSSUSD0054	0.54	3.11	50.11	50	0.11	3	●
VAPDSSUSD0055	0.55	3.11	50.11	50	0.11	3	●
VAPDSSUSD0056	0.56	4.12	50.12	50	0.12	3	●
VAPDSSUSD0057	0.57	4.12	50.12	50	0.12	3	●
VAPDSSUSD0058	0.58	4.12	50.12	50	0.12	3	●
VAPDSSUSD0059	0.59	4.12	50.12	50	0.12	3	●
VAPDSSUSD0060	0.60	5.12	50.12	50	0.12	3	●
VAPDSSUSD0061	0.61	5.13	50.13	50	0.13	3	●
VAPDSSUSD0062	0.62	5.13	50.13	50	0.13	3	●
VAPDSSUSD0063	0.63	5.13	50.13	50	0.13	3	●
VAPDSSUSD0064	0.64	5.13	50.13	50	0.13	3	●
VAPDSSUSD0065	0.65	5.13	50.13	50	0.13	3	●
VAPDSSUSD0066	0.66	5.14	50.14	50	0.14	3	●
VAPDSSUSD0067	0.67	5.14	50.14	50	0.14	3	●
VAPDSSUSD0068	0.68	5.14	50.14	50	0.14	3	●
VAPDSSUSD0069	0.69	5.14	50.14	50	0.14	3	●
VAPDSSUSD0070	0.70	5.14	50.14	50	0.14	3	●
VAPDSSUSD0071	0.71	5.15	50.15	50	0.15	3	●
VAPDSSUSD0072	0.72	5.15	50.15	50	0.15	3	●
VAPDSSUSD0073	0.73	5.15	50.15	50	0.15	3	●
VAPDSSUSD0074	0.74	5.15	50.15	50	0.15	3	●
VAPDSSUSD0075	0.75	5.16	50.16	50	0.16	3	●
VAPDSSUSD0076	0.76	5.16	50.16	50	0.16	3	●
VAPDSSUSD0077	0.77	5.16	50.16	50	0.16	3	●
VAPDSSUSD0078	0.78	5.16	50.16	50	0.16	3	●
VAPDSSUSD0079	0.79	5.16	50.16	50	0.16	3	●
VAPDSSUSD0080	0.80	5.17	50.17	50	0.17	3	●
VAPDSSUSD0081	0.81	5.17	50.17	50	0.17	3	●
VAPDSSUSD0082	0.82	5.17	50.17	50	0.17	3	●
VAPDSSUSD0083	0.83	5.17	50.17	50	0.17	3	●
VAPDSSUSD0084	0.84	5.17	50.17	50	0.17	3	●
VAPDSSUSD0085	0.85	5.18	50.18	50	0.18	3	●
VAPDSSUSD0086	0.86	6.18	50.18	50	0.18	3	●
VAPDSSUSD0087	0.87	6.18	50.18	50	0.18	3	●
VAPDSSUSD0088	0.88	6.18	50.18	50	0.18	3	●
VAPDSSUSD0089	0.89	6.18	50.18	50	0.18	3	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDSSUSD0090	0.90	6.19	50.19	50	0.19	3	●
VAPDSSUSD0091	0.91	6.19	50.19	50	0.19	3	●
VAPDSSUSD0092	0.92	6.19	50.19	50	0.19	3	●
VAPDSSUSD0093	0.93	6.19	50.19	50	0.19	3	●
VAPDSSUSD0094	0.94	6.19	50.19	50	0.19	3	●
VAPDSSUSD0095	0.95	6.20	50.20	50	0.20	3	●
VAPDSSUSD0096	0.96	6.20	50.20	50	0.20	3	●
VAPDSSUSD0097	0.97	6.20	50.20	50	0.20	3	●
VAPDSSUSD0098	0.98	6.20	50.20	50	0.20	3	●
VAPDSSUSD0099	0.99	6.21	50.21	50	0.21	3	●
VAPDSSUSD0100	1.00	6.2	50.2	50	0.2	3	●
VAPDSSUSD0101	1.01	6.2	50.2	50	0.2	3	●
VAPDSSUSD0102	1.02	6.2	50.2	50	0.2	3	●
VAPDSSUSD0103	1.03	6.2	50.2	50	0.2	3	●
VAPDSSUSD0104	1.04	6.2	50.2	50	0.2	3	●
VAPDSSUSD0105	1.05	6.2	50.2	50	0.2	3	●
VAPDSSUSD0106	1.06	6.2	50.2	50	0.2	3	●
VAPDSSUSD0107	1.07	8.2	55.2	55	0.2	3	●
VAPDSSUSD0108	1.08	8.2	55.2	55	0.2	3	●
VAPDSSUSD0109	1.09	8.2	55.2	55	0.2	3	●
VAPDSSUSD0110	1.10	8.2	55.2	55	0.2	3	●
VAPDSSUSD0111	1.11	8.2	55.2	55	0.2	3	●
VAPDSSUSD0112	1.12	8.2	55.2	55	0.2	3	●
VAPDSSUSD0113	1.13	8.2	55.2	55	0.2	3	●
VAPDSSUSD0114	1.14	8.2	55.2	55	0.2	3	●
VAPDSSUSD0115	1.15	8.2	55.2	55	0.2	3	●
VAPDSSUSD0116	1.16	8.2	55.2	55	0.2	3	●
VAPDSSUSD0117	1.17	8.2	55.2	55	0.2	3	●
VAPDSSUSD0118	1.18	8.2	55.2	55	0.2	3	●
VAPDSSUSD0119	1.19	8.3	55.3	55	0.3	3	●
VAPDSSUSD0120	1.20	8.3	55.3	55	0.3	3	●
VAPDSSUSD0121	1.21	8.3	55.3	55	0.3	3	●
VAPDSSUSD0122	1.22	8.3	55.3	55	0.3	3	●
VAPDSSUSD0123	1.23	8.3	55.3	55	0.3	3	●
VAPDSSUSD0124	1.24	8.3	55.3	55	0.3	3	●
VAPDSSUSD0125	1.25	8.3	55.3	55	0.3	3	●
VAPDSSUSD0126	1.26	8.3	55.3	55	0.3	3	●
VAPDSSUSD0127	1.27	8.3	55.3	55	0.3	3	●
VAPDSSUSD0128	1.28	8.3	55.3	55	0.3	3	●
VAPDSSUSD0129	1.29	8.3	55.3	55	0.3	3	●

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDSSUSD0130	1.30	9.3	55.3	55	0.3	3	●
VAPDSSUSD0131	1.31	9.3	55.3	55	0.3	3	●
VAPDSSUSD0132	1.32	9.3	55.3	55	0.3	3	●
VAPDSSUSD0133	1.33	9.3	55.3	55	0.3	3	●
VAPDSSUSD0134	1.34	9.3	55.3	55	0.3	3	●
VAPDSSUSD0135	1.35	9.3	55.3	55	0.3	3	●
VAPDSSUSD0136	1.36	9.3	55.3	55	0.3	3	●
VAPDSSUSD0137	1.37	9.3	55.3	55	0.3	3	●
VAPDSSUSD0138	1.38	9.3	55.3	55	0.3	3	●
VAPDSSUSD0139	1.39	9.3	55.3	55	0.3	3	●
VAPDSSUSD0140	1.40	9.3	55.3	55	0.3	3	●
VAPDSSUSD0141	1.41	9.3	55.3	55	0.3	3	●
VAPDSSUSD0142	1.42	9.3	55.3	55	0.3	3	●
VAPDSSUSD0143	1.43	9.3	55.3	55	0.3	3	●
VAPDSSUSD0144	1.44	9.3	55.3	55	0.3	3	●
VAPDSSUSD0145	1.45	9.3	55.3	55	0.3	3	●
VAPDSSUSD0146	1.46	9.3	55.3	55	0.3	3	●
VAPDSSUSD0147	1.47	9.3	55.3	55	0.3	3	●
VAPDSSUSD0148	1.48	9.3	55.3	55	0.3	3	●
VAPDSSUSD0149	1.49	9.3	55.3	55	0.3	3	●
VAPDSSUSD0150	1.50	9.3	55.3	55	0.3	3	●
VAPDSSUSD0151	1.51	11.3	55.3	55	0.3	3	●
VAPDSSUSD0152	1.52	11.3	55.3	55	0.3	3	●
VAPDSSUSD0153	1.53	11.3	55.3	55	0.3	3	●
VAPDSSUSD0154	1.54	11.3	55.3	55	0.3	3	●
VAPDSSUSD0155	1.55	11.3	55.3	55	0.3	3	●
VAPDSSUSD0156	1.56	11.3	55.3	55	0.3	3	●
VAPDSSUSD0157	1.57	11.3	55.3	55	0.3	3	●
VAPDSSUSD0158	1.58	11.3	55.3	55	0.3	3	●
VAPDSSUSD0159	1.59	11.3	55.3	55	0.3	3	●
VAPDSSUSD0160	1.60	11.3	55.3	55	0.3	3	●
VAPDSSUSD0161	1.61	11.3	55.3	55	0.3	3	●
VAPDSSUSD0162	1.62	11.3	55.3	55	0.3	3	●
VAPDSSUSD0163	1.63	11.3	55.3	55	0.3	3	●
VAPDSSUSD0164	1.64	11.3	55.3	55	0.3	3	●
VAPDSSUSD0165	1.65	11.3	55.3	55	0.3	3	●
VAPDSSUSD0166	1.66	11.3	55.3	55	0.3	3	●
VAPDSSUSD0167	1.67	11.4	55.4	55	0.4	3	●
VAPDSSUSD0168	1.68	11.4	55.4	55	0.4	3	●
VAPDSSUSD0169	1.69	11.4	55.4	55	0.4	3	●
VAPDSSUSD0170	1.70	11.4	55.4	55	0.4	3	●
VAPDSSUSD0171	1.71	11.4	55.4	55	0.4	3	●
VAPDSSUSD0172	1.72	11.4	55.4	55	0.4	3	●
VAPDSSUSD0173	1.73	11.4	55.4	55	0.4	3	●
VAPDSSUSD0174	1.74	11.4	55.4	55	0.4	3	●
VAPDSSUSD0175	1.75	11.4	55.4	55	0.4	3	●
VAPDSSUSD0176	1.76	11.4	55.4	55	0.4	3	●
VAPDSSUSD0177	1.77	11.4	55.4	55	0.4	3	●
VAPDSSUSD0178	1.78	11.4	55.4	55	0.4	3	●
VAPDSSUSD0179	1.79	11.4	55.4	55	0.4	3	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDSSUSD0180	1.80	11.4	55.4	55	0.4	3	●
VAPDSSUSD0181	1.81	11.4	55.4	55	0.4	3	●
VAPDSSUSD0182	1.82	11.4	55.4	55	0.4	3	●
VAPDSSUSD0183	1.83	11.4	55.4	55	0.4	3	●
VAPDSSUSD0184	1.84	11.4	55.4	55	0.4	3	●
VAPDSSUSD0185	1.85	11.4	55.4	55	0.4	3	●
VAPDSSUSD0186	1.86	11.4	55.4	55	0.4	3	●
VAPDSSUSD0187	1.87	11.4	55.4	55	0.4	3	●
VAPDSSUSD0188	1.88	11.4	55.4	55	0.4	3	●
VAPDSSUSD0189	1.89	11.4	55.4	55	0.4	3	●
VAPDSSUSD0190	1.90	12.4	55.4	55	0.4	3	●
VAPDSSUSD0191	1.91	12.4	60.4	60	0.4	3	●
VAPDSSUSD0192	1.92	12.4	60.4	60	0.4	3	●
VAPDSSUSD0193	1.93	12.4	60.4	60	0.4	3	●
VAPDSSUSD0194	1.94	12.4	60.4	60	0.4	3	●
VAPDSSUSD0195	1.95	12.4	60.4	60	0.4	3	●
VAPDSSUSD0196	1.96	12.4	60.4	60	0.4	3	●
VAPDSSUSD0197	1.97	12.4	60.4	60	0.4	3	●
VAPDSSUSD0198	1.98	12.4	60.4	60	0.4	3	●
VAPDSSUSD0199	1.99	12.4	60.4	60	0.4	3	●
VAPDSSUSD0200	2.00	12.4	60.4	60	0.4	3	●
VAPDSSUSD0201	2.01	12.4	60.4	60	0.4	3	●
VAPDSSUSD0202	2.02	12.4	60.4	60	0.4	3	●
VAPDSSUSD0203	2.03	12.4	60.4	60	0.4	3	●
VAPDSSUSD0204	2.04	12.4	60.4	60	0.4	3	●
VAPDSSUSD0205	2.05	12.4	60.4	60	0.4	3	●
VAPDSSUSD0206	2.06	12.4	60.4	60	0.4	3	●
VAPDSSUSD0207	2.07	12.4	60.4	60	0.4	3	●
VAPDSSUSD0208	2.08	12.4	60.4	60	0.4	3	●
VAPDSSUSD0209	2.09	12.4	60.4	60	0.4	3	●
VAPDSSUSD0210	2.10	12.4	60.4	60	0.4	3	●
VAPDSSUSD0211	2.11	12.4	60.4	60	0.4	3	●
VAPDSSUSD0212	2.12	12.4	60.4	60	0.4	3	●
VAPDSSUSD0213	2.13	12.4	60.4	60	0.4	3	●
VAPDSSUSD0214	2.14	12.4	60.4	60	0.4	3	●
VAPDSSUSD0215	2.15	12.5	60.5	60	0.5	3	●
VAPDSSUSD0216	2.16	12.5	60.5	60	0.5	3	●
VAPDSSUSD0217	2.17	12.5	60.5	60	0.5	3	●
VAPDSSUSD0218	2.18	12.5	60.5	60	0.5	3	●
VAPDSSUSD0219	2.19	12.5	60.5	60	0.5	3	●
VAPDSSUSD0220	2.20	12.5	60.5	60	0.5	3	●
VAPDSSUSD0221	2.21	12.5	60.5	60	0.5	3	●
VAPDSSUSD0222	2.22	12.5	60.5	60	0.5	3	●
VAPDSSUSD0223	2.23	12.5	60.5	60	0.5	3	●
VAPDSSUSD0224	2.24	12.5	60.5	60	0.5	3	●
VAPDSSUSD0225	2.25	12.5	60.5	60	0.5	3	●
VAPDSSUSD0226	2.26	12.5	60.5	60	0.5	3	●
VAPDSSUSD0227	2.27	12.5	60.5	60	0.5	3	●
VAPDSSUSD0228	2.28	12.5	60.5	60	0.5	3	●
VAPDSSUSD0229	2.29	12.5	60.5	60	0.5	3	●

HSS

VAPDSSUS

Short, High precision, For stainless steel

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDSSUSD0230	2.30	13.5	60.5	60	0.5	3	●
VAPDSSUSD0231	2.31	13.5	60.5	60	0.5	3	●
VAPDSSUSD0232	2.32	13.5	60.5	60	0.5	3	●
VAPDSSUSD0233	2.33	13.5	60.5	60	0.5	3	●
VAPDSSUSD0234	2.34	13.5	60.5	60	0.5	3	●
VAPDSSUSD0235	2.35	13.5	60.5	60	0.5	3	●
VAPDSSUSD0236	2.36	13.5	60.5	60	0.5	3	●
VAPDSSUSD0237	2.37	13.5	60.5	60	0.5	3	●
VAPDSSUSD0238	2.38	13.5	60.5	60	0.5	3	●
VAPDSSUSD0239	2.39	13.5	60.5	60	0.5	3	●
VAPDSSUSD0240	2.40	13.5	60.5	60	0.5	3	●
VAPDSSUSD0241	2.41	13.5	60.5	60	0.5	3	●
VAPDSSUSD0242	2.42	13.5	60.5	60	0.5	3	●
VAPDSSUSD0243	2.43	13.5	60.5	60	0.5	3	●
VAPDSSUSD0244	2.44	13.5	60.5	60	0.5	3	●
VAPDSSUSD0245	2.45	13.5	60.5	60	0.5	3	●
VAPDSSUSD0246	2.46	13.5	60.5	60	0.5	3	●
VAPDSSUSD0247	2.47	13.5	60.5	60	0.5	3	●
VAPDSSUSD0248	2.48	13.5	60.5	60	0.5	3	●
VAPDSSUSD0249	2.49	13.5	60.5	60	0.5	3	●
VAPDSSUSD0250	2.50	13.5	60.5	60	0.5	3	●
VAPDSSUSD0251	2.51	13.5	60.5	60	0.5	3	●
VAPDSSUSD0252	2.52	13.5	60.5	60	0.5	3	●
VAPDSSUSD0253	2.53	13.5	60.5	60	0.5	3	●
VAPDSSUSD0254	2.54	13.5	60.5	60	0.5	3	●
VAPDSSUSD0255	2.55	13.5	60.5	60	0.5	3	●
VAPDSSUSD0256	2.56	13.5	60.5	60	0.5	3	●
VAPDSSUSD0257	2.57	13.5	60.5	60	0.5	3	●
VAPDSSUSD0258	2.58	13.5	60.5	60	0.5	3	●
VAPDSSUSD0259	2.59	13.5	60.5	60	0.5	3	●
VAPDSSUSD0260	2.60	15.5	60.5	60	0.5	3	●
VAPDSSUSD0261	2.61	15.5	60.5	60	0.5	3	●
VAPDSSUSD0262	2.62	15.5	60.5	60	0.5	3	●
VAPDSSUSD0263	2.63	15.5	60.5	60	0.5	3	●
VAPDSSUSD0264	2.64	15.6	60.6	60	0.6	3	●
VAPDSSUSD0265	2.65	15.6	60.6	60	0.6	3	●
VAPDSSUSD0266	2.66	15.6	60.6	60	0.6	3	●
VAPDSSUSD0267	2.67	15.6	60.6	60	0.6	3	●
VAPDSSUSD0268	2.68	15.6	60.6	60	0.6	3	●
VAPDSSUSD0269	2.69	15.6	60.6	60	0.6	3	●
VAPDSSUSD0270	2.70	15.6	60.6	60	0.6	3	●
VAPDSSUSD0271	2.71	15.6	60.6	60	0.6	3	●
VAPDSSUSD0272	2.72	15.6	60.6	60	0.6	3	●
VAPDSSUSD0273	2.73	15.6	60.6	60	0.6	3	●
VAPDSSUSD0274	2.74	15.6	60.6	60	0.6	3	●
VAPDSSUSD0275	2.75	15.6	60.6	60	0.6	3	●
VAPDSSUSD0276	2.76	15.6	60.6	60	0.6	3	●
VAPDSSUSD0277	2.77	15.6	60.6	60	0.6	3	●
VAPDSSUSD0278	2.78	15.6	60.6	60	0.6	3	●
VAPDSSUSD0279	2.79	15.6	60.6	60	0.6	3	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDSSUSD0280	2.80	15.6	60.6	60	0.6	3	●
VAPDSSUSD0281	2.81	15.6	60.6	60	0.6	3	●
VAPDSSUSD0282	2.82	15.6	60.6	60	0.6	3	●
VAPDSSUSD0283	2.83	15.6	60.6	60	0.6	3	●
VAPDSSUSD0284	2.84	15.6	60.6	60	0.6	3	●
VAPDSSUSD0285	2.85	15.6	60.6	60	0.6	3	●
VAPDSSUSD0286	2.86	15.6	60.6	60	0.6	3	●
VAPDSSUSD0287	2.87	15.6	60.6	60	0.6	3	●
VAPDSSUSD0288	2.88	15.6	60.6	60	0.6	3	●
VAPDSSUSD0289	2.89	15.6	60.6	60	0.6	3	●
VAPDSSUSD0290	2.90	15.6	60.6	60	0.6	3	●
VAPDSSUSD0291	2.91	15.6	60.6	60	0.6	3	●
VAPDSSUSD0292	2.92	15.6	60.6	60	0.6	3	●
VAPDSSUSD0293	2.93	15.6	60.6	60	0.6	3	●
VAPDSSUSD0294	2.94	15.6	60.6	60	0.6	3	●
VAPDSSUSD0295	2.95	15.6	60.6	60	0.6	3	●
VAPDSSUSD0296	2.96	15.6	60.6	60	0.6	3	●
VAPDSSUSD0297	2.97	15.6	60.6	60	0.6	3	●
VAPDSSUSD0298	2.98	15.6	60.6	60	0.6	3	●
VAPDSSUSD0299	2.99	15.6	60.6	60	0.6	3	●
VAPDSSUSD0300	3.00	15.6	60.6	60	0.6	3	●
VAPDSSUSD0301	3.01	17.6	70.6	70	0.6	4	●
VAPDSSUSD0302	3.02	17.6	70.6	70	0.6	4	●
VAPDSSUSD0303	3.03	17.6	70.6	70	0.6	4	●
VAPDSSUSD0304	3.04	17.6	70.6	70	0.6	4	●
VAPDSSUSD0305	3.05	17.6	70.6	70	0.6	4	●
VAPDSSUSD0306	3.06	17.6	70.6	70	0.6	4	●
VAPDSSUSD0307	3.07	17.6	70.6	70	0.6	4	●
VAPDSSUSD0308	3.08	17.6	70.6	70	0.6	4	●
VAPDSSUSD0309	3.09	17.6	70.6	70	0.6	4	●
VAPDSSUSD0310	3.10	17.6	70.6	70	0.6	4	●
VAPDSSUSD0311	3.11	17.6	70.6	70	0.6	4	●
VAPDSSUSD0312	3.12	17.7	70.7	70	0.7	4	●
VAPDSSUSD0313	3.13	17.7	70.7	70	0.7	4	●
VAPDSSUSD0314	3.14	17.7	70.7	70	0.7	4	●
VAPDSSUSD0315	3.15	17.7	70.7	70	0.7	4	●
VAPDSSUSD0316	3.16	17.7	70.7	70	0.7	4	●
VAPDSSUSD0317	3.17	17.7	70.7	70	0.7	4	●
VAPDSSUSD0318	3.18	17.7	70.7	70	0.7	4	●
VAPDSSUSD0319	3.19	17.7	70.7	70	0.7	4	●
VAPDSSUSD0320	3.20	17.7	70.7	70	0.7	4	●
VAPDSSUSD0321	3.21	17.7	70.7	70	0.7	4	●
VAPDSSUSD0322	3.22	17.7	70.7	70	0.7	4	●
VAPDSSUSD0323	3.23	17.7	70.7	70	0.7	4	●
VAPDSSUSD0324	3.24	17.7	70.7	70	0.7	4	●
VAPDSSUSD0325	3.25	17.7	70.7	70	0.7	4	●
VAPDSSUSD0326	3.26	17.7	70.7	70	0.7	4	●
VAPDSSUSD0327	3.27	17.7	70.7	70	0.7	4	●
VAPDSSUSD0328	3.28	17.7	70.7	70	0.7	4	●
VAPDSSUSD0329	3.29	17.7	70.7	70	0.7	4	●

● : Inventory maintained in Japan.

DRILLING

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDSSUSD0330	3.30	19.7	70.7	70	0.7	4	●
VAPDSSUSD0331	3.31	19.7	70.7	70	0.7	4	●
VAPDSSUSD0332	3.32	19.7	70.7	70	0.7	4	●
VAPDSSUSD0333	3.33	19.7	70.7	70	0.7	4	●
VAPDSSUSD0334	3.34	19.7	70.7	70	0.7	4	●
VAPDSSUSD0335	3.35	19.7	70.7	70	0.7	4	●
VAPDSSUSD0336	3.36	19.7	70.7	70	0.7	4	●
VAPDSSUSD0337	3.37	19.7	70.7	70	0.7	4	●
VAPDSSUSD0338	3.38	19.7	70.7	70	0.7	4	●
VAPDSSUSD0339	3.39	19.7	70.7	70	0.7	4	●
VAPDSSUSD0340	3.40	19.7	70.7	70	0.7	4	●
VAPDSSUSD0341	3.41	19.7	70.7	70	0.7	4	●
VAPDSSUSD0342	3.42	19.7	70.7	70	0.7	4	●
VAPDSSUSD0343	3.43	19.7	70.7	70	0.7	4	●
VAPDSSUSD0344	3.44	19.7	70.7	70	0.7	4	●
VAPDSSUSD0345	3.45	19.7	70.7	70	0.7	4	●
VAPDSSUSD0346	3.46	19.7	70.7	70	0.7	4	●
VAPDSSUSD0347	3.47	19.7	70.7	70	0.7	4	●
VAPDSSUSD0348	3.48	19.7	70.7	70	0.7	4	●
VAPDSSUSD0349	3.49	19.7	70.7	70	0.7	4	●
VAPDSSUSD0350	3.50	19.7	70.7	70	0.7	4	●
VAPDSSUSD0351	3.51	19.7	70.7	70	0.7	4	●
VAPDSSUSD0352	3.52	19.7	70.7	70	0.7	4	●
VAPDSSUSD0353	3.53	19.7	70.7	70	0.7	4	●
VAPDSSUSD0354	3.54	19.7	70.7	70	0.7	4	●
VAPDSSUSD0355	3.55	19.7	70.7	70	0.7	4	●
VAPDSSUSD0356	3.56	19.7	70.7	70	0.7	4	●
VAPDSSUSD0357	3.57	19.7	70.7	70	0.7	4	●
VAPDSSUSD0358	3.58	19.7	70.7	70	0.7	4	●
VAPDSSUSD0359	3.59	19.7	70.7	70	0.7	4	●
VAPDSSUSD0360	3.60	21.8	70.8	70	0.8	4	●
VAPDSSUSD0361	3.61	21.8	70.8	70	0.8	4	●
VAPDSSUSD0362	3.62	21.8	70.8	70	0.8	4	●
VAPDSSUSD0363	3.63	21.8	70.8	70	0.8	4	●
VAPDSSUSD0364	3.64	21.8	70.8	70	0.8	4	●
VAPDSSUSD0365	3.65	21.8	70.8	70	0.8	4	●
VAPDSSUSD0366	3.66	21.8	70.8	70	0.8	4	●
VAPDSSUSD0367	3.67	21.8	70.8	70	0.8	4	●
VAPDSSUSD0368	3.68	21.8	70.8	70	0.8	4	●
VAPDSSUSD0369	3.69	21.8	70.8	70	0.8	4	●
VAPDSSUSD0370	3.70	21.8	70.8	70	0.8	4	●
VAPDSSUSD0371	3.71	21.8	70.8	70	0.8	4	●
VAPDSSUSD0372	3.72	21.8	70.8	70	0.8	4	●
VAPDSSUSD0373	3.73	21.8	70.8	70	0.8	4	●
VAPDSSUSD0374	3.74	21.8	70.8	70	0.8	4	●
VAPDSSUSD0375	3.75	21.8	70.8	70	0.8	4	●
VAPDSSUSD0376	3.76	21.8	70.8	70	0.8	4	●
VAPDSSUSD0377	3.77	21.8	70.8	70	0.8	4	●
VAPDSSUSD0378	3.78	21.8	70.8	70	0.8	4	●
VAPDSSUSD0379	3.79	21.8	70.8	70	0.8	4	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDSSUSD0380	3.80	21.8	70.8	70	0.8	4	●
VAPDSSUSD0381	3.81	21.8	70.8	70	0.8	4	●
VAPDSSUSD0382	3.82	21.8	70.8	70	0.8	4	●
VAPDSSUSD0383	3.83	21.8	70.8	70	0.8	4	●
VAPDSSUSD0384	3.84	21.8	70.8	70	0.8	4	●
VAPDSSUSD0385	3.85	21.8	70.8	70	0.8	4	●
VAPDSSUSD0386	3.86	21.8	70.8	70	0.8	4	●
VAPDSSUSD0387	3.87	21.8	70.8	70	0.8	4	●
VAPDSSUSD0388	3.88	21.8	70.8	70	0.8	4	●
VAPDSSUSD0389	3.89	21.8	70.8	70	0.8	4	●
VAPDSSUSD0390	3.90	21.8	70.8	70	0.8	4	●
VAPDSSUSD0391	3.91	21.8	70.8	70	0.8	4	●
VAPDSSUSD0392	3.92	21.8	70.8	70	0.8	4	●
VAPDSSUSD0393	3.93	21.8	70.8	70	0.8	4	●
VAPDSSUSD0394	3.94	21.8	70.8	70	0.8	4	●
VAPDSSUSD0395	3.95	21.8	70.8	70	0.8	4	●
VAPDSSUSD0396	3.96	21.8	70.8	70	0.8	4	●
VAPDSSUSD0397	3.97	21.8	70.8	70	0.8	4	●
VAPDSSUSD0398	3.98	21.8	70.8	70	0.8	4	●
VAPDSSUSD0399	3.99	21.8	70.8	70	0.8	4	●
VAPDSSUSD0400	4.00	21.8	70.8	70	0.8	4	●
VAPDSSUSD0405	4.05	21.8	80.8	80	0.8	6	●
VAPDSSUSD0410	4.10	21.9	80.9	80	0.9	6	●
VAPDSSUSD0415	4.15	21.9	80.9	80	0.9	6	●
VAPDSSUSD0420	4.20	21.9	80.9	80	0.9	6	●
VAPDSSUSD0425	4.25	21.9	80.9	80	0.9	6	●
VAPDSSUSD0430	4.30	23.9	80.9	80	0.9	6	●
VAPDSSUSD0435	4.35	23.9	80.9	80	0.9	6	●
VAPDSSUSD0440	4.40	23.9	80.9	80	0.9	6	●
VAPDSSUSD0445	4.45	23.9	80.9	80	0.9	6	●
VAPDSSUSD0450	4.50	23.9	80.9	80	0.9	6	●
VAPDSSUSD0455	4.55	23.9	80.9	80	0.9	6	●
VAPDSSUSD0460	4.60	26.0	81.0	80	1.0	6	●
VAPDSSUSD0465	4.65	26.0	81.0	80	1.0	6	●
VAPDSSUSD0470	4.70	26.0	81.0	80	1.0	6	●
VAPDSSUSD0475	4.75	26.0	81.0	80	1.0	6	●
VAPDSSUSD0480	4.80	26.0	81.0	80	1.0	6	●
VAPDSSUSD0485	4.85	26.0	81.0	80	1.0	6	●
VAPDSSUSD0490	4.90	26.0	81.0	80	1.0	6	●
VAPDSSUSD0495	4.95	26.0	81.0	80	1.0	6	●
VAPDSSUSD0500	5.00	26.0	81.0	80	1.0	6	●
VAPDSSUSD0505	5.05	26.1	81.1	80	1.1	6	●
VAPDSSUSD0510	5.10	26.1	81.1	80	1.1	6	●
VAPDSSUSD0515	5.15	26.1	81.1	80	1.1	6	●
VAPDSSUSD0520	5.20	26.1	81.1	80	1.1	6	●
VAPDSSUSD0525	5.25	26.1	81.1	80	1.1	6	●
VAPDSSUSD0530	5.30	26.1	81.1	80	1.1	6	●
VAPDSSUSD0535	5.35	28.1	81.1	80	1.1	6	●
VAPDSSUSD0540	5.40	28.1	81.1	80	1.1	6	●
VAPDSSUSD0545	5.45	28.1	81.1	80	1.1	6	●

VIOLET DRILLS

VAPDSSUS

Short, High precision, For stainless steel

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDSSUSD0550	5.50	28.1	81.1	80	1.1	6	●
VAPDSSUSD0555	5.55	28.2	81.2	80	1.2	6	●
VAPDSSUSD0560	5.60	28.2	81.2	80	1.2	6	●
VAPDSSUSD0565	5.65	28.2	81.2	80	1.2	6	●
VAPDSSUSD0570	5.70	28.2	81.2	80	1.2	6	●
VAPDSSUSD0575	5.75	28.2	81.2	80	1.2	6	●
VAPDSSUSD0580	5.80	28.2	81.2	80	1.2	6	●
VAPDSSUSD0585	5.85	28.2	81.2	80	1.2	6	●
VAPDSSUSD0590	5.90	28.2	81.2	80	1.2	6	●
VAPDSSUSD0595	5.95	28.2	81.2	80	1.2	6	●
VAPDSSUSD0600	6.00	28.2	81.2	80	1.2	6	●
VAPDSSUSD0605	6.05	31.3	81.3	80	1.3	8	●
VAPDSSUSD0610	6.10	31.3	81.3	80	1.3	8	●
VAPDSSUSD0615	6.15	31.3	81.3	80	1.3	8	●
VAPDSSUSD0620	6.20	31.3	81.3	80	1.3	8	●
VAPDSSUSD0625	6.25	31.3	81.3	80	1.3	8	●
VAPDSSUSD0630	6.30	31.3	81.3	80	1.3	8	●
VAPDSSUSD0635	6.35	31.3	81.3	80	1.3	8	●
VAPDSSUSD0640	6.40	31.3	81.3	80	1.3	8	●
VAPDSSUSD0645	6.45	31.3	81.3	80	1.3	8	●
VAPDSSUSD0650	6.50	31.4	81.4	80	1.4	8	●
VAPDSSUSD0655	6.55	31.4	81.4	80	1.4	8	●
VAPDSSUSD0660	6.60	31.4	81.4	80	1.4	8	●
VAPDSSUSD0665	6.65	31.4	81.4	80	1.4	8	●
VAPDSSUSD0670	6.70	31.4	81.4	80	1.4	8	●
VAPDSSUSD0675	6.75	33.4	81.4	80	1.4	8	●
VAPDSSUSD0680	6.80	33.4	81.4	80	1.4	8	●
VAPDSSUSD0685	6.85	33.4	81.4	80	1.4	8	●
VAPDSSUSD0690	6.90	33.4	81.4	80	1.4	8	●
VAPDSSUSD0695	6.95	33.4	81.4	80	1.4	8	●
VAPDSSUSD0700	7.00	33.5	81.5	80	1.5	8	●
VAPDSSUSD0705	7.05	33.5	81.5	80	1.5	8	●
VAPDSSUSD0710	7.10	33.5	81.5	80	1.5	8	●
VAPDSSUSD0715	7.15	33.5	81.5	80	1.5	8	●
VAPDSSUSD0720	7.20	33.5	81.5	80	1.5	8	●
VAPDSSUSD0725	7.25	33.5	81.5	80	1.5	8	●
VAPDSSUSD0730	7.30	33.5	81.5	80	1.5	8	●
VAPDSSUSD0735	7.35	33.5	81.5	80	1.5	8	●
VAPDSSUSD0740	7.40	33.5	81.5	80	1.5	8	●
VAPDSSUSD0745	7.45	33.5	81.5	80	1.5	8	●
VAPDSSUSD0750	7.50	33.6	81.6	80	1.6	8	●
VAPDSSUSD0755	7.55	36.6	86.6	85	1.6	8	●
VAPDSSUSD0760	7.60	36.6	86.6	85	1.6	8	●
VAPDSSUSD0765	7.65	36.6	86.6	85	1.6	8	●
VAPDSSUSD0770	7.70	36.6	86.6	85	1.6	8	●
VAPDSSUSD0775	7.75	36.6	86.6	85	1.6	8	●
VAPDSSUSD0780	7.80	36.6	86.6	85	1.6	8	●
VAPDSSUSD0785	7.85	36.6	86.6	85	1.6	8	●
VAPDSSUSD0790	7.90	36.6	86.6	85	1.6	8	●
VAPDSSUSD0795	7.95	36.7	86.7	85	1.7	8	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDSSUSD0800	8.00	36.7	86.7	85	1.7	8	●
VAPDSSUSD0805	8.05	36.7	91.7	90	1.7	10	●
VAPDSSUSD0810	8.10	36.7	91.7	90	1.7	10	●
VAPDSSUSD0815	8.15	36.7	91.7	90	1.7	10	●
VAPDSSUSD0820	8.20	36.7	91.7	90	1.7	10	●
VAPDSSUSD0825	8.25	36.7	91.7	90	1.7	10	●
VAPDSSUSD0830	8.30	36.7	91.7	90	1.7	10	●
VAPDSSUSD0835	8.35	36.7	91.7	90	1.7	10	●
VAPDSSUSD0840	8.40	36.7	91.7	90	1.7	10	●
VAPDSSUSD0845	8.45	36.8	91.8	90	1.8	10	●
VAPDSSUSD0850	8.50	36.8	91.8	90	1.8	10	●
VAPDSSUSD0855	8.55	39.8	94.8	93	1.8	10	●
VAPDSSUSD0860	8.60	39.8	94.8	93	1.8	10	●
VAPDSSUSD0865	8.65	39.8	94.8	93	1.8	10	●
VAPDSSUSD0870	8.70	39.8	94.8	93	1.8	10	●
VAPDSSUSD0875	8.75	39.8	94.8	93	1.8	10	●
VAPDSSUSD0880	8.80	39.8	94.8	93	1.8	10	●
VAPDSSUSD0885	8.85	39.8	94.8	93	1.8	10	●
VAPDSSUSD0890	8.90	39.8	94.8	93	1.8	10	●
VAPDSSUSD0895	8.95	39.9	94.9	93	1.9	10	●
VAPDSSUSD0900	9.00	39.9	94.9	93	1.9	10	●
VAPDSSUSD0910	9.10	39.9	94.9	93	1.9	10	●
VAPDSSUSD0920	9.20	39.9	94.9	93	1.9	10	●
VAPDSSUSD0930	9.30	39.9	94.9	93	1.9	10	●
VAPDSSUSD0940	9.40	40.0	95.0	93	2.0	10	●
VAPDSSUSD0950	9.50	40.0	95.0	93	2.0	10	●
VAPDSSUSD0960	9.60	43.0	98.0	96	2.0	10	●
VAPDSSUSD0970	9.70	43.0	98.0	96	2.0	10	●
VAPDSSUSD0980	9.80	43.0	98.0	96	2.0	10	●
VAPDSSUSD0990	9.90	43.1	98.1	96	2.1	10	●
VAPDSSUSD1000	10.0	43.1	98.1	96	2.1	10	●
VAPDSSUSD1010	10.1	43.1	103.1	101	2.1	12	●
VAPDSSUSD1020	10.2	43.1	103.1	101	2.1	12	●
VAPDSSUSD1030	10.3	43.1	103.1	101	2.1	12	●
VAPDSSUSD1040	10.4	43.2	103.2	101	2.2	12	●
VAPDSSUSD1050	10.5	43.2	103.2	101	2.2	12	●
VAPDSSUSD1060	10.6	43.2	103.2	101	2.2	12	●
VAPDSSUSD1070	10.7	47.2	107.2	105	2.2	12	●
VAPDSSUSD1080	10.8	47.2	107.2	105	2.2	12	●
VAPDSSUSD1090	10.9	47.3	107.3	105	2.3	12	●
VAPDSSUSD1100	11.0	47.3	107.3	105	2.3	12	●
VAPDSSUSD1110	11.1	47.3	107.3	105	2.3	12	●
VAPDSSUSD1120	11.2	47.3	107.3	105	2.3	12	●
VAPDSSUSD1130	11.3	47.3	107.3	105	2.3	12	●
VAPDSSUSD1140	11.4	47.4	107.4	105	2.4	12	●
VAPDSSUSD1150	11.5	47.4	107.4	105	2.4	12	●
VAPDSSUSD1160	11.6	47.4	107.4	105	2.4	12	●
VAPDSSUSD1170	11.7	47.4	107.4	105	2.4	12	●
VAPDSSUSD1180	11.8	47.4	107.4	105	2.4	12	●
VAPDSSUSD1190	11.9	51.5	111.5	109	2.5	12	●

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDSSUSD1200	12.0	51.5	111.5	109	2.5	12	●
VAPDSSUSD1210	12.1	51.5	111.5	109	2.5	12	●
VAPDSSUSD1220	12.2	51.5	111.5	109	2.5	12	●
VAPDSSUSD1230	12.3	51.6	111.6	109	2.6	12	●
VAPDSSUSD1240	12.4	51.6	111.6	109	2.6	12	●
VAPDSSUSD1250	12.5	51.6	111.6	109	2.6	12	●
VAPDSSUSD1260	12.6	51.6	111.6	109	2.6	12	●
VAPDSSUSD1270	12.7	51.6	111.6	109	2.6	12	●
VAPDSSUSD1280	12.8	51.7	111.7	109	2.7	12	●
VAPDSSUSD1290	12.9	51.7	111.7	109	2.7	12	●
VAPDSSUSD1300	13.0	51.7	111.7	109	2.7	12	●
VAPDSSUSD1350	13.5	53.8	113.8	111	2.8	16	●
VAPDSSUSD1400	14.0	53.9	113.9	111	2.9	16	●
VAPDSSUSD1410	14.1	55.9	115.9	113	2.9	16	●
VAPDSSUSD1420	14.2	55.9	115.9	113	2.9	16	●
VAPDSSUSD1450	14.5	56.0	116.0	113	3.0	16	●
VAPDSSUSD1500	15.0	56.1	116.1	113	3.1	16	●
VAPDSSUSD1550	15.5	58.2	118.2	115	3.2	16	●
VAPDSSUSD1560	15.6	58.2	118.2	115	3.2	16	●
VAPDSSUSD1570	15.7	58.3	118.3	115	3.3	16	●
VAPDSSUSD1600	16.0	58.3	118.3	115	3.3	16	●
VAPDSSUSD1650	16.5	60.4	125.4	122	3.4	20	●
VAPDSSUSD1700	17.0	60.5	125.5	122	3.5	20	●
VAPDSSUSD1750	17.5	61.6	126.6	123	3.6	20	●
VAPDSSUSD1760	17.6	61.7	126.7	123	3.7	20	●
VAPDSSUSD1770	17.7	61.7	126.7	123	3.7	20	●
VAPDSSUSD1800	18.0	61.7	126.7	123	3.7	20	●
VAPDSSUSD1850	18.5	63.8	128.8	125	3.8	20	●
VAPDSSUSD1900	19.0	63.9	128.9	125	3.9	20	●
VAPDSSUSD1950	19.5	66.0	131.0	127	4.0	20	●
VAPDSSUSD1960	19.6	66.1	131.1	127	4.1	20	●
VAPDSSUSD1970	19.7	66.1	131.1	127	4.1	20	●
VAPDSSUSD2000	20.0	66.1	131.1	127	4.1	20	●

VIOLET DRILLS

VAPDMSUS

Medium, High precision, For stainless steel

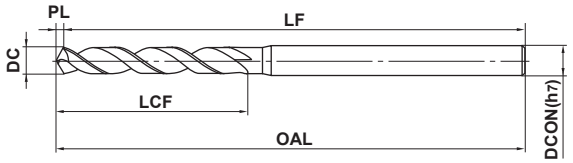
CO HSS | V | 118° DC<4 | 135° DC≥4 | X Thinning DC≥1

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal		

0.5≤DC≤3	3<DC≤6	6<DC≤10	10<DC≤13
0 −0.014	0 −0.018	0 −0.022	0 −0.027

✱All drills except those with intervals of 0.1mm and under dia. 4.0mm have a tolerance of 0—0.009mm.





● New design and the Violet coating combination enable high efficiency drilling and long tool life for drilling of stainless steels.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDMSUSD0050	0.50	6.15	50.15	50	0.15	3	●
VAPDMSUSD0051	0.51	6.15	50.15	50	0.15	3	●
VAPDMSUSD0052	0.52	6.16	50.16	50	0.16	3	●
VAPDMSUSD0053	0.53	6.16	50.16	50	0.16	3	●
VAPDMSUSD0054	0.54	6.16	50.16	50	0.16	3	●
VAPDMSUSD0055	0.55	6.17	50.17	50	0.17	3	●
VAPDMSUSD0056	0.56	8.17	50.17	50	0.17	3	●
VAPDMSUSD0057	0.57	8.17	50.17	50	0.17	3	●
VAPDMSUSD0058	0.58	8.17	50.17	50	0.17	3	●
VAPDMSUSD0059	0.59	8.18	50.18	50	0.18	3	●
VAPDMSUSD0060	0.60	8.18	50.18	50	0.18	3	●
VAPDMSUSD0061	0.61	8.18	50.18	50	0.18	3	●
VAPDMSUSD0062	0.62	8.19	50.19	50	0.19	3	●
VAPDMSUSD0063	0.63	8.19	50.19	50	0.19	3	●
VAPDMSUSD0064	0.64	8.19	50.19	50	0.19	3	●
VAPDMSUSD0065	0.65	8.20	50.20	50	0.20	3	●
VAPDMSUSD0066	0.66	8.20	50.20	50	0.20	3	●
VAPDMSUSD0067	0.67	8.20	50.20	50	0.20	3	●
VAPDMSUSD0068	0.68	8.20	50.20	50	0.20	3	●
VAPDMSUSD0069	0.69	8.21	50.21	50	0.21	3	●
VAPDMSUSD0070	0.70	10.21	50.21	50	0.21	3	●
VAPDMSUSD0071	0.71	10.21	50.21	50	0.21	3	●
VAPDMSUSD0072	0.72	10.22	50.22	50	0.22	3	●
VAPDMSUSD0073	0.73	10.22	50.22	50	0.22	3	●
VAPDMSUSD0074	0.74	10.22	50.22	50	0.22	3	●
VAPDMSUSD0075	0.75	10.23	50.23	50	0.23	3	●
VAPDMSUSD0076	0.76	10.23	50.23	50	0.23	3	●
VAPDMSUSD0077	0.77	10.23	50.23	50	0.23	3	●
VAPDMSUSD0078	0.78	10.23	50.23	50	0.23	3	●
VAPDMSUSD0079	0.79	10.24	50.24	50	0.24	3	●
VAPDMSUSD0080	0.80	10.24	50.24	50	0.24	3	●
VAPDMSUSD0081	0.81	10.24	50.24	50	0.24	3	●
VAPDMSUSD0082	0.82	10.25	50.25	50	0.25	3	●
VAPDMSUSD0083	0.83	10.25	50.25	50	0.25	3	●
VAPDMSUSD0084	0.84	10.25	50.25	50	0.25	3	●
VAPDMSUSD0085	0.85	10.26	50.26	50	0.26	3	●
VAPDMSUSD0086	0.86	12.26	50.26	50	0.26	3	●
VAPDMSUSD0087	0.87	12.26	50.26	50	0.26	3	●
VAPDMSUSD0088	0.88	12.26	50.26	50	0.26	3	●
VAPDMSUSD0089	0.89	12.27	50.27	50	0.27	3	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDMSUSD0090	0.90	12.27	50.27	50	0.27	3	●
VAPDMSUSD0091	0.91	12.27	50.27	50	0.27	3	●
VAPDMSUSD0092	0.92	12.28	50.28	50	0.28	3	●
VAPDMSUSD0093	0.93	12.28	50.28	50	0.28	3	●
VAPDMSUSD0094	0.94	12.28	50.28	50	0.28	3	●
VAPDMSUSD0095	0.95	12.29	50.29	50	0.29	3	●
VAPDMSUSD0096	0.96	12.29	50.29	50	0.29	3	●
VAPDMSUSD0097	0.97	12.29	50.29	50	0.29	3	●
VAPDMSUSD0098	0.98	12.29	50.29	50	0.29	3	●
VAPDMSUSD0099	0.99	12.30	50.30	50	0.30	3	●
VAPDMSUSD0100	1.00	12.3	60.3	60	0.3	3	●
VAPDMSUSD0101	1.01	12.3	60.3	60	0.3	3	●
VAPDMSUSD0102	1.02	12.3	60.3	60	0.3	3	●
VAPDMSUSD0103	1.03	12.3	60.3	60	0.3	3	●
VAPDMSUSD0104	1.04	12.3	60.3	60	0.3	3	●
VAPDMSUSD0105	1.05	12.3	60.3	60	0.3	3	●
VAPDMSUSD0106	1.06	12.3	60.3	60	0.3	3	●
VAPDMSUSD0107	1.07	16.3	60.3	60	0.3	3	●
VAPDMSUSD0108	1.08	16.3	60.3	60	0.3	3	●
VAPDMSUSD0109	1.09	16.3	60.3	60	0.3	3	●
VAPDMSUSD0110	1.10	16.3	60.3	60	0.3	3	●
VAPDMSUSD0111	1.11	16.3	60.3	60	0.3	3	●
VAPDMSUSD0112	1.12	16.3	60.3	60	0.3	3	●
VAPDMSUSD0113	1.13	16.3	60.3	60	0.3	3	●
VAPDMSUSD0114	1.14	16.3	60.3	60	0.3	3	●
VAPDMSUSD0115	1.15	16.4	60.4	60	0.4	3	●
VAPDMSUSD0116	1.16	16.4	60.4	60	0.4	3	●
VAPDMSUSD0117	1.17	16.4	60.4	60	0.4	3	●
VAPDMSUSD0118	1.18	16.4	60.4	60	0.4	3	●
VAPDMSUSD0119	1.19	16.4	60.4	60	0.4	3	●
VAPDMSUSD0120	1.20	16.4	60.4	60	0.4	3	●
VAPDMSUSD0121	1.21	16.4	60.4	60	0.4	3	●
VAPDMSUSD0122	1.22	16.4	60.4	60	0.4	3	●
VAPDMSUSD0123	1.23	16.4	60.4	60	0.4	3	●
VAPDMSUSD0124	1.24	16.4	60.4	60	0.4	3	●
VAPDMSUSD0125	1.25	16.4	60.4	60	0.4	3	●
VAPDMSUSD0126	1.26	16.4	60.4	60	0.4	3	●
VAPDMSUSD0127	1.27	16.4	60.4	60	0.4	3	●
VAPDMSUSD0128	1.28	16.4	60.4	60	0.4	3	●
VAPDMSUSD0129	1.29	16.4	60.4	60	0.4	3	●

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDMSUSD0130	1.30	16.4	60.4	60	0.4	3	●
VAPDMSUSD0131	1.31	18.4	60.4	60	0.4	3	●
VAPDMSUSD0132	1.32	18.4	60.4	60	0.4	3	●
VAPDMSUSD0133	1.33	18.4	60.4	60	0.4	3	●
VAPDMSUSD0134	1.34	18.4	60.4	60	0.4	3	●
VAPDMSUSD0135	1.35	18.4	60.4	60	0.4	3	●
VAPDMSUSD0136	1.36	18.4	60.4	60	0.4	3	●
VAPDMSUSD0137	1.37	18.4	60.4	60	0.4	3	●
VAPDMSUSD0138	1.38	18.4	60.4	60	0.4	3	●
VAPDMSUSD0139	1.39	18.4	60.4	60	0.4	3	●
VAPDMSUSD0140	1.40	18.4	60.4	60	0.4	3	●
VAPDMSUSD0141	1.41	18.4	60.4	60	0.4	3	●
VAPDMSUSD0142	1.42	18.4	60.4	60	0.4	3	●
VAPDMSUSD0143	1.43	18.4	60.4	60	0.4	3	●
VAPDMSUSD0144	1.44	18.4	60.4	60	0.4	3	●
VAPDMSUSD0145	1.45	18.4	60.4	60	0.4	3	●
VAPDMSUSD0146	1.46	18.4	60.4	60	0.4	3	●
VAPDMSUSD0147	1.47	18.4	60.4	60	0.4	3	●
VAPDMSUSD0148	1.48	18.4	60.4	60	0.4	3	●
VAPDMSUSD0149	1.49	18.5	60.5	60	0.5	3	●
VAPDMSUSD0150	1.50	18.5	60.5	60	0.5	3	●
VAPDMSUSD0151	1.51	20.5	60.5	60	0.5	3	●
VAPDMSUSD0152	1.52	20.5	60.5	60	0.5	3	●
VAPDMSUSD0153	1.53	20.5	60.5	60	0.5	3	●
VAPDMSUSD0154	1.54	20.5	60.5	60	0.5	3	●
VAPDMSUSD0155	1.55	20.5	60.5	60	0.5	3	●
VAPDMSUSD0156	1.56	20.5	60.5	60	0.5	3	●
VAPDMSUSD0157	1.57	20.5	60.5	60	0.5	3	●
VAPDMSUSD0158	1.58	20.5	60.5	60	0.5	3	●
VAPDMSUSD0159	1.59	20.5	60.5	60	0.5	3	●
VAPDMSUSD0160	1.60	20.5	60.5	60	0.5	3	●
VAPDMSUSD0161	1.61	20.5	60.5	60	0.5	3	●
VAPDMSUSD0162	1.62	20.5	60.5	60	0.5	3	●
VAPDMSUSD0163	1.63	20.5	60.5	60	0.5	3	●
VAPDMSUSD0164	1.64	20.5	60.5	60	0.5	3	●
VAPDMSUSD0165	1.65	20.5	60.5	60	0.5	3	●
VAPDMSUSD0166	1.66	20.5	60.5	60	0.5	3	●
VAPDMSUSD0167	1.67	20.5	60.5	60	0.5	3	●
VAPDMSUSD0168	1.68	20.5	60.5	60	0.5	3	●
VAPDMSUSD0169	1.69	20.5	60.5	60	0.5	3	●
VAPDMSUSD0170	1.70	20.5	60.5	60	0.5	3	●
VAPDMSUSD0171	1.71	20.5	60.5	60	0.5	3	●
VAPDMSUSD0172	1.72	20.5	60.5	60	0.5	3	●
VAPDMSUSD0173	1.73	20.5	60.5	60	0.5	3	●
VAPDMSUSD0174	1.74	20.5	60.5	60	0.5	3	●
VAPDMSUSD0175	1.75	20.5	60.5	60	0.5	3	●
VAPDMSUSD0176	1.76	20.5	60.5	60	0.5	3	●
VAPDMSUSD0177	1.77	20.5	60.5	60	0.5	3	●
VAPDMSUSD0178	1.78	20.5	60.5	60	0.5	3	●
VAPDMSUSD0179	1.79	20.5	60.5	60	0.5	3	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDMSUSD0180	1.80	22.5	60.5	60	0.5	3	●
VAPDMSUSD0181	1.81	22.5	60.5	60	0.5	3	●
VAPDMSUSD0182	1.82	22.6	60.6	60	0.6	3	●
VAPDMSUSD0183	1.83	22.6	60.6	60	0.6	3	●
VAPDMSUSD0184	1.84	22.6	60.6	60	0.6	3	●
VAPDMSUSD0185	1.85	22.6	60.6	60	0.6	3	●
VAPDMSUSD0186	1.86	22.6	60.6	60	0.6	3	●
VAPDMSUSD0187	1.87	22.6	60.6	60	0.6	3	●
VAPDMSUSD0188	1.88	22.6	60.6	60	0.6	3	●
VAPDMSUSD0189	1.89	22.6	60.6	60	0.6	3	●
VAPDMSUSD0190	1.90	22.6	60.6	60	0.6	3	●
VAPDMSUSD0191	1.91	23.6	60.6	60	0.6	3	●
VAPDMSUSD0192	1.92	23.6	60.6	60	0.6	3	●
VAPDMSUSD0193	1.93	23.6	60.6	60	0.6	3	●
VAPDMSUSD0194	1.94	23.6	60.6	60	0.6	3	●
VAPDMSUSD0195	1.95	23.6	60.6	60	0.6	3	●
VAPDMSUSD0196	1.96	23.6	60.6	60	0.6	3	●
VAPDMSUSD0197	1.97	23.6	60.6	60	0.6	3	●
VAPDMSUSD0198	1.98	23.6	60.6	60	0.6	3	●
VAPDMSUSD0199	1.99	23.6	60.6	60	0.6	3	●
VAPDMSUSD0200	2.00	23.6	70.6	70	0.6	3	●
VAPDMSUSD0201	2.01	23.6	70.6	70	0.6	3	●
VAPDMSUSD0202	2.02	23.6	70.6	70	0.6	3	●
VAPDMSUSD0203	2.03	23.6	70.6	70	0.6	3	●
VAPDMSUSD0204	2.04	23.6	70.6	70	0.6	3	●
VAPDMSUSD0205	2.05	23.6	70.6	70	0.6	3	●
VAPDMSUSD0206	2.06	23.6	70.6	70	0.6	3	●
VAPDMSUSD0207	2.07	23.6	70.6	70	0.6	3	●
VAPDMSUSD0208	2.08	23.6	70.6	70	0.6	3	●
VAPDMSUSD0209	2.09	23.6	70.6	70	0.6	3	●
VAPDMSUSD0210	2.10	23.6	70.6	70	0.6	3	●
VAPDMSUSD0211	2.11	23.6	70.6	70	0.6	3	●
VAPDMSUSD0212	2.12	23.6	70.6	70	0.6	3	●
VAPDMSUSD0213	2.13	23.6	70.6	70	0.6	3	●
VAPDMSUSD0214	2.14	23.6	70.6	70	0.6	3	●
VAPDMSUSD0215	2.15	23.7	70.7	70	0.7	3	●
VAPDMSUSD0216	2.16	23.7	70.7	70	0.7	3	●
VAPDMSUSD0217	2.17	23.7	70.7	70	0.7	3	●
VAPDMSUSD0218	2.18	23.7	70.7	70	0.7	3	●
VAPDMSUSD0219	2.19	23.7	70.7	70	0.7	3	●
VAPDMSUSD0220	2.20	26.7	70.7	70	0.7	3	●
VAPDMSUSD0221	2.21	26.7	70.7	70	0.7	3	●
VAPDMSUSD0222	2.22	26.7	70.7	70	0.7	3	●
VAPDMSUSD0223	2.23	26.7	70.7	70	0.7	3	●
VAPDMSUSD0224	2.24	26.7	70.7	70	0.7	3	●
VAPDMSUSD0225	2.25	26.7	70.7	70	0.7	3	●
VAPDMSUSD0226	2.26	26.7	70.7	70	0.7	3	●
VAPDMSUSD0227	2.27	26.7	70.7	70	0.7	3	●
VAPDMSUSD0228	2.28	26.7	70.7	70	0.7	3	●
VAPDMSUSD0229	2.29	26.7	70.7	70	0.7	3	●

VIOLET DRILLS

VAPDMSUS

Medium, High precision, For stainless steel

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDMSUSD0230	2.30	26.7	70.7	70	0.7	3	●
VAPDMSUSD0231	2.31	26.7	70.7	70	0.7	3	●
VAPDMSUSD0232	2.32	26.7	70.7	70	0.7	3	●
VAPDMSUSD0233	2.33	26.7	70.7	70	0.7	3	●
VAPDMSUSD0234	2.34	26.7	70.7	70	0.7	3	●
VAPDMSUSD0235	2.35	26.7	70.7	70	0.7	3	●
VAPDMSUSD0236	2.36	26.7	70.7	70	0.7	3	●
VAPDMSUSD0237	2.37	26.7	70.7	70	0.7	3	●
VAPDMSUSD0238	2.38	26.7	70.7	70	0.7	3	●
VAPDMSUSD0239	2.39	26.7	70.7	70	0.7	3	●
VAPDMSUSD0240	2.40	29.7	70.7	70	0.7	3	●
VAPDMSUSD0241	2.41	29.7	70.7	70	0.7	3	●
VAPDMSUSD0242	2.42	29.7	70.7	70	0.7	3	●
VAPDMSUSD0243	2.43	29.7	70.7	70	0.7	3	●
VAPDMSUSD0244	2.44	29.7	70.7	70	0.7	3	●
VAPDMSUSD0245	2.45	29.7	70.7	70	0.7	3	●
VAPDMSUSD0246	2.46	29.7	70.7	70	0.7	3	●
VAPDMSUSD0247	2.47	29.7	70.7	70	0.7	3	●
VAPDMSUSD0248	2.48	29.8	70.8	70	0.8	3	●
VAPDMSUSD0249	2.49	29.8	70.8	70	0.8	3	●
VAPDMSUSD0250	2.50	29.8	70.8	70	0.8	3	●
VAPDMSUSD0251	2.51	29.8	70.8	70	0.8	3	●
VAPDMSUSD0252	2.52	29.8	70.8	70	0.8	3	●
VAPDMSUSD0253	2.53	29.8	70.8	70	0.8	3	●
VAPDMSUSD0254	2.54	29.8	70.8	70	0.8	3	●
VAPDMSUSD0255	2.55	29.8	70.8	70	0.8	3	●
VAPDMSUSD0256	2.56	29.8	70.8	70	0.8	3	●
VAPDMSUSD0257	2.57	29.8	70.8	70	0.8	3	●
VAPDMSUSD0258	2.58	29.8	70.8	70	0.8	3	●
VAPDMSUSD0259	2.59	29.8	70.8	70	0.8	3	●
VAPDMSUSD0260	2.60	29.8	70.8	70	0.8	3	●
VAPDMSUSD0261	2.61	29.8	70.8	70	0.8	3	●
VAPDMSUSD0262	2.62	29.8	70.8	70	0.8	3	●
VAPDMSUSD0263	2.63	29.8	70.8	70	0.8	3	●
VAPDMSUSD0264	2.64	29.8	70.8	70	0.8	3	●
VAPDMSUSD0265	2.65	29.8	70.8	70	0.8	3	●
VAPDMSUSD0266	2.66	29.8	70.8	70	0.8	3	●
VAPDMSUSD0267	2.67	29.8	70.8	70	0.8	3	●
VAPDMSUSD0268	2.68	29.8	70.8	70	0.8	3	●
VAPDMSUSD0269	2.69	29.8	70.8	70	0.8	3	●
VAPDMSUSD0270	2.70	32.8	70.8	70	0.8	3	●
VAPDMSUSD0271	2.71	32.8	70.8	70	0.8	3	●
VAPDMSUSD0272	2.72	32.8	70.8	70	0.8	3	●
VAPDMSUSD0273	2.73	32.8	70.8	70	0.8	3	●
VAPDMSUSD0274	2.74	32.8	70.8	70	0.8	3	●
VAPDMSUSD0275	2.75	32.8	70.8	70	0.8	3	●
VAPDMSUSD0276	2.76	32.8	70.8	70	0.8	3	●
VAPDMSUSD0277	2.77	32.8	70.8	70	0.8	3	●
VAPDMSUSD0278	2.78	32.8	70.8	70	0.8	3	●
VAPDMSUSD0279	2.79	32.8	70.8	70	0.8	3	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDMSUSD0280	2.80	32.8	70.8	70	0.8	3	●
VAPDMSUSD0281	2.81	32.8	70.8	70	0.8	3	●
VAPDMSUSD0282	2.82	32.9	70.9	70	0.9	3	●
VAPDMSUSD0283	2.83	32.9	70.9	70	0.9	3	●
VAPDMSUSD0284	2.84	32.9	70.9	70	0.9	3	●
VAPDMSUSD0285	2.85	32.9	70.9	70	0.9	3	●
VAPDMSUSD0286	2.86	32.9	70.9	70	0.9	3	●
VAPDMSUSD0287	2.87	32.9	70.9	70	0.9	3	●
VAPDMSUSD0288	2.88	32.9	70.9	70	0.9	3	●
VAPDMSUSD0289	2.89	32.9	70.9	70	0.9	3	●
VAPDMSUSD0290	2.90	32.9	70.9	70	0.9	3	●
VAPDMSUSD0291	2.91	32.9	70.9	70	0.9	3	●
VAPDMSUSD0292	2.92	32.9	70.9	70	0.9	3	●
VAPDMSUSD0293	2.93	32.9	70.9	70	0.9	3	●
VAPDMSUSD0294	2.94	32.9	70.9	70	0.9	3	●
VAPDMSUSD0295	2.95	32.9	70.9	70	0.9	3	●
VAPDMSUSD0296	2.96	32.9	70.9	70	0.9	3	●
VAPDMSUSD0297	2.97	32.9	70.9	70	0.9	3	●
VAPDMSUSD0298	2.98	32.9	70.9	70	0.9	3	●
VAPDMSUSD0299	2.99	32.9	70.9	70	0.9	3	●
VAPDMSUSD0300	3.00	32.9	70.9	70	0.9	3	●
VAPDMSUSD0301	3.01	35.9	85.9	85	0.9	4	●
VAPDMSUSD0302	3.02	35.9	85.9	85	0.9	4	●
VAPDMSUSD0303	3.03	35.9	85.9	85	0.9	4	●
VAPDMSUSD0304	3.04	35.9	85.9	85	0.9	4	●
VAPDMSUSD0305	3.05	35.9	85.9	85	0.9	4	●
VAPDMSUSD0306	3.06	35.9	85.9	85	0.9	4	●
VAPDMSUSD0307	3.07	35.9	85.9	85	0.9	4	●
VAPDMSUSD0308	3.08	35.9	85.9	85	0.9	4	●
VAPDMSUSD0309	3.09	35.9	85.9	85	0.9	4	●
VAPDMSUSD0310	3.10	35.9	85.9	85	0.9	4	●
VAPDMSUSD0311	3.11	35.9	85.9	85	0.9	4	●
VAPDMSUSD0312	3.12	35.9	85.9	85	0.9	4	●
VAPDMSUSD0313	3.13	35.9	85.9	85	0.9	4	●
VAPDMSUSD0314	3.14	35.9	85.9	85	0.9	4	●
VAPDMSUSD0315	3.15	36.0	86.0	85	1.0	4	●
VAPDMSUSD0316	3.16	36.0	86.0	85	1.0	4	●
VAPDMSUSD0317	3.17	36.0	86.0	85	1.0	4	●
VAPDMSUSD0318	3.18	36.0	86.0	85	1.0	4	●
VAPDMSUSD0319	3.19	36.0	86.0	85	1.0	4	●
VAPDMSUSD0320	3.20	36.0	86.0	85	1.0	4	●
VAPDMSUSD0321	3.21	36.0	86.0	85	1.0	4	●
VAPDMSUSD0322	3.22	36.0	86.0	85	1.0	4	●
VAPDMSUSD0323	3.23	36.0	86.0	85	1.0	4	●
VAPDMSUSD0324	3.24	36.0	86.0	85	1.0	4	●
VAPDMSUSD0325	3.25	36.0	86.0	85	1.0	4	●
VAPDMSUSD0326	3.26	36.0	86.0	85	1.0	4	●
VAPDMSUSD0327	3.27	36.0	86.0	85	1.0	4	●
VAPDMSUSD0328	3.28	36.0	86.0	85	1.0	4	●
VAPDMSUSD0329	3.29	36.0	86.0	85	1.0	4	●

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDMSUSD0330	3.30	36.0	86.0	85	1.0	4	●
VAPDMSUSD0331	3.31	39.0	86.0	85	1.0	4	●
VAPDMSUSD0332	3.32	39.0	86.0	85	1.0	4	●
VAPDMSUSD0333	3.33	39.0	86.0	85	1.0	4	●
VAPDMSUSD0334	3.34	39.0	86.0	85	1.0	4	●
VAPDMSUSD0335	3.35	39.0	86.0	85	1.0	4	●
VAPDMSUSD0336	3.36	39.0	86.0	85	1.0	4	●
VAPDMSUSD0337	3.37	39.0	86.0	85	1.0	4	●
VAPDMSUSD0338	3.38	39.0	86.0	85	1.0	4	●
VAPDMSUSD0339	3.39	39.0	86.0	85	1.0	4	●
VAPDMSUSD0340	3.40	39.0	86.0	85	1.0	4	●
VAPDMSUSD0341	3.41	39.0	86.0	85	1.0	4	●
VAPDMSUSD0342	3.42	39.0	86.0	85	1.0	4	●
VAPDMSUSD0343	3.43	39.0	86.0	85	1.0	4	●
VAPDMSUSD0344	3.44	39.0	86.0	85	1.0	4	●
VAPDMSUSD0345	3.45	39.0	86.0	85	1.0	4	●
VAPDMSUSD0346	3.46	39.0	86.0	85	1.0	4	●
VAPDMSUSD0347	3.47	39.0	86.0	85	1.0	4	●
VAPDMSUSD0348	3.48	39.1	86.1	85	1.1	4	●
VAPDMSUSD0349	3.49	39.1	86.1	85	1.1	4	●
VAPDMSUSD0350	3.50	39.1	86.1	85	1.1	4	●
VAPDMSUSD0351	3.51	39.1	86.1	85	1.1	4	●
VAPDMSUSD0352	3.52	39.1	86.1	85	1.1	4	●
VAPDMSUSD0353	3.53	39.1	86.1	85	1.1	4	●
VAPDMSUSD0354	3.54	39.1	86.1	85	1.1	4	●
VAPDMSUSD0355	3.55	39.1	86.1	85	1.1	4	●
VAPDMSUSD0356	3.56	39.1	86.1	85	1.1	4	●
VAPDMSUSD0357	3.57	39.1	86.1	85	1.1	4	●
VAPDMSUSD0358	3.58	39.1	86.1	85	1.1	4	●
VAPDMSUSD0359	3.59	39.1	86.1	85	1.1	4	●
VAPDMSUSD0360	3.60	39.1	86.1	85	1.1	4	●
VAPDMSUSD0361	3.61	39.1	86.1	85	1.1	4	●
VAPDMSUSD0362	3.62	39.1	86.1	85	1.1	4	●
VAPDMSUSD0363	3.63	39.1	86.1	85	1.1	4	●
VAPDMSUSD0364	3.64	39.1	86.1	85	1.1	4	●
VAPDMSUSD0365	3.65	39.1	86.1	85	1.1	4	●
VAPDMSUSD0366	3.66	39.1	86.1	85	1.1	4	●
VAPDMSUSD0367	3.67	39.1	86.1	85	1.1	4	●
VAPDMSUSD0368	3.68	39.1	86.1	85	1.1	4	●
VAPDMSUSD0369	3.69	39.1	86.1	85	1.1	4	●
VAPDMSUSD0370	3.70	39.1	86.1	85	1.1	4	●
VAPDMSUSD0371	3.71	43.1	86.1	85	1.1	4	●
VAPDMSUSD0372	3.72	43.1	86.1	85	1.1	4	●
VAPDMSUSD0373	3.73	43.1	86.1	85	1.1	4	●
VAPDMSUSD0374	3.74	43.1	86.1	85	1.1	4	●
VAPDMSUSD0375	3.75	43.1	86.1	85	1.1	4	●
VAPDMSUSD0376	3.76	43.1	86.1	85	1.1	4	●
VAPDMSUSD0377	3.77	43.1	86.1	85	1.1	4	●
VAPDMSUSD0378	3.78	43.1	86.1	85	1.1	4	●
VAPDMSUSD0379	3.79	43.1	86.1	85	1.1	4	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDMSUSD0380	3.80	43.1	86.1	85	1.1	4	●
VAPDMSUSD0381	3.81	43.1	86.1	85	1.1	4	●
VAPDMSUSD0382	3.82	43.2	86.2	85	1.2	4	●
VAPDMSUSD0383	3.83	43.2	86.2	85	1.2	4	●
VAPDMSUSD0384	3.84	43.2	86.2	85	1.2	4	●
VAPDMSUSD0385	3.85	43.2	86.2	85	1.2	4	●
VAPDMSUSD0386	3.86	43.2	86.2	85	1.2	4	●
VAPDMSUSD0387	3.87	43.2	86.2	85	1.2	4	●
VAPDMSUSD0388	3.88	43.2	86.2	85	1.2	4	●
VAPDMSUSD0389	3.89	43.2	86.2	85	1.2	4	●
VAPDMSUSD0390	3.90	43.2	86.2	85	1.2	4	●
VAPDMSUSD0391	3.91	43.2	86.2	85	1.2	4	●
VAPDMSUSD0392	3.92	43.2	86.2	85	1.2	4	●
VAPDMSUSD0393	3.93	43.2	86.2	85	1.2	4	●
VAPDMSUSD0394	3.94	43.2	86.2	85	1.2	4	●
VAPDMSUSD0395	3.95	43.2	86.2	85	1.2	4	●
VAPDMSUSD0396	3.96	43.2	86.2	85	1.2	4	●
VAPDMSUSD0397	3.97	43.2	86.2	85	1.2	4	●
VAPDMSUSD0398	3.98	43.2	86.2	85	1.2	4	●
VAPDMSUSD0399	3.99	43.2	86.2	85	1.2	4	●
VAPDMSUSD0400	4.00	42.8	85.8	85	0.8	4	●
VAPDMSUSD0405	4.05	42.8	100.8	100	0.8	6	●
VAPDMSUSD0410	4.10	42.9	100.9	100	0.9	6	●
VAPDMSUSD0415	4.15	42.9	100.9	100	0.9	6	●
VAPDMSUSD0420	4.20	42.9	100.9	100	0.9	6	●
VAPDMSUSD0425	4.25	46.9	100.9	100	0.9	6	●
VAPDMSUSD0430	4.30	46.9	100.9	100	0.9	6	●
VAPDMSUSD0435	4.35	46.9	100.9	100	0.9	6	●
VAPDMSUSD0440	4.40	46.9	100.9	100	0.9	6	●
VAPDMSUSD0445	4.45	46.9	100.9	100	0.9	6	●
VAPDMSUSD0450	4.50	46.9	100.9	100	0.9	6	●
VAPDMSUSD0455	4.55	46.9	100.9	100	0.9	6	●
VAPDMSUSD0460	4.60	47.0	101.0	100	1.0	6	●
VAPDMSUSD0465	4.65	47.0	101.0	100	1.0	6	●
VAPDMSUSD0470	4.70	47.0	101.0	100	1.0	6	●
VAPDMSUSD0475	4.75	47.0	101.0	100	1.0	6	●
VAPDMSUSD0480	4.80	52.0	101.0	100	1.0	6	●
VAPDMSUSD0485	4.85	52.0	101.0	100	1.0	6	●
VAPDMSUSD0490	4.90	52.0	101.0	100	1.0	6	●
VAPDMSUSD0495	4.95	52.0	101.0	100	1.0	6	●
VAPDMSUSD0500	5.00	52.0	101.0	100	1.0	6	●
VAPDMSUSD0505	5.05	52.1	101.1	100	1.1	6	●
VAPDMSUSD0510	5.10	52.1	101.1	100	1.1	6	●
VAPDMSUSD0515	5.15	52.1	101.1	100	1.1	6	●
VAPDMSUSD0520	5.20	52.1	101.1	100	1.1	6	●
VAPDMSUSD0525	5.25	52.1	101.1	100	1.1	6	●
VAPDMSUSD0530	5.30	52.1	101.1	100	1.1	6	●
VAPDMSUSD0535	5.35	57.1	107.1	106	1.1	6	●
VAPDMSUSD0540	5.40	57.1	107.1	106	1.1	6	●
VAPDMSUSD0545	5.45	57.1	107.1	106	1.1	6	●

VIOLET DRILLS

VAPDMSUS

Medium, High precision, For stainless steel

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDMSUSD0550	5.50	57.1	107.1	106	1.1	6	●
VAPDMSUSD0555	5.55	57.2	107.2	106	1.2	6	●
VAPDMSUSD0560	5.60	57.2	107.2	106	1.2	6	●
VAPDMSUSD0565	5.65	57.2	107.2	106	1.2	6	●
VAPDMSUSD0570	5.70	57.2	107.2	106	1.2	6	●
VAPDMSUSD0575	5.75	57.2	107.2	106	1.2	6	●
VAPDMSUSD0580	5.80	57.2	107.2	106	1.2	6	●
VAPDMSUSD0585	5.85	57.2	107.2	106	1.2	6	●
VAPDMSUSD0590	5.90	57.2	107.2	106	1.2	6	●
VAPDMSUSD0595	5.95	57.2	107.2	106	1.2	6	●
VAPDMSUSD0600	6.00	57.2	107.2	106	1.2	6	●
VAPDMSUSD0605	6.05	63.3	113.3	112	1.3	8	●
VAPDMSUSD0610	6.10	63.3	113.3	112	1.3	8	●
VAPDMSUSD0615	6.15	63.3	113.3	112	1.3	8	●
VAPDMSUSD0620	6.20	63.3	113.3	112	1.3	8	●
VAPDMSUSD0625	6.25	63.3	113.3	112	1.3	8	●
VAPDMSUSD0630	6.30	63.3	113.3	112	1.3	8	●
VAPDMSUSD0635	6.35	63.3	113.3	112	1.3	8	●
VAPDMSUSD0640	6.40	63.3	113.3	112	1.3	8	●
VAPDMSUSD0645	6.45	63.3	113.3	112	1.3	8	●
VAPDMSUSD0650	6.50	63.4	113.4	112	1.4	8	●
VAPDMSUSD0655	6.55	63.4	113.4	112	1.4	8	●
VAPDMSUSD0660	6.60	63.4	113.4	112	1.4	8	●
VAPDMSUSD0665	6.65	63.4	113.4	112	1.4	8	●
VAPDMSUSD0670	6.70	63.4	113.4	112	1.4	8	●
VAPDMSUSD0675	6.75	68.4	118.4	117	1.4	8	●
VAPDMSUSD0680	6.80	68.4	118.4	117	1.4	8	●
VAPDMSUSD0685	6.85	68.4	118.4	117	1.4	8	●
VAPDMSUSD0690	6.90	68.4	118.4	117	1.4	8	●
VAPDMSUSD0695	6.95	68.4	118.4	117	1.4	8	●
VAPDMSUSD0700	7.00	68.5	118.5	117	1.5	8	●
VAPDMSUSD0705	7.05	68.5	118.5	117	1.5	8	●
VAPDMSUSD0710	7.10	68.5	118.5	117	1.5	8	●
VAPDMSUSD0715	7.15	68.5	118.5	117	1.5	8	●
VAPDMSUSD0720	7.20	68.5	118.5	117	1.5	8	●
VAPDMSUSD0725	7.25	68.5	118.5	117	1.5	8	●
VAPDMSUSD0730	7.30	68.5	118.5	117	1.5	8	●
VAPDMSUSD0735	7.35	68.5	118.5	117	1.5	8	●
VAPDMSUSD0740	7.40	68.5	118.5	117	1.5	8	●
VAPDMSUSD0745	7.45	68.5	118.5	117	1.5	8	●
VAPDMSUSD0750	7.50	68.6	118.6	117	1.6	8	●
VAPDMSUSD0755	7.55	74.6	124.6	123	1.6	8	●
VAPDMSUSD0760	7.60	74.6	124.6	123	1.6	8	●
VAPDMSUSD0765	7.65	74.6	124.6	123	1.6	8	●
VAPDMSUSD0770	7.70	74.6	124.6	123	1.6	8	●
VAPDMSUSD0775	7.75	74.6	124.6	123	1.6	8	●
VAPDMSUSD0780	7.80	74.6	124.6	123	1.6	8	●
VAPDMSUSD0785	7.85	74.6	124.6	123	1.6	8	●
VAPDMSUSD0790	7.90	74.6	124.6	123	1.6	8	●
VAPDMSUSD0795	7.95	74.7	124.7	123	1.7	8	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDMSUSD0800	8.00	74.7	124.7	123	1.7	8	●
VAPDMSUSD0805	8.05	74.7	129.7	128	1.7	10	●
VAPDMSUSD0810	8.10	74.7	129.7	128	1.7	10	●
VAPDMSUSD0815	8.15	74.7	129.7	128	1.7	10	●
VAPDMSUSD0820	8.20	74.7	129.7	128	1.7	10	●
VAPDMSUSD0825	8.25	74.7	129.7	128	1.7	10	●
VAPDMSUSD0830	8.30	74.7	129.7	128	1.7	10	●
VAPDMSUSD0835	8.35	74.7	129.7	128	1.7	10	●
VAPDMSUSD0840	8.40	74.7	129.7	128	1.7	10	●
VAPDMSUSD0845	8.45	74.8	129.8	128	1.8	10	●
VAPDMSUSD0850	8.50	74.8	129.8	128	1.8	10	●
VAPDMSUSD0855	8.55	80.8	135.8	134	1.8	10	●
VAPDMSUSD0860	8.60	80.8	135.8	134	1.8	10	●
VAPDMSUSD0865	8.65	80.8	135.8	134	1.8	10	●
VAPDMSUSD0870	8.70	80.8	135.8	134	1.8	10	●
VAPDMSUSD0875	8.75	80.8	135.8	134	1.8	10	●
VAPDMSUSD0880	8.80	80.8	135.8	134	1.8	10	●
VAPDMSUSD0885	8.85	80.8	135.8	134	1.8	10	●
VAPDMSUSD0890	8.90	80.8	135.8	134	1.8	10	●
VAPDMSUSD0895	8.95	80.9	135.9	134	1.9	10	●
VAPDMSUSD0900	9.00	80.9	135.9	134	1.9	10	●
VAPDMSUSD0910	9.10	80.9	135.9	134	1.9	10	●
VAPDMSUSD0920	9.20	80.9	135.9	134	1.9	10	●
VAPDMSUSD0930	9.30	80.9	135.9	134	1.9	10	●
VAPDMSUSD0940	9.40	81.0	136.0	134	2.0	10	●
VAPDMSUSD0950	9.50	81.0	136.0	134	2.0	10	●
VAPDMSUSD0960	9.60	87.0	142.0	140	2.0	10	●
VAPDMSUSD0970	9.70	87.0	142.0	140	2.0	10	●
VAPDMSUSD0980	9.80	87.0	142.0	140	2.0	10	●
VAPDMSUSD0990	9.90	87.1	142.1	140	2.1	10	●
VAPDMSUSD1000	10.0	87.1	142.1	140	2.1	10	●
VAPDMSUSD1010	10.1	87.1	147.1	145	2.1	12	●
VAPDMSUSD1020	10.2	87.1	147.1	145	2.1	12	●
VAPDMSUSD1030	10.3	87.1	147.1	145	2.1	12	●
VAPDMSUSD1040	10.4	87.2	147.2	145	2.2	12	●
VAPDMSUSD1050	10.5	87.2	147.2	145	2.2	12	●
VAPDMSUSD1060	10.6	87.2	147.2	145	2.2	12	●
VAPDMSUSD1070	10.7	94.2	154.2	152	2.2	12	●
VAPDMSUSD1080	10.8	94.2	154.2	152	2.2	12	●
VAPDMSUSD1090	10.9	94.3	154.3	152	2.3	12	●
VAPDMSUSD1100	11.0	94.3	154.3	152	2.3	12	●
VAPDMSUSD1110	11.1	94.3	154.3	152	2.3	12	●
VAPDMSUSD1120	11.2	94.3	154.3	152	2.3	12	●
VAPDMSUSD1130	11.3	94.3	154.3	152	2.3	12	●
VAPDMSUSD1140	11.4	94.4	154.4	152	2.4	12	●
VAPDMSUSD1150	11.5	94.4	154.4	152	2.4	12	●
VAPDMSUSD1160	11.6	94.4	154.4	152	2.4	12	●
VAPDMSUSD1170	11.7	94.4	154.4	152	2.4	12	●
VAPDMSUSD1180	11.8	94.4	154.4	152	2.4	12	●
VAPDMSUSD1190	11.9	101.5	161.5	159	2.5	12	●

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VAPDMSUSD1200	12.0	101.5	161.5	159	2.5	12	●
VAPDMSUS**D1210**	12.1	101.5	161.5	159	2.5	12	●
VAPDMSUS**D1220**	12.2	101.5	161.5	159	2.5	12	●
VAPDMSUS**D1230**	12.3	101.6	161.6	159	2.6	12	●
VAPDMSUS**D1240**	12.4	101.6	161.6	159	2.6	12	●
VAPDMSUS**D1250**	12.5	101.6	161.6	159	2.6	12	●
VAPDMSUS**D1260**	12.6	101.6	161.6	159	2.6	12	●
VAPDMSUS**D1270**	12.7	101.6	161.6	159	2.6	12	●
VAPDMSUS**D1280**	12.8	101.7	161.7	159	2.7	12	●
VAPDMSUS**D1290**	12.9	101.7	161.7	159	2.7	12	●
VAPDMSUS**D1300**	13.0	101.7	161.7	159	2.7	12	●

VAPDSSUS VAPDMSUS

VIOLET DRILLS, High precision, For stainless steel, Short/medium

RECOMMENDED CUTTING CONDITIONS

Work Material	Stainless steel				Carbon steel AISI 1049 Alloy steel SCM Cast iron FC Copper, Copper alloy		Structural steel Aluminium alloy	
	Austenitic AISI 304, AISI 316		Martensitic Ferritic AISI 430					
Drill Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	7600	0.01	8800	0.01	11250	0.01	15000	0.02
1.0	4800	0.02	6300	0.05	10000	0.05	12000	0.05
2.0	2400	0.04	3200	0.06	5500	0.09	6400	0.09
3.0	1600	0.07	2100	0.10	3700	0.13	4300	0.13
4.0	1200	0.09	1600	0.10	2800	0.15	3200	0.15
5.0	950	0.12	1300	0.13	2200	0.18	2600	0.18
6.0	800	0.14	1100	0.15	1800	0.20	2100	0.19
8.0	600	0.18	800	0.18	1400	0.22	1600	0.24
10.0	480	0.22	640	0.21	1100	0.25	1300	0.28
12.0	400	0.24	530	0.25	930	0.30	1100	0.34
13.0	370	0.26	490	0.28	860	0.32	1000	0.36
14.0	340	0.30	450	0.27	730	0.31	930	0.36
15.0	320	0.31	425	0.28	680	0.32	870	0.38
16.0	300	0.32	400	0.30	640	0.34	820	0.42
18.0	270	0.34	350	0.32	570	0.36	725	0.43
20.0	240	0.36	320	0.35	510	0.38	660	0.45

1) Please reduce the revolution and feed rate depending on the drilling situation when the installation of workpiece or machine lacks rigidity.
2) Please use a collet type drill chuck or a milling chuck.
3) Use sufficient cutting fluid.
4) For precipitation-hardened stainless steels (JIS SUS630 and SUS631), MWE and MWS are recommended.
5) When drilling holes greater than 4 x drill diameter hole depths, please use a peck feed.

The above-mentioned cutting condition is standard when using water-soluble cutting fluid.
Please reduce the revolution when using non-water-soluble cutting fluid.

VAPDSCB

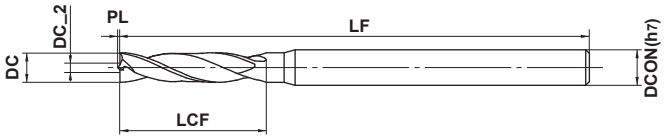
Short flute length, High precision, For counter boring

HG HSS | V | 180° 118° | X Thinning

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal		

DC≤3	3<DC≤6	6<DC≤10	10<DC≤18	18<DC≤30	30<DC≤32
0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033	0 −0.039





- Unique geometry offers high efficiency counter boring.
  Excellent chip breaking and flat counterbored surface.

Unit : mm

Order Number	DC	DC_2	LCF	LF	PL	DCON	Stock
VAPDSCBD0200	2.0	0.7	12	60	0.2	3	●
VAPDSCBD0210	2.1	0.7	12	60	0.2	3	●
VAPDSCBD0220	2.2	0.7	12	60	0.2	3	●
VAPDSCBD0230	2.3	0.7	13	60	0.2	3	●
VAPDSCBD0240	2.4	0.7	13	60	0.2	3	●
VAPDSCBD0250	2.5	0.7	13	60	0.2	3	●
VAPDSCBD0260	2.6	0.8	15	60	0.2	3	●
VAPDSCBD0270	2.7	0.8	15	60	0.2	3	●
VAPDSCBD0280	2.8	0.8	15	60	0.2	3	●
VAPDSCBD0290	2.9	0.8	15	60	0.2	3	●
VAPDSCBD0300	3.0	0.8	15	60	0.2	3	●
VAPDSCBD0310	3.1	0.8	17	70	0.2	4	●
VAPDSCBD0320	3.2	0.8	17	70	0.2	4	●
VAPDSCBD0330	3.3	0.8	19	70	0.2	4	●
VAPDSCBD0340	3.4	0.8	19	70	0.2	4	●
VAPDSCBD0350	3.5	0.8	19	70	0.2	4	●
VAPDSCBD0360	3.6	1.0	21	70	0.2	4	●
VAPDSCBD0370	3.7	1.0	21	70	0.2	4	●
VAPDSCBD0380	3.8	1.0	21	70	0.2	4	●
VAPDSCBD0390	3.9	1.0	21	70	0.2	4	●
VAPDSCBD0400	4.0	1.0	21	70	0.3	4	●
VAPDSCBD0410	4.1	1.0	21	80	0.3	6	●
VAPDSCBD0420	4.2	1.0	21	80	0.3	6	●
VAPDSCBD0430	4.3	1.0	23	80	0.3	6	●
VAPDSCBD0440	4.4	1.0	23	80	0.3	6	●
VAPDSCBD0450	4.5	1.0	23	80	0.3	6	●
VAPDSCBD0460	4.6	1.4	25	80	0.3	6	●
VAPDSCBD0470	4.7	1.4	25	80	0.3	6	●
VAPDSCBD0480	4.8	1.4	25	80	0.3	6	●
VAPDSCBD0490	4.9	1.4	25	80	0.3	6	●
VAPDSCBD0500	5.0	1.4	25	80	0.4	6	●
VAPDSCBD0510	5.1	1.4	25	80	0.4	6	●
VAPDSCBD0520	5.2	1.4	25	80	0.4	6	●
VAPDSCBD0530	5.3	1.4	25	80	0.4	6	●
VAPDSCBD0540	5.4	1.4	27	80	0.4	6	●
VAPDSCBD0550	5.5	1.4	27	80	0.4	6	●
VAPDSCBD0560	5.6	1.4	27	80	0.4	6	●
VAPDSCBD0570	5.7	1.4	27	80	0.4	6	●
VAPDSCBD0580	5.8	1.4	27	80	0.4	6	●
VAPDSCBD0590	5.9	1.4	27	80	0.4	6	●

Order Number	DC	DC_2	LCF	LF	PL	DCON	Stock
VAPDSCBD0600	6.0	1.4	27	80	0.4	6	●
VAPDSCBD0610	6.1	1.4	30	80	0.4	8	●
VAPDSCBD0620	6.2	1.4	30	80	0.4	8	●
VAPDSCBD0630	6.3	1.4	30	80	0.4	8	●
VAPDSCBD0640	6.4	1.4	30	80	0.4	8	●
VAPDSCBD0650	6.5	1.4	30	80	0.4	8	●
VAPDSCBD0660	6.6	1.8	30	80	0.4	8	●
VAPDSCBD0670	6.7	1.8	30	80	0.4	8	●
VAPDSCBD0680	6.8	1.8	32	80	0.4	8	●
VAPDSCBD0690	6.9	1.8	32	80	0.4	8	●
VAPDSCBD0700	7.0	1.8	32	80	0.6	8	●
VAPDSCBD0710	7.1	1.8	32	80	0.6	8	●
VAPDSCBD0720	7.2	1.8	32	80	0.6	8	●
VAPDSCBD0730	7.3	1.8	32	80	0.6	8	●
VAPDSCBD0740	7.4	1.8	32	80	0.6	8	●
VAPDSCBD0750	7.5	1.8	32	80	0.6	8	●
VAPDSCBD0760	7.6	2.0	35	85	0.6	8	●
VAPDSCBD0770	7.7	2.0	35	85	0.6	8	●
VAPDSCBD0780	7.8	2.0	35	85	0.6	8	●
VAPDSCBD0790	7.9	2.0	35	85	0.6	8	●
VAPDSCBD0800	8.0	2.0	35	85	0.6	8	●
VAPDSCBD0810	8.1	2.0	35	90	0.6	10	●
VAPDSCBD0850	8.5	2.0	35	90	0.6	10	●
VAPDSCBD0860	8.6	2.8	38	93	0.6	10	●
VAPDSCBD0880	8.8	2.8	38	93	0.6	10	●
VAPDSCBD0900	9.0	2.8	38	93	0.8	10	●
VAPDSCBD0910	9.1	2.8	38	93	0.8	10	●
VAPDSCBD0950	9.5	2.8	38	93	0.8	10	●
VAPDSCBD0960	9.6	3.2	41	96	0.8	10	●
VAPDSCBD0980	9.8	3.2	41	96	0.8	10	●
VAPDSCBD1000	10.0	3.2	41	96	0.9	10	●
VAPDSCBD1010	10.1	3.2	41	101	0.9	12	●
VAPDSCBD1030	10.3	3.2	41	101	0.9	12	●
VAPDSCBD1050	10.5	3.2	41	101	0.9	12	●
VAPDSCBD1080	10.8	3.7	45	105	0.9	12	●
VAPDSCBD1100	11.0	3.7	45	105	0.9	12	●
VAPDSCBD1110	11.1	3.7	45	105	0.9	12	●
VAPDSCBD1150	11.5	3.7	45	105	0.9	12	●
VAPDSCBD1180	11.8	3.7	45	105	0.9	12	●
VAPDSCBD1200	12.0	3.7	49	109	0.9	12	●

● : Inventory maintained in Japan.

VAPDSCB

Short flute length, High precision, For counter boring

Unit : mm

Order Number	DC	DC_2	LCF	LF	PL	DCON	Stock
VAPDSCBD1250	12.5	3.7	49	109	0.9	12	●
VAPDSCBD1300	13.0	4.2	49	109	1.1	12	●
VAPDSCBD1350	13.5	4.2	51	121	1.1	16	●
VAPDSCBD1380	13.8	4.2	51	121	1.1	16	●
VAPDSCBD1400	14.0	4.2	51	121	1.1	16	●
VAPDSCBD1410	14.1	5.5	58	123	1.1	16	●
VAPDSCBD1420	14.2	5.5	58	123	1.1	16	●
VAPDSCBD1450	14.5	5.5	58	123	1.1	16	●
VAPDSCBD1480	14.8	5.5	58	123	1.1	16	●
VAPDSCBD1500	15.0	5.5	58	123	1.3	16	●
VAPDSCBD1550	15.5	5.5	60	125	1.3	16	●
VAPDSCBD1570	15.7	5.5	60	125	1.3	16	●
VAPDSCBD1580	15.8	5.5	60	125	1.3	16	●
VAPDSCBD1600	16.0	5.5	60	125	1.3	16	●
VAPDSCBD1700	17.0	5.5	62	132	1.3	20	●
VAPDSCBD1750	17.5	5.5	63	133	1.6	20	●
VAPDSCBD1760	17.6	6.5	63	133	1.6	20	●
VAPDSCBD1770	17.7	6.5	63	133	1.6	20	●
VAPDSCBD1780	17.8	6.5	63	133	1.6	20	●
VAPDSCBD1800	18.0	6.5	63	133	1.6	20	●
VAPDSCBD1810	18.1	6.5	65	135	1.6	20	●
VAPDSCBD1900	19.0	6.5	65	135	1.6	20	●
VAPDSCBD1980	19.8	7.5	67	137	1.6	20	●
VAPDSCBD2000	20.0	7.5	67	137	1.8	20	●
VAPDSCBD2010	20.1	7.5	67	137	1.8	20	●
VAPDSCBD2100	21.0	7.5	75	165	1.8	25	●
VAPDSCBD2200	22.0	7.5	75	165	1.8	25	●
VAPDSCBD2300	23.0	7.5	80	170	1.8	25	●
VAPDSCBD2400	24.0	8.5	80	170	2.2	25	●
VAPDSCBD2500	25.0	8.5	85	180	2.2	25	●
VAPDSCBD2600	26.0	9.0	85	180	2.2	32	●
VAPDSCBD2700	27.0	9.0	95	190	2.2	32	●
VAPDSCBD2800	28.0	10.0	95	190	2.6	32	●
VAPDSCBD2900	29.0	10.0	100	195	2.6	32	●
VAPDSCBD3000	30.0	11.0	100	195	2.6	32	●
VAPDSCBD3100	31.0	11.0	105	200	2.6	32	●
VAPDSCBD3200	32.0	13.0	105	200	2.6	32	●

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work material	Structural steel Aluminium alloy		Carbon steel AISI 1049 Alloy steel SCM Cast iron FCD		Alloy tool steel AISI D2 (Low-hardness materials) Ferritic stainless steel AISI 430, AISI 405 Martensitic stainless steel AISI 420, AISI 440		Alloy tool steel AISI H13 (−40HRC) Precipitation hardening stainless steel ASTM 630, ASTM 631	
Drill Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
2.0	5600	0.07	4800	0.07	3200	0.07	2800	0.04
3.0	3700	0.10	3200	0.10	2100	0.10	1900	0.05
4.0	2800	0.12	2400	0.12	1600	0.12	1400	0.06
5.0	2200	0.14	1900	0.14	1300	0.14	1150	0.07
6.0	1850	0.15	1600	0.15	1050	0.15	950	0.08
8.0	1400	0.20	1200	0.20	800	0.20	720	0.10
10.0	1100	0.23	960	0.23	640	0.21	570	0.11
12.0	950	0.26	800	0.26	530	0.24	470	0.12
14.0	800	0.27	680	0.27	450	0.25	410	0.13
16.0	700	0.28	500	0.28	360	0.26	300	0.14
18.0	620	0.29	450	0.29	320	0.27	260	0.15
20.0	560	0.30	400	0.30	290	0.27	240	0.15
22.0	510	0.32	360	0.32	260	0.29	220	0.16
24.0	460	0.33	330	0.33	240	0.30	200	0.16
26.0	430	0.35	310	0.35	220	0.31	180	0.17
28.0	400	0.36	290	0.36	210	0.33	170	0.18
30.0	370	0.37	270	0.37	190	0.34	160	0.18
32.0	350	0.38	250	0.38	180	0.35	150	0.19

1) The above cutting conditions are for drilling 3xDC hole depths without a pilot hole. When drilling holes smaller than 1xDC hole depths, it is possible to increase the revolution speed by 20%.
2) Drilling without a pilot hole is recommended. If there is a pilot hole, chips are not broken. Use a pick feed when chip breaking is necessary.
3) For counter boring of a sloped face, a carbide end mill is recommended.
4) When machining austenitic stainless steels (JIS SUS304, SUS316), set the revolution at 40%-70% and the feed rate 40%-60%.
5) Please use a collet type drill chuck or a milling chuck.
6) Please reduce the revolution and feed rate depending on the drilling situation when the installation of workpiece or machine lacks rigidity.
7) Use sufficient cutting fluid.

The above-mentioned cutting condition is standard when using water-soluble cutting fluid.
Please reduce the revolution when using non-water-soluble cutting fluid.

VIOLET DRILLS

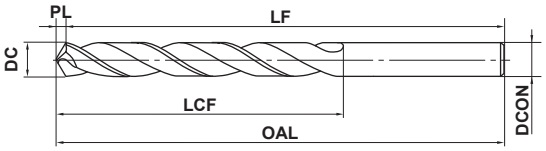
VSD
Straight shank

HSS | V | 110° DC<0.7 | 118° DC≥0.7 | X Thinning DC<2 | XR Thinning DC≥2

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron			



0.5≤DC<1	1≤DC≤3	3<DC≤6	6<DC≤10	10<DC≤13
0 −0.010	0 −0.014	0 −0.018	0 −0.022	0 −0.027



Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VSDD0050	0.5	6.18	27.18	27	0.18	0.5	●
VSDD0060	0.6	7.21	30.21	30	0.21	0.6	●
VSDD0070	0.7	9.21	32.21	32	0.21	0.7	●
VSDD0080	0.8	10.24	34.24	34	0.24	0.8	●
VSDD0090	0.9	11.27	36.27	36	0.27	0.9	●
VSDD0100	1.0	12.3	40.3	40	0.3	1.0	●
VSDD0110	1.1	14.3	42.3	42	0.3	1.1	●
VSDD0120	1.2	16.4	42.4	42	0.4	1.2	●
VSDD0130	1.3	16.4	45.4	45	0.4	1.3	●
VSDD0140	1.4	18.4	48.4	48	0.4	1.4	●
VSDD0150	1.5	18.5	48.5	48	0.5	1.5	●
VSDD0160	1.6	20.5	50.5	50	0.5	1.6	●
VSDD0170	1.7	20.5	50.5	50	0.5	1.7	●
VSDD0180	1.8	22.5	52.5	52	0.5	1.8	●
VSDD0190	1.9	22.6	52.6	52	0.6	1.9	●
VSDD0200	2.0	23.6	55.6	55	0.6	2.0	●
VSDD0210	2.1	23.6	55.6	55	0.6	2.1	●
VSDD0220	2.2	26.7	58.7	58	0.7	2.2	●
VSDD0230	2.3	26.7	58.7	58	0.7	2.3	●
VSDD0240	2.4	29.7	61.7	61	0.7	2.4	●
VSDD0250	2.5	29.8	61.8	61	0.8	2.5	●
VSDD0260	2.6	29.8	64.8	64	0.8	2.6	●
VSDD0270	2.7	32.8	64.8	64	0.8	2.7	●
VSDD0280	2.8	32.8	67.8	67	0.8	2.8	●
VSDD0290	2.9	32.9	71.9	71	0.9	2.9	●
VSDD0300	3.0	32.9	71.9	71	0.9	3.0	●
VSDD0310	3.1	35.9	71.9	71	0.9	3.1	●
VSDD0320	3.2	36.0	72.0	71	1.0	3.2	●
VSDD0330	3.3	36.0	74.0	73	1.0	3.3	●
VSDD0340	3.4	39.0	74.0	73	1.0	3.4	●
VSDD0350	3.5	39.1	74.1	73	1.1	3.5	●
VSDD0360	3.6	39.1	77.1	76	1.1	3.6	●
VSDD0370	3.7	39.1	77.1	76	1.1	3.7	●
VSDD0380	3.8	43.1	77.1	76	1.1	3.8	●
VSDD0390	3.9	43.2	80.2	79	1.2	3.9	●
VSDD0400	4.0	43.2	84.2	83	1.2	4.0	●
VSDD0410	4.1	43.2	84.2	83	1.2	4.1	●
VSDD0420	4.2	43.3	84.3	83	1.3	4.2	●
VSDD0430	4.3	47.3	84.3	83	1.3	4.3	●
VSDD0440	4.4	47.3	87.3	86	1.3	4.4	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VSDD0450	4.5	47.4	87.4	86	1.4	4.5	●
VSDD0460	4.6	47.4	87.4	86	1.4	4.6	●
VSDD0470	4.7	47.4	90.4	89	1.4	4.7	●
VSDD0480	4.8	52.4	90.4	89	1.4	4.8	●
VSDD0490	4.9	52.5	93.5	92	1.5	4.9	●
VSDD0500	5.0	52.5	93.5	92	1.5	5.0	●
VSDD0510	5.1	52.5	93.5	92	1.5	5.1	●
VSDD0520	5.2	52.6	96.6	95	1.6	5.2	●
VSDD0530	5.3	52.6	96.6	95	1.6	5.3	●
VSDD0540	5.4	57.6	96.6	95	1.6	5.4	●
VSDD0550	5.5	57.7	96.7	95	1.7	5.5	●
VSDD0560	5.6	57.7	99.7	98	1.7	5.6	●
VSDD0570	5.7	57.7	99.7	98	1.7	5.7	●
VSDD0580	5.8	57.7	99.7	98	1.7	5.8	●
VSDD0590	5.9	57.8	99.8	98	1.8	5.9	●
VSDD0600	6.0	57.8	103.8	102	1.8	6.0	●
VSDD0610	6.1	63.8	103.8	102	1.8	6.1	●
VSDD0620	6.2	63.9	103.9	102	1.9	6.2	●
VSDD0630	6.3	63.9	103.9	102	1.9	6.3	●
VSDD0640	6.4	63.9	106.9	105	1.9	6.4	●
VSDD0650	6.5	64.0	107.0	105	2.0	6.5	●
VSDD0660	6.6	64.0	107.0	105	2.0	6.6	●
VSDD0670	6.7	64.0	107.0	105	2.0	6.7	●
VSDD0680	6.8	69.0	107.0	105	2.0	6.8	●
VSDD0690	6.9	69.1	107.1	105	2.1	6.9	●
VSDD0700	7.0	69.1	107.1	105	2.1	7.0	●
VSDD0710	7.1	69.1	110.1	108	2.1	7.1	●
VSDD0720	7.2	69.2	110.2	108	2.2	7.2	●
VSDD0730	7.3	69.2	110.2	108	2.2	7.3	●
VSDD0740	7.4	69.2	113.2	111	2.2	7.4	●
VSDD0750	7.5	69.3	113.3	111	2.3	7.5	●
VSDD0760	7.6	75.3	113.3	111	2.3	7.6	●
VSDD0770	7.7	75.3	116.3	114	2.3	7.7	●
VSDD0780	7.8	75.3	116.3	114	2.3	7.8	●
VSDD0790	7.9	75.4	116.4	114	2.4	7.9	●
VSDD0800	8.0	75.4	116.4	114	2.4	8.0	●
VSDD0810	8.1	75.4	119.4	117	2.4	8.1	●
VSDD0820	8.2	75.5	119.5	117	2.5	8.2	●
VSDD0830	8.3	75.5	119.5	117	2.5	8.3	●
VSDD0840	8.4	75.5	123.5	121	2.5	8.4	●

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VSDD0850	8.5	75.6	123.6	121	2.6	8.5	●
VSDD0860	8.6	81.6	123.6	121	2.6	8.6	●
VSDD0870	8.7	81.6	123.6	121	2.6	8.7	●
VSDD0880	8.8	81.6	126.6	124	2.6	8.8	●
VSDD0890	8.9	81.7	126.7	124	2.7	8.9	●
VSDD0900	9.0	81.7	126.7	124	2.7	9.0	●
VSDD0910	9.1	81.7	126.7	124	2.7	9.1	●
VSDD0920	9.2	81.8	129.8	127	2.8	9.2	●
VSDD0930	9.3	81.8	129.8	127	2.8	9.3	●
VSDD0940	9.4	81.8	129.8	127	2.8	9.4	●
VSDD0950	9.5	81.9	129.9	127	2.9	9.5	●
VSDD0960	9.6	87.9	132.9	130	2.9	9.6	●
VSDD0970	9.7	87.9	132.9	130	2.9	9.7	●
VSDD0980	9.8	87.9	132.9	130	2.9	9.8	●
VSDD0990	9.9	88.0	133.0	130	3.0	9.9	●
VSDD1000	10.0	88.0	133.0	130	3.0	10.0	●
VSDD1010	10.1	88.0	136.0	133	3.0	10.1	●
VSDD1020	10.2	88.1	136.1	133	3.1	10.2	●
VSDD1030	10.3	88.1	136.1	133	3.1	10.3	●
VSDD1040	10.4	88.1	136.1	133	3.1	10.4	●
VSDD1050	10.5	88.2	140.2	137	3.2	10.5	●
VSDD1060	10.6	88.2	140.2	137	3.2	10.6	●
VSDD1070	10.7	95.2	140.2	137	3.2	10.7	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
VSDD1080	10.8	95.2	143.2	140	3.2	10.8	●
VSDD1090	10.9	95.3	143.3	140	3.3	10.9	●
VSDD1100	11.0	95.3	143.3	140	3.3	11.0	●
VSDD1110	11.1	95.3	143.3	140	3.3	11.1	●
VSDD1120	11.2	95.4	146.4	143	3.4	11.2	●
VSDD1130	11.3	95.4	146.4	143	3.4	11.3	●
VSDD1140	11.4	95.4	146.4	143	3.4	11.4	●
VSDD1150	11.5	95.5	146.5	143	3.5	11.5	●
VSDD1160	11.6	95.5	149.5	146	3.5	11.6	●
VSDD1170	11.7	95.5	149.5	146	3.5	11.7	●
VSDD1180	11.8	95.5	149.5	146	3.5	11.8	●
VSDD1190	11.9	102.6	149.6	146	3.6	11.9	●
VSDD1200	12.0	102.6	152.6	149	3.6	12.0	●
VSDD1210	12.1	102.6	152.6	149	3.6	12.1	●
VSDD1220	12.2	102.7	152.7	149	3.7	12.2	●
VSDD1230	12.3	102.7	152.7	149	3.7	12.3	●
VSDD1240	12.4	102.7	155.7	152	3.7	12.4	●
VSDD1250	12.5	102.8	155.8	152	3.8	12.5	●
VSDD1260	12.6	102.8	155.8	152	3.8	12.6	●
VSDD1270	12.7	102.8	155.8	152	3.8	12.7	●
VSDD1280	12.8	102.8	155.8	152	3.8	12.8	●
VSDD1290	12.9	102.9	155.9	152	3.9	12.9	●
VSDD1300	13.0	102.9	155.9	152	3.9	13.0	●

RECOMMENDED CUTTING CONDITIONS

Work Material	Structural steel		Carbon steel AISI 1049		Stainless steel AISI 420		Stainless steel AISI 304 Tool steel AISI D2 (Low-hardness materials) Heat-treated steel AISI H13 (−40HRC)	
Cutting speed	40m/min		30m/min		20m/min		10−14m/min	
Drill Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	15000	0.01	11250	0.01	7500	0.01	5620	0.01
1.0	10000	0.02	7500	0.02	5000	0.02	3750	0.02
1.5	8200	0.03	6150	0.03	4100	0.03	2800	0.03
2.0	6370	0.05	4780	0.05	3180	0.05	2200	0.04
3.0	4250	0.10	3180	0.10	2120	0.07	1400	0.06
4.0	3180	0.13	2390	0.13	1590	0.09	1100	0.08
5.0	2550	0.15	1910	0.15	1270	0.11	860	0.10
6.0	2120	0.18	1590	0.18	1060	0.13	720	0.11
7.0	1820	0.20	1360	0.20	910	0.14	610	0.12
8.0	1590	0.22	1190	0.21	800	0.15	540	0.13
9.0	1420	0.24	1060	0.22	710	0.17	480	0.14
10.0	1270	0.26	960	0.23	640	0.18	430	0.15
11.0	1160	0.28	870	0.24	580	0.19	390	0.16
12.0	1060	0.30	800	0.25	530	0.20	360	0.17
13.0	980	0.30	730	0.26	490	0.20	330	0.17

1) Please reduce the revolution depending on drilling situation when the application lacks rigidity.
2) Please use step drilling and reduce the cutting conditions in the case when the drilling depth exceeds 3DC (DC: drill diameter).
3) The above-mentioned cutting condition is standard when using water-soluble cutting fluid.
   Please reduce the revolution when using non-water-soluble cutting fluid.

VIOLET DRILLS

VTDS

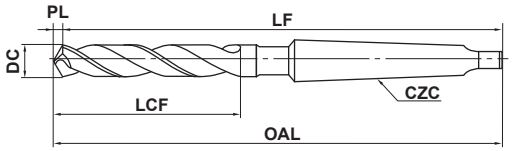
Short, Taper shank

HSS | V | 118° | XR Thinning

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron			

DC=6	6<DC≤10	10<DC≤18	18<DC≤30	30<DC≤32
0 −0.018	0 −0.022	0 −0.027	0 −0.033	0 −0.039





Unit : mm

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
VTDSD0600M1	6.0	45.8	127.8	126	1.8	MT.1	●
VTDSD0650M1	6.5	46.0	128.0	126	2.0	MT.1	●
VTDSD0660M1	6.6	46.0	128.0	126	2.0	MT.1	●
VTDSD0680M1	6.8	46.0	128.0	126	2.0	MT.1	●
VTDSD0700M1	7.0	46.1	128.1	126	2.1	MT.1	●
VTDSD0720M1	7.2	46.2	128.2	126	2.2	MT.1	●
VTDSD0750M1	7.5	46.3	128.3	126	2.3	MT.1	●
VTDSD0770M1	7.7	50.3	132.3	130	2.3	MT.1	●
VTDSD0780M1	7.8	50.3	132.3	130	2.3	MT.1	●
VTDSD0800M1	8.0	50.4	132.4	130	2.4	MT.1	●
VTDSD0820M1	8.2	50.5	132.5	130	2.5	MT.1	●
VTDSD0850M1	8.5	50.6	132.6	130	2.6	MT.1	●
VTDSD0880M1	8.8	54.6	135.6	133	2.6	MT.1	●
VTDSD0900M1	9.0	54.7	135.7	133	2.7	MT.1	●
VTDSD0950M1	9.5	54.9	135.9	133	2.9	MT.1	●
VTDSD0970M1	9.7	58.9	139.9	137	2.9	MT.1	●
VTDSD0980M1	9.8	58.9	139.9	137	2.9	MT.1	●
VTDSD1000M1	10.0	59.0	140.0	137	3.0	MT.1	●
VTDSD1030M1	10.3	59.1	140.1	137	3.1	MT.1	●
VTDSD1050M1	10.5	59.2	140.2	137	3.2	MT.1	●
VTDSD1080M1	10.8	64.2	145.2	142	3.2	MT.1	●
VTDSD1100M1	11.0	64.3	145.3	142	3.3	MT.1	●
VTDSD1150M1	11.5	64.5	145.5	142	3.5	MT.1	●
VTDSD1200M1	12.0	69.6	149.6	146	3.6	MT.1	●
VTDSD1250M2	12.5	69.8	166.8	163	3.8	MT.2	●
VTDSD1300M2	13.0	69.9	166.9	163	3.9	MT.2	●
VTDSD1350M2	13.5	74.1	172.1	168	4.1	MT.2	●
VTDSD1400M2	14.0	74.2	172.2	168	4.2	MT.2	●
VTDSD1450M2	14.5	77.4	175.4	171	4.4	MT.2	●
VTDSD1500M2	15.0	77.5	175.5	171	4.5	MT.2	●
VTDSD1550M2	15.5	81.7	179.7	175	4.7	MT.2	●
VTDSD1600M2	16.0	81.8	179.8	175	4.8	MT.2	●
VTDSD1650M2	16.5	85.0	183.0	178	5.0	MT.2	●
VTDSD1700M2	17.0	85.1	183.1	178	5.1	MT.2	●
VTDSD1750M2	17.5	89.3	187.3	182	5.3	MT.2	●
VTDSD1800M2	18.0	89.4	187.4	182	5.4	MT.2	●
VTDSD1850M2	18.5	91.6	189.6	184	5.6	MT.2	●
VTDSD1900M2	19.0	91.7	189.7	184	5.7	MT.2	●
VTDSD1950M2	19.5	95.9	193.9	188	5.9	MT.2	●
VTDSD2000M2	20.0	96.0	194.0	188	6.0	MT.2	●

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
VTDSD2050M2	20.5	99.2	197.2	191	6.2	MT.2	●
VTDSD2100M2	21.0	99.3	197.3	191	6.3	MT.2	●
VTDSD2150M2	21.5	102.5	200.5	194	6.5	MT.2	●
VTDSD2200M2	22.0	102.6	200.6	194	6.6	MT.2	●
VTDSD2250M2	22.5	106.8	204.8	198	6.8	MT.2	●
VTDSD2300M2	23.0	106.9	204.9	198	6.9	MT.2	●
VTDSD2350M3	23.5	109.1	231.1	224	7.1	MT.3	●
VTDSD2400M3	24.0	109.2	231.2	224	7.2	MT.3	●
VTDSD2450M3	24.5	109.4	231.4	224	7.4	MT.3	●
VTDSD2500M3	25.0	109.5	231.5	224	7.5	MT.3	●
VTDSD2550M3	25.5	112.7	233.7	226	7.7	MT.3	●
VTDSD2600M3	26.0	112.8	233.8	226	7.8	MT.3	●
VTDSD2650M3	26.5	113.0	234.0	226	8.0	MT.3	●
VTDSD2700M3	27.0	116.1	238.1	230	8.1	MT.3	●
VTDSD2750M3	27.5	116.3	238.3	230	8.3	MT.3	●
VTDSD2800M3	28.0	116.4	238.4	230	8.4	MT.3	●
VTDSD2850M3	28.5	119.6	240.6	232	8.6	MT.3	●
VTDSD2900M3	29.0	119.7	240.7	232	8.7	MT.3	●
VTDSD2950M3	29.5	119.9	240.9	232	8.9	MT.3	●
VTDSD3000M3	30.0	120.0	241.0	232	9.0	MT.3	●
VTDSD3050M3	30.5	123.2	244.2	235	9.2	MT.3	●
VTDSD3100M3	31.0	123.3	244.3	235	9.3	MT.3	●
VTDSD3150M3	31.5	123.5	244.5	235	9.5	MT.3	●
VTDSD3200M3	32.0	123.6	244.6	235	9.6	MT.3	●

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work Material	Structural steel		Carbon steel AISI 1049		Stainless steel AISI 420 Copper alloy, Brass		Stainless steel AISI 304 Tool steel AISI D2 (Low-hardness materials)		Heat-treated steel AISI H13 (35—40HRC)	
Cutting speed	33—38m/min		28—33m/min		20m/min		15m/min		18m/min	
Drill Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
6.0	2000	0.18	1750	0.18	1060	0.15	800	0.12	950	0.12
8.0	1400	0.22	1270	0.22	800	0.20	600	0.15	720	0.15
10.0	1100	0.25	960	0.25	640	0.22	480	0.18	570	0.18
14.0	790	0.30	680	0.28	450	0.25	340	0.23	410	0.23
18.0	610	0.35	530	0.34	350	0.30	270	0.27	320	0.27
20.0	540	0.40	480	0.38	320	0.33	240	0.30	280	0.30
22.0	480	0.42	430	0.40	290	0.35	220	0.30	260	0.30
24.0	430	0.42	380	0.40	260	0.35	200	0.30	240	0.30
28.0	370	0.45	330	0.42	220	0.38	170	0.33	200	0.33
32.0	320	0.45	280	0.42	200	0.38	150	0.33	180	0.33

1) The above-mentioned cutting condition is standard when using water-soluble cutting fluid.
Please reduce the revolution when using non-water-soluble cutting fluid.

STRAIGHT SHANK DRILLS

GSD

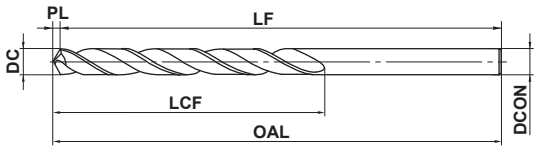
TiN, Straight shank

HSS | G | 110° DC<0.7 | 118° DC≥0.7 | X Thinning DC<2 | XR Thinning DC≥2

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal		



0.5≤DC<1	1≤DC≤3	3<DC≤6	6<DC≤10	10<DC≤13
0 −0.010	0 −0.014	0 −0.018	0 −0.022	0 −0.027



Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
GSDD0050	0.5	6.18	27.18	27	0.18	0.5	●
GSDD0060	0.6	7.21	30.21	30	0.21	0.6	●
GSDD0070	0.7	9.21	32.21	32	0.21	0.7	●
GSDD0080	0.8	10.24	34.24	34	0.24	0.8	●
GSDD0090	0.9	11.27	36.27	36	0.27	0.9	●
GSDD0100	1.0	12.3	40.3	40	0.3	1.0	●
GSDD0110	1.1	14.3	42.3	42	0.3	1.1	●
GSDD0120	1.2	16.4	42.4	42	0.4	1.2	●
GSDD0130	1.3	16.4	45.4	45	0.4	1.3	●
GSDD0140	1.4	18.4	48.4	48	0.4	1.4	●
GSDD0150	1.5	18.5	48.5	48	0.5	1.5	●
GSDD0160	1.6	20.5	50.5	50	0.5	1.6	●
GSDD0170	1.7	20.5	50.5	50	0.5	1.7	●
GSDD0180	1.8	22.5	52.5	52	0.5	1.8	●
GSDD0190	1.9	22.6	52.6	52	0.6	1.9	●
GSDD0200	2.0	23.6	55.6	55	0.6	2.0	●
GSDD0210	2.1	23.6	55.6	55	0.6	2.1	●
GSDD0220	2.2	26.7	58.7	58	0.7	2.2	●
GSDD0230	2.3	26.7	58.7	58	0.7	2.3	●
GSDD0240	2.4	29.7	61.7	61	0.7	2.4	●
GSDD0250	2.5	29.8	61.8	61	0.8	2.5	●
GSDD0260	2.6	29.8	64.8	64	0.8	2.6	●
GSDD0270	2.7	32.8	64.8	64	0.8	2.7	●
GSDD0280	2.8	32.8	67.8	67	0.8	2.8	●
GSDD0290	2.9	32.9	71.9	71	0.9	2.9	●
GSDD0300	3.0	32.9	71.9	71	0.9	3.0	●
GSDD0310	3.1	35.9	71.9	71	0.9	3.1	●
GSDD0320	3.2	36.0	72.0	71	1.0	3.2	●
GSDD0330	3.3	36.0	74.0	73	1.0	3.3	●
GSDD0340	3.4	39.0	74.0	73	1.0	3.4	●
GSDD0350	3.5	39.1	74.1	73	1.1	3.5	●
GSDD0360	3.6	39.1	77.1	76	1.1	3.6	●
GSDD0370	3.7	39.1	77.1	76	1.1	3.7	●
GSDD0380	3.8	43.1	77.1	76	1.1	3.8	●
GSDD0390	3.9	43.2	80.2	79	1.2	3.9	●
GSDD0400	4.0	43.2	84.2	83	1.2	4.0	●
GSDD0410	4.1	43.2	84.2	83	1.2	4.1	●
GSDD0420	4.2	43.3	84.3	83	1.3	4.2	●
GSDD0430	4.3	47.3	84.3	83	1.3	4.3	●
GSDD0440	4.4	47.3	87.3	86	1.3	4.4	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
GSDD0450	4.5	47.4	87.4	86	1.4	4.5	●
GSDD0460	4.6	47.4	87.4	86	1.4	4.6	●
GSDD0470	4.7	47.4	90.4	89	1.4	4.7	●
GSDD0480	4.8	52.4	90.4	89	1.4	4.8	●
GSDD0490	4.9	52.5	93.5	92	1.5	4.9	●
GSDD0500	5.0	52.5	93.5	92	1.5	5.0	●
GSDD0510	5.1	52.5	93.5	92	1.5	5.1	●
GSDD0520	5.2	52.6	96.6	95	1.6	5.2	●
GSDD0530	5.3	52.6	96.6	95	1.6	5.3	●
GSDD0540	5.4	57.6	96.6	95	1.6	5.4	●
GSDD0550	5.5	57.7	96.7	95	1.7	5.5	●
GSDD0560	5.6	57.7	99.7	98	1.7	5.6	●
GSDD0570	5.7	57.7	99.7	98	1.7	5.7	●
GSDD0580	5.8	57.7	99.7	98	1.7	5.8	●
GSDD0590	5.9	57.8	99.8	98	1.8	5.9	●
GSDD0600	6.0	57.8	103.8	102	1.8	6.0	●
GSDD0610	6.1	63.8	103.8	102	1.8	6.1	●
GSDD0620	6.2	63.9	103.9	102	1.9	6.2	●
GSDD0630	6.3	63.9	103.9	102	1.9	6.3	●
GSDD0640	6.4	63.9	106.9	105	1.9	6.4	●
GSDD0650	6.5	64.0	107.0	105	2.0	6.5	●
GSDD0660	6.6	64.0	107.0	105	2.0	6.6	●
GSDD0670	6.7	64.0	107.0	105	2.0	6.7	●
GSDD0680	6.8	69.0	107.0	105	2.0	6.8	●
GSDD0690	6.9	69.1	107.1	105	2.1	6.9	●
GSDD0700	7.0	69.1	107.1	105	2.1	7.0	●
GSDD0710	7.1	69.1	110.1	108	2.1	7.1	●
GSDD0720	7.2	69.2	110.2	108	2.2	7.2	●
GSDD0730	7.3	69.2	110.2	108	2.2	7.3	●
GSDD0740	7.4	69.2	113.2	111	2.2	7.4	●
GSDD0750	7.5	69.3	113.3	111	2.3	7.5	●
GSDD0760	7.6	75.3	113.3	111	2.3	7.6	●
GSDD0770	7.7	75.3	116.3	114	2.3	7.7	●
GSDD0780	7.8	75.3	116.3	114	2.3	7.8	●
GSDD0790	7.9	75.4	116.4	114	2.4	7.9	●
GSDD0800	8.0	75.4	116.4	114	2.4	8.0	●
GSDD0810	8.1	75.4	119.4	117	2.4	8.1	●
GSDD0820	8.2	75.5	119.5	117	2.5	8.2	●
GSDD0830	8.3	75.5	119.5	117	2.5	8.3	●
GSDD0840	8.4	75.5	123.5	121	2.5	8.4	●

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
GSDD0850	8.5	75.6	123.6	121	2.6	8.5	●
GSD**D0860**	8.6	81.6	123.6	121	2.6	8.6	●
GSD**D0870**	8.7	81.6	123.6	121	2.6	8.7	●
GSD**D0880**	8.8	81.6	126.6	124	2.6	8.8	●
GSD**D0890**	8.9	81.7	126.7	124	2.7	8.9	●
GSD**D0900**	9.0	81.7	126.7	124	2.7	9.0	●
GSD**D0910**	9.1	81.7	126.7	124	2.7	9.1	●
GSD**D0920**	9.2	81.8	129.8	127	2.8	9.2	●
GSD**D0930**	9.3	81.8	129.8	127	2.8	9.3	●
GSD**D0940**	9.4	81.8	129.8	127	2.8	9.4	●
GSD**D0950**	9.5	81.9	129.9	127	2.9	9.5	●
GSD**D0960**	9.6	87.9	132.9	130	2.9	9.6	●
GSD**D0970**	9.7	87.9	132.9	130	2.9	9.7	●
GSD**D0980**	9.8	87.9	132.9	130	2.9	9.8	●
GSD**D0990**	9.9	88.0	133.0	130	3.0	9.9	●
GSD**D1000**	10.0	88.0	133.0	130	3.0	10.0	●
GSD**D1010**	10.1	88.0	136.0	133	3.0	10.1	●
GSD**D1020**	10.2	88.1	136.1	133	3.1	10.2	●
GSD**D1030**	10.3	88.1	136.1	133	3.1	10.3	●
GSD**D1040**	10.4	88.1	136.1	133	3.1	10.4	●
GSD**D1050**	10.5	88.2	140.2	137	3.2	10.5	●
GSD**D1060**	10.6	88.2	140.2	137	3.2	10.6	●
GSD**D1070**	10.7	95.2	140.2	137	3.2	10.7	●
GSD**D1080**	10.8	95.2	143.2	140	3.2	10.8	●
GSD**D1090**	10.9	95.3	143.3	140	3.3	10.9	●
GSD**D1100**	11.0	95.3	143.3	140	3.3	11.0	●
GSD**D1110**	11.1	95.3	143.3	140	3.3	11.1	●
GSD**D1120**	11.2	95.4	146.4	143	3.4	11.2	●
GSD**D1130**	11.3	95.4	146.4	143	3.4	11.3	●
GSD**D1140**	11.4	95.4	146.4	143	3.4	11.4	●
GSD**D1150**	11.5	95.5	146.5	143	3.5	11.5	●
GSD**D1160**	11.6	95.5	149.5	146	3.5	11.6	●
GSD**D1170**	11.7	95.5	149.5	146	3.5	11.7	●
GSD**D1180**	11.8	95.6	149.6	146	3.6	11.8	●
GSD**D1190**	11.9	102.6	149.6	146	3.6	11.9	●
GSD**D1200**	12.0	102.6	152.6	149	3.6	12.0	●
GSD**D1210**	12.1	102.6	152.6	149	3.6	12.1	●
GSD**D1220**	12.2	102.7	152.7	149	3.7	12.2	●
GSD**D1230**	12.3	102.7	152.7	149	3.7	12.3	●
GSD**D1240**	12.4	102.7	155.7	152	3.7	12.4	●
GSD**D1250**	12.5	102.8	155.8	152	3.8	12.5	●
GSD**D1260**	12.6	102.8	155.8	152	3.8	12.6	●
GSD**D1270**	12.7	102.8	155.8	152	3.8	12.7	●
GSD**D1280**	12.8	102.9	155.9	152	3.9	12.8	●
GSD**D1290**	12.9	102.9	155.9	152	3.9	12.9	●
GSD**D1300**	13.0	102.9	155.9	152	3.9	13.0	●

STRAIGHT SHANK DRILLS

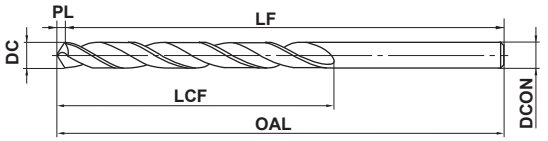
SD
Straight shank

HSS 118°

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal		

0.2≤DC<1	1≤DC≤3	3<DC≤6	6<DC≤10	10<DC≤17.5
0 −0.012	0 −0.014	0 −0.018	0 −0.022	0 −0.027





● For general drilling.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
SDD0020	0.2	2.56	19.06	19	0.06	0.2	●
SDD0030	0.3	3.09	19.09	19	0.09	0.3	●
SDD0040	0.4	5.12	20.12	20	0.12	0.4	●
SDD0050	0.5	6.15	22.15	22	0.15	0.5	●
SDD0060	0.6	7.18	24.18	24	0.18	0.6	●
SDD0070	0.7	10.21	32.21	32	0.21	0.7	●
SDD0080	0.8	11.24	34.24	34	0.24	0.8	●
SDD0090	0.9	13.27	36.27	36	0.27	0.9	●
SDD0100	1.0	18.3	40.3	40	0.3	1.0	●
SDD0110	1.1	20.3	42.3	42	0.3	1.1	●
SDD0120	1.2	20.4	42.4	42	0.4	1.2	●
SDD0130	1.3	22.4	45.4	45	0.4	1.3	●
SDD0140	1.4	23.4	48.4	48	0.4	1.4	●
SDD0150	1.5	23.5	48.5	48	0.5	1.5	●
SDD0160	1.6	25.5	50.5	50	0.5	1.6	●
SDD0170	1.7	25.5	50.5	50	0.5	1.7	●
SDD0180	1.8	28.5	52.5	52	0.5	1.8	●
SDD0190	1.9	28.6	52.6	52	0.6	1.9	●
SDD0200	2.0	29.6	55.6	55	0.6	2.0	●
SDD0210	2.1	29.6	55.6	55	0.6	2.1	●
SDD0220	2.2	33.7	58.7	58	0.7	2.2	●
SDD0230	2.3	33.7	58.7	58	0.7	2.3	●
SDD0240	2.4	35.7	61.7	61	0.7	2.4	●
SDD0250	2.5	35.8	61.8	61	0.8	2.5	●
SDD0260	2.6	37.8	64.8	64	0.8	2.6	●
SDD0270	2.7	37.8	64.8	64	0.8	2.7	●
SDD0280	2.8	39.8	67.8	67	0.8	2.8	●
SDD0290	2.9	42.9	71.9	71	0.9	2.9	●
SDD0300	3.0	42.9	71.9	71	0.9	3.0	●
SDD0310	3.1	42.9	71.9	71	0.9	3.1	●
SDD0320	3.2	43.0	72.0	71	1.0	3.2	●
SDD0330	3.3	46.0	74.0	73	1.0	3.3	●
SDD0340	3.4	46.0	74.0	73	1.0	3.4	●
SDD0350	3.5	46.1	74.1	73	1.1	3.5	●
SDD0360	3.6	49.1	77.1	76	1.1	3.6	●
SDD0370	3.7	49.1	77.1	76	1.1	3.7	●
SDD0380	3.8	49.1	77.1	76	1.1	3.8	●
SDD0390	3.9	52.2	80.2	79	1.2	3.9	●
SDD0400	4.0	55.2	84.2	83	1.2	4.0	●
SDD0410	4.1	55.2	84.2	83	1.2	4.1	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
SDD0420	4.2	55.3	84.3	83	1.3	4.2	●
SDD0430	4.3	55.3	84.3	83	1.3	4.3	●
SDD0440	4.4	57.3	87.3	86	1.3	4.4	●
SDD0450	4.5	57.4	87.4	86	1.4	4.5	●
SDD0460	4.6	57.4	87.4	86	1.4	4.6	●
SDD0470	4.7	60.4	90.4	89	1.4	4.7	●
SDD0480	4.8	60.4	90.4	89	1.4	4.8	●
SDD0490	4.9	63.5	93.5	92	1.5	4.9	●
SDD0500	5.0	63.5	93.5	92	1.5	5.0	●
SDD0510	5.1	63.5	93.5	92	1.5	5.1	●
SDD0520	5.2	65.6	96.6	95	1.6	5.2	●
SDD0530	5.3	65.6	96.6	95	1.6	5.3	●
SDD0540	5.4	65.6	96.6	95	1.6	5.4	●
SDD0550	5.5	65.7	96.7	95	1.7	5.5	●
SDD0560	5.6	68.7	99.7	98	1.7	5.6	●
SDD0570	5.7	68.7	99.7	98	1.7	5.7	●
SDD0580	5.8	68.7	99.7	98	1.7	5.8	●
SDD0590	5.9	68.8	99.8	98	1.8	5.9	●
SDD0600	6.0	71.8	103.8	102	1.8	6.0	●
SDD0610	6.1	71.8	103.8	102	1.8	6.1	●
SDD0620	6.2	71.9	103.9	102	1.9	6.2	●
SDD0630	6.3	71.9	103.9	102	1.9	6.3	●
SDD0640	6.4	74.9	106.9	105	1.9	6.4	●
SDD0650	6.5	75.0	107.0	105	2.0	6.5	●
SDD0660	6.6	75.0	107.0	105	2.0	6.6	●
SDD0670	6.7	75.0	107.0	105	2.0	6.7	●
SDD0680	6.8	75.0	107.0	105	2.0	6.8	●
SDD0690	6.9	75.1	107.1	105	2.1	6.9	●
SDD0700	7.0	75.1	107.1	105	2.1	7.0	●
SDD0710	7.1	77.1	110.1	108	2.1	7.1	●
SDD0720	7.2	77.2	110.2	108	2.2	7.2	●
SDD0730	7.3	77.2	110.2	108	2.2	7.3	●
SDD0740	7.4	80.2	113.2	111	2.2	7.4	●
SDD0750	7.5	80.3	113.3	111	2.3	7.5	●
SDD0760	7.6	80.3	113.3	111	2.3	7.6	●
SDD0770	7.7	83.3	116.3	114	2.3	7.7	●
SDD0780	7.8	83.3	116.3	114	2.3	7.8	●
SDD0790	7.9	83.4	116.4	114	2.4	7.9	●
SDD0800	8.0	83.4	116.4	114	2.4	8.0	●
SDD0810	8.1	86.4	119.4	117	2.4	8.1	●

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
SDD0820	8.2	86.5	119.5	117	2.5	8.2	●
SDD0830	8.3	86.5	119.5	117	2.5	8.3	●
SDD0840	8.4	89.5	123.5	121	2.5	8.4	●
SDD0850	8.5	89.6	123.6	121	2.6	8.5	●
SDD0860	8.6	89.6	123.6	121	2.6	8.6	●
SDD0870	8.7	89.6	123.6	121	2.6	8.7	●
SDD0880	8.8	91.6	126.6	124	2.6	8.8	●
SDD0890	8.9	91.7	126.7	124	2.7	8.9	●
SDD0900	9.0	91.7	126.7	124	2.7	9.0	●
SDD0910	9.1	91.7	126.7	124	2.7	9.1	●
SDD0920	9.2	94.8	129.8	127	2.8	9.2	●
SDD0930	9.3	94.8	129.8	127	2.8	9.3	●
SDD0940	9.4	94.8	129.8	127	2.8	9.4	●
SDD0950	9.5	94.9	129.9	127	2.9	9.5	●
SDD0960	9.6	97.9	132.9	130	2.9	9.6	●
SDD0970	9.7	97.9	132.9	130	2.9	9.7	●
SDD0980	9.8	97.9	132.9	130	2.9	9.8	●
SDD0990	9.9	98.0	133.0	130	3.0	9.9	●
SDD1000	10.0	98.0	133.0	130	3.0	10.0	●
SDD1010	10.1	101.0	136.0	133	3.0	10.1	●
SDD1020	10.2	101.1	136.1	133	3.1	10.2	●
SDD1030	10.3	101.1	136.1	133	3.1	10.3	●
SDD1040	10.4	101.1	136.1	133	3.1	10.4	●
SDD1050	10.5	103.2	140.2	137	3.2	10.5	●
SDD1060	10.6	103.2	140.2	137	3.2	10.6	●
SDD1070	10.7	103.2	140.2	137	3.2	10.7	●
SDD1080	10.8	106.2	143.2	140	3.2	10.8	●
SDD1090	10.9	106.3	143.3	140	3.3	10.9	●
SDD1100	11.0	106.3	143.3	140	3.3	11.0	●
SDD1110	11.1	106.3	143.3	140	3.3	11.1	●
SDD1120	11.2	109.4	146.4	143	3.4	11.2	●
SDD1130	11.3	109.4	146.4	143	3.4	11.3	●
SDD1140	11.4	109.4	146.4	143	3.4	11.4	●
SDD1150	11.5	109.5	146.5	143	3.5	11.5	●
SDD1160	11.6	112.5	149.5	146	3.5	11.6	●
SDD1170	11.7	112.5	149.5	146	3.5	11.7	●
SDD1180	11.8	112.6	149.6	146	3.6	11.8	●
SDD1190	11.9	112.6	149.6	146	3.6	11.9	●
SDD1200	12.0	114.6	152.6	149	3.6	12.0	●
SDD1210	12.1	114.6	152.6	149	3.6	12.1	●
SDD1220	12.2	114.7	152.7	149	3.7	12.2	●
SDD1230	12.3	114.7	152.7	149	3.7	12.3	●
SDD1240	12.4	117.7	155.7	152	3.7	12.4	●
SDD1250	12.5	117.8	155.8	152	3.8	12.5	●
SDD1260	12.6	117.8	155.8	152	3.8	12.6	●
SDD1270	12.7	117.8	155.8	152	3.8	12.7	●
SDD1280	12.8	117.9	155.9	152	3.9	12.8	●
SDD1290	12.9	117.9	155.9	152	3.9	12.9	●
SDD1300	13.0	117.9	155.9	152	3.9	13.0	●
SDD1350	13.5	126.1	172.1	168	4.1	13.5	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
SDD1400	14.0	126.2	172.2	168	4.2	14.0	●
SDD1450	14.5	126.4	172.4	168	4.4	14.5	●
SDD1500	15.0	136.5	185.5	181	4.5	15.0	●
SDD1550	15.5	136.7	185.7	181	4.7	15.5	●
SDD1600	16.0	136.8	185.8	181	4.8	16.0	●
SDD1650	16.5	137.0	186.0	181	5.0	16.5	●
SDD1700	17.0	148.1	199.1	194	5.1	17.0	●
SDD1750	17.5	148.3	199.3	194	5.3	17.5	●

STRAIGHT SHANK DRILLS

SD

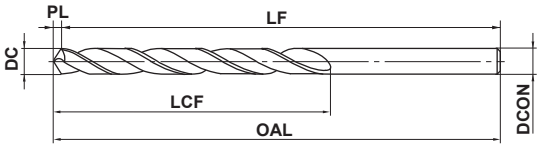
Straight shank, 1/100mm

HSS 118°

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal		

0.25≤DC≤5.95 $^{0}_{-0.007}$





● The diameter tolerance is $^{0}_{-0.007}$ mm.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
SDD0025	0.25	3.08	19.08	19	0.08	0.25	●
SD**D0035**	0.35	4.11	19.11	19	0.11	0.35	●
SD**D0045**	0.45	5.14	20.14	20	0.14	0.45	●
SD**D0055**	0.55	7.17	24.17	24	0.17	0.55	●
SD**D0065**	0.65	8.20	26.20	26	0.20	0.65	●
SD**D0075**	0.75	11.23	34.23	34	0.23	0.75	●
SD**D0085**	0.85	13.26	36.26	36	0.26	0.85	●
SD**D0095**	0.95	18.29	40.29	40	0.29	0.95	●
SD**D0105**	1.05	20.3	42.3	42	0.3	1.05	●
SD**D0115**	1.15	20.4	42.4	42	0.4	1.15	●
SD**D0125**	1.25	22.4	45.4	45	0.4	1.25	●
SD**D0135**	1.35	23.4	48.4	48	0.4	1.35	●
SD**D0145**	1.45	23.4	48.4	48	0.4	1.45	●
SD**D0155**	1.55	25.5	50.5	50	0.5	1.55	●
SD**D0165**	1.65	25.5	50.5	50	0.5	1.65	●
SD**D0175**	1.75	28.5	52.5	52	0.5	1.75	●
SD**D0185**	1.85	28.6	52.6	52	0.6	1.85	●
SD**D0195**	1.95	29.6	55.6	55	0.6	1.95	●
SD**D0205**	2.05	29.6	55.6	55	0.6	2.05	●
SD**D0215**	2.15	29.7	55.7	55	0.7	2.15	●
SD**D0225**	2.25	33.7	58.7	58	0.7	2.25	●
SD**D0235**	2.35	33.7	58.7	58	0.7	2.35	●
SD**D0245**	2.45	35.7	61.7	61	0.7	2.45	●
SD**D0255**	2.55	37.8	64.8	64	0.8	2.55	●
SD**D0265**	2.65	37.8	64.8	64	0.8	2.65	●
SD**D0275**	2.75	39.8	67.8	67	0.8	2.75	●
SD**D0285**	2.85	39.9	67.9	67	0.9	2.85	●
SD**D0295**	2.95	42.9	71.9	71	0.9	2.95	●
SD**D0305**	3.05	42.9	71.9	71	0.9	3.05	●
SD**D0315**	3.15	43.0	72.0	71	1.0	3.15	●
SD**D0325**	3.25	43.0	72.0	71	1.0	3.25	●
SD**D0335**	3.35	46.0	74.0	73	1.0	3.35	●
SD**D0345**	3.45	46.0	74.0	73	1.0	3.45	●
SD**D0355**	3.55	46.1	74.1	73	1.1	3.55	●
SD**D0365**	3.65	49.1	77.1	76	1.1	3.65	●
SD**D0375**	3.75	49.1	77.1	76	1.1	3.75	●
SD**D0385**	3.85	52.2	80.2	79	1.2	3.85	●
SD**D0395**	3.95	52.2	80.2	79	1.2	3.95	●
SD**D0405**	4.05	55.2	84.2	83	1.2	4.05	●
SD**D0415**	4.15	55.3	84.3	83	1.3	4.15	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
SDD0425	4.25	55.3	84.3	83	1.3	4.25	●
SD**D0435**	4.35	55.3	84.3	83	1.3	4.35	●
SD**D0445**	4.45	57.3	87.3	86	1.3	4.45	●
SD**D0455**	4.55	57.4	87.4	86	1.4	4.55	●
SD**D0465**	4.65	60.4	90.4	89	1.4	4.65	●
SD**D0475**	4.75	60.4	90.4	89	1.4	4.75	●
SD**D0485**	4.85	60.5	90.5	89	1.5	4.85	●
SD**D0495**	4.95	63.5	93.5	92	1.5	4.95	●
SD**D0505**	5.05	63.5	93.5	92	1.5	5.05	●
SD**D0515**	5.15	63.6	93.6	92	1.6	5.15	●
SD**D0525**	5.25	65.6	96.6	95	1.6	5.25	●
SD**D0535**	5.35	65.6	96.6	95	1.6	5.35	●
SD**D0545**	5.45	65.6	96.6	95	1.6	5.45	●
SD**D0555**	5.55	65.7	96.7	95	1.7	5.55	●
SD**D0565**	5.65	68.7	99.7	98	1.7	5.65	●
SD**D0575**	5.75	68.7	99.7	98	1.7	5.75	●
SD**D0585**	5.85	68.8	99.8	98	1.8	5.85	●
SD**D0595**	5.95	68.8	99.8	98	1.8	5.95	●

● : Inventory maintained in Japan.

CUTTING CONDITIONS ➤ N199

SDLS NEW

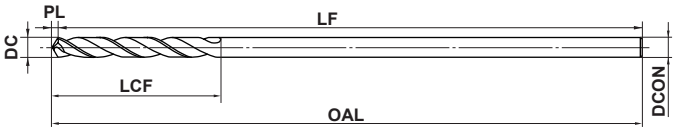
Long shank straight drill

HSS | 118° | X Thinning

DC≥2

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal		

1≤DC≤3	3<DC≤6	6<DC≤10
0 −0.014	0 −0.018	0 −0.022



- It is recommended to use when long overall length is demanded for preventing collision with workpiece with high rigidity.
- For both machining center and manually operated machines.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
SDLSD0100A100	1.0	12.3	100.3	100	0.3	1.0	●
SDLSD0110A100	1.1	14.3	100.3	100	0.3	1.1	●
SDLSD0120A100	1.2	16.4	100.4	100	0.4	1.2	●
SDLSD0130A100	1.3	16.4	100.4	100	0.4	1.3	●
SDLSD0140A100	1.4	18.4	100.4	100	0.4	1.4	●
SDLSD0150A100	1.5	18.5	100.5	100	0.5	1.5	●
SDLSD0160A100	1.6	20.5	100.5	100	0.5	1.6	●
SDLSD0170A100	1.7	20.5	100.5	100	0.5	1.7	●
SDLSD0180A100	1.8	22.5	100.5	100	0.5	1.8	●
SDLSD0190A100	1.9	22.6	100.6	100	0.6	1.9	●
SDLSD0200A100	2.0	23.6	100.6	100	0.6	2.0	●
SDLSD0210A150	2.1	23.6	150.6	150	0.6	2.1	●
SDLSD0220A150	2.2	26.7	150.7	150	0.7	2.2	●
SDLSD0230A150	2.3	26.7	150.7	150	0.7	2.3	●
SDLSD0240A150	2.4	29.7	150.7	150	0.7	2.4	●
SDLSD0250A150	2.5	29.8	150.8	150	0.8	2.5	●
SDLSD0260A150	2.6	29.8	150.8	150	0.8	2.6	●
SDLSD0270A150	2.7	32.8	150.8	150	0.8	2.7	●
SDLSD0280A150	2.8	32.8	150.8	150	0.8	2.8	●
SDLSD0290A150	2.9	32.9	150.9	150	0.9	2.9	●
SDLSD0300A150	3.0	32.9	150.9	150	0.9	3.0	●
SDLSD0310A150	3.1	35.9	150.9	150	0.9	3.1	●
SDLSD0320A150	3.2	36.0	151.0	150	1.0	3.2	●
SDLSD0330A150	3.3	36.0	151.0	150	1.0	3.3	●
SDLSD0340A150	3.4	39.0	151.0	150	1.0	3.4	●
SDLSD0350A150	3.5	39.1	151.1	150	1.1	3.5	●
SDLSD0360A200	3.6	39.1	201.1	200	1.1	3.6	●
SDLSD0370A200	3.7	39.1	201.1	200	1.1	3.7	●
SDLSD0380A200	3.8	43.1	201.1	200	1.1	3.8	●
SDLSD0390A200	3.9	43.2	201.2	200	1.2	3.9	●
SDLSD0400A200	4.0	43.2	201.2	200	1.2	4.0	●
SDLSD0410A200	4.1	43.2	201.2	200	1.2	4.1	●
SDLSD0420A200	4.2	43.3	201.3	200	1.3	4.2	●
SDLSD0430A200	4.3	47.3	201.3	200	1.3	4.3	●
SDLSD0440A200	4.4	47.3	201.3	200	1.3	4.4	●
SDLSD0450A200	4.5	47.4	201.4	200	1.4	4.5	●
SDLSD0460A200	4.6	47.4	201.4	200	1.4	4.6	●
SDLSD0470A200	4.7	47.4	201.4	200	1.4	4.7	●
SDLSD0480A200	4.8	52.4	201.4	200	1.4	4.8	●
SDLSD0490A200	4.9	52.5	201.5	200	1.5	4.9	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
SDLSD0500A200	5.0	52.5	201.5	200	1.5	5.0	●
SDLSD0510A200	5.1	52.5	201.5	200	1.5	5.1	●
SDLSD0520A200	5.2	52.6	201.6	200	1.6	5.2	●
SDLSD0530A200	5.3	52.6	201.6	200	1.6	5.3	●
SDLSD0540A200	5.4	57.6	201.6	200	1.6	5.4	●
SDLSD0550A200	5.5	57.7	201.7	200	1.7	5.5	●
SDLSD0560A200	5.6	57.7	201.7	200	1.7	5.6	●
SDLSD0570A200	5.7	57.7	201.7	200	1.7	5.7	●
SDLSD0580A200	5.8	57.7	201.7	200	1.7	5.8	●
SDLSD0590A200	5.9	57.8	201.8	200	1.8	5.9	●
SDLSD0600A200	6.0	57.8	201.8	200	1.8	6.0	●
SDLSD0610A250	6.1	63.8	251.8	250	1.8	6.1	●
SDLSD0620A250	6.2	63.9	251.9	250	1.9	6.2	●
SDLSD0630A250	6.3	63.9	251.9	250	1.9	6.3	●
SDLSD0640A250	6.4	63.9	251.9	250	1.9	6.4	●
SDLSD0650A250	6.5	64.0	252.0	250	2.0	6.5	●
SDLSD0660A250	6.6	64.0	252.0	250	2.0	6.6	●
SDLSD0670A250	6.7	64.0	252.0	250	2.0	6.7	●
SDLSD0680A250	6.8	69.0	252.0	250	2.0	6.8	●
SDLSD0690A250	6.9	69.1	252.1	250	2.1	6.9	●
SDLSD0700A250	7.0	69.1	252.1	250	2.1	7.0	●
SDLSD0710A250	7.1	69.1	252.1	250	2.1	7.1	●
SDLSD0720A250	7.2	69.2	252.2	250	2.2	7.2	●
SDLSD0730A250	7.3	69.2	252.2	250	2.2	7.3	●
SDLSD0740A250	7.4	69.2	252.2	250	2.2	7.4	●
SDLSD0750A250	7.5	69.3	252.3	250	2.3	7.5	●
SDLSD0760A250	7.6	75.3	252.3	250	2.3	7.6	●
SDLSD0770A250	7.7	75.3	252.3	250	2.3	7.7	●
SDLSD0780A250	7.8	75.3	252.3	250	2.3	7.8	●
SDLSD0790A250	7.9	75.4	252.4	250	2.4	7.9	●
SDLSD0800A250	8.0	75.4	252.4	250	2.4	8.0	●
SDLSD0810A250	8.1	75.4	252.4	250	2.4	8.1	●
SDLSD0820A250	8.2	75.5	252.5	250	2.5	8.2	●
SDLSD0830A250	8.3	75.5	252.5	250	2.5	8.3	●
SDLSD0840A250	8.4	75.5	252.5	250	2.5	8.4	●
SDLSD0850A250	8.5	75.6	252.6	250	2.6	8.5	●
SDLSD0860A250	8.6	81.6	252.6	250	2.6	8.6	●
SDLSD0870A250	8.7	81.6	252.6	250	2.6	8.7	●
SDLSD0880A250	8.8	81.6	252.6	250	2.6	8.8	●
SDLSD0890A250	8.9	81.7	252.7	250	2.7	8.9	●

STRAIGHT SHANK DRILLS

SDLS NEW

Long shank straight drill

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
SDLSD0900A250	9.0	81.7	252.7	250	2.7	9.0	●
SDLSD0910A250	9.1	81.7	252.7	250	2.7	9.1	●
SDLSD0920A250	9.2	81.8	252.8	250	2.8	9.2	●
SDLSD0930A250	9.3	81.8	252.8	250	2.8	9.3	●
SDLSD0940A250	9.4	81.8	252.8	250	2.8	9.4	●
SDLSD0950A250	9.5	81.9	252.9	250	2.9	9.5	●
SDLSD0960A250	9.6	87.9	252.9	250	2.9	9.6	●
SDLSD0970A250	9.7	87.9	252.9	250	2.9	9.7	●
SDLSD0980A250	9.8	87.9	252.9	250	2.9	9.8	●
SDLSD0990A250	9.9	88.0	253.0	250	3.0	9.9	●
SDLSD1000A250	10.0	88.0	253.0	250	3.0	10.0	●

● : Inventory maintained in Japan.

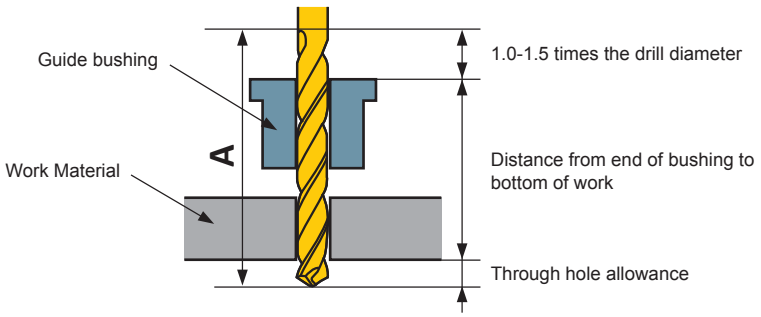
RECOMMENDED CUTTING CONDITIONS

Work material	Mild Steel (≤180HB), Carbon Steel, Alloy Steel(180−250HB) ASTM A36, AISI 1010 AISI 1045, AISI 4140 etc				Alloy tool steel (≤30HRC) AISI H13, AISI L6 etc				Alloy tool steel (<40HRC) AISI H13, AISI L6 etc				Gray Cast Iron (≤350MPa) No 45 B etc			
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Table Feed (mm/min)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Table Feed (mm/min)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Table Feed (mm/min)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Table Feed (mm/min)
1.0	16	5000	0.02	100	13	4000	0.01	40	9	2800	0.007	15	16	5000	0.02	100
1.5	20	4200	0.03	125	15	3200	0.02	60	10	2100	0.01	20	20	4200	0.03	125
2.0	20	3200	0.05	160	16	2500	0.03	75	11	1800	0.02	35	20	3200	0.05	160
3.0	20	2100	0.1	210	17	1800	0.06	105	11	1200	0.04	45	22	2300	0.1	230
4.0	20	1600	0.12	190	17	1350	0.08	105	11	900	0.06	50	22	1750	0.12	210
5.0	20	1300	0.14	180	17	1100	0.1	110	11	700	0.08	55	22	1400	0.14	195
6.0	20	1050	0.17	175	17	900	0.12	105	11	600	0.1	60	22	1150	0.18	205
7.0	20	900	0.19	170	17	780	0.14	105	11	500	0.11	55	22	1000	0.19	190
8.0	20	800	0.2	160	17	670	0.15	100	11	450	0.12	50	22	890	0.2	175
9.0	20	700	0.21	145	17	600	0.16	95	11	400	0.13	50	22	780	0.21	160
10.0	20	650	0.22	140	17	540	0.17	90	11	350	0.14	45	22	700	0.22	150

Work material	Ferritic, Precipitation hardening stainless steel (≤200HB) AISI 410, AISI 430 etc				Austenitic Stainless Steel (≤200HB) AISI 304, AISI 316 etc				Copper, Copper alloy				Aluminium Alloy (Si<5%)			
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Table Feed (mm/min)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Table Feed (mm/min)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Table Feed (mm/min)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Table Feed (mm/min)
1.0	13	4000	0.02	80	9	3000	0.02	60	16	5000	0.02	100	22	7000	0.04	280
1.5	14	3000	0.03	90	9	2000	0.03	60	20	4200	0.03	125	28	6000	0.06	360
2.0	14	2200	0.05	110	9	1500	0.04	60	20	3200	0.05	160	30	4800	0.08	380
3.0	15	1600	0.07	110	9	1000	0.06	60	20	2100	0.1	210	40	4200	0.13	545
4.0	15	1200	0.11	130	9	700	0.08	55	20	1600	0.12	190	40	3200	0.16	510
5.0	15	950	0.13	120	9	600	0.09	50	20	1300	0.14	180	40	2550	0.2	510
6.0	15	800	0.14	110	10	530	0.1	50	20	1050	0.18	185	40	2100	0.23	480
7.0	15	700	0.15	105	10	450	0.11	45	20	900	0.19	170	40	1800	0.25	450
8.0	15	600	0.16	95	10	400	0.13	50	20	800	0.2	160	40	1600	0.28	445
9.0	15	520	0.17	85	10	360	0.14	50	20	700	0.21	145	40	1400	0.3	420
10.0	15	480	0.18	85	10	310	0.15	45	20	650	0.22	140	40	1280	0.33	420

(Note) The intermediate diameter revolution is not tabulated. It is matched to the large diameter side and closest drill diameter conditions or by calculating the cutting speed of the closest drill diameter. Set the feedrate per revolution to a suitable value with the recommended feedrate of the closest drill diameter as the standard.

1) Lower the revolution and feedrate accordingly, when the work material is not rigid or there are restrictions on the machine.
2) When drilling holes greater than 3 x drill diameter hole depths, please use a peck feed.
3) The cutting conditions mentioned above arevstandard with the tool protrusion length was made 2 times the flute length.
4) Use of water-soluble cutting fluid is recommended. Please reduce the revolution when using water-insoluble cutting fluid.
5) Use sufficient cutting fluid. Please reduce the revolution when insufficient cutting fluid.
6) When using a guide bush, please confirm the flute length > A. In case of short flute length, please conduct machining without the bush. And, when not being able to dismount the bush, please use LSD or GWSL.



KSD

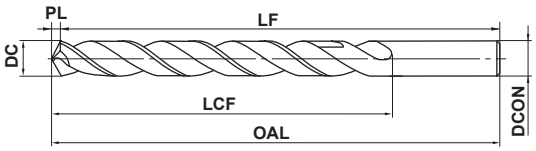
Cobalt HSS, For stainless steel

CO HSS | 125° DC<2 | 118° DC≥2 | XR Thinning DC≥2

P Steel | M Stainless Steel | K | N Non-ferrous Metal | S | H



1≤DC≤3	3<DC≤6	6<DC≤10	10<DC≤13
0 −0.014	0 −0.018	0 −0.022	0 −0.027



● Sharp edge geometry for stainless steels up to 200HB.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
KSDD0100	1.0	12.3	40.3	40	0.3	1.0	●
KSDD0110	1.1	14.3	42.3	42	0.3	1.1	●
KSDD0120	1.2	16.3	42.3	42	0.3	1.2	●
KSDD0130	1.3	16.3	45.3	45	0.3	1.3	●
KSDD0140	1.4	18.4	48.4	48	0.4	1.4	●
KSDD0150	1.5	18.4	48.4	48	0.4	1.5	●
KSDD0160	1.6	20.4	50.4	50	0.4	1.6	●
KSDD0170	1.7	20.4	50.4	50	0.4	1.7	●
KSDD0180	1.8	22.5	52.5	52	0.5	1.8	●
KSDD0190	1.9	22.5	52.5	52	0.5	1.9	●
KSDD0200	2.0	29.6	55.6	55	0.6	2.0	●
KSDD0210	2.1	29.6	55.6	55	0.6	2.1	●
KSDD0220	2.2	33.7	58.7	58	0.7	2.2	●
KSDD0230	2.3	33.7	58.7	58	0.7	2.3	●
KSDD0240	2.4	35.7	61.7	61	0.7	2.4	●
KSDD0250	2.5	35.8	61.8	61	0.8	2.5	●
KSDD0260	2.6	37.8	64.8	64	0.8	2.6	●
KSDD0270	2.7	37.8	64.8	64	0.8	2.7	●
KSDD0280	2.8	39.8	67.8	67	0.8	2.8	●
KSDD0290	2.9	42.9	71.9	71	0.9	2.9	●
KSDD0300	3.0	42.9	71.9	71	0.9	3.0	●
KSDD0310	3.1	42.9	71.9	71	0.9	3.1	●
KSDD0320	3.2	43.0	72.0	71	1.0	3.2	●
KSDD0330	3.3	46.0	74.0	73	1.0	3.3	●
KSDD0340	3.4	46.0	74.0	73	1.0	3.4	●
KSDD0350	3.5	46.1	74.1	73	1.1	3.5	●
KSDD0360	3.6	49.1	77.1	76	1.1	3.6	●
KSDD0370	3.7	49.1	77.1	76	1.1	3.7	●
KSDD0380	3.8	49.1	77.1	76	1.1	3.8	●
KSDD0390	3.9	52.2	80.2	79	1.2	3.9	●
KSDD0400	4.0	55.2	84.2	83	1.2	4.0	●
KSDD0410	4.1	55.2	84.2	83	1.2	4.1	●
KSDD0420	4.2	55.3	84.3	83	1.3	4.2	●
KSDD0430	4.3	55.3	84.3	83	1.3	4.3	●
KSDD0440	4.4	57.3	87.3	86	1.3	4.4	●
KSDD0450	4.5	57.4	87.4	86	1.4	4.5	●
KSDD0460	4.6	57.4	87.4	86	1.4	4.6	●
KSDD0470	4.7	60.4	90.4	89	1.4	4.7	●
KSDD0480	4.8	60.4	90.4	89	1.4	4.8	●
KSDD0490	4.9	63.5	93.5	92	1.5	4.9	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
KSDD0500	5.0	63.5	93.5	92	1.5	5.0	●
KSDD0510	5.1	63.5	93.5	92	1.5	5.1	●
KSDD0520	5.2	65.6	96.6	95	1.6	5.2	●
KSDD0530	5.3	65.6	96.6	95	1.6	5.3	●
KSDD0540	5.4	65.6	96.6	95	1.6	5.4	●
KSDD0550	5.5	65.7	96.7	95	1.7	5.5	●
KSDD0560	5.6	68.7	99.7	98	1.7	5.6	●
KSDD0570	5.7	68.7	99.7	98	1.7	5.7	●
KSDD0580	5.8	68.7	99.7	98	1.7	5.8	●
KSDD0590	5.9	68.8	99.8	98	1.8	5.9	●
KSDD0600	6.0	71.8	103.8	102	1.8	6.0	●
KSDD0610	6.1	71.8	103.8	102	1.8	6.1	●
KSDD0620	6.2	71.9	103.9	102	1.9	6.2	●
KSDD0630	6.3	71.9	103.9	102	1.9	6.3	●
KSDD0640	6.4	74.9	106.9	105	1.9	6.4	●
KSDD0650	6.5	75.0	107.0	105	2.0	6.5	●
KSDD0660	6.6	75.0	107.0	105	2.0	6.6	●
KSDD0670	6.7	75.0	107.0	105	2.0	6.7	●
KSDD0680	6.8	75.0	107.0	105	2.0	6.8	●
KSDD0690	6.9	75.1	107.1	105	2.1	6.9	●
KSDD0700	7.0	75.1	107.1	105	2.1	7.0	●
KSDD0710	7.1	77.1	110.1	108	2.1	7.1	●
KSDD0720	7.2	77.2	110.2	108	2.2	7.2	●
KSDD0730	7.3	77.2	110.2	108	2.2	7.3	●
KSDD0740	7.4	80.2	113.2	111	2.2	7.4	●
KSDD0750	7.5	80.3	113.3	111	2.3	7.5	●
KSDD0760	7.6	80.3	113.3	111	2.3	7.6	●
KSDD0770	7.7	83.3	116.3	114	2.3	7.7	●
KSDD0780	7.8	83.3	116.3	114	2.3	7.8	●
KSDD0790	7.9	83.4	116.4	114	2.4	7.9	●
KSDD0800	8.0	83.4	116.4	114	2.4	8.0	●
KSDD0810	8.1	86.4	119.4	117	2.4	8.1	●
KSDD0820	8.2	86.5	119.5	117	2.5	8.2	●
KSDD0830	8.3	86.5	119.5	117	2.5	8.3	●
KSDD0840	8.4	89.5	123.5	121	2.5	8.4	●
KSDD0850	8.5	89.6	123.6	121	2.6	8.5	●
KSDD0860	8.6	89.6	123.6	121	2.6	8.6	●
KSDD0870	8.7	89.6	123.6	121	2.6	8.7	●
KSDD0880	8.8	91.6	126.6	124	2.6	8.8	●
KSDD0890	8.9	91.7	126.7	124	2.7	8.9	●

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
KSDD0900	9.0	91.7	126.7	124	2.7	9.0	●
KSDD0910	9.1	91.7	126.7	124	2.7	9.1	●
KSDD0920	9.2	94.8	129.8	127	2.8	9.2	●
KSDD0930	9.3	94.8	129.8	127	2.8	9.3	●
KSDD0940	9.4	94.8	129.8	127	2.8	9.4	●
KSDD0950	9.5	94.9	129.9	127	2.9	9.5	●
KSDD0960	9.6	97.9	132.9	130	2.9	9.6	●
KSDD0970	9.7	97.9	132.9	130	2.9	9.7	●
KSDD0980	9.8	97.9	132.9	130	2.9	9.8	●
KSDD0990	9.9	98.0	133.0	130	3.0	9.9	●
KSDD1000	10.0	98.0	133.0	130	3.0	10.0	●
KSDD1010	10.1	101.0	136.0	133	3.0	10.1	●
KSDD1020	10.2	101.1	136.1	133	3.1	10.2	●
KSDD1030	10.3	101.1	136.1	133	3.1	10.3	●
KSDD1040	10.4	101.1	136.1	133	3.1	10.4	●
KSDD1050	10.5	103.2	140.2	137	3.2	10.5	●
KSDD1060	10.6	103.2	140.2	137	3.2	10.6	●
KSDD1070	10.7	103.2	140.2	137	3.2	10.7	●
KSDD1080	10.8	106.2	143.2	140	3.2	10.8	●
KSDD1090	10.9	106.3	143.3	140	3.3	10.9	●
KSDD1100	11.0	106.3	143.3	140	3.3	11.0	●
KSDD1110	11.1	106.3	143.3	140	3.3	11.1	●
KSDD1120	11.2	109.4	146.4	143	3.4	11.2	●
KSDD1130	11.3	109.4	146.4	143	3.4	11.3	●
KSDD1140	11.4	109.4	146.4	143	3.4	11.4	●
KSDD1150	11.5	109.5	146.5	143	3.5	11.5	●
KSDD1160	11.6	112.5	149.5	146	3.5	11.6	●
KSDD1170	11.7	112.5	149.5	146	3.5	11.7	●
KSDD1180	11.8	112.5	149.5	146	3.5	11.8	●
KSDD1190	11.9	112.6	149.6	146	3.6	11.9	●
KSDD1200	12.0	114.6	152.6	149	3.6	12.0	●
KSDD1210	12.1	114.6	152.6	149	3.6	12.1	●
KSDD1220	12.2	114.7	152.7	149	3.7	12.2	●
KSDD1230	12.3	114.7	152.7	149	3.7	12.3	●
KSDD1240	12.4	117.7	155.7	152	3.7	12.4	●
KSDD1250	12.5	117.8	155.8	152	3.8	12.5	●
KSDD1260	12.6	117.8	155.8	152	3.8	12.6	●
KSDD1270	12.7	117.8	155.8	152	3.8	12.7	●
KSDD1280	12.8	117.8	155.8	152	3.8	12.8	●
KSDD1290	12.9	117.9	155.9	152	3.9	12.9	●
KSDD1300	13.0	117.9	155.9	152	3.9	13.0	●

STRAIGHT SHANK DRILLS

GWSS

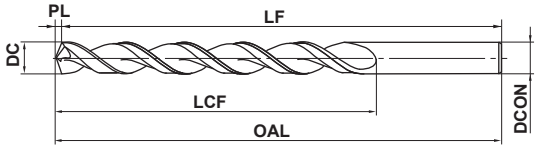
TiN, For deep hole, Convolute flute

CO HSS | G | 118° | X Thinning

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal		

1≤DC≤3	3<DC≤6	6<DC≤10	10<DC≤13
0 −0.014	0 −0.018	0 −0.022	0 −0.027





● Suitable for general and deep hole drilling.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
GWSSD0100	1.0	18.3	40.3	40	0.3	1.0	●
GWSSD0110	1.1	20.3	42.3	42	0.3	1.1	●
GWSSD0120	1.2	20.4	42.4	42	0.4	1.2	●
GWSSD0130	1.3	22.4	45.4	45	0.4	1.3	●
GWSSD0140	1.4	23.4	48.4	48	0.4	1.4	●
GWSSD0150	1.5	23.5	48.5	48	0.5	1.5	●
GWSSD0160	1.6	25.5	50.5	50	0.5	1.6	●
GWSSD0170	1.7	25.5	50.5	50	0.5	1.7	●
GWSSD0180	1.8	28.5	52.5	52	0.5	1.8	●
GWSSD0190	1.9	28.6	52.6	52	0.6	1.9	●
GWSSD0200	2.0	29.6	55.6	55	0.6	2.0	●
GWSSD0210	2.1	29.6	55.6	55	0.6	2.1	●
GWSSD0220	2.2	33.7	58.7	58	0.7	2.2	●
GWSSD0230	2.3	33.7	58.7	58	0.7	2.3	●
GWSSD0240	2.4	35.7	61.7	61	0.7	2.4	●
GWSSD0250	2.5	35.8	61.8	61	0.8	2.5	●
GWSSD0260	2.6	37.8	64.8	64	0.8	2.6	●
GWSSD0270	2.7	37.8	64.8	64	0.8	2.7	●
GWSSD0280	2.8	39.8	67.8	67	0.8	2.8	●
GWSSD0290	2.9	42.9	71.9	71	0.9	2.9	●
GWSSD0300	3.0	42.9	71.9	71	0.9	3.0	●
GWSSD0310	3.1	42.9	71.9	71	0.9	3.1	●
GWSSD0320	3.2	43.0	72.0	71	1.0	3.2	●
GWSSD0330	3.3	46.0	74.0	73	1.0	3.3	●
GWSSD0340	3.4	46.0	74.0	73	1.0	3.4	●
GWSSD0350	3.5	46.1	74.1	73	1.1	3.5	●
GWSSD0360	3.6	49.1	77.1	76	1.1	3.6	●
GWSSD0370	3.7	49.1	77.1	76	1.1	3.7	●
GWSSD0380	3.8	49.1	77.1	76	1.1	3.8	●
GWSSD0390	3.9	52.2	80.2	79	1.2	3.9	●
GWSSD0400	4.0	55.2	84.2	83	1.2	4.0	●
GWSSD0410	4.1	55.2	84.2	83	1.2	4.1	●
GWSSD0420	4.2	55.3	84.3	83	1.3	4.2	●
GWSSD0430	4.3	55.3	84.3	83	1.3	4.3	●
GWSSD0440	4.4	57.3	87.3	86	1.3	4.4	●
GWSSD0450	4.5	57.4	87.4	86	1.4	4.5	●
GWSSD0460	4.6	57.4	87.4	86	1.4	4.6	●
GWSSD0470	4.7	60.4	90.4	89	1.4	4.7	●
GWSSD0480	4.8	60.4	90.4	89	1.4	4.8	●
GWSSD0490	4.9	63.5	93.5	92	1.5	4.9	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
GWSSD0500	5.0	63.5	93.5	92	1.5	5.0	●
GWSSD0510	5.1	63.5	93.5	92	1.5	5.1	●
GWSSD0520	5.2	65.6	96.6	95	1.6	5.2	●
GWSSD0530	5.3	65.6	96.6	95	1.6	5.3	●
GWSSD0540	5.4	65.6	96.6	95	1.6	5.4	●
GWSSD0550	5.5	65.7	96.7	95	1.7	5.5	●
GWSSD0560	5.6	68.7	99.7	98	1.7	5.6	●
GWSSD0570	5.7	68.7	99.7	98	1.7	5.7	●
GWSSD0580	5.8	68.7	99.7	98	1.7	5.8	●
GWSSD0590	5.9	68.8	99.8	98	1.8	5.9	●
GWSSD0600	6.0	71.8	103.8	102	1.8	6.0	●
GWSSD0610	6.1	71.8	103.8	102	1.8	6.1	●
GWSSD0620	6.2	71.9	103.9	102	1.9	6.2	●
GWSSD0630	6.3	71.9	103.9	102	1.9	6.3	●
GWSSD0640	6.4	74.9	106.9	105	1.9	6.4	●
GWSSD0650	6.5	75.0	107.0	105	2.0	6.5	●
GWSSD0660	6.6	75.0	107.0	105	2.0	6.6	●
GWSSD0670	6.7	75.0	107.0	105	2.0	6.7	●
GWSSD0680	6.8	75.0	107.0	105	2.0	6.8	●
GWSSD0690	6.9	75.1	107.1	105	2.1	6.9	●
GWSSD0700	7.0	75.1	107.1	105	2.1	7.0	●
GWSSD0710	7.1	77.1	110.1	108	2.1	7.1	●
GWSSD0720	7.2	77.2	110.2	108	2.2	7.2	●
GWSSD0730	7.3	77.2	110.2	108	2.2	7.3	●
GWSSD0740	7.4	80.2	113.2	111	2.2	7.4	●
GWSSD0750	7.5	80.3	113.3	111	2.3	7.5	●
GWSSD0760	7.6	80.3	113.3	111	2.3	7.6	●
GWSSD0770	7.7	83.3	116.3	114	2.3	7.7	●
GWSSD0780	7.8	83.3	116.3	114	2.3	7.8	●
GWSSD0790	7.9	83.4	116.4	114	2.4	7.9	●
GWSSD0800	8.0	83.4	116.4	114	2.4	8.0	●
GWSSD0810	8.1	86.4	119.4	117	2.4	8.1	●
GWSSD0820	8.2	86.5	119.5	117	2.5	8.2	●
GWSSD0830	8.3	86.5	119.5	117	2.5	8.3	●
GWSSD0840	8.4	89.5	123.5	121	2.5	8.4	●
GWSSD0850	8.5	89.6	123.6	121	2.6	8.5	●
GWSSD0860	8.6	89.6	123.6	121	2.6	8.6	●
GWSSD0870	8.7	89.6	123.6	121	2.6	8.7	●
GWSSD0880	8.8	91.6	126.6	124	2.6	8.8	●
GWSSD0890	8.9	91.7	126.7	124	2.7	8.9	●

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
GWSSD0900	9.0	91.7	126.7	124	2.7	9.0	●
GWSS**D0910**	9.1	91.7	126.7	124	2.7	9.1	●
GWSS**D0920**	9.2	94.8	129.8	127	2.8	9.2	●
GWSS**D0930**	9.3	94.8	129.8	127	2.8	9.3	●
GWSS**D0940**	9.4	94.8	129.8	127	2.8	9.4	●
GWSS**D0950**	9.5	94.9	129.9	127	2.9	9.5	●
GWSS**D0960**	9.6	97.9	132.9	130	2.9	9.6	●
GWSS**D0970**	9.7	97.9	132.9	130	2.9	9.7	●
GWSS**D0980**	9.8	97.9	132.9	130	2.9	9.8	●
GWSS**D0990**	9.9	98.0	133.0	130	3.0	9.9	●
GWSS**D1000**	10.0	98.0	133.0	130	3.0	10.0	●
GWSS**D1010**	10.1	101.0	136.0	133	3.0	10.1	●
GWSS**D1020**	10.2	101.1	136.1	133	3.1	10.2	●
GWSS**D1030**	10.3	101.1	136.1	133	3.1	10.3	●
GWSS**D1040**	10.4	101.1	136.1	133	3.1	10.4	●
GWSS**D1050**	10.5	103.2	140.2	137	3.2	10.5	●
GWSS**D1060**	10.6	103.2	140.2	137	3.2	10.6	●
GWSS**D1070**	10.7	103.2	140.2	137	3.2	10.7	●
GWSS**D1080**	10.8	106.2	143.2	140	3.2	10.8	●
GWSS**D1090**	10.9	106.3	143.3	140	3.3	10.9	●
GWSS**D1100**	11.0	106.3	143.3	140	3.3	11.0	●
GWSS**D1110**	11.1	106.3	143.3	140	3.3	11.1	●
GWSS**D1120**	11.2	109.4	146.4	143	3.4	11.2	●
GWSS**D1130**	11.3	109.4	146.4	143	3.4	11.3	●
GWSS**D1140**	11.4	109.4	146.4	143	3.4	11.4	●
GWSS**D1150**	11.5	109.5	146.5	143	3.5	11.5	●
GWSS**D1160**	11.6	112.5	149.5	146	3.5	11.6	●
GWSS**D1170**	11.7	112.5	149.5	146	3.5	11.7	●
GWSS**D1180**	11.8	112.5	149.5	146	3.5	11.8	●
GWSS**D1190**	11.9	112.6	149.6	146	3.6	11.9	●
GWSS**D1200**	12.0	114.6	152.6	149	3.6	12.0	●
GWSS**D1210**	12.1	114.6	152.6	149	3.6	12.1	●
GWSS**D1220**	12.2	114.7	152.7	149	3.7	12.2	●
GWSS**D1230**	12.3	114.7	152.7	149	3.7	12.3	●
GWSS**D1240**	12.4	117.7	155.7	152	3.7	12.4	●
GWSS**D1250**	12.5	117.8	155.8	152	3.8	12.5	●
GWSS**D1260**	12.6	117.8	155.8	152	3.8	12.6	●
GWSS**D1270**	12.7	117.8	155.8	152	3.8	12.7	●
GWSS**D1280**	12.8	117.8	155.8	152	3.8	12.8	●
GWSS**D1290**	12.9	117.9	155.9	152	3.9	12.9	●
GWSS**D1300**	13.0	117.9	155.9	152	3.9	13.0	●

STRAIGHT SHANK DRILLS

GWSL

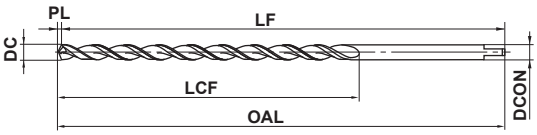
TiN, Extra long

CO HSS | G | 118° | X Thinning

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal		

2≤DC≤3	3<DC≤6	6<DC≤10	10<DC≤13
0 −0.014	0 −0.018	0 −0.022	0 −0.027





● Suitable for extra deep hole drilling.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
GWSLD0200A125	2.0	80.6	125.6	125	0.6	2.0	●
GWSLD0200A160	2.0	100.6	160.6	160	0.6	2.0	●
GWSLD0210A125	2.1	80.6	125.6	125	0.6	2.1	●
GWSLD0210A160	2.1	100.6	160.6	160	0.6	2.1	●
GWSLD0220A125	2.2	80.7	125.7	125	0.7	2.2	●
GWSLD0220A160	2.2	100.7	160.7	160	0.7	2.2	●
GWSLD0230A125	2.3	80.7	125.7	125	0.7	2.3	●
GWSLD0230A160	2.3	100.7	160.7	160	0.7	2.3	●
GWSLD0240A125	2.4	80.7	125.7	125	0.7	2.4	●
GWSLD0240A160	2.4	100.7	160.7	160	0.7	2.4	●
GWSLD0250A125	2.5	80.8	125.8	125	0.8	2.5	●
GWSLD0250A160	2.5	100.8	160.8	160	0.8	2.5	●
GWSLD0260A125	2.6	80.8	125.8	125	0.8	2.6	●
GWSLD0260A160	2.6	100.8	160.8	160	0.8	2.6	●
GWSLD0270A125	2.7	80.8	125.8	125	0.8	2.7	●
GWSLD0270A160	2.7	100.8	160.8	160	0.8	2.7	●
GWSLD0280A125	2.8	80.8	125.8	125	0.8	2.8	●
GWSLD0280A160	2.8	100.8	160.8	160	0.8	2.8	●
GWSLD0290A125	2.9	80.9	125.9	125	0.9	2.9	●
GWSLD0290A160	2.9	100.9	160.9	160	0.9	2.9	●
GWSLD0300A125	3.0	80.9	125.9	125	0.9	3.0	●
GWSLD0300A160	3.0	100.9	160.9	160	0.9	3.0	●
GWSLD0300A200	3.0	125.9	200.9	200	0.9	3.0	●
GWSLD0310A160	3.1	100.9	160.9	160	0.9	3.1	●
GWSLD0310A200	3.1	125.9	200.9	200	0.9	3.1	●
GWSLD0320A160	3.2	101.0	161.0	160	1.0	3.2	●
GWSLD0320A200	3.2	126.0	201.0	200	1.0	3.2	●
GWSLD0330A160	3.3	101.0	161.0	160	1.0	3.3	●
GWSLD0330A200	3.3	126.0	201.0	200	1.0	3.3	●
GWSLD0340A160	3.4	101.0	161.0	160	1.0	3.4	●
GWSLD0340A200	3.4	126.0	201.0	200	1.0	3.4	●
GWSLD0350A160	3.5	101.1	161.1	160	1.1	3.5	●
GWSLD0350A200	3.5	126.1	201.1	200	1.1	3.5	●
GWSLD0360A160	3.6	101.1	161.1	160	1.1	3.6	●
GWSLD0360A200	3.6	126.1	201.1	200	1.1	3.6	●
GWSLD0370A160	3.7	101.1	161.1	160	1.1	3.7	●
GWSLD0370A200	3.7	126.1	201.1	200	1.1	3.7	●
GWSLD0380A160	3.8	101.1	161.1	160	1.1	3.8	●
GWSLD0380A200	3.8	126.1	201.1	200	1.1	3.8	●
GWSLD0390A160	3.9	101.2	161.2	160	1.2	3.9	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
GWSLD0390A200	3.9	126.2	201.2	200	1.2	3.9	●
GWSLD0400A160	4.0	101.2	161.2	160	1.2	4.0	●
GWSLD0400A200	4.0	126.2	201.2	200	1.2	4.0	●
GWSLD0400A250	4.0	161.2	251.2	250	1.2	4.0	●
GWSLD0410A160	4.1	101.2	161.2	160	1.2	4.1	●
GWSLD0410A200	4.1	126.2	201.2	200	1.2	4.1	●
GWSLD0410A250	4.1	161.2	251.2	250	1.2	4.1	●
GWSLD0420A160	4.2	101.3	161.3	160	1.3	4.2	●
GWSLD0420A200	4.2	126.3	201.3	200	1.3	4.2	●
GWSLD0420A250	4.2	161.3	251.3	250	1.3	4.2	●
GWSLD0430A160	4.3	101.3	161.3	160	1.3	4.3	●
GWSLD0430A200	4.3	126.3	201.3	200	1.3	4.3	●
GWSLD0430A250	4.3	161.3	251.3	250	1.3	4.3	●
GWSLD0440A160	4.4	101.3	161.3	160	1.3	4.4	●
GWSLD0440A200	4.4	126.3	201.3	200	1.3	4.4	●
GWSLD0440A250	4.4	161.3	251.3	250	1.3	4.4	●
GWSLD0450A160	4.5	101.4	161.4	160	1.4	4.5	●
GWSLD0450A200	4.5	126.4	201.4	200	1.4	4.5	●
GWSLD0450A250	4.5	161.4	251.4	250	1.4	4.5	●
GWSLD0460A160	4.6	101.4	161.4	160	1.4	4.6	●
GWSLD0460A200	4.6	126.4	201.4	200	1.4	4.6	●
GWSLD0460A250	4.6	161.4	251.4	250	1.4	4.6	●
GWSLD0470A160	4.7	101.4	161.4	160	1.4	4.7	●
GWSLD0470A200	4.7	126.4	201.4	200	1.4	4.7	●
GWSLD0470A250	4.7	161.4	251.4	250	1.4	4.7	●
GWSLD0480A160	4.8	101.4	161.4	160	1.4	4.8	●
GWSLD0480A200	4.8	126.4	201.4	200	1.4	4.8	●
GWSLD0480A250	4.8	161.4	251.4	250	1.4	4.8	●
GWSLD0490A160	4.9	101.5	161.5	160	1.5	4.9	●
GWSLD0490A200	4.9	126.5	201.5	200	1.5	4.9	●
GWSLD0490A250	4.9	161.5	251.5	250	1.5	4.9	●
GWSLD0500A160	5.0	101.5	161.5	160	1.5	5.0	●
GWSLD0500A200	5.0	126.5	201.5	200	1.5	5.0	●
GWSLD0500A250	5.0	161.5	251.5	250	1.5	5.0	●
GWSLD0510A160	5.1	101.5	161.5	160	1.5	5.1	●
GWSLD0510A200	5.1	126.5	201.5	200	1.5	5.1	●
GWSLD0510A250	5.1	161.5	251.5	250	1.5	5.1	●
GWSLD0520A160	5.2	101.6	161.6	160	1.6	5.2	●
GWSLD0520A200	5.2	126.6	201.6	200	1.6	5.2	●
GWSLD0520A250	5.2	161.6	251.6	250	1.6	5.2	●

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
GWSLD0530A160	5.3	101.6	161.6	160	1.6	5.3	●
GWSLD0530A200	5.3	126.6	201.6	200	1.6	5.3	●
GWSLD0530A250	5.3	161.6	251.6	250	1.6	5.3	●
GWSLD0540A160	5.4	101.6	161.6	160	1.6	5.4	●
GWSLD0540A200	5.4	126.6	201.6	200	1.6	5.4	●
GWSLD0540A250	5.4	161.6	251.6	250	1.6	5.4	●
GWSLD0550A160	5.5	101.7	161.7	160	1.7	5.5	●
GWSLD0550A200	5.5	126.7	201.7	200	1.7	5.5	●
GWSLD0550A250	5.5	161.7	251.7	250	1.7	5.5	●
GWSLD0560A160	5.6	101.7	161.7	160	1.7	5.6	●
GWSLD0560A200	5.6	126.7	201.7	200	1.7	5.6	●
GWSLD0560A250	5.6	161.7	251.7	250	1.7	5.6	●
GWSLD0570A160	5.7	101.7	161.7	160	1.7	5.7	●
GWSLD0570A200	5.7	126.7	201.7	200	1.7	5.7	●
GWSLD0570A250	5.7	161.7	251.7	250	1.7	5.7	●
GWSLD0580A160	5.8	101.7	161.7	160	1.7	5.8	●
GWSLD0580A200	5.8	126.7	201.7	200	1.7	5.8	●
GWSLD0580A250	5.8	161.7	251.7	250	1.7	5.8	●
GWSLD0590A160	5.9	101.8	161.8	160	1.8	5.9	●
GWSLD0590A200	5.9	126.8	201.8	200	1.8	5.9	●
GWSLD0590A250	5.9	161.8	251.8	250	1.8	5.9	●
GWSLD0600A160	6.0	101.8	161.8	160	1.8	6.0	●
GWSLD0600A200	6.0	126.8	201.8	200	1.8	6.0	●
GWSLD0600A250	6.0	161.8	251.8	250	1.8	6.0	●
GWSLD0600A315	6.0	201.8	316.8	315	1.8	6.0	●
GWSLD0650A160	6.5	102.0	162.0	160	2.0	6.5	●
GWSLD0650A200	6.5	127.0	202.0	200	2.0	6.5	●
GWSLD0650A250	6.5	162.0	252.0	250	2.0	6.5	●
GWSLD0650A315	6.5	202.0	317.0	315	2.0	6.5	●
GWSLD0680A160	6.8	102.0	162.0	160	2.0	6.8	●
GWSLD0680A200	6.8	127.0	202.0	200	2.0	6.8	●
GWSLD0680A250	6.8	162.0	252.0	250	2.0	6.8	●
GWSLD0680A315	6.8	202.0	317.0	315	2.0	6.8	●
GWSLD0700A160	7.0	102.1	162.1	160	2.1	7.0	●
GWSLD0700A200	7.0	127.1	202.1	200	2.1	7.0	●
GWSLD0700A250	7.0	162.1	252.1	250	2.1	7.0	●
GWSLD0700A315	7.0	202.1	317.1	315	2.1	7.0	●
GWSLD0750A200	7.5	127.3	202.3	200	2.3	7.5	●
GWSLD0750A250	7.5	162.3	252.3	250	2.3	7.5	●
GWSLD0750A315	7.5	202.3	317.3	315	2.3	7.5	●
GWSLD0800A200	8.0	127.4	202.4	200	2.4	8.0	●
GWSLD0800A250	8.0	162.4	252.4	250	2.4	8.0	●
GWSLD0800A315	8.0	202.4	317.4	315	2.4	8.0	●
GWSLD0850A200	8.5	142.6	202.6	200	2.6	8.5	●
GWSLD0850A250	8.5	162.6	252.6	250	2.6	8.5	●
GWSLD0850A315	8.5	202.6	317.6	315	2.6	8.5	●
GWSLD0900A200	9.0	142.7	202.7	200	2.7	9.0	●
GWSLD0900A250	9.0	162.7	252.7	250	2.7	9.0	●
GWSLD0900A315	9.0	202.7	317.7	315	2.7	9.0	●
GWSLD0950A200	9.5	142.9	202.9	200	2.9	9.5	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
GWSLD0950A250	9.5	162.9	252.9	250	2.9	9.5	●
GWSLD0950A315	9.5	202.9	317.9	315	2.9	9.5	●
GWSLD1000A200	10.0	143.0	203.0	200	3.0	10.0	●
GWSLD1000A250	10.0	163.0	253.0	250	3.0	10.0	●
GWSLD1000A315	10.0	203.0	318.0	315	3.0	10.0	●
GWSLD1050A250	10.5	163.2	253.2	250	3.2	10.5	●
GWSLD1050A315	10.5	203.2	318.2	315	3.2	10.5	●
GWSLD1100A250	11.0	163.3	253.3	250	3.3	11.0	●
GWSLD1100A315	11.0	203.3	318.3	315	3.3	11.0	●
GWSLD1150A250	11.5	163.5	253.5	250	3.5	11.5	●
GWSLD1150A315	11.5	203.5	318.5	315	3.5	11.5	●
GWSLD1200A250	12.0	163.6	253.6	250	3.6	12.0	●
GWSLD1200A315	12.0	203.6	318.6	315	3.6	12.0	●
GWSLD1250A250	12.5	163.8	253.8	250	3.8	12.5	●
GWSLD1250A315	12.5	203.8	318.8	315	3.8	12.5	●
GWSLD1300A250	13.0	163.9	253.9	250	3.9	13.0	●
GWSLD1300A315	13.0	203.9	318.9	315	3.9	13.0	●

STRAIGHT SHANK DRILLS

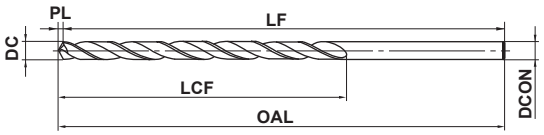
LSD
Extra long

HSS | 118° | X Thinning

P	M	K	N	S	H
Steel		Cast Iron	Non-ferrous Metal		

1≤DC≤3	3<DC≤6	6<DC≤10	10<DC≤13
0 −0.014	0 −0.018	0 −0.022	0 −0.027





● Widely used for deep hole drilling.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
LSDD0100A100	1.0	25.3	100.3	100	0.3	1.0	●
LSDD0100A150	1.0	25.3	150.3	150	0.3	1.0	●
LSDD0110A100	1.1	25.3	100.3	100	0.3	1.1	●
LSDD0110A150	1.1	25.3	150.3	150	0.3	1.1	●
LSDD0120A100	1.2	25.4	100.4	100	0.4	1.2	●
LSDD0120A150	1.2	25.4	150.4	150	0.4	1.2	●
LSDD0130A100	1.3	30.4	100.4	100	0.4	1.3	●
LSDD0130A150	1.3	30.4	150.4	150	0.4	1.3	●
LSDD0140A100	1.4	30.4	100.4	100	0.4	1.4	●
LSDD0140A150	1.4	30.4	150.4	150	0.4	1.4	●
LSDD0150A100	1.5	30.5	100.5	100	0.5	1.5	●
LSDD0150A150	1.5	30.5	150.5	150	0.5	1.5	●
LSDD0160A100	1.6	40.5	100.5	100	0.5	1.6	●
LSDD0160A150	1.6	40.5	150.5	150	0.5	1.6	●
LSDD0170A100	1.7	40.5	100.5	100	0.5	1.7	●
LSDD0170A150	1.7	40.5	150.5	150	0.5	1.7	●
LSDD0180A100	1.8	40.5	100.5	100	0.5	1.8	●
LSDD0180A150	1.8	40.5	150.5	150	0.5	1.8	●
LSDD0190A100	1.9	40.6	100.6	100	0.6	1.9	●
LSDD0190A150	1.9	40.6	150.6	150	0.6	1.9	●
LSDD0200A100	2.0	50.6	100.6	100	0.6	2.0	●
LSDD0200A125	2.0	65.6	125.6	125	0.6	2.0	●
LSDD0200A150	2.0	75.6	150.6	150	0.6	2.0	●
LSDD0210A100	2.1	50.6	100.6	100	0.6	2.1	●
LSDD0210A150	2.1	75.6	150.6	150	0.6	2.1	●
LSDD0220A100	2.2	50.7	100.7	100	0.7	2.2	●
LSDD0220A150	2.2	75.7	150.7	150	0.7	2.2	●
LSDD0230A100	2.3	50.7	100.7	100	0.7	2.3	●
LSDD0230A150	2.3	75.7	150.7	150	0.7	2.3	●
LSDD0240A100	2.4	50.7	100.7	100	0.7	2.4	●
LSDD0240A150	2.4	75.7	150.7	150	0.7	2.4	●
LSDD0250A100	2.5	50.8	100.8	100	0.8	2.5	●
LSDD0250A125	2.5	65.8	125.8	125	0.8	2.5	●
LSDD0250A150	2.5	75.8	150.8	150	0.8	2.5	●
LSDD0260A100	2.6	50.8	100.8	100	0.8	2.6	●
LSDD0260A150	2.6	75.8	150.8	150	0.8	2.6	●
LSDD0270A100	2.7	50.8	100.8	100	0.8	2.7	●
LSDD0270A150	2.7	75.8	150.8	150	0.8	2.7	●
LSDD0280A100	2.8	50.8	100.8	100	0.8	2.8	●
LSDD0280A150	2.8	75.8	150.8	150	0.8	2.8	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
LSDD0290A100	2.9	50.9	100.9	100	0.9	2.9	●
LSDD0290A150	2.9	75.9	150.9	150	0.9	2.9	●
LSDD0300A100	3.0	50.9	100.9	100	0.9	3.0	●
LSDD0300A125	3.0	65.9	125.9	125	0.9	3.0	●
LSDD0300A150	3.0	75.9	150.9	150	0.9	3.0	●
LSDD0300A200	3.0	100.9	200.9	200	0.9	3.0	●
LSDD0310A150	3.1	75.9	150.9	150	0.9	3.1	●
LSDD0310A200	3.1	100.9	200.9	200	0.9	3.1	●
LSDD0320A125	3.2	66.0	126.0	125	1.0	3.2	●
LSDD0320A150	3.2	76.0	151.0	150	1.0	3.2	●
LSDD0320A200	3.2	101.0	201.0	200	1.0	3.2	●
LSDD0320A250	3.2	131.0	251.0	250	1.0	3.2	●
LSDD0330A150	3.3	76.0	151.0	150	1.0	3.3	●
LSDD0330A200	3.3	101.0	201.0	200	1.0	3.3	●
LSDD0340A150	3.4	76.0	151.0	150	1.0	3.4	●
LSDD0340A200	3.4	101.0	201.0	200	1.0	3.4	●
LSDD0350A125	3.5	66.1	126.1	125	1.1	3.5	●
LSDD0350A150	3.5	76.1	151.1	150	1.1	3.5	●
LSDD0350A200	3.5	101.1	201.1	200	1.1	3.5	●
LSDD0350A250	3.5	131.1	251.1	250	1.1	3.5	●
LSDD0360A150	3.6	76.1	151.1	150	1.1	3.6	●
LSDD0360A200	3.6	101.1	201.1	200	1.1	3.6	●
LSDD0370A150	3.7	76.1	151.1	150	1.1	3.7	●
LSDD0370A200	3.7	101.1	201.1	200	1.1	3.7	●
LSDD0380A150	3.8	76.1	151.1	150	1.1	3.8	●
LSDD0380A200	3.8	101.1	201.1	200	1.1	3.8	●
LSDD0390A150	3.9	76.2	151.2	150	1.2	3.9	●
LSDD0390A200	3.9	101.2	201.2	200	1.2	3.9	●
LSDD0400A125	4.0	71.2	126.2	125	1.2	4.0	●
LSDD0400A150	4.0	76.2	151.2	150	1.2	4.0	●
LSDD0400A200	4.0	101.2	201.2	200	1.2	4.0	●
LSDD0400A250	4.0	131.2	251.2	250	1.2	4.0	●
LSDD0410A150	4.1	76.2	151.2	150	1.2	4.1	●
LSDD0410A200	4.1	101.2	201.2	200	1.2	4.1	●
LSDD0420A150	4.2	76.3	151.3	150	1.3	4.2	●
LSDD0420A200	4.2	101.3	201.3	200	1.3	4.2	●
LSDD0430A150	4.3	76.3	151.3	150	1.3	4.3	●
LSDD0430A200	4.3	101.3	201.3	200	1.3	4.3	●
LSDD0440A150	4.4	76.3	151.3	150	1.3	4.4	●
LSDD0440A200	4.4	101.3	201.3	200	1.3	4.4	●

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
LSDD0450A125	4.5	71.4	126.4	125	1.4	4.5	●
LSDD0450A150	4.5	76.4	151.4	150	1.4	4.5	●
LSDD0450A200	4.5	101.4	201.4	200	1.4	4.5	●
LSDD0450A250	4.5	131.4	251.4	250	1.4	4.5	●
LSDD0460A150	4.6	91.4	151.4	150	1.4	4.6	●
LSDD0460A200	4.6	101.4	201.4	200	1.4	4.6	●
LSDD0470A150	4.7	91.4	151.4	150	1.4	4.7	●
LSDD0470A200	4.7	101.4	201.4	200	1.4	4.7	●
LSDD0480A150	4.8	91.4	151.4	150	1.4	4.8	●
LSDD0480A200	4.8	101.4	201.4	200	1.4	4.8	●
LSDD0480A250	4.8	131.4	251.4	250	1.4	4.8	●
LSDD0490A150	4.9	91.5	151.5	150	1.5	4.9	●
LSDD0490A200	4.9	101.5	201.5	200	1.5	4.9	●
LSDD0500A150	5.0	91.5	151.5	150	1.5	5.0	●
LSDD0500A200	5.0	101.5	201.5	200	1.5	5.0	●
LSDD0500A250	5.0	131.5	251.5	250	1.5	5.0	●
LSDD0500A300	5.0	151.5	301.5	300	1.5	5.0	●
LSDD0510A200	5.1	101.5	201.5	200	1.5	5.1	●
LSDD0510A250	5.1	131.5	251.5	250	1.5	5.1	●
LSDD0520A200	5.2	101.6	201.6	200	1.6	5.2	●
LSDD0520A250	5.2	131.6	251.6	250	1.6	5.2	●
LSDD0530A200	5.3	101.6	201.6	200	1.6	5.3	●
LSDD0530A250	5.3	131.6	251.6	250	1.6	5.3	●
LSDD0530A300	5.3	151.6	301.6	300	1.6	5.3	●
LSDD0540A200	5.4	101.6	201.6	200	1.6	5.4	●
LSDD0540A250	5.4	131.6	251.6	250	1.6	5.4	●
LSDD0540A300	5.4	151.6	301.6	300	1.6	5.4	●
LSDD0550A150	5.5	91.7	151.7	150	1.7	5.5	●
LSDD0550A200	5.5	101.7	201.7	200	1.7	5.5	●
LSDD0550A250	5.5	131.7	251.7	250	1.7	5.5	●
LSDD0550A300	5.5	151.7	301.7	300	1.7	5.5	●
LSDD0560A200	5.6	101.7	201.7	200	1.7	5.6	●
LSDD0560A250	5.6	131.7	251.7	250	1.7	5.6	●
LSDD0570A200	5.7	101.7	201.7	200	1.7	5.7	●
LSDD0570A250	5.7	131.7	251.7	250	1.7	5.7	●
LSDD0580A200	5.8	101.7	201.7	200	1.7	5.8	●
LSDD0580A250	5.8	131.7	251.7	250	1.7	5.8	●
LSDD0590A200	5.9	101.8	201.8	200	1.8	5.9	●
LSDD0590A250	5.9	131.8	251.8	250	1.8	5.9	●
LSDD0600A150	6.0	91.8	151.8	150	1.8	6.0	●
LSDD0600A200	6.0	101.8	201.8	200	1.8	6.0	●
LSDD0600A250	6.0	131.8	251.8	250	1.8	6.0	●
LSDD0600A300	6.0	151.8	301.8	300	1.8	6.0	●
LSDD0610A200	6.1	121.8	201.8	200	1.8	6.1	●
LSDD0610A250	6.1	131.8	251.8	250	1.8	6.1	●
LSDD0610A300	6.1	151.8	301.8	300	1.8	6.1	●
LSDD0620A200	6.2	121.9	201.9	200	1.9	6.2	●
LSDD0620A250	6.2	131.9	251.9	250	1.9	6.2	●
LSDD0620A300	6.2	151.9	301.9	300	1.9	6.2	●
LSDD0630A200	6.3	121.9	201.9	200	1.9	6.3	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
LSDD0630A250	6.3	131.9	251.9	250	1.9	6.3	●
LSDD0630A300	6.3	151.9	301.9	300	1.9	6.3	●
LSDD0640A200	6.4	121.9	201.9	200	1.9	6.4	●
LSDD0640A250	6.4	131.9	251.9	250	1.9	6.4	●
LSDD0640A300	6.4	151.9	301.9	300	1.9	6.4	●
LSDD0650A150	6.5	92.0	152.0	150	2.0	6.5	●
LSDD0650A200	6.5	122.0	202.0	200	2.0	6.5	●
LSDD0650A250	6.5	132.0	252.0	250	2.0	6.5	●
LSDD0650A300	6.5	152.0	302.0	300	2.0	6.5	●
LSDD0660A200	6.6	122.0	202.0	200	2.0	6.6	●
LSDD0660A250	6.6	132.0	252.0	250	2.0	6.6	●
LSDD0670A200	6.7	122.0	202.0	200	2.0	6.7	●
LSDD0670A250	6.7	132.0	252.0	250	2.0	6.7	●
LSDD0680A200	6.8	122.0	202.0	200	2.0	6.8	●
LSDD0680A250	6.8	132.0	252.0	250	2.0	6.8	●
LSDD0690A200	6.9	122.1	202.1	200	2.1	6.9	●
LSDD0690A250	6.9	132.1	252.1	250	2.1	6.9	●
LSDD0690A300	6.9	152.1	302.1	300	2.1	6.9	●
LSDD0700A150	7.0	92.1	152.1	150	2.1	7.0	●
LSDD0700A200	7.0	122.1	202.1	200	2.1	7.0	●
LSDD0700A250	7.0	132.1	252.1	250	2.1	7.0	●
LSDD0700A300	7.0	152.1	302.1	300	2.1	7.0	●
LSDD0710A200	7.1	122.1	202.1	200	2.1	7.1	●
LSDD0710A250	7.1	132.1	252.1	250	2.1	7.1	●
LSDD0710A300	7.1	152.1	302.1	300	2.1	7.1	●
LSDD0720A200	7.2	122.2	202.2	200	2.2	7.2	●
LSDD0720A250	7.2	132.2	252.2	250	2.2	7.2	●
LSDD0720A300	7.2	152.2	302.2	300	2.2	7.2	●
LSDD0730A200	7.3	122.2	202.2	200	2.2	7.3	●
LSDD0730A250	7.3	132.2	252.2	250	2.2	7.3	●
LSDD0730A300	7.3	152.2	302.2	300	2.2	7.3	●
LSDD0740A250	7.4	132.2	252.2	250	2.2	7.4	●
LSDD0740A300	7.4	152.2	302.2	300	2.2	7.4	●
LSDD0750A150	7.5	92.3	152.3	150	2.3	7.5	●
LSDD0750A200	7.5	122.3	202.3	200	2.3	7.5	●
LSDD0750A250	7.5	132.3	252.3	250	2.3	7.5	●
LSDD0750A300	7.5	152.3	302.3	300	2.3	7.5	●
LSDD0760A200	7.6	122.3	202.3	200	2.3	7.6	●
LSDD0760A250	7.6	132.3	252.3	250	2.3	7.6	●
LSDD0760A300	7.6	152.3	302.3	300	2.3	7.6	●
LSDD0770A200	7.7	122.3	202.3	200	2.3	7.7	●
LSDD0770A250	7.7	132.3	252.3	250	2.3	7.7	●
LSDD0770A300	7.7	152.3	302.3	300	2.3	7.7	●
LSDD0780A200	7.8	122.3	202.3	200	2.3	7.8	●
LSDD0780A250	7.8	132.3	252.3	250	2.3	7.8	●
LSDD0780A300	7.8	152.3	302.3	300	2.3	7.8	●
LSDD0790A200	7.9	122.4	202.4	200	2.4	7.9	●
LSDD0790A250	7.9	132.4	252.4	250	2.4	7.9	●
LSDD0800A150	8.0	92.4	152.4	150	2.4	8.0	●
LSDD0800A200	8.0	122.4	202.4	200	2.4	8.0	●

STRAIGHT SHANK DRILLS

LSD
Extra long

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
LSDD0800A250	8.0	132.4	252.4	250	2.4	8.0	●
LSDD0800A300	8.0	152.4	302.4	300	2.4	8.0	●
LSDD0810A250	8.1	132.4	252.4	250	2.4	8.1	●
LSDD0810A300	8.1	182.4	302.4	300	2.4	8.1	●
LSDD0810A350	8.1	202.4	352.4	350	2.4	8.1	●
LSDD0820A250	8.2	132.5	252.5	250	2.5	8.2	●
LSDD0820A300	8.2	182.5	302.5	300	2.5	8.2	●
LSDD0830A250	8.3	132.5	252.5	250	2.5	8.3	●
LSDD0830A300	8.3	182.5	302.5	300	2.5	8.3	●
LSDD0840A200	8.4	122.5	202.5	200	2.5	8.4	●
LSDD0840A250	8.4	132.5	252.5	250	2.5	8.4	●
LSDD0840A300	8.4	182.5	302.5	300	2.5	8.4	●
LSDD0850A200	8.5	122.6	202.6	200	2.6	8.5	●
LSDD0850A250	8.5	132.6	252.6	250	2.6	8.5	●
LSDD0850A300	8.5	182.6	302.6	300	2.6	8.5	●
LSDD0850A350	8.5	202.6	352.6	350	2.6	8.5	●
LSDD0860A250	8.6	132.6	252.6	250	2.6	8.6	●
LSDD0870A250	8.7	132.6	252.6	250	2.6	8.7	●
LSDD0870A300	8.7	182.6	302.6	300	2.6	8.7	●
LSDD0880A200	8.8	122.6	202.6	200	2.6	8.8	●
LSDD0880A250	8.8	132.6	252.6	250	2.6	8.8	●
LSDD0880A300	8.8	182.6	302.6	300	2.6	8.8	●
LSDD0890A200	8.9	122.7	202.7	200	2.7	8.9	●
LSDD0890A250	8.9	132.7	252.7	250	2.7	8.9	●
LSDD0890A300	8.9	182.7	302.7	300	2.7	8.9	●
LSDD0900A200	9.0	122.7	202.7	200	2.7	9.0	●
LSDD0900A250	9.0	132.7	252.7	250	2.7	9.0	●
LSDD0900A300	9.0	182.7	302.7	300	2.7	9.0	●
LSDD0900A350	9.0	202.7	352.7	350	2.7	9.0	●
LSDD0910A250	9.1	132.7	252.7	250	2.7	9.1	●
LSDD0910A300	9.1	182.7	302.7	300	2.7	9.1	●
LSDD0920A250	9.2	132.8	252.8	250	2.8	9.2	●
LSDD0920A300	9.2	182.8	302.8	300	2.8	9.2	●
LSDD0930A250	9.3	132.8	252.8	250	2.8	9.3	●
LSDD0930A300	9.3	182.8	302.8	300	2.8	9.3	●
LSDD0940A250	9.4	132.8	252.8	250	2.8	9.4	●
LSDD0940A300	9.4	182.8	302.8	300	2.8	9.4	●
LSDD0950A200	9.5	122.9	202.9	200	2.9	9.5	●
LSDD0950A250	9.5	132.9	252.9	250	2.9	9.5	●
LSDD0950A300	9.5	182.9	302.9	300	2.9	9.5	●
LSDD0950A350	9.5	202.9	352.9	350	2.9	9.5	●
LSDD0960A250	9.6	132.9	252.9	250	2.9	9.6	●
LSDD0960A300	9.6	182.9	302.9	300	2.9	9.6	●
LSDD0970A250	9.7	132.9	252.9	250	2.9	9.7	●
LSDD0970A300	9.7	182.9	302.9	300	2.9	9.7	●
LSDD0980A250	9.8	132.9	252.9	250	2.9	9.8	●
LSDD0980A300	9.8	182.9	302.9	300	2.9	9.8	●
LSDD0990A250	9.9	133.0	253.0	250	3.0	9.9	●
LSDD0990A300	9.9	183.0	303.0	300	3.0	9.9	●
LSDD1000A200	10.0	123.0	203.0	200	3.0	10.0	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
LSDD1000A250	10.0	133.0	253.0	250	3.0	10.0	●
LSDD1000A300	10.0	183.0	303.0	300	3.0	10.0	●
LSDD1000A350	10.0	203.0	353.0	350	3.0	10.0	●
LSDD1010A250	10.1	133.0	253.0	250	3.0	10.1	●
LSDD1010A300	10.1	183.0	303.0	300	3.0	10.1	●
LSDD1020A250	10.2	133.1	253.1	250	3.1	10.2	●
LSDD1020A300	10.2	183.1	303.1	300	3.1	10.2	●
LSDD1030A250	10.3	133.1	253.1	250	3.1	10.3	●
LSDD1030A300	10.3	183.1	303.1	300	3.1	10.3	●
LSDD1040A250	10.4	133.1	253.1	250	3.1	10.4	●
LSDD1040A300	10.4	183.1	303.1	300	3.1	10.4	●
LSDD1050A200	10.5	123.2	203.2	200	3.2	10.5	●
LSDD1050A250	10.5	133.2	253.2	250	3.2	10.5	●
LSDD1050A300	10.5	183.2	303.2	300	3.2	10.5	●
LSDD1050A350	10.5	203.2	353.2	350	3.2	10.5	●
LSDD1060A300	10.6	183.2	303.2	300	3.2	10.6	●
LSDD1070A300	10.7	183.2	303.2	300	3.2	10.7	●
LSDD1080A300	10.8	183.2	303.2	300	3.2	10.8	●
LSDD1090A300	10.9	183.3	303.3	300	3.3	10.9	●
LSDD1100A200	11.0	123.3	203.3	200	3.3	11.0	●
LSDD1100A250	11.0	133.3	253.3	250	3.3	11.0	●
LSDD1100A300	11.0	183.3	303.3	300	3.3	11.0	●
LSDD1100A350	11.0	203.3	353.3	350	3.3	11.0	●
LSDD1110A250	11.1	133.3	253.3	250	3.3	11.1	●
LSDD1110A350	11.1	203.3	353.3	350	3.3	11.1	●
LSDD1120A250	11.2	133.4	253.4	250	3.4	11.2	●
LSDD1120A350	11.2	203.4	353.4	350	3.4	11.2	●
LSDD1130A250	11.3	133.4	253.4	250	3.4	11.3	●
LSDD1130A350	11.3	203.4	353.4	350	3.4	11.3	●
LSDD1140A250	11.4	133.4	253.4	250	3.4	11.4	●
LSDD1140A350	11.4	203.4	353.4	350	3.4	11.4	●
LSDD1150A200	11.5	123.5	203.5	200	3.5	11.5	●
LSDD1150A250	11.5	133.5	253.5	250	3.5	11.5	●
LSDD1150A300	11.5	183.5	303.5	300	3.5	11.5	●
LSDD1150A350	11.5	203.5	353.5	350	3.5	11.5	●
LSDD1200A200	12.0	123.6	203.6	200	3.6	12.0	●
LSDD1200A250	12.0	133.6	253.6	250	3.6	12.0	●
LSDD1200A300	12.0	183.6	303.6	300	3.6	12.0	●
LSDD1200A350	12.0	203.6	353.6	350	3.6	12.0	●
LSDD1250A200	12.5	123.8	203.8	200	3.8	12.5	●
LSDD1250A250	12.5	133.8	253.8	250	3.8	12.5	●
LSDD1250A300	12.5	183.8	303.8	300	3.8	12.5	●
LSDD1250A350	12.5	203.8	353.8	350	3.8	12.5	●
LSDD1300A200	13.0	123.9	203.9	200	3.9	13.0	●
LSDD1300A250	13.0	133.9	253.9	250	3.9	13.0	●
LSDD1300A300	13.0	183.9	303.9	300	3.9	13.0	●
LSDD1300A350	13.0	203.9	353.9	350	3.9	13.0	●

● : Inventory maintained in Japan.

CUTTING CONDITIONS ➤ N199

EPSS

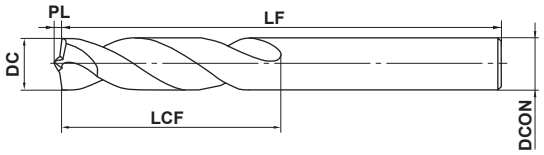
Plate pal

HSS | 170° 110° | X Thinning

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal		



2≤DC≤3	3<DC≤6	6<DC≤10	10<DC≤13
0 −0.014	0 −0.018	0 −0.022	0 −0.027



● Special cutting edge geometry to prevent through hole burrs.

Unit : mm

Order Number	DC	LCF	LF	PL	DCON	Stock
EPSSD0200	2.0	17	48	0.3	2.0	●
EPSS**D0210**	2.1	17	48	0.3	2.1	●
EPSS**D0220**	2.2	17	48	0.3	2.2	●
EPSS**D0230**	2.3	17	48	0.3	2.3	●
EPSS**D0240**	2.4	17	48	0.3	2.4	●
EPSS**D0250**	2.5	17	48	0.4	2.5	●
EPSS**D0260**	2.6	17	48	0.4	2.6	●
EPSS**D0270**	2.7	17	48	0.4	2.7	●
EPSS**D0280**	2.8	17	48	0.4	2.8	●
EPSS**D0290**	2.9	17	48	0.4	2.9	●
EPSS**D0300**	3.0	17	48	0.5	3.0	●
EPSS**D0310**	3.1	17	48	0.5	3.1	●
EPSS**D0320**	3.2	17	48	0.5	3.2	●
EPSS**D0330**	3.3	17	48	0.5	3.3	●
EPSS**D0340**	3.4	19	51	0.5	3.4	●
EPSS**D0350**	3.5	19	51	0.6	3.5	●
EPSS**D0360**	3.6	19	51	0.6	3.6	●
EPSS**D0370**	3.7	19	51	0.6	3.7	●
EPSS**D0380**	3.8	21	54	0.6	3.8	●
EPSS**D0390**	3.9	21	54	0.6	3.9	●
EPSS**D0400**	4.0	21	54	0.6	4.0	●
EPSS**D0410**	4.1	21	54	0.6	4.1	●
EPSS**D0420**	4.2	21	54	0.6	4.2	●
EPSS**D0430**	4.3	23	57	0.6	4.3	●
EPSS**D0440**	4.4	23	57	0.6	4.4	●
EPSS**D0450**	4.5	23	57	0.7	4.5	●
EPSS**D0460**	4.6	23	57	0.7	4.6	●
EPSS**D0470**	4.7	23	57	0.7	4.7	●
EPSS**D0480**	4.8	24	60	0.7	4.8	●
EPSS**D0490**	4.9	24	60	0.7	4.9	●
EPSS**D0500**	5.0	24	60	0.8	5.0	●
EPSS**D0510**	5.1	24	60	0.8	5.1	●
EPSS**D0520**	5.2	24	60	0.8	5.2	●
EPSS**D0530**	5.3	24	60	0.8	5.3	●
EPSS**D0540**	5.4	26	64	0.8	5.4	●
EPSS**D0550**	5.5	26	64	0.9	5.5	●
EPSS**D0600**	6.0	26	64	1.0	6.0	●
EPSS**D0650**	6.5	29	68	1.0	6.5	●
EPSS**D0680**	6.8	32	72	1.1	6.8	●
EPSS**D0700**	7.0	32	72	1.1	7.0	●

Order Number	DC	LCF	LF	PL	DCON	Stock
EPSSD0750	7.5	32	72	1.2	7.5	●
EPSS**D0800**	8.0	34	76	1.3	8.0	●
EPSS**D0820**	8.2	34	76	1.3	8.2	●
EPSS**D0850**	8.5	34	76	1.4	8.5	●
EPSS**D0900**	9.0	37	81	1.5	9.0	●
EPSS**D0950**	9.5	37	81	1.6	9.5	●
EPSS**D1000**	10.0	40	86	1.6	10.0	●
EPSS**D1020**	10.2	40	86	1.6	10.2	●
EPSS**D1030**	10.3	40	86	1.6	10.3	●
EPSS**D1050**	10.5	40	86	1.7	10.5	●
EPSS**D1100**	11.0	43	91	1.8	11.0	●
EPSS**D1150**	11.5	43	91	1.9	11.5	●
EPSS**D1200**	12.0	47	98	2.0	12.0	●
EPSS**D1250**	12.5	47	98	2.0	12.5	●
EPSS**D1300**	13.0	47	98	2.2	13.0	●

TAPER SHANK DRILLS

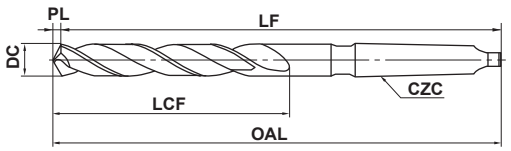
GTD
TiN

HSS | G | 118° | XR Thinning

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal		

DC=6	6<DC≤10	10<DC≤18	18<DC≤30	30<DC≤40
0 −0.018	0 −0.022	0 −0.027	0 −0.033	0 −0.039





- Original manufacturing and coating technology for improved performance.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
GTDD0600M1	6.0	56.8	149.8	148	1.8	MT.1	●
GTDD0650M1	6.5	63.0	154.0	152	2.0	MT.1	●
GTDD0660M1	6.6	63.0	157.0	155	2.0	MT.1	●
GTDD0680M1	6.8	69.0	157.0	155	2.0	MT.1	●
GTDD0700M1	7.0	69.1	157.1	155	2.1	MT.1	●
GTDD0720M1	7.2	69.2	160.2	158	2.2	MT.1	●
GTDD0750M1	7.5	69.3	160.3	158	2.3	MT.1	●
GTDD0770M1	7.7	74.3	164.3	162	2.3	MT.1	●
GTDD0780M1	7.8	74.3	164.3	162	2.3	MT.1	●
GTDD0800M1	8.0	74.4	164.4	162	2.4	MT.1	●
GTDD0820M1	8.2	74.5	170.5	168	2.5	MT.1	●
GTDD0850M1	8.5	74.6	170.6	168	2.6	MT.1	●
GTDD0880M1	8.8	80.6	174.6	172	2.6	MT.1	●
GTDD0900M1	9.0	80.7	174.7	172	2.7	MT.1	●
GTDD0950M1	9.5	80.9	177.9	175	2.9	MT.1	●
GTDD0970M1	9.7	86.9	180.9	178	2.9	MT.1	●
GTDD0980M1	9.8	86.9	180.9	178	2.9	MT.1	●
GTDD1000M1	10.0	87.0	181.0	178	3.0	MT.1	●
GTDD1030M1	10.3	87.1	185.1	182	3.1	MT.1	●
GTDD1050M1	10.5	87.2	185.2	182	3.2	MT.1	●
GTDD1080M1	10.8	93.2	188.2	185	3.2	MT.1	●
GTDD1100M1	11.0	93.3	188.3	185	3.3	MT.1	●
GTDD1150M1	11.5	93.5	191.5	188	3.5	MT.1	●
GTDD1200M1	12.0	100.6	195.6	192	3.6	MT.1	●
GTDD1250M1	12.5	100.8	198.8	195	3.8	MT.1	●
GTDD1300M1	13.0	100.9	201.9	198	3.9	MT.1	●
GTDD1350M1	13.5	107.1	206.1	202	4.1	MT.1	●
GTDD1400M1	14.0	107.2	209.2	205	4.2	MT.1	●
GTDD1450M2	14.5	113.4	226.4	222	4.4	MT.2	●
GTDD1500M2	15.0	113.5	229.5	225	4.5	MT.2	●
GTDD1550M2	15.5	119.7	232.7	228	4.7	MT.2	●
GTDD1600M2	16.0	119.8	234.8	230	4.8	MT.2	●
GTDD1650M2	16.5	124.0	237.0	232	5.0	MT.2	●
GTDD1700M2	17.0	124.1	240.1	235	5.1	MT.2	●
GTDD1750M2	17.5	129.3	245.3	240	5.3	MT.2	●
GTDD1800M2	18.0	129.4	245.4	240	5.4	MT.2	●
GTDD1850M2	18.5	134.6	250.6	245	5.6	MT.2	●
GTDD1900M2	19.0	134.7	250.7	245	5.7	MT.2	●
GTDD1950M2	19.5	138.9	255.9	250	5.9	MT.2	●
GTDD2000M2	20.0	139.0	256.0	250	6.0	MT.2	●

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
GTDD2050M2	20.5	144.2	261.2	255	6.2	MT.2	●
GTDD2100M2	21.0	144.3	261.3	255	6.3	MT.2	●
GTDD2150M2	21.5	149.5	266.5	260	6.5	MT.2	●
GTDD2150M3	21.5	149.5	286.5	280	6.5	MT.3	●
GTDD2200M2	22.0	149.6	266.6	260	6.6	MT.2	●
GTDD2200M3	22.0	149.6	286.6	280	6.6	MT.3	●
GTDD2250M2	22.5	153.8	271.8	265	6.8	MT.2	●
GTDD2250M3	22.5	153.8	291.8	285	6.8	MT.3	●
GTDD2300M2	23.0	153.9	271.9	265	6.9	MT.2	●
GTDD2300M3	23.0	153.9	291.9	285	6.9	MT.3	●
GTDD2350M3	23.5	154.1	292.1	285	7.1	MT.3	●
GTDD2400M3	24.0	159.2	292.2	285	7.2	MT.3	●
GTDD2450M3	24.5	159.4	292.4	285	7.4	MT.3	●
GTDD2500M3	25.0	159.5	292.5	285	7.5	MT.3	●
GTDD2550M3	25.5	163.7	292.7	285	7.7	MT.3	●
GTDD2600M3	26.0	163.8	292.8	285	7.8	MT.3	●
GTDD2650M3	26.5	164.0	298.0	290	8.0	MT.3	●
GTDD2700M3	27.0	169.1	298.1	290	8.1	MT.3	●
GTDD2750M3	27.5	169.3	303.3	295	8.3	MT.3	●
GTDD2800M3	28.0	169.4	303.4	295	8.4	MT.3	●
GTDD2850M3	28.5	173.6	308.6	300	8.6	MT.3	●
GTDD2900M3	29.0	173.7	308.7	300	8.7	MT.3	●
GTDD2950M3	29.5	173.9	313.9	305	8.9	MT.3	●
GTDD3000M3	30.0	174.0	314.0	305	9.0	MT.3	●
GTDD3050M3	30.5	179.2	319.2	310	9.2	MT.3	●
GTDD3100M3	31.0	179.3	319.3	310	9.3	MT.3	●
GTDD3150M3	31.5	179.5	324.5	315	9.5	MT.3	●
GTDD3200M3	32.0	183.6	324.6	315	9.6	MT.3	●
GTDD3300M4	33.0	183.9	354.9	345	9.9	MT.4	●
GTDD3400M4	34.0	189.2	360.2	350	10.2	MT.4	●
GTDD3500M4	35.0	189.5	360.5	350	10.5	MT.4	●
GTDD3600M4	36.0	193.8	365.8	355	10.8	MT.4	●
GTDD3700M4	37.0	194.1	366.1	355	11.1	MT.4	●
GTDD3800M4	38.0	198.4	371.4	360	11.4	MT.4	●
GTDD3900M4	39.0	198.7	371.7	360	11.7	MT.4	●
GTDD4000M4	40.0	199.0	377.0	365	12.0	MT.4	●

● : Inventory maintained in Japan.

CUTTING CONDITIONS ➤ N198

TD

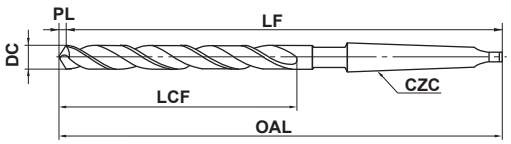
Taper shank

HSS | 118° | S Thinning DC>40

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal		

DC=3	3<DC≤6	6<DC≤10	10<DC≤18	18<DC≤30	30<DC≤50	50<DC≤75
0 −0.014	0 −0.018	0 −0.022	0 −0.027	0 −0.033	0 −0.039	0 −0.046





● For general drilling.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
TDD0300M1	3.0	38.9	115.9	115	0.9	MT.1	●
TDD0310M1	3.1	45.9	122.9	122	0.9	MT.1	●
TDD0320M1	3.2	46.0	123.0	122	1.0	MT.1	●
TDD0330M1	3.3	46.0	123.0	122	1.0	MT.1	●
TDD0340M1	3.4	46.0	123.0	122	1.0	MT.1	●
TDD0350M1	3.5	46.1	123.1	122	1.1	MT.1	●
TDD0360M1	3.6	51.1	129.1	128	1.1	MT.1	●
TDD0370M1	3.7	51.1	129.1	128	1.1	MT.1	●
TDD0380M1	3.8	51.1	129.1	128	1.1	MT.1	●
TDD0390M1	3.9	51.2	129.2	128	1.2	MT.1	●
TDD0400M1	4.0	51.2	129.2	128	1.2	MT.1	●
TDD0410M1	4.1	56.2	136.2	135	1.2	MT.1	●
TDD0420M1	4.2	56.3	136.3	135	1.3	MT.1	●
TDD0430M1	4.3	56.3	136.3	135	1.3	MT.1	●
TDD0440M1	4.4	56.3	136.3	135	1.3	MT.1	●
TDD0450M1	4.5	56.4	136.4	135	1.4	MT.1	●
TDD0460M1	4.6	61.4	141.4	140	1.4	MT.1	●
TDD0470M1	4.7	61.4	141.4	140	1.4	MT.1	●
TDD0480M1	4.8	61.4	141.4	140	1.4	MT.1	●
TDD0490M1	4.9	61.5	141.5	140	1.5	MT.1	●
TDD0500M1	5.0	61.5	141.5	140	1.5	MT.1	●
TDD0510M1	5.1	66.5	146.5	145	1.5	MT.1	●
TDD0520M1	5.2	66.6	146.6	145	1.6	MT.1	●
TDD0530M1	5.3	66.6	146.6	145	1.6	MT.1	●
TDD0540M1	5.4	66.6	146.6	145	1.6	MT.1	●
TDD0550M1	5.5	66.7	146.7	145	1.7	MT.1	●
TDD0560M1	5.6	69.7	149.7	148	1.7	MT.1	●
TDD0570M1	5.7	69.7	149.7	148	1.7	MT.1	●
TDD0580M1	5.8	69.7	149.7	148	1.7	MT.1	●
TDD0590M1	5.9	69.8	149.8	148	1.8	MT.1	●
TDD0600M1	6.0	69.8	149.8	148	1.8	MT.1	●
TDD0610M1	6.1	73.8	153.8	152	1.8	MT.1	●
TDD0620M1	6.2	73.9	153.9	152	1.9	MT.1	●
TDD0630M1	6.3	73.9	153.9	152	1.9	MT.1	●
TDD0640M1	6.4	73.9	153.9	152	1.9	MT.1	●
TDD0650M1	6.5	74.0	154.0	152	2.0	MT.1	●
TDD0660M1	6.6	77.0	157.0	155	2.0	MT.1	●
TDD0670M1	6.7	77.0	157.0	155	2.0	MT.1	●
TDD0680M1	6.8	77.0	157.0	155	2.0	MT.1	●
TDD0690M1	6.9	77.1	157.1	155	2.1	MT.1	●

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
TDD0700M1	7.0	77.1	157.1	155	2.1	MT.1	●
TDD0710M1	7.1	80.1	160.1	158	2.1	MT.1	●
TDD0720M1	7.2	80.2	160.2	158	2.2	MT.1	●
TDD0730M1	7.3	80.2	160.2	158	2.2	MT.1	●
TDD0740M1	7.4	80.2	160.2	158	2.2	MT.1	●
TDD0750M1	7.5	80.3	160.3	158	2.3	MT.1	●
TDD0760M1	7.6	84.3	164.3	162	2.3	MT.1	●
TDD0770M1	7.7	84.3	164.3	162	2.3	MT.1	●
TDD0780M1	7.8	84.3	164.3	162	2.3	MT.1	●
TDD0790M1	7.9	84.4	164.4	162	2.4	MT.1	●
TDD0800M1	8.0	84.4	164.4	162	2.4	MT.1	●
TDD0810M1	8.1	87.4	170.4	168	2.4	MT.1	●
TDD0820M1	8.2	87.5	170.5	168	2.5	MT.1	●
TDD0830M1	8.3	87.5	170.5	168	2.5	MT.1	●
TDD0840M1	8.4	87.5	170.5	168	2.5	MT.1	●
TDD0850M1	8.5	87.6	170.6	168	2.6	MT.1	●
TDD0860M1	8.6	90.6	174.6	172	2.6	MT.1	●
TDD0870M1	8.7	90.6	174.6	172	2.6	MT.1	●
TDD0880M1	8.8	90.6	174.6	172	2.6	MT.1	●
TDD0890M1	8.9	90.7	174.7	172	2.7	MT.1	●
TDD0900M1	9.0	90.7	174.7	172	2.7	MT.1	●
TDD0910M1	9.1	94.7	177.7	175	2.7	MT.1	●
TDD0920M1	9.2	94.8	177.8	175	2.8	MT.1	●
TDD0930M1	9.3	94.8	177.8	175	2.8	MT.1	●
TDD0940M1	9.4	94.8	177.8	175	2.8	MT.1	●
TDD0950M1	9.5	94.9	177.9	175	2.9	MT.1	●
TDD0960M1	9.6	97.9	180.9	178	2.9	MT.1	●
TDD0970M1	9.7	97.9	180.9	178	2.9	MT.1	●
TDD0980M1	9.8	97.9	180.9	178	2.9	MT.1	●
TDD0990M1	9.9	98.0	181.0	178	3.0	MT.1	●
TDD1000M1	10.0	98.0	181.0	178	3.0	MT.1	●
TDD1010M1	10.1	101.0	185.0	182	3.0	MT.1	●
TDD1020M1	10.2	101.1	185.1	182	3.1	MT.1	●
TDD1030M1	10.3	101.1	185.1	182	3.1	MT.1	●
TDD1040M1	10.4	101.1	185.1	182	3.1	MT.1	●
TDD1050M1	10.5	101.2	185.2	182	3.2	MT.1	●
TDD1060M1	10.6	105.2	188.2	185	3.2	MT.1	●
TDD1070M1	10.7	105.2	188.2	185	3.2	MT.1	●
TDD1080M1	10.8	105.2	188.2	185	3.2	MT.1	●
TDD1090M1	10.9	105.3	188.3	185	3.3	MT.1	●

HSS

TD

Taper shank

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
TDD1100M1	11.0	105.3	188.3	185	3.3	MT.1	●
TDD1110M1	11.1	108.3	191.3	188	3.3	MT.1	●
TDD1120M1	11.2	108.4	191.4	188	3.4	MT.1	●
TDD1130M1	11.3	108.4	191.4	188	3.4	MT.1	●
TDD1140M1	11.4	108.4	191.4	188	3.4	MT.1	●
TDD1150M1	11.5	108.5	191.5	188	3.5	MT.1	●
TDD1160M1	11.6	111.5	195.5	192	3.5	MT.1	●
TDD1170M1	11.7	111.5	195.5	192	3.5	MT.1	●
TDD1180M1	11.8	111.5	195.5	192	3.5	MT.1	●
TDD1190M1	11.9	111.6	195.6	192	3.6	MT.1	●
TDD1200M1	12.0	111.6	195.6	192	3.6	MT.1	●
TDD1210M1	12.1	115.6	198.6	195	3.6	MT.1	●
TDD1220M1	12.2	115.7	198.7	195	3.7	MT.1	●
TDD1230M1	12.3	115.7	198.7	195	3.7	MT.1	●
TDD1240M1	12.4	115.7	198.7	195	3.7	MT.1	●
TDD1250M1	12.5	115.8	198.8	195	3.8	MT.1	●
TDD1260M1	12.6	118.8	201.8	198	3.8	MT.1	●
TDD1270M1	12.7	118.8	201.8	198	3.8	MT.1	●
TDD1280M1	12.8	118.8	201.8	198	3.8	MT.1	●
TDD1290M1	12.9	118.9	201.9	198	3.9	MT.1	●
TDD1300M1	13.0	118.9	201.9	198	3.9	MT.1	●
TDD1310M1	13.1	121.9	205.9	202	3.9	MT.1	●
TDD1320M1	13.2	122.0	206.0	202	4.0	MT.1	●
TDD1330M1	13.3	122.0	206.0	202	4.0	MT.1	●
TDD1340M1	13.4	122.0	206.0	202	4.0	MT.1	●
TDD1350M1	13.5	122.1	206.1	202	4.1	MT.1	●
TDD1360M1	13.6	126.1	209.1	205	4.1	MT.1	●
TDD1370M1	13.7	126.1	209.1	205	4.1	MT.1	●
TDD1380M1	13.8	126.1	209.1	205	4.1	MT.1	●
TDD1390M1	13.9	126.2	209.2	205	4.2	MT.1	●
TDD1400M1	14.0	126.2	209.2	205	4.2	MT.1	●
TDD1410M2	14.1	126.2	226.2	222	4.2	MT.2	●
TDD1420M2	14.2	126.3	226.3	222	4.3	MT.2	●
TDD1430M2	14.3	126.3	226.3	222	4.3	MT.2	●
TDD1440M2	14.4	126.3	226.3	222	4.3	MT.2	●
TDD1450M2	14.5	126.4	226.4	222	4.4	MT.2	●
TDD1460M2	14.6	129.4	229.4	225	4.4	MT.2	●
TDD1470M2	14.7	129.4	229.4	225	4.4	MT.2	●
TDD1480M2	14.8	129.4	229.4	225	4.4	MT.2	●
TDD1490M2	14.9	129.5	229.5	225	4.5	MT.2	●
TDD1500M2	15.0	129.5	229.5	225	4.5	MT.2	●
TDD1510M2	15.1	132.5	232.5	228	4.5	MT.2	●
TDD1520M2	15.2	132.6	232.6	228	4.6	MT.2	●
TDD1530M2	15.3	132.6	232.6	228	4.6	MT.2	●
TDD1540M2	15.4	132.6	232.6	228	4.6	MT.2	●
TDD1550M2	15.5	132.7	232.7	228	4.7	MT.2	●
TDD1560M2	15.6	134.7	234.7	230	4.7	MT.2	●
TDD1570M2	15.7	134.7	234.7	230	4.7	MT.2	●
TDD1580M2	15.8	134.7	234.7	230	4.7	MT.2	●
TDD1590M2	15.9	134.8	234.8	230	4.8	MT.2	●

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
TDD1600M2	16.0	134.8	234.8	230	4.8	MT.2	●
TDD1610M2	16.1	136.8	236.8	232	4.8	MT.2	●
TDD1620M2	16.2	136.9	236.9	232	4.9	MT.2	●
TDD1630M2	16.3	136.9	236.9	232	4.9	MT.2	●
TDD1640M2	16.4	136.9	236.9	232	4.9	MT.2	●
TDD1650M2	16.5	137.0	237.0	232	5.0	MT.2	●
TDD1660M2	16.6	140.0	240.0	235	5.0	MT.2	●
TDD1670M2	16.7	140.0	240.0	235	5.0	MT.2	●
TDD1680M2	16.8	140.0	240.0	235	5.0	MT.2	●
TDD1690M2	16.9	140.1	240.1	235	5.1	MT.2	●
TDD1700M2	17.0	140.1	240.1	235	5.1	MT.2	●
TDD1710M2	17.1	145.1	245.1	240	5.1	MT.2	●
TDD1720M2	17.2	145.2	245.2	240	5.2	MT.2	●
TDD1730M2	17.3	145.2	245.2	240	5.2	MT.2	●
TDD1740M2	17.4	145.2	245.2	240	5.2	MT.2	●
TDD1750M2	17.5	145.3	245.3	240	5.3	MT.2	●
TDD1760M2	17.6	145.3	245.3	240	5.3	MT.2	●
TDD1770M2	17.7	145.3	245.3	240	5.3	MT.2	●
TDD1780M2	17.8	145.3	245.3	240	5.3	MT.2	●
TDD1790M2	17.9	145.4	245.4	240	5.4	MT.2	●
TDD1800M2	18.0	145.4	245.4	240	5.4	MT.2	●
TDD1810M2	18.1	150.4	250.4	245	5.4	MT.2	●
TDD1820M2	18.2	150.5	250.5	245	5.5	MT.2	●
TDD1830M2	18.3	150.5	250.5	245	5.5	MT.2	●
TDD1840M2	18.4	150.5	250.5	245	5.5	MT.2	●
TDD1850M2	18.5	150.6	250.6	245	5.6	MT.2	●
TDD1860M2	18.6	150.6	250.6	245	5.6	MT.2	●
TDD1870M2	18.7	150.6	250.6	245	5.6	MT.2	●
TDD1880M2	18.8	150.6	250.6	245	5.6	MT.2	●
TDD1890M2	18.9	150.7	250.7	245	5.7	MT.2	●
TDD1900M2	19.0	150.7	250.7	245	5.7	MT.2	●
TDD1910M2	19.1	155.7	255.7	250	5.7	MT.2	●
TDD1920M2	19.2	155.8	255.8	250	5.8	MT.2	●
TDD1930M2	19.3	155.8	255.8	250	5.8	MT.2	●
TDD1940M2	19.4	155.8	255.8	250	5.8	MT.2	●
TDD1950M2	19.5	155.9	255.9	250	5.9	MT.2	●
TDD1960M2	19.6	155.9	255.9	250	5.9	MT.2	●
TDD1970M2	19.7	155.9	255.9	250	5.9	MT.2	●
TDD1980M2	19.8	155.9	255.9	250	5.9	MT.2	●
TDD1990M2	19.9	156.0	256.0	250	6.0	MT.2	●
TDD2000M2	20.0	156.0	256.0	250	6.0	MT.2	●
TDD2010M2	20.1	161.0	261.0	255	6.0	MT.2	●
TDD2020M2	20.2	161.1	261.1	255	6.1	MT.2	●
TDD2030M2	20.3	161.1	261.1	255	6.1	MT.2	●
TDD2040M2	20.4	161.1	261.1	255	6.1	MT.2	●
TDD2050M2	20.5	161.2	261.2	255	6.2	MT.2	●
TDD2060M2	20.6	161.2	261.2	255	6.2	MT.2	●
TDD2070M2	20.7	161.2	261.2	255	6.2	MT.2	●
TDD2080M2	20.8	161.2	261.2	255	6.2	MT.2	●
TDD2090M2	20.9	161.3	261.3	255	6.3	MT.2	●

● : Inventory maintained in Japan.

DRILLING

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
TDD2100M2	21.0	161.3	261.3	255	6.3	MT.2	●
TDD2110M2	21.1	166.3	266.3	260	6.3	MT.2	●
TDD2120M2	21.2	166.4	266.4	260	6.4	MT.2	●
TDD2130M2	21.3	166.4	266.4	260	6.4	MT.2	●
TDD2140M2	21.4	166.4	266.4	260	6.4	MT.2	●
TDD2150M2	21.5	166.5	266.5	260	6.5	MT.2	●
TDD2160M2	21.6	166.5	266.5	260	6.5	MT.2	●
TDD2170M2	21.7	166.5	266.5	260	6.5	MT.2	●
TDD2180M2	21.8	166.5	266.5	260	6.5	MT.2	●
TDD2190M2	21.9	166.6	266.6	260	6.6	MT.2	●
TDD2200M2	22.0	166.6	266.6	260	6.6	MT.2	●
TDD2210M2	22.1	171.6	271.6	265	6.6	MT.2	●
TDD2220M2	22.2	171.7	271.7	265	6.7	MT.2	●
TDD2230M2	22.3	171.7	271.7	265	6.7	MT.2	●
TDD2240M2	22.4	171.7	271.7	265	6.7	MT.2	●
TDD2250M2	22.5	171.8	271.8	265	6.8	MT.2	●
TDD2260M2	22.6	171.8	271.8	265	6.8	MT.2	●
TDD2270M2	22.7	171.8	271.8	265	6.8	MT.2	●
TDD2280M2	22.8	171.8	271.8	265	6.8	MT.2	●
TDD2290M2	22.9	171.9	271.9	265	6.9	MT.2	●
TDD2300M2	23.0	171.9	271.9	265	6.9	MT.2	●
TDD2310M3	23.1	171.9	291.9	285	6.9	MT.3	●
TDD2320M3	23.2	172.0	292.0	285	7.0	MT.3	●
TDD2330M3	23.3	172.0	292.0	285	7.0	MT.3	●
TDD2340M3	23.4	172.0	292.0	285	7.0	MT.3	●
TDD2350M3	23.5	172.1	292.1	285	7.1	MT.3	●
TDD2360M3	23.6	172.1	292.1	285	7.1	MT.3	●
TDD2370M3	23.7	172.1	292.1	285	7.1	MT.3	●
TDD2380M3	23.8	172.2	292.2	285	7.2	MT.3	●
TDD2390M3	23.9	172.2	292.2	285	7.2	MT.3	●
TDD2400M3	24.0	172.2	292.2	285	7.2	MT.3	●
TDD2410M3	24.1	172.2	292.2	285	7.2	MT.3	●
TDD2420M3	24.2	172.3	292.3	285	7.3	MT.3	●
TDD2430M3	24.3	172.3	292.3	285	7.3	MT.3	●
TDD2440M3	24.4	172.3	292.3	285	7.3	MT.3	●
TDD2450M3	24.5	172.4	292.4	285	7.4	MT.3	●
TDD2460M3	24.6	172.4	292.4	285	7.4	MT.3	●
TDD2470M3	24.7	172.4	292.4	285	7.4	MT.3	●
TDD2480M3	24.8	172.5	292.5	285	7.5	MT.3	●
TDD2490M3	24.9	172.5	292.5	285	7.5	MT.3	●
TDD2500M3	25.0	172.5	292.5	285	7.5	MT.3	●
TDD2510M3	25.1	172.5	292.5	285	7.5	MT.3	●
TDD2520M3	25.2	172.6	292.6	285	7.6	MT.3	●
TDD2530M3	25.3	172.6	292.6	285	7.6	MT.3	●
TDD2540M3	25.4	172.6	292.6	285	7.6	MT.3	●
TDD2550M3	25.5	172.7	292.7	285	7.7	MT.3	●
TDD2560M3	25.6	172.7	292.7	285	7.7	MT.3	●
TDD2570M3	25.7	172.7	292.7	285	7.7	MT.3	●
TDD2580M3	25.8	172.8	292.8	285	7.8	MT.3	●
TDD2590M3	25.9	172.8	292.8	285	7.8	MT.3	●

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
TDD2600M3	26.0	172.8	292.8	285	7.8	MT.3	●
TDD2610M3	26.1	177.8	297.8	290	7.8	MT.3	●
TDD2620M3	26.2	177.9	297.9	290	7.9	MT.3	●
TDD2630M3	26.3	177.9	297.9	290	7.9	MT.3	●
TDD2640M3	26.4	177.9	297.9	290	7.9	MT.3	●
TDD2650M3	26.5	178.0	298.0	290	8.0	MT.3	●
TDD2660M3	26.6	178.0	298.0	290	8.0	MT.3	●
TDD2670M3	26.7	178.0	298.0	290	8.0	MT.3	●
TDD2680M3	26.8	178.1	298.1	290	8.1	MT.3	●
TDD2690M3	26.9	178.1	298.1	290	8.1	MT.3	●
TDD2700M3	27.0	178.1	298.1	290	8.1	MT.3	●
TDD2710M3	27.1	183.1	303.1	295	8.1	MT.3	●
TDD2720M3	27.2	183.2	303.2	295	8.2	MT.3	●
TDD2730M3	27.3	183.2	303.2	295	8.2	MT.3	●
TDD2740M3	27.4	183.2	303.2	295	8.2	MT.3	●
TDD2750M3	27.5	183.3	303.3	295	8.3	MT.3	●
TDD2760M3	27.6	183.3	303.3	295	8.3	MT.3	●
TDD2770M3	27.7	183.3	303.3	295	8.3	MT.3	●
TDD2780M3	27.8	183.4	303.4	295	8.4	MT.3	●
TDD2790M3	27.9	183.4	303.4	295	8.4	MT.3	●
TDD2800M3	28.0	183.4	303.4	295	8.4	MT.3	●
TDD2810M3	28.1	188.4	308.4	300	8.4	MT.3	●
TDD2820M3	28.2	188.5	308.5	300	8.5	MT.3	●
TDD2830M3	28.3	188.5	308.5	300	8.5	MT.3	●
TDD2840M3	28.4	188.5	308.5	300	8.5	MT.3	●
TDD2850M3	28.5	188.6	308.6	300	8.6	MT.3	●
TDD2860M3	28.6	188.6	308.6	300	8.6	MT.3	●
TDD2870M3	28.7	188.6	308.6	300	8.6	MT.3	●
TDD2880M3	28.8	188.7	308.7	300	8.7	MT.3	●
TDD2890M3	28.9	188.7	308.7	300	8.7	MT.3	●
TDD2900M3	29.0	188.7	308.7	300	8.7	MT.3	●
TDD2910M3	29.1	193.7	313.7	305	8.7	MT.3	●
TDD2920M3	29.2	193.8	313.8	305	8.8	MT.3	●
TDD2930M3	29.3	193.8	313.8	305	8.8	MT.3	●
TDD2940M3	29.4	193.8	313.8	305	8.8	MT.3	●
TDD2950M3	29.5	193.9	313.9	305	8.9	MT.3	●
TDD2960M3	29.6	193.9	313.9	305	8.9	MT.3	●
TDD2970M3	29.7	193.9	313.9	305	8.9	MT.3	●
TDD2980M3	29.8	194.0	314.0	305	9.0	MT.3	●
TDD2990M3	29.9	194.0	314.0	305	9.0	MT.3	●
TDD3000M3	30.0	194.0	314.0	305	9.0	MT.3	●
TDD3010M3	30.1	199.0	319.0	310	9.0	MT.3	●
TDD3020M3	30.2	199.1	319.1	310	9.1	MT.3	●
TDD3030M3	30.3	199.1	319.1	310	9.1	MT.3	●
TDD3040M3	30.4	199.1	319.1	310	9.1	MT.3	●
TDD3050M3	30.5	199.2	319.2	310	9.2	MT.3	●
TDD3060M3	30.6	199.2	319.2	310	9.2	MT.3	●
TDD3070M3	30.7	199.2	319.2	310	9.2	MT.3	●
TDD3080M3	30.8	199.3	319.3	310	9.3	MT.3	●
TDD3090M3	30.9	199.3	319.3	310	9.3	MT.3	●

TAPER SHANK DRILLS

TD
Taper shank

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
TDD3100M3	31.0	199.3	319.3	310	9.3	MT.3	●
TDD3110M3	31.1	204.3	324.3	315	9.3	MT.3	●
TDD3120M3	31.2	204.4	324.4	315	9.4	MT.3	●
TDD3130M3	31.3	204.4	324.4	315	9.4	MT.3	●
TDD3140M3	31.4	204.4	324.4	315	9.4	MT.3	●
TDD3150M3	31.5	204.5	324.5	315	9.5	MT.3	●
TDD3160M3	31.6	204.5	324.5	315	9.5	MT.3	●
TDD3170M3	31.7	204.5	324.5	315	9.5	MT.3	●
TDD3180M3	31.8	204.6	324.6	315	9.6	MT.3	●
TDD3190M3	31.9	204.6	324.6	315	9.6	MT.3	●
TDD3200M3	32.0	204.6	324.6	315	9.6	MT.3	●
TDD3250M4	32.5	209.8	354.8	345	9.8	MT.4	●
TDD3300M4	33.0	209.9	354.9	345	9.9	MT.4	●
TDD3350M4	33.5	215.1	360.1	350	10.1	MT.4	●
TDD3400M4	34.0	215.2	360.2	350	10.2	MT.4	●
TDD3450M4	34.5	215.4	360.4	350	10.4	MT.4	●
TDD3500M4	35.0	215.5	360.5	350	10.5	MT.4	●
TDD3550M4	35.5	220.7	365.7	355	10.7	MT.4	●
TDD3600M4	36.0	220.8	365.8	355	10.8	MT.4	●
TDD3650M4	36.5	221.0	366.0	355	11.0	MT.4	●
TDD3700M4	37.0	221.1	366.1	355	11.1	MT.4	●
TDD3750M4	37.5	226.3	371.3	360	11.3	MT.4	●
TDD3800M4	38.0	226.4	371.4	360	11.4	MT.4	●
TDD3850M4	38.5	226.6	371.6	360	11.6	MT.4	●
TDD3900M4	39.0	226.7	371.7	360	11.7	MT.4	●
TDD3950M4	39.5	231.9	376.9	365	11.9	MT.4	●
TDD4000M4	40.0	232.0	377.0	365	12.0	MT.4	●
TDD4050M4	40.5	232.2	377.2	365	12.2	MT.4	●
TDD4100M4	41.0	232.3	377.3	365	12.3	MT.4	●
TDD4150M4	41.5	237.5	382.5	370	12.5	MT.4	●
TDD4200M4	42.0	237.6	382.6	370	12.6	MT.4	●
TDD4250M4	42.5	237.8	382.8	370	12.8	MT.4	●
TDD4300M4	43.0	237.9	382.9	370	12.9	MT.4	●
TDD4350M4	43.5	243.1	388.1	375	13.1	MT.4	●
TDD4400M4	44.0	243.2	388.2	375	13.2	MT.4	●
TDD4450M4	44.5	243.4	388.4	375	13.4	MT.4	●
TDD4500M4	45.0	243.5	388.5	375	13.5	MT.4	●
TDD4550M4	45.5	248.7	393.7	380	13.7	MT.4	●
TDD4600M4	46.0	248.8	393.8	380	13.8	MT.4	●
TDD4650M4	46.5	249.0	394.0	380	14.0	MT.4	●
TDD4700M4	47.0	249.1	394.1	380	14.1	MT.4	●
TDD4750M4	47.5	254.3	399.3	385	14.3	MT.4	●
TDD4800M4	48.0	254.4	399.4	385	14.4	MT.4	●
TDD4850M4	48.5	254.6	399.6	385	14.6	MT.4	●
TDD4900M4	49.0	254.7	399.7	385	14.7	MT.4	●
TDD4950M4	49.5	259.9	404.9	390	14.9	MT.4	●
TDD5000M4	50.0	260.0	405.0	390	15.0	MT.4	●
TDD5100M5	51.0	260.3	440.3	425	15.3	MT.5	●
TDD5200M5	52.0	265.6	445.6	430	15.6	MT.5	●
TDD5300M5	53.0	265.9	445.9	430	15.9	MT.5	●

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
TDD5400M5	54.0	271.2	451.2	435	16.2	MT.5	●
TDD5500M5	55.0	271.5	451.5	435	16.5	MT.5	●
TDD5600M5	56.0	276.8	456.8	440	16.8	MT.5	●
TDD5700M5	57.0	277.1	457.1	440	17.1	MT.5	●
TDD5800M5	58.0	282.4	462.4	445	17.4	MT.5	●
TDD5900M5	59.0	282.7	462.7	445	17.7	MT.5	●
TDD6000M5	60.0	288.0	468.0	450	18.0	MT.5	●
TDD6100M5	61.0	288.3	468.3	450	18.3	MT.5	●
TDD6200M5	62.0	293.6	473.6	455	18.6	MT.5	●
TDD6300M5	63.0	293.9	473.9	455	18.9	MT.5	●
TDD6400M5	64.0	299.2	479.2	460	19.2	MT.5	●
TDD6500M5	65.0	299.5	479.5	460	19.5	MT.5	●
TDD6600M5	66.0	304.8	484.8	465	19.8	MT.5	●
TDD6700M5	67.0	305.1	485.1	465	20.1	MT.5	●
TDD6800M5	68.0	310.4	490.4	470	20.4	MT.5	●
TDD6900M5	69.0	310.7	490.7	470	20.7	MT.5	●
TDD7000M5	70.0	316.0	496.0	475	21.0	MT.5	●
TDD7100M5	71.0	316.3	496.3	475	21.3	MT.5	●
TDD7200M5	72.0	321.6	501.6	480	21.6	MT.5	●
TDD7300M5	73.0	321.9	501.9	480	21.9	MT.5	●
TDD7400M5	74.0	327.2	507.2	485	22.2	MT.5	●
TDD7500M5	75.0	327.5	507.5	485	22.5	MT.5	●

● : Inventory maintained in Japan.

CUTTING CONDITIONS ➤ N199

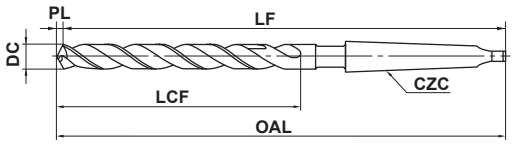
KTD
Cobalt HSS

CO HSS | 118° DC<10,DC>35 | 128° 10≤DC≤35 | C Thinning 16<DC≤35 | S Thinning DC>35

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal		

5≤DC≤6	6<DC≤10	10<DC≤18	18<DC≤30	30<DC≤50
0 −0.018	0 −0.022	0 −0.027	0 −0.033	0 −0.039





● Suitable for drilling of difficult-to-cut materials.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
KTDD0500M1	5.0	61.5	141.5	140	1.5	MT.1	●
KTDD0550M1	5.5	66.7	146.7	145	1.7	MT.1	●
KTDD0600M1	6.0	69.8	149.8	148	1.8	MT.1	●
KTDD0650M1	6.5	74.0	154.0	152	2.0	MT.1	●
KTDD0700M1	7.0	77.1	157.1	155	2.1	MT.1	●
KTDD0750M1	7.5	80.3	160.3	158	2.3	MT.1	●
KTDD0800M1	8.0	84.4	164.4	162	2.4	MT.1	●
KTDD0850M1	8.5	87.6	170.6	168	2.6	MT.1	●
KTDD0900M1	9.0	90.7	174.7	172	2.7	MT.1	●
KTDD0950M1	9.5	94.9	177.9	175	2.9	MT.1	●
KTDD1000M1	10.0	97.4	180.4	178	2.4	MT.1	●
KTDD1010M1	10.1	100.5	184.5	182	2.5	MT.1	●
KTDD1020M1	10.2	100.5	184.5	182	2.5	MT.1	●
KTDD1030M1	10.3	100.5	184.5	182	2.5	MT.1	●
KTDD1040M1	10.4	100.5	184.5	182	2.5	MT.1	●
KTDD1050M1	10.5	100.6	184.6	182	2.6	MT.1	●
KTDD1060M1	10.6	104.6	187.6	185	2.6	MT.1	●
KTDD1070M1	10.7	104.6	187.6	185	2.6	MT.1	●
KTDD1080M1	10.8	104.6	187.6	185	2.6	MT.1	●
KTDD1090M1	10.9	104.7	187.7	185	2.7	MT.1	●
KTDD1100M1	11.0	104.7	187.7	185	2.7	MT.1	●
KTDD1150M1	11.5	107.8	190.8	188	2.8	MT.1	●
KTDD1200M1	12.0	110.9	194.9	192	2.9	MT.1	●
KTDD1210M2	12.1	115.0	215.0	212	3.0	MT.2	●
KTDD1220M2	12.2	115.0	215.0	212	3.0	MT.2	●
KTDD1250M2	12.5	115.0	215.0	212	3.0	MT.2	●
KTDD1300M2	13.0	118.2	218.2	215	3.2	MT.2	●
KTDD1310M2	13.1	121.2	221.2	218	3.2	MT.2	●
KTDD1320M2	13.2	121.2	221.2	218	3.2	MT.2	●
KTDD1350M2	13.5	121.3	221.3	218	3.3	MT.2	●
KTDD1370M2	13.7	125.3	225.3	222	3.3	MT.2	●
KTDD1380M2	13.8	125.4	225.4	222	3.4	MT.2	●
KTDD1390M2	13.9	125.4	225.4	222	3.4	MT.2	●
KTDD1400M2	14.0	125.4	225.4	222	3.4	MT.2	●
KTDD1410M2	14.1	125.4	225.4	222	3.4	MT.2	●
KTDD1420M2	14.2	125.5	225.5	222	3.5	MT.2	●
KTDD1430M2	14.3	125.5	225.5	222	3.5	MT.2	●
KTDD1440M2	14.4	125.5	225.5	222	3.5	MT.2	●
KTDD1450M2	14.5	125.5	225.5	222	3.5	MT.2	●
KTDD1470M2	14.7	128.6	228.6	225	3.6	MT.2	●

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
KTDD1500M2	15.0	128.7	228.7	225	3.7	MT.2	●
KTDD1550M2	15.5	131.8	231.8	228	3.8	MT.2	●
KTDD1600M2	16.0	133.9	233.9	230	3.9	MT.2	●
KTDD1620M2	16.2	136.0	236.0	232	4.0	MT.2	●
KTDD1650M2	16.5	136.0	236.0	232	4.0	MT.2	●
KTDD1670M2	16.7	139.1	239.1	235	4.1	MT.2	●
KTDD1700M2	17.0	139.1	239.1	235	4.1	MT.2	●
KTDD1750M2	17.5	144.3	244.3	240	4.3	MT.2	●
KTDD1770M2	17.7	144.3	244.3	240	4.3	MT.2	●
KTDD1800M2	18.0	144.4	244.4	240	4.4	MT.2	●
KTDD1850M2	18.5	149.5	249.5	245	4.5	MT.2	●
KTDD1900M2	19.0	149.6	249.6	245	4.6	MT.2	●
KTDD1950M2	19.5	154.8	254.8	250	4.8	MT.2	●
KTDD2000M2	20.0	154.9	254.9	250	4.9	MT.2	●
KTDD2050M3	20.5	160.0	280.0	275	5.0	MT.3	●
KTDD2100M3	21.0	160.1	280.1	275	5.1	MT.3	●
KTDD2150M3	21.5	165.2	285.2	280	5.2	MT.3	●
KTDD2200M3	22.0	165.4	285.4	280	5.4	MT.3	●
KTDD2250M3	22.5	170.5	290.5	285	5.5	MT.3	●
KTDD2300M3	23.0	170.6	290.6	285	5.6	MT.3	●
KTDD2350M3	23.5	170.7	290.7	285	5.7	MT.3	●
KTDD2400M3	24.0	170.9	290.9	285	5.9	MT.3	●
KTDD2450M3	24.5	171.0	291.0	285	6.0	MT.3	●
KTDD2500M3	25.0	171.1	291.1	285	6.1	MT.3	●
KTDD2550M3	25.5	171.2	291.2	285	6.2	MT.3	●
KTDD2600M3	26.0	171.3	291.3	285	6.3	MT.3	●
KTDD2650M3	26.5	176.5	296.5	290	6.5	MT.3	●
KTDD2700M3	27.0	176.6	296.6	290	6.6	MT.3	●
KTDD2750M4	27.5	181.7	326.7	320	6.7	MT.4	●
KTDD2800M4	28.0	181.8	326.8	320	6.8	MT.4	●
KTDD2850M4	28.5	187.0	332.0	325	7.0	MT.4	●
KTDD2900M4	29.0	187.1	332.1	325	7.1	MT.4	●
KTDD2950M4	29.5	192.2	337.2	330	7.2	MT.4	●
KTDD3000M4	30.0	192.3	337.3	330	7.3	MT.4	●
KTDD3050M4	30.5	197.4	342.4	335	7.4	MT.4	●
KTDD3100M4	31.0	197.6	342.6	335	7.6	MT.4	●
KTDD3150M4	31.5	202.7	347.7	340	7.7	MT.4	●
KTDD3200M4	32.0	202.8	347.8	340	7.8	MT.4	●
KTDD3300M4	33.0	208.0	353.0	345	8.0	MT.4	●
KTDD3400M4	34.0	213.3	358.3	350	8.3	MT.4	●

TAPER SHANK DRILLS

KTD
Cobalt HSS

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
KTDD3500M4	35.0	213.5	358.5	350	8.5	MT.4	●
KTDD3600M4	36.0	220.8	365.8	355	10.8	MT.4	●
KTDD3700M4	37.0	221.1	366.1	355	11.1	MT.4	●
KTDD3800M4	38.0	226.4	371.4	360	11.4	MT.4	●
KTDD3900M4	39.0	226.7	371.7	360	11.7	MT.4	●
KTDD4000M4	40.0	232.0	377.0	365	12.0	MT.4	●
KTDD4100M4	41.0	232.3	377.3	365	12.3	MT.4	●
KTDD4200M4	42.0	237.6	382.6	370	12.6	MT.4	●
KTDD4300M4	43.0	237.9	382.9	370	12.9	MT.4	●
KTDD4400M4	44.0	243.2	388.2	375	13.2	MT.4	●
KTDD4500M4	45.0	243.5	388.5	375	13.5	MT.4	●
KTDD4600M4	46.0	248.8	393.8	380	13.8	MT.4	●
KTDD4700M4	47.0	249.1	394.1	380	14.1	MT.4	●
KTDD4800M4	48.0	254.4	399.4	385	14.4	MT.4	●
KTDD4900M4	49.0	254.7	399.7	385	14.7	MT.4	●
KTDD5000M4	50.0	260.0	405.0	390	15.0	MT.4	●

● : Inventory maintained in Japan.

CUTTING CONDITIONS ➤ N199

GWTS

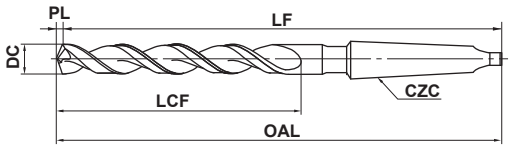
TiN, For deep hole, Convolute flute

CO HSS | G | 118° | XR Thinning

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal		

DC=6	6<DC≤10	10<DC≤18	18<DC≤30	30<DC≤32
0 −0.018	0 −0.022	0 −0.027	0 −0.033	0 −0.039





● Suitable for general and deep hole drilling.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
GWTSD0600M1	6.0	69.8	149.8	148	1.8	MT.1	●
GWTSD0620M1	6.2	73.9	153.9	152	1.9	MT.1	●
GWTSD0650M1	6.5	74.0	154.0	152	2.0	MT.1	●
GWTSD0680M1	6.8	77.0	157.0	155	2.0	MT.1	●
GWTSD0690M1	6.9	77.1	157.1	155	2.1	MT.1	●
GWTSD0700M1	7.0	77.1	157.1	155	2.1	MT.1	●
GWTSD0720M1	7.2	80.2	160.2	158	2.2	MT.1	●
GWTSD0750M1	7.5	80.3	160.3	158	2.3	MT.1	●
GWTSD0780M1	7.8	84.3	164.3	162	2.3	MT.1	●
GWTSD0800M1	8.0	84.4	164.4	162	2.4	MT.1	●
GWTSD0820M1	8.2	87.5	170.5	168	2.5	MT.1	●
GWTSD0850M1	8.5	87.6	170.6	168	2.6	MT.1	●
GWTSD0880M1	8.8	90.6	174.6	172	2.6	MT.1	●
GWTSD0900M1	9.0	90.7	174.7	172	2.7	MT.1	●
GWTSD0920M1	9.2	94.8	177.8	175	2.8	MT.1	●
GWTSD0950M1	9.5	94.9	177.9	175	2.9	MT.1	●
GWTSD0980M1	9.8	97.9	180.9	178	2.9	MT.1	●
GWTSD1000M1	10.0	98.0	181.0	178	3.0	MT.1	●
GWTSD1020M1	10.2	101.1	185.1	182	3.1	MT.1	●
GWTSD1030M1	10.3	101.1	185.1	182	3.1	MT.1	●
GWTSD1050M1	10.5	101.2	185.2	182	3.2	MT.1	●
GWTSD1100M1	11.0	105.3	188.3	185	3.3	MT.1	●
GWTSD1150M1	11.5	108.5	191.5	188	3.5	MT.1	●
GWTSD1200M1	12.0	111.6	195.6	192	3.6	MT.1	●
GWTSD1220M2	12.2	115.7	215.7	212	3.7	MT.2	●
GWTSD1230M2	12.3	115.7	215.7	212	3.7	MT.2	●
GWTSD1250M2	12.5	115.8	215.8	212	3.8	MT.2	●
GWTSD1300M2	13.0	118.9	218.9	215	3.9	MT.2	●
GWTSD1350M2	13.5	122.1	222.1	218	4.1	MT.2	●
GWTSD1400M2	14.0	126.2	226.2	222	4.2	MT.2	●
GWTSD1410M2	14.1	126.2	226.2	222	4.2	MT.2	●
GWTSD1420M2	14.2	126.3	226.3	222	4.3	MT.2	●
GWTSD1450M2	14.5	126.4	226.4	222	4.4	MT.2	●
GWTSD1500M2	15.0	129.5	229.5	225	4.5	MT.2	●
GWTSD1550M2	15.5	132.7	232.7	228	4.7	MT.2	●
GWTSD1600M2	16.0	134.8	234.8	230	4.8	MT.2	●
GWTSD1650M2	16.5	137.0	237.0	232	5.0	MT.2	●
GWTSD1700M2	17.0	140.1	240.1	235	5.1	MT.2	●
GWTSD1750M2	17.5	145.3	245.3	240	5.3	MT.2	●
GWTSD1800M2	18.0	145.4	245.4	240	5.4	MT.2	●

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
GWTSD1850M2	18.5	150.6	250.6	245	5.6	MT.2	●
GWTSD1900M2	19.0	150.7	250.7	245	5.7	MT.2	●
GWTSD1950M2	19.5	155.9	255.9	250	5.9	MT.2	●
GWTSD2000M2	20.0	156.0	256.0	250	6.0	MT.2	●
GWTSD2100M3	21.0	161.3	281.3	275	6.3	MT.3	●
GWTSD2200M3	22.0	166.6	286.6	280	6.6	MT.3	●
GWTSD2300M3	23.0	171.9	291.9	285	6.9	MT.3	●
GWTSD2400M3	24.0	172.2	292.2	285	7.2	MT.3	●
GWTSD2500M3	25.0	172.5	292.5	285	7.5	MT.3	●
GWTSD2600M3	26.0	172.8	292.8	285	7.8	MT.3	●
GWTSD2700M3	27.0	178.1	298.1	290	8.1	MT.3	●
GWTSD2800M4	28.0	183.4	328.4	320	8.4	MT.4	●
GWTSD2900M4	29.0	188.7	333.7	325	8.7	MT.4	●
GWTSD3000M4	30.0	194.0	339.0	330	9.0	MT.4	●
GWTSD3100M4	31.0	199.3	344.3	335	9.3	MT.4	●
GWTSD3200M4	32.0	204.6	349.6	340	9.6	MT.4	●

TAPER SHANK DRILLS

LTD
Extra long

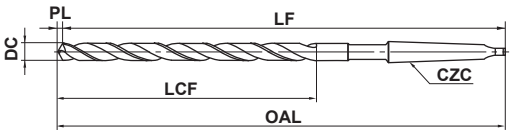
HSS | 118° | S Thinning

DC>6

P	M	K	N	S	H
Steel		Cast Iron	Non-ferrous Metal		

DC=6	6<DC≤10	10<DC≤18	18<DC≤30	30<DC≤40
0 −0.018	0 −0.022	0 −0.027	0 −0.033	0 −0.039





● For deep hole drilling.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
LTDD0600A200M1	6.0	101.8	201.8	200	1.8	MT.1	●
LTDD0600A250M1	6.0	151.8	251.8	250	1.8	MT.1	●
LTDD0600A300M1	6.0	201.8	301.8	300	1.8	MT.1	●
LTDD0600A350M1	6.0	226.8	351.8	350	1.8	MT.1	●
LTDD0650A250M1	6.5	152.0	252.0	250	2.0	MT.1	●
LTDD0650A300M1	6.5	202.0	302.0	300	2.0	MT.1	●
LTDD0650A350M1	6.5	227.0	352.0	350	2.0	MT.1	●
LTDD0700A250M1	7.0	152.1	252.1	250	2.1	MT.1	●
LTDD0700A300M1	7.0	202.1	302.1	300	2.1	MT.1	●
LTDD0700A350M1	7.0	227.1	352.1	350	2.1	MT.1	●
LTDD0750A250M1	7.5	152.3	252.3	250	2.3	MT.1	●
LTDD0750A300M1	7.5	202.3	302.3	300	2.3	MT.1	●
LTDD0750A350M1	7.5	227.3	352.3	350	2.3	MT.1	●
LTDD0800A250M1	8.0	152.4	252.4	250	2.4	MT.1	●
LTDD0800A300M1	8.0	202.4	302.4	300	2.4	MT.1	●
LTDD0800A350M1	8.0	227.4	352.4	350	2.4	MT.1	●
LTDD0850A250M1	8.5	152.6	252.6	250	2.6	MT.1	●
LTDD0850A300M1	8.5	202.6	302.6	300	2.6	MT.1	●
LTDD0850A350M1	8.5	227.6	352.6	350	2.6	MT.1	●
LTDD0900A250M1	9.0	152.7	252.7	250	2.7	MT.1	●
LTDD0900A300M1	9.0	202.7	302.7	300	2.7	MT.1	●
LTDD0900A350M1	9.0	227.7	352.7	350	2.7	MT.1	●
LTDD0950A250M1	9.5	152.9	252.9	250	2.9	MT.1	●
LTDD0950A300M1	9.5	202.9	302.9	300	2.9	MT.1	●
LTDD0950A350M1	9.5	227.9	352.9	350	2.9	MT.1	●
LTDD0950A400M1	9.5	252.9	402.9	400	2.9	MT.1	●
LTDD1000A250M1	10.0	153.0	253.0	250	3.0	MT.1	●
LTDD1000A300M1	10.0	203.0	303.0	300	3.0	MT.1	●
LTDD1000A350M1	10.0	228.0	353.0	350	3.0	MT.1	●
LTDD1000A400M1	10.0	253.0	403.0	400	3.0	MT.1	●
LTDD1050A250M1	10.5	153.2	253.2	250	3.2	MT.1	●
LTDD1050A300M1	10.5	203.2	303.2	300	3.2	MT.1	●
LTDD1050A350M1	10.5	228.2	353.2	350	3.2	MT.1	●
LTDD1050A400M1	10.5	253.2	403.2	400	3.2	MT.1	●
LTDD1100A250M1	11.0	153.3	253.3	250	3.3	MT.1	●
LTDD1100A300M1	11.0	203.3	303.3	300	3.3	MT.1	●
LTDD1100A350M1	11.0	228.3	353.3	350	3.3	MT.1	●
LTDD1100A400M1	11.0	253.3	403.3	400	3.3	MT.1	●
LTDD1150A250M1	11.5	153.5	253.5	250	3.5	MT.1	●
LTDD1150A300M1	11.5	203.5	303.5	300	3.5	MT.1	●

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
LTDD1150A350M1	11.5	228.5	353.5	350	3.5	MT.1	●
LTDD1150A400M1	11.5	253.5	403.5	400	3.5	MT.1	●
LTDD1200A250M1	12.0	153.6	253.6	250	3.6	MT.1	●
LTDD1200A300M1	12.0	203.6	303.6	300	3.6	MT.1	●
LTDD1200A350M1	12.0	228.6	353.6	350	3.6	MT.1	●
LTDD1200A400M1	12.0	253.6	403.6	400	3.6	MT.1	●
LTDD1250A250M1	12.5	153.8	253.8	250	3.8	MT.1	●
LTDD1250A300M1	12.5	203.8	303.8	300	3.8	MT.1	●
LTDD1250A350M1	12.5	228.8	353.8	350	3.8	MT.1	●
LTDD1250A400M1	12.5	253.8	403.8	400	3.8	MT.1	●
LTDD1300A250M1	13.0	153.9	253.9	250	3.9	MT.1	●
LTDD1300A300M1	13.0	203.9	303.9	300	3.9	MT.1	●
LTDD1300A350M1	13.0	228.9	353.9	350	3.9	MT.1	●
LTDD1300A400M1	13.0	253.9	403.9	400	3.9	MT.1	●
LTDD1350A300M1	13.5	204.1	304.1	300	4.1	MT.1	●
LTDD1350A350M1	13.5	229.1	354.1	350	4.1	MT.1	●
LTDD1350A400M1	13.5	254.1	404.1	400	4.1	MT.1	●
LTDD1350A450M1	13.5	304.1	454.1	450	4.1	MT.1	●
LTDD1350A500M1	13.5	354.1	504.1	500	4.1	MT.1	●
LTDD1350A600M1	13.5	404.1	604.1	600	4.1	MT.1	●
LTDD1400A300M1	14.0	204.2	304.2	300	4.2	MT.1	●
LTDD1400A350M1	14.0	229.2	354.2	350	4.2	MT.1	●
LTDD1400A400M1	14.0	254.2	404.2	400	4.2	MT.1	●
LTDD1400A450M1	14.0	304.2	454.2	450	4.2	MT.1	●
LTDD1400A500M1	14.0	354.2	504.2	500	4.2	MT.1	●
LTDD1400A600M1	14.0	404.2	604.2	600	4.2	MT.1	●
LTDD1450A300M2	14.5	179.4	304.4	300	4.4	MT.2	●
LTDD1450A350M2	14.5	229.4	354.4	350	4.4	MT.2	●
LTDD1450A400M2	14.5	254.4	404.4	400	4.4	MT.2	●
LTDD1450A450M2	14.5	304.4	454.4	450	4.4	MT.2	●
LTDD1450A500M2	14.5	354.4	504.4	500	4.4	MT.2	●
LTDD1450A600M2	14.5	404.4	604.4	600	4.4	MT.2	●
LTDD1500A300M2	15.0	179.5	304.5	300	4.5	MT.2	●
LTDD1500A350M2	15.0	229.5	354.5	350	4.5	MT.2	●
LTDD1500A400M2	15.0	254.5	404.5	400	4.5	MT.2	●
LTDD1500A450M2	15.0	304.5	454.5	450	4.5	MT.2	●
LTDD1500A500M2	15.0	354.5	504.5	500	4.5	MT.2	●
LTDD1500A600M2	15.0	404.5	604.5	600	4.5	MT.2	●
LTDD1550A300M2	15.5	179.7	304.7	300	4.7	MT.2	●
LTDD1550A350M2	15.5	229.7	354.7	350	4.7	MT.2	●

● : Inventory maintained in Japan.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
LTDD1550A400M2	15.5	254.7	404.7	400	4.7	MT.2	●
LTDD1550A450M2	15.5	304.7	454.7	450	4.7	MT.2	●
LTDD1550A500M2	15.5	354.7	504.7	500	4.7	MT.2	●
LTDD1550A600M2	15.5	404.7	604.7	600	4.7	MT.2	●
LTDD1600A300M2	16.0	179.8	304.8	300	4.8	MT.2	●
LTDD1600A350M2	16.0	229.8	354.8	350	4.8	MT.2	●
LTDD1600A400M2	16.0	254.8	404.8	400	4.8	MT.2	●
LTDD1600A450M2	16.0	304.8	454.8	450	4.8	MT.2	●
LTDD1600A500M2	16.0	354.8	504.8	500	4.8	MT.2	●
LTDD1600A600M2	16.0	404.8	604.8	600	4.8	MT.2	●
LTDD1650A300M2	16.5	180.0	305.0	300	5.0	MT.2	●
LTDD1650A350M2	16.5	230.0	355.0	350	5.0	MT.2	●
LTDD1650A400M2	16.5	255.0	405.0	400	5.0	MT.2	●
LTDD1650A450M2	16.5	305.0	455.0	450	5.0	MT.2	●
LTDD1650A500M2	16.5	355.0	505.0	500	5.0	MT.2	●
LTDD1650A600M2	16.5	405.0	605.0	600	5.0	MT.2	●
LTDD1700A300M2	17.0	180.1	305.1	300	5.1	MT.2	●
LTDD1700A350M2	17.0	230.1	355.1	350	5.1	MT.2	●
LTDD1700A400M2	17.0	255.1	405.1	400	5.1	MT.2	●
LTDD1700A450M2	17.0	305.1	455.1	450	5.1	MT.2	●
LTDD1700A500M2	17.0	355.1	505.1	500	5.1	MT.2	●
LTDD1700A600M2	17.0	405.1	605.1	600	5.1	MT.2	●
LTDD1750A300M2	17.5	180.3	305.3	300	5.3	MT.2	●
LTDD1750A350M2	17.5	230.3	355.3	350	5.3	MT.2	●
LTDD1750A400M2	17.5	255.3	405.3	400	5.3	MT.2	●
LTDD1750A450M2	17.5	305.3	455.3	450	5.3	MT.2	●
LTDD1750A500M2	17.5	355.3	505.3	500	5.3	MT.2	●
LTDD1750A600M2	17.5	405.3	605.3	600	5.3	MT.2	●
LTDD1800A300M2	18.0	180.4	305.4	300	5.4	MT.2	●
LTDD1800A350M2	18.0	230.4	355.4	350	5.4	MT.2	●
LTDD1800A400M2	18.0	255.4	405.4	400	5.4	MT.2	●
LTDD1800A450M2	18.0	305.4	455.4	450	5.4	MT.2	●
LTDD1800A500M2	18.0	355.4	505.4	500	5.4	MT.2	●
LTDD1800A600M2	18.0	405.4	605.4	600	5.4	MT.2	●
LTDD1850A300M2	18.5	180.6	305.6	300	5.6	MT.2	●
LTDD1850A350M2	18.5	230.6	355.6	350	5.6	MT.2	●
LTDD1850A400M2	18.5	255.6	405.6	400	5.6	MT.2	●
LTDD1850A450M2	18.5	305.6	455.6	450	5.6	MT.2	●
LTDD1850A500M2	18.5	355.6	505.6	500	5.6	MT.2	●
LTDD1850A600M2	18.5	405.6	605.6	600	5.6	MT.2	●
LTDD1900A300M2	19.0	180.7	305.7	300	5.7	MT.2	●
LTDD1900A350M2	19.0	230.7	355.7	350	5.7	MT.2	●
LTDD1900A400M2	19.0	255.7	405.7	400	5.7	MT.2	●
LTDD1900A450M2	19.0	305.7	455.7	450	5.7	MT.2	●
LTDD1900A500M2	19.0	355.7	505.7	500	5.7	MT.2	●
LTDD1900A600M2	19.0	405.7	605.7	600	5.7	MT.2	●
LTDD1950A300M2	19.5	180.9	305.9	300	5.9	MT.2	●
LTDD1950A350M2	19.5	230.9	355.9	350	5.9	MT.2	●
LTDD1950A400M2	19.5	255.9	405.9	400	5.9	MT.2	●
LTDD1950A450M2	19.5	305.9	455.9	450	5.9	MT.2	●

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
LTDD1950A500M2	19.5	355.9	505.9	500	5.9	MT.2	●
LTDD1950A600M2	19.5	405.9	605.9	600	5.9	MT.2	●
LTDD2000A300M2	20.0	181.0	306.0	300	6.0	MT.2	●
LTDD2000A350M2	20.0	231.0	356.0	350	6.0	MT.2	●
LTDD2000A400M2	20.0	256.0	406.0	400	6.0	MT.2	●
LTDD2000A450M2	20.0	306.0	456.0	450	6.0	MT.2	●
LTDD2000A500M2	20.0	356.0	506.0	500	6.0	MT.2	●
LTDD2000A600M2	20.0	406.0	606.0	600	6.0	MT.2	●
LTDD2050A350M2	20.5	231.2	356.2	350	6.2	MT.2	●
LTDD2050A400M2	20.5	256.2	406.2	400	6.2	MT.2	●
LTDD2050A450M2	20.5	306.2	456.2	450	6.2	MT.2	●
LTDD2050A500M2	20.5	356.2	506.2	500	6.2	MT.2	●
LTDD2050A600M2	20.5	406.2	606.2	600	6.2	MT.2	●
LTDD2100A350M2	21.0	231.3	356.3	350	6.3	MT.2	●
LTDD2100A400M2	21.0	256.3	406.3	400	6.3	MT.2	●
LTDD2100A450M2	21.0	306.3	456.3	450	6.3	MT.2	●
LTDD2100A500M2	21.0	356.3	506.3	500	6.3	MT.2	●
LTDD2100A600M2	21.0	406.3	606.3	600	6.3	MT.2	●
LTDD2150A350M2	21.5	231.5	356.5	350	6.5	MT.2	●
LTDD2150A400M2	21.5	256.5	406.5	400	6.5	MT.2	●
LTDD2150A450M2	21.5	306.5	456.5	450	6.5	MT.2	●
LTDD2150A500M2	21.5	356.5	506.5	500	6.5	MT.2	●
LTDD2150A600M2	21.5	406.5	606.5	600	6.5	MT.2	●
LTDD2200A350M2	22.0	231.6	356.6	350	6.6	MT.2	●
LTDD2200A400M2	22.0	256.6	406.6	400	6.6	MT.2	●
LTDD2200A450M2	22.0	306.6	456.6	450	6.6	MT.2	●
LTDD2200A500M2	22.0	356.6	506.6	500	6.6	MT.2	●
LTDD2200A600M2	22.0	406.6	606.6	600	6.6	MT.2	●
LTDD2250A350M2	22.5	231.8	356.8	350	6.8	MT.2	●
LTDD2250A400M2	22.5	256.8	406.8	400	6.8	MT.2	●
LTDD2250A450M2	22.5	306.8	456.8	450	6.8	MT.2	●
LTDD2250A500M2	22.5	356.8	506.8	500	6.8	MT.2	●
LTDD2250A600M2	22.5	406.8	606.8	600	6.8	MT.2	●
LTDD2300A350M2	23.0	231.9	356.9	350	6.9	MT.2	●
LTDD2300A400M2	23.0	256.9	406.9	400	6.9	MT.2	●
LTDD2300A450M2	23.0	306.9	456.9	450	6.9	MT.2	●
LTDD2300A500M2	23.0	356.9	506.9	500	6.9	MT.2	●
LTDD2300A600M2	23.0	406.9	606.9	600	6.9	MT.2	●
LTDD2350A350M3	23.5	207.1	357.1	350	7.1	MT.3	●
LTDD2350A400M3	23.5	257.1	407.1	400	7.1	MT.3	●
LTDD2350A450M3	23.5	307.1	457.1	450	7.1	MT.3	●
LTDD2350A500M3	23.5	357.1	507.1	500	7.1	MT.3	●
LTDD2350A600M3	23.5	407.1	607.1	600	7.1	MT.3	●
LTDD2400A350M3	24.0	207.2	357.2	350	7.2	MT.3	●
LTDD2400A400M3	24.0	257.2	407.2	400	7.2	MT.3	●
LTDD2400A450M3	24.0	307.2	457.2	450	7.2	MT.3	●
LTDD2400A500M3	24.0	357.2	507.2	500	7.2	MT.3	●
LTDD2400A600M3	24.0	407.2	607.2	600	7.2	MT.3	●
LTDD2450A350M3	24.5	207.4	357.4	350	7.4	MT.3	●
LTDD2450A400M3	24.5	257.4	407.4	400	7.4	MT.3	●

HSS

LTD
Extra long

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
LTDD2450A450M3	24.5	307.4	457.4	450	7.4	MT.3	●
LTDD2450A500M3	24.5	357.4	507.4	500	7.4	MT.3	●
LTDD2450A600M3	24.5	407.4	607.4	600	7.4	MT.3	●
LTDD2500A350M3	25.0	207.5	357.5	350	7.5	MT.3	●
LTDD2500A400M3	25.0	257.5	407.5	400	7.5	MT.3	●
LTDD2500A450M3	25.0	307.5	457.5	450	7.5	MT.3	●
LTDD2500A500M3	25.0	357.5	507.5	500	7.5	MT.3	●
LTDD2500A600M3	25.0	407.5	607.5	600	7.5	MT.3	●
LTDD2550A400M3	25.5	257.7	407.7	400	7.7	MT.3	●
LTDD2550A450M3	25.5	307.7	457.7	450	7.7	MT.3	●
LTDD2550A500M3	25.5	357.7	507.7	500	7.7	MT.3	●
LTDD2550A600M3	25.5	407.7	607.7	600	7.7	MT.3	●
LTDD2600A400M3	26.0	257.8	407.8	400	7.8	MT.3	●
LTDD2600A450M3	26.0	307.8	457.8	450	7.8	MT.3	●
LTDD2600A500M3	26.0	357.8	507.8	500	7.8	MT.3	●
LTDD2600A600M3	26.0	407.8	607.8	600	7.8	MT.3	●
LTDD2650A400M3	26.5	258.0	408.0	400	8.0	MT.3	●
LTDD2650A450M3	26.5	308.0	458.0	450	8.0	MT.3	●
LTDD2650A500M3	26.5	358.0	508.0	500	8.0	MT.3	●
LTDD2650A600M3	26.5	408.0	608.0	600	8.0	MT.3	●
LTDD2700A400M3	27.0	258.1	408.1	400	8.1	MT.3	●
LTDD2700A450M3	27.0	308.1	458.1	450	8.1	MT.3	●
LTDD2700A500M3	27.0	358.1	508.1	500	8.1	MT.3	●
LTDD2700A600M3	27.0	408.1	608.1	600	8.1	MT.3	●
LTDD2750A400M3	27.5	258.3	408.3	400	8.3	MT.3	●
LTDD2750A450M3	27.5	308.3	458.3	450	8.3	MT.3	●
LTDD2750A500M3	27.5	358.3	508.3	500	8.3	MT.3	●
LTDD2750A600M3	27.5	408.3	608.3	600	8.3	MT.3	●
LTDD2800A400M3	28.0	258.4	408.4	400	8.4	MT.3	●
LTDD2800A450M3	28.0	308.4	458.4	450	8.4	MT.3	●
LTDD2800A500M3	28.0	358.4	508.4	500	8.4	MT.3	●
LTDD2800A600M3	28.0	408.4	608.4	600	8.4	MT.3	●
LTDD2850A400M3	28.5	258.6	408.6	400	8.6	MT.3	●
LTDD2850A450M3	28.5	308.6	458.6	450	8.6	MT.3	●
LTDD2850A500M3	28.5	358.6	508.6	500	8.6	MT.3	●
LTDD2850A600M3	28.5	408.6	608.6	600	8.6	MT.3	●
LTDD2900A400M3	29.0	258.7	408.7	400	8.7	MT.3	●
LTDD2900A450M3	29.0	308.7	458.7	450	8.7	MT.3	●
LTDD2900A500M3	29.0	358.7	508.7	500	8.7	MT.3	●
LTDD2900A600M3	29.0	408.7	608.7	600	8.7	MT.3	●
LTDD2950A400M3	29.5	258.9	408.9	400	8.9	MT.3	●
LTDD2950A450M3	29.5	308.9	458.9	450	8.9	MT.3	●
LTDD2950A500M3	29.5	358.9	508.9	500	8.9	MT.3	●
LTDD2950A600M3	29.5	408.9	608.9	600	8.9	MT.3	●
LTDD3000A400M3	30.0	259.0	409.0	400	9.0	MT.3	●
LTDD3000A450M3	30.0	309.0	459.0	450	9.0	MT.3	●
LTDD3000A500M3	30.0	359.0	509.0	500	9.0	MT.3	●
LTDD3000A600M3	30.0	409.0	609.0	600	9.0	MT.3	●
LTDD3050A450M3	30.5	309.2	459.2	450	9.2	MT.3	●
LTDD3050A500M3	30.5	359.2	509.2	500	9.2	MT.3	●

Order Number	DC	LCF	OAL	LF	PL	CZC	Stock
LTDD3050A600M3	30.5	409.2	609.2	600	9.2	MT.3	●
LTDD3100A450M3	31.0	309.3	459.3	450	9.3	MT.3	●
LTDD3100A500M3	31.0	359.3	509.3	500	9.3	MT.3	●
LTDD3100A600M3	31.0	409.3	609.3	600	9.3	MT.3	●
LTDD3150A450M3	31.5	309.5	459.5	450	9.5	MT.3	●
LTDD3150A500M3	31.5	359.5	509.5	500	9.5	MT.3	●
LTDD3150A600M3	31.5	409.5	609.5	600	9.5	MT.3	●
LTDD3200A450M3	32.0	309.6	459.6	450	9.6	MT.3	●
LTDD3200A500M3	32.0	359.6	509.6	500	9.6	MT.3	●
LTDD3200A600M3	32.0	409.6	609.6	600	9.6	MT.3	●
LTDD3300A500M4	33.0	359.9	509.9	500	9.9	MT.4	●
LTDD3300A600M4	33.0	409.9	609.9	600	9.9	MT.4	●
LTDD3400A500M4	34.0	360.2	510.2	500	10.2	MT.4	●
LTDD3400A600M4	34.0	410.2	610.2	600	10.2	MT.4	●
LTDD3500A500M4	35.0	360.5	510.5	500	10.5	MT.4	●
LTDD3500A600M4	35.0	410.5	610.5	600	10.5	MT.4	●
LTDD3600A500M4	36.0	360.8	510.8	500	10.8	MT.4	●
LTDD3600A600M4	36.0	410.8	610.8	600	10.8	MT.4	●
LTDD3700A500M4	37.0	361.1	511.1	500	11.1	MT.4	●
LTDD3700A600M4	37.0	411.1	611.1	600	11.1	MT.4	●
LTDD3800A500M4	38.0	361.4	511.4	500	11.4	MT.4	●
LTDD3800A600M4	38.0	411.4	611.4	600	11.4	MT.4	●
LTDD3900A500M4	39.0	361.7	511.7	500	11.7	MT.4	●
LTDD3900A600M4	39.0	411.7	611.7	600	11.7	MT.4	●
LTDD4000A500M4	40.0	362.0	512.0	500	12.0	MT.4	●
LTDD4000A600M4	40.0	412.0	612.0	600	12.0	MT.4	●

● : Inventory maintained in Japan.

DRILLING

GTTD

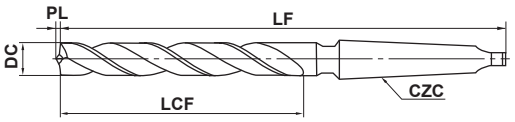
TiN, For steel frame

HSS | G | 160° 100° | N Thinning

P Steel | M | K | N | S | H

17≤DC≤18	18<DC≤30	30<DC≤32
0 −0.027	0 −0.033	0 −0.039





● Special point geometry for minimal through hole burrs.

Unit : mm

Order Number	DC	LCF	LF	PL	CZC	Stock
GTTDD1700M3	17.0	135	255	2.9	MT.3	●
GTTD**D1750M3**	17.5	140	260	3.0	MT.3	●
GTTD**D1800M3**	18.0	140	260	3.0	MT.3	●
GTTD**D1900M3**	19.0	145	265	3.2	MT.3	●
GTTD**D2000M3**	20.0	150	270	3.3	MT.3	●
GTTD**D2150M3**	21.5	160	280	3.6	MT.3	●
GTTD**D2200M3**	22.0	160	280	3.7	MT.3	●
GTTD**D2250M3**	22.5	165	285	3.8	MT.3	●
GTTD**D2300M3**	23.0	165	285	3.8	MT.3	●
GTTD**D2350M3**	23.5	165	285	4.0	MT.3	●
GTTD**D2400M3**	24.0	165	285	4.0	MT.3	●
GTTD**D2450M3**	24.5	165	285	4.1	MT.3	●
GTTD**D2500M3**	25.0	165	285	4.1	MT.3	●
GTTD**D2600M3**	26.0	165	285	4.3	MT.3	●
GTTD**D2650M3**	26.5	170	290	4.4	MT.3	●
GTTD**D2800M4**	28.0	175	320	4.5	MT.4	●
GTTD**D3200M4**	32.0	195	340	5.0	MT.4	●

TAPER SHANK DRILLS

TTD

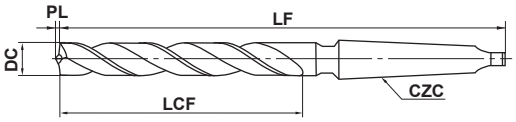
For steel frame

HSS | 160° 100° | N Thinning

P Steel | M | K | N | S | H

17≤DC≤18	18<DC≤30	30<DC≤32
0 −0.027	0 −0.033	0 −0.039





● Special point geometry for minimal through hole burrs.

Unit : mm

Order Number	DC	LCF	LF	PL	CZC	Stock
TTDD1700M3	17.0	135	255	2.9	MT.3	●
TTD**D1750M3**	17.5	140	260	3.0	MT.3	●
TTD**D1800M3**	18.0	140	260	3.0	MT.3	●
TTD**D1900M3**	19.0	145	265	3.2	MT.3	●
TTD**D2000M3**	20.0	150	270	3.3	MT.3	●
TTD**D2150M3**	21.5	160	280	3.6	MT.3	●
TTD**D2200M3**	22.0	160	280	3.7	MT.3	●
TTD**D2250M3**	22.5	165	285	3.8	MT.3	●
TTD**D2300M3**	23.0	165	285	3.8	MT.3	●
TTD**D2350M3**	23.5	165	285	4.0	MT.3	●
TTD**D2400M3**	24.0	165	285	4.0	MT.3	●
TTD**D2450M3**	24.5	165	285	4.1	MT.3	●
TTD**D2500M3**	25.0	165	285	4.1	MT.3	●
TTD**D2600M3**	26.0	165	285	4.3	MT.3	●
TTD**D2650M3**	26.5	170	290	4.4	MT.3	●
TTD**D2800M4**	28.0	175	320	4.5	MT.4	●
TTD**D3200M4**	32.0	195	340	5.0	MT.4	●

● : Inventory maintained in Japan.

CUTTING CONDITIONS ➤ N199

TRIANGULAR SHANK DRILLS

3KD

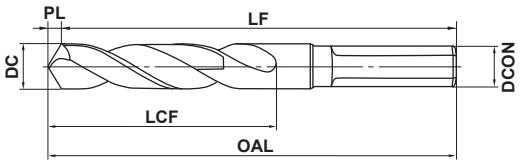
Triangular shank (Type 6.5)(Type 10)(Type 13)

HSS 118°

P Steel | M | K Cast Iron | N Non-ferrous Metal | S | H

7≤DC≤10	10<DC≤18	18<DC≤26
0 −0.022	0 −0.027	0 −0.033





● 3 shank types for portable power tools.

Type 6.5

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
3KD6D0700	7.0	37.1	77.1	75	2.1	6.5	●
3KD6D0750	7.5	37.3	77.3	75	2.3	6.5	●
3KD6D0800	8.0	37.4	77.4	75	2.4	6.5	●
3KD6D0850	8.5	37.6	77.6	75	2.6	6.5	●
3KD6D0900	9.0	37.7	77.7	75	2.7	6.5	●
3KD6D0950	9.5	37.9	77.9	75	2.9	6.5	●
3KD6D1000	10.0	53.0	93.0	90	3.0	6.5	●
3KD6D1050	10.5	53.2	93.2	90	3.2	6.5	●
3KD6D1100	11.0	53.3	93.3	90	3.3	6.5	●
3KD6D1150	11.5	53.5	93.5	90	3.5	6.5	●
3KD6D1200	12.0	53.6	93.6	90	3.6	6.5	●
3KD6D1250	12.5	53.8	93.8	90	3.8	6.5	●
3KD6D1300	13.0	53.9	93.9	90	3.9	6.5	●

Type 10

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
3KD10D1000	10.0	53.0	93.0	90	3.0	10	●
3KD10D1050	10.5	53.2	93.2	90	3.2	10	●
3KD10D1100	11.0	53.3	93.3	90	3.3	10	●
3KD10D1150	11.5	53.5	93.5	90	3.5	10	●
3KD10D1200	12.0	53.6	93.6	90	3.6	10	●
3KD10D1250	12.5	53.8	93.8	90	3.8	10	●
3KD10D1300	13.0	53.9	93.9	90	3.9	10	●
3KD10D1350	13.5	89.1	144.1	140	4.1	10	●
3KD10D1400	14.0	89.2	144.2	140	4.2	10	●
3KD10D1450	14.5	89.4	144.4	140	4.4	10	●
3KD10D1500	15.0	89.5	144.5	140	4.5	10	●
3KD10D1550	15.5	89.7	144.7	140	4.7	10	●
3KD10D1600	16.0	89.8	144.8	140	4.8	10	●

Type 13

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
3KD13D1350	13.5	89.1	144.1	140	4.1	13	●
3KD13D1400	14.0	89.2	144.2	140	4.2	13	●
3KD13D1450	14.5	89.4	144.4	140	4.4	13	●
3KD13D1500	15.0	89.5	144.5	140	4.5	13	●
3KD13D1550	15.5	89.7	144.7	140	4.7	13	●
3KD13D1600	16.0	89.8	144.8	140	4.8	13	●
3KD13D1650	16.5	90.0	145.0	140	5.0	13	●
3KD13D1700	17.0	90.1	145.1	140	5.1	13	●
3KD13D1750	17.5	90.3	145.3	140	5.3	13	●
3KD13D1800	18.0	90.4	145.4	140	5.4	13	●
3KD13D1850	18.5	90.6	145.6	140	5.6	13	●
3KD13D1900	19.0	90.7	145.7	140	5.7	13	●
3KD13D1950	19.5	90.9	145.9	140	5.9	13	●
3KD13D2000	20.0	91.0	146.0	140	6.0	13	●
3KD13D2050	20.5	91.2	146.2	140	6.2	13	●
3KD13D2100	21.0	91.3	146.3	140	6.3	13	●
3KD13D2150	21.5	91.5	146.5	140	6.5	13	●
3KD13D2200	22.0	91.6	146.6	140	6.6	13	●
3KD13D2250	22.5	91.8	146.8	140	6.8	13	●
3KD13D2300	23.0	91.9	146.9	140	6.9	13	●
3KD13D2350	23.5	92.1	147.1	140	7.1	13	●
3KD13D2400	24.0	92.2	147.2	140	7.2	13	●
3KD13D2450	24.5	92.4	147.4	140	7.4	13	●
3KD13D2500	25.0	92.5	147.5	140	7.5	13	●
3KD13D2550	25.5	92.7	147.7	140	7.7	13	●
3KD13D2600	26.0	92.8	147.8	140	7.8	13	●

STRAIGHT SHANK DRILLS/TAPER SHANK DRILLS

GSD GWSS GWSL GTD GWTS GTTD

TiN coated drills

RECOMMENDED CUTTING CONDITIONS

Work material	Structural steel SS Carbon steel S-C (−25HRC)		Alloy steel SCM Tool steel SK (−35HRC)		Alloy steel SCM Die steel SKD (−40HRC)		Cast iron FC	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	8000	0.01	7000	0.008	6000	0.005	8000	0.01
1.0	6000	0.02	5500	0.01	4500	0.008	6000	0.02
2.0	4700	0.05	3600	0.03	2400	0.02	4700	0.05
3.0	3200	0.10	2400	0.08	1800	0.05	3500	0.10
6.0	1600	0.18	1200	0.15	900	0.13	1750	0.18
8.0	1200	0.20	900	0.18	680	0.15	1300	0.20
10.0	960	0.22	720	0.20	550	0.18	1100	0.22
12.0	800	0.24	600	0.22	450	0.20	880	0.24
15.0	630	0.28	480	0.24	350	0.22	700	0.28
20.0	470	0.33	360	0.26	260	0.24	530	0.33
25.0	380	0.36	290	0.28	210	0.26	420	0.36
30.0	310	0.40	240	0.30	180	0.28	330	0.40

Work material	Stainless steel				Copper alloy, Brass		Aluminium alloy	
	Martensitic Ferritic AISI 430		Austenitic AISI 304 Precipitation hardening ASTM 630					
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	8000	0.01	6000	0.01	8000	0.01	10000	0.02
1.0	5000	0.02	4000	0.02	6000	0.02	7000	0.04
2.0	2500	0.05	2300	0.04	4700	0.05	6000	0.08
3.0	1900	0.10	1500	0.07	3200	0.10	5500	0.13
6.0	950	0.18	750	0.10	1600	0.18	3100	0.23
8.0	700	0.20	530	0.13	1200	0.20	2300	0.28
10.0	560	0.22	420	0.15	960	0.22	1900	0.33
12.0	460	0.24	340	0.17	800	0.24	1600	0.38
15.0	360	0.26	270	0.20	630	0.26	1300	0.42
20.0	270	0.28	200	0.23	470	0.28	950	0.45
25.0	210	0.32	160	0.24	380	0.32	750	0.48
30.0	180	0.35	135	0.25	310	0.35	630	0.50

1) Please reduce the cutting conditions when drilling a deep hole.
2) This table only shows standard cutting conditions with water-soluble cutting fluids. Please make corrections or adjustments depending on the application.

Reduction rate of cutting conditions for hole drilling

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
4D	10%	10%
5D	10%	15%
6D	20%	20%
7D	20%	20%

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
8D	30%	20%
10D	30%	25%
15D	40%	30%
20D	40%	45%

D : Drill dia.

SD KSD LSD TD KTD TTD

Standard drills

RECOMMENDED CUTTING CONDITIONS

Work material	Structural steel SS Carbon steel S-C (−25HRC)		Alloy steel SCM Tool steel SK (−35HRC)		Alloy steel SCM Die steel SKD (−40HRC)		Cast iron FC	
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	6000	0.01	5000	0.008	4000	0.005	6000	0.01
1.0	5000	0.02	4000	0.01	2800	0.008	5000	0.02
2.0	3000	0.05	2500	0.03	1800	0.02	3000	0.05
3.0	2100	0.10	1800	0.08	1200	0.05	2300	0.10
6.0	1100	0.18	900	0.15	600	0.13	1100	0.18
8.0	800	0.20	670	0.18	450	0.15	900	0.20
10.0	650	0.22	540	0.20	350	0.18	700	0.22
12.0	520	0.24	450	0.22	300	0.20	600	0.24
15.0	420	0.28	360	0.24	240	0.22	470	0.28
20.0	320	0.33	270	0.26	180	0.24	350	0.33
25.0	250	0.36	210	0.28	145	0.26	280	0.36
30.0	210	0.40	180	0.30	120	0.28	230	0.40
40.0	160	0.42	130	0.32	90	0.30	180	0.42

Work material	Stainless steel				Copper alloy, Brass		Aluminium alloy	
	Martensitic Ferritic AISI 430		Austenitic AISI 304 Precipitation hardening ASTM 630					
Dia. **DC** (mm)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)	Revolution (min^{-1})	Feed rate (mm/rev)
0.5	5000	0.01	4000	0.01	6000	0.01	10000	0.02
1.0	4000	0.02	3000	0.02	5000	0.02	7000	0.04
2.0	2200	0.05	1500	0.04	3000	0.05	5000	0.08
3.0	1600	0.10	1000	0.07	2100	0.10	4200	0.13
6.0	800	0.18	530	0.10	1100	0.18	2100	0.23
8.0	600	0.20	400	0.13	800	0.20	1600	0.28
10.0	480	0.22	310	0.15	650	0.22	1200	0.33
12.0	400	0.24	250	0.17	520	0.24	1000	0.38
15.0	320	0.26	170	0.20	420	0.26	850	0.42
20.0	240	0.28	130	0.23	320	0.28	630	0.45
25.0	190	0.32	100	0.24	250	0.32	500	0.48
30.0	160	0.35	85	0.25	210	0.35	400	0.50
40.0	120	0.38	65	0.28	160	0.38	300	0.52

1) Please reduce the cutting conditions when drilling a deep hole.
2) This table only shows standard cutting conditions with water-soluble cutting fluids. Please make corrections or adjustments depending on the application.

Reduction rate of cutting conditions for hole drilling

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
4D	10%	10%
5D	10%	15%
6D	20%	20%
7D	20%	20%

Drilling depth	Reduction rate of cutting speed	Reduction rate of feed
8D	30%	20%
10D	30%	25%
15D	40%	30%
20D	40%	45%

D : Drill dia.

DRILLING(BRAZED TYPE)

BRS

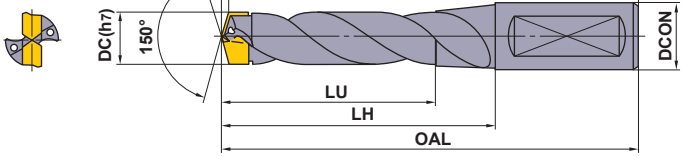
●Excellent cutting sharpness and chip discharge due to high rake type insert.
●High efficiency, high accuracy machining.

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron			

	14≤DC≤18	18<DC≤30
	0 −0.018	0 −0.021

(l/d=3)





DC (mm)	Standard Diameter		Intermediate Diameters		Dimensions (mm)					
	Order Number	Stock UP20M	Range of Drill Diameters (DC)	Order Number	LU	LH	OAL	LF	PL	DCON
14.0	BRS1400S16	●	14.0<DC≤14.5	BRS□□□□S16	53.9	67.9	115.9	114	1.9	16
14.5	BRS1450S16	●			53.9	67.9	115.9	114	1.9	16
15.0	BRS1500S20	●	14.5<DC≤15.5	BRS□□□□S20	63.0	78.0	128.0	126	2.0	20
15.5	BRS1550S20	●			63.1	78.1	128.1	126	2.1	20
16.0	BRS1600S20	●	15.5<DC≤16.5		67.1	83.1	133.1	131	2.1	20
16.5	BRS1650S20	●			67.2	83.2	133.2	131	2.2	20
17.0	BRS1700S20	●	16.5<DC≤17.5		71.3	88.3	138.3	136	2.3	20
17.5	BRS1750S20	●			71.3	88.3	138.3	136	2.3	20
18.0	BRS1800S20	●	17.5<DC≤18.5		75.4	93.4	143.4	141	2.4	20
18.5	BRS1850S20	●			75.5	93.5	143.5	141	2.5	20
19.0	BRS1900S25	●	18.5<DC≤19.5	BRS□□□□S25	79.5	103.5	159.5	157	2.5	25
19.5	BRS1950S25	●			79.6	103.6	159.6	157	2.6	25
20.0	BRS2000S25	●	19.5<DC≤20.5		83.7	103.7	159.7	157	2.7	25
20.5	BRS2050S25	●			83.7	103.7	159.7	157	2.7	25
21.0	BRS2100S25	●	20.5<DC≤21.5		82.8	103.8	159.8	157	2.8	25
21.5	BRS2150S25	●			82.9	103.9	159.9	157	2.9	25
22.0	BRS2200S25	●	21.5<DC≤22.5		86.9	108.9	164.9	162	2.9	25
22.5	BRS2250S25	●			87.0	109.0	165.0	162	3.0	25
23.0	BRS2300S25	●	22.5<DC≤23.5		86.1	109.1	165.1	162	3.1	25
23.5	BRS2350S25	●			86.1	109.1	165.1	162	3.1	25
24.0	BRS2400S32	●	23.5<DC≤24.5	BRS□□□□S32	90.2	114.2	174.2	171	3.2	32
24.5	BRS2450S32	●			90.3	114.3	174.3	171	3.3	32
25.0	BRS2500S32	●	24.5<DC≤25.5		89.3	114.3	174.3	171	3.3	32
25.5	BRS2550S32	●			89.4	114.4	174.4	171	3.4	32
26.0	BRS2600S32	●	25.5<DC≤26.5		93.5	119.5	179.5	176	3.5	32
26.5	BRS2650S32	●			93.6	119.6	179.6	176	3.6	32
27.0	BRS2700S32	●	26.5<DC≤27.5		92.6	119.6	179.6	176	3.6	32
27.5	BRS2750S32	●			92.7	119.7	179.7	176	3.7	32
28.0	BRS2800S32	●	27.5<DC≤28.5		96.8	124.8	184.8	181	3.8	32
28.5	BRS2850S32	●			96.8	124.8	184.8	181	3.8	32
29.0	BRS2900S32	●	28.5<DC≤29.5		100.9	129.9	189.9	186	3.9	32
29.5	BRS2950S32	●			101.0	130.0	190.0	186	4.0	32
30.0	BRS3000S32	●	29.5<DC≤30.5		100.0	130.0	190.0	186	4.0	32

For ordering an intermediate diameter, please enter the diameter (DC) into the 4-digit space□□□□in the nominal designation.
(Ex. UP20M BRS2530S32 for a diameter of ϕ25.30mm)

● : **Inventory maintained in Japan.**

RECOMMENDED CUTTING CONDITIONS

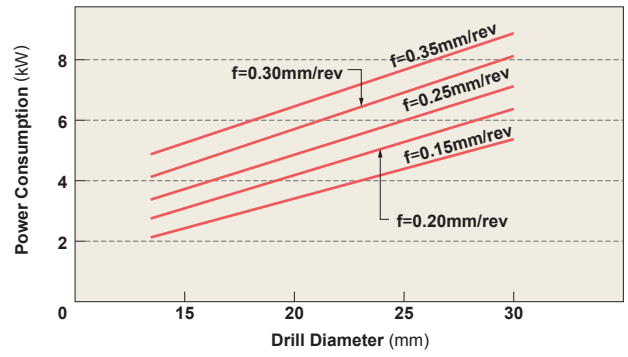
	Work Material		Hardness	Drill Dia. ϕ14.0—ϕ20.0		Drill Dia. ϕ20.0—ϕ30.0	
				Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)
P	Mild Steel		≤180HB	65 (50—75)	0.3 (0.20—0.40)	70 (55—85)	0.35 (0.20—0.45)
P	Structural Steel	SS400 (JIS)	Tensile Strength 400—500MPa	80 (70—90)	0.30 (0.25—0.35)	80 (70—90)	0.35 (0.30—0.45)
P	Structural Steel	SM490 (JIS)	Tensile Strength 490—610MPa	70 (60—80)	0.25 (0.20—0.30)	70 (60—80)	0.30 (0.20—0.40)
P	Structural Steel	SM570 (JIS)	Tensile Strength 570—720MPa	60 (50—70)	0.25 (0.20—0.30)	60 (50—70)	0.30 (0.20—0.35)
P	Carbon Steel Alloy Steel		180—280HB	60 (45—70)	0.25 (0.1—0.35)	65 (45—80)	0.30 (0.15—0.35)
P	Carbon Steel Alloy Steel		280—350HB	55 (40—65)	0.20 (0.15—0.35)	60 (45—70)	0.25 (0.15—0.35)
M	Stainless Steel (Austenitic)		≤200HB	70 (50—90)	0.30 (0.20—0.40)	80 (60—100)	0.3 (0.20—0.40)
K	Gray Cast Iron		Tensile Strength≤350MPa	75 (60—110)	0.30 (0.20—0.40)	80 (60—100)	0.35 (0.25—0.50)
K	Ductile Cast Iron		Tensile Strength≤450MPa	75 (60—100)	0.30 (0.20—0.40)	80 (60—100)	0.35 (0.20—0.45)
K	Ductile Cast Iron		Tensile Strength 500—800MPa	70 (55—90)	0.25 (0.15—0.35)	75 (55—90)	0.30 (0.15—0.40)

(Note) The above conditions are for general cutting. The cutting conditions need to be modified depending on power, rigidity of the machine and workpiece shape.

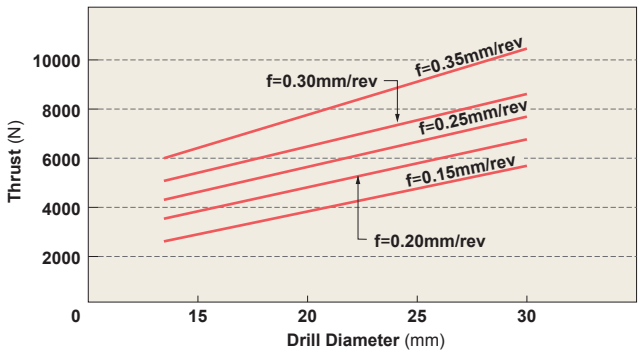
CUTTING RESISTANCE

Workpiece : JIS SUS304 Drilled Depth : l/d=3(Through Hole) Cutting Speed : 70m/min WSO (10%)

Power Consumption



Thrust



DRILLING(BRAZED TYPE)

BRM

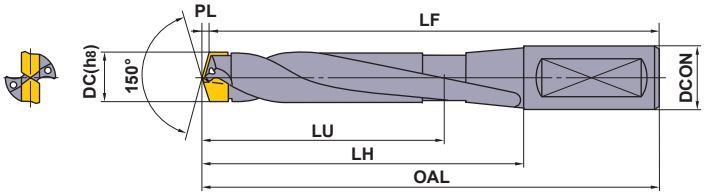
●Excellent cutting sharpness and chip discharge due to high rake type insert.
●High efficiency, high accuracy machining.

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron			

14≤DC≤18	18<DC≤30
0 −0.027	0 −0.033

(l/d=5)





DC (mm)	Standard Diameter		Intermediate Diameters		Dimensions (mm)					
	Order Number	Stock UP20M	Range of Drill Diameters (DC)	Order Number	LU	LH	OAL	LF	PL	DCON
14.0	BRM1400S16	●	14.0<DC≤14.5	BRM□□□□S16	79.9	93.9	141.9	140	1.9	16
14.5	BRM1450S16	●			79.9	93.9	141.9	140	1.9	16
15.0	BRM1500S20	●	14.5<DC≤15.5	BRM□□□□S20	87.0	102.0	152.0	150	2.0	20
15.5	BRM1550S20	●			87.1	102.1	152.1	150	2.1	20
16.0	BRM1600S20	●	15.5<DC≤16.5		91.1	107.1	157.1	155	2.1	20
16.5	BRM1650S20	●			91.2	107.2	157.2	155	2.2	20
17.0	BRM1700S20	●	16.5<DC≤17.5		100.3	117.3	167.3	165	2.3	20
17.5	BRM1750S20	●			100.3	117.3	167.3	165	2.3	20
18.0	BRM1800S20	●	17.5<DC≤18.5		104.4	122.4	172.4	170	2.4	20
18.5	BRM1850S20	●			104.5	122.5	172.5	170	2.5	20
19.0	BRM1900S25	●	18.5<DC≤19.5	BRM□□□□S25	107.5	126.5	182.5	180	2.5	25
19.5	BRM1950S25	●			107.6	126.6	182.6	180	2.6	25
20.0	BRM2000S25	●	19.5<DC≤20.5		116.7	136.7	192.7	190	2.7	25
20.5	BRM2050S25	●			116.7	136.7	192.7	190	2.7	25
21.0	BRM2100S25	●	20.5<DC≤21.5		120.8	141.8	197.8	195	2.8	25
21.5	BRM2150S25	●			120.9	141.9	197.9	195	2.9	25
22.0	BRM2200S25	●	21.5<DC≤22.5		124.9	146.9	202.9	200	2.9	25
22.5	BRM2250S25	●			125.0	147.0	203.0	200	3.0	25
23.0	BRM2300S25	●	22.5<DC≤23.5		129.1	152.1	208.1	205	3.1	25
23.5	BRM2350S25	●			129.1	152.1	208.1	205	3.1	25
24.0	BRM2400S32	●	23.5<DC≤24.5	BRM□□□□S32	139.2	163.2	223.2	220	3.2	32
24.5	BRM2450S32	●			139.3	163.3	223.3	220	3.3	32
25.0	BRM2500S32	●	24.5<DC≤25.5		143.3	168.3	228.3	225	3.3	32
25.5	BRM2550S32	●			143.4	168.4	228.4	225	3.4	32
26.0	BRM2600S32	●	25.5<DC≤26.5		147.5	173.5	233.5	230	3.5	32
26.5	BRM2650S32	●			147.6	173.6	233.6	230	3.6	32
27.0	BRM2700S32	●	26.5<DC≤27.5		151.6	178.6	238.6	235	3.6	32
27.5	BRM2750S32	●			151.7	178.7	238.7	235	3.7	32
28.0	BRM2800S32	●	27.5<DC≤28.5		160.8	188.8	248.8	245	3.8	32
28.5	BRM2850S32	●			160.8	188.8	248.8	245	3.8	32
29.0	BRM2900S32	●	28.5<DC≤29.5		164.9	193.9	253.9	250	3.9	32
29.5	BRM2950S32	●			165.0	194.0	254.0	250	4.0	32
30.0	BRM3000S32	●	29.5<DC≤30.0		169.0	199.0	259.0	255	4.0	32

For ordering an intermediate diameter, please enter the diameter (DC) into the 4-digit space□□□□in the nominal designation.
(Ex. UP20M BRM2530S32 for a diameter of ϕ25.30mm)

● : **Inventory maintained in Japan.**

RECOMMENDED CUTTING CONDITIONS

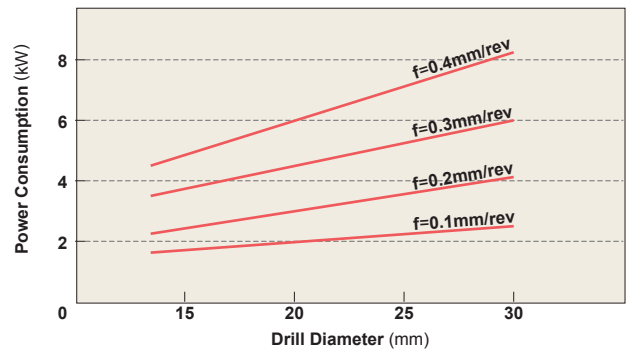
	Work Material		Hardness	Drill Dia. ϕ14.0—ϕ20.0		Drill Dia. ϕ20.0—ϕ30.0	
				Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)
P	Mild Steel		≤180HB	65 (50—75)	0.30 (0.20—0.40)	70 (55—85)	0.35 (0.20—0.45)
P	Structural Steel	SS400 (JIS)	Tensile Strength 400—500MPa	70 (60—80)	0.30 (0.25—0.35)	70 (60—80)	0.35 (0.30—0.45)
P	Structural Steel	SM490 (JIS)	Tensile Strength 490—610MPa	60 (50—70)	0.25 (0.20—0.30)	60 (50—70)	0.30 (0.20—0.40)
P	Structural Steel	SM570 (JIS)	Tensile Strength 570—720MPa	50 (40—60)	0.25 (0.20—0.30)	50 (40—60)	0.30 (0.20—0.35)
P	Carbon Steel Alloy Steel		180—280HB	60 (45—70)	0.25 (0.15—0.35)	65 (45—80)	0.30 (0.15—0.40)
P	Carbon Steel Alloy Steel		280—350HB	55 (40—65)	0.20 (0.15—0.35)	60 (45—70)	0.25 (0.15—0.35)
M	Stainless Steel (Austenitic)		≤200HB	60 (50—80)	0.25 (0.15—0.35)	65 (50—80)	0.30 (0.20—0.40)
K	Gray Cast Iron		Tensile Strength≤350MPa	65 (50—100)	0.30 (0.20—0.40)	70 (50—100)	0.35 (0.25—0.50)
K	Ductile Cast Iron		Tensile Strength≤450MPa	65 (50—90)	0.30 (0.2—0.40)	70 (50—90)	0.35 (0.20—0.45)
K	Ductile Cast Iron		Tensile Strength 500—800MPa	60 (45—80)	0.25 (0.15—0.35)	65 (45—80)	0.30 (0.15—0.40)

(Note) The above conditions are for general cutting. The cutting conditions need to be modified depending on power, rigidity of the machine and workpiece shape.

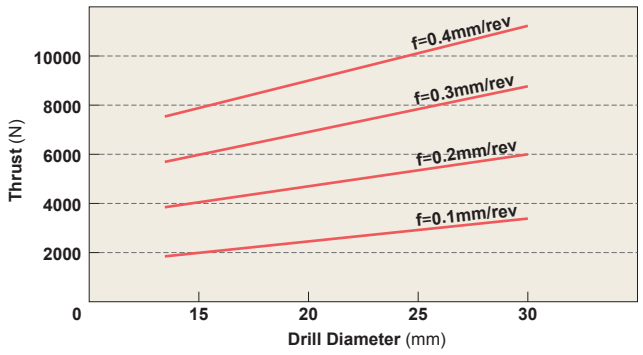
CUTTING RESISTANCE

Workpiece : JIS SUS304 Drilled Depth : l/d=5(Through Hole) Cutting Speed : 60m/min WSO (10%)

Power Consumption



Thrust



BRSB

Key point drill for bridge construction

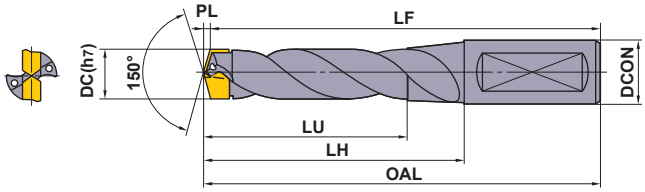
- Excellent cutting sharpness and chip discharge due to high rake type insert.
- Unique flute shape is used. (l/d=3)

P Steel | M | K | N | S | H

18<DC≤30 0 −0.021

Key point drill for bridge construction (l/d=3)





DC (mm)	Order Number	Stock UP20M	Dimensions (mm) LU	LH	OAL	LF	PL	DCON
24.5	BRSB2450S32	●	90.3	114.3	174.3	171	3.3	32
24.6	BRSB2460S32	●	89.3	114.3	174.3	171	3.3	32
24.7	BRSB2470S32	●	89.3	114.3	174.3	171	3.3	32
26.5	BRSB2650S32	●	93.6	119.6	179.6	176	3.6	32
26.7	BRSB2670S32	●	92.6	119.6	179.6	176	3.6	32

BRMB

Key point drill for bridge construction

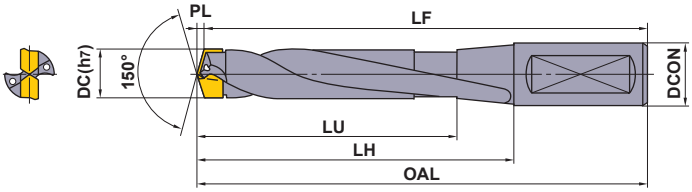
- Excellent cutting sharpness and chip discharge due to high rake type insert.
- Unique flute shape is used. (l/d=5)

P Steel | M | K | N | S | H

18<DC≤30 0 −0.021

Key point drill for bridge construction (l/d=5)





DC (mm)	Order Number	Stock UP20M	Dimensions (mm) LU	LH	OAL	LF	PL	DCON
24.5	BRMB2450S32	●	139.3	163.3	223.3	220	3.3	32
24.6	BRMB2460S32	●	143.3	168.3	228.3	225	3.3	32
24.7	BRMB2470S32	●	143.3	168.3	228.3	225	3.3	32
26.5	BRMB2650S32	●	147.6	173.6	233.6	230	3.6	32
26.7	BRMB2670S32	●	151.6	178.6	238.6	235	3.6	32

● : Inventory maintained in Japan.

BRB

- Low thrust due to the absence of a chisel edge.
- Easy regrinding.

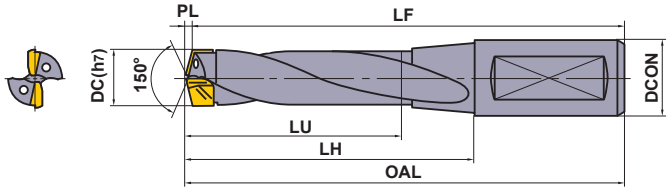
New point drill for bridge construction parts

P Steel | M | K | N | S | H

18<DC≤30
0
−0.021

New point drill for bridge construction parts
(l/d=3)





DC (mm)	Order Number	Stock UTi20T	Dimensions (mm) LU	LH	OAL	LF	PL	DCON
24.5	BRB2450S32M	●	90.3	114.3	174.3	171	3.3	32
24.6	BRB2460S32M	●	89.3	114.3	174.3	171	3.3	32
24.7	BRB2470S32M	●	89.3	114.3	174.3	171	3.3	32
26.5	BRB2650S32M	●	93.6	119.6	179.6	176	3.6	32
26.7	BRB2670S32M	●	92.6	119.6	179.6	176	3.6	32

RECOMMENDED CUTTING CONDITIONS

Work Material		Hardness	BRB Cutting Speed (m/min)	BRB Feed (mm/rev)	BRSB Cutting Speed (m/min)	BRSB Feed (mm/rev)	BRMB Cutting Speed (m/min)	BRMB Feed (mm/rev)
P	Structural Steel SS400 (JIS)	Tensile Strength 400−500MPa	65 (60−75)	0.35 (0.3−0.4)	80 (70−90)	0.35 (0.3−0.45)	70 (60−80)	0.35 (0.3−0.45)
	Structural Steel SM490 (JIS)	Tensile Strength 490−610MPa	60 (50−70)	0.3 (0.2−0.4)	70 (60−80)	0.3 (0.2−0.4)	60 (50−70)	0.3 (0.2−0.4)
	Structural Steel SM570 (JIS)	Tensile Strength 570−720MPa	55 (50−60)	0.3 (0.2−0.35)	60 (50−70)	0.3 (0.2−0.35)	50 (40−60)	0.3 (0.2−0.35)
	Mild Steel	≤180HB	40 (30−50)	0.35 (0.25−0.4)	70 (55−85)	0.35 (0.2−0.45)	70 (55−85)	0.35 (0.2−0.45)

DRILLING(BRAZED TYPE)

BRA

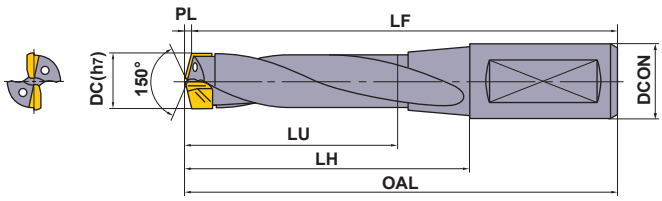
- Low thrust due to the absence of a chisel edge.
- Easy regrinding.

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron			

8≤D≤10	10<DC≤18	18<DC≤30	30<DC≤40
0 −0.015	0 −0.018	0 −0.021	0 −0.025

General Use (Carbon Steel, Alloy Steel, Stainless Steel)
(l/d=3)





DC (mm)	Standard Diameter		Intermediate Diameters		Dimensions (mm)					
	Order Number	Stock UP20M	Range of Drill Diameters (DC)	Order Number	LU	LH	OAL	LF	PL	DCON
8.0	BRA0800S16	●	8.0<DC≤8.5	BRA□□□□S16	24.1	36.1	84.1	83	1.1	16
8.5	BRA0850S16	●			24.1	36.1	84.1	83	1.1	16
9.0	BRA0900S16	●	8.5<DC≤9.5		29.2	41.2	89.2	88	1.2	16
9.5	BRA0950S16	●			29.3	41.3	89.3	88	1.3	16
10.0	BRA1000S16	●	9.5<DC≤10.5		36.3	46.3	94.3	93	1.3	16
10.5	BRA1050S16	●			36.4	46.4	94.4	93	1.4	16
11.0	BRA1100S16	●	10.5<DC≤11.5		41.5	52.5	100.5	99	1.5	16
11.5	BRA1150S16	●			41.5	52.5	100.5	99	1.5	16
12.0	BRA1200S16	●	11.5<DC≤12.5		45.6	57.6	105.6	104	1.6	16
12.5	BRA1250S16	●			45.7	57.7	105.7	104	1.7	16
13.0	BRA1300S16	●	12.5<DC≤13.5		49.7	62.7	110.7	109	1.7	16
13.5	BRA1350S16	●			49.8	62.8	110.8	109	1.8	16
14.0	BRA1400S16	●	13.5<DC≤14.5		53.9	67.9	115.9	114	1.9	16
14.5	BRA1450S16	●			53.9	67.9	115.9	114	1.9	16
15.0	BRA1500S20	●	14.5<DC≤15.5	BRA□□□□S20	63.0	78.0	128.0	126	2.0	20
15.5	BRA1550S20	●			63.1	78.1	128.1	126	2.1	20
16.0	BRA1600S20	●	15.5<DC≤16.5		67.1	83.1	133.1	131	2.1	20
16.5	BRA1650S20	●			67.2	83.2	133.2	131	2.2	20
17.0	BRA1700S20	●	16.5<DC≤17.5		71.3	88.3	138.3	136	2.3	20
17.5	BRA1750S20	●			71.3	88.3	138.3	136	2.3	20
18.0	BRA1800S20	●	17.5<DC≤18.5		75.4	93.4	143.4	141	2.4	20
18.5	BRA1850S20	●			75.5	93.5	143.5	141	2.5	20
19.0	BRA1900S25	●	18.5<DC≤19.5	BRA□□□□S25	79.5	103.5	159.5	157	2.5	25
19.5	BRA1950S25	●			79.6	103.6	159.6	157	2.6	25
20.0	BRA2000S25	●	19.5<DC≤20.5		83.7	103.7	159.7	157	2.7	25
20.5	BRA2050S25	●			83.7	103.7	159.7	157	2.7	25
21.0	BRA2100S25	●	20.5<DC≤21.5		82.8	103.8	159.8	157	2.8	25
21.5	BRA2150S25	●			82.9	103.9	159.9	157	2.9	25
22.0	BRA2200S25	●	21.5<DC≤22.5		86.9	108.9	164.9	162	2.9	25
22.5	BRA2250S25	●			87.0	109.0	165.0	162	3.0	25
23.0	BRA2300S25	●	22.5<DC≤23.5		86.1	109.1	165.1	162	3.1	25
23.5	BRA2350S25	●			86.1	109.1	165.1	162	3.1	25

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

DC (mm)	Standard Diameter		Intermediate Diameters		Dimensions (mm)					
	Order Number	Stock UP20M	Range of Drill Diameters (DC)	Order Number	LU	LH	OAL	LF	PL	DCON
24.0	BRA2400S32	●	23.5<DC≤24.5	BRA□□□□S32	90.2	114.2	174.2	171	3.2	32
24.5	BRA2450S32	●			90.3	114.3	174.3	171	3.3	32
25.0	BRA2500S32	●	24.5<DC≤25.5		89.3	114.3	174.3	171	3.3	32
25.5	BRA2550S32	●			89.4	114.4	174.4	171	3.4	32
26.0	BRA2600S32	●	25.5<DC≤26.5		93.5	119.5	179.5	176	3.5	32
26.5	BRA2650S32	●			93.6	119.6	179.6	176	3.6	32
27.0	BRA2700S32	●	26.5<DC≤27.5		92.6	119.6	179.6	176	3.6	32
27.5	BRA2750S32	●			92.7	119.7	179.7	176	3.7	32
28.0	BRA2800S32	●	27.5<DC≤28.5		96.8	124.8	184.8	181	3.8	32
28.5	BRA2850S32	●			96.8	124.8	184.8	181	3.8	32
29.0	BRA2900S32	●	28.5<DC≤29.5		100.9	129.9	189.9	186	3.9	32
29.5	BRA2950S32	●			101.0	130.0	190.0	186	4.0	32
30.0	BRA3000S32	●	29.5<DC≤30.5		100.0	130.0	190.0	186	4.0	32
30.5	BRA3050S32	●			100.1	130.1	190.1	186	4.1	32
31.0	BRA3100S40	□	30.5<DC≤31.5	BRA□□□□S40	100.2	131.2	201.2	197	4.2	40
31.5	BRA3150S40	□			100.2	131.2	201.2	197	4.2	40
32.0	BRA3200S40	□	31.5<DC≤32.5		104.3	136.3	206.3	202	4.3	40
32.5	BRA3250S40	□			104.4	136.4	206.4	202	4.4	40
33.0	BRA3300S40	□	32.5<DC≤33.5		108.4	141.4	211.4	207	4.4	40
33.5	BRA3350S40	□			108.5	141.5	211.5	207	4.5	40
34.0	BRA3400S40	□	33.5<DC≤34.5		107.6	141.6	211.6	207	4.6	40
34.5	BRA3450S40	□			107.6	141.6	211.6	207	4.6	40
35.0	BRA3500S40	□	34.5<DC≤35.5		111.7	146.7	216.7	212	4.7	40
35.5	BRA3550S40	□			111.8	146.8	216.8	212	4.8	40
36.0	BRA3600S40	□	35.5<DC≤36.5		115.8	151.8	221.8	217	4.8	40
36.5	BRA3650S40	□			115.9	151.9	221.9	217	4.9	40
37.0	BRA3700S40	□	36.5<DC≤37.5		120.0	157.0	227.0	222	5.0	40
37.5	BRA3750S40	□			120.0	157.0	227.0	222	5.0	40
38.0	BRA3800S40	□	37.5<DC≤38.5		124.1	162.1	232.1	227	5.1	40
38.5	BRA3850S40	□			124.2	162.2	232.2	227	5.2	40
39.0	BRA3900S40	□	38.5<DC≤39.5		123.2	162.2	232.2	227	5.2	40
39.5	BRA3950S40	□			123.3	162.3	232.3	227	5.3	40
40.0	BRA4000S40	□	39.5<DC≤40.0		127.4	167.4	237.4	232	5.4	40

(Note 1) Drills in the intermediate drill diameter range are produced to order only.
(Note 2) For ordering an intermediate diameter, please enter the diameter (DC) into the 4-digit space□□□□in the nominal designation.
(Ex. UP20M BRA2530S32 for a diameter of ϕ25.30mm)
(Note 3) Please contact us regarding special designs.
(Note 4) Please contact us for any geometry that is not in this catalogue (e.g. drills with chamfered cutting edges can be made to order).

CUTTING CONDITIONS ➤ N210
TECHNICAL DATA ➤ Q001

DRILLING(BRAZED TYPE)

BRL

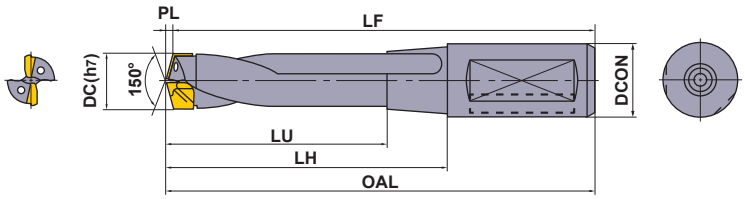
- Low thrust due to the absence of a chisel edge.
- Easy regrinding.
- Unique flute shape for lathes.

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron			

8≤DC≤10	10<DC≤18	18<DC≤30	30<DC≤40
0 −0.015	0 −0.018	0 −0.021	0 −0.025

For turning
(l/d=3)





DC (mm)	Standard Diameter		Intermediate Diameters		Dimensions (mm)					
	Order Number	Stock STi40T	Range of Drill Diameters (DC)	Order Number	LU	LH	OAL	LF	PL	DCON
8.0	BRL0800S16	●	8.0≤DC≤8.5	BRL□□□□S16	24.1	36.1	84.1	83	1.1	16
8.5	BRL0850S16	●			24.1	36.1	84.1	83	1.1	16
9.0	BRL0900S16	●	8.5<DC≤9.5		29.2	41.2	89.2	88	1.2	16
9.5	BRL0950S16	●			29.3	41.3	89.3	88	1.3	16
10.0	BRL1000S16	●	9.5<DC≤10.5		36.3	46.3	94.3	93	1.3	16
10.5	BRL1050S16	●			36.4	46.4	94.4	93	1.4	16
11.0	BRL1100S16	●	10.5<DC≤11.5		41.5	52.5	100.5	99	1.5	16
11.5	BRL1150S16	●			41.5	52.5	100.5	99	1.5	16
12.0	BRL1200S16	●	11.5<DC≤12.5		45.6	57.6	105.6	104	1.6	16
12.5	BRL1250S16	●			45.7	57.7	105.7	104	1.7	16
13.0	BRL1300S16	●	12.5<DC≤13.5		49.7	62.7	110.7	109	1.7	16
13.5	BRL1350S16	●			49.8	62.8	110.8	109	1.8	16
14.0	BRL1400S16	●	13.5<DC≤14.5		53.9	67.9	115.9	114	1.9	16
14.5	BRL1450S16	●			53.9	67.9	115.9	114	1.9	16
15.0	BRL1500S20	●	14.5<DC≤15.5	BRL□□□□S20	63.0	78.0	128.0	126	2.0	20
15.5	BRL1550S20	●			63.1	78.1	128.1	126	2.1	20
16.0	BRL1600S20	●	15.5<DC≤16.5		67.1	83.1	133.1	131	2.1	20
16.5	BRL1650S20	●			67.2	83.2	133.2	131	2.2	20
17.0	BRL1700S20	●	16.5<DC≤17.5		71.3	88.3	138.3	136	2.3	20
17.5	BRL1750S20	●			71.3	88.3	138.3	136	2.3	20
18.0	BRL1800S20	●	17.5<DC≤18.5		75.4	93.4	143.4	141	2.4	20
18.5	BRL1850S20	●			75.5	93.5	143.5	141	2.5	20
19.0	BRL1900S25	●	18.5<DC≤19.5	BRL□□□□S25	79.5	103.5	159.5	157	2.5	25
19.5	BRL1950S25	●			79.6	103.6	159.6	157	2.6	25
20.0	BRL2000S25	●	19.5<DC≤20.5		83.7	103.7	159.7	157	2.7	25
20.5	BRL2050S25	●			83.7	103.7	159.7	157	2.7	25
21.0	BRL2100S25	●	20.5<DC≤21.5		82.8	103.8	159.8	157	2.8	25
21.5	BRL2150S25	●			82.9	103.9	159.9	157	2.9	25
22.0	BRL2200S25	●	21.5<DC≤22.5		86.9	108.9	164.9	162	2.9	25
22.5	BRL2250S25	●			87.0	109.0	165.0	162	3.0	25
23.0	BRL2300S25	●	22.5<DC≤23.5		86.1	109.1	165.1	162	3.1	25
23.5	BRL2350S25	●			86.1	109.1	165.1	162	3.1	25

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

DC (mm)	Standard Diameter		Intermediate Diameters		Dimensions (mm)					
	Order Number	Stock STi40T	Range of Drill Diameters (DC)	Order Number	LU	LH	OAL	LF	PL	DCON
24.0	BRL2400S32	●	23.5<DC≤24.5	BRL□□□□S32	90.2	114.2	174.2	171	3.2	32
24.5	BRL2450S32	●			90.3	114.3	174.3	171	3.3	32
25.0	BRL2500S32	●	24.5<DC≤25.5		89.3	114.3	174.3	171	3.3	32
25.5	BRL2550S32	●			89.4	114.4	174.4	171	3.4	32
26.0	BRL2600S32	●	25.5<DC≤26.5		93.5	119.5	179.5	176	3.5	32
26.5	BRL2650S32	●			93.6	119.6	179.6	176	3.6	32
27.0	BRL2700S32	●	26.5<DC≤27.5		92.6	119.6	179.6	176	3.6	32
27.5	BRL2750S32	●			92.7	119.7	179.7	176	3.7	32
28.0	BRL2800S32	●	27.5<DC≤28.5		96.8	124.8	184.8	181	3.8	32
28.5	BRL2850S32	●			96.8	124.8	184.8	181	3.8	32
29.0	BRL2900S32	●	28.5<DC≤29.5		100.9	129.9	189.9	186	3.9	32
29.5	BRL2950S32	●			101.0	130.0	190.0	186	4.0	32
30.0	BRL3000S32	●	29.5<DC≤30.5		100.0	130.0	190.0	186	4.0	32
30.5	BRL3050S32	●			100.1	130.1	190.1	186	4.1	32
31.0	BRL3100S40	□	30.5<DC≤31.5	BRL□□□□S40	100.2	131.2	201.2	197	4.2	40
31.5	BRL3150S40	□			100.2	131.2	201.2	197	4.2	40
32.0	BRL3200S40	□	31.5<DC≤32.5		104.3	136.3	206.3	202	4.3	40
32.5	BRL3250S40	□			104.4	136.4	206.4	202	4.4	40
33.0	BRL3300S40	□	32.5<DC≤33.5		108.4	141.4	211.4	207	4.4	40
33.5	BRL3350S40	□			108.5	141.5	211.5	207	4.5	40
34.0	BRL3400S40	□	33.5<DC≤34.5		107.6	141.6	211.6	207	4.6	40
34.5	BRL3450S40	□			107.6	141.6	211.6	207	4.6	40
35.0	BRL3500S40	□	34.5<DC≤35.5		111.7	146.7	216.7	212	4.7	40
35.5	BRL3550S40	□			111.8	146.8	216.8	212	4.8	40
36.0	BRL3600S40	□	35.5<DC≤36.5		115.8	151.8	221.8	217	4.8	40
36.5	BRL3650S40	□			115.9	151.9	221.9	217	4.9	40
37.0	BRL3700S40	□	36.5<DC≤37.5		120.0	157.0	227.0	222	5.0	40
37.5	BRL3750S40	□			120.0	157.0	227.0	222	5.0	40
38.0	BRL3800S40	□	37.5<DC≤38.5		124.1	162.1	232.1	227	5.1	40
38.5	BRL3850S40	□			124.2	162.2	232.2	227	5.2	40
39.0	BRL3900S40	□	38.5<DC≤39.5		123.2	162.2	232.2	227	5.2	40
39.5	BRL3950S40	□			123.3	162.3	232.3	227	5.3	40
40.0	BRL4000S40	□	39.5<DC≤40.0		127.4	167.4	237.4	232	5.4	40

(Note 1) Drills in the intermediate drill diameter range are produced to order only.
(Note 2) For ordering an intermediate diameter, please enter the diameter (DC) into the 4-digit space□□□□in the nominal designation.
(Ex. STi40T BRL2530S32 for a diameter of ϕ25.30mm)
(Note 3) Please contact us regarding special designs.
(Note 4) Please contact us for any geometry that is not in this catalogue (e.g. drills with chamfered cutting edges can be made to order).

CUTTING CONDITIONS ➤ N210
TECHNICAL DATA ➤ Q001

DRILLING(BRAZED TYPE)

BRA/BRL

RECOMMENDED CUTTING CONDITIONS

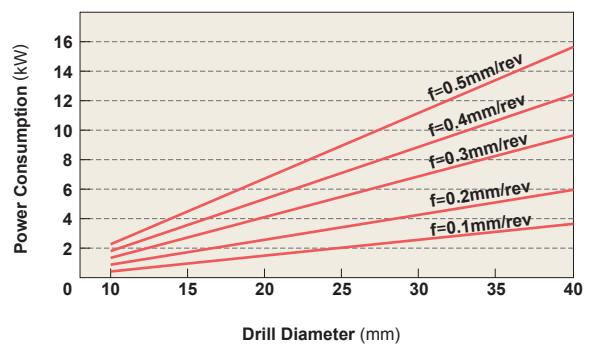
Type		Work Material	Hardness	Drill Diameter φ8.0—φ13.0		Drill Diameter φ13.0—φ18.0		Drill Diameter≥φ18.0	
				Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)
BRA	P	Mild Steel	≤180HB	55 (40—65)	0.25 (0.20—0.30)	65 (50—75)	0.30 (0.25—0.35)	75 (60—85)	0.30 (0.25—0.35)
		Carbon Steel Alloy Steel	180—280HB	50 (35—60)	0.25 (0.20—0.30)	60 (45—70)	0.30 (0.25—0.35)	70 (55—80)	0.30 (0.25—0.35)
			280—350HB	40 (30—50)	0.25 (0.20—0.30)	50 (40—60)	0.25 (0.20—0.30)	55 (45—65)	0.27 (0.20—0.30)
	M	Stainless Steel	≤200HB	30 (20—40)	0.25 (0.20—0.27)	35 (25—45)	0.27 (0.20—0.30)	40 (30—50)	0.30 (0.25—0.35)
	K	Gray Cast Iron	Tensile Strength≤350MPa	60 (40—70)	0.30 (0.25—0.35)	70 (50—80)	0.35 (0.30—0.40)	80 (60—90)	0.40 (0.35—0.45)
		Ductile Cast Iron	Tensile Strength≤450MPa	55 (40—65)	0.27 (0.20—0.30)	60 (45—70)	0.30 (0.25—0.35)	70 (55—80)	0.30 (0.25—0.35)
	S	Heat Resistant Alloy	—	15 (10—20)	0.10 (0.05—0.12)	20 (15—25)	0.15 (0.10—0.20)	25 (20—30)	0.15 (0.10—0.20)
		Titanium Alloy	—	20 (10—25)	0.15 (0.10—0.17)	30 (20—35)	0.20 (0.15—0.25)	35 (30—40)	0.25 (0.20—0.30)
BRL	P	Mild Steel	≤180HB	50 (35—60)	0.25 (0.20—0.30)	60 (45—70)	0.30 (0.25—0.35)	65 (50—75)	0.30 (0.25—0.35)
		Carbon Steel Alloy Steel	180—280HB	45 (30—55)	0.25 (0.20—0.30)	55 (40—65)	0.30 (0.25—0.35)	60 (45—70)	0.30 (0.25—0.35)
			280—350HB	35 (25—45)	0.25 (0.20—0.30)	45 (35—55)	0.25 (0.20—0.30)	50 (40—60)	0.27 (0.20—0.30)
	M	Stainless Steel	≤200HB	30 (20—40)	0.25 (0.20—0.27)	30 (20—40)	0.27 (0.20—0.30)	35 (25—45)	0.30 (0.25—0.35)
	K	Gray Cast Iron	Tensile Strength≤350MPa	55 (40—70)	0.30 (0.25—0.35)	60 (45—75)	0.35 (0.3—0.40)	65 (50—80)	0.40 (0.35—0.45)
		Ductile Cast Iron	Tensile Strength≤450MPa	50 (35—60)	0.27 (0.20—0.30)	55 (40—65)	0.30 (0.25—0.35)	60 (45—70)	0.30 (0.25—0.35)
	S	Heat Resistant Alloy	—	15 (10—20)	0.10 (0.05—0.12)	15 (10—20)	0.15 (0.10—0.20)	20 (15—25)	0.15 (0.10—0.20)
		Titanium Alloy	—	20 (10—25)	0.15 (0.10—0.17)	25 (10—30)	0.20 (0.15—0.25)	30 (20—35)	0.25 (0.20—0.30)

(Note) The above conditions are for general cutting. The cutting conditions need to be modified depending on power, rigidity of the machine and workpiece shape.

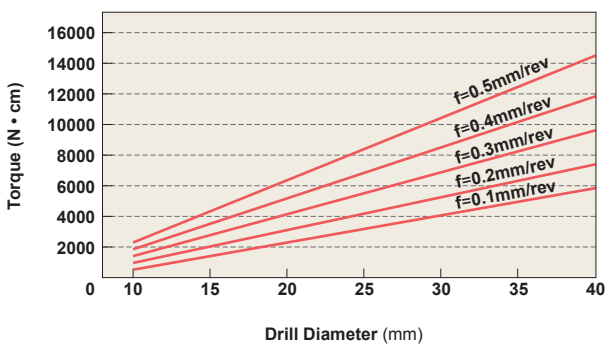
CUTTING RESISTANCE

Workpiece : JIS SCM440(200HB) Cutting Speed : 60m/min

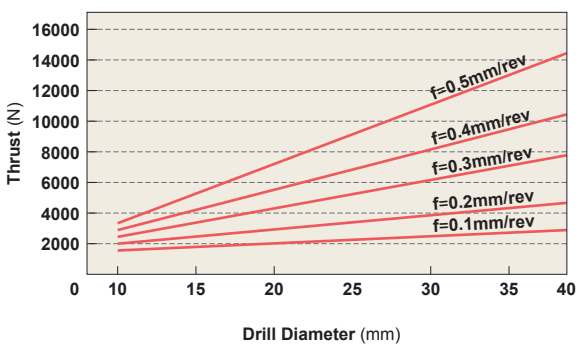
Power Consumption



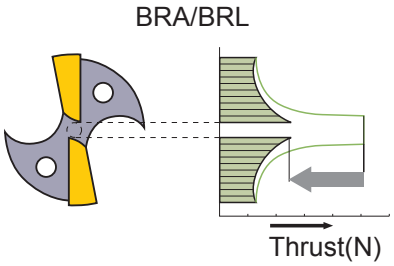
Torque

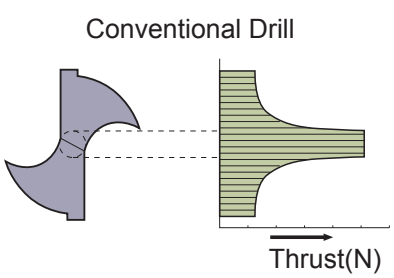


Thrust

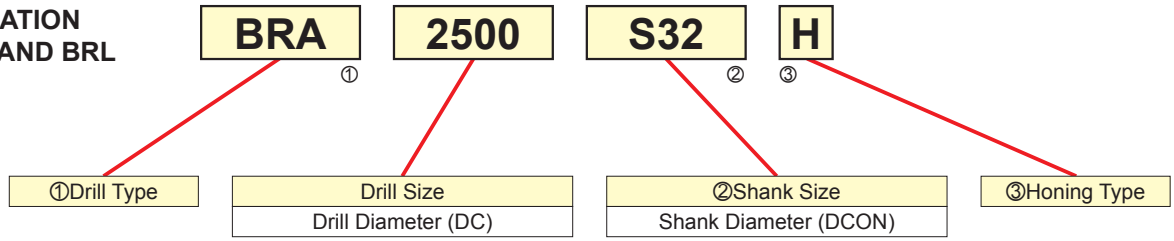


Reason for Low Thrust Load





IDENTIFICATION FOR BRA AND BRL



①Drill Type

Type	Description						Applications	Products Name
	Point Angle	Hole Depth	Helix Angle	Relief Angle	Back Taper	Body Dia.		
BRA	150°	l/d=3—4	20°	10°	0.3mm/100mm	DC-0.2mm	For General Use (Carbon / Alloy / Stainless Steel)	BRA○○○○S○○
BRL	150°	l/d=3—4	10°+ Straight	10°	1.0mm/100mm	DC-1.0mm	For Turning	BRL○○○○S○○L

②Shank Size

Type	Shank Diameter	Drill Diameter
S16	ø16 (h6)	ø8.0≤DC≤ø14.5
S20	ø20 (h6)	ø14.5 < DC≤ø18.5
S25	ø25 (h6)	ø18.5 < DC≤ø23.5
S32	ø32 (h6)	ø23.5 < DC≤ø30.5
S40	ø40 (h6)	ø30.5 < DC≤ø40.0

③Honing Type

Type	Honing Width (mm)	Work Material	
		BRA	**BRL**
-(Standard)	0.15—0.2	Carbon Steel, Alloy Steel, Mild Steel	Carbon Steel (≥200HB), Alloy Steel, Stainless Steel
S	0.2—0.25	—	Carbon Steel (<200HB)
M	0.25—0.3	—	High Tension Steel, Rolled Steel for Welded Structures
L	0.3—0.4	—	Mild Steel
H	0.05—0.1	Stainless Steel, Heat Resistant Alloy, Titanium Alloy	—
G	0.025—0.08	Cast Iron, Aluminium Alloy, Non-Ferrous Metals	Cast Iron

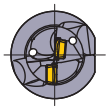
MVX

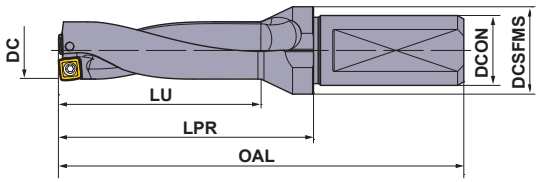
- Ideal combination of outer CVD insert and inner PVD insert.
- High rigidity body that enabled L/D=6 deep hole machining.

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron			

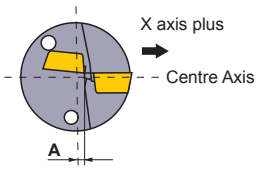
	Machining tolerance(guide)(mm)		
L/D	ø17–ø33	ø33.5–ø47	ø48–ø63
2D, 3D	0 +0.25	0 +0.3	0 +0.3
4D, 5D	0 +0.35	0 +0.4	0 +0.45
6D	0 +0.45	0 +0.6	







Maximum offset for turning



Tighten the clamp screw according to the torque below.

Drill Diameter (mm)	Clamp Torque (N · m)
17—19.5	1.0
20—22.5	2.0
23—27.5	2.5
28—46	3.5
47—63	7.5

DC (mm)	Hole Depth (l/d)	Order Number	Stock	Number of Teeth	Dimensions (mm) LU	LPR	OAL	DCON	DCSFMS	A (mm)	Insert Number	Clamp Screw	Wrench
17.0	2	MVX1700X2F20	●	2	41	56	99	20	25	0.5	SOMX063005-○○	TPS25	TIP07F
	3	MVX1700X3F20	●	2	58	73	116	20	25	0.5	SOMX063005-○○	TPS25	TIP07F
	4	MVX1700X4F20	●	2	75	90	133	20	25	0.5	SOMX063005-○○	TPS25	TIP07F
	5	MVX1700X5F20	●	2	92	107	150	20	25	0.5	SOMX063005-○○	TPS25	TIP07F
	6	MVX1700X6F20	●	2	109	124	167	20	25	0.5	SOMX063005-○○	TPS25	TIP07F
17.5	2	MVX1750X2F25	●	2	42	62	112	25	32	0.45	SOMX063005-○○	TPS25	TIP07F
	3	MVX1750X3F25	●	2	59.5	79.5	129.5	25	32	0.45	SOMX063005-○○	TPS25	TIP07F
	4	MVX1750X4F25	●	2	77	97	147	25	32	0.45	SOMX063005-○○	TPS25	TIP07F
	5	MVX1750X5F25	●	2	94.5	114.5	164.5	25	32	0.45	SOMX063005-○○	TPS25	TIP07F
	6	MVX1750X6F25	●	2	112	132	182	25	32	0.45	SOMX063005-○○	TPS25	TIP07F
18.0	2	MVX1800X2F25	●	2	43	63	113	25	32	0.4	SOMX063005-○○	TPS25	TIP07F
	3	MVX1800X3F25	●	2	61	81	131	25	32	0.4	SOMX063005-○○	TPS25	TIP07F
	4	MVX1800X4F25	●	2	79	99	149	25	32	0.4	SOMX063005-○○	TPS25	TIP07F
	5	MVX1800X5F25	●	2	97	117	167	25	32	0.4	SOMX063005-○○	TPS25	TIP07F
	6	MVX1800X6F25	●	2	115	135	185	25	32	0.4	SOMX063005-○○	TPS25	TIP07F
18.5	2	MVX1850X2F25	●	2	44	64	114	25	32	0.35	SOMX063005-○○	TPS25	TIP07F
	3	MVX1850X3F25	●	2	62.5	82.5	132.5	25	32	0.35	SOMX063005-○○	TPS25	TIP07F
	4	MVX1850X4F25	●	2	81	101	151	25	32	0.35	SOMX063005-○○	TPS25	TIP07F
	5	MVX1850X5F25	●	2	99.5	119.5	169.5	25	32	0.35	SOMX063005-○○	TPS25	TIP07F
	6	MVX1850X6F25	●	2	118	138	188	25	32	0.35	SOMX063005-○○	TPS25	TIP07F
19.0	2	MVX1900X2F25	●	2	45	65	115	25	32	0.3	SOMX063005-○○	TPS25	TIP07F
	3	MVX1900X3F25	●	2	64	84	134	25	32	0.3	SOMX063005-○○	TPS25	TIP07F
	4	MVX1900X4F25	●	2	83	103	153	25	32	0.3	SOMX063005-○○	TPS25	TIP07F
	5	MVX1900X5F25	●	2	102	122	172	25	32	0.3	SOMX063005-○○	TPS25	TIP07F
	6	MVX1900X6F25	●	2	121	141	191	25	32	0.3	SOMX063005-○○	TPS25	TIP07F
19.5	2	MVX1950X2F25	●	2	46	66	116	25	32	0.25	SOMX063005-○○	TPS25	TIP07F
	3	MVX1950X3F25	●	2	65.5	85.5	135.5	25	32	0.25	SOMX063005-○○	TPS25	TIP07F
	4	MVX1950X4F25	●	2	85	105	155	25	32	0.25	SOMX063005-○○	TPS25	TIP07F
	5	MVX1950X5F25	●	2	104.5	124.5	174.5	25	32	0.25	SOMX063005-○○	TPS25	TIP07F
	6	MVX1950X6F25	●	2	124	144	194	25	32	0.25	SOMX063005-○○	TPS25	TIP07F

* Clamp Torque (N • m) : TPS25=1.0, TPS3=2.0

● : Inventory maintained in Japan.

DC (mm)	Hole Depth (l/d)	Order Number	Stock	Number of Teeth	Dimensions (mm) LU	LPR	OAL	DCON	DCSFMS	A (mm)	Insert Number	Clamp Screw	Wrench
20.0	2	MVX2000X2F25	●	2	47	67	117	25	32	0.6	SOMX073505-○○	TPS3	TIP10W
	3	MVX2000X3F25	●	2	67	87	137	25	32	0.6	SOMX073505-○○	TPS3	TIP10W
	4	MVX2000X4F25	●	2	87	107	157	25	32	0.6	SOMX073505-○○	TPS3	TIP10W
	5	MVX2000X5F25	●	2	107	127	177	25	32	0.6	SOMX073505-○○	TPS3	TIP10W
	6	MVX2000X6F25	●	2	127	147	197	25	32	0.6	SOMX073505-○○	TPS3	TIP10W
20.5	2	MVX2050X2F25	●	2	48	68	118	25	32	0.55	SOMX073505-○○	TPS3	TIP10W
	3	MVX2050X3F25	●	2	68.5	88.5	138.5	25	32	0.55	SOMX073505-○○	TPS3	TIP10W
21.0	2	MVX2100X2F25	●	2	49	69	119	25	32	0.5	SOMX073505-○○	TPS3	TIP10W
	3	MVX2100X3F25	●	2	70	90	140	25	32	0.5	SOMX073505-○○	TPS3	TIP10W
	4	MVX2100X4F25	●	2	91	111	161	25	32	0.5	SOMX073505-○○	TPS3	TIP10W
	5	MVX2100X5F25	●	2	112	132	182	25	32	0.5	SOMX073505-○○	TPS3	TIP10W
	6	MVX2100X6F25	●	2	133	153	203	25	32	0.5	SOMX073505-○○	TPS3	TIP10W
21.5	2	MVX2150X2F25	●	2	50	70	120	25	32	0.45	SOMX073505-○○	TPS3	TIP10W
	3	MVX2150X3F25	●	2	71.5	91.5	141.5	25	32	0.45	SOMX073505-○○	TPS3	TIP10W
22.0	2	MVX2200X2F25	●	2	51	71	121	25	32	0.4	SOMX073505-○○	TPS3	TIP10W
	3	MVX2200X3F25	●	2	73	93	143	25	32	0.4	SOMX073505-○○	TPS3	TIP10W
	4	MVX2200X4F25	●	2	95	115	165	25	32	0.4	SOMX073505-○○	TPS3	TIP10W
	5	MVX2200X5F25	●	2	117	137	187	25	32	0.4	SOMX073505-○○	TPS3	TIP10W
	6	MVX2200X6F25	●	2	139	159	209	25	32	0.4	SOMX073505-○○	TPS3	TIP10W
22.5	2	MVX2250X2F25	●	2	52	72	122	25	32	0.35	SOMX073505-○○	TPS3	TIP10W
	3	MVX2250X3F25	●	2	74.5	94.5	144.5	25	32	0.35	SOMX073505-○○	TPS3	TIP10W
23.0	2	MVX2300X2F25	●	2	53	73	123	25	32	0.8	SOMX084005-○○	TPS351	TIP10W
	3	MVX2300X3F25	●	2	76	96	146	25	32	0.8	SOMX084005-○○	TPS351	TIP10W
	4	MVX2300X4F25	●	2	99	119	169	25	32	0.8	SOMX084005-○○	TPS351	TIP10W
	5	MVX2300X5F25	●	2	122	142	192	25	32	0.8	SOMX084005-○○	TPS351	TIP10W
	6	MVX2300X6F25	●	2	145	165	215	25	32	0.8	SOMX084005-○○	TPS351	TIP10W
23.5	2	MVX2350X2F25	●	2	54	74	124	25	32	0.75	SOMX084005-○○	TPS351	TIP10W
	3	MVX2350X3F25	●	2	77.5	97.5	147.5	25	32	0.75	SOMX084005-○○	TPS351	TIP10W
24.0	2	MVX2400X2F25	●	2	55	75	125	25	32	0.7	SOMX084005-○○	TPS351	TIP10W
	3	MVX2400X3F25	●	2	79	99	149	25	32	0.7	SOMX084005-○○	TPS351	TIP10W
	4	MVX2400X4F25	●	2	103	123	173	25	32	0.7	SOMX084005-○○	TPS351	TIP10W
	5	MVX2400X5F25	●	2	127	147	197	25	32	0.7	SOMX084005-○○	TPS351	TIP10W
	6	MVX2400X6F25	●	2	151	171	221	25	32	0.7	SOMX084005-○○	TPS351	TIP10W
24.5	2	MVX2450X2F25	●	2	56	76	126	25	32	0.65	SOMX084005-○○	TPS351	TIP10W
	3	MVX2450X3F25	●	2	80.5	100.5	150.5	25	32	0.65	SOMX084005-○○	TPS351	TIP10W
25.0	2	MVX2500X2F25	●	2	57	77	127	25	32	0.6	SOMX084005-○○	TPS351	TIP10W
	3	MVX2500X3F25	●	2	82	102	152	25	32	0.6	SOMX084005-○○	TPS351	TIP10W
	4	MVX2500X4F25	●	2	107	127	177	25	32	0.6	SOMX084005-○○	TPS351	TIP10W
	5	MVX2500X5F25	●	2	132	152	202	25	32	0.6	SOMX084005-○○	TPS351	TIP10W
	6	MVX2500X6F25	●	2	157	177	227	25	32	0.6	SOMX084005-○○	TPS351	TIP10W
25.5	2	MVX2550X2F25	●	2	58	78	128	25	32	0.6	SOMX084005-○○	TPS351	TIP10W
	3	MVX2550X3F25	●	2	83.5	103.5	153.5	25	32	0.6	SOMX084005-○○	TPS351	TIP10W
26.0	2	MVX2600X2F32	●	2	59	79	134	32	42	0.5	SOMX084005-○○	TPS351	TIP10W
	3	MVX2600X3F32	●	2	85	105	160	32	42	0.5	SOMX084005-○○	TPS351	TIP10W
	4	MVX2600X4F32	●	2	111	131	186	32	42	0.5	SOMX084005-○○	TPS351	TIP10W
	5	MVX2600X5F32	●	2	137	157	212	32	42	0.5	SOMX084005-○○	TPS351	TIP10W
	6	MVX2600X6F32	●	2	163	183	238	32	42	0.5	SOMX084005-○○	TPS351	TIP10W

* Clamp Torque (N • m) : TPS3=2.0, TPS351=2.0

MVX

DC (mm)	Hole Depth (l/d)	Order Number	Stock	Number of Teeth	Dimensions (mm) LU	LPR	OAL	DCON	DCSFMS	A (mm)	Insert Number	Clamp Screw	Wrench
26.5	2	MVX2650X2F32	●	2	60	80	135	32	42	0.5	SOMX084005-○○	TPS351	TIP10W
	3	MVX2650X3F32	●	2	86.5	106.5	161.5	32	42	0.5	SOMX084005-○○	TPS351	TIP10W
27.0	2	MVX2700X2F32	●	2	61	81	136	32	42	0.45	SOMX084005-○○	TPS351	TIP10W
	3	MVX2700X3F32	●	2	88	108	163	32	42	0.45	SOMX084005-○○	TPS351	TIP10W
	4	MVX2700X4F32	●	2	115	135	190	32	42	0.45	SOMX084005-○○	TPS351	TIP10W
	5	MVX2700X5F32	●	2	142	162	217	32	42	0.45	SOMX084005-○○	TPS351	TIP10W
	6	MVX2700X6F32	●	2	169	189	244	32	42	0.45	SOMX084005-○○	TPS351	TIP10W
27.5	2	MVX2750X2F32	●	2	62	82	137	32	42	0.4	SOMX084005-○○	TPS351	TIP10W
	3	MVX2750X3F32	●	2	89.5	109.5	164.5	32	42	0.4	SOMX084005-○○	TPS351	TIP10W
28.0	2	MVX2800X2F32	●	2	63	83	138	32	42	0.85	SOMX094506-○○	TPS4	TIP15W
	3	MVX2800X3F32	●	2	91	111	166	32	42	0.85	SOMX094506-○○	TPS4	TIP15W
	4	MVX2800X4F32	●	2	119	139	194	32	42	0.85	SOMX094506-○○	TPS4	TIP15W
	5	MVX2800X5F32	●	2	147	167	222	32	42	0.85	SOMX094506-○○	TPS4	TIP15W
	6	MVX2800X6F32	●	2	175	195	250	32	42	0.85	SOMX094506-○○	TPS4	TIP15W
28.5	2	MVX2850X2F32	●	2	64	84	139	32	42	0.8	SOMX094506-○○	TPS4	TIP15W
	3	MVX2850X3F32	●	2	92.5	112.5	167.5	32	42	0.8	SOMX094506-○○	TPS4	TIP15W
29.0	2	MVX2900X2F32	●	2	65	85	140	32	42	0.75	SOMX094506-○○	TPS4	TIP15W
	3	MVX2900X3F32	●	2	94	114	169	32	42	0.75	SOMX094506-○○	TPS4	TIP15W
	4	MVX2900X4F32	●	2	123	143	198	32	42	0.75	SOMX094506-○○	TPS4	TIP15W
	5	MVX2900X5F32	●	2	152	172	227	32	42	0.75	SOMX094506-○○	TPS4	TIP15W
	6	MVX2900X6F32	●	2	181	201	256	32	42	0.75	SOMX094506-○○	TPS4	TIP15W
29.5	2	MVX2950X2F32	●	2	66	86	141	32	42	0.7	SOMX094506-○○	TPS4	TIP15W
	3	MVX2950X3F32	●	2	95.5	115.5	170.5	32	42	0.7	SOMX094506-○○	TPS4	TIP15W
30.0	2	MVX3000X2F32	●	2	67	87	142	32	42	0.65	SOMX094506-○○	TPS4	TIP15W
	3	MVX3000X3F32	●	2	97	117	172	32	42	0.65	SOMX094506-○○	TPS4	TIP15W
	4	MVX3000X4F32	●	2	127	147	202	32	42	0.65	SOMX094506-○○	TPS4	TIP15W
	5	MVX3000X5F32	●	2	157	177	232	32	42	0.65	SOMX094506-○○	TPS4	TIP15W
	6	MVX3000X6F32	●	2	187	207	262	32	42	0.65	SOMX094506-○○	TPS4	TIP15W
30.5	3	MVX3050X3F32	●	2	98.5	118.5	173.5	32	42	0.6	SOMX094506-○○	TPS4	TIP15W
31.0	2	MVX3100X2F40	●	2	69	89	154	40	50	0.55	SOMX094506-○○	TPS4	TIP15W
	3	MVX3100X3F40	●	2	100	120	185	40	50	0.55	SOMX094506-○○	TPS4	TIP15W
	4	MVX3100X4F40	●	2	131	151	216	40	50	0.55	SOMX094506-○○	TPS4	TIP15W
	5	MVX3100X5F40	●	2	162	182	247	40	50	0.55	SOMX094506-○○	TPS4	TIP15W
	6	MVX3100X6F40	●	2	193	213	278	40	50	0.55	SOMX094506-○○	TPS4	TIP15W
31.5	3	MVX3150X3F40	●	2	101.5	121.5	186.5	40	50	0.55	SOMX094506-○○	TPS4	TIP15W
32.0	2	MVX3200X2F40	●	2	71	91	156	40	50	0.45	SOMX094506-○○	TPS4	TIP15W
	3	MVX3200X3F40	●	2	103	123	188	40	50	0.45	SOMX094506-○○	TPS4	TIP15W
	4	MVX3200X4F40	●	2	135	155	220	40	50	0.45	SOMX094506-○○	TPS4	TIP15W
	5	MVX3200X5F40	●	2	167	187	252	40	50	0.45	SOMX094506-○○	TPS4	TIP15W
	6	MVX3200X6F40	●	2	199	219	284	40	50	0.45	SOMX094506-○○	TPS4	TIP15W
32.5	3	MVX3250X3F40	●	2	104.5	124.5	189.5	40	50	0.45	SOMX094506-○○	TPS4	TIP15W
33.0	2	MVX3300X2F40	●	2	73	93	158	40	50	0.4	SOMX094506-○○	TPS4	TIP15W
	3	MVX3300X3F40	●	2	106	126	191	40	50	0.4	SOMX094506-○○	TPS4	TIP15W
	4	MVX3300X4F40	●	2	139	159	224	40	50	0.4	SOMX094506-○○	TPS4	TIP15W
	5	MVX3300X5F40	●	2	172	192	257	40	50	0.4	SOMX094506-○○	TPS4	TIP15W
	6	MVX3300X6F40	●	2	205	225	290	40	50	0.4	SOMX094506-○○	TPS4	TIP15W

* Clamp Torque (N • m) : TPS351=2.0, TPS4=3.5

● : Inventory maintained in Japan.

NEW

DC (mm)	Hole Depth (l/d)	Order Number	Stock	Number of Teeth	Dimensions (mm) LU	LPR	OAL	DCON	DCSFMS	A (mm)	Insert Number	Clamp Screw	Wrench
33.5	3	**MVX3350X3F40**	●	2	107.5	127.5	192.5	40	50	1.2	**SOMX115506-○○**	TPS43	TIP15W
	2	**MVX3400X2F40**	●	2	75	105	170	40	50	1.1	**SOMX115506-○○**	TPS43	TIP15W
	3	**MVX3400X3F40**	●	2	109	139	204	40	50	1.1	**SOMX115506-○○**	TPS43	TIP15W
34.0	4	**MVX3400X4F40**	●	2	143	173	238	40	50	1.1	**SOMX115506-○○**	TPS43	TIP15W
	5	**MVX3400X5F40**	●	2	177	207	272	40	50	1.1	**SOMX115506-○○**	TPS43	TIP15W
	6	**MVX3400X6F40**	●	2	211	241	306	40	50	1.1	**SOMX115506-○○**	TPS43	TIP15W
34.5	3	**MVX3450X3F40**	●	2	110.5	140.5	205.5	40	50	1.1	**SOMX115506-○○**	TPS43	TIP15W
	2	**MVX3500X2F40**	●	2	77	107	172	40	50	1.0	**SOMX115506-○○**	TPS43	TIP15W
	3	**MVX3500X3F40**	●	2	112	142	207	40	50	1.0	**SOMX115506-○○**	TPS43	TIP15W
35.0	4	**MVX3500X4F40**	●	2	147	177	242	40	50	1.0	**SOMX115506-○○**	TPS43	TIP15W
	5	**MVX3500X5F40**	●	2	182	212	277	40	50	1.0	**SOMX115506-○○**	TPS43	TIP15W
	6	**MVX3500X6F40**	●	2	217	247	312	40	50	1.0	**SOMX115506-○○**	TPS43	TIP15W
35.5	3	**MVX3550X3F40**	●	2	113.5	143.5	208.5	40	50	1.0	**SOMX115506-○○**	TPS43	TIP15W
	2	**MVX3600X2F40**	●	2	79	109	174	40	50	1.0	**SOMX115506-○○**	TPS43	TIP15W
	3	**MVX3600X3F40**	●	2	115	145	210	40	50	1.0	**SOMX115506-○○**	TPS43	TIP15W
36.0	4	**MVX3600X4F40**	●	2	151	181	246	40	50	1.0	**SOMX115506-○○**	TPS43	TIP15W
	5	**MVX3600X5F40**	●	2	187	217	282	40	50	1.0	**SOMX115506-○○**	TPS43	TIP15W
	6	**MVX3600X6F40**	●	2	223	253	318	40	50	0.9	**SOMX115506-○○**	TPS43	TIP15W
	2	**MVX3700X2F40**	●	2	81	111	176	40	50	0.9	**SOMX115506-○○**	TPS43	TIP15W
	3	**MVX3700X3F40**	●	2	118	148	213	40	50	0.9	**SOMX115506-○○**	TPS43	TIP15W
37.0	4	**MVX3700X4F40**	●	2	155	185	250	40	50	0.9	**SOMX115506-○○**	TPS43	TIP15W
	5	**MVX3700X5F40**	●	2	192	222	287	40	50	0.9	**SOMX115506-○○**	TPS43	TIP15W
	6	**MVX3700X6F40**	●	2	229	259	324	40	50	0.9	**SOMX115506-○○**	TPS43	TIP15W
	2	**MVX3800X2F40**	●	2	83	113	178	40	50	0.8	**SOMX115506-○○**	TPS43	TIP15W
	3	**MVX3800X3F40**	●	2	121	151	216	40	50	0.8	**SOMX115506-○○**	TPS43	TIP15W
38.0	4	**MVX3800X4F40**	●	2	159	189	254	40	50	0.8	**SOMX115506-○○**	TPS43	TIP15W
	5	**MVX3800X5F40**	●	2	197	227	292	40	50	0.8	**SOMX115506-○○**	TPS43	TIP15W
	6	**MVX3800X6F40**	●	2	235	265	330	40	50	0.8	**SOMX115506-○○**	TPS43	TIP15W
	2	**MVX3900X2F40**	●	2	85	115	180	40	50	0.7	**SOMX115506-○○**	TPS43	TIP15W
	3	**MVX3900X3F40**	●	2	124	154	219	40	50	0.7	**SOMX115506-○○**	TPS43	TIP15W
39.0	4	**MVX3900X4F40**	●	2	163	193	258	40	50	0.7	**SOMX115506-○○**	TPS43	TIP15W
	5	**MVX3900X5F40**	●	2	202	232	297	40	50	0.7	**SOMX115506-○○**	TPS43	TIP15W
	6	**MVX3900X6F40**	●	2	241	271	336	40	50	0.7	**SOMX115506-○○**	TPS43	TIP15W
	2	**MVX4000X2F40**	●	2	87	117	182	40	50	1.5	**SOMX136008-○○**	TPS43	TIP15W
	3	**MVX4000X3F40**	●	2	127	157	222	40	50	1.5	**SOMX136008-○○**	TPS43	TIP15W
40.0	4	**MVX4000X4F40**	●	2	167	197	262	40	50	1.5	**SOMX136008-○○**	TPS43	TIP15W
	5	**MVX4000X5F40**	●	2	207	237	302	40	50	1.5	**SOMX136008-○○**	TPS43	TIP15W
	6	**MVX4000X6F40**	●	2	247	277	342	40	50	1.4	**SOMX136008-○○**	TPS43	TIP15W
	2	**MVX4100X2F40**	●	2	89	119	184	40	50	1.4	**SOMX136008-○○**	TPS43	TIP15W
	3	**MVX4100X3F40**	●	2	130	160	225	40	50	1.4	**SOMX136008-○○**	TPS43	TIP15W
41.0	4	**MVX4100X4F40**	●	2	171	201	266	40	50	1.4	**SOMX136008-○○**	TPS43	TIP15W
	5	**MVX4100X5F40**	●	2	212	242	307	40	50	1.4	**SOMX136008-○○**	TPS43	TIP15W
	6	**MVX4100X6F40**	●	2	253	283	348	40	50	1.4	**SOMX136008-○○**	TPS43	TIP15W
	2	**MVX4200X2F40**	●	2	91	121	186	40	50	1.3	**SOMX136008-○○**	TPS43	TIP15W
	3	**MVX4200X3F40**	●	2	133	163	228	40	50	1.3	**SOMX136008-○○**	TPS43	TIP15W
42.0	4	**MVX4200X4F50**	●	2	175	205	280	50	63	1.3	**SOMX136008-○○**	TPS43	TIP15W
	5	**MVX4200X5F50**	●	2	217	247	322	50	63	1.3	**SOMX136008-○○**	TPS43	TIP15W
	6	**MVX4200X6F50**	●	2	259	289	364	50	63	1.3	**SOMX136008-○○**	TPS43	TIP15W

* Clamp Torque (N • m) : TPS43=3.5

INSERT DESCRIPTION	➢ N218
CUTTING CONDITIONS	➢ N218
USAGE NOTE	➢ N247
TECHNICAL DATA	➢ Q001

MVX

NEW

DC (mm)	Hole Depth (l/d)	Order Number	Stock	Number of Teeth	Dimensions (mm) LU	LPR	OAL	DCON	DCSFMS	A (mm)	Insert Number	Clamp Screw	Wrench
43.0	2	MVX4300X2F40	●	2	93	123	188	40	50	1.2	SOMX136008-○○	TPS43	①TIP15W
	3	MVX4300X3F40	●	2	136	166	231	40	50	1.2	SOMX136008-○○	TPS43	①TIP15W
	4	MVX4300X4F50	●	2	179	209	284	50	63	1.2	SOMX136008-○○	TPS43	①TIP15W
	5	MVX4300X5F50	●	2	222	252	327	50	63	1.2	SOMX136008-○○	TPS43	①TIP15W
	6	MVX4300X6F50	●	2	265	295	370	50	63	1.2	SOMX136008-○○	TPS43	①TIP15W
44.0	2	MVX4400X2F40	●	2	95	125	190	40	50	1.1	SOMX136008-○○	TPS43	①TIP15W
	3	MVX4400X3F40	●	2	139	169	234	40	50	1.1	SOMX136008-○○	TPS43	①TIP15W
	4	MVX4400X4F50	●	2	183	213	288	50	63	1.1	SOMX136008-○○	TPS43	①TIP15W
	5	MVX4400X5F50	●	2	227	257	332	50	63	1.1	SOMX136008-○○	TPS43	①TIP15W
45.0	2	MVX4500X2F40	●	2	97	127	192	40	50	1.0	SOMX136008-○○	TPS43	①TIP15W
	3	MVX4500X3F40	●	2	142	172	237	40	50	1.0	SOMX136008-○○	TPS43	①TIP15W
	4	MVX4500X4F50	●	2	187	217	292	50	63	1.0	SOMX136008-○○	TPS43	①TIP15W
	5	MVX4500X5F50	●	2	232	262	337	50	63	1.0	SOMX136008-○○	TPS43	①TIP15W
46.0	2	MVX4600X2F40	●	2	99	129	194	40	50	0.9	SOMX136008-○○	TPS43	①TIP15W
	3	MVX4600X3F40	●	2	145	175	240	40	50	0.9	SOMX136008-○○	TPS43	①TIP15W
	4	MVX4600X4F50	●	2	191	221	296	50	63	0.9	SOMX136008-○○	TPS43	①TIP15W
	5	MVX4600X5F50	●	2	237	267	342	50	63	0.9	SOMX136008-○○	TPS43	①TIP15W
47.0	2	MVX4700X2F40	●	2	101	141	206	40	63	1.9	SOMX166508-○○	TPS54	②TIP25D
	3	MVX4700X3F40	●	2	148	188	253	40	63	1.9	SOMX166508-○○	TPS54	②TIP25D
	4	MVX4700X4F50	●	2	195	235	310	50	63	1.9	SOMX166508-○○	TPS54	②TIP25D
	5	MVX4700X5F50	●	2	242	282	357	50	63	1.9	SOMX166508-○○	TPS54	②TIP25D
48.0	2	MVX4800X2F40	●	2	103	143	208	40	63	1.8	SOMX166508-○○	TPS54	②TIP25D
	3	MVX4800X3F40	●	2	151	191	256	40	63	1.8	SOMX166508-○○	TPS54	②TIP25D
	4	MVX4800X4F50	●	2	199	239	314	50	63	1.8	SOMX166508-○○	TPS54	②TIP25D
	5	MVX4800X5F50	●	2	247	287	362	50	63	1.8	SOMX166508-○○	TPS54	②TIP25D
49.0	2	MVX4900X2F40	●	2	105	145	210	40	63	1.7	SOMX166508-○○	TPS54	②TIP25D
	3	MVX4900X3F40	●	2	154	194	259	40	63	1.7	SOMX166508-○○	TPS54	②TIP25D
	4	MVX4900X4F50	●	2	203	243	318	50	63	1.7	SOMX166508-○○	TPS54	②TIP25D
	5	MVX4900X5F50	●	2	252	292	367	50	63	1.7	SOMX166508-○○	TPS54	②TIP25D
50.0	2	MVX5000X2F40	●	2	107	147	212	40	63	1.6	SOMX166508-○○	TPS54	②TIP25D
	3	MVX5000X3F40	●	2	157	197	262	40	63	1.6	SOMX166508-○○	TPS54	②TIP25D
	4	MVX5000X4F50	●	2	207	247	322	50	63	1.6	SOMX166508-○○	TPS54	②TIP25D
	5	MVX5000X5F50	●	2	257	297	372	50	63	1.6	SOMX166508-○○	TPS54	②TIP25D
51.0	2	MVX5100X2F40	●	2	109	149	214	40	63	1.5	SOMX166508-○○	TPS54	②TIP25D
	3	MVX5100X3F40	●	2	160	200	265	40	63	1.5	SOMX166508-○○	TPS54	②TIP25D
	4	MVX5100X4F50	●	2	211	251	326	50	63	1.5	SOMX166508-○○	TPS54	②TIP25D
	5	MVX5100X5F50	●	2	262	302	377	50	63	1.5	SOMX166508-○○	TPS54	②TIP25D
52.0	2	MVX5200X2F40	●	2	111	151	216	40	63	1.4	SOMX166508-○○	TPS54	②TIP25D
	3	MVX5200X3F40	●	2	163	203	268	40	63	1.4	SOMX166508-○○	TPS54	②TIP25D
	4	MVX5200X4F50	●	2	215	255	330	50	63	1.4	SOMX166508-○○	TPS54	②TIP25D
	5	MVX5200X5F50	●	2	267	307	382	50	63	1.4	SOMX166508-○○	TPS54	②TIP25D
53.0	2	MVX5300X2F40	●	2	113	153	218	40	63	1.3	SOMX166508-○○	TPS54	②TIP25D
	3	MVX5300X3F40	●	2	166	206	271	40	63	1.3	SOMX166508-○○	TPS54	②TIP25D
	4	MVX5300X4F50	●	2	219	259	334	50	63	1.3	SOMX166508-○○	TPS54	②TIP25D
	5	MVX5300X5F50	●	2	272	312	387	50	63	1.3	SOMX166508-○○	TPS54	②TIP25D

* Clamp Torque (N • m) : TPS43=3.5, TPS54=4.5

● : Inventory maintained in Japan.

NEW

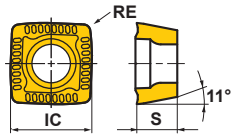
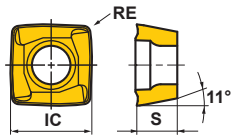
DC (mm)	Hole Depth (l/d)	Order Number	Stock	Number of Teeth	Dimensions (mm) LU	LPR	OAL	DCON	DCSFMS	A (mm)	Insert Number	Clamp Screw	Wrench
54.0	2	**MVX5400X2F40**	●	2	115	155	220	40	63	1.2	**SOMX166508-**○○	TPS54	TIP25D
	3	MVX**5400X3F40**	●	2	169	209	274	40	63	1.2	SOMX**166508-**○○	TPS54	TIP25D
	4	MVX**5400X4F50**	●	2	223	263	338	50	63	1.2	SOMX**166508-**○○	TPS54	TIP25D
	5	MVX**5400X5F50**	●	2	277	317	392	50	63	1.2	SOMX**166508-**○○	TPS54	TIP25D
55.0	2	MVX**5500X2F40**	●	2	117	157	222	40	63	1.1	SOMX**166508-**○○	TPS54	TIP25D
	3	MVX**5500X3F40**	●	2	172	212	277	40	63	1.1	SOMX**166508-**○○	TPS54	TIP25D
	4	MVX**5500X4F50**	●	2	227	267	342	50	63	1.1	SOMX**166508-**○○	TPS54	TIP25D
	5	MVX**5500X5F50**	●	2	282	322	397	50	63	1.1	SOMX**166508-**○○	TPS54	TIP25D
56.0	2	MVX**5600X2F40**	●	2	119	159	224	40	63	1.0	SOMX**166508-**○○	TPS54	TIP25D
	3	MVX**5600X3F40**	●	2	175	215	280	40	63	1.0	SOMX**166508-**○○	TPS54	TIP25D
	4	MVX**5600X4F50**	●	2	231	271	346	50	63	1.0	SOMX**166508-**○○	TPS54	TIP25D
	5	MVX**5600X5F50**	●	2	287	327	402	50	63	1.0	SOMX**166508-**○○	TPS54	TIP25D
57.0	2	MVX**5700X2F40**	●	2	121	161	226	40	68	1.5	SOMX**187008-**○○	TPS54	TIP25D
	3	MVX**5700X3F40**	●	2	178	218	283	40	68	1.5	SOMX**187008-**○○	TPS54	TIP25D
	4	MVX**5700X4F50**	●	2	235	275	350	50	68	1.5	SOMX**187008-**○○	TPS54	TIP25D
	5	MVX**5700X5F50**	●	2	292	332	407	50	68	1.5	SOMX**187008-**○○	TPS54	TIP25D
58.0	2	MVX**5800X2F40**	●	2	123	163	228	40	68	1.4	SOMX**187008-**○○	TPS54	TIP25D
	3	MVX**5800X3F40**	●	2	181	221	286	40	68	1.4	SOMX**187008-**○○	TPS54	TIP25D
	4	MVX**5800X4F50**	●	2	239	279	354	50	68	1.4	SOMX**187008-**○○	TPS54	TIP25D
	5	MVX**5800X5F50**	●	2	297	337	412	50	68	1.4	SOMX**187008-**○○	TPS54	TIP25D
59.0	2	MVX**5900X2F40**	●	2	125	165	230	40	68	1.3	SOMX**187008-**○○	TPS54	TIP25D
	3	MVX**5900X3F40**	●	2	184	224	289	40	68	1.3	SOMX**187008-**○○	TPS54	TIP25D
	4	MVX**5900X4F50**	●	2	243	283	358	50	68	1.3	SOMX**187008-**○○	TPS54	TIP25D
	5	MVX**5900X5F50**	●	2	302	342	417	50	68	1.3	SOMX**187008-**○○	TPS54	TIP25D
60.0	2	MVX**6000X2F40**	●	2	127	167	232	40	68	1.2	SOMX**187008-**○○	TPS54	TIP25D
	3	MVX**6000X3F40**	●	2	187	227	292	40	68	1.2	SOMX**187008-**○○	TPS54	TIP25D
	4	MVX**6000X4F50**	●	2	247	287	362	50	68	1.2	SOMX**187008-**○○	TPS54	TIP25D
	5	MVX**6000X5F50**	●	2	307	347	422	50	68	1.2	SOMX**187008-**○○	TPS54	TIP25D
61.0	2	MVX**6100X2F40**	●	2	129	169	234	40	68	1.1	SOMX**187008-**○○	TPS54	TIP25D
	3	MVX**6100X3F40**	●	2	190	230	295	40	68	1.1	SOMX**187008-**○○	TPS54	TIP25D
	4	MVX**6100X4F50**	●	2	251	291	366	50	68	1.1	SOMX**187008-**○○	TPS54	TIP25D
	5	MVX**6100X5F50**	●	2	312	352	427	50	68	1.1	SOMX**187008-**○○	TPS54	TIP25D
62.0	2	MVX**6200X2F40**	●	2	131	171	236	40	68	1.0	SOMX**187008-**○○	TPS54	TIP25D
	3	MVX**6200X3F40**	●	2	193	233	298	40	68	1.0	SOMX**187008-**○○	TPS54	TIP25D
	4	MVX**6200X4F50**	●	2	255	295	370	50	68	1.0	SOMX**187008-**○○	TPS54	TIP25D
	5	MVX**6200X5F50**	●	2	317	357	432	50	68	1.0	SOMX**187008-**○○	TPS54	TIP25D
63.0	2	MVX**6300X2F40**	●	2	133	173	238	40	68	0.8	SOMX**187008-**○○	TPS54	TIP25D
	3	MVX**6300X3F40**	●	2	196	236	301	40	68	0.8	SOMX**187008-**○○	TPS54	TIP25D
	4	MVX**6300X4F50**	●	2	259	299	374	50	68	0.8	SOMX**187008-**○○	TPS54	TIP25D
	5	MVX**6300X5F50**	●	2	322	362	437	50	68	0.8	SOMX**187008-**○○	TPS54	TIP25D

* Clamp Torque (N • m) : TPS54=4.5

INSERT DESCRIPTION ➤ N218
CUTTING CONDITIONS ➤ N218
USAGE NOTE ➤ N247
TECHNICAL DATA ➤ Q001

MVX

INSERTS

Shape	Drill Dia.	Insert Number	Dimensions (mm)			Stock			Geometry
			IC	S	RE	VP15TF	MC1020	MC5020	
UM	ø17—ø19.5	**SOMX063005-UM**	6	3	0.5	●	●	●	
	ø20—ø22.5	**SOMX073505-UM**	7	3.5	0.5	●	●	●	
	ø23—ø27.5	**SOMX084005-UM**	8.3	4	0.5	●	●	●	
	ø28—ø33	**SOMX094506-UM**	9.7	4.5	0.6	●	●	●	
NEW	ø33.5—ø39	**SOMX115506-UM**	11.6	5.5	0.6	●	●	●	
NEW	ø40—ø46	**SOMX136008-UM**	13.8	6	0.8	●	●	●	
NEW	ø47—ø56	**SOMX166508-UM**	16.5	6.5	0.8	●	●	●	
General purpose NEW	ø57—ø63	**SOMX187008-UM**	18.2	7	0.8	●	●	●	
NEW **US**	ø17—ø19.5	**SOMX063005-US**	6	3	0.5	●			
	ø20—ø22.5	**SOMX073505-US**	7	3.5	0.5	●			
	ø23—ø27.5	**SOMX084005-US**	8.3	4	0.5	●			
For stainless steel inner edge	ø28—ø33	**SOMX094506-US**	9.7	4.5	0.6	●			

*MC1020 and MC5020 are made exclusively for use as an outer insert.
*US breaker is designed exclusively for use as an inner insert.

RECOMMENDED CUTTING CONDITIONS

	Work material	Hardness	Cutting Speed Centre value (Min.—Max.) (m/min)	ϕ17—ϕ19.5 Feed per Tooth Centre value (Min.—Max.) (mm/rev)			ϕ20—ϕ23.5 Feed per Tooth Centre value (Min.—Max.) (mm/rev)		
			l/d=2—6	l/d=2, 3	l/d=4, 5	l/d=6	l/d=2, 3	l/d=4, 5	l/d=6
P	Mild Steel (ASTM A36, AISI 1010etc.)	≤180HB	200 (180—235)	0.05 (0.04—0.06)	0.05 (0.04—0.06)	0.04 (0.04—0.05)	0.06 (0.04—0.08)	0.06 (0.04—0.07)	0.04 (0.04—0.05)
	Carbon Steel, Alloy Steel (AISI 1045, AISI 4140etc.)	180—280HB	140 (115—180)	0.08 (0.06—0.14)	0.08 (0.06—0.09)	0.05 (0.04—0.06)	0.10 (0.06—0.18)	0.09 (0.06—0.12)	0.07 (0.06—0.08)
	Carbon Steel, Alloy Steel (AISI 4340etc.)	280—350HB	100 (75—140)	0.08 (0.06—0.14)	0.08 (0.06—0.09)	0.05 (0.04—0.06)	0.10 (0.06—0.18)	0.09 (0.06—0.12)	0.07 (0.06—0.08)
	Alloy Tool Steel (SKD, SKTetc.)	≤350HB	135 (100—170)	0.08 (0.06—0.14)	0.08 (0.06—0.09)	0.05 (0.04—0.06)	0.10 (0.06—0.18)	0.09 (0.06—0.12)	0.07 (0.06—0.08)
M	Austenitic Stainless Steel (AISI 304, AISI 316etc.)	≤200HB	130 (80—180)	0.08 (0.06—0.12)	0.06 (0.04—0.08)	0.05 (0.04—0.06)	0.10 (0.06—0.14)	0.07 (0.06—0.08)	0.06 (0.06—0.07)
	Austenitic Stainless Steel (AISI 304LN, AISI 316LNetc.)	>200HB	130 (80—180)	0.08 (0.06—0.12)	0.06 (0.04—0.08)	0.05 (0.04—0.06)	0.10 (0.06—0.14)	0.07 (0.06—0.08)	0.06 (0.06—0.07)
	Ferritic and Martensitic Stainless Steel (AISI 410, AISI 430etc.)	≤200HB	120 (80—165)	0.08 (0.06—0.12)	0.06 (0.04—0.08)	0.05 (0.04—0.06)	0.10 (0.06—0.14)	0.07 (0.06—0.08)	0.06 (0.06—0.07)
	Ferritic and Martensitic Stainless Steel (AISI 431, AISI 420J2etc.)	>200HB	120 (80—165)	0.08 (0.06—0.12)	0.06 (0.04—0.08)	0.05 (0.04—0.06)	0.10 (0.06—0.14)	0.07 (0.06—0.08)	0.06 (0.06—0.07)
K	Gray Cast Iron (FC300etc.)	Tensile Strength ≤350MPa	160 (130—195)	0.11 (0.08—0.14)	0.09 (0.08—0.10)	0.05 (0.04—0.06)	0.14 (0.10—0.18)	0.10 (0.10—0.12)	0.07 (0.06—0.08)
	Ductile Cast Iron (FCD450etc.)	Tensile Strength ≤450MPa	100 (80—135)	0.11 (0.08—0.14)	0.09 (0.08—0.10)	0.05 (0.04—0.06)	0.13 (0.10—0.16)	0.10 (0.10—0.11)	0.07 (0.06—0.08)
	Ductile Cast Iron (FCD700etc.)	Tensile Strength ≤800MPa	100 (70—125)	0.11 (0.08—0.14)	0.09 (0.08—0.10)	0.05 (0.04—0.06)	0.13 (0.10—0.16)	0.10 (0.10—0.11)	0.07 (0.06—0.08)

Note 1) Reduce the cutting speed by 30% when VP15TF is used as an outer insert.
Note 2) L/D=3 is the recommended maximum depth when only external coolant is used.
Note 3) Internal through coolant is highly necessary when drilling stainless steel.

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

	Work material	Hardness	Cutting Speed Centre value (Min.–Max.) (m/min)	ϕ24–ϕ29.5 Feed per Tooth Centre value (Min.–Max.) (mm/rev)			ϕ30–ϕ33 Feed per Tooth Centre value (Min.–Max.) (mm/rev)		
			l/d=2–6	l/d=2, 3	l/d=4, 5	l/d=6	l/d=2, 3	l/d=4, 5	l/d=6
P	Mild Steel (ASTM A36, AISI 1010etc.)	≤180HB	200 (180–235)	0.07 (0.04–0.08)	0.06 (0.04–0.07)	0.05 (0.04–0.06)	0.08 (0.06–0.10)	0.07 (0.06–0.08)	0.06 (0.06–0.07)
	Carbon Steel, Alloy Steel (AISI 1045, AISI 4140etc.)	180–280HB	140 (115–180)	0.12 (0.08–0.18)	0.10 (0.08–0.12)	0.09 (0.08–0.10)	0.14 (0.08–0.24)	0.12 (0.08–0.16)	0.11 (0.10–0.12)
	Carbon Steel, Alloy Steel (AISI 4340etc.)	280–350HB	100 (75–140)	0.12 (0.08–0.18)	0.10 (0.08–0.12)	0.09 (0.08–0.10)	0.14 (0.08–0.24)	0.12 (0.08–0.16)	0.11 (0.10–0.12)
	Alloy Tool Steel (SKD, SKTetc.)	≤350HB	135 (100–170)	0.12 (0.08–0.18)	0.10 (0.08–0.12)	0.09 (0.08–0.10)	0.14 (0.08–0.24)	0.12 (0.08–0.16)	0.10 (0.08–0.12)
M	Austenitic Stainless Steel (AISI 304, AISI 316etc.)	≤200HB	130 (80–180)	0.10 (0.06–0.14)	0.08 (0.06–0.10)	0.07 (0.06–0.08)	0.10 (0.06–0.14)	0.09 (0.06–0.12)	0.07 (0.06–0.10)
	Austenitic Stainless Steel (AISI 304LN, AISI 316LNetc.)	>200HB	130 (80–180)	0.10 (0.06–0.14)	0.08 (0.06–0.10)	0.07 (0.06–0.08)	0.10 (0.06–0.14)	0.09 (0.06–0.12)	0.07 (0.06–0.10)
	Ferritic and Martensitic Stainless Steel (AISI 410, AISI 430etc.)	≤200HB	120 (80–165)	0.10 (0.06–0.14)	0.08 (0.06–0.10)	0.07 (0.06–0.08)	0.10 (0.06–0.14)	0.09 (0.06–0.12)	0.07 (0.06–0.10)
	Ferritic and Martensitic Stainless Steel (AISI 431, AISI 420J2etc.)	>200HB	120 (80–165)	0.10 (0.06–0.14)	0.08 (0.06–0.10)	0.07 (0.06–0.08)	0.10 (0.06–0.14)	0.09 (0.06–0.12)	0.07 (0.06–0.10)
K	Gray Cast Iron (FC300etc.)	Tensile Strength ≤350MPa	160 (130–195)	0.15 (0.10–0.20)	0.11 (0.10–0.13)	0.09 (0.08–0.10)	0.15 (0.10–0.20)	0.12 (0.10–0.13)	0.11 (0.10–0.12)
	Ductile Cast Iron (FCD450etc.)	Tensile Strength ≤450MPa	100 (80–135)	0.14 (0.10–0.18)	0.11 (0.10–0.12)	0.09 (0.08–0.10)	0.15 (0.10–0.20)	0.12 (0.10–0.13)	0.11 (0.10–0.12)
	Ductile Cast Iron (FCD700etc.)	Tensile Strength ≤800MPa	100 (70–125)	0.14 (0.10–0.18)	0.11 (0.10–0.12)	0.09 (0.08–0.10)	0.15 (0.10–0.20)	0.12 (0.10–0.13)	0.11 (0.10–0.12)

Note 1) Reduce the cutting speed by 30% when VP15TF is used as an outer insert.

Note 2) L/D=3 is the recommended maximum depth when only external coolant is used.

Note 3) Internal through coolant is highly necessary when drilling stainless steel.

	Work material	Hardness	Cutting Speed Centre value (Min.–Max.) (m/min)	ϕ33.5–ϕ63 Feed per Tooth Centre value (Min.–Max.) (mm/rev)		
			l/d=2–6	l/d=2, 3	l/d=4, 5	l/d=6
P	Mild Steel (ASTM A36, AISI 1010etc.)	≤180HB	200 (180–235)	0.08 (0.06–0.10)	0.07 (0.06–0.08)	0.06 (0.06–0.07)
	Carbon Steel,Alloy Steel (AISI 1045, AISI 4140etc.)	180–280HB	140 (115–180)	0.14 (0.08–0.24)	0.12 (0.08–0.16)	0.11 (0.10–0.12)
	Carbon Steel,Alloy Steel (AISI 4340etc.)	280–350HB	100 (75–140)	0.14 (0.08–0.24)	0.12 (0.08–0.16)	0.11 (0.10–0.12)
	Alloy Tool Steel (SKD, SKTetc.)	≤350HB	135 (100–170)	0.14 (0.08–0.24)	0.12 (0.08–0.16)	0.10 (0.08–0.12)
M	Austenitic Stainless Steel (AISI 304, AISI 316etc.)	≤200HB	130 (80–180)	0.09 (0.06–0.12)	0.08 (0.06–0.10)	0.07 (0.06–0.08)
	Austenitic Stainless Steel (AISI 304LN, AISI 316LNetc.)	>200HB	130 (80–180)	0.09 (0.06–0.12)	0.08 (0.06–0.10)	0.07 (0.06–0.08)
	Ferritic and Martensitic Stainless Steel (AISI 410, AISI 430etc.)	≤200HB	120 (80–165)	0.09 (0.06–0.12)	0.08 (0.06–0.10)	0.07 (0.06–0.08)
	Ferritic and Martensitic Stainless Steel (AISI 431, AISI 420J2etc.)	>200HB	120 (80–165)	0.09 (0.06–0.12)	0.08 (0.06–0.10)	0.07 (0.06–0.08)
K	Gray Cast Iron (FC300etc.)	Tensile Strength ≤350MPa	160 (130–195)	0.15 (0.10–0.20)	0.12 (0.10–0.13)	0.11 (0.10–0.12)
	Ductile Cast Iron (FCD450etc.)	Tensile Strength ≤450MPa	100 (80–135)	0.15 (0.10–0.20)	0.12 (0.10–0.13)	0.11 (0.10–0.12)
	Ductile Cast Iron (FCD700etc.)	Tensile Strength ≤800MPa	100 (70–125)	0.15 (0.10–0.20)	0.12 (0.10–0.13)	0.11 (0.10–0.12)

Note 1) L/D=3 is the recommended maximum depth when only external coolant is used.

Note 2) Internal through coolant is highly necessary when drilling stainless steel.

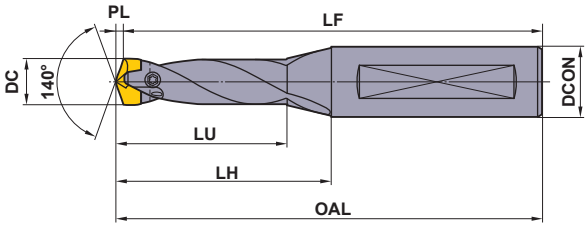
STAW

Small Diameter Indexable Drill

- Wavy cutting edge design for good chip control.
- Highly rigid clamping system offers stability and reliability for small hole drilling.

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron			





HOLDERS

DC (mm)	Hole Depth (l/d)	Holder Order Number	Stock	LU	LH	OAL	LF	PL	DCON	Wrench	Insert DC (mm)	Insert Order Number	Stock VP15TF	Stock VP10H	Stock DP5010
10.0 | 10.4	1.5	STAWSS1000S16	●	23.8	33.8	81.8	80	1.8	16	TIP06F	10.0	* STAWN1000TH	●	□	
												STAWK1000TG			●
	3	STAWSN1000S16	●	38.8	48.8	96.8	95	1.8	16	TIP06F	10.1	STAWN1010TH	●	□	
												STAWK1010TG			●
	5	STAWMN1000S16	●	58.8	68.8	116.8	115	1.8	16	TIP06F	10.2	STAWN1020TH	●	□	
												STAWK1020TG			●
	8	STAWLN1000S16	●	88.8	98.8	146.8	145	1.8	16	TIP06F	10.3	STAWN1030TH	●	□	
												STAWK1030TG			●
											10.4	STAWN1040TH	●	□	
												STAWK1040TG			●
10.5 | 10.9	1.5	STAWSS1050S16	●	23.9	33.9	81.9	80	1.9	16	TIP06F	10.5	* STAWN1050TH	●	□	
												STAWK1050TG			●
	3	STAWSN1050S16	●	38.9	48.9	96.9	95	1.9	16	TIP06F	10.6	STAWN1060TH	●	□	
												STAWK1060TG			●
	5	STAWMN1050S16	●	58.9	68.9	116.9	115	1.9	16	TIP06F	10.7	STAWN1070TH	●	□	
												STAWK1070TG			●
	8	STAWLN1050S16	●	88.9	98.9	146.9	145	1.9	16	TIP06F	10.8	STAWN1080TH	●	□	
												STAWK1080TG			●
											10.9	STAWN1090TH	●	□	
												STAWK1090TG			●
11.0 | 11.4	1.5	STAWSS1100S16	●	27.0	38.0	86.0	84	2.0	16	TIP06F	11.0	* STAWN1100TH	●	□	
												STAWK1100TG			●
	3	STAWSN1100S16	●	43.0	54.0	102.0	100	2.0	16	TIP06F	11.1	STAWN1110TH	●	□	
												STAWK1110TG			●
	5	STAWMN1100S16	●	68.0	79.0	127.0	125	2.0	16	TIP06F	11.2	STAWN1120TH	●	□	
												STAWK1120TG			●
	8	STAWLN1100S16	●	98.0	109.0	157.0	155	2.0	16	TIP06F	11.3	STAWN1130TH	●	□	
												STAWK1130TG			●
											11.4	STAWN1140TH	●	□	
												STAWK1140TG			●
11.5 | 11.9	1.5	STAWSS1150S16	●	27.1	38.1	86.1	84	2.1	16	TIP06F	11.5	* STAWN1150TH	●	□	
												STAWK1150TG			●
	3	STAWSN1150S16	●	43.1	54.1	102.1	100	2.1	16	TIP06F	11.6	STAWN1160TH	●	□	
												STAWK1160TG			●
	5	STAWMN1150S16	●	68.1	79.1	127.1	125	2.1	16	TIP06F	11.7	STAWN1170TH	●	□	
												STAWK1170TG			●
	8	STAWLN1150S16	●	98.1	109.1	157.1	155	2.1	16	TIP06F	11.8	STAWN1180TH	●	□	
												STAWK1180TG			●
											11.9	STAWN1190TH	●	□	
												STAWK1190TG			●
12.0 | 12.4	1.5	STAWSS1200S16	●	29.2	41.2	89.2	87	2.2	16	TIP06F	12.0	* STAWN1200TH	●	□	
												STAWK1200TG			●
	3	STAWSN1200S16	●	47.2	59.2	107.2	105	2.2	16	TIP06F	12.1	STAWN1210TH	●	□	
												STAWK1210TG			●
	5	STAWMN1200S16	●	72.2	84.2	132.2	130	2.2	16	TIP06F	12.2	STAWN1220TH	●	□	
												STAWK1220TG			●
	8	STAWLN1200S16	●	107.2	119.2	167.2	165	2.2	16	TIP06F	12.3	STAWN1230TH	●	□	
												STAWK1230TG			●
											12.4	STAWN1240TH	●	□	
												STAWK1240TG			●

(Note 1) The above dimensions are for when installing the STAWN (VP15TF) insert.
(Note 2) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

DC (mm)	Hole Depth (l/d)	Holder Order Number	Stock	LU	LH	OAL	LF	PL	DCON	Wrench	DC (mm)	Insert Order Number	Stock VP15TF	Stock VP10H	Stock DP5010
12.5 – 12.9	1.5	STAWSS1250S16	●	29.3	41.3	89.3	87	2.3	16	①TIP06F	12.5	* STAWN1250TH	●	□	
												STAWK1250TG			●
	3	STAWSN1250S16	●	47.3	59.3	107.3	105	2.3	16	①TIP06F	12.6	STAWN1260TH	●	□	
												STAWK1260TG			●
	5	STAWMN1250S16	●	72.3	84.3	132.3	130	2.3	16	①TIP06F	12.7	STAWN1270TH	●	□	
												STAWK1270TG			●
	8	STAWLN1250S16	●	107.3	119.3	167.3	165	2.3	16	①TIP06F	12.8	STAWN1280TH	●	□	
												STAWK1280TG			●
											12.9	STAWN1290TH	●	□	
												STAWK1290TG			●
13.0 – 13.4	1.5	STAWSS1300S16	●	32.4	45.4	93.4	91	2.4	16	②TIP08W	13.0	* STAWN1300TH	●	□	
												STAWK1300TG			●
	3	STAWSN1300S16	●	51.4	64.4	112.4	110	2.4	16	②TIP08W	13.1	STAWN1310TH	●	□	
												STAWK1310TG			●
	5	STAWMN1300S16	●	76.4	89.4	137.4	135	2.4	16	②TIP08W	13.2	STAWN1320TH	●	□	
												STAWK1320TG			●
	8	STAWLN1300S16	●	116.4	129.4	177.4	175	2.4	16	②TIP08W	13.3	STAWN1330TH	●	□	
												STAWK1330TG			●
											13.4	STAWN1340TH	●	□	
												STAWK1340TG			●
13.5 – 13.9	1.5	STAWSS1350S16	●	32.5	45.5	93.5	91	2.5	16	②TIP08W	13.5	* STAWN1350TH	●	□	
												STAWK1350TG			●
	3	STAWSN1350S16	●	51.5	64.5	112.5	110	2.5	16	②TIP08W	13.6	STAWN1360TH	●	□	
												STAWK1360TG			●
	5	STAWMN1350S16	●	76.5	89.5	137.5	135	2.5	16	②TIP08W	13.7	STAWN1370TH	●	□	
												STAWK1370TG			●
	8	STAWLN1350S16	●	116.5	129.5	177.5	175	2.5	16	②TIP08W	13.8	STAWN1380TH	●	□	
												STAWK1380TG			●
											13.9	STAWN1390TH	●	□	
												STAWK1390TG			●
14.0 – 14.4	1.5	STAWSS1400S16	●	33.5	47.5	95.5	93	2.5	16	②TIP08W	14.0	* STAWN1400TH	●		
												STAWK1400TG			●
	3	STAWSN1400S16	●	55.5	69.5	117.5	115	2.5	16	②TIP08W	14.1	STAWN1410TH	●		
												STAWK1410TG			●
	5	STAWMN1400S16	●	85.5	99.5	147.5	145	2.5	16	②TIP08W	14.2	STAWN1420TH	●		
												STAWK1420TG			●
	8	STAWLN1400S16	●	124.5	139.5	187.5	185	2.5	16	②TIP08W	14.3	STAWN1430TH	●		
												STAWK1430TG			●
											14.4	STAWN1440TH	●		
												STAWK1440TG			●
14.5 – 14.9	1.5	STAWSS1450S16	●	33.6	47.6	95.6	93	2.6	16	②TIP08W	14.5	* STAWN1450TH	●		
												STAWK1450TG			●
	3	STAWSN1450S16	●	55.6	69.6	117.6	115	2.6	16	②TIP08W	14.6	STAWN1460TH	●		
												STAWK1460TG			●
	5	STAWMN1450S16	●	85.6	99.6	147.6	145	2.6	16	②TIP08W	14.7	STAWN1470TH	●		
												STAWK1470TG			●
	8	STAWLN1450S16	●	124.6	139.6	187.6	185	2.6	16	②TIP08W	14.8	STAWN1480TH	●		
												STAWK1480TG			●
											14.9	STAWN1490TH	●		
												STAWK1490TG			●
15.0 – 15.4	1.5	STAWSS1500S20	●	35.7	50.7	100.7	98	2.7	20	②TIP08W	15.0	* STAWN1500TH	●		
												STAWK1500TG			●
	3	STAWSN1500S20	●	62.7	77.7	127.7	125	2.7	20	②TIP08W	15.1	STAWN1510TH	●		
												STAWK1510TG			●
	5	STAWMN1500S20	●	92.7	107.7	157.7	155	2.7	20	②TIP08W	15.2	STAWN1520TH	●		
												STAWK1520TG			●
	8	STAWLN1500S20	●	132.7	150.7	200.7	198	2.7	20	②TIP08W	15.3	STAWN1530TH	●		
												STAWK1530TG			●
											15.4	STAWN1540TH	●		
												STAWK1540TG			●

DRILLING

INSERT DESCRIPTION ➤ N223
CUTTING CONDITIONS ➤ N227
USAGE NOTE ➤ N228
TECHNICAL DATA ➤ Q001

STAW

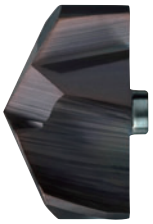
Small Diameter Indexable Drill

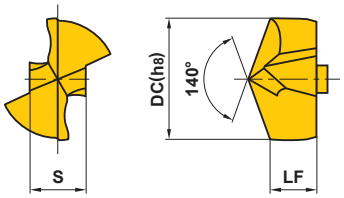
DC (mm)	Hole Depth (l/d)	Holder Order Number	Stock	LU	LH	OAL	LF	PL	DCON	Wrench	Insert DC (mm)	Insert Order Number	Stock VP15TF	Stock VP10H	Stock DP5010
15.5 | 16.4	1.5	STAWSS1600S20	●	36.8	52.8	102.8	100	2.8	20	TIP10W	15.5	* STAWN1550T	●		
												STAWK1550TG			●
											15.6	STAWN1560T	●		
												STAWK1560TG			●
											15.7	STAWN1570T	●		
												STAWK1570TG			●
	3	STAWSN1600S20	●	62.8	82.8	132.8	130	2.8	20	TIP10W	15.8	STAWN1580T	●		
												STAWK1580TG			●
											15.9	STAWN1590T	●		
												STAWK1590TG			●
	5	STAWMN1600S20	●	92.8	117.8	167.8	165	2.8	20	TIP10W	16.0	STAWN1600T	●		
												STAWK1600TG			●
											16.1	STAWN1610T	●		
												STAWK1610TG			●
											16.2	STAWN1620T	●		
												STAWK1620TG			●
	8	STAWLN1600S20	●	140.8	160.8	210.8	208	2.8	20	TIP10W	16.3	STAWN1630T	●		
												STAWK1630TG			●
											16.4	STAWN1640T	●		
												STAWK1640TG			●
16.5 | 17.4	1.5	STAWSS1700S20	●	39.0	56.0	106.0	103	3.0	20	TIP10W	16.5	* STAWN1650T	●		
												STAWK1650TG			●
											16.6	STAWN1660T	●		
												STAWK1660TG			●
											16.7	STAWN1670T	●		
												STAWK1670TG			●
	3	STAWSN1700S20	●	64.0	88.0	138.0	135	3.0	20	TIP10W	16.8	STAWN1680T	●		
												STAWK1680TG			●
											16.9	STAWN1690T	●		
												STAWK1690TG			●
	5	STAWMN1700S20	●	98.0	123.0	173.0	170	3.0	20	TIP10W	17.0	STAWN1700T	●		
												STAWK1700TG			●
											17.1	STAWN1710T	●		
												STAWK1710TG			●
											17.2	STAWN1720T	●		
												STAWK1720TG			●
	8	STAWLN1700S20	●	149.0	169.0	219.0	216	3.0	20	TIP10W	17.3	STAWN1730T	●		
												STAWK1730TG			●
											17.4	STAWN1740T	●		
												STAWK1740TG			●
17.5 | 18.4	1.5	STAWSS1800S20	●	40.2	58.2	108.2	105	3.2	20	TIP10W	17.5	* STAWN1750T	●		
												STAWK1750TG			●
											17.6	STAWN1760T	●		
												STAWK1760TG			●
											17.7	STAWN1770T	●		
												STAWK1770TG			●
	3	STAWSN1800S20	●	67.2	93.2	143.2	140	3.2	20	TIP10W	17.8	STAWN1780T	●		
												STAWK1780TG			●
											17.9	STAWN1790T	●		
												STAWK1790TG			●
	5	STAWMN1800S20	●	103.2	128.2	178.2	175	3.2	20	TIP10W	18.0	STAWN1800T	●		
												STAWK1800TG			●
											18.1	STAWN1810T	●		
												STAWK1810TG			●
											18.2	STAWN1820T	●		
												STAWK1820TG			●
	8	STAWLN1800S20	●	157.2	177.2	227.2	224	3.2	20	TIP10W	18.3	STAWN1830T	●		
												STAWK1830TG			●
											18.4	STAWN1840T	●		
												STAWK1840TG			●

(Note 1) The above dimensions are for when installing the STAWN (VP15TF) insert.
(Note 2) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

INSERTS





Order Number	Stock		Dimensions (mm)			Applicable Holder
	VP15TF	VP10H	DC	LF	S	
STAWN1000TH	●	□	10.0	3.8	4.6	STAWSS1000S16 STAWSN1000S16 STAWMN1000S16 STAWLN1000S16
STAWN**1010TH**	●	□	10.1	3.8	4.6	
STAWN**1020TH**	●	□	10.2	3.8	4.6	
STAWN**1030TH**	●	□	10.3	3.8	4.6	
STAWN**1040TH**	●	□	10.4	3.8	4.6	
STAWN**1050TH**	●	□	10.5	4.0	4.8	STAWSS1050S16 STAWSN1050S16 STAWMN1050S16 STAWLN1050S16
STAWN**1060TH**	●	□	10.6	4.0	4.8	
STAWN**1070TH**	●	□	10.7	4.0	4.8	
STAWN**1080TH**	●	□	10.8	4.0	4.8	
STAWN**1090TH**	●	□	10.9	4.0	4.8	
STAWN**1100TH**	●	□	11.0	4.2	5.1	STAWSS1100S16 STAWSN1100S16 STAWMN1100S16 STAWLN1100S16
STAWN**1110TH**	●	□	11.1	4.2	5.1	
STAWN**1120TH**	●	□	11.2	4.2	5.1	
STAWN**1130TH**	●	□	11.3	4.2	5.1	
STAWN**1140TH**	●	□	11.4	4.2	5.1	
STAWN**1150TH**	●	□	11.5	4.4	5.3	STAWSS1150S16 STAWSN1150S16 STAWMN1150S16 STAWLN1150S16
STAWN**1160TH**	●	□	11.6	4.4	5.3	
STAWN**1170TH**	●	□	11.7	4.4	5.3	
STAWN**1180TH**	●	□	11.8	4.4	5.3	
STAWN**1190TH**	●	□	11.9	4.4	5.3	
STAWN**1200TH**	●	□	12.0	4.6	5.5	STAWSS1200S16 STAWSN1200S16 STAWMN1200S16 STAWLN1200S16
STAWN**1210TH**	●	□	12.1	4.6	5.5	
STAWN**1220TH**	●	□	12.2	4.6	5.5	
STAWN**1230TH**	●	□	12.3	4.6	5.5	
STAWN**1240TH**	●	□	12.4	4.6	5.5	
STAWN**1250TH**	●	□	12.5	4.8	5.8	STAWSS1250S16 STAWSN1250S16 STAWMN1250S16 STAWLN1250S16
STAWN**1260TH**	●	□	12.6	4.8	5.8	
STAWN**1270TH**	●	□	12.7	4.8	5.8	
STAWN**1280TH**	●	□	12.8	4.8	5.8	
STAWN**1290TH**	●	□	12.9	4.8	5.8	
STAWN**1300TH**	●	□	13.0	4.9	6.0	STAWSS1300S16 STAWSN1300S16 STAWMN1300S16 STAWLN1300S16
STAWN**1310TH**	●	□	13.1	4.9	6.0	
STAWN**1320TH**	●	□	13.2	4.9	6.0	
STAWN**1330TH**	●	□	13.3	4.9	6.0	
STAWN**1340TH**	●	□	13.4	4.9	6.0	
STAWN**1350TH**	●	□	13.5	5.1	6.2	STAWSS1350S16 STAWSN1350S16 STAWMN1350S16 STAWLN1350S16
STAWN**1360TH**	●	□	13.6	5.1	6.2	
STAWN**1370TH**	●	□	13.7	5.1	6.2	
STAWN**1380TH**	●	□	13.8	5.1	6.2	
STAWN**1390TH**	●	□	13.9	5.1	6.2	

CUTTING CONDITIONS ➤ N227
USAGE NOTE ➤ N228
TECHNICAL DATA ➤ Q001

STAW

Small Diameter Indexable Drill

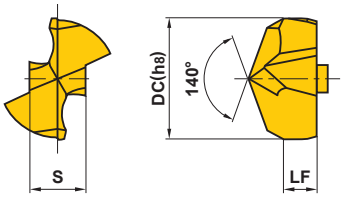
Order Number	Stock		Dimensions (mm)			Applicable Holder
	VP15TF	VP10H	DC	LF	S	
STAWN1400TH	●		14.0	5.3	6.4	STAWSS1400S16 STAWSN1400S16 STAWMN1400S16 STAWLN1400S16
STAWN**1410TH**	●		14.1	5.3	6.4	
STAWN**1420TH**	●		14.2	5.3	6.4	
STAWN**1430TH**	●		14.3	5.3	6.4	
STAWN**1440TH**	●		14.4	5.3	6.4	
STAWN**1450TH**	●		14.5	5.5	6.7	STAWSS1450S16 STAWSN1450S16 STAWMN1450S16 STAWLN1450S16
STAWN**1460TH**	●		14.6	5.5	6.7	
STAWN**1470TH**	●		14.7	5.5	6.7	
STAWN**1480TH**	●		14.8	5.5	6.7	
STAWN**1490TH**	●		14.9	5.5	6.7	
STAWN**1500TH**	●		15.0	5.7	6.9	STAWSS1500S20 STAWSN1500S20 STAWMN1500S20 STAWLN1500S20
STAWN**1510TH**	●		15.1	5.7	6.9	
STAWN**1520TH**	●		15.2	5.7	6.9	
STAWN**1530TH**	●		15.3	5.7	6.9	
STAWN**1540TH**	●		15.4	5.7	6.9	
STAWN**1550T**	●		15.5	5.9	7.1	STAWSS1600S20 STAWSN1600S20 STAWMN1600S20 STAWLN1600S20
STAWN**1560T**	●		15.6	5.9	7.1	
STAWN**1570T**	●		15.7	5.9	7.1	
STAWN**1580T**	●		15.8	5.9	7.1	
STAWN**1590T**	●		15.9	5.9	7.1	
STAWN**1600T**	●		16.0	5.9	7.1	
STAWN**1610T**	●		16.1	5.9	7.1	
STAWN**1620T**	●		16.2	5.9	7.1	
STAWN**1630T**	●		16.3	5.9	7.1	
STAWN**1640T**	●		16.4	5.9	7.1	
STAWN**1650T**	●		16.5	6.3	7.6	STAWSS1700S20 STAWSN1700S20 STAWMN1700S20 STAWLN1700S20
STAWN**1660T**	●		16.6	6.3	7.6	
STAWN**1670T**	●		16.7	6.3	7.6	
STAWN**1680T**	●		16.8	6.3	7.6	
STAWN**1690T**	●		16.9	6.3	7.6	
STAWN**1700T**	●		17.0	6.3	7.6	
STAWN**1710T**	●		17.1	6.3	7.6	
STAWN**1720T**	●		17.2	6.3	7.6	
STAWN**1730T**	●		17.3	6.3	7.6	
STAWN**1740T**	●		17.4	6.3	7.6	
STAWN**1750T**	●		17.5	6.7	8.1	STAWSS1800S20 STAWSN1800S20 STAWMN1800S20 STAWLN1800S20
STAWN**1760T**	●		17.6	6.7	8.1	
STAWN**1770T**	●		17.7	6.7	8.1	
STAWN**1780T**	●		17.8	6.7	8.1	
STAWN**1790T**	●		17.9	6.7	8.1	
STAWN**1800T**	●		18.0	6.7	8.1	
STAWN**1810T**	●		18.1	6.7	8.1	
STAWN**1820T**	●		18.2	6.7	8.1	
STAWN**1830T**	●		18.3	6.7	8.1	
STAWN**1840T**	●		18.4	6.7	8.1	

● : Inventory maintained in Japan.
(1 insert in one case)

INSERTS

(Cast Iron)





Order Number	Stock		Dimensions (mm)			Applicable Holder
	DP5010		DC	LF	S	
STAWK1000TG	●		10.0	3.3	4.6	STAWSS1000S16 STAWSN1000S16 STAWMN1000S16 STAWLN1000S16
STAWK**1010TG**	●		10.1	3.3	4.6	
STAWK**1020TG**	●		10.2	3.3	4.6	
STAWK**1030TG**	●		10.3	3.3	4.6	
STAWK**1040TG**	●		10.4	3.3	4.6	
STAWK**1050TG**	●		10.5	3.5	4.8	STAWSS1050S16 STAWSN1050S16 STAWMN1050S16 STAWLN1050S16
STAWK**1060TG**	●		10.6	3.5	4.8	
STAWK**1070TG**	●		10.7	3.5	4.8	
STAWK**1080TG**	●		10.8	3.5	4.8	
STAWK**1090TG**	●		10.9	3.5	4.8	
STAWK**1100TG**	●		11.0	3.7	5.1	STAWSS1100S16 STAWSN1100S16 STAWMN1100S16 STAWLN1100S16
STAWK**1110TG**	●		11.1	3.7	5.1	
STAWK**1120TG**	●		11.2	3.7	5.1	
STAWK**1130TG**	●		11.3	3.7	5.1	
STAWK**1140TG**	●		11.4	3.7	5.1	
STAWK**1150TG**	●		11.5	3.9	5.3	STAWSS1150S16 STAWSN1150S16 STAWMN1150S16 STAWLN1150S16
STAWK**1160TG**	●		11.6	3.9	5.3	
STAWK**1170TG**	●		11.7	3.9	5.3	
STAWK**1180TG**	●		11.8	3.9	5.3	
STAWK**1190TG**	●		11.9	3.9	5.3	
STAWK**1200TG**	●		12.0	4.1	5.5	STAWSS1200S16 STAWSN1200S16 STAWMN1200S16 STAWLN1200S16
STAWK**1210TG**	●		12.1	4.1	5.5	
STAWK**1220TG**	●		12.2	4.1	5.5	
STAWK**1230TG**	●		12.3	4.1	5.5	
STAWK**1240TG**	●		12.4	4.1	5.5	
STAWK**1250TG**	●		12.5	4.2	5.8	STAWSS1250S16 STAWSN1250S16 STAWMN1250S16 STAWLN1250S16
STAWK**1260TG**	●		12.6	4.2	5.8	
STAWK**1270TG**	●		12.7	4.2	5.8	
STAWK**1280TG**	●		12.8	4.2	5.8	
STAWK**1290TG**	●		12.9	4.2	5.8	
STAWK**1300TG**	●		13.0	4.4	6.0	STAWSS1300S16 STAWSN1300S16 STAWMN1300S16 STAWLN1300S16
STAWK**1310TG**	●		13.1	4.4	6.0	
STAWK**1320TG**	●		13.2	4.4	6.0	
STAWK**1330TG**	●		13.3	4.4	6.0	
STAWK**1340TG**	●		13.4	4.4	6.0	
STAWK**1350TG**	●		13.5	4.6	6.2	STAWSS1350S16 STAWSN1350S16 STAWMN1350S16 STAWLN1350S16
STAWK**1360TG**	●		13.6	4.6	6.2	
STAWK**1370TG**	●		13.7	4.6	6.2	
STAWK**1380TG**	●		13.8	4.6	6.2	
STAWK**1390TG**	●		13.9	4.6	6.2	

STAW

Small Diameter Indexable Drill

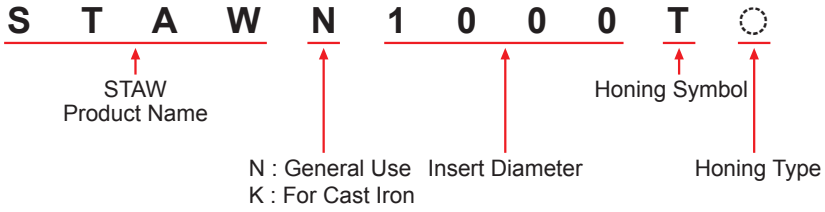
Order Number	Stock		Dimensions (mm)			Applicable Holder
	DP5010		DC	LF	S	
STAWK1400TG	●		14.0	4.8	6.4	STAWSS1400S16 STAWSN1400S16 STAWMN1400S16 STAWLN1400S16
STAWK**1410TG**	●		14.1	4.8	6.4	
STAWK**1420TG**	●		14.2	4.8	6.4	
STAWK**1430TG**	●		14.3	4.8	6.4	
STAWK**1440TG**	●		14.4	4.8	6.4	
STAWK**1450TG**	●		14.5	5.0	6.7	STAWSS1450S16 STAWSN1450S16 STAWMN1450S16 STAWLN1450S16
STAWK**1460TG**	●		14.6	5.0	6.7	
STAWK**1470TG**	●		14.7	5.0	6.7	
STAWK**1480TG**	●		14.8	5.0	6.7	
STAWK**1490TG**	●		14.9	5.0	6.7	
STAWK**1500TG**	●		15.0	5.2	6.9	STAWSS1500S20 STAWSN1500S20 STAWMN1500S20 STAWLN1500S20
STAWK**1510TG**	●		15.1	5.2	6.9	
STAWK**1520TG**	●		15.2	5.2	6.9	
STAWK**1530TG**	●		15.3	5.2	6.9	
STAWK**1540TG**	●		15.4	5.2	6.9	
STAWK**1550TG**	●		15.5	5.3	7.1	STAWSS1600S20 STAWSN1600S20 STAWMN1600S20 STAWLN1600S20
STAWK**1560TG**	●		15.6	5.3	7.1	
STAWK**1570TG**	●		15.7	5.3	7.1	
STAWK**1580TG**	●		15.8	5.3	7.1	
STAWK**1590TG**	●		15.9	5.3	7.1	
STAWK**1600TG**	●		16.0	5.3	7.1	
STAWK**1610TG**	●		16.1	5.3	7.1	
STAWK**1620TG**	●		16.2	5.3	7.1	
STAWK**1630TG**	●		16.3	5.3	7.1	
STAWK**1640TG**	●		16.4	5.3	7.1	
STAWK**1650TG**	●		16.5	5.7	7.6	STAWSS1700S20 STAWSN1700S20 STAWMN1700S20 STAWLN1700S20
STAWK**1660TG**	●		16.6	5.7	7.6	
STAWK**1670TG**	●		16.7	5.7	7.6	
STAWK**1680TG**	●		16.8	5.7	7.6	
STAWK**1690TG**	●		16.9	5.7	7.6	
STAWK**1700TG**	●		17.0	5.7	7.6	
STAWK**1710TG**	●		17.1	5.7	7.6	
STAWK**1720TG**	●		17.2	5.7	7.6	
STAWK**1730TG**	●		17.3	5.7	7.6	
STAWK**1740TG**	●		17.4	5.7	7.6	
STAWK**1750TG**	●		17.5	6.0	8.1	STAWSS1800S20 STAWSN1800S20 STAWMN1800S20 STAWLN1800S20
STAWK**1760TG**	●		17.6	6.0	8.1	
STAWK**1770TG**	●		17.7	6.0	8.1	
STAWK**1780TG**	●		17.8	6.0	8.1	
STAWK**1790TG**	●		17.9	6.0	8.1	
STAWK**1800TG**	●		18.0	6.0	8.1	
STAWK**1810TG**	●		18.1	6.0	8.1	
STAWK**1820TG**	●		18.2	6.0	8.1	
STAWK**1830TG**	●		18.3	6.0	8.1	
STAWK**1840TG**	●		18.4	6.0	8.1	

● : Inventory maintained in Japan.
(1 insert in one case)

HONE WIDTH

If an insert with honing other than standard is needed, please order using the symbols below.

(Insert Order Number)



(Honing Standard)

Honing Type	Hone Width (mm)
F	0
G	0.02—0.05
H	0.05—0.10
-	0.10—0.15
K	0.15—0.20
S	0.20—0.25
M	0.25—0.30

RECOMMENDED CUTTING CONDITIONS

	Work Material	Drill Diameter / Conditions / Hardness	ϕ10.0—ϕ12.9		ϕ13.0—ϕ13.9		ϕ14.0—ϕ15.4		ϕ15.5—ϕ18.4	
			Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)
P	Mild Steel	≤180HB	80 (60—100)	0.20 (0.15—0.25)	90 (70—110)	0.25 (0.20—0.30)	100 (80—120)	0.30 (0.25—0.35)	100 (80—120)	0.35 (0.25—0.40)
P	Carbon Steel Alloy Steel	180—280HB	80 (60—100)	0.20 (0.15—0.25)	90 (70—110)	0.25 (0.20—0.30)	100 (80—120)	0.30 (0.25—0.35)	100 (80—120)	0.35 (0.25—0.40)
P	Carbon Steel Alloy Steel	280—350HB	70 (60—90)	0.20 (0.15—0.25)	80 (60—100)	0.25 (0.20—0.30)	90 (70—110)	0.25 (0.20—0.30)	90 (70—110)	0.30 (0.20—0.35)
M	Stainless Steel	≤200HB	40 (30—50)	0.13 (0.10—0.16)	50 (40—60)	0.15 (0.12—0.18)	60 (50—70)	0.17 (0.14—0.20)	60 (50—70)	0.17 (0.14—0.20)
K	Gray Cast Iron	Tensile Strength ≤350MPa	80 (60—100)	0.20 (0.15—0.25)	90 (70—110)	0.25 (0.20—0.30)	100 (80—120)	0.30 (0.25—0.35)	120 (80—140)	0.45 (0.35—0.55)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	70 (60—90)	0.20 (0.15—0.25)	80 (60—100)	0.25 (0.20—0.30)	90 (70—110)	0.30 (0.25—0.35)	100 (80—120)	0.35 (0.25—0.40)

(Note 1) When using a drill for 1.5DC depth of hole, it is possible to increase the feed rate by approx. 20%.
(Note 2) When using the 8DC type holder, reduce the cutting speed by approx. 20%.
(Note 3) When using the 8DC type holder, it is recommended to drill a pilot guide hole.
(Note 4) For stainless steel, please use internal coolant. (Mist & MQL are not recommended).

STAW

Small Diameter Indexable Drill

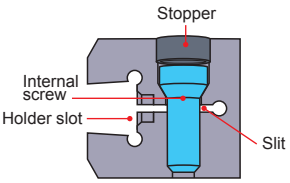
NOTES ON USE

INSERT INSTALLATION

1. Before inserting the insert into the holder, ensure that there are no foreign objects or dirt in the holder slot or slit. If there are any foreign objects or dirt, use compressed air to remove them.

2. Use the provided wrench to loosen the inner screw to open the tip of the holder, then put the insert into the holder slot as shown in figure 1.
   *Ensure that the wrench is firmly in contact with the base of the inner screw head when tightening.

3. After the insert has been set in the holder slot, tighten the inner screw while holding the insert lightly as shown in figure 2 to securely clamp and locate the insert.
   *Ensure that the wrench is firmly in contact with the base of the inner screw head when tightening.



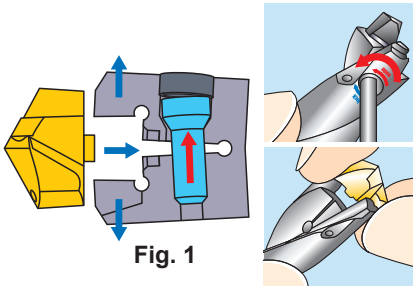


Fig. 1

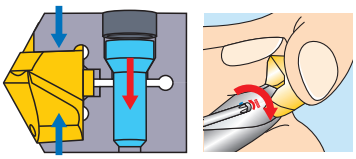
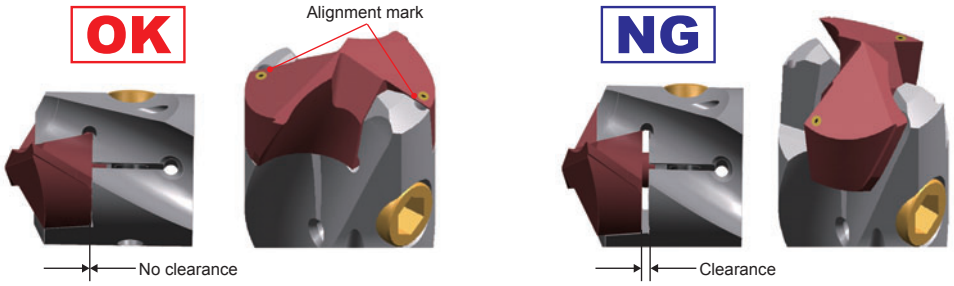


Fig. 2

Tighten the clamp screw according to the torque below.

Drill Diameter (mm)	Clamp Torque N · m
10 －12.9	1
13 －15.4	2
15.5－18.4	2.5

4. Check there is no gap between the bottom of the insert and holder slot.



(Note) Poor or incorrect clamping of inserts can cause poor drilling performance and/or drill breakage.
Therefore ensure that the alignment marks on both the body and insert are aligned when setting.
When machining, use safety guards and goggles.

SPARE PARTS

Applicable Holder	Pack Order Number (Internal screw & stopper)	Internal screw	Stopper
STAWSS/SN/MN/LN1000S16	WS203107TPS-35LH	WS203107TPS	WS35LH
STAWSS/SN/MN/LN1050S16	WS203107TPS-35LH	WS203107TPS	WS35LH
STAWSS/SN/MN/LN1100S16	WS203108TPS-35LH	WS203108TPS	WS35LH
STAWSS/SN/MN/LN1150S16	WS203108TPS-35LH	WS203108TPS	WS35LH
STAWSS/SN/MN/LN1200S16	WS203108TPS-35LH	WS203108TPS	WS35LH
STAWSS/SN/MN/LN1250S16	WS203108TPS-35LH	WS203108TPS	WS35LH
STAWSS/SN/MN/LN1300S16	WS253909TPS-45LH	WS253909TPS	WS45LH
STAWSS/SN/MN/LN1350S16	WS253909TPS-45LH	WS253909TPS	WS45LH
STAWSS/SN/MN/LN1400S16	WS253909TPS-45LH	WS253909TPS	WS45LH
STAWSS/SN/MN/LN1450S16	WS253909TPS-45LH	WS253909TPS	WS45LH
STAWSS/SN/MN/LN1500S20	WS253909TPS-45LH	WS253909TPS	WS45LH
STAWSS/SN/MN/LN1600S20	WS304912TPS-55LH	WS304912TPS	WS55LH
STAWSS/SN/MN/LN1700S20	WS304912TPS-55LH	WS304912TPS	WS55LH
STAWSS/SN/MN/LN1800S20	WS304912TPS-55LH	WS304912TPS	WS55LH

(Note) The parts are packaged internal screw, stopper and operation manual. Please replace the parts in accordance with the operation manual.

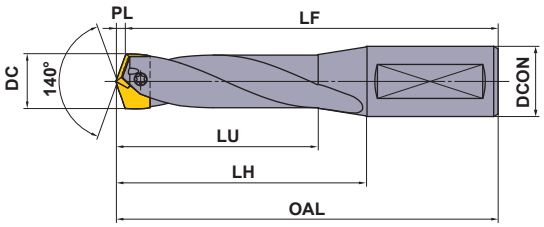
TAW

- Wavy cutting edge design for good chip control.
- Serration geometry for accurate insert location.

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron			

(General Use)





HOLDERS

DC (mm)	Hole Depth (l/d)	Holder Order Number	Stock	Dimensions (mm) LU	LH	OAL	LF	PL	DCON	Clamp Screw	Wrench	Plate	Anti-seize Lubricant	Insert DC (mm)	Order Number	Stock VP15TF	DP5010	VP10H
18.5 – 19.4	3	TAWSN1900S25	●	71.4	102.4	158.4	155	3.4	25	WS304517T	TKY10T	WPT4405	MK1KS	18.5	TAWNH1850T	●		□
															TAWKH1850TG		●	
														18.6	TAWNH1860T	●		□
															TAWKH1860TG		●	
														18.7	TAWNH1870T	●		□
															TAWKH1870TG		●	
														18.8	TAWNH1880T	●		□
															TAWKH1880TG		●	
	5	TAWMN1900S25	●	110.4	137.4	193.4	190	3.4	25	WS304517T	TKY10T	WPT4405	MK1KS	18.9	TAWNH1890T	●		□
															TAWKH1890TG		●	
														19.0	TAWNH1900T	●		□
															TAWKH1900TG		●	
														19.1	TAWNH1910T	●		□
															TAWKH1910TG		●	
	8	TAWLN1900S25	●	165.5	188.5	244.5	241	3.5	25	WS304517T	TKY10T	WPT4405	MK1KS	19.2	TAWNH1920T	●		□
															TAWKH1920TG		●	
														19.3	TAWNH1930T	●		□
															TAWKH1930TG		●	
														19.4	TAWNH1940T	●		□
															TAWKH1940TG		●	
19.5 – 20.4	3	TAWSN2000S25	●	75.5	102.5	158.5	155	3.5	25	WS304518T	TKY10T	WPT4405	MK1KS	19.5	TAWNH1950T	●		□
															TAWKH1950TG		●	
														19.6	TAWNH1960T	●		□
															TAWKH1960TG		●	
														19.7	TAWNH1970T	●		□
															TAWKH1970TG		●	
														19.8	TAWNH1980T	●		□
															TAWKH1980TG		●	
	5	TAWMN2000S25	●	116.6	142.6	198.6	195	3.6	25	WS304518T	TKY10T	WPT4405	MK1KS	19.9	TAWNH1990T	●		□
															TAWKH1990TG		●	
														20.0	TAWNH2000T	●		□
															TAWKH2000TG		●	
														20.1	TAWNH2010T	□		□
															TAWKH2010TG		□	
	8	TAWLN2000S25	●	173.7	196.7	252.7	249	3.7	25	WS304518T	TKY10T	WPT4405	MK1KS	20.2	TAWNH2020T	□		□
															TAWKH2020TG		□	
														20.3	TAWNH2030T	□		□
															TAWKH2030TG		□	
														20.4	TAWNH2040T	□		□
															TAWKH2040TG		□	

(Note 1) The dimensions in brackets represent the sizes when TAWNH type inserts are used.
(Note 2) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan.
□ : Non stock, produced to order only.

INSERT DESCRIPTION ➤ N234
CUTTING CONDITIONS ➤ N238
USAGE NOTE ➤ N238
TECHNICAL DATA ➤ Q001

TAW

DC (mm)	Hole Depth (l/d)	Holder Order Number	Stock	LU	LH	OAL	LF	PL	DCON	Clamp Screw	Wrench	Plate	Anti-seize Lubricant	Insert DC (mm)	Insert Order Number	Stock VP15TF	Stock DP5010	Stock VP10H
20.5 – 21.4	3	TAWSN2100S25	●	78.7	102.7	158.7	155.0	3.7	25	WS304518T	TKY10T	WPT4405	MK1KS	20.5	*TAWNH2050T	●		□
															TAWKH2050TG		●	
														20.6	TAWNH2060T	□		□
															TAWKH2060TG		□	
														20.7	TAWNH2070T	□		□
															TAWKH2070TG		□	
														20.8	TAWNH2080T	□		□
															TAWKH2080TG		□	
	5	TAWMN2100S25	●	121.8	142.8	198.7	195.0	3.7	25	WS304518T	TKY10T	WPT4405	MK1KS	20.9	TAWNH2090T	□		□
															TAWKH2090TG		□	
														21.0	TAWNH2100T	●		□
															TAWKH2100TG		●	
														21.1	TAWNH2110T	□		□
															TAWKH2110TG		□	
	8	TAWLN2100S25	●	181.7	205.7	261.7	258.0	3.7	25	WS304518T	TKY10T	WPT4405	MK1KS	21.2	TAWNH2120T	□		□
															TAWKH2120TG		□	
														21.3	TAWNH2130T	□		□
															TAWKH2130TG		□	
														21.4	TAWNH2140T	□		□
															TAWKH2140TG		□	
21.5 – 22.4	3	TAWSN2200S25	●	83.2	108.2	164.2	160.3	3.9	25	WS355520T	TKY15T	WPT4405	MK1KS	21.5	*TAWNH2150T	●		□
															TAWKH2150TG		●	
														21.6	TAWNH2160T	□		□
															TAWKH2160TG		□	
														21.7	TAWNH2170T	□		□
															TAWKH2170TG		□	
														21.8	TAWNH2180T	□		□
															TAWKH2180TG		□	
	5	TAWMN2200S25	●	128.2	148.2	204.2	200.3	3.9	25	WS355520T	TKY15T	WPT4405	MK1KS	21.9	TAWNH2190T	□		□
															TAWKH2190TG		□	
														22.0	TAWNH2200T	●		□
															TAWKH2200TG		●	
														22.1	TAWNH2210T	□		□
															TAWKH2210TG		□	
	8	TAWLN2200S25	●	189.9	213.9	269.9	266.0	3.9	25	WS355520T	TKY15T	WPT4405	MK1KS	22.2	TAWNH2220T	□		□
															TAWKH2220TG		□	
														22.3	TAWNH2230T	□		□
															TAWKH2230TG		□	
														22.4	TAWNH2240T	□		□
															TAWKH2240TG		□	
22.5 – 23.4	3	TAWSN2300S25	●	86.4	108.4	164.4	160.3	4.1	25	WS355521T	TKY15T	WPT4405	MK1KS	22.5	*TAWNH2250T	●		□
															TAWKH2250TG		●	
														22.6	TAWNH2260T	□		□
															TAWKH2260TG		□	
														22.7	TAWNH2270T	□		□
															TAWKH2270TG		□	
														22.8	TAWNH2280T	□		□
															TAWKH2280TG		□	
	5	TAWMN2300S25	●	133.4	158.4	214.4	210.3	4.1	25	WS355521T	TKY15T	WPT4405	MK1KS	22.9	TAWNH2290T	□		□
															TAWKH2290TG		□	
														23.0	TAWNH2300T	●		□
															TAWKH2300TG		●	
														23.1	TAWNH2310T	□		□
															TAWKH2310TG		□	
	8	TAWLN2300S25	●	198.1	227.1	283.1	279.0	4.1	25	WS355521T	TKY15T	WPT4405	MK1KS	23.2	TAWNH2320T	□		□
															TAWKH2320TG		□	
														23.3	TAWNH2330T	□		□
															TAWKH2330TG		□	
														23.4	TAWNH2340T	□		□
															TAWKH2340TG		□	

(Note 1) The dimensions in brackets represent the sizes when TAWNH type inserts are used.
(Note 2) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

DC (mm)	Hole Depth (l/d)	Holder: Order Number	Holder: Stock	LU	LH	OAL	LF	PL	DCON	Clamp Screw	Wrench	Plate	Anti-seize Lubricant	Insert: DC (mm)	Insert: Order Number	Stock: VP15TF	Stock: DP5010	Stock: VP10H
23.5 — 24.4	3	TAWSN2400S32	●	90.6	114.6	174.6	170.3	4.3	32	WS355521T	TKY15T	WPT4405	MK1KS	23.5	*TAWNH2350T	●		□
															TAWKH2350TG		●	
														23.6	TAWNH2360T	□		□
															TAWKH2360TG		□	
														23.7	TAWNH2370T	□		□
															TAWKH2370TG		□	
														23.8	TAWNH2380T	□		□
															TAWKH2380TG		□	
														23.9	TAWNH2390T	□		□
															TAWKH2390TG		□	
	5	TAWMN2400S32	●	139.6	164.6	224.6	220.3	4.3	32	WS355521T	TKY15T	WPT4405	MK1KS	24.0	TAWNH2400T	●		□
															TAWKH2400TG		●	
														24.1	TAWNH2410T	□		□
															TAWKH2410TG		□	
	8	TAWLN2400S32	●	206.3	236.3	296.3	292.0	4.3	32	WS355521T	TKY15T	WPT4405	MK1KS	24.2	TAWNH2420T	□		□
															TAWKH2420TG		□	
														24.3	TAWNH2430T	□		□
															TAWKH2430TG		□	
														24.4	TAWNH2440T	□		□
															TAWKH2440TG		□	
24.5 — 25.4	3	TAWSN2500S32	●	93.1	115.1	175.1	170.6	4.5	32	WS406023T	TKY25T	WPT4405	MK1KS	24.5	*TAWNH2450T	●		□
															TAWKH2450TG		●	
														24.6	TAWNH2460T	□		□
															TAWKH2460TG		□	
														24.7	TAWNH2470T	□		□
															TAWKH2470TG		□	
														24.8	TAWNH2480T	□		□
															TAWKH2480TG		□	
	5	TAWMN2500S32	●	145.1	170.1	230.1	225.6	4.5	32	WS406023T	TKY25T	WPT4405	MK1KS	24.9	TAWNH2490T	□		□
															TAWKH2490TG		□	
														25.0	TAWNH2500T	●		□
															TAWKH2500TG		●	
														25.1	TAWNH2510T	□		□
															TAWKH2510TG		□	
	8	TAWLN2500S32	●	214.5	244.5	304.5	300.0	4.5	32	WS406023T	TKY25T	WPT4405	MK1KS	25.2	TAWNH2520T	□		□
															TAWKH2520TG		□	
														25.3	TAWNH2530T	□		□
															TAWKH2530TG		□	
														25.4	TAWNH2540T	□		□
															TAWKH2540TG		□	
25.5 — 26.4	3	TAWSN2600S32	●	97.2	120.2	180.2	175.6	4.6	32	WS406024T	TKY25T	WPT4405	MK1KS	25.5	*TAWNH2550T	●		□
															TAWKH2550TG		●	
														25.6	TAWNH2560T	□		□
															TAWKH2560TG		□	
														25.7	TAWNH2570T	□		□
															TAWKH2570TG		□	
														25.8	TAWNH2580T	□		□
															TAWKH2580TG		□	
	5	TAWMN2600S32	●	151.2	175.2	235.2	230.6	4.6	32	WS406024T	TKY25T	WPT4405	MK1KS	25.9	TAWNH2590T	□		□
															TAWKH2590TG		□	
														26.0	TAWNH2600T	●		□
															TAWKH2600TG		●	
														26.1	TAWNH2610T	□		□
															TAWKH2610TG		□	
	8	TAWLN2600S32	●	222.6	252.6	312.6	308.0	4.6	32	WS406024T	TKY25T	WPT4405	MK1KS	26.2	TAWNH2620T	□		□
															TAWKH2620TG		□	
														26.3	TAWNH2630T	□		□
															TAWKH2630TG		□	
														26.4	TAWNH2640T	□		□
															TAWKH2640TG		□	

INSERT DESCRIPTION ➤ N234
CUTTING CONDITIONS ➤ N238
USAGE NOTE ➤ N238
TECHNICAL DATA ➤ Q001

TAW

DC (mm)	Hole Depth (l/d)	Holder Order Number	Stock	LU	LH	OAL	LF	PL	DCON	Clamp Screw	Wrench	Plate	Anti-seize Lubricant	Insert DC (mm)	Insert Order Number	Stock VP15TF	Stock DP5010	Stock VP10H
26.5 – 27.4	3	TAWSN2700S32	●	99.4	120.4	180.4	175.6	4.8	32	WS406024T	TKY25T	WPT4405	MK1KS	26.5	*TAWNH2650T	●		□
															TAWKH2650TG		●	
														26.6	TAWNH2660T	□		□
															TAWKH2660TG		□	
														26.7	TAWNH2670T	□		□
															TAWKH2670TG		□	
														26.8	TAWNH2680T	□		□
															TAWKH2680TG		□	
	5	TAWMN2700S32	●	156.4	180.4	240.4	235.6	4.8	32	WS406024T	TKY25T	WPT4405	MK1KS	26.9	TAWNH2690T	□		□
															TAWKH2690TG		□	
														27.0	TAWNH2700T	●		□
															TAWKH2700TG		●	
														27.1	TAWNH2710T	□		□
															TAWKH2710TG		□	
	8	TAWLN2700S32	●	230.8	260.8	320.8	316.0	4.8	32	WS406024T	TKY25T	WPT4405	MK1KS	27.2	TAWNH2720T	□		□
															TAWKH2720TG		□	
														27.3	TAWNH2730T	□		□
															TAWKH2730TG		□	
														27.4	TAWNH2740T	□		□
															TAWKH2740TG		□	
27.5 – 28.4	3	TAWSN2800S32	●	102.2	125.2	185.2	180.2	5.0	32	WS508026T	TKY27T	WPT4405	MK1KS	27.5	*TAWNH2750T	●		□
															TAWKH2750TG		●	
														27.6	TAWNH2760T	□		□
															TAWKH2760TG		□	
														27.7	TAWNH2770T	□		□
															TAWKH2770TG		□	
														27.8	TAWNH2780T	□		□
															TAWKH2780TG		□	
	5	TAWMN2800S32	●	162.2	185.2	245.2	240.2	5.0	32	WS508026T	TKY27T	WPT4405	MK1KS	27.9	TAWNH2790T	□		□
															TAWKH2790TG		□	
														28.0	TAWNH2800T	●		□
															TAWKH2800TG		●	
														28.1	TAWNH2810T	□		□
															TAWKH2810TG		□	
	8	TAWLN2800S32	●	239.0	269.0	329.0	324.0	5.0	32	WS508026T	TKY27T	WPT4405	MK1KS	28.2	TAWNH2820T	□		□
															TAWKH2820TG		□	
														28.3	TAWNH2830T	□		□
															TAWKH2830TG		□	
														28.4	TAWNH2840T	□		□
															TAWKH2840TG		□	
28.5 – 29.4	3	TAWSN2900S32	●	105.4	130.4	190.4	185.2	5.2	32	WS508027T	TKY27T	WPT4405	MK1KS	28.5	*TAWNH2850T	●		□
															TAWKH2850TG		●	
														28.6	TAWNH2860T	□		□
															TAWKH2860TG		□	
														28.7	TAWNH2870T	□		□
															TAWKH2870TG		□	
														28.8	TAWNH2880T	□		□
															TAWKH2880TG		□	
	5	TAWMN2900S32	●	167.4	190.4	250.4	245.2	5.2	32	WS508027T	TKY27T	WPT4405	MK1KS	28.9	TAWNH2890T	□		□
															TAWKH2890TG		□	
														29.0	TAWNH2900T	●		□
															TAWKH2900TG		●	
														29.1	TAWNH2910T	□		□
															TAWKH2910TG		□	
	8	TAWLN2900S32	●	247.2	277.2	337.2	332.0	5.2	32	WS508027T	TKY27T	WPT4405	MK1KS	29.2	TAWNH2920T	□		□
															TAWKH2920TG		□	
														29.3	TAWNH2930T	□		□
															TAWKH2930TG		□	
														29.4	TAWNH2940T	□		□
															TAWKH2940TG		□	

(Note 1) The dimensions in brackets represent the sizes when TAWNH type inserts are used.
(Note 2) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

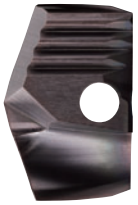
DC (mm)	Hole Depth (l/d)	Holder Order Number	Holder Stock	LU	LH	OAL	LF	PL	DCON	Clamp Screw	Wrench	Plate	Anti-seize Lubricant	Insert DC (mm)	Insert Order Number	Stock VP15TF	Stock DP5010	Stock VP10H
29.5 — 30.4	3	TAWSN3000S32	●	109.6	130.6	190.6	185.2	5.4	32	WS508027T	TKY27T	WPT4405	MK1KS	29.5	*TAWNH2950T	●		□
															TAWKH2950TG		●	
														29.6	TAWNH2960T	□		□
															TAWKH2960TG		□	
														29.7	TAWNH2970T	□		□
															TAWKH2970TG		□	
														29.8	TAWNH2980T	□		□
															TAWKH2980TG		□	
	5	TAWMN3000S32	●	172.6	200.6	260.6	255.2	5.4	32	WS508027T	TKY27T	WPT4405	MK1KS	29.9	TAWNH2990T	□		□
															TAWKH2990TG		□	
														30.0	TAWNH3000T	●		□
															TAWKH3000TG		●	
														30.1	TAWNH3010T	□		□
															TAWKH3010TG		□	
	8	TAWLN3000S32	●	255.4	290.4	350.4	345.0	5.4	32	WS508027T	TKY27T	WPT4405	MK1KS	30.2	TAWNH3020T	□		□
															TAWKH3020TG		□	
														30.3	TAWNH3030T	□		□
															TAWKH3030TG		□	
														30.4	TAWNH3040T	□		□
															TAWKH3040TG		□	

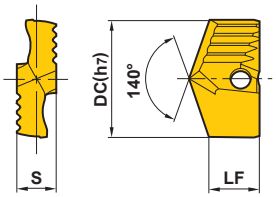
INSERT DESCRIPTION ➤ N234
CUTTING CONDITIONS ➤ N238
USAGE NOTE ➤ N238
TECHNICAL DATA ➤ Q001

TAW

INSERTS

H Type





Order Number	Stock VP15TF	Stock VP10H	Dimensions (mm) DC	LF	S	Applicable Holder
TAWNH1400T	▲		14.0	7.6	5.0	TAWSNH 1400S16 TAWMNH 1400S16 TAWLNH 1400S16
TAWNH1410T	▲		14.1	7.6	5.0	
TAWNH1420T	▲		14.2	7.6	5.0	
TAWNH1430T	▲		14.3	7.6	5.0	
TAWNH1440T	▲		14.4	7.6	5.0	
TAWNH1450T	▲		14.5	7.5	5.0	TAWSNH 1500S20 TAWMNH 1500S20 TAWLNH 1500S20
TAWNH1460T	▲		14.6	7.5	5.0	
TAWNH1470T	▲		14.7	7.5	5.0	
TAWNH1480T	▲		14.8	7.5	5.0	
TAWNH1490T	▲		14.9	7.5	5.0	
TAWNH1500T	▲		15.0	7.4	5.0	
TAWNH1510T	▲		15.1	7.4	5.0	
TAWNH1520T	▲		15.2	7.4	5.0	
TAWNH1530T	▲		15.3	7.4	5.0	
TAWNH1540T	▲		15.4	7.4	5.0	
TAWNH1550T	▲		15.5	7.9	6.0	TAWSN 1600S20 TAWMN 1600S20 TAWLN 1600S20
TAWNH1560T	▲		15.6	7.9	6.0	
TAWNH1570T	▲		15.7	7.9	6.0	
TAWNH1580T	▲		15.8	7.9	6.0	
TAWNH1590T	▲		15.9	7.9	6.0	
TAWNH1600T	▲		16.0	7.8	6.0	
TAWNH1610T	▲		16.1	7.8	6.0	
TAWNH1620T	▲		16.2	7.8	6.0	
TAWNH1630T	▲		16.3	7.8	6.0	
TAWNH1640T	▲		16.4	7.8	6.0	
TAWNH1650T	▲		16.5	7.7	6.0	TAWSN 1700S20 TAWMN 1700S20 TAWLN 1700S20
TAWNH1660T	▲		16.6	7.7	6.0	
TAWNH1670T	▲		16.7	7.7	6.0	
TAWNH1680T	▲		16.8	7.7	6.0	
TAWNH1690T	▲		16.9	7.7	6.0	
TAWNH1700T	▲		17.0	7.6	6.0	
TAWNH1710T	▲		17.1	7.6	6.0	
TAWNH1720T	▲		17.2	7.6	6.0	
TAWNH1730T	▲		17.3	7.6	6.0	
TAWNH1740T	▲		17.4	7.6	6.0	
TAWNH1750T	▲		17.5	7.5	6.0	TAWSN 1800S20 TAWMN 1800S20 TAWLN 1800S20
TAWNH1760T	▲		17.6	7.5	6.0	
TAWNH1770T	▲		17.7	7.5	6.0	
TAWNH1780T	▲		17.8	7.5	6.0	
TAWNH1790T	▲		17.9	7.5	6.0	
TAWNH1800T	▲		18.0	7.4	6.0	
TAWNH1810T	▲		18.1	7.4	6.0	
TAWNH1820T	▲		18.2	7.4	6.0	
TAWNH1830T	▲		18.3	7.4	6.0	
TAWNH1840T	▲		18.4	7.4	6.0	

Order Number	Stock VP15TF	Stock VP10H	Dimensions (mm) DC	LF	S	Applicable Holder
TAWNH1850T	●	□	18.5	9.3	7.0	TAWSN 1900S25 TAWMN 1900S25 TAWLN 1900S25
TAWNH1860T	●	□	18.6	9.3	7.0	
TAWNH1870T	●	□	18.7	9.3	7.0	
TAWNH1880T	●	□	18.8	9.3	7.0	
TAWNH1890T	●	□	18.9	9.3	7.0	
TAWNH1900T	●	□	19.0	9.2	7.0	
TAWNH1910T	●	□	19.1	9.2	7.0	
TAWNH1920T	●	□	19.2	9.2	7.0	
TAWNH1930T	●	□	19.3	9.2	7.0	
TAWNH1940T	●	□	19.4	9.2	7.0	
TAWNH1950T	●	□	19.5	9.1	7.0	TAWSN 2000S25 TAWMN 2000S25 TAWLN 2000S25
TAWNH1960T	●	□	19.6	9.1	7.0	
TAWNH1970T	●	□	19.7	9.1	7.0	
TAWNH1980T	●	□	19.8	9.1	7.0	
TAWNH1990T	●	□	19.9	9.1	7.0	
TAWNH2000T	●	□	20.0	9.0	7.0	
TAWNH2010T	□	□	20.1	9.0	7.0	
TAWNH2020T	□	□	20.2	9.0	7.0	
TAWNH2030T	□	□	20.3	9.0	7.0	
TAWNH2040T	□	□	20.4	9.0	7.0	
TAWNH2050T	●	□	20.5	8.9	7.0	TAWSN 2100S25 TAWMN 2100S25 TAWLN 2100S25
TAWNH2060T	□	□	20.6	8.9	7.0	
TAWNH2070T	□	□	20.7	8.9	7.0	
TAWNH2080T	□	□	20.8	8.9	7.0	
TAWNH2090T	□	□	20.9	8.9	7.0	
TAWNH2100T	●	□	21.0	8.8	7.0	
TAWNH2110T	□	□	21.1	8.8	7.0	
TAWNH2120T	□	□	21.2	8.8	7.0	
TAWNH2130T	□	□	21.3	8.8	7.0	
TAWNH2140T	□	□	21.4	8.8	7.0	
TAWNH2150T	●	□	21.5	10.6	8.0	TAWSN 2200S25 TAWMN 2200S25 TAWLN 2200S25
TAWNH2160T	□	□	21.6	10.6	8.0	
TAWNH2170T	□	□	21.7	10.6	8.0	
TAWNH2180T	□	□	21.8	10.6	8.0	
TAWNH2190T	□	□	21.9	10.6	8.0	
TAWNH2200T	●	□	22.0	10.5	8.0	
TAWNH2210T	□	□	22.1	10.5	8.0	
TAWNH2220T	□	□	22.2	10.5	8.0	
TAWNH2230T	□	□	22.3	10.5	8.0	
TAWNH2240T	□	□	22.4	10.5	8.0	
TAWNH2250T	●	□	22.5	10.4	8.0	TAWSN 2300S25 TAWMN 2300S25 TAWLN 2300S25
TAWNH2260T	□	□	22.6	10.4	8.0	
TAWNH2270T	□	□	22.7	10.4	8.0	
TAWNH2280T	□	□	22.8	10.4	8.0	
TAWNH2290T	□	□	22.9	10.4	8.0	

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
▲ : Inventory maintained in Japan. To be replaced by new products.
(1 insert in one case)

Order Number	Stock VP15TF	Stock VP10H	Dimensions (mm) DC	LF	S	Applicable Holder
TAWNH2300T	●	□	23.0	10.3	8.0	TAWSN 2300S25 TAWMN 2300S25 TAWLN 2300S25
TAWNH**2310T**	□	□	23.1	10.3	8.0	
TAWNH**2320T**	□	□	23.2	10.3	8.0	
TAWNH**2330T**	□	□	23.3	10.3	8.0	
TAWNH**2340T**	□	□	23.4	10.3	8.0	
TAWNH**2350T**	●	□	23.5	10.2	8.0	TAWSN 2400S32 TAWMN 2400S32 TAWLN 2400S32
TAWNH**2360T**	□	□	23.6	10.2	8.0	
TAWNH**2370T**	□	□	23.7	10.2	8.0	
TAWNH**2380T**	□	□	23.8	10.2	8.0	
TAWNH**2390T**	□	□	23.9	10.2	8.0	
TAWNH**2400T**	●	□	24.0	10.1	8.0	
TAWNH**2410T**	□	□	24.1	10.1	8.0	
TAWNH**2420T**	□	□	24.2	10.1	8.0	
TAWNH**2430T**	□	□	24.3	10.1	8.0	
TAWNH**2440T**	□	□	24.4	10.1	8.0	
TAWNH**2450T**	●	□	24.5	11.7	9.0	TAWSN 2500S32 TAWMN 2500S32 TAWLN 2500S32
TAWNH**2460T**	□	□	24.6	11.7	9.0	
TAWNH**2470T**	□	□	24.7	11.7	9.0	
TAWNH**2480T**	□	□	24.8	11.7	9.0	
TAWNH**2490T**	□	□	24.9	11.7	9.0	
TAWNH**2500T**	●	□	25.0	11.6	9.0	
TAWNH**2510T**	□	□	25.1	11.6	9.0	
TAWNH**2520T**	□	□	25.2	11.6	9.0	
TAWNH**2530T**	□	□	25.3	11.6	9.0	
TAWNH**2540T**	□	□	25.4	11.6	9.0	
TAWNH**2550T**	●	□	25.5	11.5	9.0	TAWSN 2600S32 TAWMN 2600S32 TAWLN 2600S32
TAWNH**2560T**	□	□	25.6	11.5	9.0	
TAWNH**2570T**	□	□	25.7	11.5	9.0	
TAWNH**2580T**	□	□	25.8	11.5	9.0	
TAWNH**2590T**	□	□	25.9	11.5	9.0	
TAWNH**2600T**	●	□	26.0	11.4	9.0	
TAWNH**2610T**	□	□	26.1	11.4	9.0	
TAWNH**2620T**	□	□	26.2	11.4	9.0	
TAWNH**2630T**	□	□	26.3	11.4	9.0	
TAWNH**2640T**	□	□	26.4	11.4	9.0	
TAWNH**2650T**	●	□	26.5	11.3	9.0	TAWSN 2700S32 TAWMN 2700S32 TAWLN 2700S32
TAWNH**2660T**	□	□	26.6	11.3	9.0	
TAWNH**2670T**	□	□	26.7	11.3	9.0	
TAWNH**2680T**	□	□	26.8	11.3	9.0	
TAWNH**2690T**	□	□	26.9	11.3	9.0	
TAWNH**2700T**	●	□	27.0	11.2	9.0	
TAWNH**2710T**	□	□	27.1	11.2	9.0	
TAWNH**2720T**	□	□	27.2	11.2	9.0	
TAWNH**2730T**	□	□	27.3	11.2	9.0	
TAWNH**2740T**	□	□	27.4	11.2	9.0	

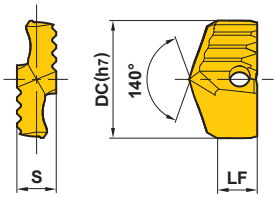
Order Number	Stock VP15TF	Stock VP10H	Dimensions (mm) DC	LF	S	Applicable Holder
TAWNH2750T	●	□	27.5	12.3	10.0	TAWSN 2800S32 TAWMN 2800S32 TAWLN 2800S32
TAWNH**2760T**	□	□	27.6	12.3	10.0	
TAWNH**2770T**	□	□	27.7	12.3	10.0	
TAWNH**2780T**	□	□	27.8	12.3	10.0	
TAWNH**2790T**	□	□	27.9	12.3	10.0	
TAWNH**2800T**	●	□	28.0	12.2	10.0	
TAWNH**2810T**	□	□	28.1	12.2	10.0	
TAWNH**2820T**	□	□	28.2	12.2	10.0	
TAWNH**2830T**	□	□	28.3	12.2	10.0	
TAWNH**2840T**	□	□	28.4	12.2	10.0	
TAWNH**2850T**	●	□	28.5	12.1	10.0	TAWSN 2900S32 TAWMN 2900S32 TAWLN 2900S32
TAWNH**2860T**	□	□	28.6	12.1	10.0	
TAWNH**2870T**	□	□	28.7	12.1	10.0	
TAWNH**2880T**	□	□	28.8	12.1	10.0	
TAWNH**2890T**	□	□	28.9	12.1	10.0	
TAWNH**2900T**	●	□	29.0	12.0	10.0	
TAWNH**2910T**	□	□	29.1	12.0	10.0	
TAWNH**2920T**	□	□	29.2	12.0	10.0	
TAWNH**2930T**	□	□	29.3	12.0	10.0	
TAWNH**2940T**	□	□	29.4	12.0	10.0	
TAWNH**2950T**	●	□	29.5	11.9	10.0	TAWSN 3000S32 TAWMN 3000S32 TAWLN 3000S32
TAWNH**2960T**	□	□	29.6	11.9	10.0	
TAWNH**2970T**	□	□	29.7	11.9	10.0	
TAWNH**2980T**	□	□	29.8	11.9	10.0	
TAWNH**2990T**	□	□	29.9	11.9	10.0	
TAWNH**3000T**	●	□	30.0	11.8	10.0	
TAWNH**3010T**	□	□	30.1	11.8	10.0	
TAWNH**3020T**	□	□	30.2	11.8	10.0	
TAWNH**3030T**	□	□	30.3	11.8	10.0	
TAWNH**3040T**	□	□	30.4	11.8	10.0	

TAW

INSERTS

H Type
(Cast Iron)





Order Number	Stock DP5010	Dimensions (mm) DC	LF	S	Applicable Holder
TAWKH1400TG	▲	14.0	7.1	5.0	TAWSNH 1400S16
TAWKH1410TG	▲	14.1	7.1	5.0	TAWMNH 1400S16
TAWKH1420TG	▲	14.2	7.1	5.0	TAWLNH 1400S16
TAWKH1430TG	▲	14.3	7.1	5.0	
TAWKH1440TG	▲	14.4	7.1	5.0	
TAWKH1450TG	▲	14.5	7.0	5.0	
TAWKH1460TG	▲	14.6	7.0	5.0	
TAWKH1470TG	▲	14.7	7.0	5.0	TAWSNH 1500S20
TAWKH1480TG	▲	14.8	7.0	5.0	TAWMNH 1500S20
TAWKH1490TG	▲	14.9	7.0	5.0	TAWLNH 1500S20
TAWKH1500TG	▲	15.0	6.9	5.0	
TAWKH1510TG	▲	15.1	6.9	5.0	
TAWKH1520TG	▲	15.2	6.9	5.0	
TAWKH1530TG	▲	15.3	6.9	5.0	
TAWKH1540TG	▲	15.4	6.9	5.0	
TAWKH1550TG	▲	15.5	7.3	6.0	
TAWKH1560TG	▲	15.6	7.3	6.0	
TAWKH1570TG	▲	15.7	7.3	6.0	TAWSN 1600S20
TAWKH1580TG	▲	15.8	7.3	6.0	TAWMN 1600S20
TAWKH1590TG	▲	15.9	7.3	6.0	TAWLN 1600S20
TAWKH1600TG	▲	16.0	7.2	6.0	
TAWKH1610TG	▲	16.1	7.2	6.0	
TAWKH1620TG	▲	16.2	7.2	6.0	
TAWKH1630TG	▲	16.3	7.2	6.0	
TAWKH1640TG	▲	16.4	7.2	6.0	
TAWKH1650TG	▲	16.5	7.1	6.0	
TAWKH1660TG	▲	16.6	7.1	6.0	
TAWKH1670TG	▲	16.7	7.1	6.0	TAWSN 1700S20
TAWKH1680TG	▲	16.8	7.1	6.0	TAWMN 1700S20
TAWKH1690TG	▲	16.9	7.1	6.0	TAWLN 1700S20
TAWKH1700TG	▲	17.0	7.0	6.0	
TAWKH1710TG	▲	17.1	7.0	6.0	
TAWKH1720TG	▲	17.2	7.0	6.0	
TAWKH1730TG	▲	17.3	7.0	6.0	
TAWKH1740TG	▲	17.4	7.0	6.0	
TAWKH1750TG	▲	17.5	6.8	6.0	
TAWKH1760TG	▲	17.6	6.8	6.0	
TAWKH1770TG	▲	17.7	6.8	6.0	TAWSN 1800S20
TAWKH1780TG	▲	17.8	6.8	6.0	TAWMN 1800S20
TAWKH1790TG	▲	17.9	6.8	6.0	TAWLN 1800S20
TAWKH1800TG	▲	18.0	6.8	6.0	
TAWKH1810TG	▲	18.1	6.8	6.0	
TAWKH1820TG	▲	18.2	6.8	6.0	
TAWKH1830TG	▲	18.3	6.8	6.0	
TAWKH1840TG	▲	18.4	6.8	6.0	

Order Number	Stock DP5010	Dimensions (mm) DC	LF	S	Applicable Holder
TAWKH1850TG	●	18.5	8.6	7.0	
TAWKH1860TG	●	18.6	8.6	7.0	
TAWKH1870TG	●	18.7	8.6	7.0	TAWSN 1900S25
TAWKH1880TG	●	18.8	8.6	7.0	TAWMN 1900S25
TAWKH1890TG	●	18.9	8.6	7.0	TAWLN 1900S25
TAWKH1900TG	●	19.0	8.5	7.0	
TAWKH1910TG	●	19.1	8.5	7.0	
TAWKH1920TG	●	19.2	8.5	7.0	
TAWKH1930TG	●	19.3	8.5	7.0	
TAWKH1940TG	●	19.4	8.5	7.0	
TAWKH1950TG	●	19.5	8.4	7.0	
TAWKH1960TG	●	19.6	8.4	7.0	
TAWKH1970TG	●	19.7	8.4	7.0	TAWSN 2000S25
TAWKH1980TG	●	19.8	8.4	7.0	TAWMN 2000S25
TAWKH1990TG	●	19.9	8.4	7.0	TAWLN 2000S25
TAWKH2000TG	●	20.0	8.3	7.0	
TAWKH2010TG	□	20.1	8.3	7.0	
TAWKH2020TG	□	20.2	8.3	7.0	
TAWKH2030TG	□	20.3	8.3	7.0	
TAWKH2040TG	□	20.4	8.3	7.0	
TAWKH2050TG	●	20.5	8.2	7.0	
TAWKH2060TG	□	20.6	8.2	7.0	
TAWKH2070TG	□	20.7	8.2	7.0	TAWSN 2100S25
TAWKH2080TG	□	20.8	8.2	7.0	TAWMN 2100S25
TAWKH2090TG	□	20.9	8.2	7.0	TAWLN 2100S25
TAWKH2100TG	●	21.0	8.1	7.0	
TAWKH2110TG	□	21.1	8.1	7.0	
TAWKH2120TG	□	21.2	8.1	7.0	
TAWKH2130TG	□	21.3	8.1	7.0	
TAWKH2140TG	□	21.4	8.1	7.0	
TAWKH2150TG	●	21.5	9.8	8.0	
TAWKH2160TG	□	21.6	9.8	8.0	
TAWKH2170TG	□	21.7	9.8	8.0	TAWSN 2200S25
TAWKH2180TG	□	21.8	9.8	8.0	TAWMN 2200S25
TAWKH2190TG	□	21.9	9.8	8.0	TAWLN 2200S25
TAWKH2200TG	●	22.0	9.7	8.0	
TAWKH2210TG	□	22.1	9.7	8.0	
TAWKH2220TG	□	22.2	9.7	8.0	
TAWKH2230TG	□	22.3	9.7	8.0	
TAWKH2240TG	□	22.4	9.7	8.0	
TAWKH2250TG	●	22.5	9.6	8.0	TAWSN 2300S25
TAWKH2260TG	□	22.6	9.6	8.0	TAWMN 2300S25
TAWKH2270TG	□	22.7	9.6	8.0	TAWLN 2300S25
TAWKH2280TG	□	22.8	9.6	8.0	
TAWKH2290TG	□	22.9	9.6	8.0	

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
▲ : Inventory maintained in Japan. To be replaced by new products.
(1 insert in one case)

Order Number	Stock	Dimensions (mm)			Applicable Holder
	DP5010	DC	LF	S	
TAWKH2300TG	●	23.0	9.5	8.0	TAWSN 2300S25 TAWMN 2300S25 TAWLN 2300S25
TAWKH2310TG	□	23.1	9.5	8.0	
TAWKH2320TG	□	23.2	9.5	8.0	
TAWKH2330TG	□	23.3	9.5	8.0	
TAWKH2340TG	□	23.4	9.5	8.0	
TAWKH2350TG	●	23.5	9.4	8.0	TAWSN 2400S32 TAWMN 2400S32 TAWLN 2400S32
TAWKH2360TG	□	23.6	9.4	8.0	
TAWKH2370TG	□	23.7	9.4	8.0	
TAWKH2380TG	□	23.8	9.4	8.0	
TAWKH2390TG	□	23.9	9.4	8.0	
TAWKH2400TG	●	24.0	9.3	8.0	
TAWKH2410TG	□	24.1	9.3	8.0	
TAWKH2420TG	□	24.2	9.3	8.0	
TAWKH2430TG	□	24.3	9.3	8.0	
TAWKH2440TG	□	24.4	9.3	8.0	
TAWKH2450TG	●	24.5	10.8	9.0	TAWSN 2500S32 TAWMN 2500S32 TAWLN 2500S32
TAWKH2460TG	□	24.6	10.8	9.0	
TAWKH2470TG	□	24.7	10.8	9.0	
TAWKH2480TG	□	24.8	10.8	9.0	
TAWKH2490TG	□	24.9	10.8	9.0	
TAWKH2500TG	●	25.0	10.7	9.0	
TAWKH2510TG	□	25.1	10.7	9.0	
TAWKH2520TG	□	25.2	10.7	9.0	
TAWKH2530TG	□	25.3	10.7	9.0	
TAWKH2540TG	□	25.4	10.7	9.0	
TAWKH2550TG	●	25.5	10.6	9.0	TAWSN 2600S32 TAWMN 2600S32 TAWLN 2600S32
TAWKH2560TG	□	25.6	10.6	9.0	
TAWKH2570TG	□	25.7	10.6	9.0	
TAWKH2580TG	□	25.8	10.6	9.0	
TAWKH2590TG	□	25.9	10.6	9.0	
TAWKH2600TG	●	26.0	10.5	9.0	
TAWKH2610TG	□	26.1	10.5	9.0	
TAWKH2620TG	□	26.2	10.5	9.0	
TAWKH2630TG	□	26.3	10.5	9.0	
TAWKH2640TG	□	26.4	10.5	9.0	
TAWKH2650TG	●	26.5	10.4	9.0	TAWSN 2700S32 TAWMN 2700S32 TAWLN 2700S32
TAWKH2660TG	□	26.6	10.4	9.0	
TAWKH2670TG	□	26.7	10.4	9.0	
TAWKH2680TG	□	26.8	10.4	9.0	
TAWKH2690TG	□	26.9	10.4	9.0	
TAWKH2700TG	●	27.0	10.3	9.0	
TAWKH2710TG	□	27.1	10.3	9.0	
TAWKH2720TG	□	27.2	10.3	9.0	
TAWKH2730TG	□	27.3	10.3	9.0	
TAWKH2740TG	□	27.4	10.3	9.0	

Order Number	Stock	Dimensions (mm)			Applicable Holder
	DP5010	DC	LF	S	
TAWKH2750TG	●	27.5	11.3	10.0	TAWSN 2800S32 TAWMN 2800S32 TAWLN 2800S32
TAWKH2760TG	□	27.6	11.3	10.0	
TAWKH2770TG	□	27.7	11.3	10.0	
TAWKH2780TG	□	27.8	11.3	10.0	
TAWKH2790TG	□	27.9	11.3	10.0	
TAWKH2800TG	●	28.0	11.2	10.0	
TAWKH2810TG	□	28.1	11.2	10.0	
TAWKH2820TG	□	28.2	11.2	10.0	
TAWKH2830TG	□	28.3	11.2	10.0	
TAWKH2840TG	□	28.4	11.2	10.0	
TAWKH2850TG	●	28.5	11.1	10.0	TAWSN 2900S32 TAWMN 2900S32 TAWLN 2900S32
TAWKH2860TG	□	28.6	11.1	10.0	
TAWKH2870TG	□	28.7	11.1	10.0	
TAWKH2880TG	□	28.8	11.1	10.0	
TAWKH2890TG	□	28.9	11.1	10.0	
TAWKH2900TG	●	29.0	11.0	10.0	
TAWKH2910TG	□	29.1	11.0	10.0	
TAWKH2920TG	□	29.2	11.0	10.0	
TAWKH2930TG	□	29.3	11.0	10.0	
TAWKH2940TG	□	29.4	11.0	10.0	
TAWKH2950TG	●	29.5	10.9	10.0	TAWSN 3000S32 TAWMN 3000S32 TAWLN 3000S32
TAWKH2960TG	□	29.6	10.9	10.0	
TAWKH2970TG	□	29.7	10.9	10.0	
TAWKH2980TG	□	29.8	10.9	10.0	
TAWKH2990TG	□	29.9	10.9	10.0	
TAWKH3000TG	●	30.0	10.8	10.0	
TAWKH3010TG	□	30.1	10.8	10.0	
TAWKH3020TG	□	30.2	10.8	10.0	
TAWKH3030TG	□	30.3	10.8	10.0	
TAWKH3040TG	□	30.4	10.8	10.0	

TAW

RECOMMENDED CUTTING CONDITIONS

Work Material		Drill Diameter / Conditions / Hardness	ϕ14.0—ϕ15.4		ϕ15.5—ϕ18.4		ϕ18.5—ϕ21.4	
			Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)
P	Mild Steel	≤180HB	70(60—90)	0.20 (0.15—0.25)	80 (60—100)	0.25 (0.20—0.30)	90 (70—110)	0.25 (0.20—0.30)
P	Carbon Steel Alloy Steel	180—280HB	70 (60—90)	0.20 (0.15—0.25)	80 (60—100)	0.25 (0.20—0.30)	80 (60—100)	0.25 (0.20—0.30)
P	Carbon Steel Alloy Steel	280—350HB	60 (50—80)	0.15 (0.12—0.18)	70 (50—90)	0.20 (0.15—0.25)	70 (50—90)	0.20 (0.15—0.25)
M	Stainless Steel	≤200HB	50 (40—60)	0.15 (0.12—0.18)	50 (40—60)	0.15 (0.12—0.18)	60 (50—70)	0.20 (0.15—0.22)
K	Gray Cast Iron	Tensile Strength ≤350MPa	70 (50—90)	0.20 (0.15—0.25)	100 (60—120)	0.25 (0.20—0.30)	120 (60—140)	0.25 (0.20—0.30)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	70 (50—90)	0.20 (0.15—0.25)	80 (60—90)	0.25 (0.20—0.30)	80 (60—90)	0.25 (0.20—0.30)

Work Material		Drill Diameter / Conditions / Hardness	ϕ21.5—ϕ24.4		ϕ24.5—ϕ27.4		ϕ27.5—ϕ30.4	
			Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)
P	Mild Steel	≤180HB	100 (80—120)	0.30 (0.25—0.35)	110 (80—120)	0.30 (0.25—0.35)	110 (80—120)	0.30 (0.25—0.35)
P	Carbon Steel Alloy Steel	180—280HB	90 (70—110)	0.30 (0.25—0.35)	100 (80—120)	0.30 (0.25—0.35)	100 (80—120)	0.30 (0.25—0.35)
P	Carbon Steel Alloy Steel	280—350HB	80 (60—100)	0.25 (0.20—0.30)	90 (70—110)	0.25 (0.20—0.30)	90 (70—110)	0.25 (0.20—0.30)
M	Stainless Steel	≤200HB	60 (50—70)	0.20 (0.15—0.22)	70 (60—80)	0.25 (0.20—0.28)	70 (60—80)	0.25 (0.20—0.28)
K	Gray Cast Iron	Tensile Strength ≤350MPa	130 (80—150)	0.35 (0.25—0.40)	140 (90—160)	0.35 (0.25—0.40)	140 (90—160)	0.40 (0.30—0.45)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	90 (60—100)	0.30 (0.25—0.35)	100 (80—110)	0.30 (0.25—0.35)	100 (80—110)	0.30 (0.25—0.35)

(Note 1) When using the 8DC type holder, reduce the cutting speed by approx. 20%.
(Note 2) When using the 8DC type holder, it is recommended to drill a pilot guide hole.
(Note 3) H type honing is recommended when machining mild steel and stainless steel.

HONE WIDTH

If an insert with honing other than standard is needed, please order using the symbols below.

(Insert Order Number)

T A W N H 1 4 0 0 T ○

- TAW: TAW Product Name
- N: N : General Use / K : For Cast Iron / B : For Bridges
- H: H : H Type
- 1 4 0 0: Insert Diameter
- T: Honing Symbol
- ○: Honing Type

(Honing Standard)

Honing Type	Hone Width (mm)
F	0
G	0.02—0.05
H	0.05—0.10
-(Standard)	0.10—0.15
K	0.15—0.20
S	0.20—0.25
M	0.25—0.30

NOTES ON USE

INSERT INSTALLATION

- Loosen the clamp screw to install the insert.
- Correctly mesh the insert and the holder serrations, then slide the insert to the bottom of the slot.
- Fasten the clamp screw using the torque wrench provided while holding the insert lightly as shown. (Figure 1)
- Check there is no gap between the bottom of the insert and holder. (Figure 2)

Tighten the clamp screw according to the torque below.

Drill Diameter (mm)	Clamp Torque (N · m)
14—15	2.0
16—18	2.0
19—21	3.5
22—24	5.5
25—27	8.5
28—30	12.0

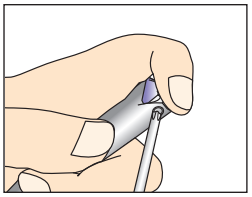


Fig. 1

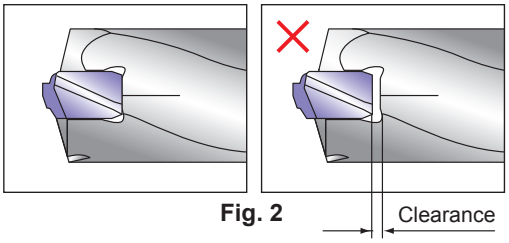


Fig. 2

INSERT REPLACEMENT

- Thouroughly clean the serrations of the holder before installing a new insert.
  Remove heavy dirt in the holder serrations by using the cleaning plate provided.

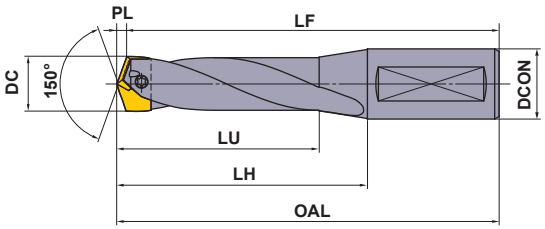
TAW

P | M | K | N | S | H

Steel

(For Bridge Construction)



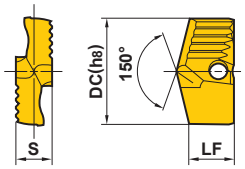


HOLDERS

DC (mm)	Hole Depth (l/d)	Holder Order Number	Holder Stock	Insert DC (mm)	Insert Order Number	Insert Stock VP15TF	LU	LH	OAL	LF	PL	DCON	Clamp Screw	Wrench	Plate	Anti-seize Lubricant
24.5	3	TAWSB2500S32	●	24.5	TAWBH2450T	●	91.9	113.9	173.9	170.6	3.3	32	WS406023T	TKY25T	WPT4405	MK1KS
24.6	5	TAWMB2500S32	□	24.6	TAWBH2460T	□	143.9	168.9	228.9	225.6	3.3	32	WS406023T	TKY25T	WPT4405	MK1KS
24.7				24.7	TAWBH2470T	●										
26.5	3	TAWSB2700S32	●	26.5	TAWBH2650T	□	98.2	119.2	179.2	175.6	3.6	32	WS406024T	TKY25T	WPT4405	MK1KS
26.7	5	TAWMB2700S32	□	26.7	TAWB2670T	●	155.2	179.2	239.2	235.6	3.6	32	WS406024T	TKY25T	WPT4405	MK1KS
					TAWBH2670T	●										

(Note 1) The above dimensions are for when installing the TAWBH (H type) insert.
(Note 2) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).
● : Inventory maintained in Japan. □ : Non stock, produced to order only.

INSERTS

Shape	Order Number	Stock VP15TF	Dimensions (mm) DC	LF	S	Applicable Holder	Hone Width (mm)	Geometry
H Type 	TAWBH2450T	●	24.5	11.7	9.0	TAWSB2500S32 TAWMB2500S32	0.20—0.25	
	TAWBH2460T	□	24.6	11.7	9.0			
	TAWBH2470T	●	24.7	11.7	9.0			
	TAWBH2650T	□	26.5	11.3	9.0	TAWSB2700S32 TAWMB2700S32		
	TAWBH2670T	●	26.7	11.3	9.0			

● : Inventory maintained in Japan. □ : Non stock, produced to order only.
(1 insert in one case)

RECOMMENDED CUTTING CONDITIONS

Work Material			Drill Diameter / Conditions / Hardness	ϕ24.5, ϕ24.6, ϕ24.7 Cutting Speed (m/min)	ϕ24.5, ϕ24.6, ϕ24.7 Feed (mm/rev)	ϕ26.5, ϕ26.7 Cutting Speed (m/min)	ϕ26.5, ϕ26.7 Feed (mm/rev)
P	Structural Steel	SS400 (JIS)	Tensile Strength ≦400—500MPa	70 (60—80)	0.30 (0.25—0.35)	70 (60—80)	0.30 (0.25—0.35)
		SM490 (JIS)	Tensile Strength ≦490—610MPa	65 (55—75)	0.30 (0.25—0.35)	65 (55—75)	0.30 (0.25—0.35)
		SM570 (JIS)	Tensile Strength ≦570—720MPa	60 (50—70)	0.30 (0.25—0.35)	60 (50—70)	0.30 (0.25—0.35)

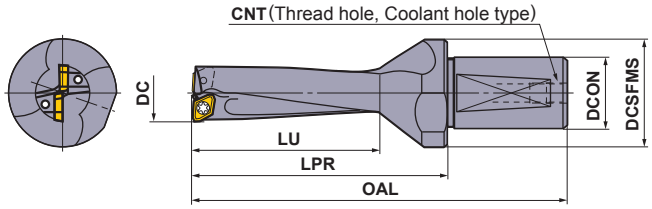
TAFS/TAFM/TAFL

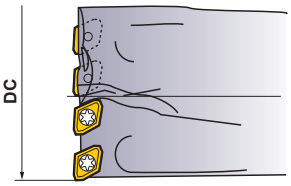
- High rigidity holder.
- 4 corner use insert.
- Various grades and chip breakers.

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron			



*A screw hole on the flange section is not a coolant hole.

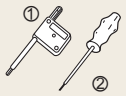




Number of Teeth = 4 (ϕDC ≥ 49)

DC (mm)	Hole Depth (l/d)	Order Number	Stock	Number of Teeth	Dimensions (mm) LU	LPR	OAL	DCON	DCSFMS	CNT	Insert Number	Clamp Screw	Wrench
12.0	2	TAFS1200F20	●	2	29	39	82	20	25	PT1/8	GCMT040204-U○	TS2	TKY06F
	3	TAFM1200F20	●	2	41	51	94	20	25	PT1/8	GCMT040204-U○	TS2	TKY06F
12.5	2	TAFS1250F20	●	2	29	39	82	20	25	PT1/8	GCMT040204-U○	TS2	TKY06F
	3	TAFM1250F20	●	2	41	51	94	20	25	PT1/8	GCMT040204-U○	TS2	TKY06F
13.0	2	TAFS1300F20	●	2	31	41	84	20	25	PT1/8	GCMT040204-U○	TS2	TKY06F
	3	TAFM1300F20	●	2	44	54	97	20	25	PT1/8	GCMT040204-U○	TS2	TKY06F
13.5	2	TAFS1350F20	●	2	31	41	84	20	25	PT1/8	GCMT040204-U○	TS2	TKY06F
	3	TAFM1350F20	●	2	44	54	97	20	25	PT1/8	GCMT040204-U○	TS2	TKY06F
14.0	2	TAFS1400F20	●	2	33	43	86	20	25	PT1/8	GCMT040204-U○	TS2	TKY06F
	3	TAFM1400F20	●	2	47	57	100	20	25	PT1/8	GCMT040204-U○	TS2	TKY06F
14.5	2	TAFS1450F20	●	2	33	43	86	20	25	PT1/8	GCMT040204-U○	TS2	TKY06F
	3	TAFM1450F20	●	2	47	57	100	20	25	PT1/8	GCMT040204-U○	TS2	TKY06F
15.0	2	TAFS1500F20	●	2	35	45	88	20	25	PT1/8	GPMT060204-U○	TS2	TKY06F
	3	TAFM1500F20	●	2	50	60	103	20	25	PT1/8	GPMT060204-U○	TS2	TKY06F
15.5	2	TAFS1550F20	●	2	35	45	88	20	25	PT1/8	GPMT060204-U○	TS2	TKY06F
	3	TAFM1550F20	●	2	50	60	103	20	25	PT1/8	GPMT060204-U○	TS2	TKY06F
16.0	2	TAFS1600F25	●	2	38	57	107	25	35	PT1/8	GPMT060204-U○	TS2	TKY06F
	3	TAFM1600F25	●	2	54	73	123	25	35	PT1/8	GPMT060204-U○	TS2	TKY06F
	4	TAFL1600F25	●	2	70	89	139	25	35	PT1/8	GPMT060204-U○	TS2	TKY06F
16.5	2	TAFS1650F25	●	2	38	57	107	25	35	PT1/8	GPMT060204-U○	TS2	TKY06F
	3	TAFM1650F25	●	2	54	73	123	25	35	PT1/8	GPMT060204-U○	TS2	TKY06F
17.0	2	TAFS1700F25	●	2	41	59	109	25	35	PT1/8	GPMT060204-U○	TS2	TKY06F
	3	TAFM1700F25	●	2	58	76	126	25	35	PT1/8	GPMT060204-U○	TS2	TKY06F
	4	TAFL1700F25	●	2	75	93	143	25	35	PT1/8	GPMT060204-U○	TS2	TKY06F
17.5	2	TAFS1750F25	●	2	41	59	109	25	35	PT1/8	GPMT060204-U○	TS2	TKY06F
	3	TAFM1750F25	●	2	58	76	126	25	35	PT1/8	GPMT060204-U○	TS2	TKY06F
18.0	2	TAFS1800F25	●	2	43	61	111	25	35	PT1/8	GPMT070204-U○	TS25	TKY08F
	3	TAFM1800F25	●	2	61	79	129	25	35	PT1/8	GPMT070204-U○	TS25	TKY08F
	4	TAFL1800F25	●	2	79	97	147	25	35	PT1/8	GPMT070204-U○	TS25	TKY08F
18.5	2	TAFS1850F25	●	2	43	61	111	25	35	PT1/8	GPMT070204-U○	TS25	TKY08F
	3	TAFM1850F25	●	2	61	79	129	25	35	PT1/8	GPMT070204-U○	TS25	TKY08F

● : Inventory maintained in Japan.

DC (mm)	Hole Depth (l/d)	Order Number	Stock	Number of Teeth	Dimensions (mm)						Insert Number	 Clamp Screw	 Wrench
					LU	LPR	OAL	DCON	DCSFMS	CNT			
19.0	2	TAFS1900F25	●	2	46	63	113	25	35	PT1/8	GPMT070204-U○	TS25	①TKY08F
	3	TAFM1900F25	●	2	65	82	132	25	35	PT1/8	GPMT070204-U○	TS25	①TKY08F
	4	TAFL1900F25	●	2	84	101	151	25	35	PT1/8	GPMT070204-U○	TS25	①TKY08F
19.5	2	TAFS1950F25	●	2	46	63	113	25	35	PT1/8	GPMT070204-U○	TS25	①TKY08F
	3	TAFM1950F25	●	2	65	82	132	25	35	PT1/8	GPMT070204-U○	TS25	①TKY08F
20.0	2	TAFS2000F25	●	2	48	65	115	25	35	PT1/8	GPMT070204-U○	TS25	①TKY08F
	3	TAFM2000F25	●	2	68	85	135	25	35	PT1/8	GPMT070204-U○	TS25	①TKY08F
	4	TAFL2000F25	●	2	88	105	155	25	35	PT1/8	GPMT070204-U○	TS25	①TKY08F
20.5	2	TAFS2050F25	●	2	48	65	115	25	35	PT1/8	GPMT070204-U○	TS25	①TKY08F
	3	TAFM2050F25	●	2	68	85	135	25	35	PT1/8	GPMT070204-U○	TS25	①TKY08F
21.0	2	TAFS2100F25	●	2	50	67	117	25	35	PT1/8	GPMT070204-U○	TS25	①TKY08F
	3	TAFM2100F25	●	2	71	88	138	25	35	PT1/8	GPMT070204-U○	TS25	①TKY08F
	4	TAFL2100F25	●	2	92	109	159	25	35	PT1/8	GPMT070204-U○	TS25	①TKY08F
21.5	2	TAFS2150F25	●	2	50	67	117	25	35	PT1/8	GPMT070204-U○	TS25	①TKY08F
	3	TAFM2150F25	●	2	71	88	138	25	35	PT1/8	GPMT070204-U○	TS25	①TKY08F
22.0	2	TAFS2200F25	●	2	53	69	119	25	35	PT1/8	GPMT070204-U○	TS25	①TKY08F
	3	TAFM2200F25	●	2	75	91	141	25	35	PT1/8	GPMT070204-U○	TS25	①TKY08F
	4	TAFL2200F25	●	2	97	113	163	25	35	PT1/8	GPMT070204-U○	TS25	①TKY08F
22.5	2	TAFS2250F25	●	2	53	69	119	25	35	PT1/8	GPMT070204-U○	TS25	①TKY08F
	3	TAFM2250F25	●	2	75	91	141	25	35	PT1/8	GPMT070204-U○	TS25	①TKY08F
23.0	2	TAFS2300F25	●	2	55	71	121	25	35	PT1/8	GPMT090304-U○	TS3	①TKY08F
	3	TAFM2300F25	●	2	78	94	144	25	35	PT1/8	GPMT090304-U○	TS3	①TKY08F
	4	TAFL2300F25	●	2	101	117	167	25	35	PT1/8	GPMT090304-U○	TS3	①TKY08F
23.5	2	TAFS2350F25	●	2	55	71	121	25	35	PT1/8	GPMT090304-U○	TS3	①TKY08F
	3	TAFM2350F25	●	2	78	94	144	25	35	PT1/8	GPMT090304-U○	TS3	①TKY08F
24.0	2	TAFS2400F25	●	2	58	73	123	25	35	PT1/8	GPMT090304-U○	TS3	①TKY08F
	3	TAFM2400F25	●	2	82	97	147	25	35	PT1/8	GPMT090304-U○	TS3	①TKY08F
	4	TAFL2400F25	●	2	106	121	171	25	35	PT1/8	GPMT090304-U○	TS3	①TKY08F
24.5	2	TAFS2450F25	●	2	58	73	123	25	35	PT1/8	GPMT090304-U○	TS3	①TKY08F
	3	TAFM2450F25	●	2	82	97	147	25	35	PT1/8	GPMT090304-U○	TS3	①TKY08F
25.0	2	TAFS2500F32	●	2	60	75	130	32	42	PT1/8	GPMT090304-U○	TS3	①TKY08F
	3	TAFM2500F32	●	2	85	100	155	32	42	PT1/8	GPMT090304-U○	TS3	①TKY08F
	4	TAFL2500F32	●	2	110	125	180	32	42	PT1/8	GPMT090304-U○	TS3	①TKY08F
25.5	2	TAFS2550F32	●	2	60	75	130	32	42	PT1/8	GPMT090304-U○	TS3	①TKY08F
	3	TAFM2550F32	●	2	85	100	155	32	42	PT1/8	GPMT090304-U○	TS3	①TKY08F
26.0	2	TAFS2600F32	●	2	62	77	132	32	42	PT1/8	GPMT090304-U○	TS3	①TKY08F
	3	TAFM2600F32	●	2	88	103	158	32	42	PT1/8	GPMT090304-U○	TS3	①TKY08F
	4	TAFL2600F32	●	2	114	129	184	32	42	PT1/8	GPMT090304-U○	TS3	①TKY08F
26.5	2	TAFS2650F32	●	2	62	77	132	32	42	PT1/8	GPMT090304-U○	TS3	①TKY08F
	3	TAFM2650F32	●	2	88	103	158	32	42	PT1/8	GPMT090304-U○	TS3	①TKY08F
27.0	2	TAFS2700F32	●	2	65	79	134	32	42	PT1/8	GPMT090304-U○	TS3	①TKY08F
	3	TAFM2700F32	●	2	92	106	161	32	42	PT1/8	GPMT090304-U○	TS3	①TKY08F
	4	TAFL2700F32	●	2	119	133	188	32	42	PT1/8	GPMT090304-U○	TS3	①TKY08F
27.5	2	TAFS2750F32	●	2	65	79	134	32	42	PT1/8	GPMT090304-U○	TS3	①TKY08F
	3	TAFM2750F32	●	2	92	106	161	32	42	PT1/8	GPMT090304-U○	TS3	①TKY08F
28.0	2	TAFS2800F32	●	2	67	81	136	32	42	PT1/8	GPMT11T308-U○	TS4	②TKY15D
	3	TAFM2800F32	●	2	95	109	164	32	42	PT1/8	GPMT11T308-U○	TS4	②TKY15D
	4	TAFL2800F32	●	2	123	137	192	32	42	PT1/8	GPMT11T308-U○	TS4	②TKY15D

DRILLING

INSERT DESCRIPTION ➤ N244
CUTTING CONDITIONS ➤ N245
USAGE NOTE ➤ N248
TECHNICAL DATA ➤ Q001

TAFS/TAFM/TAFL

DC (mm)	Hole Depth (l/d)	Order Number	Stock	Number of Teeth	Dimensions (mm)						Insert Number	Clamp Screw	Wrench
					LU	LPR	OAL	DCON	DCSFMS	CNT			
28.5	2	TAFS2850F32	●	2	67	81	136	32	42	PT1/8	GPMT11T308-U○	TS4	TKY15D
	3	TAFM2850F32	●	2	95	109	164	32	42	PT1/8	GPMT11T308-U○	TS4	TKY15D
29.0	2	TAFS2900F32	●	2	70	83	138	32	42	PT1/8	GPMT11T308-U○	TS4	TKY15D
	3	TAFM2900F32	●	2	99	112	167	32	42	PT1/8	GPMT11T308-U○	TS4	TKY15D
	4	TAFL2900F32	●	2	128	141	196	32	42	PT1/8	GPMT11T308-U○	TS4	TKY15D
29.5	2	TAFS2950F32	●	2	70	83	138	32	42	PT1/8	GPMT11T308-U○	TS4	TKY15D
	3	TAFM2950F32	●	2	99	112	167	32	42	PT1/8	GPMT11T308-U○	TS4	TKY15D
30.0	2	TAFS3000F40	●	2	72	90	155	40	50	PT1/4	GPMT11T308-U○	TS4	TKY15D
	3	TAFM3000F40	●	2	102	120	185	40	50	PT1/4	GPMT11T308-U○	TS4	TKY15D
	4	TAFL3000F40	●	2	132	150	215	40	50	PT1/4	GPMT11T308-U○	TS4	TKY15D
31.0	2	TAFS3100F40	●	2	74	92	157	40	50	PT1/4	GPMT11T308-U○	TS4	TKY15D
	3	TAFM3100F40	●	2	105	123	188	40	50	PT1/4	GPMT11T308-U○	TS4	TKY15D
	4	TAFL3100F40	●	2	136	154	219	40	50	PT1/4	GPMT11T308-U○	TS4	TKY15D
32.0	2	TAFS3200F40	●	2	77	94	159	40	50	PT1/4	GPMT11T308-U○	TS4	TKY15D
	3	TAFM3200F40	●	2	109	126	191	40	50	PT1/4	GPMT11T308-U○	TS4	TKY15D
	4	TAFL3200F40	●	2	141	158	223	40	50	PT1/4	GPMT11T308-U○	TS4	TKY15D
33.0	2	TAFS3300F40	●	2	79	96	161	40	50	PT1/4	GPMT11T308-U○	TS4	TKY15D
	3	TAFM3300F40	●	2	112	129	194	40	50	PT1/4	GPMT11T308-U○	TS4	TKY15D
	4	TAFL3300F40	●	2	145	162	227	40	50	PT1/4	GPMT11T308-U○	TS4	TKY15D
34.0	2	TAFS3400F40	●	2	82	98	163	40	50	PT1/4	GPMT11T308-U○	TS4	TKY15D
	3	TAFM3400F40	●	2	116	132	197	40	50	PT1/4	GPMT11T308-U○	TS4	TKY15D
	4	TAFL3400F40	●	2	150	166	231	40	50	PT1/4	GPMT11T308-U○	TS4	TKY15D
35.0	2	TAFS3500F40	●	2	84	100	165	40	50	PT1/4	GPMT140408-U○	TS55	TKY25D
	3	TAFM3500F40	●	2	119	135	200	40	50	PT1/4	GPMT140408-U○	TS55	TKY25D
36.0	2	TAFS3600F40	●	2	86	102	167	40	50	PT1/4	GPMT140408-U○	TS55	TKY25D
	3	TAFM3600F40	●	2	122	138	203	40	50	PT1/4	GPMT140408-U○	TS55	TKY25D
37.0	2	TAFS3700F40	●	2	89	104	169	40	50	PT1/4	GPMT140408-U○	TS55	TKY25D
	3	TAFM3700F40	●	2	126	141	206	40	50	PT1/4	GPMT140408-U○	TS55	TKY25D
38.0	2	TAFS3800F40	●	2	91	106	171	40	50	PT1/4	GPMT140408-U○	TS55	TKY25D
	3	TAFM3800F40	●	2	129	144	209	40	50	PT1/4	GPMT140408-U○	TS55	TKY25D
39.0	2	TAFS3900F40	●	2	94	108	173	40	50	PT1/4	GPMT140408-U○	TS55	TKY25D
	3	TAFM3900F40	●	2	133	147	212	40	50	PT1/4	GPMT140408-U○	TS55	TKY25D
40.0	2	TAFS4000F40	●	2	96	110	175	40	50	PT1/4	GPMT140408-U○	TS55	TKY25D
	3	TAFM4000F40	●	2	136	150	215	40	50	PT1/4	GPMT140408-U○	TS55	TKY25D
41.0	2	TAFS4100F40	●	2	98	112	177	40	50	PT1/4	GPMT140408-U○	TS55	TKY25D
	3	TAFM4100F40	●	2	139	153	218	40	50	PT1/4	GPMT140408-U○	TS55	TKY25D
42.0	2	TAFS4200F40	●	2	101	114	179	40	50	PT1/4	GPMT140408-U○	TS55	TKY25D
	3	TAFM4200F40	●	2	143	156	221	40	50	PT1/4	GPMT140408-U○	TS55	TKY25D
43.0	2	TAFS4300F40	●	2	103	116	181	40	50	PT1/4	GPMT140408-U○	TS55	TKY25D
	3	TAFM4300F40	●	2	146	159	224	40	50	PT1/4	GPMT140408-U○	TS55	TKY25D
44.0	2	TAFS4400F40	●	2	106	118	183	40	50	PT1/4	GPMT140408-U○	TS55	TKY25D
	3	TAFM4400F40	●	2	150	162	227	40	50	PT1/4	GPMT140408-U○	TS55	TKY25D
45.0	2	TAFS4500F40	●	2	108	120	185	40	54	PT1/4	GPMT140408-U○	TS55	TKY25D
	3	TAFM4500F40	●	2	153	165	230	40	54	PT1/4	GPMT140408-U○	TS55	TKY25D
46.0	2	TAFS4600F40	●	2	110	122	187	40	54	PT1/4	GPMT140408-U○	TS55	TKY25D
	3	TAFM4600F40	●	2	156	168	233	40	54	PT1/4	GPMT140408-U○	TS55	TKY25D
47.0	2	TAFS4700F40	●	2	113	124	189	40	54	PT1/4	GPMT140408-U○	TS55	TKY25D
	3	TAFM4700F40	●	2	160	171	236	40	54	PT1/4	GPMT140408-U○	TS55	TKY25D
48.0	2	TAFS4800F40	●	2	115	126	191	40	54	PT1/4	GPMT140408-U○	TS55	TKY25D
	3	TAFM4800F40	●	2	163	174	239	40	54	PT1/4	GPMT140408-U○	TS55	TKY25D

● : Inventory maintained in Japan.

DC (mm)	Hole Depth (l/d)	Order Number	Stock	Number of Teeth	Dimensions (mm)						Insert Number	 Clamp Screw	 Wrench
					LU	LPR	OAL	DCON	DCSFMS	CNT			
49.0	2	TAFS4900F40	●	4	118	133	198	40	58	PT1/4	GPMT090304-U○	TS3	TKY08F
	3	TAFM4900F40	●	4	167	182	247	40	58	PT1/4	GPMT090304-U○	TS3	TKY08F
50.0	2	TAFS5000F40	●	4	120	135	200	40	58	PT1/4	GPMT090304-U○	TS3	TKY08F
	3	TAFM5000F40	●	4	170	185	250	40	58	PT1/4	GPMT090304-U○	TS3	TKY08F
51.0	2	TAFS5100F40	●	4	122	137	202	40	58	PT1/4	GPMT090304-U○	TS3	TKY08F
	3	TAFM5100F40	●	4	173	188	253	40	58	PT1/4	GPMT090304-U○	TS3	TKY08F
52.0	2	TAFS5200F40	●	4	125	139	204	40	58	PT1/4	GPMT090304-U○	TS3	TKY08F
	3	TAFM5200F40	●	4	177	191	256	40	58	PT1/4	GPMT090304-U○	TS3	TKY08F
53.0	2	TAFS5300F40	●	4	127	141	206	40	63	PT1/4	GPMT090304-U○	TS3	TKY08F
	3	TAFM5300F40	●	4	180	194	259	40	63	PT1/4	GPMT090304-U○	TS3	TKY08F
54.0	2	TAFS5400F40	●	4	128	143	208	40	63	PT1/4	GPMT090304-U○	TS3	TKY08F
	3	TAFM5400F40	●	4	182	197	262	40	63	PT1/4	GPMT090304-U○	TS3	TKY08F
55.0	2	TAFS5500F40	●	4	130	145	210	40	63	PT1/4	GPMT090304-U○	TS3	TKY08F
	3	TAFM5500F40	●	4	185	200	265	40	63	PT1/4	GPMT090304-U○	TS3	TKY08F
56.0	2	TAFS5600F40	●	4	132	147	212	40	63	PT1/4	GPMT090304-U○	TS3	TKY08F
	3	TAFM5600F40	●	4	188	203	268	40	63	PT1/4	GPMT090304-U○	TS3	TKY08F

INSERT DESCRIPTION ➤ N244
CUTTING CONDITIONS ➤ N245
USAGE NOTE ➤ N248
TECHNICAL DATA ➤ Q001

TAFS/TAFM/TAFL

INSERTS

Geometry	Drill Dia.	Insert Number	Dimensions (mm)				Stock				
			IC	L	S	RE	VP15TF	UP20M	GP20M	UE6020	US735
U1 Breaker GCMT GPMT	ø12—ø14.5	GCMT040204-U1	—	5.0	2.38	0.4		●			
	ø15—ø17.5	GPMT060204-U1	5.56	—	2.38	0.4		●		●	
	ø18—ø22.5	GPMT070204-U1	6.35	—	2.38	0.4		●		●	
	ø23—ø27.5 ø49—ø56	GPMT090304-U1	7.94	—	3.18	0.4		●		●	
	ø28—ø34	GPMT11T308-U1	9.525	—	3.97	0.8		●		●	
	ø35—ø48	GPMT140408-U1	12.70	—	4.76	0.8		●		●	
U2 Breaker GCMT GPMT	ø12—ø14.5	GCMT040204-U2	—	5.0	2.38	0.4	●		●		
	ø15—ø17.5	GPMT060204-U2	5.56	—	2.38	0.4	●	●		●	●
	ø18—ø22.5	GPMT070204-U2	6.35	—	2.38	0.4	●	●		●	●
	ø23—ø27.5 ø49—ø56	GPMT090304-U2	7.94	—	3.18	0.4	●	●		●	●
	ø28—ø34	GPMT11T308-U2	9.525	—	3.97	0.8	●	●		●	●
	ø35—ø48	GPMT140408-U2	12.70		4.76	0.8	●	●		●	●
U3 Breaker GPMT	ø15—ø17.5	GPMT060204-U3	5.56	—	2.38	0.4		●		●	●
	ø18—ø22.5	GPMT070204-U3	6.35	—	2.38	0.4		●		●	●
	ø23—ø27.5 ø49—ø56	GPMT090304-U3	7.94	—	3.18	0.4		●		●	●
	ø28—ø34	GPMT11T308-U3	9.525	—	3.97	0.8		●		●	●
	ø35—ø48	GPMT140408-U3	12.70	—	4.76	0.8		●		●	●

INSERT RECOMMENDATION

CHIP BREAKER RECOMMENDATION

◎ : 1st Recommendation ○ : 2nd Recommendation

Work Material / Breaker	P						M		K			
	Mild Steel		Carbon Steel		Alloy Steel		Stainless Steel		Gray Cast Iron		Ductile Cast Iron	
	GCMT	GPMT	GCMT	GPMT	GCMT	GPMT	GCMT	GPMT	GCMT	GPMT	GCMT	GPMT
U1	◎	◎	○	○	○	○	○	○	○	○	○	○
U2	○	○	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
U3		○		○		○		○		○		○

INSERT GRADE RECOMMENDATION

◎ : 1st Recommendation ○ : 2nd Recommendation

Work Material / Grade	P						M		K			
	Mild Steel		Carbon Steel		Alloy Steel		Stainless Steel		Gray Cast Iron		Ductile Cast Iron	
	GCMT	GPMT	GCMT	GPMT	GCMT	GPMT	GCMT	GPMT	GCMT	GPMT	GCMT	GPMT
VP15TF		○	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
UP20M	◎	◎	○	○	○	○	○	○	○	○	○	○
GP20M	○		○		○		○		○		○	
UE6020		○		○		○		○		○		○
US735		○		○		○		○		○		○

● : Inventory maintained in Japan. (1 insert in one case)

RECOMMENDED CUTTING CONDITIONS

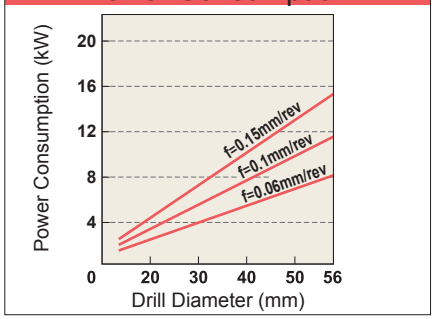
	Work Material	Hardness	Cutting Speed (m/min) For l/d=2,3 (ϕ12–ϕ14.5)	Cutting Speed (m/min) For l/d=2,3 (ϕ15–)	Cutting Speed (m/min) For l/d=4 (ϕ16–)	Breaker	Feed (mm/rev) Drill Diameter (mm) ϕ12–ϕ14.5	ϕ15–ϕ22.5	ϕ23–ϕ34	ϕ35–ϕ48	ϕ49–ϕ56
P	Mild Steel	≤180HB	150 (100–200)	200 (150–300)	140 (100–200)	U1	0.06 (0.04–0.10)	0.07 (0.04–0.10)	0.08 (0.04–0.10)	0.10 (0.04–0.12)	0.08 (0.04–0.10)
						U2	0.06 (0.04–0.10)	0.08 (0.04–0.12)	0.10 (0.04–0.12)	0.12 (0.04–0.14)	0.10 (0.04–0.12)
						U3	–	0.08 (0.04–0.12)	0.10 (0.04–0.12)	0.12 (0.04–0.14)	0.10 (0.04–0.12)
	Carbon Steel	180–280HB	120 (80–160)	150 (120–180)	100 (80–120)	U1	0.06 (0.04–0.10)	0.09 (0.06–0.12)	0.12 (0.08–0.14)	0.15 (0.08–0.18)	0.12 (0.08–0.14)
						U2	0.06 (0.04–0.10)	0.12 (0.06–0.14)	0.14 (0.08–0.18)	0.17 (0.08–0.20)	0.14 (0.08–0.18)
						U3	–	0.12 (0.06–0.14)	0.14 (0.08–0.18)	0.17 (0.08–0.20)	0.14 (0.08–0.18)
	Alloy Steel	180–280HB	120 (80–160)	150 (120–180)	100 (80–120)	U1	0.06 (0.04–0.10)	0.08 (0.06–0.10)	0.09 (0.06–0.12)	0.11 (0.06–0.14)	0.09 (0.06–0.12)
						U2	0.06 (0.04–0.10)	0.10 (0.06–0.12)	0.12 (0.08–0.16)	0.14 (0.08–0.18)	0.12 (0.08–0.16)
						U3	–	0.10 (0.06–0.12)	0.12 (0.08–0.16)	0.14 (0.08–0.18)	0.12 (0.08–0.16)
M	Stainless Steel	≤200HB	100 (80–120)	150 (120–200)	110 (80–140)	U1	0.07 (0.04–0.10)	0.07 (0.04–0.10)	0.08 (0.04–0.10)	0.10 (0.04–0.12)	0.08 (0.04–0.10)
						U2	0.07 (0.04–0.10)	0.08 (0.04–0.12)	0.10 (0.04–0.14)	0.12 (0.04–0.16)	0.10 (0.04–0.14)
						U3	–	0.08 (0.04–0.12)	0.10 (0.04–0.14)	0.12 (0.04–0.16)	0.10 (0.04–0.14)
K	Gray Cast Iron	Tensile Strength ≤350MPa	120 (80–160)	150 (120–180)	140 (110–160)	U1	0.07 (0.06–0.10)	0.07 (0.06–0.10)	0.10 (0.04–0.14)	0.10 (0.06–0.14)	0.10 (0.06–0.14)
						U2	0.07 (0.06–0.10)	0.15 (0.10–0.18)	0.20 (0.10–0.25)	0.20 (0.10–0.25)	0.20 (0.10–0.25)
						U3	–	0.15 (0.10–0.18)	0.20 (0.10–0.25)	0.20 (0.10–0.25)	0.20 (0.10–0.25)
	Ductile Cast Iron	Tensile Strength ≤450MPa	120 (80–150)	150 (120–180)	100 (80–120)	U1	0.06 (0.04–0.10)	0.07 (0.06–0.10)	0.10 (0.06–0.14)	0.10 (0.06–0.14)	0.10 (0.06–0.14)
						U2	0.06 (0.04–0.10)	0.12 (0.08–0.14)	0.15 (0.08–0.20)	0.18 (0.08–0.20)	0.15 (0.08–0.20)
						U3	–	0.12 (0.08–0.14)	0.15 (0.08–0.20)	0.18 (0.08–0.20)	0.15 (0.08–0.20)

(Note) When using drills for l/d= 4, the feed should be reduced to 80% of the above recommendations.

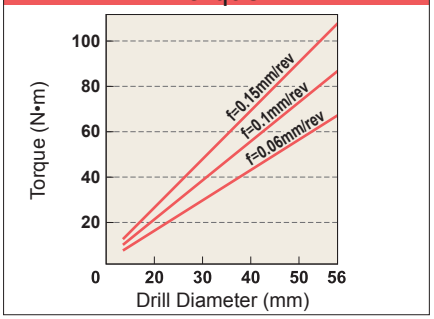
CUTTING RESISTANCE

Workpiece : JIS SCM440(220HB) Cutting Speed : 150m/min Insert : U2 Breaker

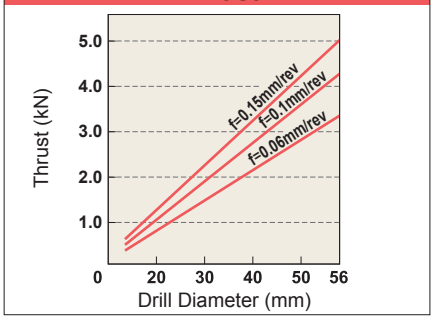
Power Consumption



Torque



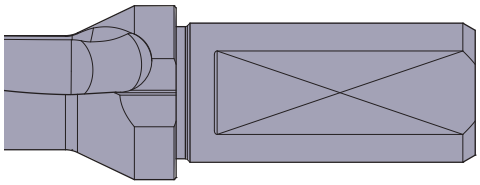
Thrust

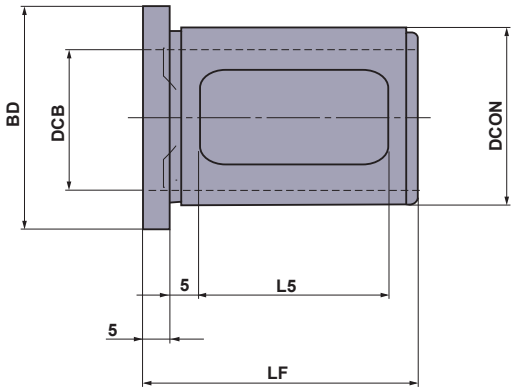


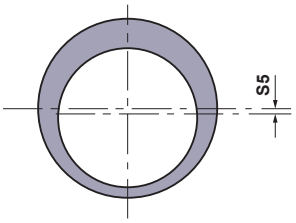
USAGE NOTE ➤ N248
TECHNICAL DATA ➤ Q001

JUST FIT SLEEVE [JFS]

- A sleve designed to improve the performance of MVX/TAF drills, allowing the cutting diameter to be increased in increments of 0.1mm
- When intstalling on the drill shank the rotation axis of the drill is slightly decentered. It enables slight enlargement of the machined hole. (enlargement range: 0.1-0.5mm)







*Increase : Size of the increase in the cutting diameter.

Set Order Number	Individual Order Number	Stock	Dimensions (mm)					*Increase (S5×2)	Suitable MVX Type Drill TAF Type Drill
			BD	DCON	DCB	LF	L5		
JFS-1	JFS2520-10	●	33	25	20	43	30	0.10	MVX1700 X ○F20 ⏐ TAFS/M/L1200F20 ⏐ TAFS/M/L1550F20
	JFS2520-20	●	33	25	20	43	30	0.20	
	JFS2520-30	●	33	25	20	43	30	0.30	
	JFS2520-40	●	33	25	20	43	30	0.40	
	JFS2520-50	●	33	25	20	43	30	0.50	
JFS-2	JFS3225-10	●	40	32	25	50	34	0.10	MVX1750 X ○F25 ⏐ MVX2550 X ○F25 ⏐ TAFS/M/L1600F25 ⏐ TAFS/M/L2450F25
	JFS3225-20	●	40	32	25	50	34	0.20	
	JFS3225-30	●	40	32	25	50	34	0.30	
	JFS3225-40	●	40	32	25	50	34	0.40	
	JFS3225-50	●	40	32	25	50	34	0.50	
JFS-3	JFS4032-10	●	48	40	32	55	40	0.10	MVX2600 X ○F32 ⏐ MVX3050 X ○F32 ⏐ TAFS/M/L2500F32 ⏐ TAFS/M/L2950F32
	JFS4032-20	●	48	40	32	55	40	0.20	
	JFS4032-30	●	48	40	32	55	40	0.30	
	JFS4032-40	●	48	40	32	55	40	0.40	
	JFS4032-50	●	48	40	32	55	40	0.50	

(Note) Cannot be used for shank diameter Ø40.

GUIDELINE FOR SELECTING A JUST FIT SLEEVE

Desired = (Drillϕ+ Increase of JFS) + 0.1mm

(Eg.) Desired diameter is 20.3mm (oversize is taken as 0.1mm).

ø20.3=(MVX2000 X ○F25+JFS3225-20)+0.1

- MVX2000 X ○F25 → 20mm Drill
- JFS3225-20 → Using JFS an Increase of 0.2mm.
- 0.1 → Oversize

<Tool Selected>
Drill : **MVX2000 X ○F25**
JUST FIT SLEEVE [JFS]
: **JFS3225-20**

(Note) Oversize can vary due to the cutting conditions used, please use the above as a guideline.

ORDERING THE JUST FIT SLEEVE

●Purchasing Method 1
Oversize can vary due to the cutting conditions used. Therefore it is recommended to purchase as a set. When placing an order, please use the set order number. (5 sleeves/set)

●Purchasing Method 2
It is possible to order individually. When placing an order, please use the individual order number.

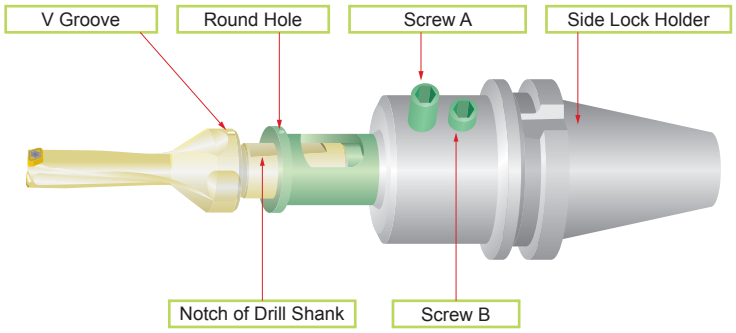
● : Inventory maintained in Japan.

APPLICATION OF JUST FIT SLEEVE

1 When inserting the drill into the side lock holder, aligin the V groove on the outer peripheral edge of the drill flange, as well as the round holes of the outer peripheral edge of the sleeve flange and the screws of the side lock holder for fixing the drill. (If the drill does not have a V groove, align the notch of the drill shank with the round holes of the sleeve.)

2 Insert screws A of the side lock holder directly to the open window of the sleeve and fix the drill. Tighten screw B to a degree so as not to damage the sleeve.

(Note)
- Fine adjustments cannot be made for the diameter
- Cannot be used with collect chuck type holders.

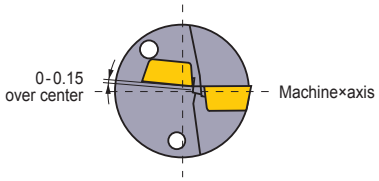


APPLICATION OF MVX TYPE DRILL

●Use on a Lathe

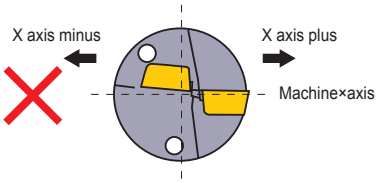
(1)The outer insert and machine X axis must be set parallel. The drill is designed so that when the drill center and the machine spindle center are aligned then the inner insert height is 0-0.15mm lower.

*The inner insert may fracture if the center height of the inner insert is higher than the machine X axis.

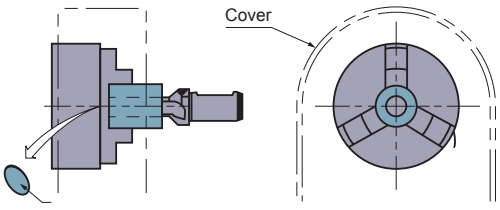


(2)By off setting it is possible to adjust the hole diameter. To do this adjust in the positive X axis direction (hole oversize direction). For the amount of possible adjustment please refer to the dimensions list.

*It is not recommended to adjust in the negative X axis direction as this may lead to drill interference with the hole.



(3)When through hole drilling on a lathe the disc produced by the drill exiting the workpiece may be expelled at high velocity.
To reduce the danger of injury or damage a cover guard is highly recommended.



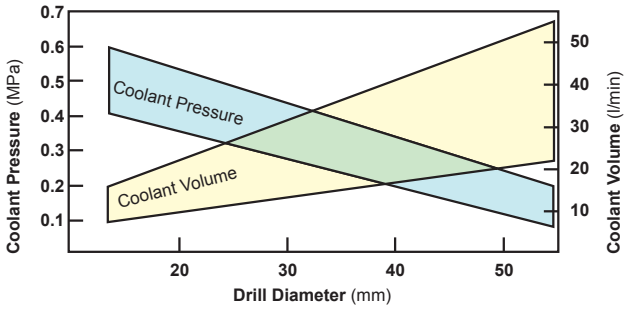
JUST FIT SLEEVE [JFS]

APPLICATION OF TAF TYPE DRILL

●Please ensure the highest rigidity possible exists in both machine set up and workholding.

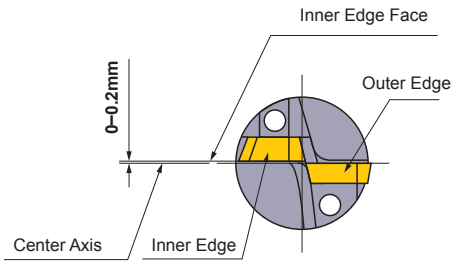
●Refer to the following graph on the right for coolant pressure and volume. Coolant is an important factor in the efficient use of these drills.

●Cannot be used for stack drilling.
In common with many indexable insert drills, these drills produce a round disc on exit which unless evacuated may cause the drill to fracture.

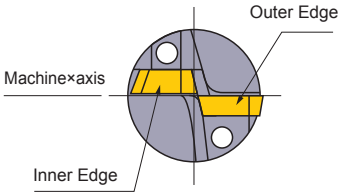


●Use on a Lathe

(1)The inner cutting edge must be positioned between 0—0.2mm over center.

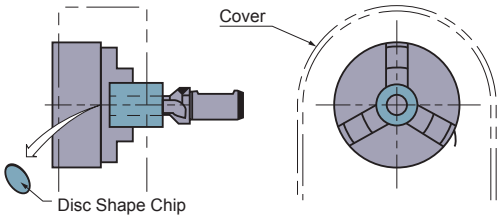


(2)To adjust the hole diameter by off-setting the drill, the outer cutting edge and machine axis must be set parallel.



(3)When producing an oversize hole.
The drill offset should be no more than 2% of the diameter.
It is not possible to produce an undersized hole.

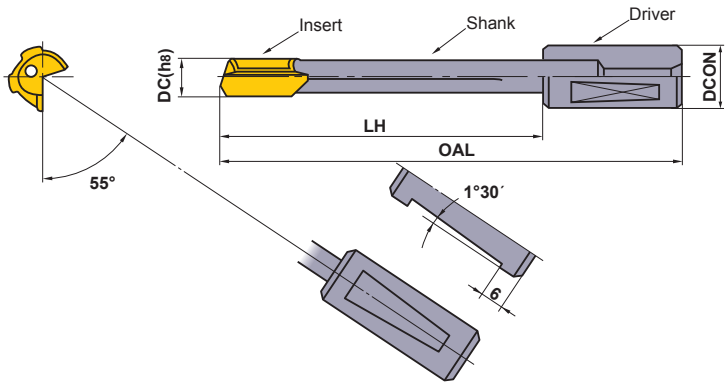
(4)When through hole drilling on a lathe the disc produced by the drill exiting the workpiece may be expelled at high velocity.
To reduce the danger of injury or damage a cover guard is highly recommended.



GUN DRILL

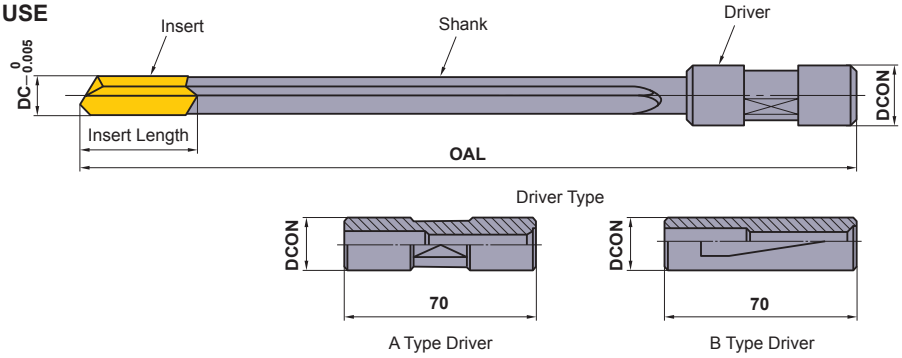
●GUN DRILL FOR MACHINING CENTER

- ●Suitable for deep hole drilling on Machining Center.
- ●Drill Diameter :ϕ6.0—ϕ20.0



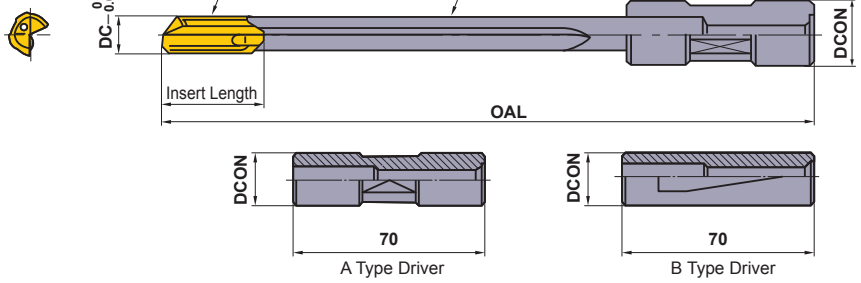
●GUN DRILL FOR GENERAL USE

- ●Suitable for deep hole drilling.
- ●Drill Diameter : ϕ2.0—ϕ30.3



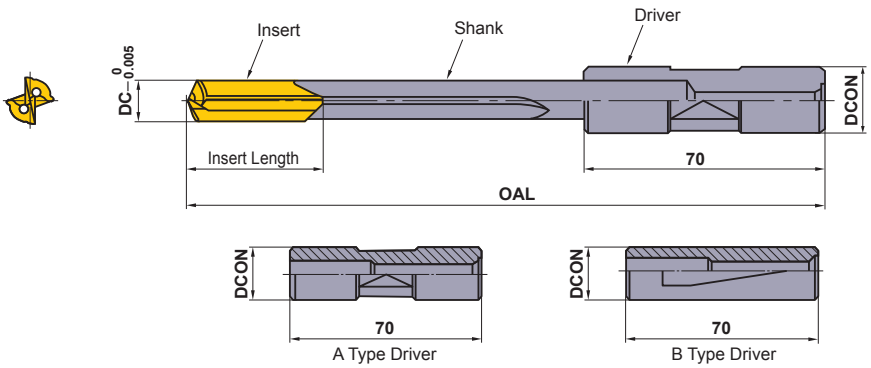
●SAMMIKA GUN DRILL

- ●The unique uneven cutting edge shape displays excellent chip dividing and enables high feed machining.
- ●Drill Diameter : ϕ5.0—ϕ30.3



●ARROW JET GUN DRILL

- ●Excellent chip discharge due to the double-tooth design and chip breaker.
- ●Drill Diameter : ϕ6.0—ϕ30.0



■ORDERING METHOD

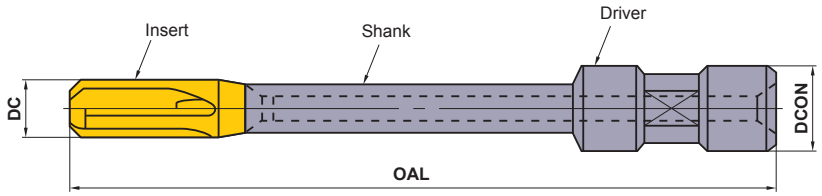
Please specify the following when ordering.
①Drill Name ②Diameter of Drill (DC) ③Length of Drill (OAL) ④Outside Diameter of Driver (DCON) and Type ⑤Workpiece Material, Drilling Accuracy, Drilling Depth and Drilling Mode (Through Hole, Blind Hole)
e.g.) General Gun Drill ϕ8 x 500 x ϕ19.5 A type Driver, SCM440(250HB) x $\phi 8^{\pm 0.020}$ 300 x Through Hole

GUN REAMER

●Straight Reamer Type

●Reamer Diameter : ϕ6.0—ϕ30.0
●Number of teeth : 1, 2, 3, 4, 6

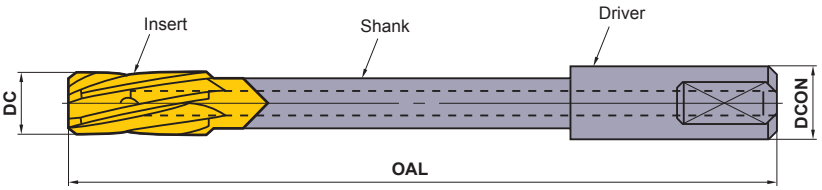




●Spiral Reamer Type

●Reamer Diameter : ϕ6.0—ϕ30.0
●Number of teeth : 4, 6

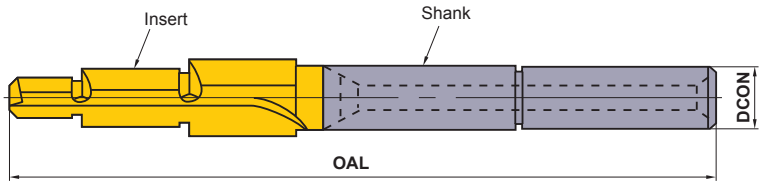




●Line Reamer Type

●Reamer Diameter : ϕ6.0—ϕ30.0
●Number of teeth : 1, 2, 4





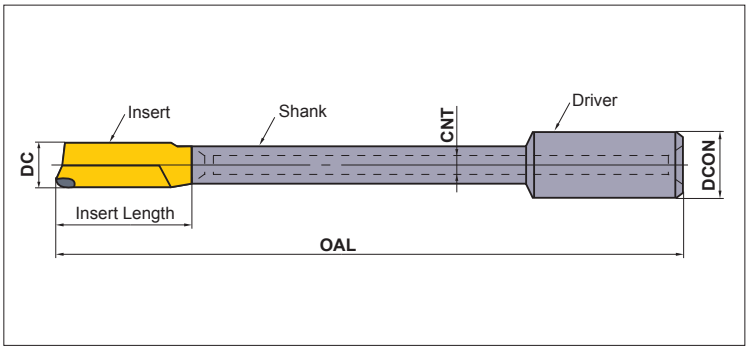
■ORDERING METHOD

Please specify the following when ordering.
①Reamer Name ②Diameter of Reamer (DC) ③Length of Reamer (OAL) ④Outside Diameter of Driver (DCON) and Type
⑤Number of Teeth ⑥Workpiece Material, Drilling Accuracy, Drilling Depth and Drilling Mode (Through Hole, Blind Hole)
e.g.) General Gun Reamer ϕ12 x 450 x ϕ19.5 A type Driver, 4-Teeth, FC250 (180HB) x $\phi 12^{\pm 0.020}$ x 100 x Through Hole

WITH DIAMOND COMPOUND

GUN REAMER





STANDARD

Reamer Diameter	Insert Length	Overall Length **OAL**	Number of Teeth	Shape of Teeth
ø6−ø30.3	*	*	*	Straight

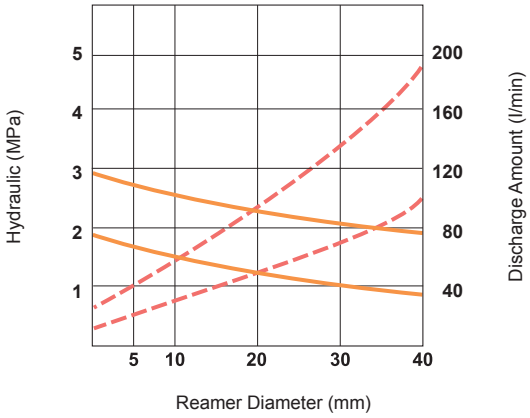
*Please contact us for any geometry (different diameter of reamer, insert length, tool length, number of teeth) that is not in this list.

Reamer Diameter **DC**	Driver hole diameter **CNT**	External Diameter of Driver **DCON**
6.0≤DC≤7.0	3.5	12.70
7.0<DC≤13.3	4.8	19.05
13.3<DC≤20.8	6.4	25.40
20.8<DC≤25.3	8.0	31.75
25.3<DC≤30.3	8.0	38.10

RECOMMENDED CUTTING CONDITIONS

Work Material	Cutting Speed (m/min)	Feed (mm/rev)		
		ø5 − ø10	**ø10 − ø20**	**ø25 − ø30**
Aluminium Alloy	150 (100−200)	0.08 (0.05−0.10)	0.10 (0.05−0.15)	0.10 (0.05−0.15)
Alloy Steel	130 (80−180)	0.03 (0.02−0.04)	0.05 (0.03−0.06)	0.06 (0.04−0.07)

COOLANT



ORDERING METHOD

Please specify the following when ordering.

①Reamer Name ②Diameter of Reamer (DC) ③Length of Reamer (OAL) ④Number of Teeth ⑤Outside Diameter of Driver (DCON) and Type ⑥Workpiece Material, Drilling Accuracy, Drilling Depth and Drilling Mode (Through Hole, Blind Hole)

e.g.) Gun Reamer with Diamond Compound ϕ10 x 300 1-Tooth x ϕ19.05 A Type Driver, AC4B x $\phi 10^{+0.01}_{0}$ x 200 x Through Hole

CVD DIAMOND COATED DRILLS

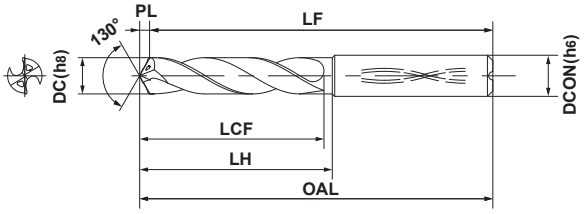
MCS
For CFRP

- For high accuracy and efficient drilling of CFRP.
- Unique diamond coating produces excellent wear resistance and smooth hole surface.

CFRP	CFRP with Aluminium stack	CFRP/Titanium Alloy stacks
◎	◎	

	3<DC≤6	6<DC≤10	10<DC≤18	18<DC≤20
h6	0 −0.008	0 −0.009	0 −0.011	0 −0.013





Internal Coolant

DC (inch)	DC (mm)	Hole Depth (l/d)	Stock DD2010	Order Number	Dimensions (mm) LCF	LH	OAL	LF	PL	DCON
.1719	4.366	3	●	MCS01719X3DB	24.0	29.0	66.0	65	1.0	6
.1915	4.864	3	●	MCS01915X3DB	28.1	29.1	66.1	65	1.1	6
.2510	6.375	3	●	MCS02510X3DB	34.5	42.5	79.5	78	1.5	8
.3125	7.938	3	●	MCS03125X3DB	41.9	42.9	79.9	78	1.9	8
.3760	9.550	3	●	MCS03760X3DB	47.2	48.2	89.2	87	2.2	10
.3765	9.563	3	●	MCS03765X3DB	47.2	48.2	89.2	87	2.2	10
.4380	11.125	3	●	MCS04380X3DB	55.6	56.6	102.6	100	2.6	12
.5010	12.725	3	●	MCS05010X3DB	61.0	62.0	108.0	105	3.0	14

(Note 1) MCS drills are suitable for use with shrink fit holders.
(Note 2) Please contact Mitsubishi Materials for special grades and geometries other than our standard products.

For non stocked sizes please enter details into the □ below.
Please contact us for details of any geometry that is not mentioned.
*Recommended carbide grade TF15 for CFRP/titanium stacks.

Order number of straight type

MC□ □□□□ X□D □□□

- MC□: Coolant — S : Int., E : Ext.
- □□□□: Drill Dia. DC — Size range : 0300-2000
- X□D: Hole Depth (l/d) — Size range : 2-5
- □□□: Shank Dia. DCON — Size range : 030-200

*Minimum diameter with internal coolant is ϕ4mm (ϕ.1575").

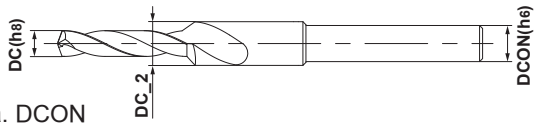
Size range of drill dia. : ϕ3mm-ϕ20mm
Size range of shank dia. : ϕ3mm -ϕ20mm
For cutting dia DC - Please indicate with 4 digits
E.g. ϕ3mm - 0300
For shank dia DCON - Please use 3 digits
E.g. ϕ12mm - 120
*For inch sizes please convert to metric (1"= 25.4mm)
ex. : ø.3760"→ø9.550mm→0955

Order number of stepped type

MC□ □□□□ X□□□□ X□D □□□

- MC□: Coolant — S : Int., E :Ext.
- □□□□: Drill Dia. DC — Size range : 0300-2000
- X□□□□: Stepped Drill Dia. DC_2
- X□D: Hole Depth (l/d) — Size range : 2-5
- □□□: Shank Dia. DCON — Size range : 030-200

*Minimum diameter with internal coolant is ϕ4mm (ϕ.1575").



● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

DD2010

Work material		CFRP				CFRP with Aluminium stack			
Dia. **DC** (inch)	Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (min.–max.) (mm/rev)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (min.–max.) (mm/rev)	Table Feed (mm/min)
.1719	**4.366**	85	6100	0.04 (0.03—0.08)	240	55	4000	0.04 (0.03—0.06)	160
.1915	**4.864**	85	5500	0.04 (0.03—0.08)	220	55	3500	0.04 (0.03—0.06)	140
.251	**6.375**	95	4700	0.05 (0.03—0.10)	235	65	3200	0.05 (0.03—0.07)	160
.3125	**7.938**	95	3800	0.05 (0.03—0.10)	190	65	2600	0.05 (0.03—0.07)	130
.376	**9.55**	95	3100	0.07 (0.04—0.12)	215	65	2100	0.06 (0.04—0.08)	125
.3765	**9.563**	95	3100	0.07 (0.04—0.12)	215	65	2100	0.06 (0.04—0.08)	125
.438	**11.125**	100	2800	0.1 (0.05—0.15)	280	70	2000	0.07 (0.05—0.10)	140
.501	**12.725**	100	2500	0.1 (0.05—0.15)	250	70	1700	0.08 (0.05—0.12)	135

TF15

Work material		CFRP with Titanium alloy stack			
Dia. **DC** (inch)	Dia. **DC** (mm)	Cutting Speed (m/min)	Revolution (min^{-1})	Feed rate (min.–max.) (mm/rev)	Table Feed (mm/min)
.1719	**4.366**	8	500	0.03 (0.02—0.04)	15
.1915	**4.864**	8	500	0.03 (0.02—0.04)	15
.251	**6.375**	8	300	0.03 (0.02—0.04)	5
.3125	**7.938**	8	300	0.03 (0.02—0.04)	5
.376	**9.55**	10	300	0.04 (0.03—0.05)	10
.3765	**9.563**	10	300	0.04 (0.03—0.05)	10
.438	**11.125**	10	200	0.04 (0.03—0.05)	5
.501	**12.725**	10	200	0.04 (0.03—0.05)	5

CVD DIAMOND COATED DRILLS

DCSSS

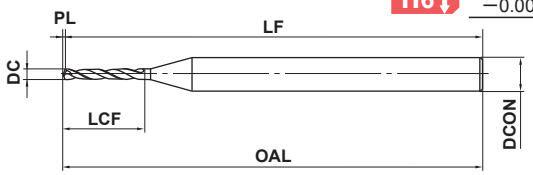
Short, For non-ferrous material

UWC | DC | 130° DC<1.5 | 135° DC≥1.5 | X Thinning DC≥1.5

P | M | K | **N** Non-ferrous Metal | S | H

0.2≤DC≤2 h6 $^{0}_{-0.014}$ $^{0}_{-0.006}$





- The original CVD diamond coating technology provides excellent adhesion for coating layer and enables stable drilling without peeling or chipping.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
DCSSSD0020	0.2	2.05	38.05	38	0.05	3	●
DCSSS**D0030**	0.3	3.07	38.07	38	0.07	3	●
DCSSS**D0040**	0.4	4.09	38.09	38	0.09	3	●
DCSSS**D0050**	0.5	4.12	38.12	38	0.12	3	●
DCSSS**D0060**	0.6	5.14	38.14	38	0.14	3	●
DCSSS**D0070**	0.7	5.16	38.16	38	0.16	3	●
DCSSS**D0080**	0.8	6.19	38.19	38	0.19	3	●
DCSSS**D0090**	0.9	6.21	38.21	38	0.21	3	●
DCSSS**D0100**	1.0	8.2	38.2	38	0.2	3	●
DCSSS**D0110**	1.1	8.3	38.3	38	0.3	3	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
DCSSSD0120	1.2	8.3	38.3	38	0.3	3	●
DCSSS**D0130**	1.3	8.3	38.3	38	0.3	3	●
DCSSS**D0140**	1.4	8.3	38.3	38	0.3	3	●
DCSSS**D0150**	1.5	10.3	45.3	45	0.3	3	●
DCSSS**D0160**	1.6	10.3	45.3	45	0.3	3	●
DCSSS**D0170**	1.7	10.4	45.4	45	0.4	3	●
DCSSS**D0180**	1.8	10.4	45.4	45	0.4	3	●
DCSSS**D0190**	1.9	10.4	45.4	45	0.4	3	●
DCSSS**D0200**	2.0	12.4	45.4	45	0.4	3	●

DCSSM

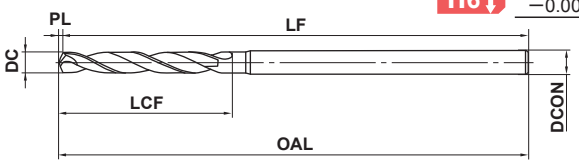
Medium, For non-ferrous material

UWC | DC | 135° | X Thinning

P | M | K | **N** Non-ferrous Metal | S | H

2.1≤DC≤3 h6 $^{0}_{-0.014}$ $^{0}_{-0.006}$





- The original CVD diamond coating technology provides excellent adhesion for coating layer and enables stable drilling without peeling or chipping.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
DCSSMD0210	2.1	17.4	60.4	60	0.4	3	●
DCSSM**D0220**	2.2	17.5	60.5	60	0.5	3	●
DCSSM**D0230**	2.3	17.5	60.5	60	0.5	3	●
DCSSM**D0240**	2.4	17.5	60.5	60	0.5	3	●
DCSSM**D0250**	2.5	21.5	60.5	60	0.5	3	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
DCSSMD0260	2.6	21.5	60.5	60	0.5	3	●
DCSSM**D0270**	2.7	21.6	60.6	60	0.6	3	●
DCSSM**D0280**	2.8	21.6	60.6	60	0.6	3	●
DCSSM**D0290**	2.9	21.6	60.6	60	0.6	3	●
DCSSM**D0300**	3.0	21.6	60.6	60	0.6	3	●

● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Work Material	Aluminium alloy		Aluminium alloy		Copper Copper alloy		Graphite Machineable Ceramics		MMC FRP	
Dia. **DC** (mm)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)	Revolution (min-1)	Feed rate (mm/rev)
0.2	20000	0.006	10000	0.003	20000	0.003	20000	0.01	10000	0.003
0.5	20000	0.02	10000	0.01	20000	0.01	20000	0.03	10000	0.01
1.0	20000	0.04	10000	0.02	20000	0.02	20000	0.05	10000	0.02
1.5	20000	0.05	10000	0.02	16000	0.02	16000	0.08	10000	0.02
2.0	20000	0.06	9000	0.03	11000	0.03	11000	0.10	9000	0.03
2.5	18500	0.08	7500	0.04	10000	0.04	10000	0.12	7500	0.04
3.0	17000	0.10	6000	0.05	8500	0.05	8500	0.15	6000	0.05

1) When drilling very hard work materials, reduce the feed.
2) Use water soluble coolant or grinding fluid when working.
3) When drilling deep holes, moderate the cutting conditions.
4) The revolution can be increased by using a high speed spindle.

CVD DIAMOND COATED DRILLS

DCBSS

Drill for hard brittle materials

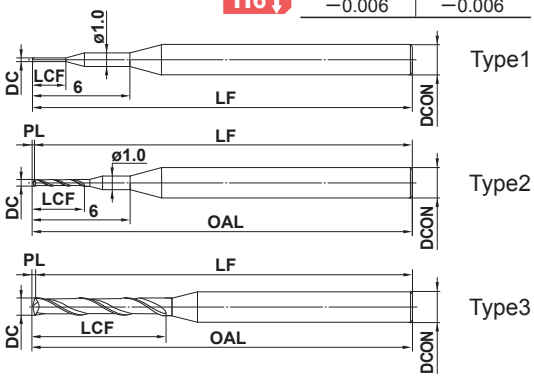
166° DC≥0.07 UWC DC

P M K **N** S H

Non-ferrous Metal

	0.05≤DC<0.2	0.2≤DC≤3
	0 −0.009	0 −0.014
h6	0 −0.006	0 −0.006





● For machining materials such as sintered ceramics and quartz glass that cannot be machined with conventional drills.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type	Short Delivery
DCBSSD0005	0.05	(0.5)	—	38	—	3	□	1	◎
DCBSS**D0006**	0.06	(0.6)	—	38	—	3	□	1	
DCBSS**D0007**	0.07	0.704	38.004	38	0.004	3	□	2	◎
DCBSS**D0008**	0.08	0.805	38.005	38	0.005	3	□	2	◎
DCBSS**D0009**	0.09	0.906	38.006	38	0.006	3	□	2	◎
DCBSS**D0010**	0.10	1.01	38.01	38	0.01	3	●	2	
DCBSS**D0011**	0.11	1.21	38.01	38	0.01	3	●	2	
DCBSS**D0012**	0.12	1.41	38.01	38	0.01	3	●	2	
DCBSS**D0013**	0.13	1.51	38.01	38	0.01	3	●	2	
DCBSS**D0014**	0.14	1.51	38.01	38	0.01	3	●	2	
DCBSS**D0015**	0.15	1.51	38.01	38	0.01	3	●	2	
DCBSS**D0016**	0.16	1.51	38.01	38	0.01	3	●	2	
DCBSS**D0017**	0.17	1.51	38.01	38	0.01	3	●	2	
DCBSS**D0018**	0.18	1.51	38.01	38	0.01	3	●	2	
DCBSS**D0019**	0.19	1.51	38.01	38	0.01	3	●	2	
DCBSS**D0020**	0.20	2.01	38.01	38	0.01	3	●	3	
DCBSS**D0021**	0.21	2.01	38.01	38	0.01	3	□	3	◎
DCBSS**D0022**	0.22	2.01	38.01	38	0.01	3	□	3	◎
DCBSS**D0023**	0.23	2.01	38.01	38	0.01	3	□	3	◎
DCBSS**D0024**	0.24	2.01	38.01	38	0.01	3	□	3	◎
DCBSS**D0025**	0.25	2.52	38.02	38	0.02	3	●	3	
DCBSS**D0026**	0.26	2.52	38.02	38	0.02	3	□	3	◎
DCBSS**D0027**	0.27	2.52	38.02	38	0.02	3	□	3	◎
DCBSS**D0028**	0.28	2.52	38.02	38	0.02	3	□	3	◎
DCBSS**D0029**	0.29	2.52	38.02	38	0.02	3	□	3	◎
DCBSS**D0030**	0.30	3.02	38.02	38	0.02	3	●	3	
DCBSS**D0031**	0.31	3.02	38.02	38	0.02	3	□	3	◎
DCBSS**D0032**	0.32	3.02	38.02	38	0.02	3	□	3	◎
DCBSS**D0033**	0.33	3.02	38.02	38	0.02	3	□	3	◎
DCBSS**D0034**	0.34	3.52	38.02	38	0.02	3	□	3	◎
DCBSS**D0035**	0.35	3.52	38.02	38	0.02	3	●	3	
DCBSS**D0036**	0.36	3.52	38.02	38	0.02	3	□	3	◎

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock	Type	Short Delivery
DCBSSD0040	0.40	4.02	38.02	38	0.02	3	●	3	
DCBSS**D0045**	0.45	4.03	38.03	38	0.03	3	□	3	◎
DCBSS**D0050**	0.50	4.03	38.03	38	0.03	3	●	3	
DCBSS**D0055**	0.55	4.53	38.03	38	0.03	3	□	3	◎
DCBSS**D0060**	0.60	5.04	38.04	38	0.04	3	●	3	
DCBSS**D0070**	0.70	5.04	38.04	38	0.04	3	●	3	
DCBSS**D0080**	0.80	6.05	38.05	38	0.05	3	●	3	
DCBSS**D0085**	0.85	6.05	38.05	38	0.05	3	□	3	◎
DCBSS**D0090**	0.90	6.06	38.06	38	0.06	3	●	3	
DCBSS**D0100**	1.00	8.1	38.1	38	0.1	3	●	3	
DCBSS**D0110**	1.10	8.1	38.1	38	0.1	3	●	3	
DCBSS**D0120**	1.20	8.1	38.1	38	0.1	3	●	3	
DCBSS**D0130**	1.30	8.1	38.1	38	0.1	3	●	3	
DCBSS**D0140**	1.40	8.1	38.1	38	0.1	3	●	3	
DCBSS**D0150**	1.50	10.1	38.1	38	0.1	3	●	3	
DCBSS**D0160**	1.60	10.1	38.1	38	0.1	3	●	3	
DCBSS**D0170**	1.70	10.1	38.1	38	0.1	3	●	3	
DCBSS**D0180**	1.80	10.1	38.1	38	0.1	3	●	3	
DCBSS**D0190**	1.90	10.1	38.1	38	0.1	3	●	3	
DCBSS**D0200**	2.00	12.1	38.1	38	0.1	3	●	3	
DCBSS**D0210**	2.10	12.1	38.1	38	0.1	3	□	3	◎
DCBSS**D0220**	2.20	12.1	38.1	38	0.1	3	□	3	◎
DCBSS**D0230**	2.30	12.1	38.1	38	0.1	3	□	3	
DCBSS**D0240**	2.40	12.2	38.2	38	0.2	3	□	3	◎
DCBSS**D0250**	2.50	12.2	38.2	38	0.2	3	●	3	
DCBSS**D0260**	2.60	12.2	38.2	38	0.2	3	□	3	
DCBSS**D0270**	2.70	12.2	38.2	38	0.2	3	□	3	
DCBSS**D0280**	2.80	12.2	38.2	38	0.2	3	□	3	
DCBSS**D0290**	2.90	12.2	38.2	38	0.2	3	□	3	
DCBSS**D0300**	3.00	12.2	38.2	38	0.2	3	□	3	◎

(Note 1) Stock mark □(produced on order products) shows the basic sizes. Consult us, if different diameters and flute lengths.
(Note 2) Drills with ◎ mark can be delivered within 1-2 weeks. For the delivery of other drills, contact Mitsubishi Materials.
(Note 3) DC=0.05, 0.06 are special shape specifications without groove. LCF is the neck lengths instead of the flute lengths.

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

RECOMMENDED CUTTING CONDITIONS

Work Material	Aluminium nitride				Alumina				Zirconia			
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Step (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Step (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Step (mm)
0.05	3	20,000	0.000015	0.001	3	20,000	0.00001	0.001	3	20,000	0.00001	0.001
0.08	5	20,000	0.00003	0.003	5	20,000	0.00002	0.002	5	20,000	0.00002	0.001
0.1	6	20,000	0.0002	0.01	6	20,000	0.0001	0.005	6	20,000	0.0001	0.003
0.16	9	18,000	0.0002	0.01	9	18,000	0.0001	0.005	9	18,000	0.0001	0.003
0.2	9	15,000	0.0002	0.01	9	15,000	0.0001	0.005	9	15,000	0.0001	0.003
0.32	12	12,000	0.0002	0.01	12	12,000	0.0001	0.005	12	12,000	0.0001	0.003
0.4	15	12,000	0.0002	0.01	15	12,000	0.0001	0.005	15	12,000	0.0001	0.003
0.5	19	12,000	0.0002	0.01	19	12,000	0.0001	0.005	19	12,000	0.0001	0.003
0.6	19	10,000	0.0002	0.01	19	10,000	0.0001	0.005	19	10,000	0.0001	0.003
0.8	25	10,000	0.0002	0.01	25	10,000	0.0001	0.005	25	10,000	0.0001	0.003
1	31	10,000	0.0002	0.01	31	10,000	0.0001	0.005	31	10,000	0.0001	0.003
1.2	30	8,000	0.00025	0.01	30	8,000	0.00015	0.005	30	8,000	0.00015	0.003
1.6	40	8,000	0.0003	0.01	40	8,000	0.0002	0.005	40	8,000	0.0002	0.003
2	38	6,000	0.0003	0.01	38	6,000	0.0002	0.005	38	6,000	0.0002	0.003
3	47	5,000	0.0003	0.01	47	5,000	0.0003	0.005	47	5,000	0.0002	0.003

Work Material	Silicon carbide Silicon nitride				Quartz glass			
Dia. **DC** (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Step (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed rate (mm/rev)	Step (mm)
0.05	3	20,000	0.000005	0.0005	3	20,000	0.000015	0.001
0.08	5	20,000	0.00001	0.001	5	20,000	0.00003	0.005
0.1	6	20,000	0.00005	0.002	6	20,000	0.0002	0.05
0.16	9	18,000	0.00005	0.002	9	18,000	0.0002	0.05
0.2	9	15,000	0.00005	0.002	9	15,000	0.0002	0.05
0.32	12	12,000	0.00005	0.002	12	12,000	0.0002	0.05
0.4	15	12,000	0.00005	0.002	15	12,000	0.0003	0.05
0.5	19	12,000	0.00005	0.002	19	12,000	0.0003	0.05
0.6	19	10,000	0.00005	0.002	19	10,000	0.0003	0.05
0.8	25	10,000	0.00005	0.002	25	10,000	0.0003	0.05
1	31	10,000	0.00005	0.002	31	10,000	0.0003	0.05
1.2	30	8,000	0.00007	0.002	30	8,000	0.0004	0.05
1.6	40	8,000	0.0001	0.002	40	8,000	0.0004	0.05
2	38	6,000	0.0001	0.002	38	6,000	0.0004	0.05
3	47	5,000	0.0001	0.002	47	5,000	0.0005	0.05

1) Depending on the type of machine, it is possible to apply cutting speeds over 20000min^{-1}.
2) Use water soluble coolant or grinding fluid when working.
3) The intermediate diameter revolution is not tabulated. It is matched to the large diameter side and closest drill diameter conditions or by calculating the cutting speed of the closest drill diameter. Set the feedrate per revolution to a suitable value with the recommended feedrate of the closest drill diameter as the standard.

Memo

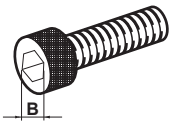
SPARE PARTS

IDENTIFICATION P002
SPARE PARTS
- CLAMP SCREW P003
- SET BOLT P009
- SHIM P010
- SHIM PIN AND CLAMP LEVER P013
- LOCK PIN P014
- CLAMP BRIDGE P014
- BREAKER PIECE P016
- REPLACEMENT PARTS FOR OLD TYPE TOOLS
  - TURNING HOLDERS P017
  - BORING BARS P023
  - BORING UNITS P026
  - FACE MILLS P027
  - INDEXABLE TYPE END MILLS P031
  - INDEXABLE TYPE DRILLS P035
- ANTI SEIZE LUBRICANT P038

IDENTIFICATION

IDENTIFICATION OF CLAMP SCREW (Metric coarse right screw thread)

H **SC** **060** **05**



● **Hexagonal Hole Dimensions**

Diameter	Pitch	B Dimensions			
		HBH	HFC	HSC	HS◌
M2	0.4	—	—	1.5	0.9
M2.5	0.45	—	—	2	1.3
M3	0.5	2	2	2.5	1.5
M4	0.7	2.5	2.5	3	2
M5	0.8	3	3	4	2.5
M6	1	4	4	5	3
M8	1.25	5	5	6	4
M10	1.5	6	6	8	5

Length

Example	
Symbol	L
05	5
10	10
20	20
30	30

Screw Diameter

Example	
Symbol	d
050	M5
060	M6

Screw Head

BH / BHA	CHUUBURASHI CO. / UNBRAKO CO.	Button Head
FC	CHUUBURASHI CO.	Flat Head
SC	JIS Standard	Socket Head
PM	JIS Standard	Pan Head
FM	JIS Standard	Flat Head
SD	JIS Standard	Set Screw (Cut Point)
SP	JIS Standard	Set Screw (Cone Point)
SR	JIS Standard	Set Screw (Dog Point)
SS	JIS Standard	Set Screw (Flat Point)

Hexagonal Hole Dimensions

Symbol	Shape
H	⬡

With Slot

Symbol	Shape
S	⊖

With Cross Hole

Symbol	Shape
C	✣

IDENTIFICATION OF WRENCH

HKY **15** **R**

Symbol	Wrench
HKY	Hexagonal Wrench
TKY	Torx Wrench
TIP	Torx plus®Wrench

Hexagonal Wrench

Symbol	B
15	1.5
20	2
25	2.5
30	3
35	3.5
40	4
50	5
60	6

Torx Wrench

Symbol	B	Size
06	1.7	T6
08	2.3	T8
10	2.7	T10
15	3.3	T15
20	3.8	T20
25	4.4	T25
27	5.0	T27
30	5.5	T30

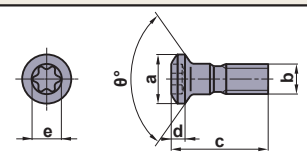
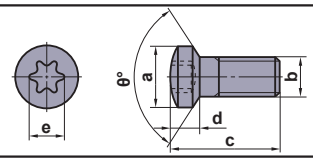
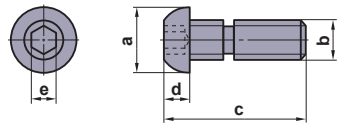
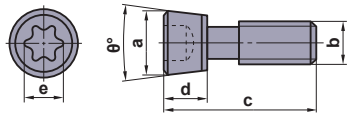
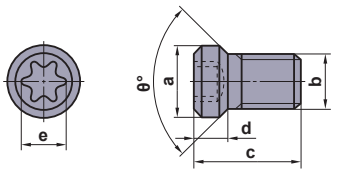
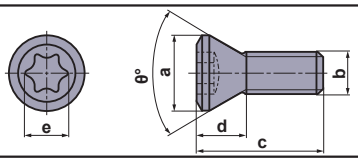
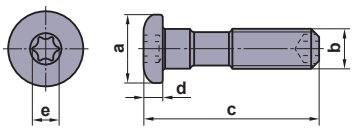
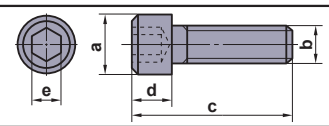
Torx plus®Wrench

Symbol	Size
06	6IP
07	7IP
08	8IP
15	15IP

R	Standard L Wrench	
L	Long L Wrench	
T	T Wrench	
F FS	Flag Wrench	
W	Flag Wrench	
D DS	Driver	

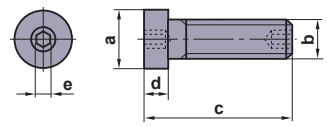
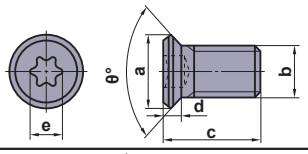
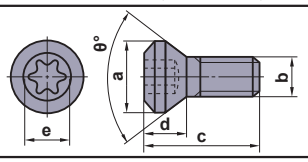
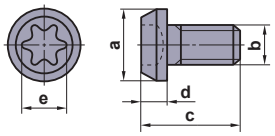
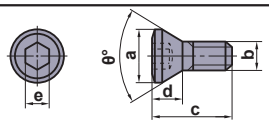
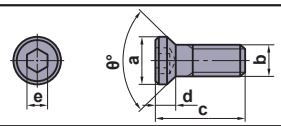
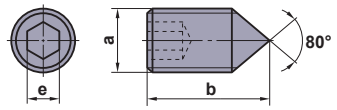
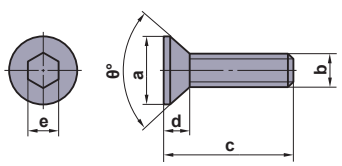
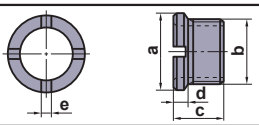
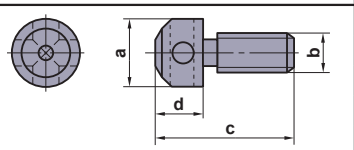
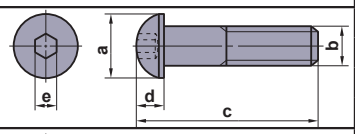
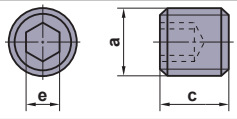
SPARE PARTS

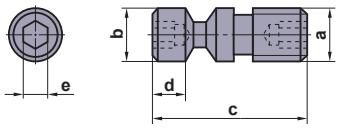
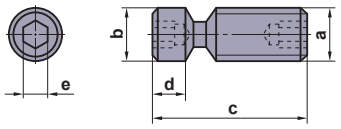
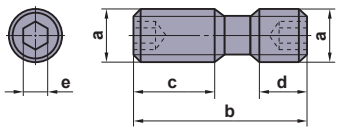
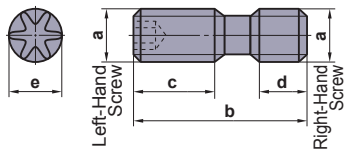
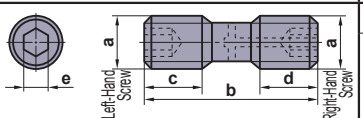
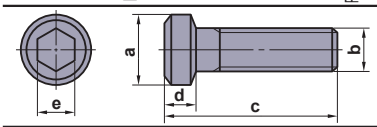
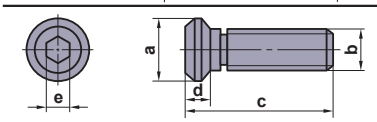
CLAMP SCREW

Geometry	Order Number	Dimensions (mm) a	b	c	d	e	Angle θ°	Drive Size	Torque (N•m)	Tool Holder
	**AJS3010T10**	5	M3×0.5	10	1.5	2.8	120	T10	2.5	**Profile** Holder
	AJS4012T15	7	M4×0.7	12	2.2	3.4	120	T15	3.5	**AJX** Type Cutter
	AJS5014T25	8	M5×0.8	14	2.7	4.5	120	T25	7.5	
	**BRS103**	5	M3×0.5	9.9	2.9	3.4	120	T15	3.5	**BRE** Type Cutter
	BRS105	8	M5×0.8	13.8	3.8	4.5	120	T25	7.5	
	**CS3**(For Use with C3)	7	M4×0.7	14.6	2.6	2.5	—	—	2.2	**F** Type Boring Bar
	CS4(For Use with C4)	9	M5×0.8	15.4	3.4	3	—	—	3.3	
	CS5(For Use with C5)	10.5	M6×1	22	4	4	—	—	7.0	This clamp screw is included with the clamp as a set.
	**CAS51T**	7.9	M5×0.8	19	5	4.5	10	T25	8.5	**BF407** Type Cutter
	**CS200T**	3.2	M2×0.4	5	1.6	1.8	90	T6	0.6	**AL** Holder
	CS250T	3.7	M2.5×0.45	6	1.8	2.4	90	T8	1.0	**F** Type Boring Bar
	* **CS250560T**	3.9	M2.5×0.45	5.2	2.5	2.4	60	T8	1.0	**MMTI** Type Boring Bar
	CS300590T	4.1	M3×0.5	5.5	2.1	2.4	90	T8	1.0	**SNT** Type Boring Bar
	CS300790TS	4.7	M3×0.5	7	2.3	2.8	90	T10	2.0	**Milling Tools** Series
	CS300890T	4.1	M3×0.5	8	2.1	2.4	90	T8	1.0	**AHX640S** Type Cutter
	* **CS350760T**	5.5	M3.5×0.6	7	4	3.4	60	T15	3.5	**Boring Unit**
	CS350790T	4.8	M3.5×0.6	7	2.4	2.8	90	T10	2.5	**MI** Type Boring Bar
	* **CS350860T**	5.5	M3.5×0.6	8.4	4	3.4	60	T15	3.5	
	CS350990T	4.8	M3.5×0.6	9	2.4	2.8	90	T10	2.5	
	CS400990T	6.0	M4×0.7	9	2.8	3.4	90	T15	3.5	
	CS401160T	5.7	M4×0.7	11	4.5	3.4	60	T15	3.5	
	CS401990T	6.0	M4×0.7	19	3.0	3.9	90	T20	3.5	
	CS451190T	6.3	M4.5×0.75	11	2.9	3.9	90	T20	5.0	
	* **CS501160T**	7.0	M5×0.8	11	3.6	3.9	60	T20	5.0	
	CS501290T	7.0	M5×0.8	11	3.5	4.5	90	T25	7.5	
	* **CS5015060T**	7.2	M5×0.8	15	2.4	3.9	60	T20	5.0	
	CS502190T	8.5	M5×0.8	21	4.0	5.1	90	T27	7.5	
	CS6016060T	8.5	M6×1.0	16	4.5	4.5	60	T25	7.5	
	**CSF401260T**	7.2	M4×0.5	12	5.2	3.9	60	T20	5.0	**PMR** Type Cutter
	**DC0520T**	8.5	M5×0.8	22.5	2.5	3.4	—	T15	3.5	**DOUBLE CLAMP** Holder
	DC0621T	10.5	M6×1.0	25	4	3.9	—	T20	5.0	**DOUBLE CLAMP DIMPLE BAR**
										HSK Tool Holder
	**DKS4**	5.6	M4×0.7	18	3.5	3	—	—	3.3	
	DKS5	7.6	M5×0.8	19	4.5	4	—	—	7.0	

SPARE PARTS

CLAMP SCREW

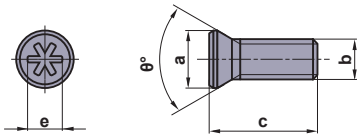
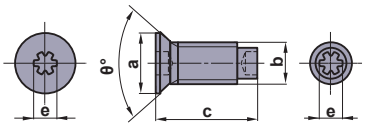
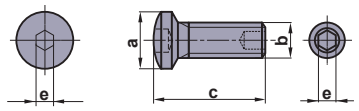
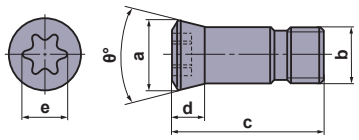
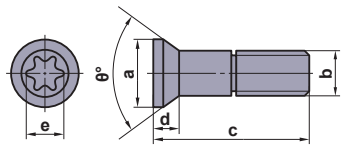
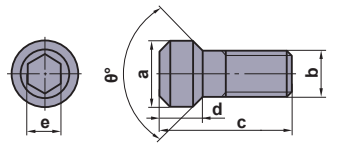
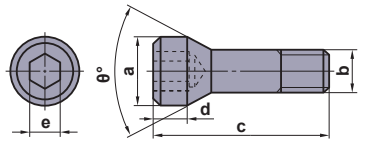
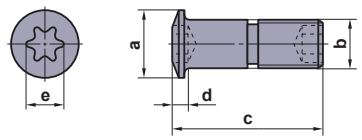
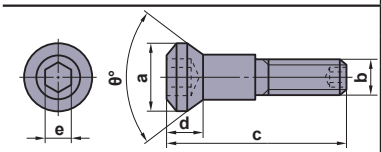
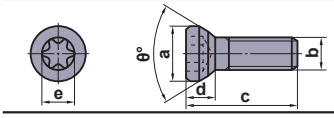
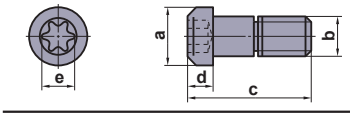
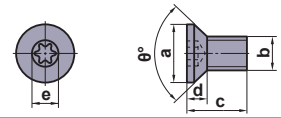
Geometry	Order Number	Dimensions (mm) a	b	c	d	e	Angle θ°	Drive Size	Torque (N•m)	Tool Holder
	**EGS06019**	9	M6×1	22.5	3.5	3	—	—	3.3	**EG** Type Holder
	EGS08024	11	M8×1.25	28.5	4.5	4	—	—	7.0	
	**FC400890T**	5.6	M4×0.7	7.5	1.3	2.8	90	T10	2.5	**AL** Type Holder **AL** Type Boring Bar **SMG** Type Holder
	**GY05016S**	8.7	M5×0.8	16	3.5	3.9	90	T20	5.0	**GY** Series
	**GY06013M**	12	M6×1.0	18	5	5.6	—	T30	6.0	**GY** Series
	**HFF06015**	10	M6×1	15	6	5	80	—	8.2	
	**HS4L**	5.4	M4×0.7	14	2.3	2.5	80	—	3.8	
	HS5S	6.8	M5×0.8	9	2.8	3	80	—	3.3	
	HS5L	6.8	M5×0.8	15	2.8	3	80	—	6.6	
	**HSP05008C**	M5×0.8	8	—	—	2.5	—	—	2.5	**MP** Type Holder **D** Type Boring Head
	**HY-A1**	4.4	M3×0.5	7	2.1	2	82	—	1.5	**Boring Unit**
	HY-V1	5.5	M3×0.5	7	2.5	2	82	—	1.5	
	HY2	5.5	M3×0.5	10	2.5	2	82	—	1.5	
	HY3	7	M3.5×0.6	12	2.9	2	82	—	1.5	
	HY4	9.3	M5×0.8	16	3.6	3	82	—	3.3	
	**JSS6**	6.9	M6×0.75	4.5	1.5	0.8	—	—	—	
	JSS7	8	M7×0.75	4.4	1.5	1	—	—	—	
	**KS1**	7	M4×0.7	14	5	—	—	—	—	**V10000** Type Cutter **LL** Type Cartridge **BC** Type Cartridge **SS** Type Cartridge **SET/MG/DG** Type Cartridge **MI** Type Boring Bar
	KS2	10	M6×1	18	7	—	—	—	—	
	KS3	8	M4×0.7	14	6.5	—	—	—	—	
	KS1S	7	M4×0.7	14	5	—	—	—	—	
	KS2S	10	M6×1	18	7	—	—	—	—	
	**KS11**	8	M5×0.8	19	3	3	—	—	3.3	
	KS12	10	M6×1	26	4	4	—	—	7.0	
	KS13	10	M6×1	30	4	4	—	—	7.0	
	KS14	13	M8×1.25	45	5	5	—	—	9.0	
	**LLR1**	M5×0.8	—	3.5	—	2.5	—	—	—	**LL** Type Cartridge
	LLR2	M6×1	—	5	—	3	—	—	—	

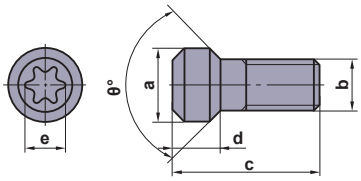
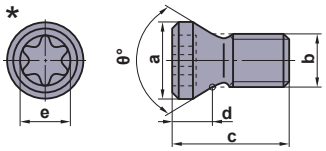
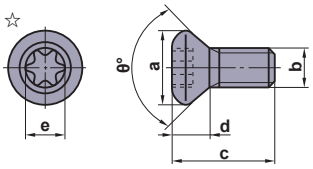
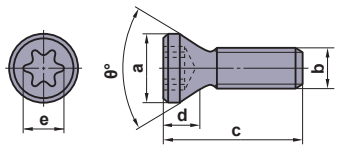
Geometry	Order Number	Dimensions (mm) a	b	c	d	e	Angle θ°	Drive Size	Torque (N•m)	Tool Holder
  **LLCS103, LLCS105 LLCS125, LLCS205** The products with "✱" do not have a hexagonal hole at the end marked **b**. The products with "☆" do not have a hexagonal hole at the end marked **a**.	☆**LLCS103**	M3×0.5	4	11	4.6	2	—	—	1.5	**LL** Type Holder
	✱ **LLCS105**	M5×0.8	M5×0.8	10	1.5	2	—	—	1.5	**P** Type Boring Bar
	LLCS105	M5×0.8	M5×0.8	10	1.5	2	—	—	1.0	**P** Type Boring Bar
	LLCS106	M6×1	6	16.5	3.5	2.5	—	—	2.2	**D** Type Boring Head
	✱ **LLCS106S**	M6×1	6	13.4	0.7	2.5	—	—	2.2	**HSK** Tool Holder
	LLCS108	M8×1.25	8	21	6.5	3	—	—	3.3	**KSMG** Type Cutter
	✱ **LLCS108S**	M8×1.25	8	16.5	2	3	—	—	3.3	**LL** Type Cartridge
	LLCS110	M10×1.5	10	29	8	4	—	—	7.0	**Boring Unit**
	LLCS112	M12×1	11.9	36.2	9	5	—	—	8.0	
	LLCS125	M5×0.8	M5×0.8	12	2	2	—	—	1.5	
	LLCS205	M5×0.8	M5×0.8	16	4	2	—	—	1.5	
	LLCS206	M6×1	6	26	13	2.5	—	—	2.2	
	LLCS208	M8×1.25	8	24	6.5	3	—	—	3.3	
	LLCS306	M6×1	6	21	4	2.5	—	—	2.2	
	LLCS308	M8×1.25	8	42	27.5	3	—	—	3.3	
	LLCS310	M10×1	10	29	8	4	—	—	7.0	
	LLCS410	M10×1	10	30	6.6	4	—	—	7.0	
	LLCS508	M8×1	8	24	6.5	3	—	—	3.3	
	✱ **LLCS508S**	M8×1	8	20.5	3	3	—	—	3.3	
 ✱Without Hexagonal Hole on Right-Hand Screw	**LS1**	M6×1	22	8	8	3	—	—	5.0	**DOUBLE CLAMP** Holder (For Heavy Cutting)
	LS2	M8×1	29	13	10	4	—	—	8.2	**MC** Type Holder
	LS3	M8×1	32	13	13	4	—	—	8.2	**UG** Type Holder
	✱ **LS4**	M6×1	15	8	4	3	—	—	5.0	**Milling Tools** Series
	✱ **LS5**	M6×1	18	8	5	3	—	—	5.0	
	✱ **LS6**	M8×1	24	13	5	4	—	—	8.2	
	✱ **LS7**	M8×1	27	13	8	4	—	—	8.2	
	✱ **LS8**	M6×0.75	18	7	7	3	—	—	5.0	
	✱ **LS9**	M6×0.75	22	8	8	3	—	—	5.0	
	✱ **LS10**	M7×0.75	16	6	6	4	—	—	8.2	
	✱ **LS11**	M8×1	16	6	6	4	—	—	8.2	
	✱ **LS12**	M8×1	24	7	7	4	—	—	8.2	
	✱ **LS13**	M8×1	34	12	12	4	—	—	8.2	
	✱ **LS14**	M7×0.75	24	10	10	4	—	—	8.2	
	✱ **LS15**	M7×0.75	18	6	8	4	—	—	8.2	
	✱ **LS16**	M7×0.75	23	11	8	4	—	—	8.2	
	✱ **LS17**	M8×1	42	17	11	4	—	—	8.2	
	✱ **LS18**	M7×0.75	14	6	4	4	—	—	8.2	
	✱ **LS20**	M10×1.5	26	9	9	5	—	—	9.0	
	✱ **LS21**	M10×1.5	32	12	12	5	—	—	9.0	
	LS24	M8×1.25	24	8.5	8.5	4	—	—	8.2	
	LS25	M8×1.0	28.5	12.0	10.5	4	—	—	8.2	
	**LS10T**	M7×0.75	14	6	5	4.5	—	T25	8.5	
	LS14T	M7×0.75	24	10	10	4.5	—	T25	8.5	
	LS15T	M7×0.75	18	7	7	4.5	—	T25	8.5	
	LS19T	M6×0.75	11	4	4	3.4	—	T15	5.0	
	LS10TS	M7×0.75	13	6	4	4.5	—	T25	8.5	
	LS0622T	M6×0.75	22	8	8	3.4	—	T15	6.0	
	**LS24H**	M8×1.25	24	8.5	8.5	4	—	—	8.2	**APX3000** Type Cutter
	**MGS6**	10	M6×1	26	4	5	—	—	9.0	
	**MHT1**	11	M8×1	18.5	3.5	4	—	—	8.7	

SPARE PARTS

SPARE PARTS

CLAMP SCREW

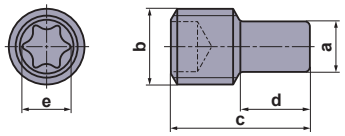
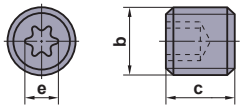
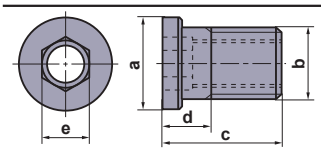
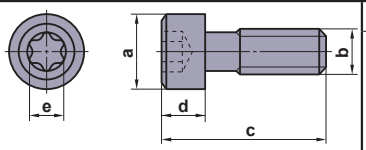
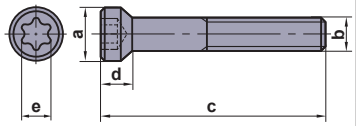
Geometry	Order Number	Dimensions (mm) a	b	c	d	e	Angle θ°	Drive Size	Torque (N•m)	Tool Holder
	**NS251**	3.6	M2.5×0.45	7	—	2.2	60	—	0.7	**SMALL TOOLS**
	NS401	5.8	M4×0.7	6	—	3.6	60	—	3.5	
	**NS402W**	5.85	M4×0.7	10	—	2.2	60	—	0.7	**SMALL TOOLS**
	NS403W	5.85	M4×0.7	12	—	2.2	60	—	0.7	
	NS404W	5.8	M4×0.7	10	—	2.2	90	—	0.7	
	**NS501W**	8	M5×0.8	16	—	2.5	120	—	2.2	**SMALL TOOLS**
	NS502W	8	M5×0.8	20	—	2.5	120	—	2.2	
	**RN-S4S**	5.8	M4×0.5	8.4	2.5	3.4	61	T15	3.5	
	RN-S4M	5.8	M4×0.5	10	2.2	3.4	61	T15	3.5	
	RN-S4	5.8	M4×0.5	12.5	2.2	3.4	61	T15	3.5	
	RN-S5	8.1	M5×0.5	15.4	3.6	3.9	61	T20	5.0	
	RN-S6	9.5	M6×0.75	20.3	4.6	3.9	61	T20	5.0	
	RN-S7	11	M7×0.75	24.7	5.2	4.5	61	T25	7.5	
	**RS3008T**	4.3	M3×0.35	8.6	2	2.4	61	T8	1.5	**SRF** Type Cutter
	RS3510T	5	M3.5×0.35	10	2.3	2.8	61	T10	2.5	
	RS4015T	6	M4×0.5	14	2.7	3.4	61	T15	3.3	
	RS5020T	8.1	M5×0.5	16.4	3.6	3.9	61	T20	5.0	
	RS6025T	9.5	M6×0.75	21.5	4.2	4.5	61	T25	7.5	
	RS8030T	12	M8×0.75	25	5	5.6	61	T30	10.0	
	**S1**	3.5	M2×0.4	5.5	2.2	1.5	92	—	1.0	**Boring Unit**
	S3	4.5	M3×0.5	7.7	2.4	2	92	—	1.5	
	S4	5.3	M4×0.7	8	1.8	2.5	62	—	2.2	
	S5	6.8	M5×0.8	9	2.4	3	62	—	3.3	
	**SD32**	12	M8×1.25	28	7.2	6	50	—	9.5	**D** Type Head Arbor
	SD40	12	M8×1.25	36	7.2	6	50	—	9.5	
	SD50	16	M10×1.5	46	8.2	8	50	—	1.0	
	SD63	16	M10×1.5	61	8.2	8	50	—	1.0	
	**SETS51**	6.8	M5×0.8	14.8	1.5	3.4	—	T15	3.5	**MMTE** Type Holder **MMTI** Type Boring Bar **SET** Type Holder **SNT** Type Boring Bar **HSK** Tool Holder **SET** Type Cartridge
	SETS61	8	M6×1	20	1.8	3.9	—	T20	5.0	
	**SLCS105**	10	M5×0.8	25	6.3	4	90	—	7.0	**WP** Type Holder
	SLCS106	12	M6×1	32	6.2	4	90	—	7.0	**M** Type Boring Bar
	**SPS1**	8.5	M5×0.8	16	4	4.5	70	T25	5.0	
	**SRS5**	6.7	M5×0.8	16	3.5	3.9	—	T20	5.0	**SRE** Type Cutter
	**STS1**	6.8	M3×0.5	7	2.2	2.8	90	T10	2.5	

Geometry	Order Number	Dimensions (mm)					Angle	Drive Size	Torque (N•m)	Tool Holder
		a	b	c	d	e	θ°			
	* **TS16**	2.5	M1.6×0.35	3.2	1.6	1.8	60	T6	0.6	**SP** Type Holder
	TS2	2.7	M2×0.4	4.6	1.4	1.8	60	T6	0.6	**Profile Holder**
	* **TS2A**	2.7	M2×0.4	4.5	1.2	1.8	60	T6	0.6	**SMALL TOOLS**
	TS2C	2.7	M2×0.4	3.8	1.4	1.8	60	T6	0.6	**DIMPLE BAR**
	☆ **TS2D**	3.8	M2×0.4	5.3	1.9	1.8	82	T6	0.6	**MICRO-DEX**
	TS21	2.7	M2×0.4	3.4	1.4	1.8	60	T6	0.6	**F** Type Boring Bar
	* **TS22**	3.0	M2.2×0.45	5	1.2	1.8	60	T6	0.6	**S** Type Boring Bar
	* **TS25**	3.3	M2.5×0.45	5.5	1.7	2.4	60	T8	1.0	**GY** SERIES
	☆ **TS25D**	4.4	M2.5×0.45	6.2	2.2	2.4	82	T8	1.0	**MMTI** Type Boring Bar
	* **TS25H**	3.6	M2.5×0.45	5.5	2	2.4	60	T8	1.0	**SNT** Type Boring Bar
	TS202	2.7	M2×0.4	5.5	1.8	1.8	60	T6	0.6	**HSK** Tool Holder
	TS253	3.3	M2.5×0.45	4.5	1.7	2.4	60	T8	1.0	**Milling Tools** Series
	TS254	3.3	M2.5×0.45	7	1.7	2.4	60	T8	1.0	**VFX5** Type Cutter
	* **TS255**	3.5	M2.5×0.45	7.5	1.6	2.4	60	T8	1.0	**VFX6** Type Cutter
	TS3	3.9	M3×0.5	6	2	2.4	60	T8	1.0	**SS** Type Cartridge
	TS3D	5.0	M3×0.5	6	2.3	2.8	82	T10	2.5	**Boring Unit**
	* **TS3SB**	4.4	M3×0.5	8	2	2.4	80	T8	1.5	**TAF** Drill
	TS31D	4.8	M3×0.5	7.2	2.2	2.8	82	T10	2.5	
	* **TS32**	3.9	M3×0.5	7.5	2	2.4	60	T8	1.0	
	* **TS33**	3.9	M3×0.5	6.7	2	2.4	60	T8	1.0	
	TS35	4.8	M3.5×0.6	6.5	2.4	2.8	60	T10	2.5	
	* **TS35D**	5.3	M3.5×0.6	12	2.8	3.4	60	T15	3.5	
* 	**TS351**	4.8	M3.5×0.6	7.2	2.4	2.8	60	T10	2.5	
	TS352	4.8	M3.5×0.6	10	3	2.8	60	T10	2.5	
	TS4S	5.4	M4×0.7	7	2.4	3.4	80	T15	3.5	
	* **TS4SL**	5.4	M4×0.7	8	2.4	3.4	80	T15	4.0	
	* **TS4SB**	5.8	M4×0.7	9	2.7	3.4	80	T15	3.5	
	* **TS4SBL**	5.8	M4×0.7	10.5	2.7	3.4	80	T15	3.5	
☆ 	**TS4**	5.4	M4×0.7	8	2.6	3.4	60	T15	3.5	
	TS4D	5.6	M4×0.7	7.7	2.5	3.4	82	T15	3.5	
	TS42	5.4	M4×0.7	6	2.6	3.4	60	T15	3.5	
	TS43	5.4	M4×0.7	10	2.6	3.4	60	T15	3.5	
	TS44	5.4	M4×0.7	12	2.6	3.4	60	T15	3.5	
	TS406	5.4	M4×0.7	15.5	2.6	3.4	60	T15	3.5	
	TS407	5.4	M4×0.7	9	2.6	3.4	60	T15	3.5	
	TS450	5.9	M4.5×0.75	13	3.6	3.9	60	T20	5.0	
	TS5S	6.8	M5×0.8	9	2.9	4.5	80	T25	7.5	
	* **TS5SL**	6.8	M5×0.8	12	2.9	4.5	80	T25	7.5	
	TS5	6.8	M5×0.8	9	3.2	4.5	60	T25	7.5	
	TS5L	6.8	M5×0.8	15	2.9	4.5	80	T25	7.5	
	TS52	6.8	M5×0.8	8	3.2	4.5	60	T25	7.5	
	TS53	6.8	M5×0.8	16	3.2	4.5	60	T25	7.5	
	TS54	6.8	M5×0.8	12	3.2	4.5	60	T25	7.5	
	TS55	6.8	M5×0.8	10.5	3.2	4.5	60	T25	7.5	
	* **TS6S**	8.5	M6×1.0	13	4.4	5.6	60	T30	10.0	
	* **TS6**	8.5	M6×1.0	16	4.4	5.6	60	T30	10.0	
	**TPS20**	2.7	M2×0.4	3.5	1.3	1.8	60	6IP	0.6	**ASX445** Type Cutter
	TPS22	3.0	M2.2×0.45	4.7	1.6	2.1	60	7IP	0.6	**ASX400** Type Cutter
	TPS22S	3.0	M2.2×0.45	4.2	1.6	2.1	60	7IP	0.6	**APX3000** Type Cutter
	TPS25	3.3	M2.5×0.45	5.5	1.7	2.1	60	7IP	1.0	**APX4000** Type Cutter **MVX** Drill
	TPS25-1	3.3	M2.5×0.45	6.5	1.7	2.1	60	7IP	1.0	**ARX** Type Cutter
	TPS3	3.9	M3×0.5	6.7	1.4	2.82	60	IP10	1.0	**MVX** Drill
	TPS35	5.3	M3.5×0.6	11.5	2.8	3.4	60	15IP	3.5	**PMR** Type Cutter
	TPS351	4.8	M3.5×0.6	7.2	1.4	2.82	60	IP10	2.5	**MVX** Drill
	TPS4	5.3	M4×0.7	8	2.6	3.4	60	15IP	3.5	**MVX** Drill
	TPS43	5.3	M4×0.7	10	2.6	3.4	60	15IP	3.5	
	TPS4R	6.4	M4×0.7	10.6	2.9	3.4	60	15IP	3.5	**WSX445**
	TPS54	6.8	M5×0.8	12	3.2	4.5	60	P25	3.5	**MVX** Large diameter

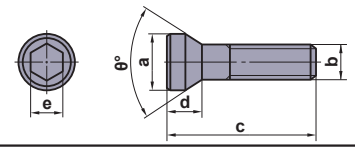
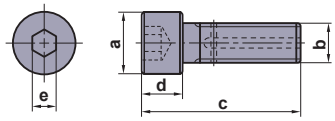
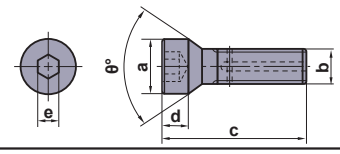
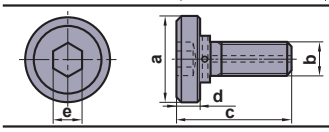
SPARE PARTS

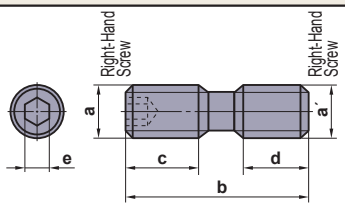
SPARE PARTS

CLAMP SCREW

Geometry	Order Number	Dimensions (mm) a	b	c	d	e	Angle θ°	Drive Size	Torque (N•m)	Tool Holder
	**TSR05008S**	3.5	M5×0.8	8	—	2.8	—	T10	—	
	TSR06011S	4	M6×1.0	11	—	3.9	—	T20	—	
	**TSS04005**	—	M4×0.7	5	—	2.4	—	T8	—	**PMF** Type Cutter
	TSS05006	—	M5×0.8	6	—	2.8	—	T10	—	**BC** Type Cartridge
	TSS06010	—	M6×1	10	—	3.9	—	T20	—	**SS** Type Cartridge
	**WCS503507H**	6.3	M5×0.5	7	3.3	3.5	—	—	5.0	**ASX445** Type Cutter
	WCS604010H	7.8	M6×0.75	10	4.1	4.0	—	—	7.0	**ASX400** Type Cutter
										PMR Type Cutter
	**WS1**	8.5	M5×0.8	19	5	4.5	—	T25	7.5	
	**WS254012T**	4	M2.5×0.45	11.5	2.2	2.4	80	T8	2.0	**TAW** Drill
	WS254013T	4	M2.5×0.45	12.5	2.2	2.4	80	T8	2.0	
	WS254014T	4	M2.5×0.45	13.5	2.2	2.4	80	T8	2.0	
	WS254015T	4	M2.5×0.45	14.5	2.2	2.4	80	T8	2.0	
	WS254016T	4	M2.5×0.45	15.5	2.2	2.4	80	T8	2.0	
	WS304517T	4.5	M3×0.5	16.5	3.4	2.8	60	T10	3.5	
	WS304518T	4.5	M3×0.5	17.5	3.4	2.8	60	T10	3.5	
	WS355520T	5.5	M3.5×0.6	19.5	3.9	3.4	60	T15	5.5	
	WS355521T	5.5	M3.5×0.6	20.5	3.9	3.4	60	T15	5.5	
	WS406023T	6	M4×0.7	22.0	4.4	4.5	60	T25	8.5	
	WS406024T	6	M4×0.7	23.0	4.4	4.5	60	T25	8.5	
	WS508026T	8	M5×0.8	25.0	5.2	5.1	60	T27	12.0	
	WS508027T	8	M5×0.8	26.0	5.2	5.1	60	T27	12.0	

SET BOLT

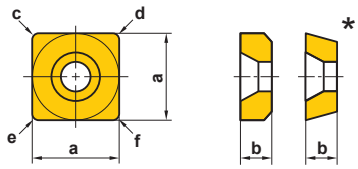
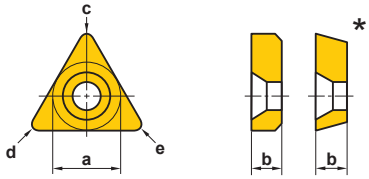
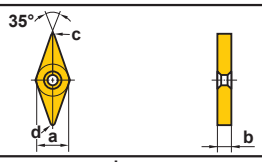
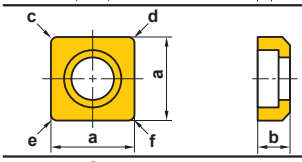
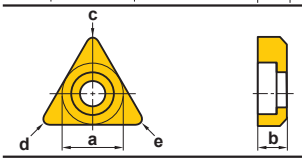
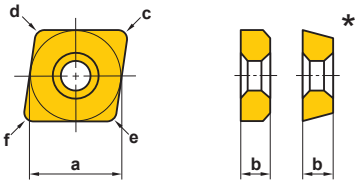
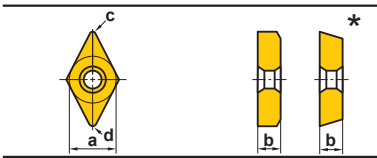
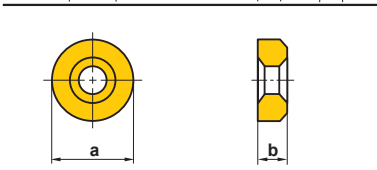
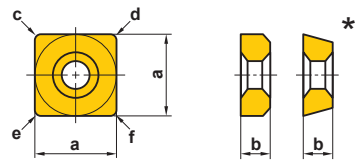
Geometry	Order Number	Dimensions (mm) a	b	c	d	e	Angle θ°	Drive Size	Torque (N•m)	Tool Holder
	**BOES101**	15	M10×1.5	45	10	8	60	—	10.0	**OCTACUT** Type Cutter
	**HSC08030H**	13	M8×1.25	38	8	5	—	—	24	APX3000/4000 Type Cutter AJX Type Cutter
	HSC**08040**	13	M8×1.25	48	8	5	—	—	24	**APX4000** Type Cutter **WSX445** Type Cutter
	HSC**08050**	13	M8×1.25	58	8	5	—	—	24	**AXD4000** Type Cutter
	HSC**10030H**	16	M10×1.5	40	10	6	—	—	40	**AXD7000** Type Cutter
	HSC**10035**	16	M10×1.5	45	10	6	—	—	40	APX3000/4000 Type Cutter AJX Type Cutter WSX445 Type Cutter
	HSC**10045**	16	M10×1.5	55	10	6	—	—	40	**BXD** Type Cutter
	HSC**10055**	16	M10×1.5	65	10	6	—	—	40	**VFX5/6** Type Cutter
	HSC**12035**	18	M12×1.75	47	12	10	—	—	80	**WSX445** Type Cutter
	HSC**12035H**	18	M12×1.75	47	12	10	—	—	80	APX3000/4000 Type Cutter AJX Type Cutter WSX445 Type Cutter
	HSC**12045**	18	M12×1.75	57	12	10	—	—	80	**WSX445** Type Cutter
	HSC**12070**	18	M12×1.75	82	12	10	—	—	80	
	HSC**16040**	24	M16×2	56	16	14	—	—	150	
	HSC**16040H**	24	M16×2	56	16	14	—	—	150	**APX3000/4000** Type Cutter **AJX** Type Cutter
	HSC**16080**	24	M16×2	96	16	14	—	—	150	
	HSC**20040**	30	M20×2.5	60	20	17	—	—	320	
	HSC**20090**	30	M20×2.5	110	20	17	—	—	320	
	**HFF08043H**	11	M8×1.25	43	5	5	90	—	8.2	**AXD4000** Type Cutter
										BXD Type Cutter
	**MBA16033H**	40	M16×2	43	10	14	—	—	150	AHX640 Type Cutter (For ϕ100) WSX445 Type Cutter
	MBA**20040H**	50	M20×2.5	54	14	17	—	—	320	**APX4000** Type Cutter
	MBA**24045H**	65	M24×3	59	14	17	—	—	520	**AXD4000** Type Cutter
										AXD7000 Type Cutter
										AJX Type Cutter
										BXD Type Cutter

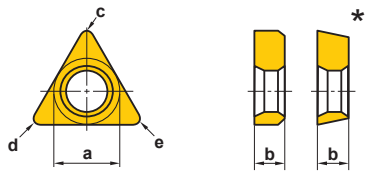
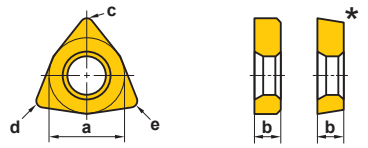
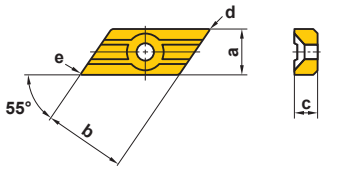
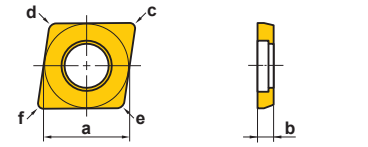
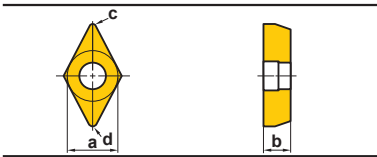
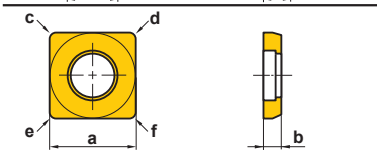
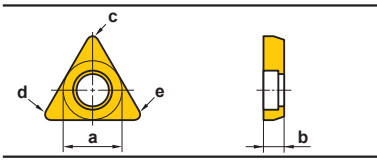
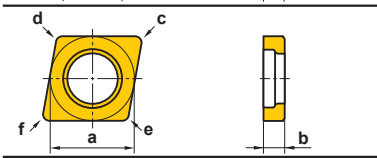
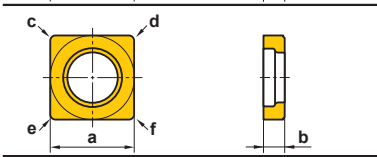
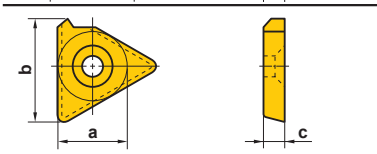
Geometry	Order Number	Dimensions (mm) a	a′	b	c	d	e	Torque (N•m)	Tool Holder
	**HDS08030**	M8×0.75	M8×1.25	30	13.5	11.5	4	8.2	**BRP** Type Cutter
	HDS**10031**	M10×1.0	M10×1.5	31	14	12	5	9.0	**OCTACUT** Type Cutter
									PMF Type Cutter

SPARE PARTS

SPARE PARTS

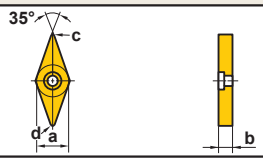
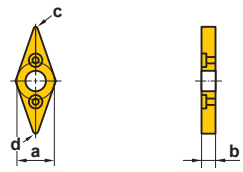
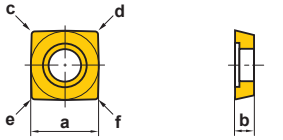
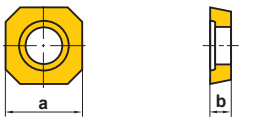
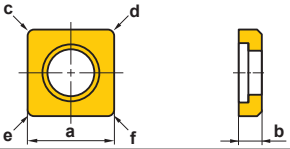
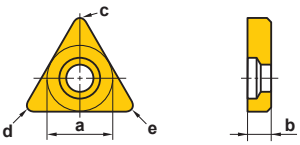
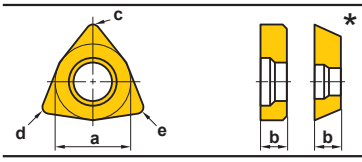
SHIM

Geometry	Order Number	Dimensions (mm)						Tool Holder
		a	b	c	d	e	f	
	**CS32**	9.52	3.18	0.8	0.8	1.2	1.2	**MC** Type Holder (Negative type)
	CS42	12.70	3.18	0.8	0.8	1.2	1.6	
	CS43	12.70	4.76	0.8	0.8	1.2	1.6	
	CS62	19.05	3.18	1.2	1.2	1.6	1.6	
	* **PS31**	8.28	2.38	0.2	0.2	0.6	0.6	**MC** Type Holder (Positive type)
	* **PS42**	11.46	3.18	0.2	0.2	0.6	1.0	**BC** Type Cartridge
	* **PS62**	17.20	3.18	0.3	0.3	0.7	0.7	
	**CT22**	6.35	3.18	0.4	0.8	1.2	—	**MC** Type Holder (Negative type)
	CT32	9.52	3.18	0.4	0.8	1.2	—	
	CT33	9.52	4.76	0.4	0.8	1.2	—	
	CT42	12.70	3.18	0.4	0.8	1.2	—	
	* **PT21**	5.11	2.38	0.2	0.2	0.6	—	**MC** Type Holder (Positive type)
	* **PT32**	8.28	3.18	0.2	0.2	0.6	—	**F** Type Boring Bar
	* **PT42**	10.85	3.18	0.3	0.3	0.7	—	**BC** Type Cartridge
	BPT322	7.8	3.18	—	—	—	—	
	**DCSVN32**	9.52	3.18	0.8	1.2	—	—	**DOUBLE CLAMP** Holder **DOUBLE CLAMP DIMPLE BAR**
	**ESS42**	12.70	3.18	0.8	0.8	1.2	1.6	**ML** Type Holder
	**EST32**	9.52	3.18	0.4	0.8	1.2	—	**ML** Type Holder
	EST43	12.70	4.76	0.4	0.8	1.2	—	
	**LLSCN3T3**	9.52	3.97	0.4	0.4	0.8	0.8	**DOUBLE CLAMP** Holder **LL** Type Holder **DOUBLE CLAMP DIMPLE BAR** **P** Type Boring Bar **D** Type Boring Head **HSK** Tool Holder **LL** Type Cartridge
	LLSCN33	9.52	4.76	0.4	0.4	0.8	0.8	
	LLSCN42	12.70	3.18	0.8	0.8	1.2	1.2	
	LLSCN53	15.87	4.76	1.2	1.2	1.6	1.6	
	LLSCN63	19.05	4.76	1.2	1.2	1.6	1.6	
	* **LLSCP42**	12.70	3.18	0.8	0.8	1.2	1.2	**DOUBLE CLAMP DIMPLE BAR**
	* **LLSCP63**	19.05	4.76	1.2	1.2	1.6	1.6	**P** Type Boring Bar **HSK** Tool Holder
	**LLSDN32**	9.52	3.18	0.8	1.2	—	—	**DOUBLE CLAMP** Holder **LL** Type Holder **DOUBLE CLAMP DIMPLE BAR** **P** Type Boring Bar **D** Type Boring Head **HSK** Tool Holder
	LLSDN42	12.70	3.18	0.8	1.2	—	—	
	LLSDN43	12.70	4.76	0.8	1.2	—	—	
	LLSDN53	15.87	4.76	1.2	1.6	—	—	
	* **LLSDP42**	12.70	3.18	0.8	1.2	—	—	**DOUBLE CLAMP DIMPLE BAR**
	**LLSRN103**	8.3	3.18	—	—	—	—	**LL** Type Holder **HSK** Tool Holder
	LLSRN123	9.8	3.18	—	—	—	—	
	LLSRN164	13.6	4.76	—	—	—	—	
	LLSRN204	17.3	4.76	—	—	—	—	
	LLSRN256	22.0	6.35	—	—	—	—	
	LLSRN326	28.0	6.35	—	—	—	—	
	**LLSSN32**	9.52	3.18	0.8	0.8	1.2	1.2	**LL** Type Holder **DOUBLE CLAMP DIMPLE BAR** **P** Type Boring Bar **LL** Type Cartridge
	LLSSN33	9.52	4.76	0.8	0.8	1.2	1.2	
	LLSSN42	12.70	3.18	0.8	0.8	1.2	1.6	
	LLSSN53	15.87	4.76	1.2	1.2	1.6	1.6	
	LLSSN63	19.05	4.76	1.2	1.2	1.6	2.0	
	LLSSN84	25.40	6.35	1.6	1.6	2.4	2.4	
	* **LLSSP42**	12.70	3.18	0.8	0.8	1.2	1.6	

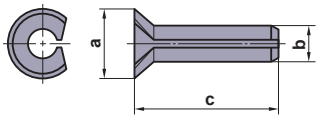
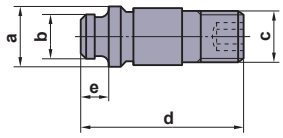
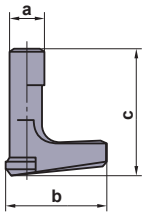
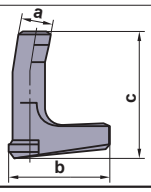
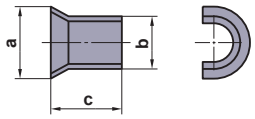
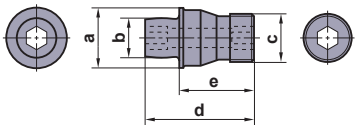
Geometry	Order Number	Dimensions (mm)						Tool Holder
		a	b	c	d	e	f	
	**LLSTE32**	7.6	3.18	0.4	0.4	0.4	—	**LL** Type Holder
	LLSTN32	9.52	3.18	0.4	0.8	1.2	—	**DOUBLE CLAMP** Holder
	LLSTN33	9.52	4.76	0.4	0.8	1.2	—	**DOUBLE CLAMP DIMPLE BAR**
	LLSTN42	12.70	3.18	0.4	0.8	1.2	—	**P** Type Boring Bar
	LLSTN53	15.87	4.76	0.8	1.2	1.6	—	**D** Type Boring Head
	* **LLSTP32**	9.52	3.18	0.4	0.8	1.2	—	**LL** Type Cartridge
	* **LLSTP42**	12.70	3.18	0.4	0.8	1.2	—	**Boring Unit**
	**LLSWN32**	9.52	3.18	0.4	0.8	1.2	—	**LL** Type Holder
	LLSWN3T3	9.52	3.97	0.4	0.8	1.2	—	**DOUBLE CLAMP** Holder
	LLSWN42	12.70	3.18	0.4	0.8	1.2	—	**DOUBLE CLAMP DIMPLE BAR**
	* **LLSWP32**	9.52	3.18	0.4	0.8	1.2	—	
	* **LLSWP42**	12.70	3.18	0.4	0.8	1.2	—	
	**MHS532R/L**	9.4	15.7	4.5	0.8	0.8	—	
	MHS533R/L	9.4	15.7	4.5	1.2	1.2	—	
	MHS534R/L	9.4	15.7	4.5	1.6	1.6	—	
	MHS542R/L	9.4	15.7	6.5	0.8	0.8	—	
	MHS543R/L	9.4	15.7	6.5	1.2	1.2	—	
	MHS544R/L	9.4	15.7	6.5	1.6	1.6	—	
	**MLCP42**	12.58	3.18	1.2	1.2	1.2	1.2	**P** Type Boring Bar
	**MLDP42**	12.56	3.18	1.2	1.2	—	—	**P** Type Boring Bar
	**MLSP42**	12.63	3.18	1.2	1.2	1.2	1.2	**P** Type Boring Bar
	**MLTP32**	9.50	3.18	1.2	1.2	1.2	—	**P** Type Boring Bar
	**MSCN63**	18.8	4.76	1.6	1.6	1.6	1.6	**DOUBLE CLAMP** Holder (For Heavy Cutting)
	**MSSN63**	18.8	4.76	1.6	1.6	1.6	1.6	**DOUBLE CLAMP** Holder (For Heavy Cutting)
	**CT32T1**	9.525	15.03	3.18	—	—	—	**SET** Type Holder **SNT** Type Boring Bar **SET** Type Cartridge
	PT32T1R	8.28	13.34	3.18	—	—	—	
	PT32T2R	8.28	13.19	3.18	—	—	—	
	PT42TR	10.85	17.20	3.18	—	—	—	

SPARE PARTS

SHIM

Geometry	Order Number	Dimensions (mm)						Tool Holder
		a	b	c	d	e	f	
	**PV321**	9.52	3.18	0.4	0.4	—	—	**MP** Type Holder
	PV322	9.52	3.18	0.8	0.8	—	—	**D** Type Boring Head
	PV323	9.52	3.18	1.2	1.2	—	—	
	**SPSVN32**	8.06	3.18	0.3	0.3	—	—	**SP** Type Holder **HSK** Tool Holder
	**STASX400N**	11.00	3.00	0.4	0.4	0.4	0.4	**ASX400** Type Cutter
	**STASX445N**	10.76	3.00	—	—	—	—	**ASX445** Type Cutter
	**STBS500N**	12.7	3.18	0.8	0.8	0.8	0.8	
	**WPSTN33**	9.3	4.76	0.8	0.4	1.2	—	**WP** Type Holder
	WPSTN43	12.50	4.76	0.8	0.4	1.2	—	
	* **WPSWC43**	12.50	4.76	0.4	0.8	1.2	—	**M** Type Boring Bar
	WPSWN43	12.50	4.76	0.4	0.8	1.2	—	

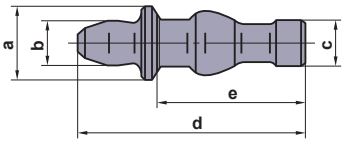
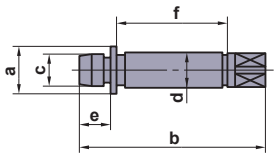
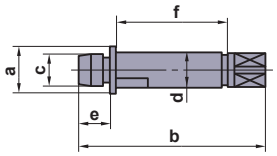
SHIM PIN AND CLAMP LEVER

Geometry	Order Number	Dimensions (mm)					Tool Holder
		a	b	c	d	e	
	**BCP141**	3.0	1.4	5.6	—	—	**MC** Type Holder
	BCP201	4.3	2	7.4	—	—	**SP** Type Holder
	BCP202	4.3	2	6.4	—	—	**F** Type Boring Bar
	BCP251	4.8	2.5	7.4	—	—	**HSK** Tool Holder
	BCP252	4.8	2.5	6.4	—	—	**BC** Type Cartridge
	BCP301	5.3	3	7.4	—	—	
	BCP401	6.3	4	7.4	—	—	
	**CCP33**	6.5	3.66	M5×0.8	18.5	3	**WP** Holder
	CCP34	7.5	5.0	M6×1.0	18.5	3	**M** Type Boring Bar
	CCP44	7.5	5.0	M5×0.8	14.2	3	
	**LLCL12S**	2.1	9.3	5.6	—	—	**LL** Type Holder
	LLCL13	3.6	10	12.5	—	—	**P** Type Boring Bar
	LLCL13S	3.6	10	7.8	—	—	**D** Type Boring Head
	LLCL14	4.7	13.4	13.2	—	—	**HSK** Tool Holder
	LLCL14S	4.7	13.6	12.2	—	—	**KSMG** Type Cutter
	LLCL15	6.0	19	17	—	—	**LL** Type Cartridge
	LLCL16	7.5	20.8	21	—	—	**Boring Unit**
	LLCL18	8.6	25.4	25.2	—	—	
	LLCL23	3.6	12.0	11.5	—	—	
	LLCL23S	3.6	11.6	9.5	—	—	
	LLCL24	4.7	16.2	14.8	—	—	
	LLCL25	6.0	17.1	17	—	—	
	**LLCL110**	3.0	10.7	11.6	—	—	
	LLCL112	3.5	13	13.5	—	—	
	LLCL116	4.5	18.5	18	—	—	
	LLCL120	5.6	20.3	19	—	—	
	LLCL125	6	24	24	—	—	
	LLCL132	8	30	27	—	—	
	**LLP13**	5.55	4.85	5.3	—	—	**LL** Type Holder
	LLP14	7.25	6.55	5.8	—	—	**DOUBLE CLAMP** Holder
	LLP15	8.8	8.05	8.6	—	—	**DOUBLE CLAMP DIMPLE BAR**
	LLP16	10.85	9.85	11.1	—	—	**P** Type Boring Bar
	LLP18	15.35	13.05	12.0	—	—	**D** Type Boring Head
	LLP23	5.55	4.85	6.8	—	—	**HSK** Tool Holder
	LLP24	7.25	6.55	9.1	—	—	**KSMG** Type Cutter
							LL Type Cartridge
							Boring Unit
	**MP6**	11.9	7.8	M10×1	22.1	15	**DOUBLE CLAMP** Holder (For Heavy Cutting)

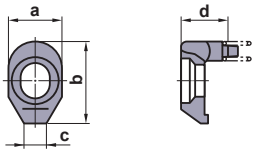
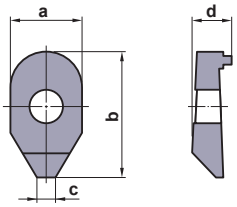
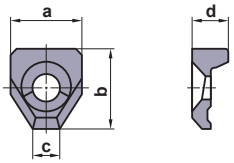
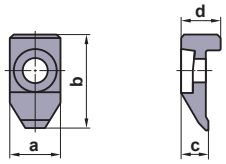
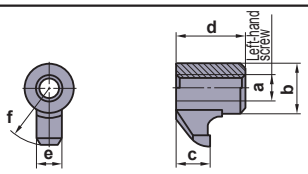
SPARE PARTS

SPARE PARTS

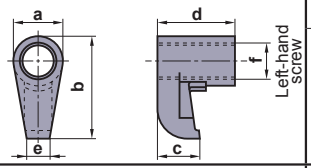
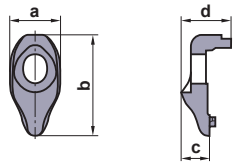
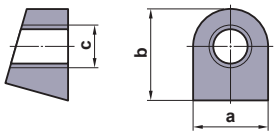
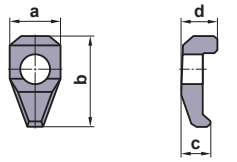
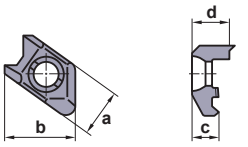
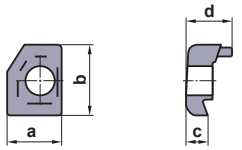
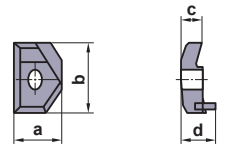
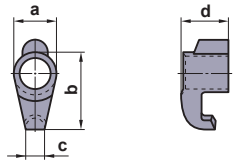
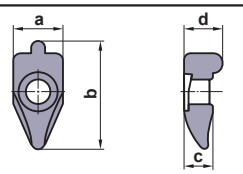
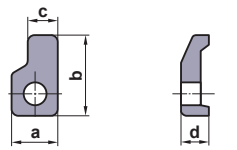
LOCK PIN

Geometry	Order Number	Dimensions (mm) a	b	c	d	e	f	Tool Holder
	**P11S**	6	3.7	4	17	11.1	—	**MP** Type Holder **D** Type Boring Head
	P21S	7.5	4.9	4.5	17.2	11.5	—	
	**P221US**	4	18	2.11	3.5	3.3	7.7	**ML** Type Holder
	P321US	5.5	18	3.64	5.0	3.3	7.5	
	P322US	5.5	21	3.64	5.0	3.3	10.5	
	P323US	5.5	24	3.64	5.0	3.3	13.5	
	P332US	5.5	21	3.64	5.0	4.9	8.9	
	**P323WS**	5.75	24	3.64	5.0	3.3	12.9	**ML** Type Holder
	P333WS	5.75	24	3.64	5.0	4.9	11.3	
	P334WS	5.75	30	3.64	5.0	4.9	17.3	
	P433W	7.75	24	5.03	7.0	4.9	10.8	
	P434W	7.75	30	5.03	7.0	4.9	16.8	

CLAMP BRIDGE

Geometry	Order Number	Dimensions (mm) a	b	c	d	e	f	Tool Holder
	**AMS3**	7	12	3	3.3	—	—	**Profile** Holder **AJX** Type Cutter **BRE** Type Cutter
	AMS4	9	13.5	3	3.8	—	—	
	AMS5	10	15	3.5	5	—	—	
	**CA142**	8	15	4	7	—	—	
	CA150	9	16	4.5	7	—	—	
	CA151	10	17	5	7	—	—	
	CA152	10	19	5	7	—	—	
	CA153	10	24	5	7	—	—	
	CA161	13	20	6	8	—	—	
	CA162	13	24	6	8	—	—	
	CA163	13	27	6	8	—	—	
	CA181	16	30	8	10	—	—	
	CA183	16	37	8	10	—	—	
	**CCK13**	15	18.5	6	9	—	—	**WP** Type Holder **M** Type Boring Bar
	CCK14	19	22	8	9.5	—	—	
	**CCTC1**	13	25	7	10.2	—	—	
	**CK231**	M6×1	8	4	7.5	4.5	9.5	**MC** Type Holder
	CK232	M6×1	8	4.5	8	4.5	11.5	
	CK341	M8×1	11	5.5	13.5	6	13.5	
	CK342	M8×1	11	6	14	6	16.5	

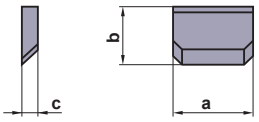
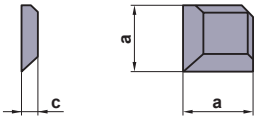
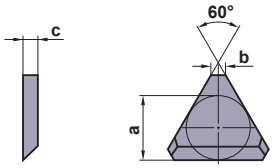
CLAMP BRIDGE

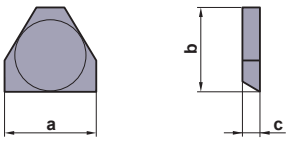
Geometry	Order Number	Dimensions (mm)						Tool Holder
		a	b	c	d	e	f	
	**CKW6**	10.9	22.5	9.2	16.8	5	M8×1	**DOUBLE CLAMP** Holder (For Heavy Cutting)
	**DCK2211**	11	22	6.57	11.1	—	—	**DOUBLE CLAMP** Holder
	DCK**2613**	13	26.5	7.35	12.9	—	—	**DOUBLE CLAMP DIMPLE BAR**
	DCK**3113**	13	31	9	14.5	—	—	**HSK** Tool Holder
	**KGC1**	12.0	15.0	M7×0.75	—	—	—	**UG** Type Holder
	**LK1**	8	14.3	4.5	5.9	—	—	
	**MHK5NR/L**	15.5	23.5	8.1	12.1	—	—	
	**MTK1R/L**	13	17.5	5	12	—	—	**MG** Type Holder **MT** Type Holder **MT1** Type Holder **HSK** Tool Holder **MG** Type Cartridge
	**MTK2R/L**	18	28	7	14	—	—	
	**SETK51**	6.8	14.5	2.9	8	—	—	**MMTE** Type Holder **MMTI** Type Holder **SET** Type Holder **SNT** Type Holder **HSK** Tool Holder **SET** Type Cartridge
	SETK**61**	8.9	18.1	4.1	8.6	—	—	
	**SRK1R**	9.4	21	5.5	7.5	—	—	**SRE** Type Cutter
	**UCR**	12	24	8	7	—	—	

SPARE PARTS

SPARE PARTS

BREAKER PIECE

Geometry	Order Number	Dimensions (mm)					Tool Holder
		a	b	c	Inscribed Circle	Breaker Width	
	**CBS3**	9.4	8.0	1.5	9.525	1.5	**MC** Type Holder
	CBS**4**	12.6	9.2	2.5	12.70	3.5	
	CBS**4N**	12.6	10.2	2.5	12.70	2.5	
	CBS**4F**	12.6	11.2	2.5	12.70	1.5	
	CBS**6**	18.9	14.6	2.5	19.05	4.5	
	CBS**6N**	18.9	16.6	2.5	19.05	2.5	
	CBS**6F**	18.9	17.6	2.5	19.05	1.5	
	**CBS3D**	8.0	—	1.5	9.525	1.5	**MC** Type Holder
	CBS**4D**	10.2	—	2.5	12.70	2.5	
	CBS**6D**	15.6	—	2.5	19.05	3.5	
	**CBT2**	5.33	1.4	1.5	6.35	1.5	**MC** Type Holder **F** Type Boring Bar *For positive inserts, the breaker width is 0.5mm larger than the figures in the list.
	CBT**2N**	5.67	1.4	1.5	6.35	1.0	
	CBT**3**	7.20	1.4	2.5	9.525	3.5	
	CBT**3N**	7.87	1.4	2.5	9.525	2.5	
	CBT**3F**	8.53	1.4	2.5	9.525	1.5	
	CBT**4**	9.73	1.4	2.5	12.70	4.5	
	CBT**4N**	11.07	1.4	2.5	12.70	2.5	
	CBT**4F**	11.73	1.4	2.5	12.70	1.5	

Geometry	Order Number	Dimensions (mm)			Thread Pitch (mm)	Tool Holder
		a	b	c		
	**CBT3106**	11.5	10.6	2.0	2.5—3.0	
	CBT**3113**	11.5	11.3	2.0	1.5—2.0	
	CBT**3120**	11.5	12	2.0	0.75—1.25	
	CBT**4108**	13.3	10.8	2.0	3.5—4.0	
	CBT**4128**	13.3	12.8	2.0	4.5—5.0	

REPLACEMENT PARTS FOR OLD TYPE TOOLS (TURNING HOLDERS)

LL TYPE HOLDER

Old Type Tool Number		Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
Type	Size					
PCFNR/L PCLNR/L PCBNR/L	1616H09	LLSCN3T3	LLP13	LLCL13	LLCS106	HKY25R
	2020K09	LLSCN3T3	LLP13	LLCL13	LLCS106	HKY25R
	2525M09	LLSCN3T3	LLP13	LLCL13	LLCS106	HKY25R
	2020K12	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R
	2525M12	LLSCN42	LLP14	LLCL14	LLCS108	HKY30R
	2525M16	LLSCN53	LLP15	LLCL25	LLCS508	HKY30R
	3225P16	LLSCN53	LLP15	LLCL25	LLCS508	HKY30R
	4040R19	LLSCN63	LLP16	LLCL16	LLCS310	HKY40R
PTANR/L PTBNR/L PTTNR/L PTGNR/L PTFNR/L	1010E11	—	—	LLCL12S	LLCS105	HKY20F
	1212F11	—	—	LLCL12S	LLCS105	HKY20F
	1616H16	LLSTN32	LLP13	LLCL13	LLCS106	HKY25R
	2020K16	LLSTN32	LLP13	LLCL13	LLCS106	HKY25R
	2525M16	LLSTN32	LLP13	LLCL13	LLCS206	HKY25R
	2525M22	LLSTN42	LLP14	LLCL14	LLCS108	HKY30R
	3225P22	LLSTN42	LLP14	LLCL14	LLCS108	HKY30R
	3232P22	LLSTN42	LLP14	LLCL14	LLCS108	HKY30R
	4040R27	LLSTN53	LLP15	LLCL25	LLCS508	HKY30R
PSBNR/L PSSNR/L PSKNR/L	3225P12	LLSSN42	LLP14	LLCL14	LLCS108	HKY30R
	2525M15	LLSSN53	LLP15	LLCL25	LLCS508	HKY30R
	3232P15	LLSSN53	LLP15	LLCL25	LLCS508	HKY30R
	3232P19	LLSSN63	LLP16	LLCL16	LLCS310	HKY40R
	4040R19	LLSSN63	LLP16	LLCL16	LLCS310	HKY40R
	5050T25	LLSSN84	LLP18	LLCL18	LLCS112	HKY50R
PRGCR/L PRDCN	2020K10	LLSRN103	LLP13	LLCL110	LLCS205	HKY20R
	2020K12	LLSRN123	LLP13	LLCL112	LLCS106	HKY25R
	3225P12	LLSRN123	LLP13	LLCL112	LLCS106	HKY25R
	3225P16	LLSRN164	LLP24	LLCL116	LLCS306	HKY25R
	4040R25	LLSRN256	LLP16	LLCL125	LLCS410	HKY40R
	5050T32	LLSRN326	LLP18	LLCL132	LLCS112	HKY50R

MC TYPE HOLDER (OLD TYPE PRODUCTS)

Old Type Tool Number		Shim	Shim Pin	Clamp Bridge	Clamp Screw	Breaker Piece	Wrench
Type	Size						
N11R/L N12R/L N13R/L N14M N15R/L	22	CS32	BCP251	CK6	LS1	CBS3◌	HKY30R
	33H	CS42	BCP301	* CK2	LS2	CBS4◌	HKY40R
	44	CS42	BCP301	* CK2	LS3	CBS4◌	HKY40R
N21R/L N22R/L N25R/L	22	CT22	BCP201	CK1	LS1	CBT2◌	HKY30R
	33H	CT32	BCP301	CK2	LS2	CBT3◌	HKY40R
	44	CT32	BCP301	CK2	LS3	CBT3◌	HKY40R
P11R/L P12R/L P14M P15R/L	22	PS31	BCP201	CK6	LS1	CBS3◌	HKY30R
	33	PS42	BCP251	* CK3	LS2	CBS4◌	HKY40R
	44	PS42	BCP251	* CK3	LS3	CBS4◌	HKY40R
P21R/L P22R/L P25R/L	22	PT21	BCP141	CK1	LS1	CBT2◌	HKY30R
	33	CT32	BCP201	CK2	LS2	CBT3◌	HKY40R
	44	CT32	BCP201	CK2	LS3	CBT3◌	HKY40R

*Please use clamp bridge No.CK3 with N11R/L33H and N11R/L44 types. Please use clamp bridge No.CK2 with P12R/L33 and P12R/L44 types.

REPLACEMENT PARTS FOR OLD TYPE TOOLS (TURNING HOLDERS)

MC TYPE HOLDER

Old Type Tool Number		Shim	Shim Pin	Clamp Bridge	Clamp Screw	Breaker Piece	Wrench	Spring
Type	Size							
CTANR/L CTGNR/L	1616	CT22	BCP201	CK231	LS1	CBT2◌	HKY30R	—
	2020	CT32	BCP301	CK341	LS2	CBT3◌	HKY40R	—
	2525	CT32	BCP301	CK341	LS3	CBT3◌	HKY40R	—
CSTNR/L CSSNR/L	1616	CS32	BCP251	CK232	LS1	CBS3◌	HKY30R	—
	2020	CS42	BCP301	CK341	LS2	CBS4◌	HKY40R	—
	2525M43	CS42	BCP301	CK341	LS3	CBS4◌	HKY40R	—
CTAPR/L	2020	PT32	BCP201	CK341	LS2	CBT3◌	HKY40R	—
CSBPR/L CSSPR/L CSKPR/L	1616	PS31	BCP201	CK232	LS1	CBS3◌	HKY30R	—
	2020	PS42	BCP251	CK342	LS2	CBS4◌	HKY40R	—
CTCPR/L	2020K16	BPT322	BCP201	CCTC1	HSC06020	CBT3◌	HKY50R	MES3
	2525M16	BPT322	BCP201	CCTC1	HSC06020	CBT3◌	HKY50R	MES3

ML TYPE HOLDER (OLD TYPE PRODUCTS)

Old Type Tool Number		Lock Pin	Shim	Stop Ring	Spanner
Type	Size				
E11R/L E12R/L E13R/L E14R/L E15R/L	11U	P321US	—	ER3	KY40
	22U	P322US	—	ER3	KY40
	33W	P433W	ESS42	ER4	KY40
	44W	P434W	ESS42	ER4	KY40
E21R/L E22R/L E25R/L E26M E27R/L	11U	P221US	—	ER2	KY25
	22FU	P322US	—	ER3	KY40
	33HU	P333US	—	ER3	KY40
	33FW	P323WS	EST32	ER3	KY40
	33HW	P333WS	EST32	ER3	KY40
	44AW	P334WS	EST32	ER3	KY40
	44BW	P434W	EST43	ER4	KY40

ML TYPE HOLDER

Old Type Tool Number		Lock Pin	Shim	Stop Ring	Spanner
Type	Size				
ETANR/L ETENN ETFNR/L ETXNR/L	1212	P221US	—	ER2	KY25
	1616H32	P322US	—	ER3	KY40
	1616H33	P332US	—	ER3	KY40
	2020K32W	P323WS	EST32	ER3	KY40
	2020K33W	P333WS	EST32	ER3	KY40
	2525M33W	P334WS	EST32	ER3	KY40
	2525M43W	P434W	EST43	ER4	KY40
ESBNR/L ESENR/L ESDNR/L ESKNR/L	1212	P321US	—	ER3	KY40
	1616H32	P322US	—	ER3	KY40
	2020W	P433W	ESS42	ER4	KY40
	2525W	P434W	ESS42	ER4	KY40

MH TYPE HOLDER

Old Type Tool Number		Shim	Shim Pin	Clamp Bridge	Clamp Screw	Stop Ring	Wrench
Type	Size						
KKCR/L	445	MHS532R/L 533R/L 534R/L	SFC03010	MHK5NR/L	MHT1	CE8	HKY40R

SL TYPE HOLDER

Old Type Tool Number		Shim	Lock Pin	Nut	Clamp Wedge	Clamp Screw	Wrench
Type	Size						
ETJNR/L ETQNR/L	33K16S	SLSTN33	SLP13	SLN13	SLCW13	SLCS105	HKY25R HKY40R
	44M16S	SLSTN33	SLP13	SLN13	SLCW13	SLCS105	HKY25R HKY40R
	44M22S	SLSTN43	SLP14	SLN14	SLCW14	SLCS106	HKY30R HKY40R
	54P22S	SLSTN43	SLP14	SLN14	SLCW14	SLCS106	HKY30R HKY40R
ETNNR/L	64M22S	SLSTN43	SLP14	SLN14	SLCW14	SLCS106	HKY30R HKY40R
	85M22S	SLSTN43	SLP14	SLN14	SLCW14	SLCS106	HKY30R HKY40R

WP TYPE HOLDER (OLD TYPE PRODUCTS)

Old Type Tool Number		Shim	Shim Pin	Clamp Bridge	Clamp Screw	Side Lock Plate	Lock Screw	Spring	Wrench
Type	Size								
MTJNR/L MTENN MTQNR/L	2020K16	SLSTN33	CCP13	CCK13	SLCS105	CPT13	WPS1	MES2	HKY25R HKY40R
	2525M16	SLSTN33	CCP13	CCK13	SLCS105	CPT13	WPS1	MES2	HKY25R HKY40R
	2525M22	SLSTN43	CCP14	CCK14	SLCS106	CPT14	WPS1	MES3	HKY30R HKY40R
MTNNR/L	5032M22	SLSTN43	CCP14	CCK14	SLCS106	CPT14	WPS1	MES3	HKY30R HKY40R
MWLNR/L	2020K08	WPSWN43	CCP34	CCK13	SLCS105	CPT24	—	MES2	HKY25R HKY30R HKY40R
	2525M08								
	3225P08								

WP TYPE HOLDER

Old Type Tool Number		Shim	Shim Pin	Clamp Bridge	Clamp Screw	Side Lock Plate	Lock Screw	Spring	Wrench
Type	Size								
MTENN MTQNR/L	2020K16N	WPSTN33	CCP33	CCK13	SLCS105	CPT13	—	MES2	HKY25R HKY40R
	2525M16N	WPSTN33	CCP33	CCK13	SLCS105	CPT13	—	MES2	HKY25R HKY40R
	2525M22N	WPSTN43	CCP34	CCK14	SLCS106	CPT14	—	MES3	HKY30R HKY40R
MTNNR/L	5032M22N	WPSTN43	CCP34	CCK14	SLCS106	CPT14	—	MES3	HKY30TL HKY40R

SP TYPE HOLDER

Old Type Tool Number		Clamp Screw	Wrench	Shim	Shim Pin
Type	Size				
SDJCR/L SDFCR/L SDXCR/L	0808D07	TS25	TKY08F	—	—
	1010E07	TS25	TKY08F	—	—
	1212F07	TS25	TKY08F	—	—
	1616H11	TS43	TKY15F	—	—
SVJCR/L SVVCN SVPCR/L	0808D11	TS25	TKY08F	—	—
	1010E11	TS25	TKY08F	—	—
	1212F16	TS43	TKY15F	—	—
	3225P16	TS44	TKY15R	SPSVN32	BCP141
SSBCR/L	1616H09	TS43	TKY15F	—	—
SRGCR/L SRXCR/L SRDCN	0808D06	TS25	TKY08F	—	—
	1010E06	TS25	TKY08F	—	—
	1212F06	TS25	TKY08F	—	—
	1010E08	TS3	TKY08F	—	—
	1212F08	TS3	TKY08F	—	—

REPLACEMENT PARTS FOR OLD TYPE TOOLS (TURNING HOLDERS)

MP TYPE HOLDER

Old Type Tool Number		Shim	Lock Pin	Lock Screw	Stop Ring	Wrench
Type	Size					
PVVNN PVPNR/L	**3225P16**	PV32◌	P11S	HSP05008C	E03	HKY25R

SR TYPE HOLDER

Old Type Tool Number		Clamp Screw	Wrench
Type	Size		
SRSGR/L	**2525M20**	TS5	TKY25F
SRSGN	**3225P20**	TS5	TKY25F

AL TYPE HOLDER

Old Type Tool Number		Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench
Type	Size					
PTGER/L PTFER/L	**2020K16**	LLSTE32	LLP13	LLCL131	LLCS106	HKY25R
	2525M16	LLSTE32	LLP13	LLCL131	LLCS106	HKY25R
SVVDN SVPDR/L	**1616H16**	—	—	—	FC400890T	TKY10F
	2020K16	—	—	—	FC400890T	TKY10F
	2525M16	—	—	—	FC400890T	TKY10F

MT2 TYPE HOLDER

Old Type Tool Number		Clamp Bridge	Clamp Screw	Spring	Wrench
Type	Size				
MT2R/L	**2525M4**	MTK1L/R	HBH06020	MES3	HKY40R

MG2 TYPE HOLDER

Old Type Tool Number		Clamp Bridge	Clamp Screw	Spring	Wrench
Type	Size				
MG2R/L	**2525M4315**	MTK1R/L	HBH06020	MES3	HKY40R
	2525M4323	MTK1R/L	HBH06020	MES3	HKY40R
	2525M4333	MTK1R/L	HBH06020	MES3	HKY40R

MG TYPE HOLDER

Old Type Tool Number		Clamp Bridge	Clamp Screw	Spring	Wrench
Type	Size				
MGHR/L	**2020K3333**	MTK1L/R	HBH06020	MES3	HKY40R
	2020K4447	MTK1L/R	HBH06020	MES3	HKY40R
	3232P5660	MTK2L/R	MGS6	MES3	HKY50R
	3232P5670	MTK2L/R	MGS6	MES3	HKY50R
	3232P5680	MTK2L/R	MGS6	MES3	HKY50R

EG TYPE HOLDER

Old Type Tool Number		Clamp Screw	Wrench
Type	Size		
EGHR	**2020K03**	EGS06019	HKY30R
	2525M3	EGS06019	HKY30R
	2525M4	EGS08024	HKY40R
	2525M5	EGS08024	HKY40R
	2525M7	EGS08024	HKY40R
	2525M8	EGS08024	HKY40R

ET TYPE HOLDER

Old Type Tool Number		Clamp Bridge	Clamp Screw	Shim Screw	Shim	Breaker Piece	Wrench
Type	Size						
ETHR	**2525M16**	CK341	LS2	CFM02008	PT32T1R PT32T2R	CBT3106 CBT3113 CBT3120	HKY40R

SET TYPE HOLDER

Old Type Tool Number		Clamp Bridge	Clamp Screw	Stop Ring	Shim Pin	Shim	Wrench
Type	Size						
SETHR	**1616H16**	SETK51	SETS51	CR4	HFC03008	CT32T1	TKY15F HKY20R
	2020K16	SETK51	SETS51	CR4	HFC03008	CT32T1	TKY15F HKY20R
	2525M16	SETK51	SETS51	CR4	HFC03008	CT32T1	TKY15F HKY20R

HSK-T TOOLS (DG)

Old Type Tool Number	Locator Screw	Clamp Screw	Spring	Wrench
H63TH-DGHR/LS	HSC05012	DGS51	MES2	HKY40R
H63TH-**DGHR/L**	HSC05012	DGS51	MES2	HKY40R
H63TH-**DGHN-H4**	HSC05010	DGS51	MES2	HKY40R
H63TH-**DGHN-H5**	HSC05012	DGS51	MES2	HKY40R
H63TH-**DGHN-H6**	HSC05012	DGS51	MES2	HKY40R
H63TH-**DGHN-L4**	HSC05010	DGS51	MES2	HKY40R
H63TH-**DGHN-L5**	HSC05012	DGS51	MES2	HKY40R
H63TH-**DGHN-L6**	HSC05012	DGS51	MES2	HKY40R

REPLACEMENT PARTS FOR OLD TYPE TOOLS (TURNING HOLDERS)

DG TYPE HOLDER

Old Type Tool Number	Clamp Bridge	Locator Screw	Wrench	Clamp Screw	Spring
DGHR/L 1616K2G	DGK2R/L	—	HKY40R	DGS51	MES2
DGHR/L **1616K3**	DGK3R/L	—	HKY40R	DGS51	MES2
DGHR/L **1616K3G**	DGK3R/L	—	HKY40R	DGS51	MES2
DGHR/L **1616KF3**	DGK3R/L	—	HKY40R	DGS51	MES2
DGHR/L **2020K**	—	HSC04014	HKY30R HKY40R	DGS51	MES2
DGHR/L **2020KFS**	—	HSC04014	HKY30R HKY40R	DGS51	MES2
DGHR/L **2020KL**	—	HSC04014	HKY30R HKY40R	DGS51	MES2
DGHR/L **2020KLS**	—	HSC04014	HKY30R HKY40R	DGS51	MES2
DGHR/L **2020KS**	—	HSC04014	HKY30R HKY40R	DGS51	MES2
DGHR/L **2525M**	—	HSC05012	HKY40R	DGS51	MES2
DGHR/L **2525MC**	—	HSC05012	HKY40R	DGS51	MES2
DGHR/L **2525MCS**	—	HSC05010	HKY40R	DGS51	MES2
DGHR/L **2525MF**	—	HSC05012	HKY40R	DGS51	MES2
DGHR/L **2525MFS**	—	HSC05012	HKY40R	DGS51	MES2
DGHR/L **2525ML**	—	HSC05012	HKY40R	DGS51	MES2
DGHR/L **2525MLS**	—	HSC05012	HKY40R	DGS51	MES2
DGHR/L **2525MS**	—	HSC05012	HKY40R	DGS51	MES2

REPLACEMENT PARTS FOR OLD TYPE TOOLS (BORING BARS)

COBRA (STEEL SHANK)

Old Type Tool Number	Clamp Screw	Wrench
S08HSTFPR09	TS253	TKY08F
S10KSTFPR09	TS25	TKY08F
S○○○STFPR11	TS3	TKY08F
S○○○STFPR16	TS4	TKY15F
S○○○SCLPR/L08	TS3	TKY08F
S○○○SCLPR/L09	TS4	TKY15F
S○○○SWLPR/L04	TS25	TKY08F
S○○○SWLPR/L06	TS4	TKY15F

COBRA (CARBIDE SHANK)

Old Type Tool Number	Clamp Screw	Wrench
E08KSTFPR09	TS253	TKY08F
E10MSTFPR09	TS25	TKY08F
E○○○STFPR11	TS3	TKY08F
E○○○SCLPR08	TS3	TKY08F
E○○○SCLPR09	TS4	TKY15F

S TYPE (STEEL SHANK)

Old Type Tool Number	Clamp Screw	Wrench
S○○○SSKCR/L12	TS5	TKY25F
S○○○SDQCR/L15	TS5	TKY25F
S○○○SCZCR/L06	TS25	TKY08F
S○○○SCZCR/L09	TS4	TKY15F
S○○○SCZCR/L12	TS5	TKY25F
S○○○SDZCR11	TS4	TKY15F

S TYPE (CARBIDE SHANK)

Old Type Tool Number	Clamp Screw	Wrench
C○○○SSKCR/L09	TS4	TKY15F
C○○○SDUCR/L15	TS5	TKY25F
C○○○SVUCR/L11	TS25	TKY08F
C○○○SVUCR/L16	TS4	TKY15F
C○○○SCLCR/L12	TS5	TKY25F
C○○○SCZCR/L06	TS25	TKY08F
C○○○SCZCR/L09	TS4	TKY15F
C○○○SCZCR/L12	TS5	TKY25F
C○○○SDZCR11	TS4	TKY15F

REPLACEMENT PARTS FOR OLD TYPE TOOLS (BORING BARS)

F TYPE

Old Type Tool Number		Shim	Shim Pin	Clamp Set	Breaker Piece	Wrench
Type	Size					
FCSK	116R/L	—	—	C3	CBS3	HKY25R
	120R/L	—	—	C3	CBS3	HKY25R
	125R/L	PS42	BCP252	C4	CBS4F	HKY30R
	132R/L	PS42	BCP251	C4	CBS4F	HKY30R
FCSK	216R/L	—	—	C3	CBS3	HKY25R
	220R/L	—	—	C3	CBS3	HKY25R
	225R/L	PS42	BCP252	C4	CBS4F	HKY30R
FCTU	232R/L	PT32	BCP201	C4	CBT3F	HKY30R

P TYPE

Old Type Tool Number	Shim	Shim Pin	Clamp Lever	Clamp Screw	Wrench	Plug
A50UPSKNR/L19	LLSSP63	LLP16	LLCL16	LLCS310	HKY40R	HGM-PT3/8
A40TPCLNR/L16	LLSCN53	LLP15	LLCL25	LLCS508	HKY30R	HGM-PT3/8
A50UPCLNR/L19	LLSCP63	LLP16	LLCL16	LLCS310	HKY40R	HGM-PT3/8

D TYPE (FOR BORING)

Old Type Tool Number		Shim	Shim Pin	Clamp Lever	Clamp Screw	Clamp Set	Breaker Piece	Stop Ring	Wrench
Type	Size								
DPSK	132R/L	LLSSN42	LLP14	LLCL14	LLCS108	—	—	—	HKY30R
	140R/L	LLSSN42	LLP14	LLCL14	LLCS108	—	—	—	HKY30R
	150R/L	LLSSN63	LLP16	LLCL16	LLCS110	—	—	—	HKY40R
	163R/L	LLSSN63	LLP16	LLCL16	LLCS110	—	—	—	HKY40R
DPTF	150R/L	LLSTN42	LLP14	LLCL14	LLCS108	—	—	—	HKY30R
	163R/L	LLSTN42	LLP14	LLCL14	LLCS108	—	—	—	HKY30R
DPDU DPDH DPDZ	132R/L	LLSDN42	LLP14	LLCL24	LLCS108	—	—	—	HKY30R
	140R/L	LLSDN42	LLP14	LLCL24	LLCS108	—	—	—	HKY30R
	* 150R/L	LLSDN53	LLP15	LLCL15	LLCS208	—	—	—	HKY30R
DPCL	150R/L	LLSCN63	LLP16	LLCL16	LLCS110	—	—	—	HKY40R
	163R/L	LLSCN63	LLP16	LLCL16	LLCS110	—	—	—	HKY40R
DPVP	150R/L	PV322	P11S	—	HSP05008C	—	—	E03	HKY25R
DCTU	132R/L	PT32	BCP201	—	—	C4	CBT3N	—	HKY30R
	140R/L	PT42	BCP251	—	—	C5	CBT4F	—	HKY40R
	150R/L	PT42	BCP251	—	—	C5	CBT4F	—	HKY40R

*DPDH150R/L can be compatible with 140R/L.

D TYPE (FOR GROOVING AND THREADING)

Old Type Tool Number		Lock Pin	Lock Screw	Stop Ring	Wrench
Type	Size				
DPT2	132R	P21S	HSP08014	E01	HKY40R
	140R	P21S	HSP08014	E01	HKY40R
DPT4	132R	P21S	HSP08014	E01	HKY40R
	140R	P21S	HSP08014	E01	HKY40R

F TYPE (FOR GROOVING AND THREADING)

Old Type Tool Number		Clamp Bridge	Clamp Set	Clamp Screw	Shim	Shim Pin	Stop Ring	Wrench
Type	Size							
FCL5	**116R/L**	LK1	–	HBH04012	–	–	–	HKY25R
	120R/L	LK1	–	HBH04012	–	–	–	HKY25R
	125R/L	LK1	–	HBH04012	–	–	–	HKY25R
	132R/L	LK1	–	HBH04012	–	–	–	HKY25R
	216R/L	LK1	–	HBH04012	–	–	–	HKY25R
	220R/L	LK1	–	HBH04012	–	–	–	HKY25R
	225R/L	LK1	–	HBH04012	–	–	–	HKY25R
NTF	**M16R**	–	C3	–	–	–	–	HKY25R
	Q20R	–	C4	–	–	–	–	HKY30R
	R25R	–	C4	–	–	–	–	HKY30R
	R216R	–	C3	–	–	–	–	HKY25R
	S220R	–	C4	–	–	–	–	HKY30R
	T225R	–	C4	–	–	–	–	HKY30R
SNTF	**K16R11**	–	–	TS25	–	–	–	TKY08F
	M16R	–	–	CS350860T	–	–	–	TKY15F
	P20R	SETK51	–	SETS51	CT32T1	HFC03008	CR4	TKY15F HKY20R
	R25R	SETK51	–	SETS51	CT32T1	HFC03008	CR4	TKY15F HKY20R
	M210R11	–	–	TS25	–	–	–	TKY08F
	Q212R11	–	–	TS25	–	–	–	TKY08F
	R216R	–	–	CS350860T	–	–	–	TKY15F
	S220R	SETK51	–	SETS51	CT32T1	HFC03008	CR4	TKY15F
	T225R	SETK51	–	SETS51	CT32T1	HFC03008	CR4	TKY15F
FCDG4	**120R/L3M**	–	BC5	–	–	–	–	TKY20R
	125R/L3M	–	BC5	–	–	–	–	TKY20R
	132R/L3M	–	BC5	–	–	–	–	TKY20R
	120R/L4M	–	BC5	–	–	–	–	TKY20R
	125R/L4M	–	BC5	–	–	–	–	TKY20R
	132R/L4M	–	BC5	–	–	–	–	TKY20R
	125R/L5M	–	BC5	–	–	–	–	TKY20R
	132R/L5M	–	BC5	–	–	–	–	TKY20R
FCDG4	**120R/L4J**	–	BC5	–	–	–	–	TKY20R
	125R/L4J	–	BC5	–	–	–	–	TKY20R
	132R/L4J	–	BC5	–	–	–	–	TKY20R
	125R/L5J	–	BC5	–	–	–	–	TKY20R
	132R/L5J	–	BC5	–	–	–	–	TKY20R

REPLACEMENT PARTS FOR OLD TYPE TOOLS (BORING UNITS)

UNIT

Old Type Tool Number	Washer Screw	Bush Screw	Wrench	Bush	Washer	Leaf Spring
NA1	HFC03008	HY-A1	HKY20R	The parts above are not sold separately as accuracy can only be guaranteed by having the complete set. Please contact us for questions about parts replacement.		
NV1	HFC03008	HY-V1	HKY20R			
NA2	HSC03010	HY2	HKY20R HKY25R			
NV2	HSC03010	HY2	HS-N2 HKY25R			
NA3	HSC04010	HY3	HKY20R HKY30R			
NV3	HSC04010	HY3	HKY20R HKY30R			
NA4	HSC05012	HY4	HKY30R HKY40R			
NV4	HSC05012	HY4	HKY30R HKY40R			

CARTRIDGE

Old Type Tool Number	Clamp Lever	Clamp Screw	Shim	Shim Pin	Spanner	Wrench
NASP11	—	CS250T	—	—	HR12	TKY08F
NVSP11	—	CS250T	—	—	HR12	TKY08F
NASP21	—	CS300890T	—	—	HR12	TKY08F
NVSP21	—	CS300890T	—	—	HR12	TKY08F
NAPN21	LLCL12S	LLCS103	—	—	HR12	HKY20F
NVPN21	LLCL12S	LLCS103	—	—	HR12	HKY20F
NASP31	—	CS300890T	—	—	HR34	TKY08F
NVSP31	—	CS300890T	—	—	HR34	TKY08F
NAPN31	LLCL12S	LLCS103	—	—	HR34	HKY20F
NVPN31	LLCL12S	LLCS103	—	—	HR34	HKY20F
NAPN41	LLCL13	LLCS106	LLSTN32	LLP13	HR34	HKY25F
NVPN41	LLCL13	LLCS106	LLSTN32	LLP13	HR34	HKY25F

REPLACEMENT PARTS FOR OLD TYPE TOOLS (FACE MILLS)

AF5000 TYPE

Old Type Tool Number	Wedge	Clamp Screw	Adjust Screw	Wrench	Wrench	Recommended Cutter
AF5000 Type	CWAF5R/L	LS10T	KS1S	TKY25T	HKY15R	**NF10000 Type** (➲L148)

BAP300 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Cutter
BAP300 Type	TS25	TKY08F	**APX3000 Type** (➲L046)

BAP400 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Cutter
BAP400-040A04R	TS43	TKY15F	**APX4000 Type** (➲L052)
BAP400-050A05R	TS43	TKY15F	
BAP400-063A06R	TS43	TKY15F	
BAP400R0307C	TS43	TKY15F	
BAP400R0408D	TS43	TKY15F	
BAP400R0509E	TS43	TKY15D	
BAP400R0610E	TS43	TKY15D	

BF407 TYPE

Old Type Tool Number	Wedge	Clamp Screw	Setting Screw	Wrench	Recommended Cutter
BF407R0812K	CWSF407TR2	LS15T	CAS51T	TKY25T	—
BF407R1016K	CWSF407TR2	LS15T	CAS51T	TKY25T	
BF407R1218P	CWSF407TR2	LS15T	CAS51T	TKY25T	

BN425 TYPE

Old Type Tool Number	Wedge	Clamp Screw	Wrench	Recommended Cutter
BN425 Type	CWS43SNN	LS14T	TKY25T	—

BOE TYPE

Old Type Tool Number	Set Bolt	Set Bolt	Clamp Screw	Wrench (Insert)	Wrench (Set Bolt)	Recommended Cutter
BOER0202B	LS21	—	CS501290T	TKY25T	HKY50R	**OCTACUT Type** (➲L094)
BOE-050A02R	LS20	—	CS501290T	TKY25T	HKY50R	
BOER2H03B	—	BOES101	CS501290T	TKY25T	HKY80R	
BOE-063A03R	—	BOES101	CS501290T	TKY25T	HKY80R	
BOER0304C	—	—	CS501290T	TKY25T	—	
BOER0405D	—	HSC16035	CS501290T	TKY25T	—	

REPLACEMENT PARTS FOR OLD TYPE TOOLS (FACE MILLS)

BSX400 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Cutter
BSX400R05004A	TS43	TKY15F	**ASX400 Type** (➲L040)
BSX400R06305A	TS43	TKY15F	
BSX400R08006C	TS43	TKY15F	
BSX400R10008D	TS43	TKY15F	
BSX400R12510E	TS43	TKY15D	
BSX400R16012E	TS43	TKY15D	

BSX500 TYPE

Old Type Tool Number	Clamp Screw	Shim Screw	Shim	Wrench	Recommended Cutter
BSX500 Type	CSF401260T	WCS604010H	STBS500N	TKY20D	**ASX400 Type** (➲L040)

BXD7000 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Cutter
BXD7000 Type	TS5SL	TKY25D	**AXD7000 Type** (➲L066)

BZC400 TYPE

Old Type Tool Number	Clamp Screw	Set Bolt	Wrench (Wedge)	Wrench (Set Bolt)	Recommended Cutter
BZC400-032A03R	CS350990T	LS24	TKY10F	HKY40R	**APX4000 Type** (➲L052)
BZC400-040A04R	CS350990T	—	TKY10F	—	
BZC400R0408D	CS350990T	—	TKY10F	—	

E404 TYPE

Old Type Tool Number	Locator	Locator Screw	Shim	Shim Screw	Wedge	Clamp Screw (Wedge)	Wrench	Wrench	Recommended Cutter
E404 Type	SSE41R	SPS1	SCD43	STS1	CWS3R/L	WS1	TKY10R	TKY25T	—

FN548 TYPE

Old Type Tool Number	Wedge	Clamp Screw	Wrench	Wrench	Hexagonal Head	Recommended Cutter
FN548 Type	CWS4	LS14	HKY40T	120QSPK x 80 (KANNON-SEIKI CO.)	6.35□ x 4 (KYOKUTO MFG CO.)	—

LSE445 TYPE

Old Type Tool Number	Shim	Shim Screw	Wedge	Clamp Screw	Wrench (Wedge)	Wrench	Recommended Cutter
LSE445 Type	STBE445NF	CS300890T	CWSE445TR	LS15T	TKY25T	TKY08F	**ASX445 Type** (➲L018)

MG300, 400 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Cutter
MG300 Type	CS350990T	TKY10F	—
MG400 Type	CS451190T	TKY20F	**ASX400 Type** (➲L040)

MG345, 445 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Cutter
MG345 Type	CS350990T	TKY10F	**ASX445 Type** (➲L018)
MG445 Type	CS451190T	TKY20F	

MGP445 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Cutter
MGP445 Type	CS401160T	TKY15D	**ASX445 Type** (➲L018)

MSD445 TYPE

Old Type Tool Number	Wedge	Clamp Screw	Wrench	Recommended Cutter
MSD445 Type	CWMSE445R2	LS15T	TKY25T	**ASX445 Type** (➲L018)

MSE445 TYPE

Old Type Tool Number	Wedge	Clamp Screw	Wrench	Recommended Cutter
MSE445 Type	CWMSE445R2	LS15T	TKY25T	**ASX445 Type** (➲L018)

NR10000 TYPE

Old Type Tool Number	Wedge	Clamp Screw	Adjusting Wedge	Adjusting Screw	Clamp Screw	Wrench	Recommended Cutter
NR10000 Type	CWAF10R2	LS10T	CWAF10N	LS15T	CSAF10	TKY25T	—

P425, P525 TYPE

Old Type Tool Number	Locator	Locator Screw	Shim	Shim Screw	Wedge	Clamp Screw (Wedge)	Wrench	Wrench	Recommended Cutter
P425 Type	SSP41R	SPS1	SCP431R/L	STS1	CWS1R/L	WS1	TKY10R	TKY25T	**ASX445 Type** (➲L018)
P525 Type	SSP51R	SPS1	SCP521R/L	STS1	CWS1R/L	WS1	TKY10R	TKY25T	**SE515 Type** (➲L034)

QBF407 TYPE

Old Type Tool Number	Wedge	Clamp Screw	Setting Screw	Guide Plate	Stop Screw	Wrench	Recommended Cutter
QBF407R0304Q	CWSF407TR1	LS15T	CAS51T	QPAR1	TFC04010	TKY20R TKY25T	—
QBF407R0406Q	CWSF407TR1	LS15T	CAS51T	QPAR1	TFC04010	TKY20R TKY25T	
QBF407R0508Q	CWSF407TR2	LS15T	CAS51T	QPAR1	TFC04010	TKY20R TKY25T	

REPLACEMENT PARTS FOR OLD TYPE TOOLS (FACE MILLS)

QBP415 TYPE

Old Type Tool Number	Shim	Shim Pin	Wedge-T	Clamp Screw	Wrench	Recommended Cutter
QBP415 Type	STSP415R	TS32	QWGR1	LS10T	TKY25T	—

QF10000 TYPE

Old Type Tool Number	Wedge	Clamp Screw	Guide Plate	Stop Screw	Adjusting Wedge	Adjusting Screw	Stop Screw	Wrench	Recommended Cutter
QF10000 Type	CWAF10R3	LS15T	QPCR1	TFC04010	CWAF10N	LS10T	CSAF10	TKY20T TKY25T	—

QSE415 TYPE

Old Type Tool Number	Wedge	Clamp Screw	Setting Screw	Guide Plate	Stop Screw	Wrench	Recommended Cutter
QSE415 Type	CWSF407TR3	LS15T	CAS51T	QPAR1	TFC04010	TKY20R TKY25T	—

SE300 TYPE

Old Type Tool Number	Locator	Locator (Wiper)	Wedge-T	Wedge-S	Wedge-S (Wiper)	Clamp Screw	Wrench	Recommended Cutter
SE300 Type	SPSE300R	SPSEW300R	CWNSE300TR	CWSE300SN	CWSEW300SN	LS10T	TKY25T	—

SE400 TYPE

Old Type Tool Number	Locator	Locator (Wiper)	Wedge-T	Wedge-S	Clamp Screw	Wrench	Recommended Cutter
SE400 Type	SPSE400R	SPSEW400R	CWSE400TN	CWSE400SN	LS15T (SE400R0304C:LS10T)	TKY25T	—

SHP400 TYPE

Old Type Tool Number	Locator	Wedge-T	Clamp Screw	Locator Screw	Wrench (Wedge)	Wrench (Locator)	Recommended Cutter
SHP400 Type	SPSHP400R/L	CWSE300TR/L	LS10T	TS32	TKY25T	TKY08F	**ASX400 Type** (➲L040)

VIP400 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Cutter
VIP400 Type	CS501160T	TKY20F	**ASX400 Type** (➲L040)

VIP445 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Cutter
VIP445 Type	CS501160T	TKY20F	**ASX445 Type** (➲L018)

VSD645 TYPE

Old Type Tool Number	Locator	Locator Screw	Clamp Screw	Adjust Screw	Wrench (Insert)	Wrench	Recommended Cutter
VSD645 Type	NE04R30	SE03-65	SE02-81	SA04-47	TKY15D	HKY30R	**ASX445 Type** (➲L018)

REPLACEMENT PARTS FOR OLD TYPE TOOLS (END MILLS)

BAE TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
BAE500R161S16	TS42	TKY15F	**APX4000 Type** (L052)
BAE500R201S20	TS42	TKY15F	
BAE500R252S25	TS42	TKY15F	
BAE500R323S32	TS4	TKY15F	
BAE500R403S32	TS4	TKY15F	
BAE500R504S32	TS4	TKY15F	
BAE600 Type	TS52	TKY25F	

BAP400 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
BAP400R252S25	TS4	TKY15F	**APX4000 Type** (L052)
BAP400R323S32	TS43	TKY15F	
BAP400R404S32	TS43	TKY15F	
BAP400R505S32	TS43	TKY15F	
BAP400R636S32	TS43	TKY15F	

BAEP400 (Long Cutting Edge Type) TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
BAP400R4008ES42	TS43	TKY15F	**APX4000 Type** (L052)
BAP400R5012ES58	TS43	TKY15F	
BAP400R06308C	TS43	TKY15F	
BAP400R08012D	TS43	TKY15F	
BAP400R06312A27	TS43	TKY15F	
BAP400R08018A27	TS43	TKY15F	

BOE TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
BOE Type	CS501290T	TKY25T	**OCTACUT Type** (L094)

BRE TYPE

Old Type Tool Number	Clamp Screw	Clamp Bridge	Clamp Screw (Bridge)	Spring	Wrench	Recommended End Mill
BRE Type	TS5S	AMS5	BRS105	ASS3	TKY25R	**BRP Type** (L102)

BSX300 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
BSX300 Type	TS32	TKY08F	**APX3000 Type** (L046)

BSX400 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
BSX400 Type	TS43	TKY15F	**ASX400 Type** (L040)

BSX500 TYPE

Old Type Tool Number	Clamp Screw	Shim Screw	Shim	Wrench	Recommended End Mill
BSX500 Type	CSF401260T	WCS604010H	STBS500N	TKY20D	**ASX400 Type** (L040)

REPLACEMENT PARTS FOR OLD TYPE TOOLS (END MILLS)

BXD7000 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
BXD7000R251SA25SA/B	TS5S	TKY25D	**AXD7000 Type** (➲L066)
BXD7000R321SA32SA/B	TS5S	TKY25D	
BXD7000R402SA42SA/B	TS5SL	TKY25D	

BZC400 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
BZC400 Type	CS350990T	TKY10F	**APX4000 Type** (➲L052)

CV TYPE

Old Type Tool Number	Clamp Screw	Clamp Bridge	Clamp Screw (Bridge)	Spring	Wrench	Recommended End Mill
CV10R253S32	TS4	AMS3	BRS103	ASS2	TKY15R	**BRP Type** (➲L102)
CV12R323S32	TS4	AMS3	BRS103	ASS2	TKY15R	
CV16R403S32	TS5	AMS5	BRS105	ASS3	TKY25R	

CV20 TYPE

Old Type Tool Number	Clamp Screw	Wedge	Wrench	Recommended End Mill
CV20R403S32	LS14T	CWCV20	TKY25T	—

DCSD, DCSN TYPE

Old Type Tool Number	Holder			Cartridge					Wrench	Recommended End Mill
	Shim	Shim Screw	Clamp Screw	Body	Shim	Shim Screw	Clamp Screw	Wrench		
DCSDR2063SN	—	—	TS5S	JKDS4	—	—	DKS5	HKY40R	TKY25T	**SPX Type** (➲L108)
DCSDR2063LN	—	—	TS5S	JKDS4	—	—	DKS5	HKY40R	TKY25T	
DCSDR2080SN	—	—	TS5S	JKDS4	—	—	DKS5	HKY40R	TKY25T	
DCSDR2100SN	—	—	TS5S	JKDS4	—	—	DKS5	HKY40R	TKY25T	
DCSNR2063SN	JENS42	JSS7	TS5L	JKNS4	JENS42	JSS7	DKS5	HKY40R	TKY25T	
DCSNR2063LN	JENS42	JSS7	TS5L	JKNS4	JENS42	JSS7	DKS5	HKY40R	TKY25T	
DCSDR2063SB	—	—	TS5S	JKDS4	—	—	DKS5	HKY40R	TKY25T	
DCSDR2063LN	—	—	TS5S	JKDS4	—	—	DKS5	HKY40R	TKY25T	
DCSNR2063SB	JENS42	JSS7	TS5L	JKNS4	JENS42	JSS7	DKS5	HKY40R	TKY25T	
DCSDR2080SA	—	—	TS5S	JKDS4	—	—	DKS5	HKY40R	TKY25T	
DCSNR2080SA	JENS42	JSS7	TS5L	JKNS4	JENS42	JSS7	DKS5	HKY40R	TKY25T	

ECMP TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
ECMP252S25	TS4	TKY15R	—
ECMP322S32	TS5	TKY25R	
ECMP402S42	TS5	TKY25R	

FF3000 TYPE

Old Type Tool Number	Shim	Lock Pin	Wrench	Recommended End Mill
FF3000 Type	FFSS	FFP	HKY25L	—

FSTE TYPE

Old Type Tool Number	Locator	Wedge	Clamp Screw	Locator Screw	Wrench	Recommended End Mill
FSTE Type	TS441R	CWFSTE	LS10T	CPM03008	TKY25T	**ASX400 Type** (➲L040)

MG200, 300 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
MG200 Type	CS300890T	TKY08F	—
MG300 Type	CS350990T	TKY10F	**ASX400 Type** (➲L040)

MG245, 345 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
MG245 Type	CS300890T	TKY08F	**ASX445 Type** (➲L018)
MG345 Type	CS350990T	TKY10F	

MSE445 TYPE

Old Type Tool Number	Wedge	Clamp Screw	Wrench	Recommended End Mill
MSE445 Type	CWMSE445R1	LS15T	TKY25T	**ASX445 Type** (➲L018)

SRE TYPE

Old Type Tool Number	Clamp Screw	Clamp Bridge	Stop Ring	Wrench	Recommended End Mill
SRER100SS16	TS253	—	—	TKY08F	
SRER120SS16	TS3	—	—	TKY08F	
SRER140SS16	TS3	—	—	TKY08F	
SRER160SS16	TS35	—	—	TKY10F	
SRER180SS20	TS35	—	—	TKY10F	
SRER200SS20	SRS5	SRK1R	CR4	TKY20F	**AQX Type** (➲L076)
SRER200SL20	SRS5	SRK1R	CR4	TKY20F	
SRER250SS25	SRS5	SRK1R	CR4	TKY20F	
SRER250SL25	SRS5	SRK1R	CR4	TKY20F	
SRER300SS32	SRS5	SRK1R	CR4	TKY20F	
SRER300SL32	SRS5	SRK1R	CR4	TKY20F	

SE300 TYPE

Old Type Tool Number	Locator	Wedge-T	Wedge-S	Clamp Screw	Wrench	Recommended End Mill
SE300 Type	SPSE300R	CWNSE300TR	CWSE300SN	LS10T	TKY25T	—

SHP400 TYPE

Old Type Tool Number	Locator	Wedge-T	Clamp Screw	Locator Screw	Wrench (Insert)	Wrench (Locator)	Recommended End Mill
SHP400 Type	SPSHP400R	CWSE300TR	LS10T	TS32	TKY25T	TKY08F	**ASX400 Type** (➲L040)

VIPER TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
VIPER Type	CS400990T	TKY15D	**SPX Type** (➲L108)

ZR TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
ZR202C/T	TS25	TKY08F	
ZR252C/T	CS300890T	TKY08F	
ZR322C/T	CS300990T	TKY10F	—
ZR402C/T	CS451190T	TKY20F	
ZR502C/T	CS451190T	TKY20F	

REPLACEMENT PARTS FOR OLD TYPE TOOLS (END MILLS)

FBE2 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
FBE2200SM	CS300590T	TKY08R	**SRF Type** (➔L120)
FBE2250SM	CS350790T	TKY10R	
FBE2300SM	CS400990T	TKY15R	
FBE2200SF	CS300590T	TKY08R	
FBE2250SF	CS350790T	TKY10R	
FBE2300SF	CS400990T	TKY15R	

TBE1/TBE2 TYPE

Old Type Tool Number	Clamp Screw		Wrench				Recommended End Mill
	R	Peripheral	R		Peripheral		
TBE1100SS	TS3	—	TKY08F	—	—	—	**SRM2 Type** (➔L128)
TBE1100SM	TS3	—	TKY08F	—	—	—	
TBE1100S	TS3	—	TKY08F	—	—	—	
TBE1150S	CS300790TS	—	—	TKY10R	—	—	
TBE1200S	CS400990T	—	—	TKY15R	—	—	
TBE1250S	CS400990T	—	—	TKY15R	—	—	
TBE1300S	CS501290T	—	—	TKY25R	—	—	
TBE2200S	CS350790T	—	—	TKY10R	—	—	
TBE2200SM	CS350790T	—	—	TKY10R	—	—	
TBE2250S	CS400990T	—	—	TKY15R	—	—	
TBE2250SM	CS400990T	—	—	TKY15R	—	—	
TBE2300S	CS501290T	—	—	TKY25R	—	—	
TBE2300SM	CS501290T	—	—	TKY25R	—	—	
TBE1150SU	CS300790TS	—	—	TKY10R	—	—	
TBE1200SU	CS400990T	—	—	TKY15R	—	—	
TBE1250SU	CS400990T	—	—	TKY15R	—	—	
TBE1300SU	CS501290T	—	—	TKY25R	—	—	
TBE2200SU	CS350790T	—	—	TKY10R	—	—	
TBE2250SU	CS400990T	—	—	TKY15R	—	—	
TBE2300SU	CS501290T	—	—	TKY25R	—	—	
TBE1200SL	CS400990T	TS3	—	TKY15R	TKY08F	—	
TBE1250SL	CS400990T	TS3	—	TKY15R	TKY08F	—	
TBE1300SL	CS501290T	TS4	—	TKY25R	—	TKY15R	
TBE2200SL	CS350790T	CS350790T	—	TKY10R	—	TKY10R	
TBE2250SL	CS400990T	CS400990T	—	TKY15R	—	TKY15R	
TBE2300SL	CS501290T	CS400990T	—	TKY25R	—	TKY15R	

TBE2 TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended End Mill
TBE2150S/SM/SU	TS254	TKY08F	**SRM2 Type** (➔L128)
TBE2160S/SM/SU	TS254	TKY08F	

TRM2 TYPE

Old Type Tool Number	Clamp Screw		Wrench		Recommended End Mill
	Inner, Outer	Peripheral	Inner, Outer	Peripheral	
TRM2200SM	CS300790TS	—	TKY10R	—	**SRM2 Type** (➔L128)
TRM2250SM	CS400990T	—	TKY15R	—	
TRM2300SM	CS501290T	—	TKY25R	—	
TRM2200SL	CS300790TS	TS3	TKY10R	TKY08F	
TRM2250SL	CS400990T	TS3	TKY15R	TKY08F	
TRM2300SL	CS501290T	TS4	TKY25R	TKY15R	
TRM2200SF	CS300790TS	TS3	TKY10R	TKY08F	
TRM2250SF	CS400990T	TS3	TKY15R	TKY08F	
TRM2300SF	CS501290T	TS4	TKY25R	TKY15R	

REPLACEMENT PARTS FOR OLD TYPE TOOLS (DRILLS)

TASS TYPE (STANDARD)

Old Type Tool Number	Clamp Screw	Wrench	Recommended Drill
TASS1600S32	TS202	TKY06F	**TAF Drill** (➔N240)
TASS1700S32	TS202	TKY06F	
TASS1800S32	TS202	TKY06F	
TASS1900S32	TS202	TKY06F	
TASS2000S32	TS25	TKY08F	
TASS2100S32	TS25	TKY08F	
TASS2200S32	TS25	TKY08F	
TASS2300S32	TS25	TKY08F	
TASS2400S32	TS25	TKY08F	
TASS2500S32	TS32	TKY08F	
TASS2600S32	TS32	TKY08F	
TASS2700S32	TS32	TKY08F	
TASS2800S32	TS32	TKY08F	
TASS2900S32	TS32	TKY08F	
TASS3000S32	TS43	TKY15F	
TASS3100S32	TS43	TKY15F	
TASS3200S32	TS43	TKY15F	
TASS3300S40	TS43	TKY15F	
TASS3400S40	TS43	TKY15F	
TASS3500S40	TS43	TKY15F	
TASS3600S40	TS43	TKY15F	

TASS TYPE (FLANGE)

Old Type Tool Number	Clamp Screw	Wrench	Recommended Drill
TASS1600C20	TS202	TKY06F	**TAF Drill** (➔N240)
TASS1650C20	TS202	TKY06F	
TASS1700C20	TS202	TKY06F	
TASS1750C20	TS202	TKY06F	
TASS1800C20	TS202	TKY06F	
TASS1850C20	TS202	TKY06F	
TASS1900C20	TS202	TKY06F	
TASS1950C20	TS202	TKY06F	
TASS2000C20	TS25	TKY08F	
TASS2100C25	TS25	TKY08F	
TASS2200C25	TS25	TKY08F	
TASS2300C25	TS25	TKY08F	
TASS2400C25	TS25	TKY08F	
TASS2500C25	TS32	TKY08F	
TASS2600C25	TS32	TKY08F	
TASS2700C25	TS32	TKY08F	
TASS2800C25	TS32	TKY08F	
TASS2900C25	TS32	TKY08F	
TASS3000C25	TS43	TKY15F	
TASS3100C32	TS43	TKY15F	
TASS3200C32	TS43	TKY15F	
TASS3300C32	TS43	TKY15F	
TASS3400C32	TS43	TKY15F	
TASS3500C32	TS43	TKY15F	
TASS3600C32	TS43	TKY15F	
TASS3700C32	TS43	TKY15F	
TASS3800C32	TS43	TKY15F	
TASS3900C32	TS43	TKY15F	
TASS4000C32	TS5	TKY25F	
TASS4100C32	TS5	TKY25F	
TASS4200C40	TS5	TKY25F	
TASS4300C40	TS5	TKY25F	
TASS4400C40	TS5	TKY25F	
TASS4500C40	TS5	TKY25F	
TASS4600C40	TS5	TKY25F	
TASS4700C40	TS5	TKY25F	
TASS4800C40	TS5	TKY25F	
TASS4900C40	TS5	TKY25F	
TASS5000C40	TS32	TKY08F	

REPLACEMENT PARTS FOR OLD TYPE TOOLS (DRILLS)

TAGS TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Drill
TAGS1600F25	TS2	TKY06F	
TAGS1700F25	TS2	TKY06F	
TAGS1800F25	TS2	TKY06F	
TAGS1900F25	TS2	TKY06F	
TAGS2000F25	TS25	TKY08F	
TAGS2100F25	TS25	TKY08F	
TAGS2200F25	TS25	TKY08F	
TAGS2300F25	TS25	TKY08F	
TAGS2400F25	TS25	TKY08F	
TAGS2500F32	TS3	TKY08F	
TAGS2600F32	TS3	TKY08F	
TAGS2700F32	TS3	TKY08F	
TAGS2800F32	TS3	TKY08F	
TAGS2900F32	TS3	TKY08F	
TAGS3000F40	TS4	TKY15F	
TAGS3100F40	TS4	TKY15F	
TAGS3200F40	TS4	TKY15F	
TAGS3300F40	TS4	TKY15F	
TAGS3400F40	TS4	TKY15F	
TAGS3500F40	TS4	TKY15F	
TAGS3600F40	TS4	TKY15F	
TAGS3700F40	TS4	TKY15F	**TAF Drill** (➔N240)
TAGS3800F40	TS4	TKY15F	
TAGS3900F40	TS4	TKY15F	
TAGS4000F40	TS5	TKY25F	
TAGS4100F40	TS5	TKY25F	
TAGS4200F40	TS5	TKY25F	
TAGS4300F40	TS5	TKY25F	
TAGS4400F40	TS5	TKY25F	
TAGS4500F40	TS5	TKY25F	
TAGS4600F40	TS5	TKY25F	
TAGS4700F40	TS5	TKY25F	
TAGS4800F40	TS5	TKY25F	
TAGS4900F40	TS5	TKY25F	
TAGS5000F40	TS3	TKY08F	
TAGS5100F40	TS3	TKY08F	
TAGS5200F40	TS3	TKY08F	
TAGS5300F40	TS3	TKY08F	
TAGS5400F40	TS3	TKY08F	
TAGS5500F40	TS4	TKY15F	
TAGS5600F40	TS4	TKY15F	
TAGS5700F40	TS4	TKY15F	
TAGS5800F40	TS4	TKY15F	
TAGS5900F40	TS4	TKY15F	

TAGM TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Drill
TAGM1600F25	TS2	TKY06F	
TAGM1700F25	TS2	TKY06F	
TAGM1800F25	TS2	TKY06F	
TAGM1900F25	TS2	TKY06F	
TAGM2000F25	TS25	TKY08F	
TAGM2100F25	TS25	TKY08F	
TAGM2200F25	TS25	TKY08F	
TAGM2300F25	TS25	TKY08F	
TAGM2400F25	TS25	TKY08F	
TAGM2500F32	TS3	TKY08F	
TAGM2600F32	TS3	TKY08F	
TAGM2700F32	TS3	TKY08F	
TAGM2800F32	TS3	TKY08F	
TAGM2900F32	TS3	TKY08F	
TAGM3000F40	TS4	TKY15F	
TAGM3100F40	TS4	TKY15F	
TAGM3200F40	TS4	TKY15F	
TAGM3300F40	TS4	TKY15F	
TAGM3400F40	TS4	TKY15F	
TAGM3500F40	TS4	TKY15F	
TAGM3600F40	TS4	TKY15F	
TAGM3700F40	TS4	TKY15F	**TAF Drill** (➔N240)
TAGM3800F40	TS4	TKY15F	
TAGM3900F40	TS4	TKY15F	
TAGM4000F40	TS5	TKY25F	
TAGM4100F40	TS5	TKY25F	
TAGM4200F40	TS5	TKY25F	
TAGM4300F40	TS5	TKY25F	
TAGM4400F40	TS5	TKY25F	
TAGM4500F40	TS5	TKY25F	
TAGM4600F40	TS5	TKY25F	
TAGM4700F40	TS5	TKY25F	
TAGM4800F40	TS5	TKY25F	
TAGM4900F40	TS5	TKY25F	
TAGM5000F40	TS3	TKY08F	
TAGM5100F40	TS3	TKY08F	
TAGM5200F40	TS3	TKY08F	
TAGM5300F40	TS3	TKY08F	
TAGM5400F40	TS3	TKY08F	
TAGM5500F40	TS4	TKY15F	
TAGM5600F40	TS4	TKY15F	
TAGM5700F40	TS4	TKY15F	
TAGM5800F40	TS4	TKY15F	
TAGM5900F40	TS4	TKY15F	

TAB TYPE

Old Type Tool Number	Clamp Screw	Plug	Wrench	Recommended Drill
TAB1700S32	TS3	PT1/4	TKY08D	
TAB1800S32	TS3	PT1/4	TKY08D	
TAB1900S32	TS3	PT1/4	TKY08D	
TAB2000S32	TS32	PT1/4	TKY08D	
TAB2100S32	TS32	PT1/4	TKY08D	
TAB2200S32	TS32	PT1/4	TKY08D	
TAB2300S32	TS32	PT1/4	TKY08D	
TAB2400S32	TS32	PT1/4	TKY08D	
TAB2500S32	TS32	PT1/4	TKY08D	
TAB2600S32	TS4	PT1/4	TKY15D	
TAB2700S32	TS4	PT1/4	TKY15D	
TAB2800S32	TS4	PT1/4	TKY15D	
TAB2900S32	TS4	PT1/4	TKY15D	
TAB3000S32	TS4	PT1/4	TKY15D	
TAB3100S32	TS4	PT1/4	TKY15D	**TAF Drill** (➔N240)
TAB3200S32	TS4	PT1/4	TKY15D	
TAB3300S40	TS5	PT1/4	TKY25D	
TAB3400S40	TS5	PT1/4	TKY25D	
TAB3500S40	TS5	PT1/4	TKY25D	
TAB3600S40	TS5	PT1/4	TKY25D	
TAB3700S40	TS5	PT1/4	TKY25D	
TAB3800S40	TS5	PT1/4	TKY25D	
TAB3900S40	TS5	PT1/4	TKY25D	
TAB4000S40	TS5	PT1/4	TKY25D	
TAB4100S40	TS5	PT1/4	TKY25D	
TAB4200S40	TS5	PT1/4	TKY25D	
TAB4300S40	TS5	PT1/4	TKY25D	
TAB4400S40	TS5	PT1/4	TKY25D	
TAB4500S40	TS5	PT1/4	TKY25D	

NPX TYPE

Old Type Tool Number	Clamp Screw	Wrench	Recommended Drill
NPXM2000S25	TS3	TKY08F	
NPXM2100S25	TS3	TKY08F	
NPXM2200S25	TS3	TKY08F	
NPXM2300S25	TS35	TKY10F	
NPXM2400S32	TS35	TKY10F	
NPXM2500S32	TS35	TKY10F	**TAW Drill** (➔N229)
NPXM2600S32	TS35	TKY10F	
NPXM2700S32	TS4	TKY15F	
NPXM2800S32	TS4	TKY15F	
NPXM2900S32	TS4	TKY15F	
NPXM3000S32	TS4	TKY15F	

ANTI SEIZE LUBRICANT

ANTI SEIZE LUBRICANT

Shape	Order Number	Stock	Volume (g)
	**MK1K**	●	20
	**MK1KS**	●	3

● : Inventory maintained in Japan.

TECHNICAL DATA

TROUBLE SHOOTING FOR TURNING ····· Q002
CHIP CONTROL FOR TURNING ····· Q004
EFFECTS OF CUTTING CONDITIONS FOR TURNING ····· Q005
FUNCTION OF TOOL FEATURES FOR TURNING ····· Q007
FORMULAE FOR CUTTING POWER ····· Q011
TROUBLE SHOOTING FOR FACE MILLING ····· Q012
FUNCTION OF TOOL FEATURES FOR FACE MILLING ····· Q013
FORMULAE FOR FACE MILLING ····· Q016
TROUBLE SHOOTING FOR END MILLING ····· Q018
END MILL TERMINOLOGY ····· Q019
TYPES AND SHAPES OF END MILLS ····· Q020
PITCH SELECTION OF PICK FEED ····· Q021
TROUBLE SHOOTING FOR DRILLING ····· Q022
DRILL WEAR AND CUTTING EDGE DAMAGE ····· Q023
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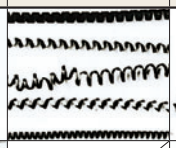
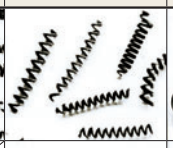
TROUBLE SHOOTING FOR TURNING

Trouble	Factors	Solution: Insert Grade Selection: Select a harder grade	Select a tougher grade	Select a grade with better thermal shock resistance	Select a grade with better adhesion resistance	Cutting Conditions: Cutting speed (Up ↗ / Down ↘)	Feed (Up ↗ / Down ↘)	Depth of cut (Up ↗ / Down ↘)	Coolant: Do not use water-soluble cutting fluid	Coolant: Determine dry or wet cutting	Style and Design of the Tool: Select chip breaker	Rake (Up ↗ / Down ↘)	Corner radius (Up ↗ / Down ↘)	Lead angle (Up ↗ / Down ↘)	Honing strengthens the cutting edge (Up ↗ / Down ↘)	Class of insert	Improve tool holder rigidity	Machine, Installation of Tool: Increase clamping rigidity of the tool and workpiece	Decrease holder overhang	Decrease power and machine backlash
Deterioration of Tool Life	Insert wear quickly generated																			
	Improper tool grade	●																		
	Improper cutting edge geometry										●	↗ ●	↗ ●	↗ ●	● ↘					
	Improper cutting speed					● ↘	↗ ●			● Wet										
	Chipping or fracturing of cutting edge																			
	Improper tool grade		●																	
	Improper cutting conditions						● ↘	● ↘												
	Lack of cutting edge strength.										●		↗ ●		↗ ●					
	Thermal crack occurs			●		● ↘	● ↘	● ↘	●	● Dry										
	Build-up edge occurs				●	↗ ●	↗ ●		●	● Wet										
	Lack of rigidity																●	●	●	●
Out of Tolerance	Dimensions are not constant																			
	Poor insert accuracy															●				
	Large cutting resistance and cutting edge flank										●	●	● ↘	● ↘	● ↘		●	●	●	●
	Necessary to adjust often because of over-size																			
	Improper tool grade	●																		
	Improper cutting conditions					● ↘	↗ ●													
Deterioration of Surface Finish	Poor finished surface																			
	Welding occurs					↗ ●			●	● Wet										
	Improper cutting edge geometry										●		↗ ●							
	Chattering					● ↘	● ↘	● ↘									●	●	●	●
Generation of Heat	Workpiece over heating can cause poor accuracy and short life of insert																			
	Improper cutting conditions					● ↘	● ↘	● ↘												
	Improper cutting edge geometry										●	↗ ●			● ↘					

Trouble		Solution / Factors	Insert Grade Selection: Select a harder grade	Insert Grade Selection: Select a tougher grade	Insert Grade Selection: Select a grade with better thermal shock resistance	Insert Grade Selection: Select a grade with better adhesion resistance	Cutting Conditions: Cutting speed (Up ↗ / Down ↘)	Cutting Conditions: Feed (Up ↗ / Down ↘)	Cutting Conditions: Depth of cut (Up ↗ / Down ↘)	Cutting Conditions: Coolant: Do not use water-soluble cutting fluid	Cutting Conditions: Coolant: Determine dry or wet cutting	Style and Design of the Tool: Select chip breaker	Style and Design of the Tool: Rake (Up ↗ / Down ↘)	Style and Design of the Tool: Corner radius (Up ↗ / Down ↘)	Style and Design of the Tool: Lead angle (Up ↗ / Down ↘)	Style and Design of the Tool: Honing strengthens the cutting edge (Up ↗ / Down ↘)	Style and Design of the Tool: Class of insert	Style and Design of the Tool: Improve tool holder rigidity	Machine, Installation of Tool: Increase clamping rigidity of the tool and workpiece	Machine, Installation of Tool: Decrease holder overhang	Machine, Installation of Tool: Decrease power and machine backlash
Burrs, Chipping etc.	Burrs (steel, aluminium)	Notch wear	●																		
		Improper cutting conditions					● ↘	↗ ●			● Wet										
		Improper cutting edge geometry										●	↗ ●	● ↘	● ↘	● ↘					
	Workpiece chipping (cast iron)	Improper cutting conditions						● ↘	● ↘												
		Improper cutting edge geometry										●	↗ ●	↗ ●	↗ ●	● ↘					
		Vibration occurs																●	●	●	●
	Burrs (mild steel)	Improper tool grade				●															
		Improper cutting conditions					↗ ●			●	● Wet										
		Improper cutting edge geometry										●	↗ ●			● ↘					
		Vibration occurs																●	●	●	●
Poor Chip Dispersal	long chips	Improper cutting conditions					● ↘	↗ ●	↗ ●		● Wet										
		Large chip control range										●									
		Improper cutting edge geometry												● ↘	● ↘						
	Chips are short and scattered	Improper cutting conditions						● ↘	● ↘		● Dry										
		Small chip control range										●									
		Improper cutting edge geometry												↗ ●	↗ ●						

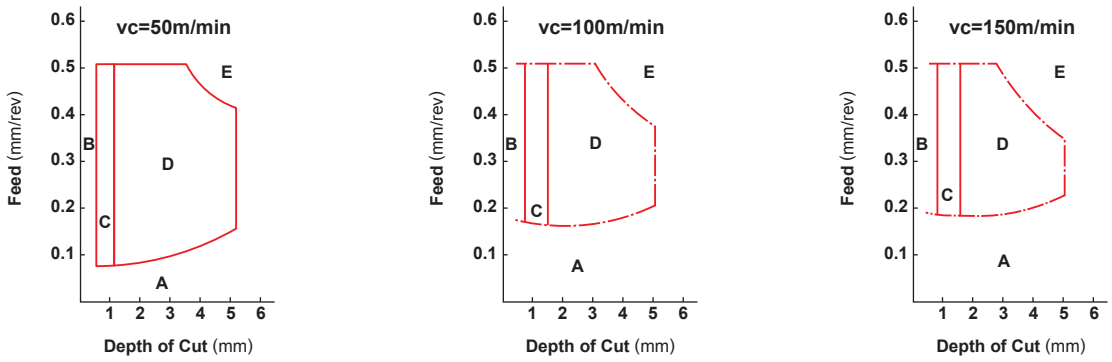
CHIP CONTROL FOR TURNING

CHIP BREAKING CONDITIONS IN STEEL TURNING

Type	A Type	B Type	C Type	D Type	E Type
Small Depth of Cut d < 7mm					
Small Depth of Cut d=7−15mm					
Curl Length l	Curless	l ≥ 50mm	l ≤ 50mm 1−5 Curl	≒ 1 Curl	Less Than 1 Curl Half a Curl
Note	●Irregular continuous shape ●Tangle around tool and workpiece	●Regular continuous shape ●Long chips	Good	Good	●Chip scattering ●Chattering ●Poor finished surface ●Maximum

Cutting speed and chip control range of chip breaker

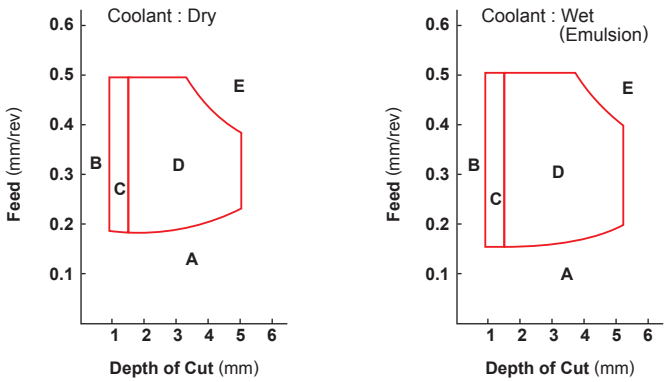
In general, when cutting speed increases, the chip control range tends to become narrower.



Workpiece : **S45C(180HB)** Tool : **MTJNR2525M16N**
Insert : **TNMG160408** Dry Cutting
Grade : **P10**Cemented Carbide

Effects of coolant on the chip control range of a chip breaker

If the cutting speed is the same, the range of chip control differs according to whether coolant is used or not.



Workpiece : **S45C**
Cutting Conditions : **vc=100m/min**

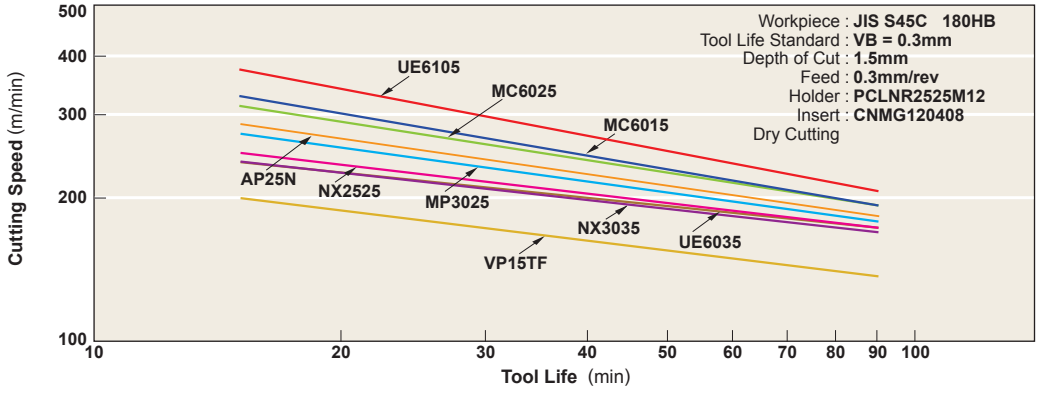
EFFECTS OF CUTTING CONDITIONS FOR TURNING

EFFECTS OF CUTTING CONDITIONS

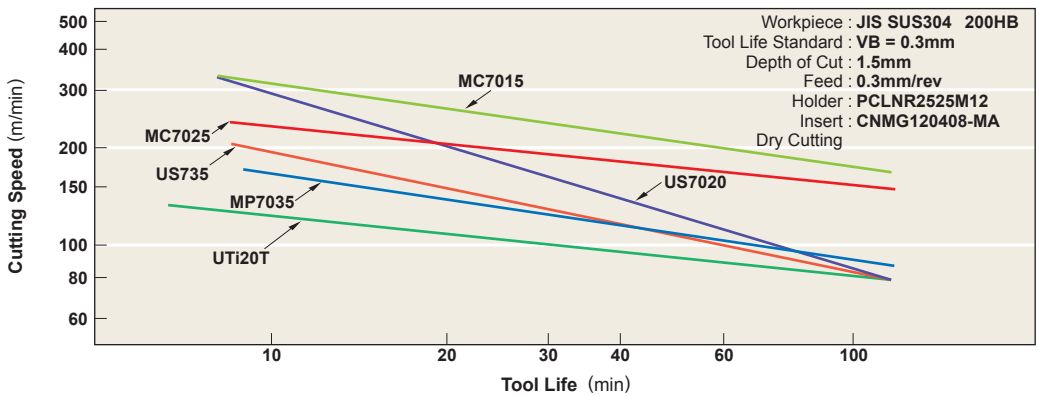
Ideal conditions for cutting are short cutting time, long tool life, and high cutting accuracy. In order to obtain these conditions, selection of efficient cutting conditions and tools, based on work material, hardness, shape and machine capability is necessary.

CUTTING SPEED

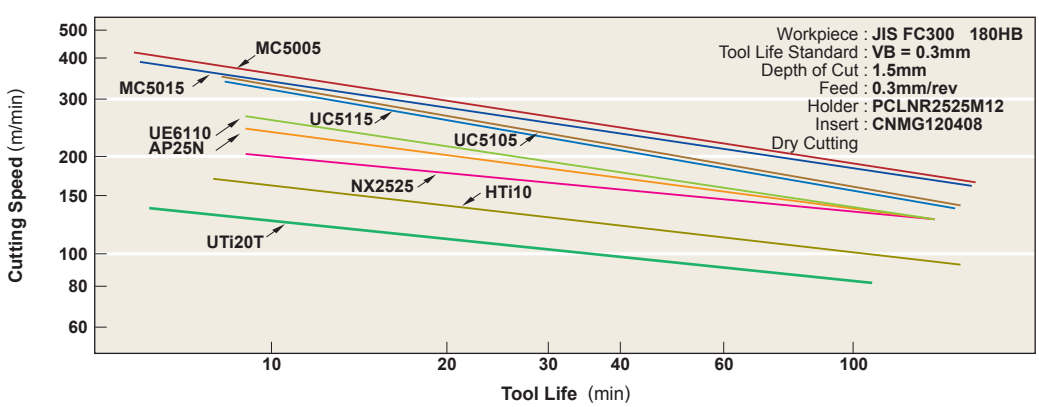
Cutting speed effects tool life greatly. Increasing cutting speed increases cutting temperature and results in shortening tool life. Cutting speed varies depending on the type and hardness of the work material. Selecting a tool grade suitable for the cutting speed is necessary.



P Class Grade Tool Life



M Class Grade Tool Life



K Class Grade Tool Life

Effects of Cutting Speed

1. Increasing cutting speed by 20% decreases tool life by 50%. Increasing cutting speed by 50% decreases tool life by 80%.
2. Cutting at low cutting speed (20–40m/min) tends to cause chattering. Thus, tool life is shortened.

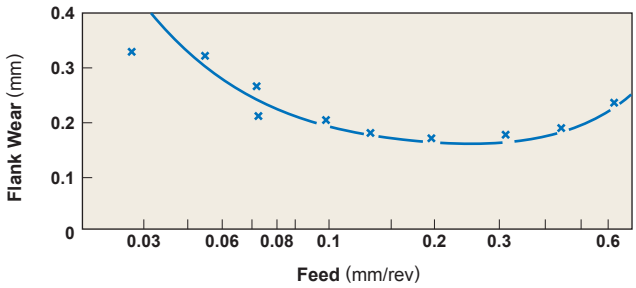
EFFECTS OF CUTTING CONDITIONS FOR TURNING

FEED

When cutting with a general type holder, feed is the distance a holder moves per workpiece revolution. When milling, feed is the distance a machine table moves per cutter revolution divided by the number of inserts. Thus, it is indicated as feed per tooth. Feed rate relates to finished surface roughness.

Effects of Feed

1. Decreasing feed rate results in flank wear and shortens tool life.
2. Increasing feed rate increases cutting temperature and flank wear. However, effects on the tool life is minimal compared to cutting speed.
3. Increasing feed rate improves machining efficiency.



Cutting Conditions Workpiece : **JIS SNCM431** Grade : **STi10T**
Insert : **0-0-5-5-35-35-0.3mm**
Depth of Cut **ap=1.0mm** Cutting Speed **vc=200m/min**
Cutting Time **Tc=10min**

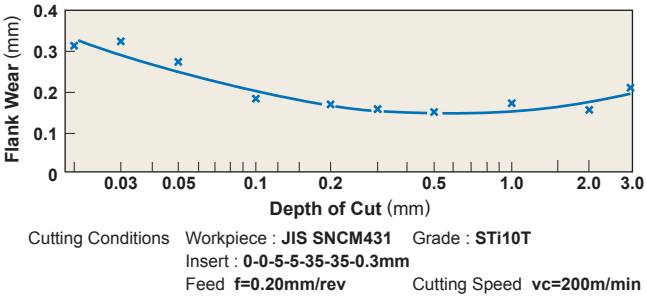
Feed and Flank Wear Relationship in Steel Turning

DEPTH OF CUT

Depth of cut is determined according to the required stock removal, shape of workpiece, power and rigidity of the machine and tool rigidity.

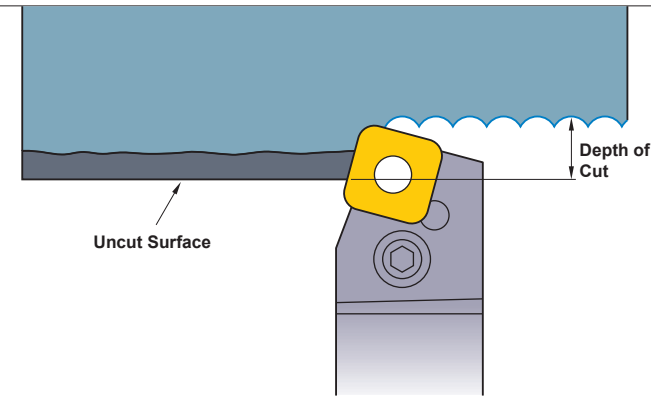
Effects of Depth of Cut

1. Changing depth of cut doesn't effect tool life greatly.
2. Small depths of cut result in friction when cutting the hardened layer of a workpiece. Thus tool life is shortened.
3. When cutting uncut surfaces or cast iron surfaces, the depth of cut needs to be increased as much as the machine power allows in order to avoid cutting impure hard layers with the tip of cutting edge to prevent chipping and abnormal wear.



Cutting Conditions Workpiece : **JIS SNCM431** Grade : **STi10T**
Insert : **0-0-5-5-35-35-0.3mm**
Feed **f=0.20mm/rev** Cutting Speed **vc=200m/min**
Cutting Time **Tc=10min**

Depth of Cut and Flank Wear Relationship in Steel Turning

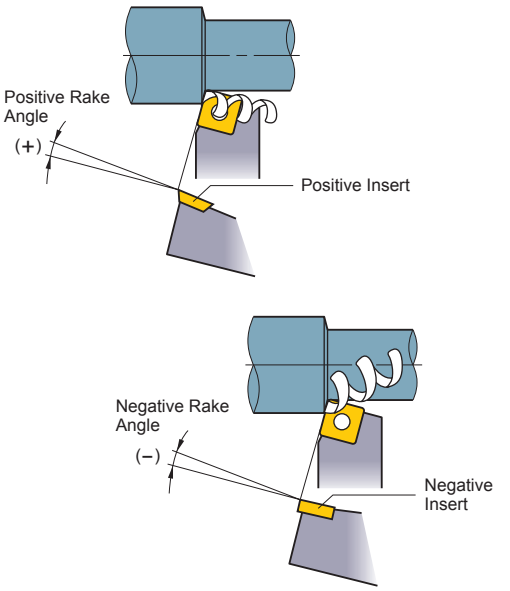


Roughing of Surface Layer that Includes Uncut Surface

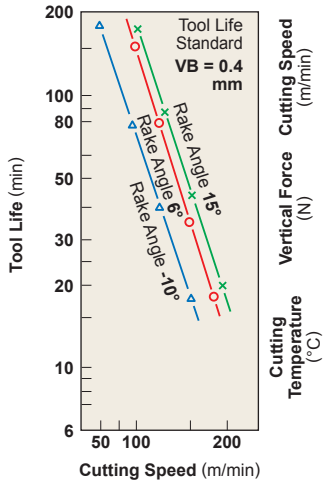
FUNCTION OF TOOL FEATURES FOR TURNING

RAKE ANGLE

Rake angle is cutting edge angle that has a large effect on cutting resistance, chip disposal, cutting temperature and tool life.

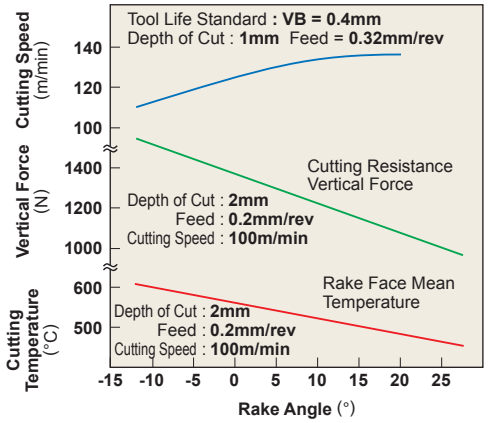


Chip Disposal and Rake Angle



Cutting Conditions
Grade : **STi10**
Depth of Cut : **1mm** Feed : **0.32mm/rev**
Workpiece : **JIS SK5**

Rake Angle and Tool Life



Cutting Conditions
Workpiece : **JIS SK5** Grade : **STi10T**
Insert : **0-Var-5-5-20-20-0.5mm**
Dry Cutting

Effects of Rake Angle on Cutting Speed, Vertical Force, and Cutting Temperature

Effects of Rake Angle

1. Increasing rake angle in the positive (+) direction improves sharpness.
2. Increasing rake angle by 1° in the positive (+) direction decreases cutting power by about 1%.
3. Increasing rake angle in the positive (+) direction lowers cutting edge strength and in the negative (-) direction increases cutting resistance.

When to Increase Rake Angle in the Negative (-) Direction

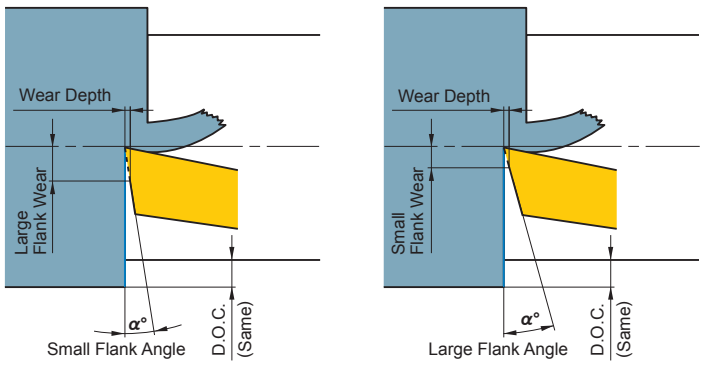
- ○ Hard workpieces.
- ○ When the cutting edge strength is required such as for uncut surfaces and interrupted cutting.

When to Increase Rake Angle in the Positive (+) Direction

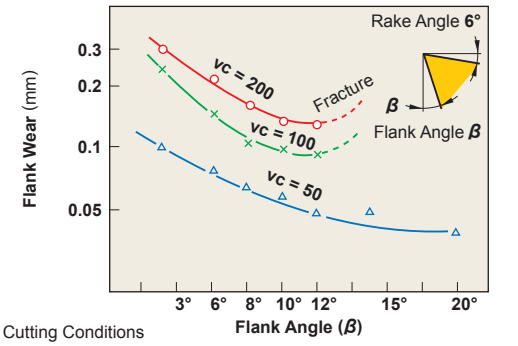
- ○ Soft workpieces.
- ○ Workpiece is easily machined.
- ○ When the workpiece or the machine have poor rigidity.

FLANK ANGLE

Flank angle prevents friction between flank face and workpiece resulting in smooth feed.



Flank angle creates a space between tool and workpiece. Flank angle relates to flank wear.



Cutting Conditions
Workpiece : **JIS SNCM431 (200HB)**
Grade : **STi20** Insert : **0-6-β-β-20-20-0.5mm**
Depth of Cut : **1mm** Feed : **0.32mm/rev** Cutting Time : **20min**

Flank Angle and Flank Wear Relationship

Effects of Rake Angle

1. Increasing flank angle decreases flank wear occurrence.
2. Increasing flank angle lowers cutting edge strength.

When to Decrease Flank Angle

- ○ Hard workpieces.
- ○ When cutting edge strength is required.

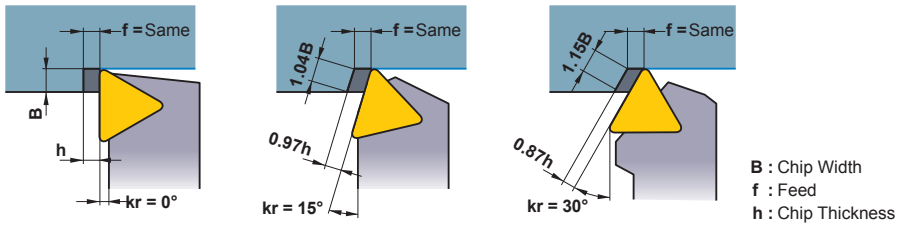
When to Increase Flank Angle

- ○ Soft workpieces.
- ○ Workpieces suffer from work hardening easily.

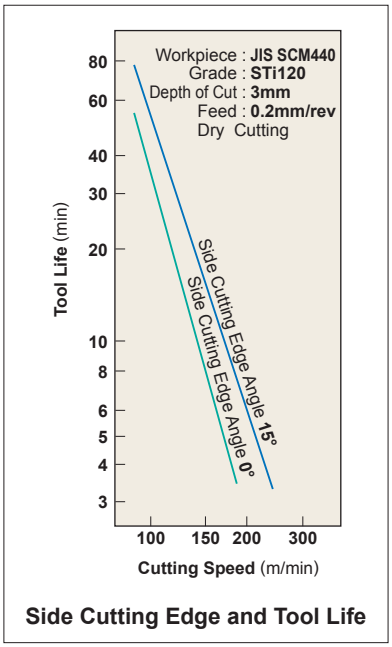
FUNCTION OF TOOL FEATURES FOR TURNING

SIDE CUTTING EDGE ANGLE (LEAD ANGLE)

The side cutting edge angle reduces impact load and effects the amount of feed force, back force and chip thickness.



Side Cutting Edge Angle and Chip Thickness

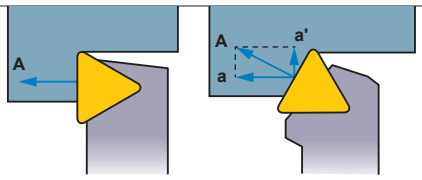


Side Cutting Edge and Tool Life

Effects of Side Cutting Edge Angle (Lead Angle)

1. At the same feed rate, increasing the side cutting edge angle increases the chip contact length and decreases chip thickness. As a result, the cutting force is dispersed on a longer cutting edge and tool life is prolonged. (Refer to the chart.)
2. Increasing the side cutting edge angle increases force a'. Thus, thin, long workpieces suffer from bending in some cases.
3. Increasing the side cutting edge angle decreases chip control.
4. Increasing the side cutting edge angle decreases the chip thickness and increases chip width. Thus, breaking chips is difficult.

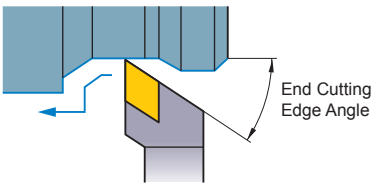
When to Decrease Lead Angle	When to Increase Lead Angle
○ Finishing with small depth of cut. ○ Thin, long workpieces. ○ When the machine has poor rigidity.	○ Hard workpieces which produce high cutting temperature. ○ When roughing a workpiece with large diameter. ○ When the machine has high rigidity.



Receive force A. Force A is divided into a and a'.

END CUTTING EDGE ANGLE

The end cutting edge angle avoids interference between the machined surface and the tool (end cutting edge). Usually 5°–15°.

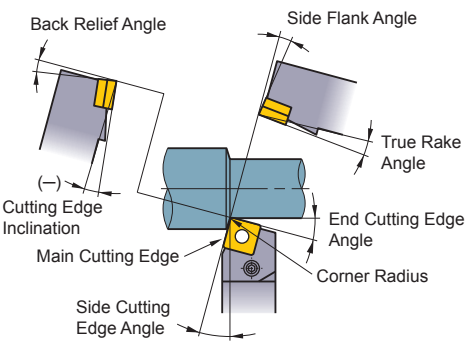


Effects of End Cutting Edge Angle

1. Decreasing the end cutting edge angle increases cutting edge strength, but it also increases cutting edge temperature.
2. Decreasing the end cutting edge angle increases the back force and can result in chattering and vibration while machining.
3. Small end cutting edge angle for roughing and large angle for finishing are recommended.

CUTTING EDGE INCLINATION

Cutting edge inclination indicates inclination of the rake face. During heavy cutting, the cutting edge receives an extremely large shock at the beginning of each cut. Cutting edge inclination keeps the cutting edge from receiving this shock and prevents fracturing. 3°–5° in turning and 10°–15° in milling are recommended.

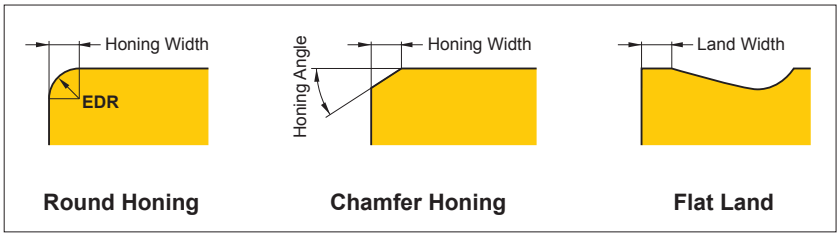


Effects of Cutting Edge Inclination

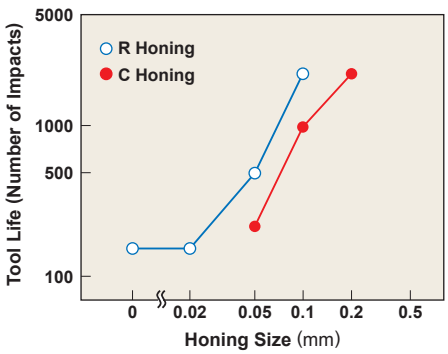
1. Negative (–) cutting edge inclination disposes chips in the workpiece direction, and positive (+) disposes chips in the opposite direction.
2. Negative (–) cutting edge inclination increases cutting edge strength, but it also increases the back force of cutting resistance. Thus, chattering can easily occur.

HONING AND LAND

Honing and land are cutting edge shapes that maintain cutting edge strength.
Honing can be round or chamfer type. The optimal honing width is approximately 1/2 of the feed.
Land is the narrow flat area on the rake or flank face.

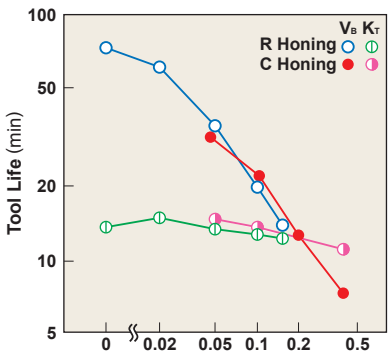


Round Honing **Chamfer Honing** **Flat Land**



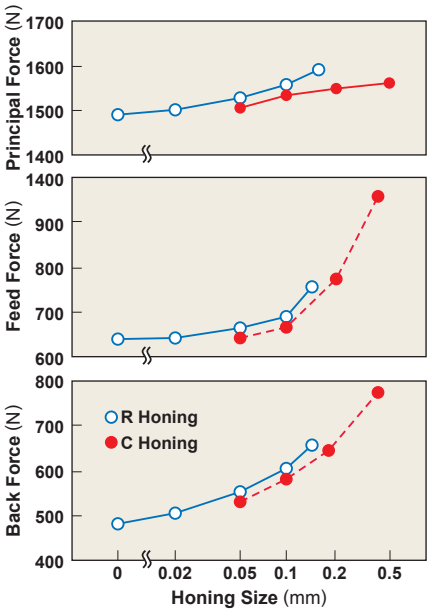
Workpiece : **JIS SNCM439 (280HB)**
Grade : **P10**
Cutting Conditions : **vc=200m/min ap=1.5mm f=0.335mm/rev**

Honing Size and Tool Life Due to Fracturing



Workpiece : **JIS SNCM439 (220HB)**
Grade : **P10**
Cutting Conditions : **vc=160m/min ap=1.5mm f=0.45mm/rev**

Honing Size and Tool Life Due to Wear



Workpiece : **JIS SNCM439 (220HB)**
Grade : **P10**
Cutting Conditions : **vc=100m/min ap=1.5mm f=0.425mm/rev**

Honing Size and Cutting Resistance

Effects of Honing

1. Enlarging the honing increases cutting edge strength, tool life and reduces fracturing.
2. Enlarging the honing increases flank wear occurrence and shortens tool life. Honing size doesn't affect rake wear.
3. Enlarging the honing increases cutting resistance and chattering.

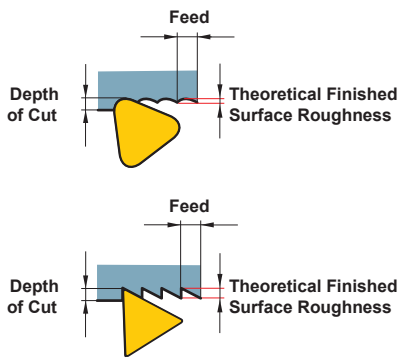
When to Decrease Honing Size	When to Increase Honing Size
○ When finishing with small depth of cut and small feed. ○ Soft workpieces. ○ When the workpiece or the machine have poor rigidity.	○ Hard workpieces. ○ When the cutting edge strength is required such as for uncut surfaces and interrupted cutting. ○ When the machine has high rigidity.

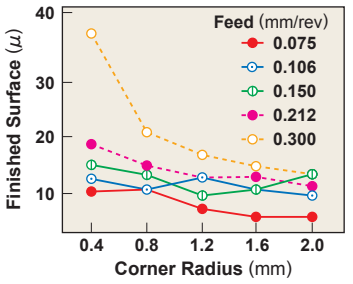
*Cemented carbide, coated diamond, and indexable cermet inserts have round honing as standard.

FUNCTION OF TOOL FEATURES FOR TURNING

RADIUS

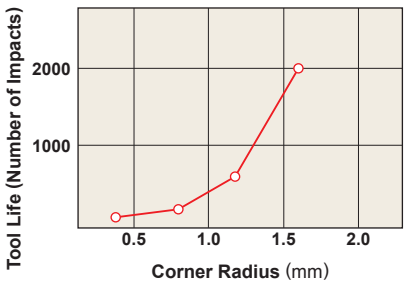
Radius effects the cutting edge strength and finished surface. In general, a corner radius 2–3 times the feed is recommended.





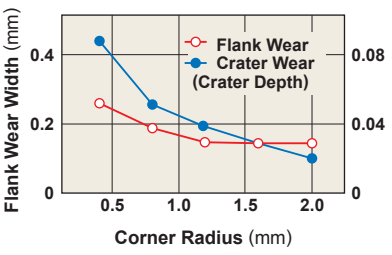
Workpiece : **JIS SNCM439 (200HB)**
Grade : **P20**
Cutting Speed : **vc=120m/min ap=0.5mm**

Corner Radius and Finished Surface



Workpiece : **JIS SNCM440 (280HB)**
Grade : **P10**
Cutting Conditions : **vc=100m/min ap=2mm f=0.335mm/rev**

Corner Radius Size and Tool Life Due to Fracturing



Workpiece : **JIS SNCM439 (200HB)**
Grade : **P10**
Cutting Conditions : **vc=140m/min ap=2mm f=0.212mm/rev Tc=10min**

Corner Radius Size and Tool Wear

Effects of Corner Radius

1. Increasing the corner radius improves the surface finish.
2. Increasing the corner radius improves cutting edge strength.
3. Increasing the corner radius too much increases the cutting resistance and causes chattering.
4. Increasing the corner radius decreases flank and rake wear.
5. Increasing the corner radius too much results in poor chip control.

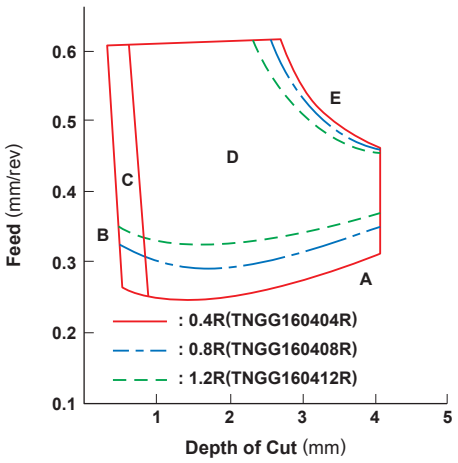
When to Decrease Corner Radius

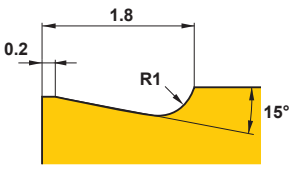
- ○Finishing with small depth of cut.
- ○Thin, long workpieces.
- ○When the machine has poor rigidity.

When to Increase Corner Radius

- ○When the cutting edge strength is required such as in intrrupted cutting and uncut surface cutting.
- ○When roughing a workpiece with large diameter.
- ○When the machine has high rigidity.

Corner Radius and Chip Control Range





Workpiece : **JIS S45C (180HB)**
Insert : **TNGG160404R TNGG160408R TNGG160412R (STi10T)**
Holder : **ETJNR33K16 (Side Cutting Edge angle 3°)**
Cutting Speed : **vc=100m/min**
Dry Cutting

(Note) Please refer to page Q004 for chip shapes (A, B, C, D, E).

FORMULAE FOR CUTTING POWER

CUTTING POWER (Pc)

$$Pc = \frac{ap \cdot f \cdot vc \cdot Kc}{60 \times 10^3 \times \eta} \ (kW)$$

Pc (kW)	: Actual Cutting Power	ap (mm)	: Depth of Cut
f (mm/rev)	: Feed per Revolution	vc (m/min)	: Cutting Speed
Kc (MPa)	: Specific Cutting Force	η	: (Machine Coefficient)

(Problem) What is the cutting power required for machining mild steel at cutting speed 120m/min with depth of cut 3mm and feed 0.2mm/rev (Machine coefficient 80%) ?

(Answer) Substitute the specific cutting force Kc=3100MPa into the formula.

$$Pc = \frac{3 \times 0.2 \times 120 \times 3100}{60 \times 10^3 \times 0.8} = 4.65 (kW)$$

Kc

Work Material	Tensile Strength(MPa) and Hardness	Specific Cutting Force Kc (MPa)				
		0.1 (mm/rev)	0.2 (mm/rev)	0.3 (mm/rev)	0.4 (mm/rev)	0.6 (mm/rev)
Mild Steel	**520**	3610	3100	2720	2500	2280
Medium Steel	**620**	3080	2700	2570	2450	2300
Hard Steel	**720**	4050	3600	3250	2950	2640
Tool Steel	**670**	3040	2800	2630	2500	2400
Tool Steel	**770**	3150	2850	2620	2450	2340
Chrome Manganese Steel	**770**	3830	3250	2900	2650	2400
Chrome Manganese Steel	**630**	4510	3900	3240	2900	2630
Chrome Molybdenum Steel	**730**	4500	3900	3400	3150	2850
Chrome Molybdenum Steel	**600**	3610	3200	2880	2700	2500
Nickel Chrome Molybdenum Steel	**900**	3070	2650	2350	2200	1980
Nickel Chrome Molybdenum Steel	**352HB**	3310	2900	2580	2400	2200
Hard Cast Iron	**46HRC**	3190	2800	2600	2450	2270
Meehanite Cast Iron	**360**	2300	1930	1730	1600	1450
Grey Cast Iron	**200HB**	2110	1800	1600	1400	1330

CUTTING SPEED (vc)

$$vc = \frac{\pi \cdot Dm \cdot n}{1000} \ (m/min)$$

vc	(m/min)	: Cutting Speed
Dm	(mm)	: Workpiece Diameter
π	(3.14)	: Pi
n	(min^{-1})	: Main Axis Spindle Speed

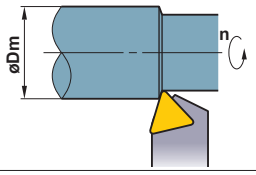
*Divide by 1000 to change to m from mm.

(Problem) What is the cutting speed when main axis spindle speed is 700min^{-1} and external diameter is ϕ50 ?

(Answer) Substitute π=3.14, Dm=50, n=700 into the formula.

$$vc = \frac{\pi \cdot Dm \cdot n}{1000} = \frac{3.14 \times 50 \times 700}{1000} = 110 m/min$$

Cutting speed is 110m/min.



FEED (f)

$$f = \frac{l}{n} \ (mm/rev)$$

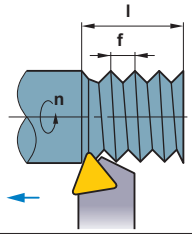
f	(mm/rev)	: Feed per Revolution
l	(mm/min)	: Cutting Length per Min.
n	(min^{-1})	: Main Axis Spindle Speed

(Problem) What is the feed per revolution when main axis spindle speed is 500min^{-1} and cutting length per minute is 120mm/min ?

(Answer) Substitute n=500, l=120 into the formula.

$$f = \frac{l}{n} = \frac{120}{500} = 0.24 mm/rev$$

The answer is 0.24mm/rev.



CUTTING TIME (Tc)

$$Tc = \frac{lm}{l} \ (min)$$

Tc	(min)	: Cutting Time
lm	(mm)	: Workpiece Length
l	(mm/min)	: Cutting Length per Min.

(Problem) What is the cutting time when 100mm workpiece is machined at 1000min^{-1} with feed = 0.2mm/rev ?

(Answer) First, calculate the cutting length per min. from the feed and spindle speed.

$$l = f \times n = 0.2 \times 1000 = 200 mm/min$$

Substitute the answer above into the formula.

$$Tc = \frac{lm}{l} = \frac{100}{200} = 0.5 min$$

0.5 x 60=30 (sec.) The answer is 30 sec.

THEORETICAL FINISHED SURFACE ROUGHNESS (h)

$$h = \frac{f^2}{8RE} \times 1000 (\mu m)$$

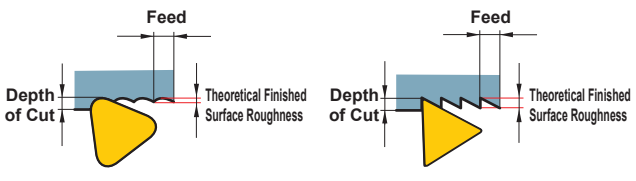
h	(μm)	: Finished Surface Roughness
f	(mm/rev)	: Feed per Revolution
RE	(mm)	: Insert Corner Radius

(Problem) What is the theoretical finished surface roughness when the insert corner radius is 0.8mm and feed is 0.2mm/rev ?

(Answer) Substitute f=0.2mm/rev, RE=0.8 into the formula.

$$h = \frac{0.2^2}{8 \times 0.8} \times 1000 = 6.25 \mu m$$

The theoretical finished surface roughness is 6μm.

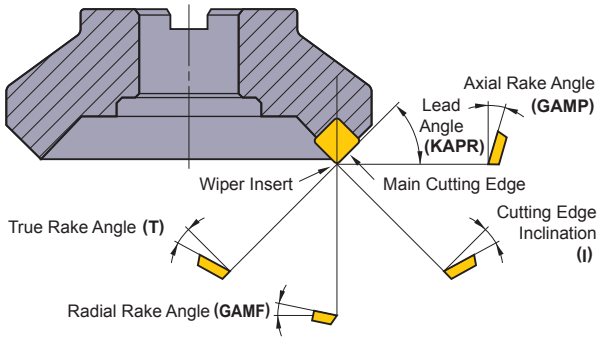


TROUBLE SHOOTING FOR FACE MILLING

Trouble	Factors	Insert Grade Selection: Select a harder grade	Select a tougher grade	Select a grade with better thermal shock resistance	Select a grade with better adhesion resistance	Cutting Conditions: Cutting speed	Feed	Depth of cut	Engage angle	Coolant: Do not use water-soluble cutting fluid	Coolant: Determine dry or wet cutting	Style and Design of the Tool: Rake	Corner angle	Honing strengthens the cutting edge	Cutter diameter	Number of teeth	Wider chip pocket	Use of a wiper insert	Improve run-out accuracy	Cutter rigidity	Machine, Installation of Tool: Increase clamping rigidity of the tool and workpiece	Decrease overhang	Decrease power and machine backlash
		Solution				Down ↘ / Up ↗			Up ↗			Down ↘ / Up ↗				Smaller ↘ / Larger ↗							
Deterioration of Tool Life	Insert wear quickly generated	Improper tool grade	●																				
		Improper cutting edge geometry										↗●	↗●	●↘					●				
		Improper cutting speed				●↘					Wet												
	Chipping or fracturing of cutting edge	Improper tool grade		●																			
		Improper cutting conditions					●↘	●↘															
		Lack of cutting edge strength.												↗●									
		Thermal crack occurs			●	●↘	●↘	●↘		●	Dry												
		Build-up edge occurs				↗●	↗●			●	Wet												
		Lack of rigidity																		●	●	●	●
Deterioration of Surface Finish	Poor finished surface	Improper cutting conditions	●			●↘	●↘	●↘															
		Welding occurs				↗●				●	Wet	↗●		●↘									
		Poor run-out accuracy																●	●				
		Chattering				●↘	●↘	●↘	↗●			↗●		●↘		●↘				●	●	●	●
	Not parallel or irregular surface	Workpiece bending					●↘	●↘				↗●	●↘	●↘		●↘					●		
		Tool clearance																		●	●	●	●
		Large back force										↗●	●↘	●↘		●↘							
Burr, Workpiece Chipping	Burrs, chipping	Chip thickness is too large				↗●	●↘	●↘															
		Cutter diameter is too large							↗●						●↘								
		Low sharpness										↗●		●↘									
		A large corner angle											●↘										
	Workpiece edge chipping	Improper cutting conditions					●↘	●↘															
		Low sharpness										↗●		●↘									
		A small corner angle											↗●										
		Chattering				●↘	●↘	●↘	↗●			↗●		●↘		●↘				●	●	●	●
Chip Control	Poor chip dispersal, chip jamming and chip packing	Welding occurs				↗●																	
		Chip thickness is too thin				↗●	↗●																
		Cutter diameter is too small													●↘								
		Poor chip disposal								●	Wet					●↘	●						

FUNCTION OF TOOL FEATURES FOR FACE MILLING

FUNCTION OF EACH CUTTING EDGE ANGLE IN FACE MILLING

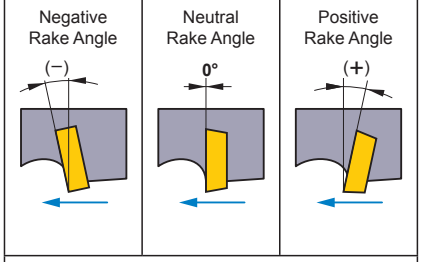


Each Cutting Edge Angle in Face Milling

Type of Angle	Symbol	Function	Effect
Axial Rake Angle	GAMP	Determines chip disposal direction.	**Positive** : Excellent machinability.
Radial Rake Angle	GAMF	Determines sharpness.	**Negative** : Excellent chip disposal.
Lead Angle	KAPR	Determines chip thickness.	**Small** : Thin chips and small cutting impact. Large back force.
True Rake Angle	T	Determines actual sharpness.	**Positive (large)** : Excellent machinability. Minimal welding. **Negative (large)** : Poor machinability. Strong cutting edge.
Cutting Edge Inclination	I	Determines chip disposal direction.	**Positive (large)** : Excellent chip disposal. Low cutting edge strength.

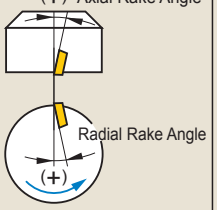
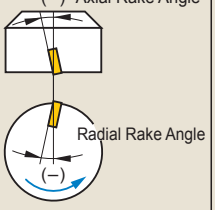
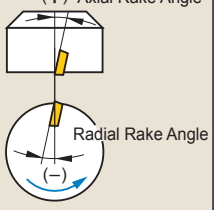
STANDARD INSERTS

Positive and Negative Rake Angle

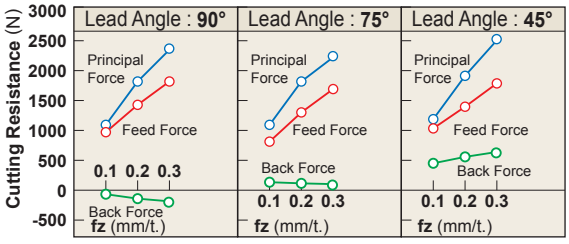


- Insert shape whose cutting edge precedes is a positive rake angle.
- Insert shape whose cutting edge follows is a negative rake angle.

Standard Cutting Edge Shape

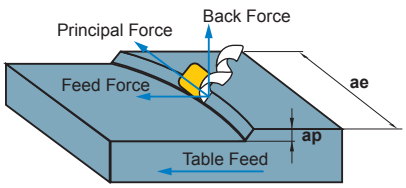
Standard Cutting Edge Combinations		 Double Positive (DP Edge Type)	 Double Negative (DN Edge Type)	 Negative/Positive (NP Edge Type)
Axial Rake Angle (GAMP)		Positive (+)	Negative (−)	Positive (+)
Radial Rake Angle (GAMF)		Positive (+)	Negative (−)	Negative (−)
Insert Used		Positive Insert (One Sided Use)	Negative Insert (Double Sided Use)	Positive Insert (One Sided Use)
Work Material	**Steel**	●	–	●
	Cast Iron	–	●	●
	Aluminium Alloy	●	–	–
	Difficult-to-Cut Material	●	–	●

LEAD ANGLE (KAPR) AND CUTTING CHARACTERISTICS



Workpiece : **JIS SCM440 (281HB)**
Tool : **ø125mm** Single Insert
Cutting Conditions : **vc=125.6m/min ap=4mm ae=110mm**

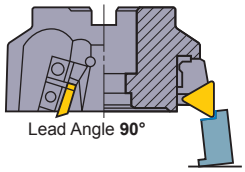
Cutting Resistance Comparison between Different Insert Shapes



Three Cutting Resistance Forces in Milling

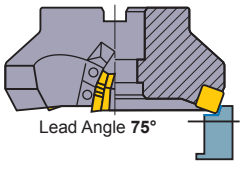
Lead Angle 90°

Back force is in the minus direction. Lifts the workpiece when workpiece clamp rigidity is low.



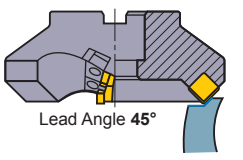
Lead Angle 75°

Lead angle 75°is recommended for face milling of workpieces with low rigidity such as thin workpieces.



Lead Angle 45°

The largest back force.
Bends thin workpieces and lowers cutting accuracy.
*Prevents workpiece edge chipping when cast iron cutting.



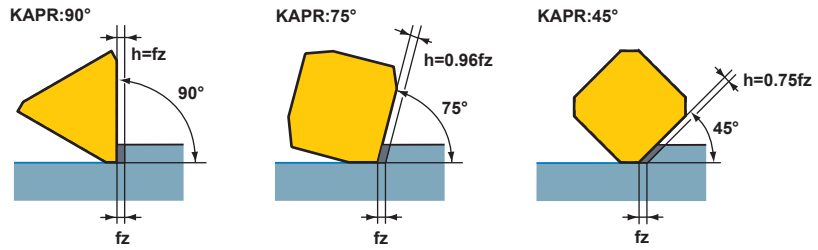
* Principal force : Force is in the opposite direction of face milling rotation.
* Back force : Force that pushes in the axial direction.
* Feed force : Force is in the feed direction and is caused by table feed.

FUNCTION OF TOOL FEATURES FOR FACE MILLING

APPROACH ANGLE AND THE TOOL LIFE

Approach Angle and Chip Thickness

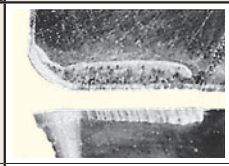
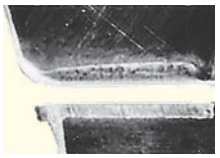
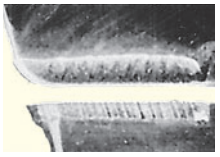
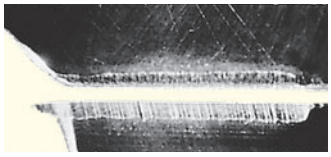
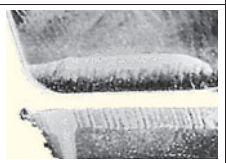
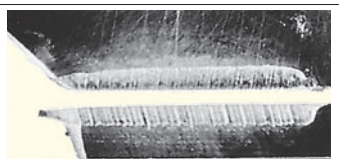
When the depth of cut and feed per tooth, fz, are fixed, the smaller the corner angle (KAPR) is, then the thinner the chip thickness (h) becomes (for a 45° KAPR, it is approx. 75% that of a 90° KAPR). This can be seen in below. Therefore as the KAPR increases, the cutting resistance decreases resulting in longer tool life. Note however, if the chip thickness is too large then the cutting resistance can increase leading to vibrations and shortened tool life.



Effects on chip thickness due to the variation of lead angles

Approach Angle and Face Wear

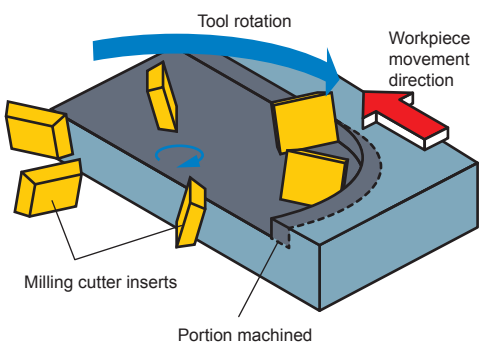
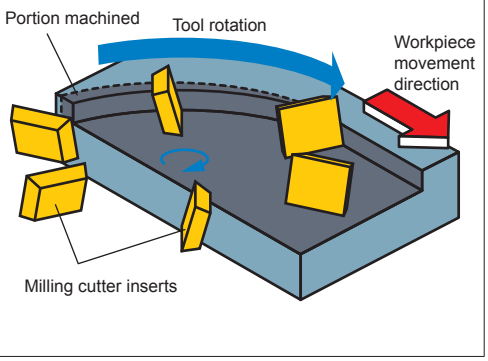
Below shows wear patterns for different lead angles. When comparing crater wear for 90° and 45° lead angles, it can be clearly seen that the ctater wear for 90° lead angle is larger.

	Lead Angle **90°**	Lead Angle **75°**	Lead Angle **45°**
vc=100m/min Tc=69min			
vc=125m/min Tc=55min			
vc=160m/min Tc=31min			

Workpiece : **SNCM439 287HB**
Tools : **DC=125mm**
Insert : **M20**Cemented Carbide
Cutting Conditions : **ap=3.0mm**
ae=110mm
fz=0.2mm/t.
Dry Cutting

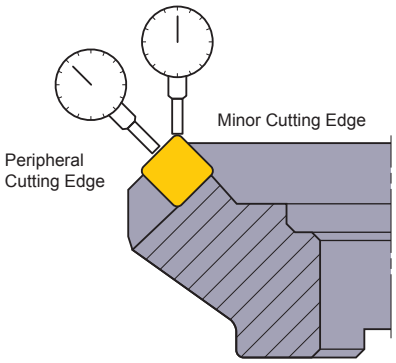
UP AND DOWN CUT (CLIMB) MILLING

When choosing a method to machine, up cutting or down cut milling (climb milling) is decided by the conditions of the machine tool, the milling cutter and the application. However, it is said that in terms of tool life, down cut (climb) milling is more advantageous.

Up Cut	Down Cut
	

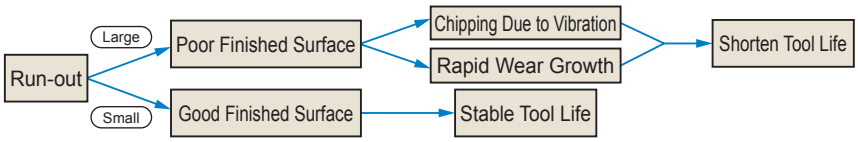
FINISHED SURFACE

Cutting Edge Run-out Accuracy

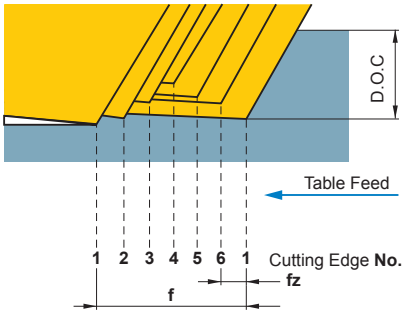


Cutting Edge Run-out and Accuracy in Face Milling

Cutting edge run-out accuracy of indexable inserts on the cutter body greatly affects the surface finish and tool life.



Improve Finished Surface Roughness



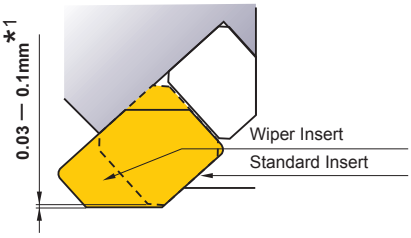
fz : Feed per Tooth
f : Feed per Revolution

Sub Cutting Edge Run-out and Finished Surface

Since Mitsubishi Materials' normal sub cutting edge width is 1.4mm, and the sub cutting edges are set parallel to the face of a milling cutter, theoretically the finished surface accuracy should be maintained even if run-out accuracy is low.

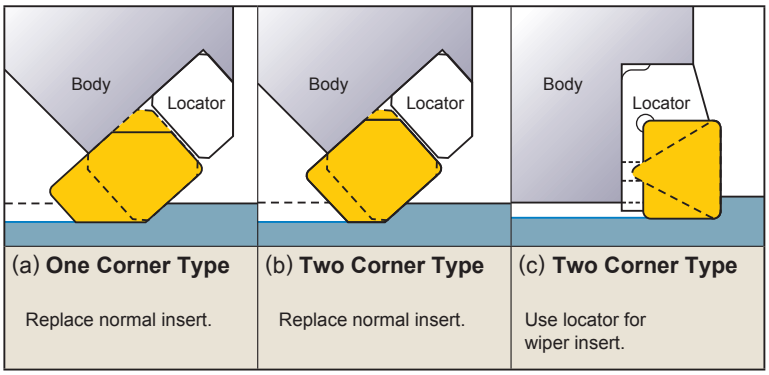
Actual Problems	Countermeasure
· Cutting edge run-out. · Sub cutting edge inclination. · Milling cutter body accuracy. · Spare parts accuracy. · Welding, vibration, chattering.	Wiper Insert

* Machine a surface that has already been per-machined in order to produce smooth finished surface.



· Replace one or two normal inserts with wiper inserts.
· Wiper inserts be set to protrude by 0.03—0.1mm from the standard inserts.
*1.Value depends on the cutting edge and insert combination.

How to Set a Wiper Insert



(a) **One Corner Type**	(b) **Two Corner Type**	(c) **Two Corner Type**
Replace normal insert.	Replace normal insert.	Use locator for wiper insert.

· Sub cutting edge length has to be longer than the feed per revolution.
* Too long sub cutting edge causes chattering.
· When the cutter diameter is large and feed per revolution is longer than the sub cutting edge of the wiper insert, use two or three wiper inserts.
· When using more than 1 wiper inserts, eliminate run-out of wiper inserts.
· Use a high hardness grade (high wear resistance) for wiper inserts.

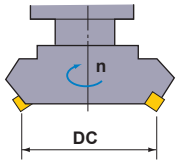
FORMULAE FOR FACE MILLING

CUTTING SPEED (vc)

$$vc = \frac{\pi \cdot DC \cdot n}{1000} \text{ (m/min)}$$

vc (m/min) : Cutting Speed
π (3.14) : Pi
DC (mm) : Cutter Diameter
n (min^{-1}) : Main Axis Spindle Speed

∗Divide by 1000 to change to m from mm.



(Problem) What is the cutting speed when main axis spindle speed is 350min^{-1} and the cutter diameter is ϕ125 ?

(Answer) Substitute π=3.14, DC=125, n=350 into the formula.

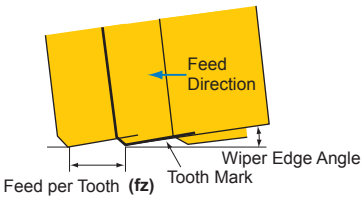
$$vc = \frac{\pi \cdot DC \cdot n}{1000} = \frac{3.14 \times 125 \times 350}{1000} = 137.4 \text{m/min}$$

The cutting speed is 137.4m/min.

FEED PER TOOTH (fz)

$$fz = \frac{vf}{z \cdot n} \text{ (mm/tooth)}$$

fz (mm/tooth) : Feed per Tooth
z : Insert Number
vf (mm/min) : Table Feed per Min.
n (min^{-1}) : Main Axis Spindle Speed (Feed per Revolution **f = z x fz**)



(Problem) What is the feed per tooth when the main axis spindle speed is 500min^{-1}, number of insert is 10, and table feed is 500mm/min ?

(Answer) Substitute the above figures into the formula.

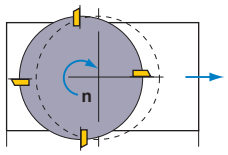
$$fz = \frac{vf}{z \times n} = \frac{500}{10 \times 500} = 0.1 \text{mm/tooth}$$

The answer is 0.1mm/tooth.

TABLE FEED (vf)

$$vf = fz \cdot z \cdot n \text{ (mm/min)}$$

vf (mm/min) : Table Feed per Min.
z : Insert Number
fz (mm/tooth) : Feed per Tooth
n (min^{-1}) : Main Axis Spindle Speed



(Problem) What is the table feed when feed per tooth is 0.1mm/tooth, number of insert is 10, and main axis spindle speed is 500min^{-1}?

(Answer) Substitute the above figures into the formula.

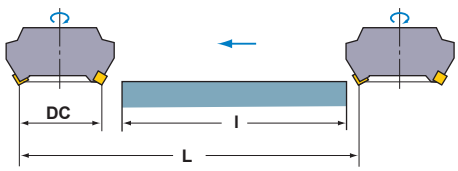
$$vf = fz \times z \times n = 0.1 \times 10 \times 500 = 500 \text{mm/min}$$

The table feed is 500mm/min.

CUTTING TIME (Tc)

$$Tc = \frac{L}{vf} \text{ (min)}$$

Tc (min) : Cutting Time
vf (mm/min) : Table Feed per Min.
L (mm) : Total Table Feed Length (Workpiece Length: (**l**)+Cutter Diameter : (**DC**))



(Problem) What is the cutting time required for finishing 100mm width and 300mm length surface of a cast iron (JIS FC200) block when the cutter diameter is ϕ200mm, the number of inserts is 16, the cutting speed is 125m/min, and feed per tooth is 0.25mm. (spindle speed is 200min^{-1})

(Answer) Calculate table feed per min vf=0.25×16×200=800mm/min
Calculate total table feed length. L=300+200=500mm
Substitute the above answers into the formula.

$$Tc = \frac{500}{800} = 0.625 \text{ (min)}$$

0.625×60=37.5 (sec). The answer is 37.5 sec.

CUTTING POWER (Pc)

$$Pc = \frac{ap \cdot ae \cdot vf \cdot Kc}{60 \times 10^6 \times \eta}$$

Pc (kW)	: Actual Cutting Power	**ap (mm)**	: Depth of Cut
ae (mm)	: Cutting Width	**vf (mm/min)**	: Table Feed per Min.
Kc (MPa)	: Specific Cutting Force	**η**	: (Machine Coefficient)

(Problem) What is the cutting power required for milling tool steel at a cutting speed of 80m/min. With depth of cut 2mm, cutting width 80mm, and table feed 280mm/min by ϕ250 cutter with 12 inserts. Machine coefficient 80%.

(Answer) First, calculate the spindle speed in order to obtain feed per tooth.

$$n = \frac{1000vc}{\pi DC} = \frac{1000 \times 80}{3.14 \times 250} = 101.91 min^{-1}$$

Feed per Tooth $$fz = \frac{vf}{z \times n} = \frac{280}{12 \times 101.9} = 0.228 mm/tooth$$

Substitute the specific cutting force into the formula.

$$Pc = \frac{2 \times 80 \times 280 \times 1800}{60 \times 10^6 \times 0.8} = 1.68\ kW$$

Kc

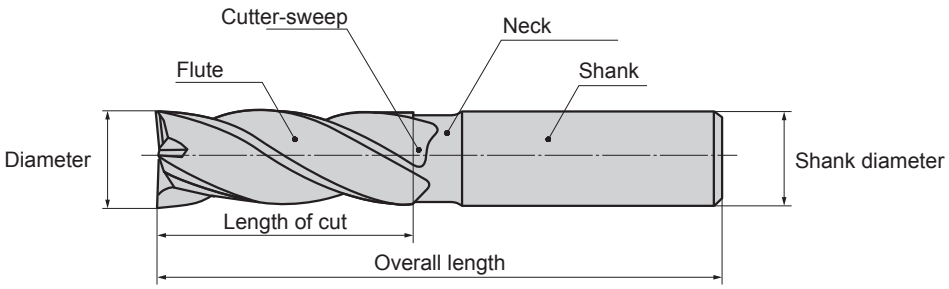
Work Material	Tensile Strength (MPa) and Hardness	Specific Cutting Force Kc (MPa)				
		0.1mm/tooth	0.2mm/tooth	0.3mm/tooth	0.4mm/tooth	0.6mm/tooth
Mild Steel	**520**	2200	1950	1820	1700	1580
Medium Steel	**620**	1980	1800	1730	1600	1570
Hard Steel	**720**	2520	2200	2040	1850	1740
Tool Steel	**670**	1980	1800	1730	1700	1600
Tool Steel	**770**	2030	1800	1750	1700	1580
Chrome Manganese Steel	**770**	2300	2000	1880	1750	1660
Chrome Manganese Steel	**630**	2750	2300	2060	1800	1780
Chrome Molybdenum Steel	**730**	2540	2250	2140	2000	1800
Chrome Molybdenum Steel	**600**	2180	2000	1860	1800	1670
Nickel Chrome Molybdenum Steel	**940**	2000	1800	1680	1600	1500
Nickel Chrome Molybdenum Steel	**352HB**	2100	1900	1760	1700	1530
Austenitic Stainless Steel	**155HB**	2030	1970	1900	1770	1710
Cast Iron	**520**	2800	2500	2320	2200	2040
Hard Cast Iron	**46HRC**	3000	2700	2500	2400	2200
Meehanite Cast Iron	**360**	2180	2000	1750	1600	1470
Grey Cast Iron	**200HB**	1750	1400	1240	1050	970
Brass	**500**	1150	950	800	700	630
Light Alloy (Al-Mg)	**160**	580	480	400	350	320
Light Alloy (Al-Si)	**200**	700	600	490	450	390
Light Alloy (Al-Zn-Mg-Cu)	**570**	880	840	840	810	720

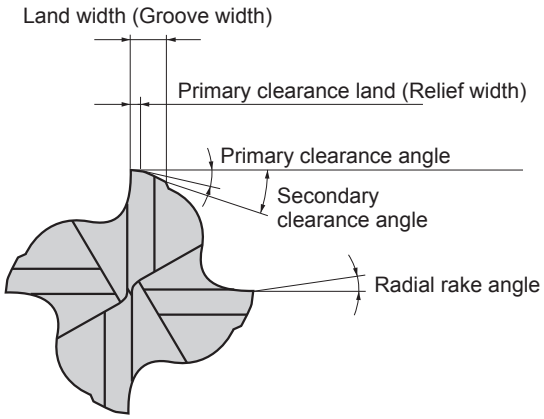
TROUBLE SHOOTING FOR END MILLING

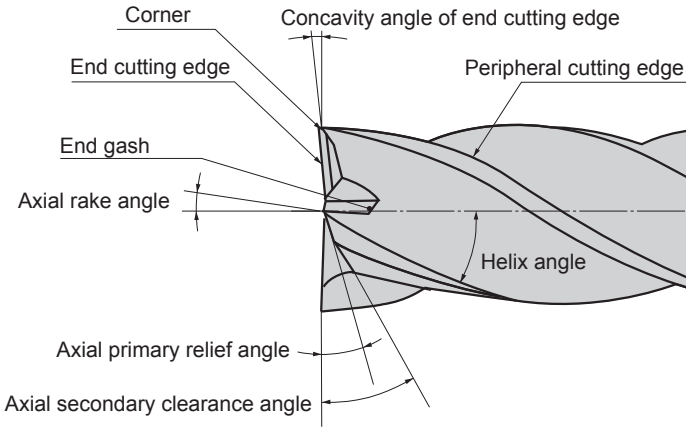
Trouble	Factors	Solution: Insert Grade Selection — Coated tool	Cutting Conditions — Cutting speed (Up↗ / Down↘)	Feed (Up↗ / Down↘)	Depth of cut (Up↗ / Down↘)	Pick feed (↘ Down)	Down cut	Use air blow	Coolant — Increase coolant quantity	Coolant — Do not use water-soluble cutting fluid	Coolant — Determine dry or wet cutting	Style and Design of the Tool — Helix angle (Up↗ Larger / Down↘ Smaller)	Insert number (Up↗ Larger / Down↘ Smaller)	Concavity angle of end cutting edge (Up↗ Larger / Down↘ Smaller)	Tool diameter (Up↗ Larger / Down↘ Smaller)	Cutter rigidity	Wider chip pocket	Machine, Installation of Tool — Shorten tool overhang	Increase tool installation accuracy	Increase spindle collet run-out accuracy	Collet inspection and exchange	Increase chuck clamping power	Increase work clamping rigidity
Deterioration of Tool Life	Non-coated end mill is used	●																					
	Large peripheral cutting edge wear — A small number of cutting edges												↗●										
	Large peripheral cutting edge wear — Improper cutting conditions		↘●							●													
	Large peripheral cutting edge wear — Up cut milling is used						Down Cut																
	Severe chipping — Improper cutting conditions																						
	Severe chipping — Fragile cutting edge															●							
	Severe chipping — Insufficient clamping force																				●	●	
	Severe chipping — Low clamping rigidity																	●	●	●	●	●	●
	Breakage during cutting — Improper cutting conditions				↘●																		
	Breakage during cutting — Low end mill rigidity														↗●	●							
	Breakage during cutting — Overhang longer than necessary				↘●													●					
	Breakage during cutting — Chip jamming								●								●						
Deterioration of Surface Finish	Vibration during cutting — Improper cutting conditions		↘●	↘●																			
	Vibration during cutting — Low end mill rigidity											↗●	↗●		↗●	●							
	Vibration during cutting — Low clamping rigidity																	●	●	●	●	●	●
	Poor surface finish on walls — Large cutting edge wear	●																					
	Poor surface finish on walls — Improper cutting conditions		↘●		↘●																		
	Poor surface finish on walls — Chip packing.							●	●		Wet												
	Poor surface finish on faces — The end cutting edge does not have a concave angle			↘●	↘●									↗●									
	Poor surface finish on faces — Large pick feed					↘●																	
	Out of vertical — Large cutting edge wear	●																					
	Out of vertical — Improper cutting conditions			↘●	↘●																		
	Out of vertical — Lack of end mill rigidty											↗●	↗●		↗●	●							
	Poor dimensional accuracy — Improper cutting conditions		↘●	↘●	↘●																		
	Poor dimensional accuracy — Low clamping rigidity																	●	●	●	●	●	●
Burrs, Chipping, etc.	Burr or chipping occurs — Improper cutting conditions			↘●	↘●																		
	Burr or chipping occurs — Large helix angle											↘●											
	Quick bur formation — Notch wear	●																					
	Quick bur formation — Improper cutting conditions		↘●	↗●																			
Poor Chip Dispersal	Chip packing — Metal removal too large			↘●	↘●																		
	Chip packing — Lack of chip pocket												↘●				●						

END MILL TERMINOLOGY

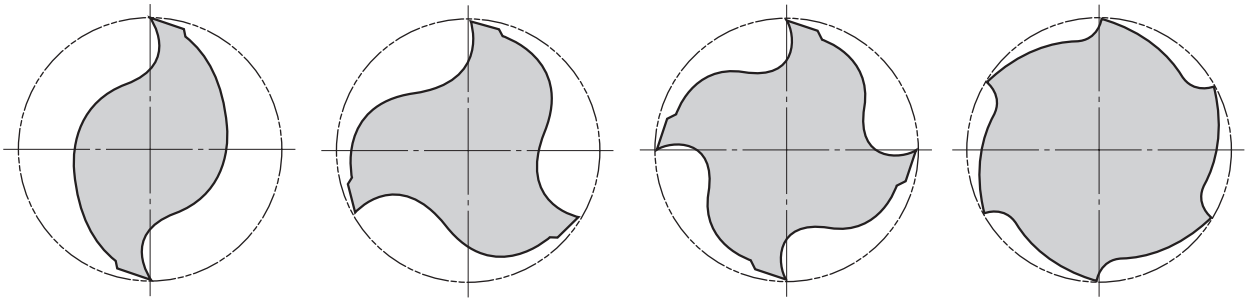
END MILL TERMINOLOGY







COMPARISON OF SECTIONAL SHAPE AREA OF CHIP POCKET



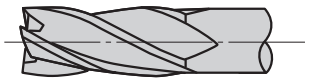
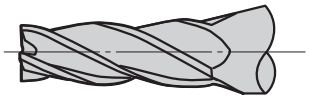
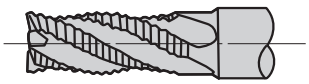
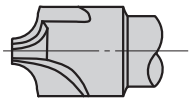
2-flutes 50%　3-flutes 45%　4-flutes 40%　6-flutes 20%

CHARACTERISTICS AND APPLICATIONS OF DIFFERENT-NUMBER-OF-FLUTE END MILLS

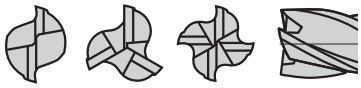
		2-flutes	3-flutes	4-flutes	6-flutes
Feature	Advantage	Chip disposability is excellent. Suitable for sinking. Low cutting resistance.	Chip disposability is excellent. Suitable for sinking.	High rigidity	High rigidity. Superior cutting edge durability.
	Fault	Low rigidity	Diameter is not easily measured.	Chip disposability is poor.	Chip disposability is poor.
Usage		Slotting, side milling, sinking etc. Wide range of use.	Slotting, side milling Heavy cutting, finishing	Shallow slotting, side milling Finishing	High Hardness Material Shallow slotting, side milling

TYPES AND SHAPES OF END MILL

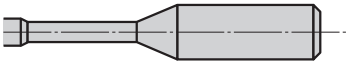
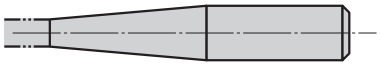
Peripheral Cutting Edge

Kind	Shape	Feature
Ordinary Flute		Ordinary flute type is most generally used for the slotting, side milling, and the shoulder milling, etc. Can be used for roughing, semi-finishing, and the finishing.
Tapered Flute		A tapered fute is used for milling mould drafts and angled faces.
Roughing Flute		Because a roughing tooth has a wave-like form and produces small chips. Cutting resistance is low, and is suitable for roughing. Not suitable for finishing. The tooth face is re-grindable.
Formed Flute		A corner radius cutter is shown. An infinite range of form cutters can be produced.

End Cutting Edge

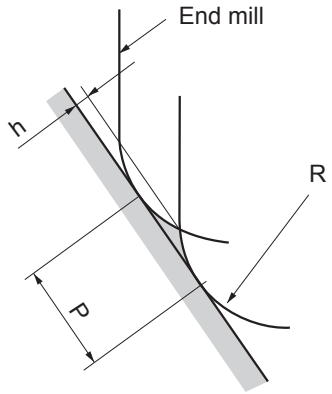
Kind	Shape	Feature
Square End (Centre With Hole)		This is generally used for slotting, side milling, and shoulder milling. Sinking is not possible. Grinding is center supported, making re-grinding accurate.
Square End (Centre Cut)		It is generally used for slotting, side milling, and shoulder milling. Vertical cutting can be performed. Re-grinding is possible.
Ball End		Suitable for profile machining and pick feed milling.
End Radius		For corner radius milling and contouring. Efficient small corner radius milling due to large diameter and small corner radius.

Shank And Neck Parts

Kind	Shape	Feature
Standard (Straight Shank)		For general use.
Long Shank		For deep slotting and has a long shank, so that adjustment of the overhang is possible.
Long Neck		For deep slotting and small diameter end mills, also suitable for boring.
Taper Neck		For best performance in deep slotting and on mould drafts.

PITCH SELECTION OF PICK FEED

PICK FEED MILLING (CONTOURING) WITH BALL NOSE END MILLS AND END MILLS WITH CORNER RADIUS



$$h = R \cdot \left[1 - \cos \left\{ \sin^{-1} \left(\frac{P}{2R} \right) \right\} \right]$$

R : Radius of Ball Nose(PRFRAD), Corner Radius(RE)

P : Pick Feed

h : Cusp Height

CORNER R OF END MILLS AND CUSP HEIGHT BY PICK FEED

Unit : mm

P / R	Pitch of Pick Feed (P)									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.5	0.003	0.010	0.023	0.042	0.067	0.100	–	–	–	–
1	0.001	0.005	0.011	0.020	0.032	0.046	0.063	0.083	0.107	–
1.5	0.001	0.003	0.008	0.013	0.021	0.030	0.041	0.054	0.069	0.086
2	0.001	0.003	0.006	0.010	0.016	0.023	0.031	0.040	0.051	0.064
2.5	0.001	0.002	0.005	0.008	0.013	0.018	0.025	0.032	0.041	0.051
3		0.002	0.004	0.007	0.010	0.015	0.020	0.027	0.034	0.042
4		0.001	0.003	0.005	0.008	0.011	0.015	0.020	0.025	0.031
5		0.001	0.002	0.004	0.006	0.009	0.012	0.016	0.020	0.025
6		0.001	0.002	0.003	0.005	0.008	0.010	0.013	0.017	0.021
8			0.001	0.003	0.004	0.006	0.008	0.010	0.013	0.016
10			0.001	0.002	0.003	0.005	0.006	0.008	0.010	0.013
12.5			0.001	0.002	0.003	0.004	0.005	0.006	0.008	0.010

P / R	Pitch of Pick Feed (P)									
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
0.5	–	–	–	–	–	–	–	–	–	–
1	–	–	–	–	–	–	–	–	–	–
1.5	0.104	–	–	–	–	–	–	–	–	–
2	0.077	0.092	0.109	–	–	–	–	–	–	–
2.5	0.061	0.073	0.086	0.100	–	–	–	–	–	–
3	0.051	0.061	0.071	0.083	0.095	0.109	–	–	–	–
4	0.038	0.045	0.053	0.062	0.071	0.081	0.091	0.103	–	–
5	0.030	0.036	0.042	0.049	0.057	0.064	0.073	0.082	0.091	0.101
6	0.025	0.030	0.035	0.041	0.047	0.054	0.061	0.068	0.076	0.084
8	0.019	0.023	0.026	0.031	0.035	0.040	0.045	0.051	0.057	0.063
10	0.015	0.018	0.021	0.025	0.028	0.032	0.036	0.041	0.045	0.050
12.5	0.012	0.014	0.017	0.020	0.023	0.026	0.029	0.032	0.036	0.040

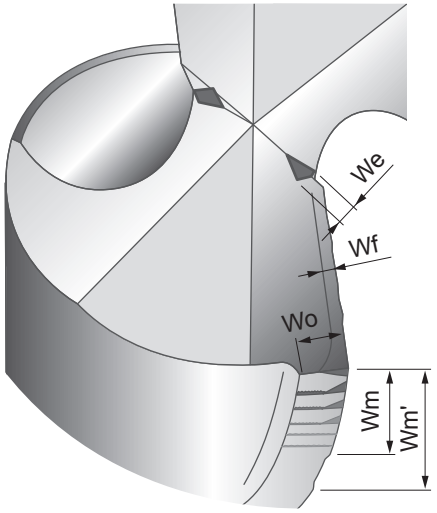
TROUBLE SHOOTING FOR DRILLING

Trouble		Factors	Cutting Conditions: Cutting speed (Up ↗ / Down ↘)	Cutting Conditions: Feed (Up ↗ / Down ↘)	Cutting Conditions: Lower feed at initial cutting	Cutting Conditions: Lower feed when breaking through	Cutting Conditions: Step feed	Cutting Conditions: Increase accuracy of prep-hole and depth	Cutting Conditions: Coolant: Increase oil ratio	Cutting Conditions: Coolant: Increase volume	Cutting Conditions: Coolant: Increase coolant pressure	Style and Design of the Tool: Chisel width (Up ↗ / Down ↘)	Style and Design of the Tool: Honing width (Up ↗ / Down ↘)	Style and Design of the Tool: Core thickness (Up ↗ / Down ↘)	Style and Design of the Tool: Shorten flute length	Style and Design of the Tool: Decrease lip height	Style and Design of the Tool: Use internal coolant type drill	Style and Design of the Tool: Change to a drill with X type thinning	Machine, Installation of Tool: Increase tool installation accuracy	Machine, Installation of Tool: Shorten tool overhang	Machine, Installation of Tool: Flat workpiece face	Machine, Installation of Tool: Increase work clamping rigidity	Machine, Installation of Tool: Reduce machine backlash and increase rigidity
Deterioration of Tool Life	Drill breakage	Lack of drill rigidity												↗●	●								
		Improper cutting conditions		↘●																			
		Large deflection of the tool holder																●					●
		Workpiece face is inclined																		●			
	Large wear at the peripheral cutting edge and along the land	Improper cutting conditions	↘●																				
		An increase in temperature at the cutting point							●	●							●						
		Poor run-out accuracy																●					
	Chipping of the peripheral cutting edge	Improper cutting conditions		↘●			●																
		Large deflection of the tool holder																●					●
		chattering, vibration											↘●						●		●		●
	Chisel edge chipping	The chisel edge width is too wide										↘●											
		Poor entry			●																		
		Chattering, vibration											↘●						●		●		●
Deterioration of Hole Accuracy	Hole diameter increases	Lack of drill rigidity												↗●	●								
		Improper drill geometry														●							
	Hole diameter becomes smaller	An increase in temperature at the cutting point							●	●							●						
		Improper cutting conditions	↘●																				
		Improper drill geometry														●							
	Poor straightness	Lack of drill rigidity												↗●	●								
		Large deflection of the tool holder																●					●
		Poor guiding properties						●															
	Poor hole positioning accuracy, roundness and surface finish	Lack of drill rigidity												↗●	●								
		Poor entry																●					
		Improper cutting conditions			●																		
		Large deflection of the tool holder																	●				●
Burrs	Burrs at the hole exit	Improper drill geometry											↘●										
		Improper cutting conditions				●																	
Poor Chip Dispersal	Long chips	Improper cutting conditions		↗●				●															
		Poor chip disposal								●	●			↘●			●						
	Chip jamming	Improper cutting conditions	↘●	↘●				●															
		Poor chip disposal								●	●			↘●			●						

DRILL WEAR AND CUTTING EDGE DAMAGE

DRILL WEAR CONDITION

The table below shows a simple drawing depicting the wear of a drill's cutting edge. The generation and the amount of wear differ according to the workpiece materials and cutting conditions used. But generally, the peripheral wear is largest and determines a drill tool life. When regrinding, the flank wear at the point needs to be ground away completely. Therefore, if there is large wear more material needs to be ground away to renew the cutting edge.



We : **Chisel edge wear width**

Wf : **Flank Wear (The middle of the cutting edge)**

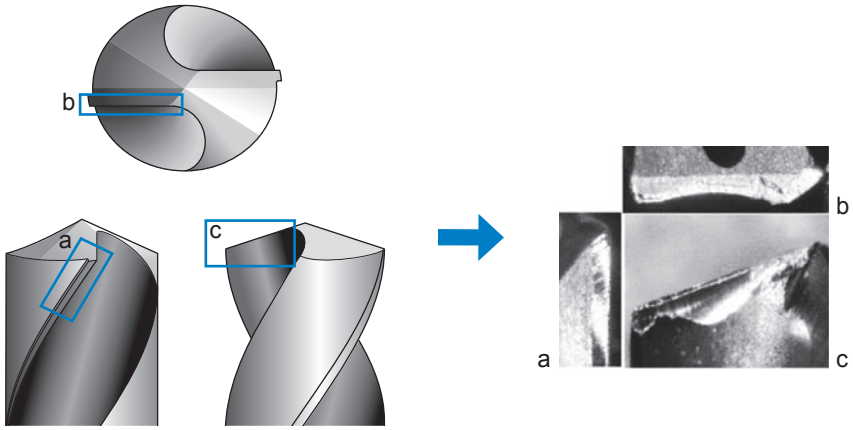
Wo : **Outer corner wear width**

Wm : **Margin wear width**

Wm' : **Margin wear width (Leading edge)**

CUTTING EDGE DAMAGE

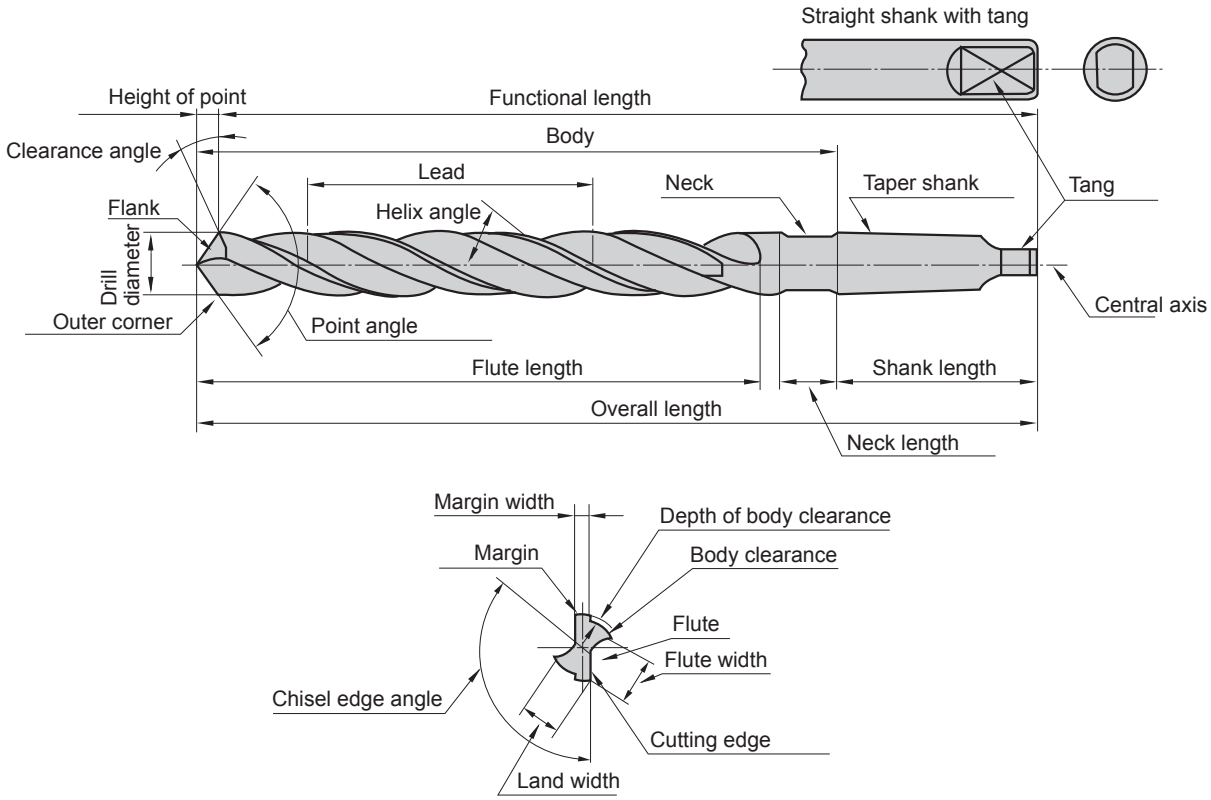
When drilling, the cutting edge of the drill can suffer from chipping, fracture and abnormal damage. In such cases, it is important to take a closer look at the damage, investigate the cause and take countermeasures.



Cutting edge damage

DRILL TERMINOLOGY AND CUTTING CHARACTERISTICS

NAMES OF EACH PART OF A DRILL



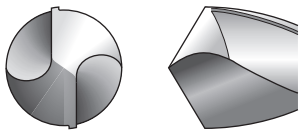
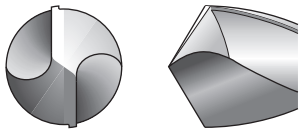
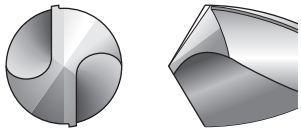
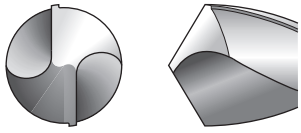
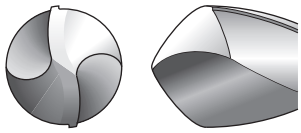
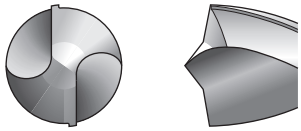
SHAPE SPECIFICATION AND CUTTING CHARACTERISTICS

Helix Angle	Is the inclination of the flute with respect to the axial direction of a drill, which corresponds to the rake angle of a bit. The rake angle of a drill differs according to the position of the cutting edge, and it decreases greatly as the circumference approaches the centre.The chisel edge has a negative rake angle, crushing the work. **High-hardness material** **Small** ◀·· **Rake angle** ··▶ **Large** **Soft material** (Aluminium, etc.)
Flute Length	It is determined by depth of hole, bush length, and regrinding allowance. Since the influence on the tool life is great, it is necessary to minimize it as much as possible.
Point Angle	In general, the angle is 118° which is set differently to various applications. **Soft material with good machinability** **Small** ◀·· **Point angle** ··▶ **Large** **For hard material and high-efficiency machining**
Web Thickness	It is an important element that determines the rigidity and chip raking performance of a drill. The web thickness is set according to applications. Small cutting resistance Low rigidity Good chip raking performance Machinable material **Thin** ◀·· **Web thickness** ··▶ **Thick** Large cutting resistance High rigidity Poor chip raking performance High-hardness material, cross hole drilling, etc.
Margin	The tip determines the drill diameter and functions as a drill guide during drilling. The margin width is determined in consideration of friction during hole drilled. **Poor guiding performance** **Small** ◀·· **Margin width** ··▶ **Large** **Good guiding performance**
Diameter Back Taper	To reduce friction with the inside of the drilled hole, the portion from the tip to the shank is tapered slightly. The degree is usually represented by the quantity of reduction in the diameter with respect to the flute length, which is approx. 0.04—0.1mm. It is set at a larger value for high-efficiency drills and the work material that allows drilled holes.

CUTTING EDGE GEOMETRY AND ITS INFLUENCE

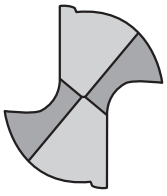
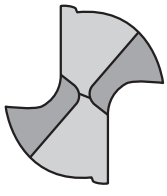
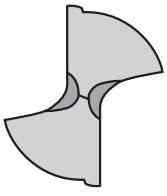
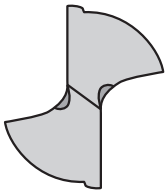
As shown in the table below, it is possible to select the most suitable cutting edge geometry for different applications. If the most suitable cutting edge geometry is selected then higher machining efficiency and higher hole accuracy can be obtained.

Cutting Edge Shapes

Grinding name	Shape	Features and effect	Application
Conical		• The flank is conical and the clearance angle increases toward the centre of the drill.	• General Use
Flat		• The flank is flat. • Easy grinding.	• Mainly for small diameter drills.
Three flank angles		• As there is no chisel edge, the results are high centripetal force and small hole oversize. • Requires a special grinding machine. • Surface grinding of three sides.	• For drilling operations that require high hole accuracy and positioning accuracy.
Spiral point		• To increase the clearance angle near the centre of the drill, conical grinding combined with irregular helix. • S type chisel edge with high centripetal force and machining accuracy.	• For drilling that requires high accuracy.
Radial lip		• The cutting edge is ground radial with the aim of dispersing load. • High machining accuracy and finished surface roughness. • For through holes, small burrs on the base. • Requires a special grinding machine.	• Cast Iron, Aluminium Alloy • For cast iron plates. • Steel
Centre Point drill		• This geometry has two-stage point angle for better concentricity and a reduction in shock when exiting the workpiece.	• For thin sheet drilling.

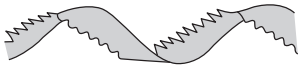
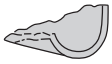
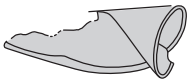
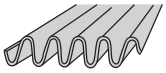
WEB THINNING

The rake angle of the cutting edge of a drill reduces toward the centre, and it changes into a negative angle at the chisel edge. During drilling, the centre of a drill crushes the work, generating 50−70% of the cutting resistance. Web thinning is very effective for reduction in the cutting resistance of a drill, early removal of cut chips at the chisel edge, and better initial bite.

Shape				
	X type	**XR type**	**S type**	**N type**
Features	The thrust load substantially reduces, and the bite performance improves. This is effective when the web is thick.	The initial performance is slightly inferior to that of the X type, but the cutting edge is hard and the applicable range of work is wide.	Popular design, easy cutting type.	Effective when the web is comparatively thick.
Major Applications	General drilling and deep hole drilling.	Long life. General drilling and stainless steel drilling.	General drilling for steel, cast iron, and non-ferrous metal.	Deep hole drilling.

DRILL TERMINOLOGY AND CUTTING CHARACTERISTICS

DRILLING CHIPS

Types of Chips	Shape	Features and Ease of Raking
Conical Spiral		Fan-shaped chips cut by the cutting edge are curved by the flute. Chips of this type are produced when the feeding rate of ductile material is small. If the chip breaks after several turns, the chip raking performance is satisfactory.
Long Pitch		The generated chip comes out without coiling. It will easily coil around the drill.
Fan		This is a chip broken by the restraint caused by the drill flute and the wall of a drilled hole. It is generated when the feed rate is high.
Segment		A conical spiral chip that is broken before the chip grows into the long-pitch shape by the restraint caused by the wall of the drilled hole due to the insufficiency of ductility. Excellent chip disposal and chip discharge.
Zigzag		A chip that is buckled and folded because of the shape of flute and the characteristics of the material. It easily causes chip packing at the flute.
Needle		Chips broken by vibration or broken when brittle material is curled with a small radius. The raking performance is satisfactory, but these chips can pack closely creating.

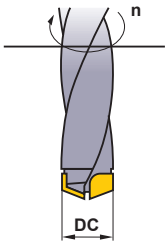
FORMULAE FOR DRILLING

CUTTING SPEED (vc)

$$vc = \frac{\pi \cdot DC \cdot n}{1000} \text{ (m/min)}$$

vc (m/min) : Cutting Speed
π (3.14) : Pi
DC (mm) : Drill Diameter
n (min^{-1}) : Main Axis Spindle Speed

*Divide by 1,000 to change to m from mm.



(Problem) What is the cutting speed when main axis spindle speed is 1350min^{-1} and drill diameter is 12mm ?

(Answer) Substitute π=3.14, DC=12, n=1350 into the formula

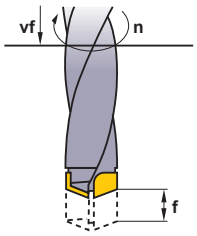
$$vc = \frac{\pi \cdot DC \cdot n}{1000} = \frac{3.14 \times 12 \times 1350}{1000} = 50.9 \text{m/min}$$

The cutting speed is 50.9m/min.

FEED OF THE MAIN SPINDLE (vf)

$$vf = fr \cdot n \text{(mm/min)}$$

vf (mm/min) : Feed Speed of the Main Spindle (Z axis)
fr (mm/rev) : Feed per Revolution
n (min^{-1}) : Main Axis Spindle Speed



(Problem) What is the spindle feed (vf) when the feed per revolution is 0.2mm/rev and main axis spindle speed is 1350min^{-1} ?

(Answer) Substitute f=0.2, n=1350 into the formula

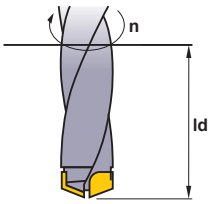
$$vf = f \times n = 0.2 \times 1350 = 270 \text{mm/min}$$

The spindle feed is 270mm/min.

DRILLING TIME (Tc)

$$Tc = \frac{ld \cdot i}{n \cdot fr}$$

Tc (min) : Drilling Time
n (min^{-1}) : Spindle Speed
ld (mm) : Hole Depth
fr (mm/rev) : Feed per Revolution
i : Number of Holes



(Problem) What is the drilling time required for drilling a 30mm length hole in alloy steel (JIS SCM440) at a cutting speed of 50m/min and a feed 0.15mm/rev ?

(Answer) Spindle Speed $n = \frac{50 \times 1000}{15 \times 3.14} = 1061.57 \text{min}^{-1}$

$$Tc = \frac{30 \times 1}{1061.57 \times 0.15} = 0.188$$

$$= 0.188 \times 60 \fallingdotseq 11.3 \text{ sec}$$

METALLIC MATERIALS CROSS REFERENCE LIST

CARBON STEEL

Japan	Germany		U.K.		France	Italy	Spain	Sweden	USA	China
JIS	W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	AISI/SAE	GB
STKM 12A STKM 12C	1.0038	RSt.37-2	4360 40 C	–	E 24-2 Ne	–	–	1311	A570.36	15
–	1.0401	C15	080M15	–	CC12	C15, C16	F.111	1350	1015	15
–	1.0402	C22	050A20	2C	CC20	C20, C21	F.112	1450	1020	20
SUM22	1.0715	9SMn28	230M07	1A	S250	CF9SMn28	F.2111 11SMn28	1912	1213	Y15
SUM22L	1.0718	9SMnPb28	–	–	S250Pb	CF9SMnPb28	11SMnPb28	1914	12L13	–
–	1.0722	10SPb20	–	–	10PbF2	CF10Pb20	10SPb20	–	–	–
–	1.0736	9SMn36	240M07	1B	S300	CF9SMn36	12SMn35	–	1215	Y13
–	1.0737	9SMnPb36	–	–	S300Pb	CF9SMnPb36	12SMnP35	1926	12L14	–
S15C	1.1141	Ck15	080M15	32C	XC12	C16	C15K	1370	1015	15
S25C	1.1158	Ck25	–	–	–	–	–	–	1025	25
–	1.8900	StE380	4360 55 E	–	–	FeE390KG	–	2145	A572-60	–
–	1.0501	C35	060A35	–	CC35	C35	F.113	1550	1035	35
–	1.0503	C45	080M46	–	CC45	C45	F.114	1650	1045	45
–	1.0726	35S20	212M36	8M	35MF4	–	F210G	1957	1140	–
–	1.1157	40Mn4	150M36	15	35M5	–	–	–	1039	40Mn
SMn438(H)	1.1167	36Mn5	–	–	40M5	–	36Mn5	2120	1335	35Mn2
SCMn1	1.1170	28Mn6	150M28	14A	20M5	C28Mn	–	–	1330	30Mn
S35C	1.1183	Cf35	060A35	–	XC38TS	C36	–	1572	1035	35Mn
S45C	1.1191	Ck45	080M46	–	XC42	C45	C45K	1672	1045	Ck45
S50C	1.1213	Cf53	060A52	–	XC48TS	C53	–	1674	1050	50
–	1.0535	C55	070M55	9	–	C55	–	1655	1055	55
–	1.0601	C60	080A62	43D	CC55	C60	–	–	1060	60
S55C	1.1203	Ck55	070M55	–	XC55	C50	C55K	–	1055	55
S58C	1.1221	Ck60	080A62	43D	XC60	C60	–	1678	1060	60Mn
–	1.1274	Ck101	060A96	–	XC100	–	F.5117	1870	1095	–
SK3	1.1545	C105W1	BW1A	–	Y105	C36KU	F.5118	1880	W1	–
SUP4	1.1545	C105W1	BW2	–	Y120	C120KU	F.515	2900	W210	–

ALLOY STEEL

Japan	Germany		U.K.		France	Italy	Spain	Sweden	USA	China
JIS	W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	AISI/SAE	GB
SM400A, SM400B SM400C	1.0144	St.44.2	4360 43 C	–	E28-3	–	–	1412	A573-81	–
SM490A, SM490B SM490C	1.0570	St52-3	4360 50 B	–	E36-3	Fe52BFN Fe52CFN	–	2132	–	–
–	1.0841	St52-3	150M19	–	20MC5	Fe52	F.431	2172	5120	–
–	1.0904	55Si7	250A53	45	55S7	55Si8	56Si7	2085	9255	55Si2Mn
–	1.0961	60SiCr7	–	–	60SC7	60SiCr8	60SiCr8	–	9262	–
SUJ2	1.3505	100Cr6	534A99	31	100C6	100Cr6	F.131	2258	ASTM 52100	Gr15, 45G
–	1.5415	15Mo3	1501-240	–	15D3	16Mo3KW	16Mo3	2912	ASTM A204Gr.A	–
–	1.5423	16Mo5	1503-245-420	–	–	16Mo5	16Mo5	–	4520	–
–	1.5622	14Ni6	–	–	16N6	14Ni6	15Ni6	–	ASTM A350LF5	–
–	1.5662	X8Ni9	1501-509-510	–	–	X10Ni9	XBNi09	–	ASTM A353	–
SNC236	1.5710	36NiCr6	640A35	111A	35NC6	–	–	–	3135	–
SNC415(H)	1.5732	14NiCr10	–	–	14NC11	16NiCr11	15NiCr11	–	3415	–
SNC815(H)	1.5752	14NiCr14	655M13	36A	12NC15	–	–	–	3415, 3310	–
SNCM220(H)	1.6523	21NiCrMo2	805M20	362	20NCD2	20NiCrMo2	20NiCrMo2	2506	8620	–
SNCM240	1.6546	40NiCrMo22	311-Type 7	–	–	40NiCrMo2(KB)	40NiCrMo2	–	8740	–
–	1.6587	17CrNiMo6	820A16	–	18NCD6	–	14NiCrMo13	–	–	–
SCr415(H)	1.7015	15Cr3	523M15	–	12C3	–	–	–	5015	15Cr

Japan	Germany		U.K.		France	Italy	Spain	Sweden	USA	China
JIS	W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	AISI/SAE	GB
SCr440	1.7045	42Cr4	–	–	–	–	42Cr4	2245	5140	40Cr
SUP9(A)	1.7176	55Cr3	527A60	48	55C3	–	–	–	5155	20CrMn
SCM415(H)	1.7262	15CrMo5	–	–	12CD4	–	12CrMo4	2216	–	–
–	1.7335	13CrMo4 4	1501-620Gr27	–	15CD3.5 15CD4.5	14CrMo45	14CrMo45	–	ASTM A182 F11, F12	–
–	1.7380	10CrMo910	1501-622 Gr31, 45	–	12CD9 12CD10	12CrMo9 12CrMo10	TU.H	2218	ASTM A182 F.22	–
–	1.7715	14MoV63	1503-660-440	–	–	–	13MoCrV6	–	–	–
–	1.8523	39CrMoV13 9	897M39	40C	–	36CrMoV12	–	–	–	–
–	1.6511	36CrNiMo4	816M40	110	40NCD3	38NiCrMo4(KB)	35NiCrMo4	–	9840	–
–	1.6582	34CrNiMo6	817M40	24	35NCD6	35NiCrMo6(KB)	–	2541	4340	40CrNiMoA
SCr430(H)	1.7033	34Cr4	530A32	18B	32C4	34Cr4(KB)	35Cr4	–	5132	35Cr
SCr440(H)	1.7035	41Cr4	530M40	18	42C4	41Cr4	42Cr4	–	5140	40Cr
–	1.7131	16MnCr5	(527M20)	–	16MC5	16MnCr5	16MnCr5	2511	5115	18CrMn
SCM420 SCM430	1.7218	25CrMo4	1717CDS110 708M20	–	25CD4	25CrMo4(KB)	55Cr3	2225	4130	30CrMn
SCM432 SCCRM3	1.7220	34CrMo4	708A37	19B	35CD4	35CrMo4	34CrMo4	2234	4137 4135	35CrMo
SCM 440	1.7223	41CrMo4	708M40	19A	42CD4TS	41CrMo4	42CrMo4	2244	4140 4142	40CrMoA
SCM440(H)	1.7225	42CrMo4	708M40	19A	42CD4	42CrMo4	42CrMo4	2244	4140	42CrMo 42CrMnMo
–	1.7361	32CrMo12	722M24	40B	30CD12	32CrMo12	F.124.A	2240	–	–
SUP10	1.8159	50CrV4	735A50	47	50CV4	50CrV4	51CrV4	2230	6150	50CrVA
–	1.8509	41CrAlMo7	905M39	41B	40CAD6 40CAD2	41CrAlMo7	41CrAlMo7	2940	–	–
–	1.2067	100Cr6	BL3	–	Y100C6	–	100Cr6	–	L3	CrV, 9SiCr
SKS31 SKS2, SKS3	1.2419	105WCr6	–	–	105WC13	100WCr6 107WCr5KU	105WCr5	2140	–	CrWMo
SKT4	1.2713	55NiCrMoV6	BH224/5	–	55NCDV7	–	F.520.S	–	L6	5CrNiMo
–	1.5662	X8Ni9	1501-509	–	–	X10Ni9	XBNi09	–	ASTM A353	–
–	1.5680	12Ni19	–	–	Z18N5	–	–	–	2515	–
–	1.6657	14NiCrMo134	832M13	36C	–	15NiCrMo13	14NiCrMo131	–	–	–
SKD1	1.2080	X210Cr12	BD3	–	Z200C12	X210Cr13KU X250Cr12KU	X210Cr12	–	D3 ASTM D3	Cr12
SKD11	1.2601	X153CrMoV12	BD2	–	–	X160CrMoV12	–	–	D2	Cr12MoV
SKD12	1.2363	X100CrMoV5	BA2	–	Z100CDV5	X100CrMoV5	F.5227	2260	A2	Cr5Mo1V
SKD61	1.2344	X40CrMoV51 X40CrMoV51	BH13	–	Z40CDV5	X35CrMoV05KU X40CrMoV51KU	X40CrMoV5	2242	H13 ASTM H13	40CrMoV5
SKD2	1.2436	X210CrW12	–	–	–	X215CrW121KU	X210CrW12	2312	–	–
–	1.2542	45WCrV7	BS1	–	–	45WCrV8KU	45WCrSi8	2710	S1	–
SKD5	1.2581	X30WCrV93	BH21	–	Z30WCV9	X28W09KU	X30WCrV9	–	H21	30WCrV9
–	1.2601	X165CrMoV12	–	–	–	X165CrMoW12KU	X160CrMoV12	2310	–	–
SKS43	1.2833	100V1	BW2	–	Y1105V	–	–	–	W210	V
SKH3	1.3255	S 18-1-2-5	BT4	–	Z80WKCV	X78WCo1805KU	HS18-1-1-5	–	T4	W18Cr4VCo5
SKH2	1.3355	S 18-0-1	BT1	–	Z80WCV	X75W18KU	HS18-0-1	–	T1	–
SCMnH/1	1.3401	G-X120Mn12	Z120M12	–	Z120M12	XG120Mn12	X120MN12	–	–	–
SUH1	1.4718	X45CrSi93	401S45	52	Z45CS9	X45CrSi8	F.322	–	HW3	X45CrSi93
SUH3	1.3343	S6-5-2	4959BA2	–	Z40CSD10	15NiCrMo13	–	2715	D3	–
SKH9, SKH51	1.3343	S6/5/2	BM2	–	Z85WDCV	HS6-5-2-2	F.5603	2722	M2	–
–	1.3348	S 2-9-2	–	–	–	HS2-9-2	HS2-9-2	2782	M7	–
SKH55	1.3243	S6/5/2/5	BM35	–	6-5-2-5	HS6-5-2-5	F.5613	2723	M35	–

METALLIC MATERIALS CROSS REFERENCE LIST

STAINLESS STEEL (FERRITIC,MARTENSITIC)

Japan	Germany		U.K.		France	Italy	Spain	Sweden	USA	China
JIS	W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	AISI/SAE	GB
SUS403	1.4000	X7Cr13	403S17	–	Z6C13	X6Cr13	F.3110	2301	403	OCr13 1Cr12
–	1.4001	X7Cr14	–	–	–	–	F.8401	–	–	–
SUS416	1.4005	X12CrS13	416S21	–	Z11CF13	X12CrS13	F.3411	2380	416	–
SUS410	1.4006	X10Cr13	410S21	56A	Z10C14	X12Cr13	F.3401	2302	410	1Cr13
SUS430	1.4016	X8Cr17	430S15	60	Z8C17	X8Cr17	F.3113	2320	430	1Cr17
SCS2	1.4027	G-X20Cr14	420C29	56B	Z20C13M	–	–	–	–	–
SUS420J2	1.4034	X46Cr13	420S45	56D	Z40CM Z38C13M	X40Cr14	F.3405	2304	–	4Cr13
–	1.4003	–	405S17	–	Z8CA12	X6CrAl13	–	–	405	–
–	1.4021	–	420S37	–	Z8CA12	X20Cr13	–	2303	420	–
SUS431	1.4057	X22CrNi17	431S29	57	Z15CNi6.02	X16CrNi16	F.3427	2321	431	1Cr17Ni2
SUS430F	1.4104	X12CrMoS17	–	–	Z10CF17	X10CrS17	F.3117	2383	430F	Y1Cr17
SUS434	1.4113	X6CrMo17	434S17	–	Z8CD17.01	X8CrMo17	–	2325	434	1Cr17Mo
SCS5	1.4313	X5CrNi134	425C11	–	Z4CND13.4M	(G)X6CrNi304	–	2385	CA6-NM	–
SUS405	1.4724	X10CrA113	403S17	–	Z10C13	X10CrA112	F.311	–	405	OCr13Al
SUS430	1.4742	X10CrA118	430S15	60	Z10CAS18	X8Cr17	F.3113	–	430	Cr17
SUH4	1.4747	X80CrNiSi20	443S65	59	Z80CSN20.02	X80CrSiNi20	F.320B	–	HNV6	–
SUH446	1.4762	X10CrA124	–	–	Z10CAS24	X16Cr26	–	2322	446	2Cr25N
SUH35	1.4871	X53CrMnNiN219	349S54	–	Z52CMN21.09	X53CrMnNiN219	–	–	EV8	5Cr2Mn9Ni4N
–	1.4521	X1CrMoTi182	–	–	–	–	–	2326	S44400	–
–	1.4922	X20CrMoV12-1	–	–	–	X20CrMoNi1201	–	2317	–	–
–	1.4542	–	–	–	Z7CNU17-04	–	–	–	630	–

STAINLESS STEEL (AUSTENITIC)

Japan	Germany		U.K.		France	Italy	Spain	Sweden	USA	China
JIS	W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	AISI/SAE	GB
SUS304L	1.4306	X2CrNi1911	304S11	–	Z2CN18.10	X2CrNi18.11	–	2352	304L	OCr19Ni10
SUS304	1.4350	X5CrNi189	304S11	58E	Z6CN18.09	X5CrNi1810	F.3551 F.3541 F.3504	2332	304	OCr18Ni9
SUS303	1.4305	X12CrNiS188	303S21	58M	Z10CNF18.09	X10CrNiS18.09	F.3508	2346	303	1Cr18Ni9MoZr
SUS304L	–	–	304C12	–	Z3CN19.10	–	–	2333	–	–
SCS19	1.4306	X2CrNi189	304S12	–	Z2CrNi1810	X2CrNi18.11	F.3503	2352	304L	–
SUS301	1.4310	X12CrNi177	–	–	Z12CN17.07	X12CrNi1707	F.3517	2331	301	Cr17Ni7
SUS304LN	1.4311	X2CrNiN1810	304S62	–	Z2CN18.10	–	–	2371	304LN	–
SUS316	1.4401	X5CrNiMo1810	316S16	58J	Z6CND17.11	X5CrNiMo1712	F.3543	2347	316	0Cr17Ni11Mo2
SCS13	1.4308	G-X6CrNi189	304C15	–	Z6CN18.10M	–	–	–	–	–
SCS14	1.4408	G-X6CrNiMo1810	316C16	–	–	–	F.8414	–	–	–
SCS22	1.4581	G-X5CrNiMoNb1810	318C17	–	Z4CNDNb1812M	XG8CrNiMo1811	–	–	–	–
SUS316LN	1.4429	X2CrNiMoN1813	–	–	Z2CND17.13	–	–	2375	316LN	OCr17Ni13Mo
–	1.4404	–	316S13	–	Z2CND17.12	X2CrNiMo1712	–	2348	316L	–
SCS16 SUS316L	1.4435	X2CrNiMo1812	316S13	–	Z2CND17.12	X2CrNiMo1712	–	2353	316L	OCr27Ni12Mo3
–	1.4436	–	316S13	–	Z6CND18-12-03	X8CrNiMo1713	–	2343, 2347	316	–
SUS317L	1.4438	X2CrNiMo1816	317S12	–	Z2CND19.15	X2CrNiMo1816	–	2367	317L	OOCr19Ni13Mo
–	1.4539	X1NiCrMo	–	–	Z6CNT18.10	–	–	2562	UNS V 0890A	–
SUS321	1.4541	X10CrNiTi189	321S12	58B	Z6CNT18.10	X6CrNiTi1811	F.3553 F.3523	2337	321	1Cr18NI9Ti
SUS347	1.4550	X10CrNiNb189	347S17	58F	Z6CNNb18.10	X6CrNiNb1811	F.3552 F.3524	2338	347	1Cr18Ni11Nb
–	1.4571	X10CrNiMoTi1810	320S17	58J	Z6CNDT17.12	X6CrNiMoTi1712	F.3535	2350	316Ti	Cr18Ni12Mo2T
–	1.4583	X10CrNiMoNb1812	–	–	Z6CNDNb1713B	X6CrNiMoNb1713	–	–	318	Cr17Ni12Mo3Mb

Japan	Germany		U.K.		France	Italy	Spain	Sweden	USA	China
JIS	W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	AISI/SAE	GB
SUH309	1.4828	X15CrNiSi2012	309S24	–	Z15CNS20.12	X6CrNi2520	–	–	309	1Cr23Ni13
SUH310	1.4845	X12CrNi2521	310S24	–	Z12CN2520	X6CrNi2520	F.331	2361	310S	OCr25Ni20
SCS17	1.4406	X10CrNi18.08	–	58C	Z1NCDU25.20	–	F.8414	2370	308	–
–	1.4418	X4CrNiMo165	–	–	Z6CND16-04-01	–	–	–	–	–
–	1.4568 1.4504	–	316S111	–	Z8CNA17-07	X2CrNiMo1712	–	–	17-7PH	–
–	1.4563	–	–	–	Z1NCDU31-27-03 Z1CNDU20-18-06AZ	–	–	2584 2378	NO8028 S31254	–
SUS321	1.4878	X12CrNiTi189	321S32	58B, 58C	Z6CNT18.12B	X6CrNiTi18 11	F.3523	–	321	1Cr18Ni9Ti

HEAT RESISTANT STEELS

Japan	Germany		U.K.		France	Italy	Spain	Sweden	USA	China
JIS	W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	AISI/SAE	GB
SUH330	1.4864	X12NiCrSi3616	–	–	Z12NCS35.16	–	–	–	330	–
SCH15	1.4865	G-X40NiCrSi3818	330C11	–	–	XG50NiCr3919	–	–	HT, HT 50	–

GRAY CAST IRON

Japan	Germany		U.K.		France	Italy	Spain	Sweden	USA	China
JIS	W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	AISI/SAE	GB
–	–	–	–	–	–	–	–	0100	–	–
FC100	–	GG 10	–	–	Ft 10 D	–	–	0110	No 20 B	–
FC150	0.6015	GG 15	Grade 150	–	Ft 15 D	G15	FG15	0115	No 25 B	HT150
FC200	0.6020	GG 20	Grade 220	–	Ft 20 D	G20	–	0120	No 30 B	HT200
FC250	0.6025	GG 25	Grade 260	–	Ft 25 D	G25	FG25	0125	No 35 B	HT250
–	–	–	–	–	–	–	–	–	No 40 B	–
FC300	0.6030	GG 30	Grade 300	–	Ft 30 D	G30	FG30	0130	No 45 B	HT300
FC350	0.6035	GG 35	Grade 350	–	Ft 35 D	G35	FG35	0135	No 50 B	HT350
–	0.6040	GG 40	Grade 400	–	Ft 40 D	–	–	0140	No 55 B	HT400
–	0.6660	GGL NiCr202	L-NiCuCr202	–	L-NC 202	–	–	0523	A436 Type 2	–

DUCTILE CAST IRON

Japan	Germany		U.K.		France	Italy	Spain	Sweden	USA	China
JIS	W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	AISI/SAE	GB
FCD400	0.7040	GGG 40	SNG 420/12	–	FCS 400-12	GS 370-17	FGE 38-17	07 17-02	60-40-18	QT400-18
–	–	GGG 40.3	SNG 370/17	–	FGS 370-17	–	–	07 17-12	–	–
–	0.7033	GGG 35.3	–	–	–	–	–	07 17-15	–	–
FCD500	0.7050	GGG 50	SNG 500/7	–	FGS 500-7	GS 500	FGE 50-7	07 27-02	80-55-06	QT500-7
–	0.7660	GGG NiCr202	Grade S6	–	S-NC202	–	–	07 76	A43D2	–
–	–	GGG NiMn137	L-NiMn 137	–	L-MN 137	–	–	07 72	–	–
FCD600	–	GGG 60	SNG 600/3	–	FGS 600-3	–	–	07 32-03	–	QT600-3
FCD700	0.7070	GGG 70	SNG 700/2	–	FGS 700-2	GS 700-2	FGS 70-2	07 37-01	100-70-03	QT700-18

MALLEABLE CAST IRON

Japan	Germany		U.K.		France	Italy	Spain	Sweden	USA	China
JIS	W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	AISI/SAE	GB
FCMB310	–	–	8 290/6	–	MN 32-8	–	–	08 14	–	–
FCMW330	–	GTS-35	B 340/12	–	MN 35-10	–	–	08 15	32510	–
FCMW370	0.8145	GTS-45	P 440/7	–	Mn 450	GMN45	–	08 52	40010	–
FCMP490	0.8155	GTS-55	P 510/4	–	MP 50-5	GMN55	–	08 54	50005	–
FCMP540	–	GTS-65	P 570/3	–	MP 60-3	–	–	08 58	70003	–
FCMP590	0.8165	GTS-65-02	P 570/3	–	Mn 650-3	GMN 65	–	08 56	A220-70003	–
FCMP690	–	GTS-70-02	P 690/2	–	Mn 700-2	GMN 70	–	08 62	A220-80002	–

DIE STEELS

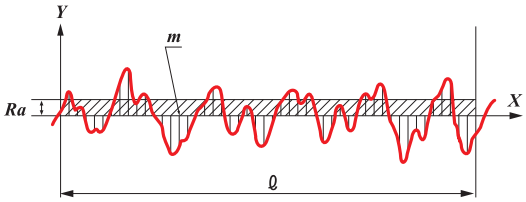
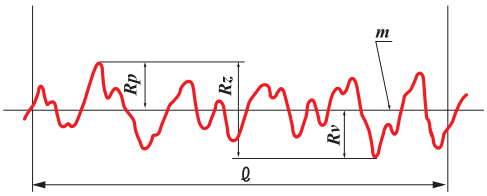
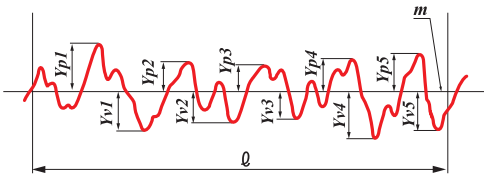
Classification	JIS (Others)	Aichi Steel Works	Uddeholm	Kobe Steel, Ltd.	Sumitomo Metal Industries, Ltd.	Daido Steel Co., Ltd.	Nippon Koshuha	Hitachi Metals, Ltd.	Mitsubishi Steel Manufacturing Co., Ltd.
Carbon Steel for Machine Structure	S50C	AUK1		KTSM2A	SD10	PDS1	KPM1		MT50C
	I			KTSM21	SD17	PXZ			
	S55C			KTSM22	SD21				
Alloy Steel for Machine Structure	SCM440	AUK11		KTSM3A	SD61	PDS3			
	I			KTSM31					
	SCM445		HOLDAX						
Carbon Tool Steel	SK3	SK3				YK3	K3	YC3	
Alloy Tool Steel (For Cold Working)	SKS3	SKS3				GOA	KS3	SGT	
	SKS31					GO31	K31		
	SKS93	SK301				YK30	K3M	YCS3	
	SKD1						KD1	CRD	
	SKD11	SKD11		KAD181		DC11	KD11	SLD	
	SKD11	AUD11				DC3	KD11V	SLD2	
	SKD11						KDQ		
	SKD12		RIGOR			DC12	KD12	SCD	
		SX4							
		SX44							
		SX105V					FH5		
		TCD							
						DC53	KD21	SLD8	
						PD613			
						GO4		ACD37	
						GO5		HMD5	
						GO40F		HPM2T	
								YSM	
								HPM31	
								HMD1	
							KDM5	HMD5	
							KD11S	ACD6	
								ACD8	
								ACD9	
Alloy Tool Steel (For Cold Working and Others)	(P20)		IMPAX	KTSM3M		PX5	KPM30	HPM2	MT24M
	(P20)							HPM7	
	(P21)			KTSM40EF		NAK55	KAP	HPM1	
				KTSM40E		NAK80	KAP2	HPM50	
						GLD2		CENA1	
Alloy Tool Steel (For Hot Working)	SKD4					DH4	KD4	YDC	
	SKD5					DH5	KD5	HDC	
	SKD6					DH6	KD6		
	SKD61	SKD61	Over M Suprem			DHA1	KDA	DAC	
	SKD61						MFA		
	SKD62	SKD62				DH62	KDB	DBC	
	SKT4					GFA	KTV	DM	
	SKD7					DH72	KDH1	YEM	
	(H10)					DH73			
	SKD8					DH41	KDF	MDC	
			QRO80M						
								YHD40	
						DH71			
						DH42			
						DH21			
							KDW		
							KDHM		
							AE31		
								YEM4	
								YHD50	
	SKT4	SKT4A						YHD26	
	6F4	MPH							
	SKT4								
						DH31	KDA1	DAC3	
							KDA5	DAC10	
								DAC40	
						GF78		DAC45	
						DH76		DAC55	
							TD3		
						DH2F	KDAS	FDAC	
								YHD3	
								MDC−K	
								YEM−K	

Classification	JIS (Others)	Aichi Steel Works	Uddeholm	Kobe Steel, Ltd.	Sumitomo Metal Industries, Ltd.	Daido Steel Co., Ltd.	Nippon Koshuha	Hitachi Metals, Ltd.	Mitsubishi Steel Manufacturing Co., Ltd.
High-speed Tool Steel	SKH51					MH51	H51	YXM1	
	SKH55					MH55	HM35	YXM4	
	SKH57					MH57	MV10	XVC5	
						MH8	NK4	YXM60	
						MH24			
						MH7V1			
						MH64			
						VH54	HV2	XVC11	
							HM3	YXM7	
						MH85	KDMV	YXR3	
						MH88	HM9TL	YXR4	
								YXR7	
								YXR35	
Powder High-speed Tool Steel			ASP23	KHA32		DEX20		HAP10	
			ASP30	KHA30		DEX40		HAP40	
				KHA3VN		DEX60		HAP50	
				KHA30N		DEX70		HAP63	
				KHA33N		DEX80		HAP72	
				KHA50					
				KHA77					
			ASP60	KHA60					
Stainless Steel	SUS403					GLD1			
	SUS420		STAVAX			S—STAR	KSP1	HPM38	
	SUS440C		ELMAX (Powder)	KAS440 (Powder)		SUS440C	KSP3		
	SUS420							SUS420	
	SUS630					NAK101	U630	PSL	
	(414)								
Maraging Steel						MAS1C	KMS18—20	YAG	DMG300
Heat Resistant Alloy								HRNC	
Forged Tool								ICD1	
								ICD5	

SURFACE ROUGHNESS

SURFACE ROUGHNESS

(From JIS B 0601-1994)

Type	Code	Determination	Determination Example (Figure)
Arithmetical Mean Roughness	Ra	Ra means the value obtained by the following formula and expressed in micrometer (μm) when sampling only the reference length from the roughness curve in the direction of the mean line, taking X-axis in the direction of mean line and Y-axis in the direction of longitudinal magnification of this sampled part and the roughness curve is expressed by y=f(x): $Ra=\frac{1}{\ell}\int_0^{\ell}\{f(x)\}dx$	
Maximum Height	Rz	Rz shall be that only when the reference length is sampled from the roughness curve in the direction of the mean line, the distance between the top profile peak line and the bottom profile valley line on this sampled portion is measured in the longitudinal magnification direction of roughness curve and the obtained value is expressed in micrometer (μm). (Note) When finding Rz, a portion without an exceptionally high peak or low valley, which may be regarded as a flaw, is selected as the sampling length. $Rz=R_P+Rv$	
Ten-Point Mean Roughness	RzJIS	RzJIS shall be that only when the reference length is sampled from the roughness curve in the direction of its mean line, the sum of the average value of absolute values of the heights of five highest profile peaks (Yp) and the depths of five deepest profile valleys (Yv) measured in the vertical magnification direction from the mean line of this sampled portion and this sum is expressed in micrometer (μm). $Rz_{JIS}=\frac{(Yp1+Yp2+Yp3+Yp4+Yp5)+(Yv1+Yv2+Yv3+Yv4+Yv5)}{5}$	 $Yp1,Yp2,Yp3,Yp4,Yp5$: altitudes of the five highest profile peaks of the sampled portion corresponding to the reference length l. $Yv1,Yv2,Yv3,Yv4,Yv5$: altitudes of the five deepest profile valleys of the sampled portion corresponding to the reference length l.

RELATIONSHIP BETWEEN ARITHMETICAL MEAN (Ra) AND CONVENTIONAL DESIGNATION (REFERENCE DATA)

Arithmetical Mean Roughness Ra		Max. Height Rz	Ten-Point Mean Roughness RzJIS	Sampling Length for Rz • RzJIS l (mm)	Conventional Finish Mark
Standard Series	Cutoff Value λc (mm)	Standard Series			
0.012 a	0.08	0.05s	0.05z	0.08	▽▽▽▽
0.025 a	0.25	0.1 s	0.1 z		
0.05 a		0.2 s	0.2 z	0.25	
0.1 a	0.8	0.4 s	0.4 z		
0.2 a		0.8 s	0.8 z	0.8	
0.4 a		1.6 s	1.6 z		▽▽▽
0.8 a		3.2 s	3.2 z		
1.6 a		6.3 s	6.3 z		
3.2 a	2.5	12.5 s	12.5 z	2.5	▽▽
6.3 a		25 s	25 z		
12.5 a	8	50 s	50 z		▽
25 a		100 s	100 z	8	
50 a		200 s	200 z		—
100 a	—	400 s	400 z	—	

*The correlation among the three is shown for convenience and is not exact.
*Ra: The evaluation length of Rz and RzJIS is the cutoff value and sampling length multiplied by 5, respectively.

HARDNESS COMPARISON TABLE

HARDNESS CONVERSION NUMBERS OF STEEL

Brinell Hardness (HB) 10mm Ball,Load: 3,000 kgf		Vickers Hardness	Rockwell Hardness				Shore Hardness	Tensile Strength (Approx.)
Standard Ball	Tungsten Carbide Ball		A Scale, Load:60kgf, Diamond Point	B Scale, Load:100kgf, 1/16" Ball	C Scale, Load:150kgf, Diamond Point	D Scale, Load:100kgf, Diamond Point		
		(HV)	(HRA)	(HRB)	(HRC)	(HRD)	(HS)	Mpa
—	—	940	85.6	—	68.0	76.9	97	—
—	—	920	85.3	—	67.5	76.5	96	—
—	—	900	85.0	—	67.0	76.1	95	—
—	(767)	880	84.7	—	66.4	75.7	93	—
—	(757)	860	84.4	—	65.9	75.3	92	—
—	(745)	840	84.1	—	65.3	74.8	91	—
—	(733)	820	83.8	—	64.7	74.3	90	—
—	(722)	800	83.4	—	64.0	73.8	88	—
—	(712)	—	—	—	—	—	—	—
—	(710)	780	83.0	—	63.3	73.3	87	—
—	(698)	760	82.6	—	62.5	72.6	86	—
—	(684)	740	82.2	—	61.8	72.1	—	—
—	(682)	737	82.2	—	61.7	72.0	84	—
—	(670)	720	81.8	—	61.0	71.5	83	—
—	(656)	700	81.3	—	60.1	70.8	—	—
—	(653)	697	81.2	—	60.0	70.7	81	—
—	(647)	690	81.1	—	59.7	70.5	—	—
—	(638)	680	80.8	—	59.2	70.1	80	—
—	630	670	80.6	—	58.8	69.8	—	—
—	627	667	80.5	—	58.7	69.7	79	—
—	—	677	80.7	—	59.1	70.0	—	—
—	601	640	79.8	—	57.3	68.7	77	—
—	—	640	79.8	—	57.3	68.7	—	—
—	578	615	79.1	—	56.0	67.7	75	—
—	—	607	78.8	—	55.6	67.4	—	—
—	555	591	78.4	—	54.7	66.7	73	2055
—	—	579	78.0	—	54.0	66.1	—	2015
—	534	569	77.8	—	53.5	65.8	71	1985
—	—	533	77.1	—	52.5	65.0	—	1915
—	514	547	76.9	—	52.1	64.7	70	1890
(495)	—	539	76.7	—	51.6	64.3	—	1855
—	—	530	76.4	—	51.1	63.9	—	1825
	495	528	76.3	—	51.0	63.8	68	1820
(477)	—	516	75.9	—	50.3	63.2	—	1780
—	—	508	75.6	—	49.6	62.7	—	1740
	477	508	75.6	—	49.6	62.7	66	1740
(461)	—	495	75.1	—	48.8	61.9	—	1680
—	—	491	74.9	—	48.5	61.7	—	1670
	461	491	74.9	—	48.5	61.7	65	1670
444	—	474	74.3	—	47.2	61.0	—	1595
—	—	472	74.2	—	47.1	60.8	—	1585
—	444	472	74.2	—	47.1	60.8	63	1585

Brinell Hardness (HB) 10mm Ball,Load: 3,000 kgf		Vickers Hardness	Rockwell Hardness				Shore Hardness	Tensile Strength (Approx.)
Standard Ball	Tungsten Carbide Ball		A Scale, Load:60kgf, Diamond Point	B Scale, Load:100kgf, 1/16" Ball	C Scale, Load:150kgf, Diamond Point	D Scale, Load:100kgf, Diamond Point		
		(HV)	(HRA)	(HRB)	(HRC)	(HRD)	(HS)	Mpa
429	429	455	73.4	—	45.7	59.7	61	1510
415	415	440	72.8	—	44.5	58.8	59	1460
401	401	425	72.0	—	43.1	57.8	58	1390
388	388	410	71.4	—	41.8	56.8	56	1330
375	375	396	70.6	—	40.4	55.7	54	1270
363	363	383	70.0	—	39.1	54.6	52	1220
352	352	372	69.3	(110.0)	37.9	53.8	51	1180
341	341	360	68.7	(109.0)	36.6	52.8	50	1130
331	331	350	68.1	(108.5)	35.5	51.9	48	1095
321	321	339	67.5	(108.0)	34.3	51.0	47	1060
311	311	328	66.9	(107.5)	33.1	50.0	46	1025
302	302	319	66.3	(107.0)	32.1	49.3	45	1005
293	293	309	65.7	(106.0)	30.9	48.3	43	970
285	285	301	65.3	(105.5)	29.9	47.6	—	950
277	277	292	64.6	(104.5)	28.8	46.7	41	925
269	269	284	64.1	(104.0)	27.6	45.9	40	895
262	262	276	63.6	(103.0)	26.6	45.0	39	875
255	255	269	63.0	(102.0)	25.4	44.2	38	850
248	248	261	62.5	(101.0)	24.2	43.2	37	825
241	241	253	61.8	100	22.8	42.0	36	800
235	235	247	61.4	99.0	21.7	41.4	35	785
229	229	241	60.8	98.2	20.5	40.5	34	765
223	223	234	—	97.3	(18.8)	—	—	—
217	217	228	—	96.4	(17.5)	—	33	725
212	212	222	—	95.5	(16.0)	—	—	705
207	207	218	—	94.6	(15.2)	—	32	690
201	201	212	—	93.8	(13.8)	—	31	675
197	197	207	—	92.8	(12.7)	—	30	655
192	192	202	—	91.9	(11.5)	—	29	640
187	187	196	—	90.7	(10.0)	—	—	620
183	183	192	—	90.0	(9.0)	—	28	615
179	179	188	—	89.0	(8.0)	—	27	600
174	174	182	—	87.8	(6.4)	—	—	585
170	170	178	—	86.8	(5.4)	—	26	570
167	167	175	—	86.0	(4.4)	—	—	560
163	163	171	—	85.0	(3.3)	—	25	545
156	156	163	—	82.9	(0.9)	—	—	525
149	149	156	—	80.8	—	—	23	505
143	143	150	—	78.7	—	—	22	490
137	137	143	—	76.4	—	—	21	460
131	131	137	—	74.0	—	—	—	450
126	126	132	—	72.0	—	—	20	435
121	121	127	—	69.8	—	—	19	415
116	116	122	—	67.6	—	—	18	400
111	111	117	—	65.7	—	—	15	385

(Note 1) Above list is the same as that at AMS Metals Hand book with tensile strength in approximate metric value and Brinell hardness over a recommended range.

(Note 2) 1MPa=1N/mm^2

(Note 3) Figures in ( ) are rarely used and are included for reference. This list has been taken from JIS Handbook Steel I.

FIT TOLERANCE TABLE (HOLE)

Classification of Standard Dimensions (mm)		Class of Geometrical Tolerance Zone of Holes														
>	≤	B10	C9	C10	D8	D9	D10	E7	E8	E9	F6	F7	F8	G6	G7	H6	H7
—	3	+180 +140	+85 +60	+100 +60	+34 +20	+45 +20	+60 +20	+24 +14	+28 +14	+39 +14	+12 +6	+16 +6	+20 +6	+8 +2	+12 +2	+6 0	+10 0
3	6	+188 +140	+100 +70	+118 +70	+48 +30	+60 +30	+78 +30	+32 +20	+38 +20	+50 +20	+18 +10	+22 +10	+28 +10	+12 +4	+16 +4	+8 0	+12 0
6	10	+208 +150	+116 +80	+138 +80	+62 +40	+76 +40	+98 +40	+40 +25	+47 +25	+61 +25	+22 +13	+28 +13	+35 +13	+14 +5	+20 +5	+9 0	+15 0
10	14	+220 +150	+138 +95	+165 +95	+77 +50	+93 +50	+120 +50	+50 +32	+59 +32	+75 +32	+27 +16	+34 +16	+43 +16	+17 +6	+24 +6	+11 0	+18 0
14	18																
18	24	+244 +160	+162 +110	+194 +110	+98 +65	+117 +65	+149 +65	+61 +40	+73 +40	+92 +40	+33 +20	+41 +20	+53 +20	+20 +7	+28 +7	+13 0	+21 0
24	30																
30	40	+270 +170	+182 +120	+220 +120	+119	+142	+180	+75	+89	+112	+41	+50	+64	+25	+34	+16	+25
40	50	+280 +180	+192 +130	+230 +130	+80	+80	+80	+50	+50	+50	+25	+25	+25	+9	+9	0	0
50	65	+310 +190	+214 +140	+260 +140	+146	+174	+220	+90	+106	+134	+49	+60	+76	+29	+40	+19	+30
65	80	+320 +200	+224 +150	+270 +150	+100	+100	+100	+60	+60	+60	+30	+30	+30	+10	+10	0	0
80	100	+360 +220	+257 +170	+310 +170	+174	+207	+260	+107	+126	+159	+58	+71	+90	+34	+47	+22	+35
100	120	+380 +240	+267 +180	+320 +180	+120	+120	+120	+72	+72	+72	+36	+36	+36	+12	+12	0	0
120	140	+420 +260	+300 +200	+360 +200													
140	160	+440 +280	+310 +210	+370 +210	+208 +145	+245 +145	+305 +145	+125 +85	+148 +85	+185 +85	+68 +43	+83 +43	+106 +43	+39 +14	+54 +14	+25 0	+40 0
160	180	+470 +310	+330 +230	+390 +230													
180	200	+525 +340	+355 +240	+425 +240													
200	225	+565 +380	+375 +260	+445 +260	+242 +170	+285 +170	+355 +170	+146 +100	+172 +100	+215 +100	+79 +50	+96 +50	+122 +50	+44 +15	+61 +15	+29 0	+46 0
225	250	+605 +420	+395 +280	+465 +280													
250	280	+690 +480	+430 +300	+510 +300	+271 +190	+320 +190	+400 +190	+162 +110	+191 +110	+240 +110	+88 +56	+108 +56	+137 +56	+49 +17	+69 +17	+32 0	+52 0
280	315	+750 +540	+460 +330	+540 +330													
315	355	+830 +600	+500 +360	+590 +360	+299 +210	+350 +210	+440 +210	+182 +125	+214 +125	+265 +125	+98 +62	+119 +62	+151 +62	+54 +18	+75 +18	+36 0	+57 0
355	400	+910 +680	+540 +400	+630 +400													
400	450	+1010 +760	+595 +440	+690 +440	+327 +230	+385 +230	+480 +230	+198 +135	+232 +135	+290 +135	+108 +68	+131 +68	+165 +68	+60 +20	+83 +20	+40 0	+63 0
450	500	+1090 +840	+635 +480	+730 +480													

(Note) Values shown in the upper portion of respective lines are upper dimensional tolerance, while values shown in the lower portion of respective lines are lower dimensional tolerance.

Units : μm

Class of Geometrical Tolerance Zone of Holes																
H8	**H9**	**H10**	**JS6**	**JS7**	**K6**	**K7**	**M6**	**M7**	**N6**	**N7**	**P6**	**P7**	**R7**	**S7**	**T7**	**U7**	**X7**
+14 0	+25 0	+40 0	±3	±5	0 −6	0 −10	−2 −8	−2 −12	−4 −10	−4 −14	−6 −12	−6 −16	−10 −20	−14 −24	—	−18 −28	−20 −30
+18 0	+30 0	+48 0	±4	±6	+2 −6	+3 −9	−1 −9	0 −12	−5 −13	−4 −16	−9 −17	−8 −20	−11 −23	−15 −27	—	−19 −31	−24 −36
+22 0	+36 0	+58 0	±4.5	±7	+2 −7	+5 −10	−3 −12	0 −15	−7 −16	−4 −19	−12 −21	−9 −24	−13 −28	−17 −32	—	−22 −37	−28 −43
+27 0	+43 0	+70 0	±5.5	±9	+2 −9	+6 −12	−4 −15	0 −18	−9 −20	−5 −23	−15 −26	−11 −29	−16 −34	−21 −39	—	−26 −44	−33 −51 −38 −56
+33 0	+52 0	+84 0	±6.5	±10	+2 −11	+6 −15	−4 −17	0 −21	−11 −24	−7 −28	−18 −31	−14 −35	−20 −41	−27 −48	— −33 −54	−33 −54 −40 −61	−46 −67 −56 −77
+39 0	+62 0	+100 0	±8	±12	+3 −13	+7 −18	−4 −20	0 −25	−12 −28	−8 −33	−21 −37	−17 −42	−25 −50	−34 −59	−39 −64 −45 −70	−51 −76 −61 −86	—
+46 0	+74 0	+120 0	±9.5	±15	+4 −15	+9 −21	−5 −24	0 −30	−14 −33	−9 −39	−26 −45	−21 −51	−30 −60 −32 −62	−42 −72 −48 −78	−55 −85 −64 −94	−76 −106 −91 −121	—
+54 0	+87 0	+140 0	±11	±17	+4 −18	+10 −25	−6 −28	0 −35	−16 −38	−10 −45	−30 −52	−24 −59	−38 −73 −41 −76	−58 −93 −66 −101	−78 −113 −91 −126	−111 −146 −131 −166	—
+63 0	+100 0	+160 0	±12.5	±20	+4 −21	+12 −28	−8 −33	0 −40	−20 −45	−12 −52	−36 −61	−28 −68	−48 −88 −50 −90 −53 −93	−77 −117 −85 −125 −93 −133	−107 −147 −119 −159 −131 −171	—	—
+72 0	+115 0	+185 0	±14.5	±23	+5 −24	+13 −33	−8 −37	0 −46	−22 −51	−14 −60	−41 −70	−33 −79	−60 −106 −63 −109 −67 −113	−105 −151 −113 −159 −123 −169	—	—	—
+81 0	+130 0	+210 0	±16	±26	+5 −27	+16 −36	−9 −41	0 −52	−25 −57	−14 −66	−47 −79	−36 −88	−74 −126 −78 −130	—	—	—	—
+89 0	+140 0	+230 0	±18	±28	+7 −29	+17 −40	−10 −46	0 −57	−26 −62	−16 −73	−51 −87	−41 −98	−87 −144 −93 −150	—	—	—	—
+97 0	+155 0	+250 0	±20	±31	+8 −32	+18 −45	−10 −50	0 −63	−27 −67	−17 −80	−55 −95	−45 −108	−103 −166 −109 −172	—	—	—	—

TECHNICAL DATA

FIT TOLERANCE TABLE (SHAFTS)

Classification of Standard Dimensions (mm)		Class of Geometrical Tolerance Zone of Shafts													
>	≤	b9	c9	d8	d9	e7	e8	e9	f6	f7	f8	g5	g6	h5	h6	h7
—	3	−140 −165	−60 −85	−20 −34	−20 −45	−14 −24	−14 −28	−14 −39	−6 −12	−6 −16	−6 −20	−2 −6	−2 −8	0 −4	0 −6	0 −10
3	6	−140 −170	−70 −100	−30 −48	−30 −60	−20 −32	−20 −38	−20 −50	−10 −18	−10 −22	−10 −28	−4 −9	−4 −12	0 −5	0 −8	0 −12
6	10	−150 −186	−80 −116	−40 −62	−40 −76	−25 −40	−25 −47	−25 −61	−13 −22	−13 −28	−13 −35	−5 −11	−5 −14	0 −6	0 −9	0 −15
10	14	−150 −193	−95 −138	−50 −77	−50 −93	−32 −50	−32 −59	−32 −75	−16 −27	−16 −34	−16 −43	−6 −14	−6 −17	0 −8	0 −11	0 −18
14	18															
18	24	−160 −212	−110 −162	−65 −98	−65 −117	−40 −61	−40 −73	−40 −92	−20 −33	−20 −41	−20 −53	−7 −16	−7 −20	0 −9	0 −13	0 −21
24	30															
30	40	−170 −232	−120 −182	−80 −119	−80 −142	−50 −75	−50 −89	−50 −112	−25 −41	−25 −50	−25 −64	−9 −20	−9 −25	0 −11	0 −16	0 −25
40	50	−180 −242	−130 −192													
50	65	−190 −264	−140 −214	−100 −146	−100 −174	−60 −90	−60 −106	−60 −134	−30 −49	−30 −60	−30 −76	−10 −23	−10 −29	0 −13	0 −19	0 −30
65	80	−200 −274	−150 −224													
80	100	−220 −307	−170 −257	−120 −174	−120 −207	−72 −107	−72 −126	−72 −159	−36 −58	−36 −71	−36 −90	−12 −27	−12 −34	0 −15	0 −22	0 −35
100	120	−240 −327	−180 −267													
120	140	−260 −360	−200 −300	−145 −208	−145 −245	−85 −125	−85 −148	−85 −185	−43 −68	−43 −83	−43 −106	−14 −32	−14 −39	0 −18	0 −25	0 −40
140	160	−280 −380	−210 −310													
160	180	−310 −410	−230 −330													
180	200	−340 −455	−240 −355	−170 −242	−170 −285	−100 −146	−100 −172	−100 −215	−50 −79	−50 −96	−50 −122	−15 −35	−15 −44	0 −20	0 −29	0 −46
200	225	−380 −495	−260 −375													
225	250	−420 −535	−280 −395													
250	280	−480 −610	−300 −430	−190 −271	−190 −320	−110 −162	−110 −191	−110 −240	−56 −88	−56 −108	−56 −137	−17 −40	−17 −49	0 −23	0 −32	0 −52
280	315	−540 −670	−330 −460													
315	355	−600 −740	−360 −500	−210 −299	−210 −350	−125 −182	−125 −214	−125 −265	−62 −98	−62 −119	−62 −151	−18 −43	−18 −54	0 −25	0 −36	0 −57
355	400	−680 −820	−400 −540													
400	450	−760 −915	−440 −595	−230 −327	−230 −385	−135 −198	−135 −232	−135 −290	−68 −108	−68 −131	−68 −165	−20 −47	−20 −60	0 −27	0 −40	0 −63
450	500	−840 −995	−480 −635													

(Note) Values shown in the upper portion of respective lines are upper dimensional tolerance, while values shown in the lower portion of respective lines are lower dimensional tolerance.

Units : μm

Class of Geometrical Tolerance Zone of Shafts

h8	h9	js5	js6	js7	k5	k6	m5	m6	n6	p6	r6	s6	t6	u6	x6
0 −14	0 −25	±2	±3	±5	+4 0	+6 0	+6 +2	+8 +2	+10 +4	+12 +6	+16 +10	+20 +14	—	+24 +18	+26 +20
0 −18	0 −30	±2.5	±4	±6	+6 +1	+9 +1	+9 +4	+12 +4	+16 +8	+20 +12	+23 +15	+27 +19	—	+31 +23	+36 +28
0 −22	0 −36	±3	±4.5	±7	+7 +1	+10 +1	+12 +6	+15 +6	+19 +10	+24 +15	+28 +19	+32 +23	—	+37 +28	+43 +34
0 −27	0 −43	±4	±5.5	±9	+9 +1	+12 +1	+15 +7	+18 +7	+23 +12	+29 +18	+34 +23	+39 +28	—	+44 +33	+51 +40 +56 +45
0 −33	0 −52	±4.5	±6.5	±10	+11 +2	+15 +2	+17 +8	+21 +8	+28 +15	+35 +22	+41 +28	+48 +35	— +54 +41	+54 +41 +61 +48	+67 +54 +77 +64
0 −39	0 −62	±5.5	±8	±12	+13 +2	+18 +2	+20 +9	+25 +9	+33 +17	+42 +26	+50 +34	+59 +43	+64 +48 +70 +54	+76 +60 +86 +70	—
0 −46	0 −74	±6.5	±9.5	±15	+15 +2	+21 +2	+24 +11	+30 +11	+39 +20	+51 +32	+60 +41 +62 +43	+72 +53 +78 +59	+85 +66 +94 +75	+106 +87 +121 +102	—
0 −54	0 −87	±7.5	±11	±17	+18 +3	+25 +3	+28 +13	+35 +13	+45 +23	+59 +37	+73 +51 +76 +54	+93 +71 +101 +79	+113 +91 +126 +104	+146 +124 +166 +144	—
0 −63	0 −100	±9	±12.5	±20	+21 +3	+28 +3	+33 +15	+40 +15	+52 +27	+68 +43	+88 +63 +90 +65 +93 +68	+117 +92 +125 +100 +133 +108	+147 +122 +159 +134 +171 +146	—	—
0 −72	0 −115	±10	±14.5	±23	+24 +4	+33 +4	+37 +17	+46 +17	+60 +31	+79 +50	+106 +77 +109 +80 +113 +84	+151 +122 +159 +130 +169 +140	—	—	—
0 −81	0 −130	±11.5	±16	±26	+27 +4	+36 +4	+43 +20	+52 +20	+66 +34	+88 +56	+126 +94 +130 +98	—	—	—	—
0 −89	0 −140	±12.5	±18	±28	+29 +4	+40 +4	+46 +21	+57 +21	+73 +37	+98 +62	+144 +108 +150 +114	—	—	—	—
0 −97	0 −155	±13.5	±20	±31	+32 +5	+45 +5	+50 +23	+63 +23	+80 +40	+108 +68	+166 +126 +172 +132	—	—	—	—

DRILL DIAMETERS FOR PREPARED HOLES

●Metric Coarse Screw Thread

Nominal	Drill Diameter	
	HSS	Carbide
M1 ×0.25	0.75	0.75
M1.1×0.25	0.85	0.85
M1.2×0.25	0.95	0.95
M1.4×0.3	1.10	1.10
M1.6×0.35	1.25	1.30
M1.7×0.35	1.35	1.40
M1.8×0.35	1.45	1.50
M2 ×0.4	1.60	1.65
M2.2×0.45	1.75	1.80
M2.3×0.4	1.90	1.95
M2.5×0.45	2.10	2.15
M2.6×0.45	2.15	2.20
M3 ×0.5	2.50	2.55
M3.5×0.6	2.90	2.95
M4 ×0.7	3.3	3.4
M4.5×0.75	3.8	3.9
M5 ×0.8	4.2	4.3
M6 ×1.0	5.0	5.1
M7 ×1.0	6.0	6.1
M8 ×1.25	6.8	6.9
M9 ×1.25	7.8	7.9
M10 ×1.5	8.5	8.7
M11 ×1.5	9.5	9.7
M12 ×1.75	10.3	10.5
M14 ×2.0	12.0	12.2
M16 ×2.0	14.0	14.2
M18 ×2.5	15.5	15.7
M20 ×2.5	17.5	17.7
M22 ×2.5	19.5	19.7
M24 ×3.0	21.0	—
M27 ×3.0	24.0	—
M30 ×3.5	26.5	—
M33 ×3.5	29.5	—
M36 ×4.0	32.0	—
M39 ×4.0	35.0	—
M42 ×4.5	37.5	—
M45 ×4.5	40.5	—
M48 ×5.0	43.0	—

●Metric Fine Screw Thread

Nominal	Drill Diameter	
	HSS	Carbide
M1 ×0.2	0.80	0.80
M1.1×0.2	0.90	0.90
M1.2×0.2	1.00	1.00
M1.4×0.2	1.20	1.20
M1.6×0.2	1.40	1.40
M1.8×0.2	1.60	1.60
M2 ×0.25	1.75	1.75
M2.2×0.25	1.95	2.00
M2.5×0.35	2.20	2.20
M3 ×0.35	2.70	2.70
M3.5×0.35	3.20	3.20
M4 ×0.5	3.50	3.55
M4.5×0.5	4.00	4.05
M5 ×0.5	4.50	4.55
M5.5×0.5	5.00	5.05
M6 ×0.75	5.30	5.35
M7 ×0.75	6.30	6.35
M8 ×1.0	7.00	7.10
M8 ×0.75	7.30	7.35
M9 ×1.0	8.00	8.10
M9 ×0.75	8.30	8.35
M10 ×1.25	8.80	8.90
M10 ×1.0	9.00	9.10
M10 ×0.75	9.30	9.35
M11 ×1.0	10.0	10.1
M11 ×0.75	10.3	10.3
M12 ×1.5	10.5	10.7
M12 ×1.25	10.8	10.9
M12 ×1.0	11.0	11.1
M14 ×1.5	12.5	12.7
M14 ×1.0	13.0	13.1
M15 ×1.5	13.5	13.7
M15 ×1.0	14.0	14.1
M16 ×1.5	14.5	14.7
M16 ×1.0	15.0	15.1
M17 ×1.5	15.5	15.7
M17 ×1.0	16.0	16.1
M18 ×2.0	16.0	16.3
M18 ×1.5	16.5	16.7
M18 ×1.0	17.0	17.1

Nominal	Drill Diameter	
	HSS	Carbide
M20 ×2.0	18.0	18.3
M20 ×1.5	18.5	18.7
M20 ×1.0	19.0	19.1
M22 ×2.0	20.0	—
M22 ×1.5	20.5	—
M22 ×1.0	21.0	—
M24 ×2.0	22.0	—
M24 ×1.5	22.5	—
M24 ×1.0	23.0	—
M25 ×2.0	23.0	—
M25 ×1.5	23.5	—
M25 ×1.0	24.0	—
M26 ×1.5	24.5	—
M27 ×2.0	25.0	—
M27 ×1.5	25.5	—
M27 ×1.0	26.0	—
M28 ×2.0	26.0	—
M28 ×1.5	26.5	—
M28 ×1.0	27.0	—
M30 ×3.0	27.0	—
M30 ×2.0	28.0	—
M30 ×1.5	28.5	—
M30 ×1.0	29.0	—
M32 ×2.0	30.0	—
M32 ×1.5	30.5	—
M33 ×3.0	30.0	—
M33 ×2.0	31.0	—
M33 ×1.5	31.5	—
M35 ×1.5	33.5	—
M36 ×3.0	33.0	—
M36 ×2.0	34.0	—
M36 ×1.5	34.5	—
M38 ×1.5	36.5	—
M39 ×3.0	36.0	—
M39 ×2.0	37.0	—
M39 ×1.5	37.5	—
M40 ×3.0	37.0	—
M40 ×2.0	38.0	—
M40 ×1.5	38.5	—
M42 ×4.0	38.0	—

Nominal	Drill Diameter	
	HSS	Carbide
M42 ×3.0	39.0	—
M42 ×2.0	40.0	—
M42 ×1.5	40.5	—
M45 ×4.0	41.0	—
M45 ×3.0	42.0	—
M45 ×2.0	43.0	—
M45 ×1.5	43.5	—
M48 ×4.0	44.0	—
M48 ×3.0	45.0	—
M48 ×2.0	46.0	—
M48 ×1.5	46.5	—
M50 ×3.0	47.0	—
M50 ×2.0	48.0	—
M50 ×1.5	48.5	—

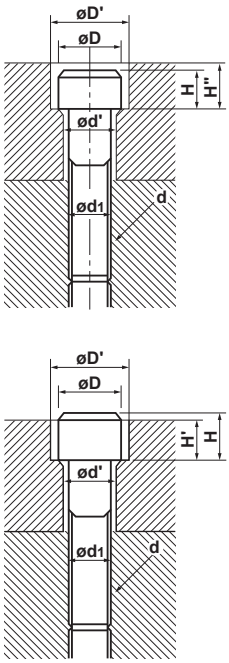
(Note) When using the drill diameters shown in this table, that the processed hole should be measured since the size accuracy of a drill hole may change due to the drilling condition, and that if found to be inappropriate for a prepared hole, the drill diameter must be corrected accordingly.

HEXAGON SOCKET HEAD BOLT HOLE SIZE

DIMENSIONS OF COUNTERBORING FOR HEXAGON SOCKET HEAD CAP SCREW AND BOLT HOLE

Unit : mm

Nominal dimensions of thread d	M3	M4	M5	M6	M8	M10	M12	M14	M16	M18	M20	M22	M24	M27	M30
d_1	3	4	5	6	8	10	12	14	16	18	20	22	24	27	30
d'	3.4	4.5	5.5	6.6	9	11	14	16	18	20	22	24	26	30	33
D	5.5	7	8.5	10	13	16	18	21	24	27	30	33	36	40	45
D'	6.5	8	9.5	11	14	17.5	20	23	26	29	32	35	39	43	48
H	3	4	5	6	8	10	12	14	16	18	20	22	24	27	30
H'	2.7	3.6	4.6	5.5	7.4	9.2	11	12.8	14.5	16.5	18.5	20.5	22.5	25	28
H"	3.3	4.4	5.4	6.5	8.6	10.8	13	15.2	17.5	19.5	21.5	23.5	25.5	29	32



TAPER STANDARD

Fig.1
Bolt Grip Taper

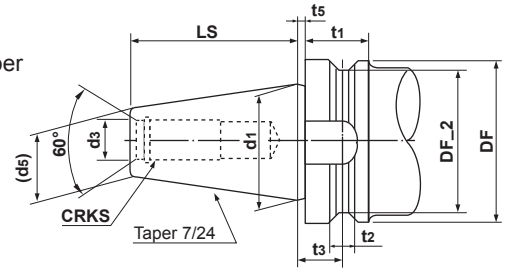


Fig.2
National Taper

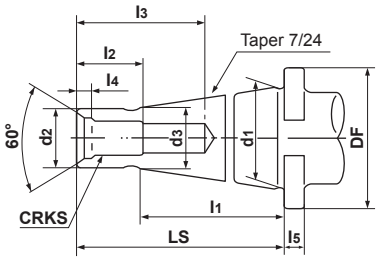


Table 1 Bolt Grip Taper (Fig.1)

Bearing Number	DF	DF_2	t1	t2	t3	t5	d1	d3	LS	CRKS	d5
BT35	53	43	20	10	13.0	2	38.1	13	56.5	M12×1.75	21.62
BT40	63	53	25	10	16.6	2	44.45	17	65.4	M16×2	25.3
BT45	85	73	30	12	21.2	3	57.15	21	82.8	M20×25	33.1
BT50	100	85	35	15	23.2	3	69.85	25	101.8	M24×3	40.1
BT60	155	135	45	20	28.2	3	107.95	31	161.8	M30×3.5	60.7

Table 2 National Taper (Fig.2)

Bearing Number	d1	d2	LS	l1	CRKS		l2	l3	d3	l4	DF	l5
					Metric Screw	Wit Screw						
NT30	31.75	17.4	70	50	M12	W 1/2	24	50	16.5	6	50	8
NT40	44.45	25.3	95	67	M16	W 5/8	30	70	24	7	63	10
NT50	69.85	39.6	130	105	M24	W 1	45	90	38	11	100	13
NT60	107.95	60.2	210	165	M30	W 1¹/4	56	110	58	12	170	15

Fig.3
Morse Taper
(Shank with Tongue)

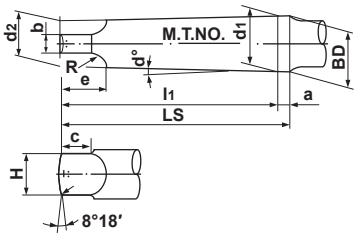


Fig.4
Morse Taper
(Shank with Screw)

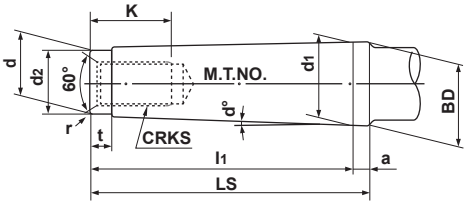


Table 3 Shank with Tongue (Fig.3)

Morse Taper Number	d1	a	BD	d2	H	l1	LS	d	c	e	R	r
0	9.045	3	9.201	6.104	6	56.5	59.5	3.9	6.5	10.5	4	1
1	12.065	3.5	12.240	8.972	8.7	62.0	65.5	5.2	8.5	13.5	5	1.2
2	17.780	5	18.030	14.034	13.5	75.0	80.0	6.3	10	16	6	1.6
3	23.825	5	24.076	19.107	18.5	94.0	99	7.9	13	20	7	2
4	31.267	6.5	31.605	25.164	24.5	117.5	124	11.9	16	24	8	2.5
5	44.399	6.5	44.741	36.531	35.7	149.5	156	15.9	19	29	10	3
6	63.348	8	63.765	52.399	51.0	210.0	218	19	27	40	13	4
7	83.058	10	83.578	68.185	66.8	286.0	296	28.6	35	54	19	5

Table 4 Shank with Screw (Fig.4)

Morse Taper Number	d1	a	BD	d	d2	l1	LS	t	r	CRKS	K
0	9.045	3	9.201	6.442	6	50	53	4	0.2	—	—
1	12.065	3.5	12.240	9.396	9	53.5	57	5	0.2	M6	16
2	17.780	5	18.030	14.583	14	64	69	5	0.2	M10	24
3	23.825	5	24.076	19.759	19	81	86	7	0.6	M12	28
4	31.267	6.5	31.605	25.943	25	102.5	109	9	1.0	M16	32
5	44.399	6.5	44.741	37.584	35.7	129.5	136	9	2.5	M20	40
6	63.348	8	63.765	53.859	51	182	190	12	4.0	M24	50
7	83.058	10	83.578	70.052	65	250	260	18.5	5.0	M33	80

INTERNATIONAL SYSTEM OF UNITS

UNIT CONVERSION TABLE for EASIER CHANGE into SI UNITS (Bold type Indicates SI unit)

Pressure

Pa	**kPa**	**MPa**	bar	kgf/cm^2	atm	mmH$_2$O	mmHg or Torr
1	1×10^{-3}	1×10^{-6}	1×10^{-5}	1.01972×10^{-5}	9.86923×10^{-6}	1.01972×10^{-1}	7.50062×10^{-3}
1×10^{3}	1	1×10^{-3}	1×10^{-2}	1.01972×10^{-2}	9.86923×10^{-3}	1.01972×10^{2}	7.50062
1×10^{6}	1×10^{3}	1	1×10	1.01972×10	9.86923	1.01972×10^{5}	7.50062×10^{3}
1×10^{5}	1×10^{2}	1×10^{-1}	1	1.01972	9.86923×10^{-1}	1.01972×10^{4}	7.50062×10^{2}
9.80665×10^{4}	9.80665×10	9.80665×10^{-2}	9.80665×10^{-1}	1	9.67841×10^{-1}	1×10^{4}	7.35559×10^{2}
1.01325×10^{5}	1.01325×10^{2}	1.01325×10^{-1}	1.01325	1.03323	1	1.03323×10^{4}	7.60000×10^{2}
9.80665	9.80665×10^{-3}	9.80665×10^{-6}	9.80665×10^{-5}	1×10^{-4}	9.67841×10^{-5}	1	7.35559×10^{-2}
1.33322×10^{2}	1.33322×10^{-1}	1.33322×10^{-4}	1.33322×10^{-3}	1.35951×10^{-3}	1.31579×10^{-3}	1.35951×10	1

(Note) 1Pa=1N/m^2

Force

N	dyn	kgf
1	1×10^{5}	1.01972×10^{-1}
1×10^{-5}	1	1.01972×10^{-6}
9.80665	9.80665×10^{5}	1

Stress

Pa	**MPa** or **N/mm^2**	kgf/mm^2	kgf/cm^2
1	1×10^{-6}	1.01972×10^{-7}	1.01972×10^{-5}
1×10^{6}	1	1.01972×10^{-1}	1.01972×10
9.80665×10^{6}	9.80665	1	1×10^{2}
9.80665×10^{4}	9.80665×10^{-2}	1×10^{-2}	1

(Note) 1Pa=1N/m^2

Work / Energy / Quantity of Heat

J	kW•h	kgf•m	kcal
1	2.77778×10^{-7}	1.01972×10^{-1}	2.38889×10^{-4}
3.600×10^{6}	1	3.67098×10^{5}	8.6000×10^{2}
9.80665	2.72407×10^{-6}	1	2.34270×10^{-3}
4.18605×10^{3}	1.16279×10^{-3}	4.26858×10^{2}	1

(Note) 1J=1W•s, 1J=1N•m
1cal=4.18605J
(By the law of weights and measures)

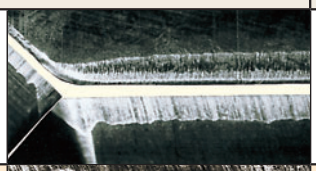
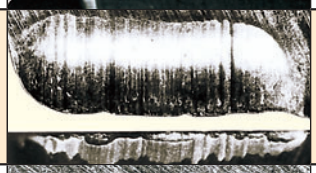
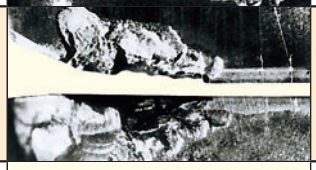
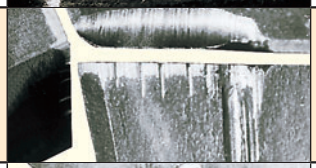
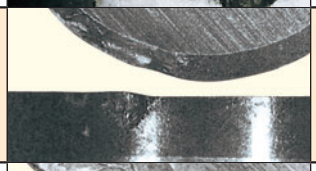
Power (Rate of Production / Motive Power) /Heat Flow Rate

W	kgf•m/s	PS	kcal/h
1	1.01972×10^{-1}	1.35962×10^{-3}	8.6000×10^{-1}
9.80665	1	1.33333×10^{-2}	8.43371
7.355×10^{2}	7.5×10	1	6.32529×10^{2}
1.16279	1.18572×10^{-1}	1.58095×10^{-3}	1

(Note) 1W=1J/s, PS:French horse power
1PS=0.7355kW
(By the enforcement act for the law of weights and measures)
1cal=4.18605J

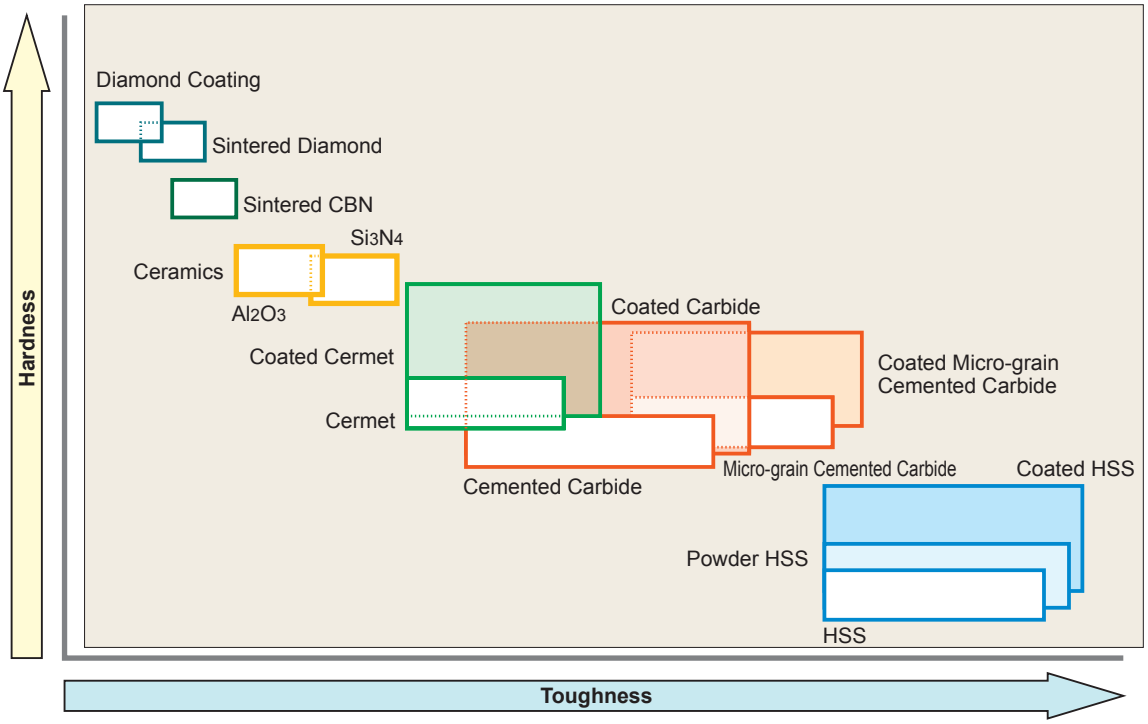
TOOL WEAR AND DAMAGE

CAUSES AND COUNTERMEASURES

Tool Damage Form		Cause	Countermeasure
Flank Wear		• Tool grade is too soft. • Cutting speed is too high. • Flank angle is too small. • Feed rate is extremely low.	• Tool grade with high wear resistance. • Lower cutting speed. • Increase flank angle. • Increase feed rate.
Crater Wear		• Tool grade is too soft. • Cutting speed is too high. • Feed rate is too high.	• Tool grade with high wear resistance. • Lower cutting speed. • Lower feed rate.
Chipping		• Tool grade is too hard. • Feed rate is too high. • Lack of cutting edge strength. • Lack of shank or holder rigidity.	• Tool grade with high toughness. • Lower feed rate. • Increase honing. (Round honing is to be changed to chamfer honing.) • Use large shank size.
Fracture		• Tool grade is too hard. • Feed rate is too high. • Lack of cutting edge strength. • Lack of shank or holder rigidity.	• Tool grade with high toughness. • Lower feed rate. • Increase honing. (Round honing is to be changed to chamfer honing.) • Use large shank size.
Plastic Deformation		• Tool grade is too soft. • Cutting speed is too high. • Depth of cut and feed rate are too large. • Cutting temperature is high.	• Tool grade with high wear resistance. • Lower cutting speed. • Decrease depth of cut and feed rate. • Tool grade with high thermal conductivity.
Welding		• Cutting speed is low. • Poor sharpness. • Unsuitable grade.	• Increase cutting speed. (For JIS S45C, cutting speed 80m/min.) • Increase rake angle. • Tool grade with low affinity. (Coated grade, cermet grade)
Thermal Cracks		• Expansion or shrinkage due to cutting heat. • Tool grade is too hard. *Especially in milling.	• Dry cutting. (For wet cutting, flood workpiece with cutting fluid) • Tool grade with high toughness.
Notching		• Hard surfaces such as uncut surfaces, chilled parts and machining hardened layer. • Friction caused by jagged shape chips. (Caused by small vibration)	• Tool grade with high wear resistance. • Increase rake angle to improve sharpness.
Flaking		• Cutting edge welding and adhesion. • Poor chip disposal.	• Increase rake angle to improve sharpness. • Enlarge chip pocket.
Flank Wear Fracture *Damage for polycrystallines		• Damage due to the lack of strength of a curved cutting edge.	• Increase honing. • Tool grade with high toughness.
Crater Wear Fracture *Damage for polycrystallines		• Tool grade is too soft. • Cutting resistance is too high and causes high cutting heat.	• Decrease honing. • Tool grade with high wear resistance.

CUTTING TOOL MATERIALS

The table below shows the relationship between various tool materials, in relation with hardness on a vertical axis and toughness on a horizontal axis. Today, cemented carbide, coated carbide and TiC-TiN-based cermet are key tool materials in the market. This is because they have the best balance of hardness and toughness.

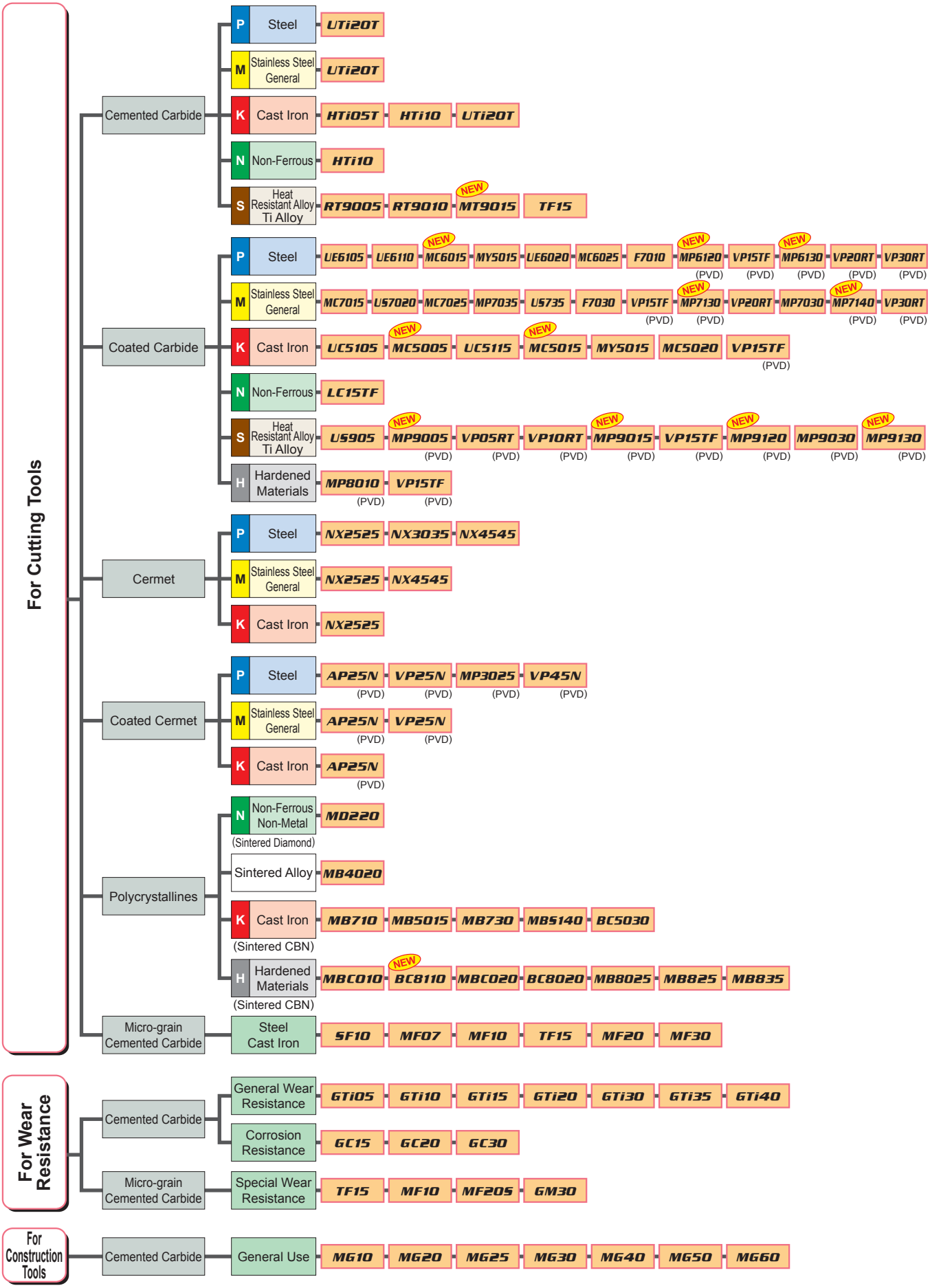


GRADE CHARACTERISTICS

Hard Materials	Hardness (HV)	Energy Formation (kcal/g·atom)	Solubility in Iron (%.1250℃)	Thermal Conductivity (W/m·k)	Thermal Expansion (x 10^{-6}/k)*	Tool Material
Diamond	>9000	–	Highly Soluble	2100	3.1	Sintered Diamond
CBN	>4500	–	–	1300	4.7	Sintered CBN
Si_3N_4	1600	–	–	100	3.4	Ceramics
Al_2O_3	2100	-100	≒0	29	7.8	Ceramics Cemented Carbide
TiC	3200	-35	< 0.5	21	7.4	Cermet Coated Carbide
TiN	2500	-50	–	29	9.4	Cermet Coated Carbide
TaC	1800	-40	0.5	21	6.3	Cemented Carbide
WC	2100	-10	7	121	5.2	Cemented Carbide

*1W/m•K=2.39×10^{-3}cal/cm•sec•℃

GRADE CHAIN


For Cutting Tools
Cemented Carbide
P Steel
UTi20T
M Stainless Steel General
UTi20T
K Cast Iron
HTi05T
HTi10
UTi20T
N Non-Ferrous
HTi10
S Heat Resistant Alloy Ti Alloy
RT9005
RT9010
NEW MT9015
TF15
Coated Carbide
P Steel
UE6105
UE6110
NEW MC6015
MY5015
UE6020
MC6025
F7010
NEW MP6120 (PVD)
VP15TF (PVD)
NEW MP6130 (PVD)
VP20RT (PVD)
VP30RT (PVD)
M Stainless Steel General
MC7015
US7020
MC7025
MP7035
US735
F7030
VP15TF (PVD)
NEW MP7130 (PVD)
VP20RT
MP7030
NEW MP7140 (PVD)
VP30RT (PVD)
K Cast Iron
UC5105
NEW MC5005
UC5115
NEW MC5015
MY5015
MC5020
VP15TF (PVD)
N Non-Ferrous
LC15TF
S Heat Resistant Alloy Ti Alloy
US905
NEW MP9005 (PVD)
VP05RT (PVD)
VP10RT (PVD)
NEW MP9015 (PVD)
VP15TF (PVD)
NEW MP9120 (PVD)
MP9030 (PVD)
NEW MP9130 (PVD)
H Hardened Materials
MP8010 (PVD)
VP15TF (PVD)
Cermet
P Steel
NX2525
NX3035
NX4545
M Stainless Steel General
NX2525
NX4545
K Cast Iron
NX2525
Coated Cermet
P Steel
AP25N (PVD)
VP25N (PVD)
MP3025 (PVD)
VP45N (PVD)
M Stainless Steel General
AP25N (PVD)
VP25N (PVD)
K Cast Iron
AP25N (PVD)
Polycrystallines
N Non-Ferrous Non-Metal (Sintered Diamond)
MD220
Sintered Alloy
MB4020
K Cast Iron (Sintered CBN)
MB710
MB5015
MB730
MB5140
BC5030
H Hardened Materials (Sintered CBN)
MBC010
NEW BC8110
MBC020
BC8020
MB8025
MB825
MB835
Micro-grain Cemented Carbide
Steel Cast Iron
SF10
MF07
MF10
TF15
MF20
MF30
For Wear Resistance
Cemented Carbide
General Wear Resistance
GTi05
GTi10
GTi15
GTi20
GTi30
GTi35
GTi40
Corrosion Resistance
GC15
GC20
GC30
Micro-grain Cemented Carbide
Special Wear Resistance
TF15
MF10
MF20S
GM30
For Construction Tools
Cemented Carbide
General Use
MG10
MG20
MG25
MG30
MG40
MG50
MG60

GRADES COMPARISON TABLE

CEMENTED CARBIDE

	ISO Classification	ISO Symbol	Mitsubishi Carbide	Sumitomo Electric	Tungaloy	Kyocera	Dijet	Mitsubishi Hitachi Tool	Sandvik	Kennametal	Seco Tools	Iscar
Turning	P	P01										
		P10		ST10P	TX10S		SRT	WS10				IC70
		P20	UTi20T	ST20E	UX30		SRT DX30	EX35	SMA			IC70 IC50M
		P30	UTi20T	A30	UX30	PW30	SR30 DX30	EX35	SM30			IC50M IC54
		P40		ST40E			SR30	EX45				IC54
	M	M10		EH510 U10E			UMN	WA10B	H10A	KU10 K313 K68	890	IC07
		M20	UTi20T	EH520 U2	UX30		DX25 UMS	EX35	H13A	KU10 K313 K68	HX	IC07 IC08 IC20
		M30	UTi20T	A30	UX30		DX25 UMS	EX45	H10F SM30		883	IC08 IC20 IC28
		M40					UM40	EX45				IC28
	K	K01	HTi05T	H1 H2	TH03 KS05F		KG03	WH05		KU10 K313 K68		
		K10	HTi10	EH10 EH510	TH10	KW10 GW15	KG10 KT9	WH10	H10 HM	KU10 K313 K68	890	IC20
		K20	UTi20T	G10E EH20 EH520	KS15F KS20	GW25	CR1 KG20	WH20	H13A	KU10 K313 K68	HX	IC20
		K30	UTi20T	G10E			KG30				883	
	N	N01		H1 H2	KS05F	KW10			H10 H13A			
		N10	HTi10	EH10 EH510	TH10	KW10 GW15	KT9	WH10		KU10 K313 K68	H15	IC08 IC20
		N20		G10E EH20 EH520	KS15F		CR1	WH20		KU10 K313 K68	HX	IC08 IC20
		N30									H25	
	S	S01	RT9005			SW05	KG03					
		S10	RT9005 RT9010 MT9015	EH10 EH510	KS05F TH10	SW10	FZ05 KG10		H10 H10A H10F H13A	K10 K313 K68	HX	IC07 IC08
		S20	RT9010 TF15	EH20 EH520	KS15F KS20	SW25	FZ15 KG20			K10 K313 K68	H25	IC07 IC08
		S30	TF15				KG30					
Milling	P	P10					SRT					
		P20	UTi20T	A30N	UX30		SRT DX30	EX35		K125M		IC50M IC28
		P30	UTi20T	A30N	UX30	PW30	SR30 DX30	EX35		GX		IC50M IC28
		P40				PW30	SR30	EX45				IC28
	M	M10					UMN					
		M20	UTi20T	A30N	UX30		DX25 UMS	EX35				IC08 IC20
		M30	UTi20T	A30N	UX30		DX25 UMS	EX45	SM30			IC08 IC28
		M40						EX45				IC28
	K	K01	HTi05T				KG03			K115M,K313		
		K10	HTi10	G10E	TH10	KW10 GW25	KG10	WH10		K115M K313		IC20
		K20	UTi20T	G10E	KS20	GW25	KT9 CR1 KG20	WH20	H13A		HX	IC20
		K30	UTi20T				KG30					

(Note) The above table is selected from a publication. We have not obtained approval from each company.

GRADES COMPARISON TABLE

MICRO GRAIN

	ISO Classification	ISO Symbol	Mitsubishi Carbide	Sumitomo Electric	Tungaloy	Kyocera	Dijet	Mitsubishi Hitachi Tool	Sandvik	Kennametal	Seco Tools
Cutting Tools	Z	Z01	SF10 MF07 MF10	F0	F MD05F MD1508		FZ05 FB05 FB10	NM08	PN90 6UF,H3F 8UF,H6F		
		Z10	HTi10 MF20	XF1 F1 AFU	MD10 MD0508 MD07F	FW30	FZ10 FZ15 FB15	NM15	H10F		890
		Z20	TF15 MF30	AF0 SF2 AF1			FZ15 FB15 FB20	BRM20 EF20N	H15F		890 883
		Z30		A1 CC			FZ20 FB20	NM25			883

CERMET

	ISO Classification	ISO Symbol	Mitsubishi Carbide	Sumitomo Electric	Tungaloy	Kyocera	Dijet	Mitsubishi Hitachi Tool	Sandvik	Kennametal	Seco Tools	Iscar
Turning	P	P01	AP25N* VP25N*	T110A T1000A	NS520 AT520* GT520* GT720*	TN30 PV30* TN6010 PV7010*	LN10 CX50					IC20N IC520N*
		P10	NX2525 AP25N* VP25N*	T1200A T2000Z* T1500A T1500Z*	NS520 NS730 GT730* NS9530 GT9530*	TN60 PV60* TN6010 PV7010*	CX50 CX75 PX75*	CZ25*	CT5015 GC1525*	KT315 KT125	TP1020 TP1030* CM CMP*	IC20N IC520N* IC530N*
		P20	NX2525 AP25N* VP25N* NX3035 MP3025*	T1200A T2000Z* T3000Z* T1500A T1500Z*	NS530 NS730 GT730* NS9530 GT9530*	TN60 PV60* TN6020 PV7020* PV7025*	CX75 PX75* PX90*	CH550	GC1525*	KT325 KT1120 KT5020*	TP1020 TP1030*	IC20N IC520N* IC30N IC530N* IC75T
		P30	MP3025* VP45N*	T3000Z*		PV7025* PV90*	PX90*					IC75T
	M	M10	NX2525 AP25N* VP25N*	T110A T1000A T2000Z* T1500Z*	NS520 AT530* GT530* GT720*	TN60 PV60* TN6020 PV7020*	LN10 CX50		GC1525*	KT125	TP1020 TP1030* CM CMP*	
		M20	NX2525 AP25N* VP25N*	T1200A T2000Z* T1500A T1500Z*	NS530 GT730* NS730	TN90 TN6020 PV90* PV7020* PV7025*	CX50 CX75	CH550				
		M30										
	K	K01	NX2525 AP25N*	T110A T1000A T2000Z* T1500Z*	NS710 NS520 AT520* GT520* GT720*	TN30 PV30* PV7005* TN6010 PV7010*	LN10					
		K10	NX2525 AP25N*	T1200A T2000Z* T1500A T1500Z*	NS520 GT730* NS730	TN60 PV60* TN6020 PV7020* PV7025*	LN10		CT5015	KT325 KT125		
		K20	NX2525 AP25N*	T3000Z*			CX75					
Milling	P	P10	NX2525			TN60	CX75	MZ1000*			C15M	IC30N
		P20	NX2525	T250A	NS530	TN100M TN60	CX75 CX90	CH550 CH7030 MZ1000* MZ2000*	CT530	KT530M HT7 KT605M	C15M MP1020	IC30N
		P30	NX4545	T250A T4500A	NS530 NS540 NS740		CX90 CX99	MZ3000* CH7035				IC30N
	M	M10	NX2525			TN60						IC30N
		M20	NX2525		NS530	TN100M	CX75	CH550 CH7030 MZ1000* MZ2000*	CT530	KT530M HT7 KT605M	C15M	IC30N
		M30	NX4545	T250A	NS540 NS740		CX90 CX99	MZ3000* CH7035				
	K	K01										
		K10	NX2525		NS530	TN60						
		K20	NX2525				CX75			KT530M HT7		

*Coated Cermet

(Note) The above table is selected from a publication. We have not obtained approval from each company.

CVD COATED GRADE

	ISO Classification	ISO Symbol	Mitsubishi Carbide	Sumitomo Electric	Tungaloy	Kyocera	Dijet	Mitsubishi Hitachi Tool	Sandvik	Kennametal	Seco Tools	Iscar
Turning	P	P01	UE6105	AC810P AC700G	T9105 T9005	CA510 CA5505	JC110V	HG8010	GC4205 GC4005	KCP05 KC9105	TP0500 TP1500	IC9150 IC8150 IC428
		P10	UE6105 MC6015 UE6110 MY5015	AC810P AC700G AC820P AC2000	T9105 T9005 T9115	CA510 CA5505 CA515 CA5515	JC110V JC215V	HG8010 HG8025 GM8020	GC4315 GC4215 GC4015 GC4325	KCP10B KCP10 KCP25 KC9110	TP1500 TP2500	IC9150 IC9015 IC8150 IC8250
		P20	MC6015 UE6110 MC6025 UE6020 MY5015	AC820P AC2000 AC830P	T9115 T9125	CA515 CA5515 CA525 CA5525 CR9025	JC110V JC215V	HG8025 GM8020 GM25	GC4315 GC4215 GC4015 GC4325 GC4225 GC4025	KCP25B KCP25 KC9125	TP2500	IC9015 IC8250 IC9025 IC9250 IC8350
		P30	MC6025 UE6020 UE6035 UH6400	AC830P AC630M	T9125 T9135 T9035	CA525 CA5525 CA530 CA5535 CR9025	JC215V JC325V	GM25 GM8035	GC4325 GC4225 GC4025 GC4235 GC4035	KCP30 KCP40 KC8050	TP3500 TP3000	IC8350 IC9250 IC9350
		P40	UE6035 UH6400	AC630M	T9135 T9035	CA530 CA5535	JC325V JC450V	GM8035 GX30	GC4235 GC4035	KCP30 KCP40 KC9140 KC9040 KC9240 KC9245	TP3500 TP3000	IC9350
	M	M10	MC7015 US7020	AC610M	T9115	CA6515	JC110V		GC2015	KCM15	TM2000	IC9250 IC6015 IC8250
		M20	MC7015 US7020 MC7025	AC610M AC6030M AC630M	T6020 T9125	CA6515 CA6525	JC110V	HG8025 GM25	GC2015	KCM15 KC9225	TM2000	IC9250 IC6015 IC9025 IC656
		M30	MC7025 US735	AC6030M AC630M	T6030	CA6525		GM8035 GX30	GC2025	KCM25 KC9230	TM4000	IC9350 IC6025 IC635
		M40	US735	AC6030M AC630M				GX30	GC2025	KCM35 KC9240 KC9245	TM4000	IC6025 IC9350
	K	K01	MC5005 UC5105	AC405K AC410K	T5105	CA4505 CA4010	JC050W JC105V	HX3505 HG3305	GC3205 GC3210	KCK05	TH1500 TK1001 TK1000	IC5005 IC9007
		K10	MC5015 UC5115 MY5015	AC405K AC410K AC415K AC420K AC700G	T5115	CA4515 CA4010 CA4115	JC050W JC105V JC110V	HX3515 HG3315 HG8010	GC3205 GC3210 GC3215	KCK15B KCK15 KCK20 KC9315	TK1001 TK1000 TK2000 TK2001	IC5005 IC5010 IC9150 IC428 IC4028
		K20	MC5015 UC5115 UE6110 MY5015	AC415K AC420K AC700G AC820P	T5115 T5125	CA4515 CA4115 CA4120	JC110V JC215V	HG8025 GM8020	GC3215	KCK20 KC9110 KC9325	TK2001 TK2000	IC5010 IC8150 IC9150 IC9015 IC418
		K30	UE6110	AC820P	T5125		JC215	HG8025 GM8020		KC9125 KC9325		IC9015 IC418
	S	S01	US905			CA6515 CA6525 CA6535			S05F			
Milling	P	P10					JC730U				MP1500	IC9080 IC4100 IC9015
		P20	F7030	ACP100	T3130		JC730U	GX2140	GC4220		MP1500 MP2500	IC5100 IC520M
		P30	F7030	ACP100	T3130			GX2140 GX2160	GC4230	KCPK30 KC930M	MP2500	IC4050
		P40						GX2030 GX30 GX2160	GC4240	KC935M KC530M		
	M	M10										IC9250
		M20	F7030	ACP100	T3130	CA6535	JC730U	GX2140		KC925M	MP2500	IC520M IC9350
		M30	F7030	ACP100	T3130	CA6535		GX2140 GX2160 GX30	GC2040	KC930M	MP2500	IC9350 IC4050
		M40						GX2030 GX2160 GX30		KC930M KC935M		IC635
	K	K01					JC600					
		K10	MC5020	ACK100	T1115 T1015		JC600					
		K20	MC5020	ACK200	T1115 T1015		JC610		GC3220 GC3330 K20W	KC915M	MK1500 MK2000	IC5100 IC9150
		K30					JC610	GX30	GC3330 GC3040	KC920M KC925M KCPK30 KC930M KC935M	MK2000 MK3000	IC4100 IC4050 IC520M

(Note) The above table is selected from a publication. We have not obtained approval from each company.

GRADES COMPARISON TABLE

PVD COATED GRADE

	ISO Classification	ISO Symbol	Mitsubishi Carbide	Sumitomo Electric	Tungaloy	Kyocera	Dijet	Mitsubishi Hitachi Tool	Sandvik	Kennametal	Seco Tools	Iscar
Turning	P	P01				PR915 PR1005						
		P10	VP10MF		AH710	PR915 PR1005 PR930 PR1025 PR1115 PR1225 PR1425			GC1525 GC1025	KC5010 KC5510 KU10T	CP200 TS2000	IC250 IC350 IC507 IC570 IC807 IC907 IC908
		P20	VP10RT VP20RT VP15TF VP20MF	AC520U	AH710 AH725 AH120 SH730 GH730 GH130	PR930 PR1025 PR1115 PR1225		IP2000	GC1525 GC1025 GC1125	KC5025 KC5525 KC7215 KC7315 KU25T	CP250 TS2500	IC228 IC250 IC308 IC328 IC350 IC354 IC507 IC528 IC570 IC807 IC808 IC907 IC908 IC928 IC1008 IC1028 IC3028
		P30	VP10RT VP20RT VP15TF VP20MF	AC530U	AH725 AH120 SH730 GH730 GH130 AH740 J740			IP3000	GC1025 GC1125	KC7015 KC7020 KU25T KC7235	CP500	IC228 IC250 IC328 IC330 IC354 IC528 IC1008 IC1028 IC3028
		P40		AC530U	AH740 J740					KC7040 KC7140 KC7030	CP500	IC228 IC328 IC330 IC528 IC1008 IC1028 IC3028
	M	M01										
		M10	VP10MF		AH710	PR915 PR1025 PR1225 PR1425	JC5003 JC8015	IP050S	GC1005 GC1025 GC1125 GC1105	KC5010 KC5510 KC6005 KC6015	CP200 TS2000	IC330 IC354 IC507 IC520 IC570 IC807 IC907 IC3028
		M20	VP10RT VP20RT VP15TF VP20MF	AC520U	AH710 AH725 AH120 SH730 GH730 GH130 GH330 AH630	PR1025 PR1125 PR1225 PR915 PR930	JC5003 JC5015 JC8015	IP100S	GC1005 GC1025 GC1125 GC1105	KC5025 KC5525 KC7020 KC7025	CP250 TS2500 CP500	IC250 IC330 IC354 IC808 IC908 IC1008 IC1028 IC3028
		M30	VP10RT VP20RT VP15TF VP20MF MP7035	AC520U AC530U	GH330 AH725 AH120 SH730 GH730 GH130 J740 AH645	PR1125	JC5015 JC8015		GC1125 GC2035	KC7030 KC7225	CP500	IC228 IC250 IC328 IC330 IC1008 IC1028 IC3028
		M40	MP7035	AC530U	J740				GC2035			IC328 IC928 IC1008 IC1028 IC3028
	K	K01										
		K10		AC510U	GH110 AH110 AH710	PR905				KC5010 KC7210	CP200 TS2000	IC350 IC1008
		K20	VP10RT VP20RT VP15TF		GH110 AH110 AH710 AH725 AH120 GH730 GH130	PR905				KC7015 KC7215 KC7315	CP200 CP250 TS2000 TS2500	IC228 IC350 IC808 IC908 IC1008
		K30	VP10RT VP20RT VP15TF		AH725 AH120 GH730 GH130					KC7225	CP500	IC228 IC350 IC808 IC908 IC1008
	S	S01	MP9005 VP05RT		AH905		JC5003 JC8015					IC507 IC907
		S10	MP9005 MP9015 VP10RT	AC510U	AH905 SH730 AH110 AH120		JC5003 JC5015 JC8015		GC1105 GC1005 GC1025	KC5010 KC5410 KC5510	CP200 CP250 TS2000 TS2500	IC507 IC903
		S20	MP9015 MT9015 VP20RT	AC510U AC520U	AH120 AH725	PR1125	JC5015 JC8015		GC1025 GC1125	KC5025 KC5525	CP250 TS2500 CP500	IC300 IC808 IC908 IC928 IC3028 IC806
		S30	VP15TF	AC520U	AH725	PR1125			GC1125			
Milling	P	P01					JC5003	ATH80D PTH08M PCA08M PCS08M				
		P10		ACP200		PR730 PR830 PR1025 PR1225	JC5003 JC5030 JC8015 JC5015 JC5118	ACS05E CY9020 JX1005 JX1020 PC20M JP4020 PCA12M	GC1010 GC1025	KC715M		IC250 IC350 IC808 IC810 IC900 IC903 IC908 IC910 IC950
		P20	MP6120 VP15TF	ACP200	AH725 AH120 GH330 AH330	PR730 PR830 PR1025 PR1225 PR1230 PR1525	JC5015 JC5030 JC5040 JC6235 JC8015 JC5118 JC6235	CY150 CY15 JX1015	GC1025 GC1010 GC2030	KC522M KC525M	F25M MP3000	IC250 IC300 IC328 IC330 IC350 IC528 IC808 IC810 IC830 IC900 IC908 IC910 IC928 IC950 IC1008

(Note) The above table is selected from a publication. We have not obtained approval from each company.

	ISO		Mitsubishi Carbide	Sumitomo Electric	Tungaloy	Kyocera	Dijet	Mitsubishi Hitachi Tool	Sandvik	Kennametal	Seco Tools	Iscar
	Classification	Symbol										
Milling	P	P30	**MP6120 VP15TF MP6130 VP30RT**	ACP200 ACP300	AH725 AH120 AH130 AH140 GH130 AH730	PR660 PR1230	JC5015 JC5040 JC8015 JC5118	JS4045 JS4060 CY250 CY25 HC844 JX1045 PTH30E	GC1010 GC1030 GC2030	KC725M KC530M	F25M MP3000 F30M	IC250 IC300 IC328 IC330 IC350 IC528 IC830 IC900 IC928 IC950 IC1008
		P40	**VP30RT**	ACP300	AH140		JC5040 JC5118	JS4060 PTH40H JX1060 GF30 GX30	GC1030	KC735M	F40M T60M	
	M	M01						PCS08M				
		M10				PR730 PR1025 PR1225	JC5118	CY9020 JX1020	GC1025 GC1030	KC715M		IC903
		M20	**VP15TF MP7130 MP7030 VP20RT**	ACP200	AH725 AH120 GH330 AH330 GH110	PR730 PR660 PR1025 PR1225	JC5015 JC5040 JC5118 JC8015	CY150 CY15 JX1015	GC1025 GC1030 GC1040 GC2030	KC730 KC522M KC525M	F25M MP3000	IC250 IC300 IC808 IC830 IC900 IC908 IC928 IC1008
		M30	**VP15TF MP7130 MP7030 VP20RT MP7140 VP30RT**	ACP200 ACP300	AH120 AH725 AH130 AH140 GH130 AH730 GH340	PR660 PR1510	JC5015 JC8015 JC8050 JC5118	CY250 CY25 HC844 JM4060 JX1045	GC1040 GC2030	KC725M KC735M	F30M F40M MP3000	IC250 IC300 IC328 IC330 IC830 IC928 IC1008
		M40	**MP7140 VP30RT**	ACP300	AH140		JC5015 JC5118 JC8050	JX1060 GF30 GX30			F40M	
	K	K01	**MP8010**		AH110 GH110 AH330		JC5003	ATH80D PTH08M PCA08M PCS08M				
		K10	**MP8010**		AH110 GH110 AH725 AH120 GH130 AH330	PR1210 PR905	JC5003 JC8015	ASC05E JX1005 JX1020 CY9020 CY100H CY10H	GC1010	KC510M		IC350 IC810 IC830 IC900 IC910 IC928 IC950 IC1008
		K20	**VP15TF VP20RT**	ACK300	GH130	PR1210 PR905	JC5015 JC5080 JC8015 JC6235	CY150 CY15 PTH13S JX1015	GC1010 GC1020	KC520M KC525M	MK2000	IC350 IC808 IC810 IC830 IC900 IC908 IC910 IC928 IC950 IC1008
		K30	**VP15TF VP20RT**	ACK300			JC5015 JC8015 JC5080	CY250 GX2030 GX30 CY25 PTH40H PTH30E JX1045	GC1020	KC725M KC735M		IC350 IC808 IC830 IC908 IC928 IC950 IC1008
	S	S01				PR905	JC5003 JC8015 JC5118					
		S10	**MP9120 VP15TF**	EH520Z EH20Z		PR905	JC5003 JC5015 JC8015 JC5118	PCS08M PTH13S JS1025	C1025	KC510M		IC903
		S20	**MP9120 VP15TF MP9130 MP9030**	EH520Z EH20Z ACK300 ACP300		PR905	JC8015 JC5015 JC8050 JC5118	CY100H CY10H	GC1025 GC2030 S30T	KC522M KC525M		IC300 IC908 IC808 IC900 IC830 IC928 IC328 IC330
		S30		ACP300			JC8050 JC5118		GC2030	KC725M	F40M	IC830 IC928
	H	H01	**MP8010 VP05HT**				JC8003 JC8008					IC903
		H10	**VP15TF VP10H**				JC8003 JC8008 JC8015 JC5118	BH200 BH250	GC1010 GC1030	KC635M	MH1000 F15M	IC900
		H20	**VP15TF**				JC8015 JC5118	ATH80D PTH08M PCA08M JP4005 JX1005	GC1010 GC1030	KC635M	F15M	IC900 IC808 IC908 IC1008
		H30								KC530M	MP3000 F30M	IC808 IC908 IC1008

(Note) The above table is selected from a publication. We have not obtained approval from each company.

GRADES COMPARISON TABLE

CBN

	ISO Classification	ISO Symbol	Mitsubishi Carbide	Sumitomo Electric	Tungaloy	Kyocera	Dijet	Sandvik	Seco Tools
Turning	H	H01	**BC8110 MBC010 MB810**	BNC100 BNX10 BN1000	BXM10 BX310	KBN050M KBN10M KBN510			CBN060K
		H10	**BC8110 MBC020 BC8020 MB825 MB8025**	BNC160 BNX20 BN2000	BXM20 BX330	KBN25M KBN525	JBN300	CB7015	CBN010
		H20	**MBC020 BC8020 MB8025**	BNC200 BNX25 BN250	BXM20 BX360	KBN30M	JBN245	CB7025 CB20	CBN150 CBN160C
		H30	**BC8020 MB835**	BNC300 BN350	BXC50 BX380	KBN35M		CB7525	CBN150 CBN160C
	S	S01	**MB730**	BN700 BN7000	BX950				CBN170
		S10							
		S20							
		S30							
	K	K01	**MB710 MB5015**	BN500 BNC500	BX930 BX910				
		K10	**MB730 MB4020**	BN700 BN7500 BN7000	BX850	KBN60M	JBN795	CB7525	
		K20	**MB730 MB4020**	BN700 BN7000	BX950	KBN60M	JBN500		CBN200
		K30	**BC5030 MBS140**	BNS800	BX90S BXC90	KBN900		CB7925	CBN300 CBN400C CBN500
	Sintered Alloy		**MB4020 MB835**	BN7500 BN7000	BX450 BX470 BX480	KBN65B KBN570 KBN65M KBN70M			CBN200

PCD

	ISO Classification	ISO Symbol	Mitsubishi Carbide	Sumitomo Electric	Tungaloy	Kyocera	Dijet	Sandvik	Seco Tools
Turning	N	N01	**MD205**	DA90	DX180 DX160	KPD001	JDA30 JDA735	CD05	PCD05
		N10	**MD220**	DA150	DX140	KPD010		CD10	PCD10
		N20	**MD220**	DA2200	DX120		JDA715		PCD20
		N30	**MD230**	DA1000	DX110	KPD230	JDA10		PCD30 PCD30M

(Note) The above table is selected from a publication. We have not obtained approval from each company.

INSERT CHIP BREAKER COMPARISON TABLE

NEGATIVE INSERT TYPE

ISO Classification	Cutting Mode	Mitsubishi Carbide	Sumitomo Electric	Tungaloy	Kyocera	Dijet	Mitsubishi Hitachi Tool	Sandvik	Kennametal	Seco Tools	Walter	TaeguTec
P	Finish	PK* FH FY	 FA FL	01* TF ZF	DP* GP, PP XP, XP-T, XF			QF LC	FF	FF1, FF2	FP5	FA
	Light	LP C SA, SH	SU LU SX, SE	 NS, 27 TSF, AS	PQ HQ, CQ	PF UR, UA, UT	 BE B, CE	XF PF	 LF*, FN	 MF2	MP3 NF3, NF4	 FG
	Light (Mild Steel)	SY		17	XQ, XS							FC
	Light (With Wiper)	SW	LUW, SEW	AFW, ASW	WP, WQ			WL, WF	FW	W-MF2	NF	WS
	Medium	MP MA MH	GU UG GE, UX	NM, ZM TM DM, 33, 37, 38	PG, CJ, GS PS, HS PT	 PG UB	CT, AB AH AY, AE	PM QM, XM	 P MN	MF3 MF5, M3 M5	MP5	PC, MP MT SM
	Medium (With Wiper)	MW	GUW					WMX, WM	MW, RW	M6, W-M3 W-MF5	NM	WT
	Rough	RP GH Std.	MU, MX, ME UZ	TH Std.	PH GT Std.	UD GG	RE	PR, HM XMR	RN, RP	MR6, MR7	RP5 NM6, NM9	RT
	Heavy	HZ, HL HM, HX HV	MP HG, HP HU, HW, HF	THS TU TUS	PX	UC	HX HE, H	QR, PR HR, MR	MR RM RH	R4, R5, R6 57, RR6, R7 R8, RR9	NR6, NRF NRR	RX, RH HD, HY, HT HZ
M	Finish Light	SH, LM	SU	SS	MQ, GU		MP, AB, BH	MF	FP LF*	MF1	NF4	SF
	Medium	MS, GM MM, MA ES	EX, UP GU HM	SA, SF SM S	MS, MU SU, HU, TK ST	SF, SZ SG	PV, DE, SE AH	MM QM K	MP	MF4	 NM4	ML EM VF
	Heavy	GH, RM HZ	MU MP	TH, SH			AE	MR MR	UP, RP	M5, MR7 RR6	NR4, NR5	
K	Finish Light	LK, MA		CF	Std.		VA, AH	KF	FN	MF2, MF5, M3, M4	MK5	
	Medium	MK, GK Std.	UZ, GZ, UX	CM Std.	C	PG	V, AE	KM	RP,UN	M5	RK5, NM5	
	Rough	RK			PH, GC	GG	RE	KR			RK7	
	Heavy	Flat Top	Flat Top	CH, Flat Top	ZS, Flat Top	Flat Top	Flat Top		Flat Top	MR3, MR4, MR7 Flat Top	Flat Top	
S	Finish	FJ*	EF		MQ			SF	FS, LF*	MF1		
	Light	LS	SU*					SGF*	MS	MF4, MF5	NF4, NFT	EA
	Medium	MS	EG, EX, UP	SA, HMM	MS, MU, TK			NGP*, SM	UP, P, NGP*	M1	NMS, NMT	
	Heavy	RS, GJ	MU					SR, SMR	RP	M5, MR3, MR4	NRS, NRT	ET

*Peripheral ground type insert.

(Note) Above charts are based on published data and not authorized by each manufacturer.

INSERT CHIP BREAKER COMPARISON TABLE

7°POSITIVE INSERT TYPE

ISO Classification	Cutting Mode	Mitsubishi Carbide	Sumitomo Electric	Tungaloy	Kyocera	Dijet	Mitsubishi Hitachi Tool	Sandvik	Kennametal	Seco Tools	Walter	TaeguTec
P	Finish	SMG*	FC*, SC*	JS*, 01*	CF*, CK* GQ*, GF*			UM*	LF*			
	Finish Light	FP, FV LP, SV	FP, LU SU	PF, PSF PS, PSS	GP XP		JQ	PF, UF	UF, 11 LF, FP	FF1 F1	PF4	FA FG
	Light (With Wiper)	SW	LUW					WF	FW	W-F1		WS
	Medium	MV MP, Std.	MU	23 PM, 24	HQ XQ, GK	FT	JE	PM, UM	MF, MP	F2, MF2, M5	PS5 PM5	PC MT
	Medium (With Wiper)	MW						WM	MW	W-F2	PM	WT
M	Finish | Light	FM LM	FC* LU SU	PF, PSF PS, PSS	CF*,CK* GQ*,GF* MQ		MP	MF	LF, UF FP	F1, F2		
	Medium	MM, Std.	MU	PM	HQ, GK			MM	MP			
K	Medium	MK, Std. Flat Top	MU, Flat Top	Flat Top, CM	Flat Top*			KF, KM, KR	Flat Top	F1, M3, M5		
N	Medium	AZ*	AG*	AL*	AH*			AL*	HP*	AL*	PM2*	SA* FL*
S	Finish Light	FJ*			MQ				LF* HP*			

*Peripheral ground type insert.

(Note) Above charts are based on published data and not authorized by each manufacturer.

11°POSITIVE INSERT TYPE

ISO Classification	Cutting Mode	Mitsubishi Carbide	Sumitomo Electric	Tungaloy	Kyocera	Dijet	Mitsubishi Hitachi Tool	Sandvik	Kennametal	Seco Tools	Walter	TaeguTec
P	Finish Light	FV, SMG* SV	SI LU SU	01* PF, PSF PS, PSS	GP, CF* XP		JQ	PF	UF LF			
	Medium	MV	MU	PM 23 24	HQ XQ		JE	PM, UM	MF			
M	Finish | Light	SV	SU	PF, PS	GP, CF*		MP	MF				
	Medium	MV	MU	PM	HQ			MM				

*Peripheral ground type insert.

(Note) Above charts are based on published data and not authorized by each manufacturer.

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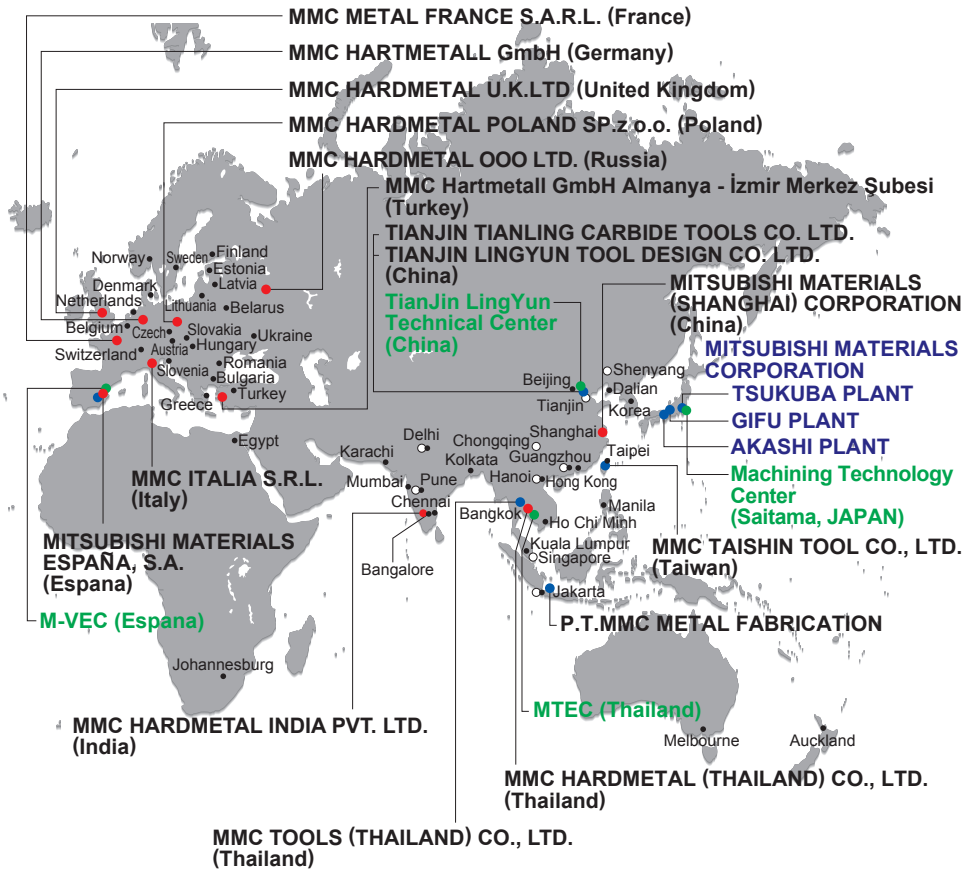
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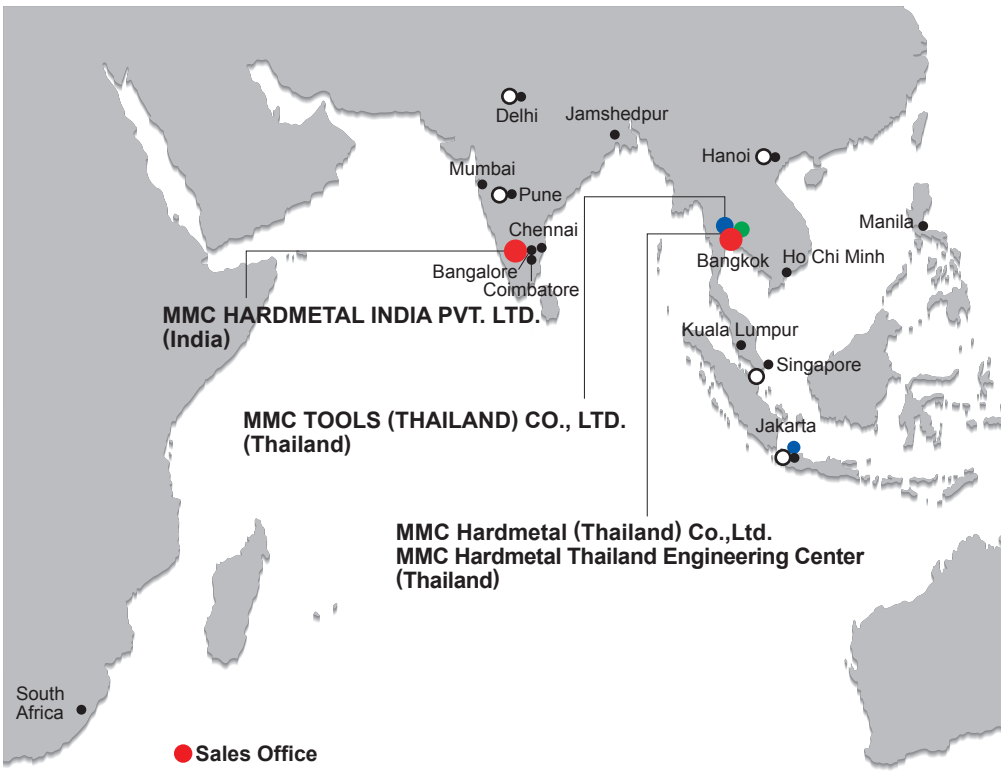
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QMS.EMS
ISO 9001 , ISO 14001
(JSAQ080) (JSAE086
The Scope of the Registration: Design, development and manufacturing of metal cutting tools and blanks of cemented carbide and other hard materials



MITSUBISHI MATERIALS CORPORATION GIFU PLANT (JAPAN)

QMS.EMS
ISO 9001 , ISO 14001
(JSAQ094) (JSAE1545)
The Scope of the Registration: Design, Development, and Production of Cutting Tools, Cemented Carbide Blanks, and Coated Products



MITSUBISHI MATERIALS CORPORATION AKASHI PLANT (JAPAN)

JQA-2522
JQA-EM0941

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	PT. YAMAZEN INDONESIA	TEL +62-21-451-3345 FAX +62-21-451-3346
	PT. Kiso-Seiko Indonesia	TEL +62-21-8261-5671 FAX +62-21-8261-5673
	PT. Anugerah Toolsindo Mandiri	TEL +62-21-2908-2786 FAX +62-21-2908-2787
	PT. KYOSEKI INDONESIA	TEL +62-21-798-9183 FAX +62-21-798-5901
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	KS PRECISION TOOLS (M) SDN. BHD.	TEL +60-3-8941-7168 FAX +60-3-8941-6088
	MSR MARKETING SDN BHD.	TEL +60-3-8941-0018 FAX +60-3-8945-0187
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