MITSUBISHI MATERIALS

INDEXABLE MILLING TOOLS

DIAEDGE

NEW

MITSUBISHI MATERIALS

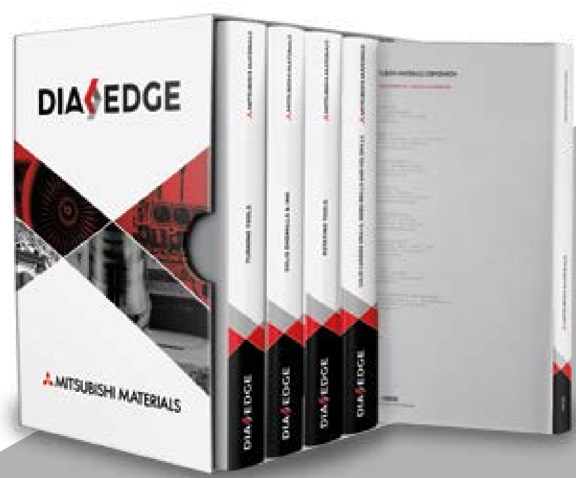
INTRODUCING THE NEW GENERAL CATALOGUE C009 – 2022/2023

TARGETED, COMPACT, HANDY.

Mitsubishi Materials' wide product portfolio is now shown in catalogues that represent individual application areas, offering users fast and easy access to targeted product information.

There is now a set of catalogues in small, practical sizes that comprise the following five volumes:

- **TURNING TOOLS**
- **DRILLING TOOLS**
- **SOLID MILLING TOOLS**
- **INDEXABLE MILLING TOOLS**
- **MPLUS**



NEW DESIGN

EASY HANDLING

HIGHER FLEXIBILITY

INDIVIDUAL APPLICATION AREAS

The slipcase provided enables easy storage and offers the required space for all future catalogues, including the product news brochures that will be published within the 2-year life cycle of the catalogue. Each new product news brochure published within the 2-year cycle will completely replace the previous version. Therefore, please dispose of old versions when new ones are supplied to ensure that the collection is up to date.

NOTES:

- With this publication, all previous general catalogues and product news brochures lose their validity.
- The product news catalogues are released twice a year, in April and October.
- The new general catalogue can be ordered only as a set of five. **Order number: C009E**

DIGITAL VERSION

For the digital version of the catalogue, please scan the QR code or visit us at www.mhg-mediastore.net

INDEXABLE MILLING TOOLS

EFFICIENCY – PASSION FOR PERFECTION

Exceeding customer expectations; that is the motto of Mitsubishi Materials.

Mitsubishi Materials focuses on the ever-growing customer requirements and develops economically sustainable tooling solutions to meet the high demands of the market.

From efficient roughing cutters through to micron-precise indexable insert milling tools, Mitsubishi Materials is committed to the manufacture and supply of milling tools of the highest quality.

DIAEDGE

CREATE A BETTER FUTURE TOGETHER WITH OUR CUSTOMERS

Announcing DIAEDGE, our new brand of tools that brings together cutting-edge technologies, exciting all who use them.

The aim is not only to offer value with our tools, but to think together with customers, share inspiration and continue to take on new challenges.

MITSUBISHI MATERIALS

INDEX

2022/2023

INDEXABLE MILLING TOOLS

HOW TO READ THE STANDARD OF ROTATING TOOLS

●How this section page is organised

①Organised according to the face milling cutting mode.
(Refer to the index on the next page.)

SCOPE OF WORK MATERIAL COVERED BY THE TOOL
provides a graph depicting the scope of the work material suitable for the tool.

CORNER ANGLE ICON

TYPE/ NAME OF PRODUCT

APPLICATION ICON
represents available machining applications, such as finishing and roughing.

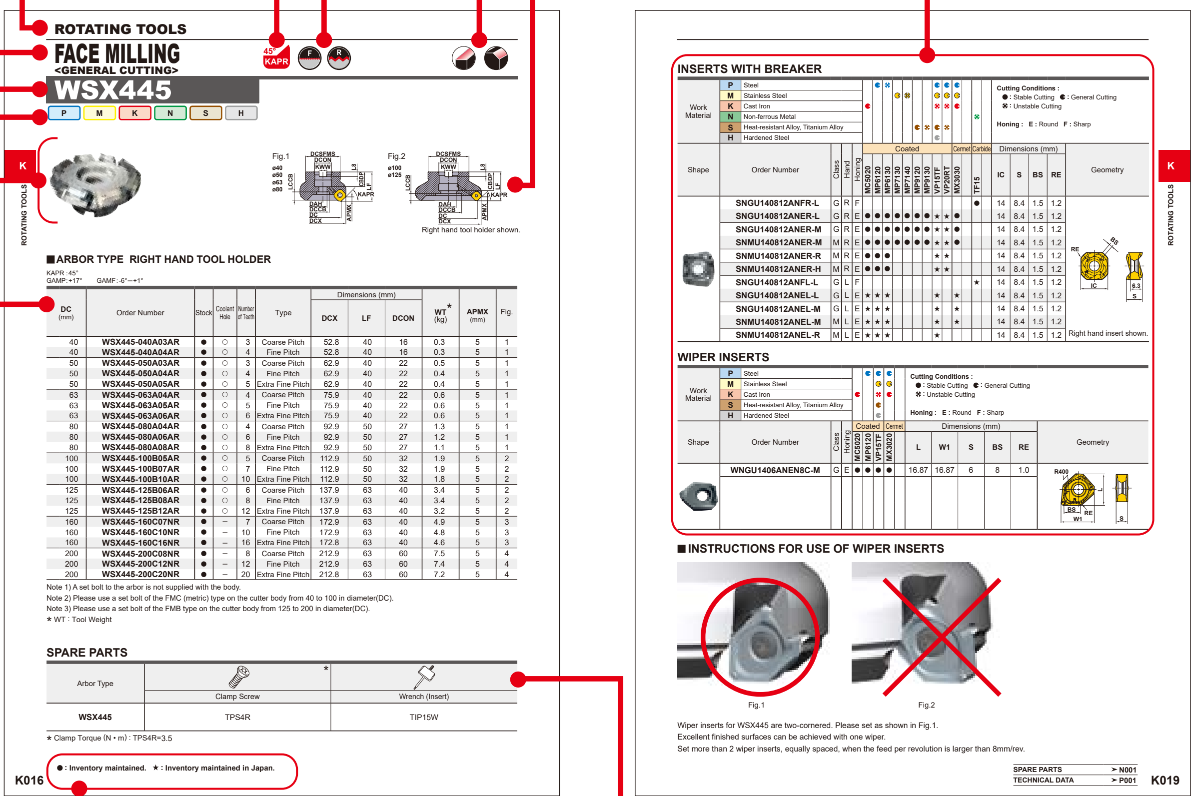
APPLICATION

CUTTING MODE ICON
represents available cutting modes, such as face milling and shoulder milling.

STANDARDS FOR APPLICABLE INSERTS
indicates stock status, dimensions, etc. for applicable inserts.

PRODUCT SECTION

GEOMETRY



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.

INDEXABLE MILLING TOOLS

ROTATING TOOLS

*Alphabetical Order Index

SYMBOL DESCRIPTIONS

KAPR (Cutting Edge Angle) List

15° KAPR	15°
30° KAPR	30°
45° KAPR	45°
50° KAPR	50°
60° KAPR	60°
90° KAPR	90°
R KAPR	R

Application

- **Face Milling**
- **Chamfer Milling**
- **Shoulder Milling with R**
- **Face Milling Close to a Wall**
- **Shoulder Milling**
- **Side Milling**
- **Slot Milling**
- **Step Milling**
- **Pocket Milling**
- **Slot Milling with Corner R**
- **Copy Milling**
- **T-Slot Milling**
- **Helical Drilling**

● : Inventory maintained.
★ : Inventory maintained in Japan.
□ : Non stock, produced to order only.

Machining Precision

F Finish Cutting

PF Medium Cutting

R Rough Cutting

Work Material Range

1st Recommendation

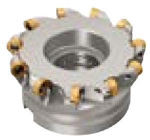
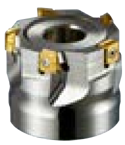
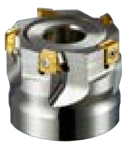
P M K N S H

2nd Recommendation

P M K N S H

CLASSIFICATION (ARBOR type)

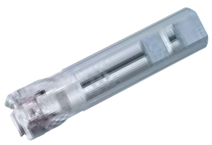
Product Name · Shape	APMX (mm)	Features	Cutter Dia. (mm)	Work Material	Page
For General Cutting **WSX445**  45° KAPR	5	●Unique design double sided insert. ●Sudden fracture & welding prevention function. ●Highly efficient chip discharge.	Ø40 — Ø200	P M K N S H	K016
For General Cutting **ASX445**  45° KAPR	6	●Precision inexpensive moulded type 20° positive insert. ●Screw-on type. ●A wide range of chipbreakers. ●High rigidity due to carbide shim.	Ø50 — Ø315	P M K N S H	K026
For General Cutting **AHX440S**  50° KAPR	3	●Heptagonal double sided insert. ●Economical 14 cutting edge inserts. ●Multi insert design for high feed machining.	Ø40 — Ø160	P M K H	K034
For High Feed Cutting **AHX475S**  15° KAPR	1.6	●Heptagonal double sided insert. ●Economical 14 cutting edge inserts. ●Multi insert design for high feed machining. ●With through coolant holes.	Ø50 — Ø160	P K H	K038
For General Cutting **AHX640S**  50° KAPR	6	●Heptagonal double sided insert. ●Economical 14 cutting edge inserts. ●Multi insert design for high feed machining.	Ø63 — Ø200	P M S H K	K041
For High Feed Cutting for Cast Iron **AHX640W**  50° KAPR	6	●Heptagonal double sided insert. ●Economical 14 cutting edge inserts. ●Multi insert design for high feed machining.	Ø80 — Ø315	K	K048
For High Feed Finishing **FMAX**  90° KAPR	2	●Feed Maximum (FMAX) milling cutter for ultra efficient and accurate finishing. ●Light Weight, High Rigidity Body & Economy, Multi-use ●With through coolant holes.	Ø40 — Ø125	K N	K051
Multi Functional Milling NEW **WJX09** 	1.2	●Negative inserts. ●Stable clamp with dovetail structure. ●Suitable for high feed machining. ●Special insert design with 6 cutting edges. ●With through coolant holes.	Ø40 — Ø66	P M K S H	K072
Multi Functional Milling **WJX14** 	2.0	●Negative inserts. ●Stable clamp with dovetail structure. ●Suitable for high feed machining. ●Special insert design with 6 cutting edges. ●With through coolant holes.	Ø50 — Ø160	P M K S H	K079

Product Name · Shape	**APMX** (mm)	Features	Cutter Dia. (mm)	Work Material	Page
Multi Functional Cutting **AJX** 	**1.2**	●15°positive insert. ●High rigidity double clamp structure. ●Suitable for high feed cutting. ●Special insert design with 3 cutting edges. ●With through coolant holes.	**Ø50 — Ø160**	P M K S H	**K180**
Multi Functional Milling of Difficult-to-cut Materials **ARP**  R KAPR	**5 – 6**	●Run-out does not occur easily when changing sections. ●Strong clamping system. ●Standardized stock of extra fine pitch. ●With through coolant holes.	**Ø40 — Ø100**	M S	**K238**
Multi Functional Cutting **BRP**  R KAPR	**6 – 8**	●11°positive insert. ●Round shape insert with a strong cutting edge. ●Wide range of tools available. ●Suitable for mould machining.	**Ø40 — Ø100**	P M K S H	**K190**
For General Cutting NEW **WWX400**  90° KAPR	**8.2**	●High-stability clamping and high quality machining. ●The optimised “X-type” insert meets the demand for greater strength. ●Economical double sided 6 corners.	**Ø50 — Ø250**	P M K N S H	**K056**
For Cast Iron **VOX400**  90° KAPR	**10**	●Tangential inserts with high strength cutting edge. ●Economical 8 cutting edge inserts. ●Screw-on type.	**Ø50 — Ø250**	K	**K065**
For General Cutting **ASX400**  90° KAPR	**10**	●High accuracy, high quality vertical wall. ●Low cutting force insert. ●With through air & coolant holes.	**Ø50 — Ø250**	P M K N S H	**K068**
Multi Functional Cutting for High Efficiency Machining **VPX200**  90° KAPR	**8**	●Special insert design with 4 cutting edges. ●High precision, high quality insert cutting edge with finishing blade. ●With through coolant holes.	**Ø32 — Ø63**	P M K N S H	**K089**
Multi Functional Cutting for High Efficiency Machining **VPX300**  90° KAPR	**11**	●Special insert design with 4 cutting edges. ●High precision, high quality insert cutting edge with finishing blade. ●With through coolant holes.	**Ø40 — Ø80**	P M K N S H	**K103**
For Multi Functional Cutting **APX3000**  90° KAPR	**10**	●Low cutting force insert. ●High accuracy, high quality vertical wall. ●With through air & coolant holes.	**Ø32 — Ø100**	P M K N S H	**K135**

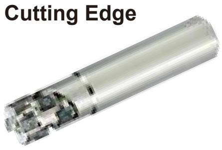
CLASSIFICATION (ARBOR type)

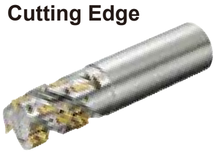
Product Name · Shape	APMX (mm)	Features	Cutter Dia. (mm)	Work Material	Page
For Multi Functional Cutting **APX4000**  90° KAPR	15	●Low cutting force insert. ●High accuracy, high quality vertical wall. ●With through air & coolant holes.	Ø40 — Ø160	P M K S H	K142
Aluminium Alloy to Difficult-to-cut Material Cutting **AXD4000**  90° KAPR	14.8 15.5	●Low resistance chipbreaker. ●Low resistance insert and high rigidity design for excellent performance. ●For high-speed machining. ●Multi-functional machining. ●With through coolant holes.	Ø40 — Ø125	N S	K155
Ultra-high Speed, Efficient Machining of Aluminium Alloys NEW **AXD4000A**  90° KAPR	14.8 15.5	●Low resistance chipbreaker. ●Low resistance insert and high rigidity design for excellent performance. ●For continuous high-speed and ultra-high-speed machining. ●Multi-functional machining.	Ø50	N	K162
Aluminium Alloy to Difficult-to-cut Material Cutting **AXD7000**  90° KAPR	20.4 21	●Low resistance chipbreaker. ●Low resistance insert and high rigidity design for excellent performance. ●For high-speed machining. ●Multi-functional machining. ●With through coolant holes.	Ø50 — Ø125	N	K166

CLASSIFICATION (SHANK type)

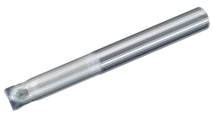
Product Name · Shape	APMX (mm)	Features	Cutter Dia. (mm)	Work Material	Page
WSX445  45° KAPR	5	●Unique design double sided insert. ●Sudden fracture & welding prevention function. ●Highly efficient chip discharge. ●With through coolant holes.	Ø40 — Ø63	P M K N S H	K018
ASX445  45° KAPR	6	●Precision inexpensive moulded type 20°positive insert. ●Screw-on type. ●A wide range of chipbreakers. ●High rigidity due to carbide shim.	Ø50 Ø63	P M K N S H	K027
WWX400 NEW  90° KAPR	8.2	●High-stability clamping and high quality machining. ●The optimised “X-type” insert meets the demand for greater strength. ●Economical double sided 6 corners.	Ø50 — Ø80	P M K N S H	K058
ASX400  90° KAPR	10	●High tolerance M-class inserts. ●Economical 4 cutting edge inserts. ●Curved cutting edge and high rigidity holder. ●Screw-on type.	Ø40 — Ø63	P M K N S H	K069
VPX200  90° KAPR	8	●Special insert design with 4 cutting edges. ●High precision, high quality insert cutting edge with finishing blade. ●With through coolant holes.	Ø16 — Ø50	P M K N S H	K086
VPX300  90° KAPR	11	●Special insert design with 4 cutting edges. ●High precision, high quality insert cutting edge with finishing blade. ●With through coolant holes.	Ø25 — Ø50	P M K N S H	K100
APX3000  90° KAPR	10	●High accuracy, high quality vertical wall. ●Low cutting force insert. ●With through air & coolant holes.	Ø12 — Ø63	P M K N S H	K133
APX4000  90° KAPR	15	●High accuracy, high quality vertical wall. ●Low cutting force insert. ●With through air & coolant holes.	Ø25 — Ø63	P M K S H	K140
AXD4000  90° KAPR	14.8 15.5	●Low resistance chipbreaker. ●Low resistance insert and high rigidity design for excellent performance. ●For high-speed machining. ●Multi-functional machining. ●With through coolant holes.	Ø20 — Ø40	N S	K156

CLASSIFICATION (SHANK type)

Product Name · Shape	APMX (mm)	Features	Cutter Dia. (mm)	Work Material	Page
AXD7000  90° KAPR	20.4 21	●Low resistance chipbreaker. ●Low resistance insert and high rigidity design for excellent performance. ●For high-speed machining. ●Multi-functional machining. ●With through coolant holes.	Ø32 — Ø50	N	K166
AQX  90° KAPR	7.4 | 55	●The centre bottom cutting edge enables drilling without previously formed hole. ●With through coolant holes.	Ø16 — Ø50	P M K N S H	K172
AJX 	0.6 | 1.2	●13° and 15° positive inserts. ●High rigidity double clamp structure. ●Suitable for high feed cutting. ●Special insert design with 3 cutting edges. ●With through coolant holes.	Ø16 — Ø63	P M K S H	K183
WJX09 NEW 	1.2	●Multi functional milling. ●Negative inserts. ●Stable clamp with dovetail structure. ●Suitable for high feed machining. ●Special insert design with 6 cutting edges. ●With through coolant holes.	Ø25 — Ø40	P M K S H	K073
WJX14 	2.0	●Multi functional milling. ●Negative inserts. ●Stable clamp with dovetail structure. ●Suitable for high feed machining. ●Special insert design with 6 cutting edges. ●With through coolant holes.	Ø50	P M K S H	K080
ARP  R KAPR	5 | 6	●Accurate insert run out. ●Solid clamping system. ●Standard stock item of extra fine pitch. ●With through coolant holes.	Ø25 — Ø50	M S	K239
VPX200 Long Cutting Edge NEW  90° KAPR	14 | 42	●Special insert design with 4 cutting edges. ●High precision, high quality insert cutting edge. ●With through coolant holes.	Ø20 — Ø40	P M K N S	K115
VPX200 Shell Type NEW  90° KAPR	35 | 42	●Special insert design with 4 cutting edges. ●High precision, high quality insert cutting edge. ●With through coolant holes.	Ø32 — Ø50	P M K N S	K116
VPX300 Long Cutting Edge NEW  90° KAPR	21 | 42	●Special insert design with 4 cutting edges. ●High precision, high quality insert cutting edge. ●With through coolant holes.	Ø40	P M K N S	K124

Product Name · Shape	APMX (mm)	Features	Cutter Dia. (mm)	Work Material	Page
VPX300 **Shell Type** NEW  90° KAPR	31 | 63	●Special insert design with 4 cutting edges. ●High precision, high quality insert cutting edge. ●With through coolant holes.	Ø40 — Ø80	P M K N S	K125
APX3000 **Long Cutting Edge**  90° KAPR	28 | 55	●High accuracy, high quality vertical wall machining. ●Low cutting force insert.	Ø20 — Ø40	P M K N S	K147
APX3000 **Shell Type**  90° KAPR	37 46	●High accuracy, high quality vertical wall machining. ●Low cutting force insert. ●With through coolant holes.	Ø40 Ø50	P M K N S	K148
APX4000 **Long Cutting Edge**  90° KAPR	56 84	●High accuracy, high quality vertical wall machining. ●Low cutting force insert. ●With through air & coolant holes.	Ø40 Ø50	P M K S	K151
APX4000 **Shell Type**  90° KAPR	42 56	●High accuracy, high quality vertical wall machining. ●Low cutting force insert. ●With through coolant holes.	Ø50 Ø63	P M K S	K152
DCCC  90° KAPR	27 | 83	●Different helical flute angles prevents chattering.	Ø25 — Ø40	P M K	K200
SPX  90° KAPR	110 | 261	●Low cutting resistance due to the use of wavy inserts. ●Suitable for heavy cutting due to holder rigidity.	Ø63	P M K S	K203
SPX **Shell Type**  90° KAPR	58	●Low cutting resistance due to the use of wavy inserts. ●Suitable for heavy cutting due to holder rigidity.	Ø63 Ø80	P M K S	K204
ASPX **Shell Type** NEW  90° KAPR	54 | 75	●High performance titanium alloy milling. ●Low cutting resistance due to the use of wavy inserts. ●Suitable for heavy cutting due to holder rigidity.	Ø50 — Ø80	S	K208

CLASSIFICATION (SHANK type)

Product Name · Shape	APMX (mm)	Features	Cutter Dia. (mm)	Work Material	Page
ASPX NEW  90° KAPR	127	●High performance titanium alloy milling. ●Low cutting resistance due to the use of wavy inserts. ●Suitable for heavy cutting due to holder rigidity.	Ø80	S	K209
VFX5  90° KAPR	26 – 75	●High performance titanium alloy milling. ●High rigidity design. ●Highly reliable clamping mechanism. ●With through coolant holes.	Ø40 — Ø80	S	K192
VFX6  90° KAPR	31 – 90	●High performance titanium alloy milling. ●High rigidity design. ●Highly reliable clamping mechanism. ●With through coolant holes.	Ø63 — Ø100	S	K196
SRF/SRB  R KAPR	5 – 17	●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.	Ø10 — Ø32	P K N H	K212
SUF  R KAPR	1.5 – 5.2	●Highly accurate corner radius tolerance allows for high precision finishing. ●Seamless gash.	Ø10 — Ø32	P M K H	K216
SRM2  R KAPR	12 – 44	●Suitable for roughing to semi-finishing of small and medium moulds. ●High rigidity body design. ●Low resistance chipbreaker. ●Through coolant hole.	Ø16 — Ø32	P M K S H	K220
SRM2 ϕ40/ϕ50  R KAPR	54 63	●Best for roughing of moulds. ●Low resistance chipbreaker. ●Highly rigid body.	Ø40 Ø50	P K	K228
CESP•CFSP•CGSP  30° KAPR 45° KAPR 60° KAPR	5.9 – 10.2	●Covers 5 cutting modes. ●Excellent sharpness with 11°positive inserts. ●30°, 45° and 60° chamfer series.	Ø8 — Ø32	P K	K230
TSMP  90° KAPR	11 – 18	●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.	Ø25 — Ø40	P K	K232

K

ROTATING TOOLS

Product Name · Shape	**APMX** (mm)	Features	Cutter Dia. (mm)	Work Material	Page
PMF 	**0.1**	●2 directional cutting with large overhang. ●Excellent straightness. ●Excellent wall accuracy.	**Ø50 — Ø80**	**P** **K**	**K234**
PMR 	**11**	●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.	**Ø50 — Ø63**	**P** **K**	**K236**

CLASSIFICATION (SCREW-IN type)

Product Name · Shape	APMX (mm)	Features	Cutter Dia. (mm)	Work Material	Page
ASX400  90° KAPR	10	●High tolerance M-class inserts. ●Economical 4 cutting edge inserts. ●Curved cutting edge and high rigidity holder. ●Screw-on type. ●With through coolant holes.	Ø32 Ø40	P M K N S H	K069
APX3000  90° KAPR	10	●High accuracy, high quality vertical wall machining. ●Low cutting force insert. ●With through air & coolant holes.	Ø16 — Ø40	P M K N S H	K136
APX4000  90° KAPR	15	●High accuracy, high quality vertical wall machining. ●Low cutting force insert. ●With through air & coolant holes.	Ø25 — Ø40	P M K S H	K143
AQX  90° KAPR	7.4 | 18	●The centre bottom cutting edge enables drilling without previously formed hole. ●With through coolant holes.	Ø16 — Ø40	P M K N S H	K174
VPX200  90° KAPR	8	●Special insert design with 4 cutting edges. ●High precision, high quality insert cutting edge with finishing blade. ●With through coolant holes.	Ø16 — Ø40	P M K N S H	K088
VPX300  90° KAPR	11	●Special insert design with 4 cutting edges. ●High precision, high quality insert cutting edge. ●With through coolant holes.	Ø25 — Ø40	P M K N S H	K102
AJX 	0.6 | 1.2	●13° and 15° positive inserts. ●High rigidity double clamp structure. ●Suitable for high feed cutting. ●Special insert design with 3 cutting edges. ●With through coolant holes.	Ø16 — Ø40	P M K S H	K182
WJX09 NEW 	1.2	●Multi functional milling. ●Negative inserts. ●Stable clamp with dovetail structure. ●Suitable for high feed machining. ●Special insert design with 6 cutting edges. ●With through coolant holes.	Ø25 — Ø40	P M K S H	K073
ARP  R KAPR	5 | 6	●Run-out does not occur easily when changing sections. ●Solid clamping system. ●With through coolant holes.	Ø25 — Ø40	M S	K240

K

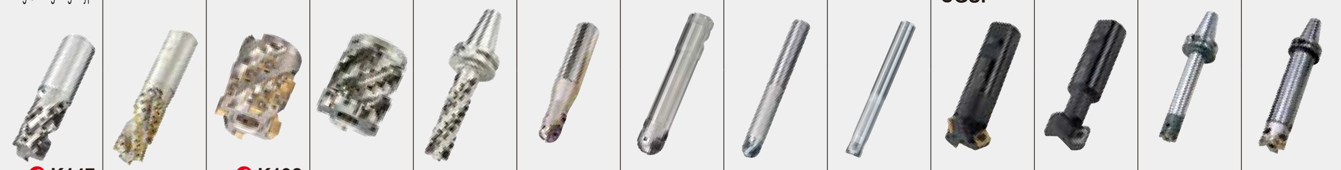
ROTATING TOOLS

Product Name · Shape	APMX (mm)	Features	Cutter Dia. (mm)	Work Material	Page
BRP  R KAPR	4 – 6	●11°positive insert. ●Round shape insert with a strong cutting edge. ●Wide range of tools available. ●Suitable for mould machining.	Ø16 — Ø42	P M K S H	K190
SRF/SRB  R KAPR	8 – 17	●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. ●With through coolant holes.	Ø16 — Ø32	P K N H	K213
SUF  R KAPR	2.1 – 5.2	●Highly accurate corner radius tolerance allows for high precision finishing. ●Seamless gash. ●With through coolant holes.	Ø16 — Ø32	P M K H	K217
SRM2  R KAPR	12 – 44	●Suitable for roughing to semi-finishing of small and medium moulds. ●High rigidity body design. ●Low resistance chipbreaker. ●With through coolant holes.	Ø16 — Ø32	P M K S H	K222

CLASSIFICATION

Product Name / Cutting Mode	Multi Functional Type							General Type			Long Cutting Edge Type
Product Name	VPX200 VPX300	APX3000 APX4000	AXD4000 AXD7000	NEW WJX09 WJX14	AJX	AQX	ARP	NEW WWX400	ASX400	ASX445 WSX445	NEW VPX200 VPX300 Long Cutting Edge Type
Cutting Mode	K086 K100	K133 K140	K156 K166	K073 K080	K183	K172	K239	K058	K069	K027 K018	K114 K124
Face Milling											
Shoulder Milling											
Slot Milling											
Pocket Milling											
Copy Milling											
Helical Drilling											
Chamfer Milling											
Radius Milling											

	Long Cutting Edge Type					Ball Nose / Radius Type				Special Purpose Type			
	APX3000 APX4000 Long Cutting Edge Type	DCCC	VFX5 VFX6	NEW ASPX	SPX	SRM2	SRM2 $\phi40/\phi50$	SRF/SRB For Finishing	SUF For Finishing	CESP CFSP CGSP	TSMP	PMF	PMR
	K147 K151	K200	K192 K196	K208	K203	K220	K228	K212	K216	K230	K232	K234	K236



*1 V-Slot Milling *2 T-Slot Milling *3 Plunging

FACE MILLING
<GENERAL CUTTING>

45° KAPR F R

WSX445

P M K N S H

Fig.1
ø40
ø50
ø63
ø80

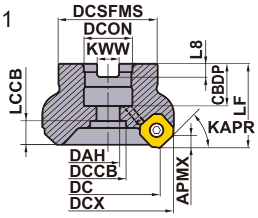
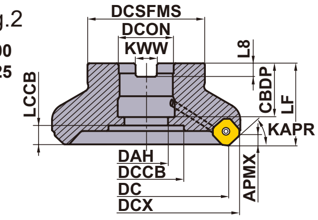


Fig.2
ø100
ø125



Right hand tool holder shown.

■ARBOR TYPE RIGHT HAND TOOL HOLDER

KAPR :45°
GAMP:+17° GAMF:-6°−+1°

DC (mm)	Order Number	Stock	Coolant Hole	Number of Teeth	Type	Dimensions (mm) DCX	LF	DCON	WT* (kg)	APMX (mm)	Fig.
40	**WSX445-040A03AR**	●	○	3	Coarse Pitch	52.8	40	16	0.3	5	1
40	**WSX445-040A04AR**	●	○	4	Fine Pitch	52.8	40	16	0.3	5	1
50	**WSX445-050A03AR**	●	○	3	Coarse Pitch	62.9	40	22	0.5	5	1
50	**WSX445-050A04AR**	●	○	4	Fine Pitch	62.9	40	22	0.4	5	1
50	**WSX445-050A05AR**	●	○	5	Extra Fine Pitch	62.9	40	22	0.4	5	1
63	**WSX445-063A04AR**	●	○	4	Coarse Pitch	75.9	40	22	0.6	5	1
63	**WSX445-063A05AR**	●	○	5	Fine Pitch	75.9	40	22	0.6	5	1
63	**WSX445-063A06AR**	●	○	6	Extra Fine Pitch	75.9	40	22	0.6	5	1
80	**WSX445-080A04AR**	●	○	4	Coarse Pitch	92.9	50	27	1.3	5	1
80	**WSX445-080A06AR**	●	○	6	Fine Pitch	92.9	50	27	1.2	5	1
80	**WSX445-080A08AR**	●	○	8	Extra Fine Pitch	92.9	50	27	1.1	5	1
100	**WSX445-100B05AR**	●	○	5	Coarse Pitch	112.9	50	32	1.9	5	2
100	**WSX445-100B07AR**	●	○	7	Fine Pitch	112.9	50	32	1.9	5	2
100	**WSX445-100B10AR**	●	○	10	Extra Fine Pitch	112.9	50	32	1.8	5	2
125	**WSX445-125B06AR**	●	○	6	Coarse Pitch	137.9	63	40	3.4	5	2
125	**WSX445-125B08AR**	●	○	8	Fine Pitch	137.9	63	40	3.4	5	2
125	**WSX445-125B12AR**	●	○	12	Extra Fine Pitch	137.9	63	40	3.2	5	2
160	**WSX445-160C07NR**	●	–	7	Coarse Pitch	172.9	63	40	4.9	5	3
160	**WSX445-160C10NR**	●	–	10	Fine Pitch	172.9	63	40	4.8	5	3
160	**WSX445-160C16NR**	●	–	16	Extra Fine Pitch	172.8	63	40	4.6	5	3
200	**WSX445-200C08NR**	●	–	8	Coarse Pitch	212.9	63	60	7.5	5	4
200	**WSX445-200C12NR**	●	–	12	Fine Pitch	212.9	63	60	7.4	5	4
200	**WSX445-200C20NR**	●	–	20	Extra Fine Pitch	212.8	63	60	7.2	5	4

Note 1) A set bolt to the arbor is not supplied with the body.
Note 2) Please use a set bolt of the FMC (metric) type on the cutter body from 40 to 100 in diameter (DC).
Note 3) Please use a set bolt of the FMB type on the cutter body from 125 to 200 in diameter (DC).
* WT : Tool Weight

SPARE PARTS

Arbor Type	 * Clamp Screw	 Wrench (Insert)
WSX445	TPS4R	TIP15W

* Clamp Torque (N • m) : TPS4R=3.5

●: Inventory maintained. ★: Inventory maintained in Japan.

Fig.3

ø160

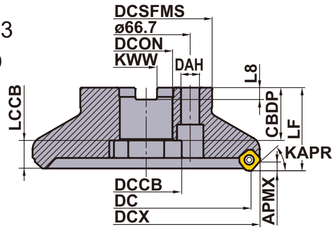
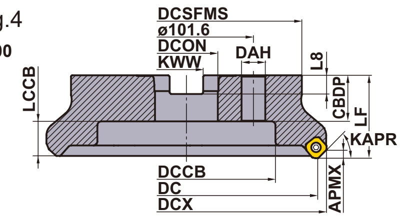


Fig.4

ø200



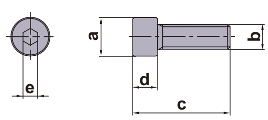
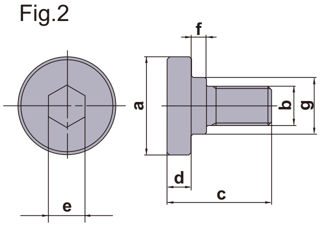
Right hand tool holder shown.

■ARBOR TYPE LEFT HAND TOOL HOLDER

DC (mm)	Order Number	Stock	Coolant Hole	Number of Teeth	Type	Dimensions (mm)			WT* (kg)	APMX (mm)	Fig.
						DCX	LF	DCON			
80	**WSX445-080A04AL**	★	○	4	Coarse Pitch	92.9	50	27	1.3	5	1
100	**WSX445-100B05AL**	★	○	5	Coarse Pitch	112.9	50	32	1.9	5	2
125	**WSX445-125B06AL**	★	○	6	Coarse Pitch	137.9	63	40	3.4	5	2
160	**WSX445-160C07NL**	★	–	7	Coarse Pitch	172.9	63	40	4.9	5	3

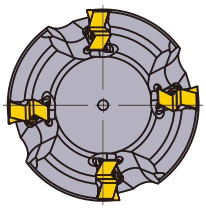
Note 1) A set bolt to the arbor is not supplied with the body.
Note 2) Please use a set bolt of the FMC (metric) type on the cutter body from 80 to 100 in diameter (DC).
Note 3) Please use a set bolt of the FMB type on the cutter body from 125 to 160 in diameter (DC).
* WT : Tool Weight

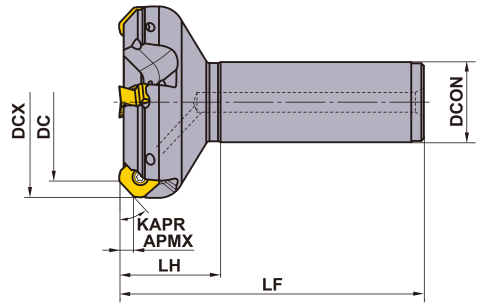
SET BOLT (SOLD SEPARATELY)

Arbor Type	Set Bolt: With Coolant Hole	Set Bolt: Without Coolant Hole	Fig.	Reference Dimensions (mm)							Geometry
	Order Number	Order Number		a	b	c	d	e	f	g	
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◌◌A◌	HSC12035H	HSC12035 (HSC12045)	1	18	M12×1.75	47 57	12	10	–	–	
WSX445-100B◌◌A◌	MBA16033H	—	2	40	M16×2	43	10	14	6	23	Fig.2 
WSX445-125B◌◌A◌	MBA20040H	—	2	50	M20×2.5	54	14	17	6	27	
WSX445-160C◌◌N◌	No coolant hole	—	2	50	M20×2.5	54	14	17	6	27	
WSX445-200C◌◌NR	No coolant hole	—	1	24	M16×2	43	16	14	–	–	

Note 1) Internal coolant is necessary with the set bolt.

MOUNTING DIMENSION ➤K020
SPARE PARTS ➤N001
TECHNICAL DATA ➤P001





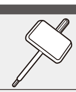
Right hand tool holder only.

■SHANK TYPE

DC (mm)	Order Number	Stock	Coolant Hole	Number of Teeth	Type	Dimensions (mm) DCX	LF	DCON	LH	WT* (kg)	APMX (mm)
40	**WSX445R4003SA32M**	★	○	3	Coarse Pitch	52.8	125	32	40	0.8	5
40	**WSX445R4004SA32M**	★	○	4	Fine Pitch	52.8	125	32	40	0.8	5
50	**WSX445R5003SA32M**	★	○	3	Coarse Pitch	62.9	125	32	40	1.0	5
50	**WSX445R5004SA32M**	★	○	4	Fine Pitch	62.9	125	32	40	1.0	5
63	**WSX445R6304SA32M**	★	○	4	Coarse Pitch	75.9	125	32	40	1.2	5
63	**WSX445R6305SA32M**	★	○	5	Fine Pitch	75.9	125	32	40	1.2	5

* WT : Tool Weight

SPARE PARTS

Arbor Type	 * Clamp Screw	 Wrench (Insert)
WSX445	TPS4R	TIP15W

* Clamp Torque (N • m) : TPS4R=3.5

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

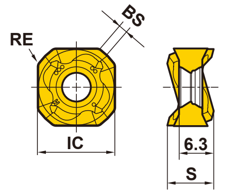
INSERTS WITH BREAKER

Work Material			MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP20RT	MX3030		TF15	
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	Hand	Honing	Coated									Cermet		Carbide		Dimensions (mm)				Geometry
					MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP20RT	MX3030		TF15		IC	S	BS	RE	
	SNGU140812ANFR-L	G	R	F												●		14	8.4	1.5	1.2	
	SNGU140812ANER-L	G	R	E	●	●	●	●	●	●	●	★	★	●				14	8.4	1.5	1.2	
	SNGU140812ANER-M	G	R	E	●	●	●	●	●	●	●	★	★	●				14	8.4	1.5	1.2	
	SNMU140812ANER-M	M	R	E	●	●	●	●	●	●	●	★	★	●				14	8.4	1.5	1.2	
	SNMU140812ANER-R	M	R	E	●	●	●					★	★					14	8.4	1.5	1.2	
	SNMU140812ANER-H	M	R	E	●	●	●					★	★					14	8.4	1.5	1.2	
	SNGU140812ANFL-L	G	L	F												★		14	8.4	1.5	1.2	
	SNGU140812ANEL-L	G	L	E	★	★	★					★		★				14	8.4	1.5	1.2	
	SNGU140812ANEL-M	G	L	E	★	★	★					★		★				14	8.4	1.5	1.2	
	SNMU140812ANEL-M	M	L	E	★	★	★					★		★				14	8.4	1.5	1.2	
	SNMU140812ANEL-R	M	L	E	★	★	★					★						14	8.4	1.5	1.2	Right hand insert shown.



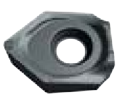
WIPER INSERTS

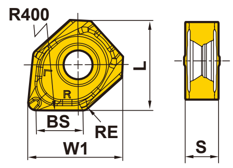
Work Material		MC5020	MP6120	VP15TF	MX3020	
P	Steel		◐	◐	◐	
M	Stainless Steel			◐	◐	
K	Cast Iron	◐		✣	◐	
S	Heat-resistant Alloy, Titanium Alloy			◐		
H	Hardened Steel			◐		

Cutting Conditions :
● : Stable Cutting ◐ : General Cutting
✣ : Unstable Cutting

Honing : E : Round F : Sharp

Shape	Order Number	Class	Honing	Coated			Cermet		Dimensions (mm)					Geometry
				MC5020	MP6120	VP15TF	MX3020		L	W1	S	BS	RE	
	WNGU1406ANEN8C-M	G	E	●	●	●	●		16.87	16.87	6	8	1.0	





■ INSTRUCTIONS FOR USE OF WIPER INSERTS


Fig.1


Fig.2

Wiper inserts for WSX445 are two-cornered. Please set as shown in Fig.1.
Excellent finished surfaces can be achieved with one wiper.
Set more than 2 wiper inserts, equally spaced, when the feed per revolution is larger than 8mm/rev.

SPARE PARTS ➤ N001
TECHNICAL DATA ➤ P001

ARBOR TYPE MOUNTING DIMENSIONS

Fig.1
ø40
ø50
ø63
ø80

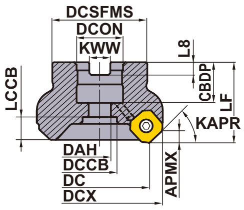


Fig.2
ø100
ø125

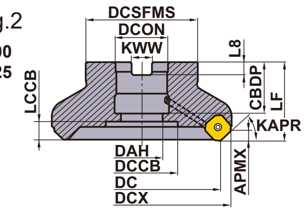
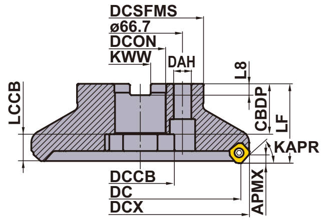


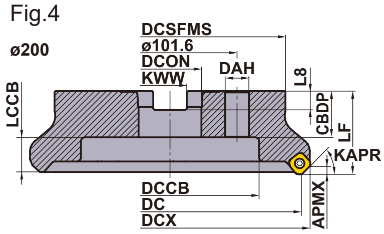
Fig.3
ø160



Right hand tool holder shown.

DC (mm)	Order Number	Dimensions (mm)								Fig.
		DCON	**CBDP**	**DAH**	**DCCB**	**LCCB**	**DCSFMS**	**KWW**	**L8**	
40	**WSX445-040A03AR**	16	18	9	14	13.3	37	8.4	5.6	1
40	**WSX445-040A04AR**	16	18	9	14	13.3	37	8.4	5.6	1
50	**WSX445-050A03AR**	22	20	11	17	11.3	47	10.4	6.3	1
50	**WSX445-050A04AR**	22	20	11	17	11.3	47	10.4	6.3	1
50	**WSX445-050A05AR**	22	20	11	17	11.3	47	10.4	6.3	1
63	**WSX445-063A04AR**	22	20	11	17	11.3	50	10.4	6.3	1
63	**WSX445-063A05AR**	22	20	11	17	11.3	50	10.4	6.3	1
63	**WSX445-063A06AR**	22	20	11	17	11.3	50	10.4	6.3	1
80	**WSX445-080A04AR**	27	23	13	20	14.3	56	12.4	7	1
80	**WSX445-080A06AR**	27	23	13	20	14.3	56	12.4	7	1
80	**WSX445-080A08AR**	27	23	13	20	14.3	56	12.4	7	1
80	**WSX445-080A04AL**	27	23	13	20	14.3	56	12.4	7	1
100	**WSX445-100B05AR**	32	26	26	45	16.3	78	14.4	8	2
100	**WSX445-100B07AR**	32	26	26	45	16.3	78	14.4	8	2
100	**WSX445-100B10AR**	32	26	26	45	16.3	78	14.4	8	2
100	**WSX445-100B05AL**	32	26	26	45	16.3	78	14.4	8	2
125	**WSX445-125B06AR**	40	28	30	56	21.3	89	16.4	9	2
125	**WSX445-125B08AR**	40	28	30	56	21.3	89	16.4	9	2
125	**WSX445-125B12AR**	40	28	30	56	21.3	89	16.4	9	2
125	**WSX445-125B06AL**	40	28	30	56	21.3	89	16.4	9	2

Fig.4



Right hand tool holder shown.

DC (mm)	Order Number	Dimensions (mm)								Fig.
		DCON	**CBDP**	**DAH**	**DCCB**	**LCCB**	**DCSFMS**	**KWW**	**L8**	
160	**WSX445-160C07NR**	40	40	14	56	21.3	100	16.4	9	3
160	**WSX445-160C10NR**	40	40	14	56	21.3	100	16.4	9	3
160	**WSX445-160C16NR**	40	40	14	56	21.3	100	16.4	9	3
160	**WSX445-160C07NL**	40	40	14	56	21.3	100	16.4	9	3
200	**WSX445-200C08NR**	60	32	18	135	29.3	160	25.7	14.22	4
200	**WSX445-200C12NR**	60	32	18	135	29.3	160	25.7	14.22	4
200	**WSX445-200C20NR**	60	32	18	135	29.3	160	25.7	14.22	4

RECOMMENDED CUTTING CONDITIONS

■ Dry cutting

	Work Material	Hardness	1st Recommendation	2nd Recommendation	**Vc** (m/min)	Finish Cutting	
						fz (mm/t.)	**ap**
P						L Breaker	
	Mild Steel	≤ 180HB	MP6120	VP15TF	250 (200−300)	0.15 (0.1−0.2)	≤ 1.0
			MP6130	VP20RT	240 (190−290)	0.15 (0.1−0.2)	≤ 1.0
			MX3030	–	180 (130−230)	0.15 (0.1−0.2)	≤ 1.0
	Carbon Steel Alloy Steel	180−350HB	MP6120	VP15TF	220 (170−270)	0.15 (0.1−0.2)	≤ 1.0
			MP6130	VP20RT	200 (150−250)	0.15 (0.1−0.2)	≤ 1.0
			MX3030	–	150 (120−180)	0.15 (0.1−0.2)	≤ 1.0
	Alloy Tool Steel	≤ 350HB (Annealing)	MP6120	VP15TF	220 (170−270)	0.15 (0.1−0.2)	≤ 1.0
			MP6130	VP20RT	200 (150−250)	0.15 (0.1−0.2)	≤ 1.0
			MX3030	–	150 (120−180)	0.15 (0.1−0.2)	≤ 1.0
	Pre-Hardened Steel	35−45HRC	MP6120	VP15TF	140 (100−180)	0.15 (0.1−0.2)	≤ 1.0
			MP6130	VP20RT	120 (90−150)	0.15 (0.1−0.2)	≤ 1.0
M						L Breaker	
	Austenitic Stainless Steel	≤ 200HB	MP7130	VP15TF	200 (150−250)	0.15 (0.1−0.2)	≤ 1.0
			MP7140	VP20RT	200 (150−250)	0.15 (0.1−0.2)	≤ 1.0
			MX3030	–	130 (100−180)	0.15 (0.1−0.2)	≤ 1.0
	Austenitic Stainless Steel	>200HB	MP7130	VP15TF	170 (120−220)	0.15 (0.1−0.2)	≤ 1.0
			MP7140	VP20RT	170 (120−220)	0.15 (0.1−0.2)	≤ 1.0
	Two-phase Stainless Steel	≤ 280HB	MP7130	VP15TF	160 (110−210)	0.15 (0.1−0.2)	≤ 1.0
			MP7140	VP20RT	160 (110−210)	0.15 (0.1−0.2)	≤ 1.0
	Precipitation Hardening Stainless Steel	≤ 450HB	MP7130	VP15TF	150 (100−200)	0.15 (0.1−0.2)	≤ 1.0
			MP7140	VP20RT	150 (100−200)	0.15 (0.1−0.2)	≤ 1.0
K						L Breaker	
	Gray Cast Iron	≤ 350MPa	MC5020	–	220 (200−270)	0.15 (0.1−0.2)	≤ 1.0
			VP15TF	–	180 (130−250)	0.15 (0.1−0.2)	≤ 1.0
			VP20RT	–	170 (120−240)	0.15 (0.1−0.2)	≤ 1.0
			MX3030	–	150 (120−180)	0.15 (0.1−0.2)	≤ 1.0
	Ductile Cast Iron	≤ 450MPa	MC5020	–	200 (180−250)	0.15 (0.1−0.2)	≤ 1.0
			VP15TF	VP20RT	160 (110−240)	0.15 (0.1−0.2)	≤ 1.0
	Ductile Cast Iron	≤ 800MPa	MC5020	–	200 (180−250)	0.15 (0.1−0.2)	≤ 1.0
			VP15TF	–	160 (110−240)	0.15 (0.1−0.2)	≤ 1.0
			VP20RT	–	150 (100−200)	0.15 (0.1−0.2)	≤ 1.0
H						M Breaker	
	Hardened Steel	40−55HRC	VP15TF	–	50 (30−70)	0.05 (0.05−0.1)	≤ 1.0
	Hardened Steel	55−62HRC	VP15TF	–	40 (20−50)	0.05 (0.05−0.1)	≤ 1.0

Note 1) Refer to the table above and set the cutting conditions to match the application.
Note 2) Wet cutting is recommended when focusing on the surface finish. (Tool life is shorter when compared to dry cutting.)

(mm)

Light Cutting		Medium Cutting		Rough Cutting		Heavy Cutting	
fz (mm/t.)	**ap**	**fz** (mm/t.)	**ap**	**fz** (mm/t.)	**ap**	**fz** (mm/t.)	**ap**
L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
L,M Breaker		M Breaker					
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	—	—	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
M,R Breaker		R,H Breaker					
0.05 (0.05—0.1)	≤ 1.5	0.1 (0.05—0.15)	≤ 2.0	—	—	—	—
0.05 (0.05—0.1)	≤ 1.5	0.1 (0.05—0.15)	≤ 2.0	—	—	—	—

RECOMMENDED CUTTING CONDITIONS

■ Wet Cutting

	Work Material	Hardness	1st Recommendation	2nd Recommendation	**Vc** (m/min)	Finish Cutting **fz** (mm/t.)	Finish Cutting **ap**
P						L Breaker	
	Mild Steel	≤ 180HB	MP6120	VP15TF	150 (100—200)	0.15 (0.1—0.2)	≤ 1.0
			MP6130	VP20RT	150 (100—200)	0.15 (0.1—0.2)	≤ 1.0
	Carbon Steel Alloy Steel	180—350HB	MP6120	VP15TF	120 (80—160)	0.15 (0.1—0.2)	≤ 1.0
			MP6130	VP20RT	120 (80—160)	0.15 (0.1—0.2)	≤ 1.0
	Alloy Tool Steel	≤ 350HB (Annealing)	MP6120	VP15TF	120 (80—160)	0.15 (0.1—0.2)	≤ 1.0
			MP6130	VP20RT	120 (80—160)	0.15 (0.1—0.2)	≤ 1.0
	Pre-Hardened Steel	35—45HRC	MP6120	VP15TF	100 (80—120)	0.15 (0.1—0.2)	≤ 1.0
			MP6130	VP20RT	100 (80—120)	0.15 (0.1—0.2)	≤ 1.0
M						L Breaker	
	Austenitic Stainless Steel	≤ 200HB	MP7130	VP15TF	130 (80—180)	0.15 (0.1—0.2)	≤ 1.0
			MP7140	VP20RT	130 (80—180)	0.15 (0.1—0.2)	≤ 1.0
	Austenitic Stainless Steel	> 200HB	MP7130	VP15TF	100 (80—150)	0.15 (0.1—0.2)	≤ 1.0
			MP7140	VP20RT	100 (80—150)	0.15 (0.1—0.2)	≤ 1.0
	Two-phase Stainless Steel	≤ 280HB	MP7130	VP15TF	100 (80—150)	0.15 (0.1—0.2)	≤ 1.0
			MP7140	VP20RT	100 (80—150)	0.15 (0.1—0.2)	≤ 1.0
	Precipitation Hardening Stainless Steel	≤ 450HB	MP7130	VP15TF	90 (50—140)	0.15 (0.1—0.2)	≤ 1.0
			MP7140	VP20RT	90 (50—140)	0.15 (0.1—0.2)	≤ 1.0
K						L Breaker	
	Gray Cast Iron	≤ 350MPa	MC5020	—	180 (160—200)	0.15 (0.1—0.2)	≤ 1.0
			VP15TF	VP20RT	130 (100—160)	0.15 (0.1—0.2)	≤ 1.0
	Ductile Cast Iron	≤ 450MPa	MC5020	—	180 (160—200)	0.15 (0.1—0.2)	≤ 1.0
			VP15TF	VP20RT	130 (100—160)	0.15 (0.1—0.2)	≤ 1.0
	Ductile Cast Iron	≤ 800MPa	MC5020	—	180 (160—200)	0.15 (0.1—0.2)	≤ 1.0
			VP15TF	VP20RT	110 (80—140)	0.15 (0.1—0.2)	≤ 1.0
N						L Breaker	
	Aluminium Alloy	—	TF15	—	≥ 300	0.15 (0.1—0.2)	≤ 1.0
S						L Breaker	
	Titanium Alloy	—	MP9120	VP15TF	50 (40—60)	0.05 (0.05—0.1)	≤ 1.0
			MP9130	VP20RT	50 (40—60)	0.05 (0.05—0.1)	≤ 1.0
	Heat Resistant Alloy	—	MP9120	VP15TF	40 (20—50)	0.05 (0.05—0.1)	≤ 1.0
			MP9130	VP20RT	40 (20—50)	0.05 (0.05—0.1)	≤ 1.0

Note 1) Refer to the table above and set the cutting conditions to match the application.
Note 2) Wet cutting is recommended when focusing on the surface finish. (Tool life is shorter when compared to dry cutting.)

(mm)

	Light Cutting		Medium Cutting		Rough Cutting		Heavy Cutting	
	fz (mm/t.)	**ap**	**fz** (mm/t.)	**ap**	**fz** (mm/t.)	**ap**	**fz** (mm/t.)	**ap**
	L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
	L,M Breaker		M Breaker					
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
	0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
	0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
	0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
	0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
	0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
	0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
	L Breaker		L Breaker		L Breaker		L Breaker	
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
	L,M Breaker		M Breaker					
	0.05 (0.05—0.1)	≤ 1.5	0.1 (0.05—0.15)	≤ 2.0	—	—	—	—
	0.05 (0.05—0.1)	≤ 1.5	0.1 (0.05—0.15)	≤ 2.0	—	—	—	—
	0.05 (0.05—0.1)	≤ 1.5	0.1 (0.05—0.15)	≤ 2.0	—	—	—	—
	0.05 (0.05—0.1)	≤ 1.5	0.1 (0.05—0.15)	≤ 2.0	—	—	—	—

FACE MILLING
<GENERAL CUTTING>

45° KAPR

ASX445

P | M | K | N | S | H

ø50, ø63

Over ø80

Fig.1
ø50
ø63

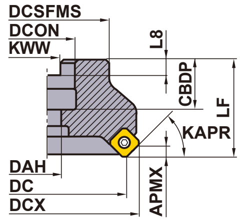


Fig.2
ø80
ø100

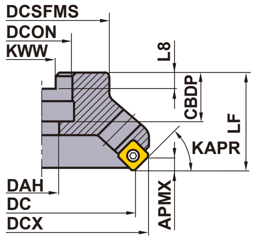


Fig.3
ø125

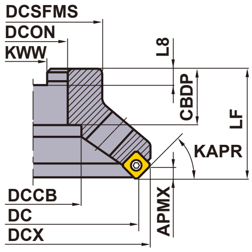


Fig.4
ø160

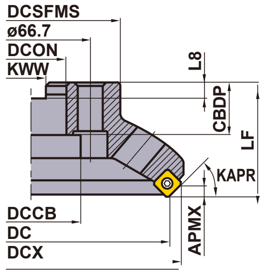
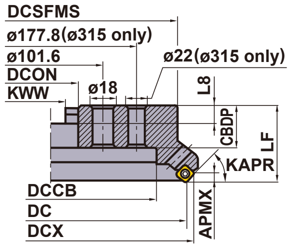


Fig.5
ø200
ø250
ø315



Right hand tool holder shown.

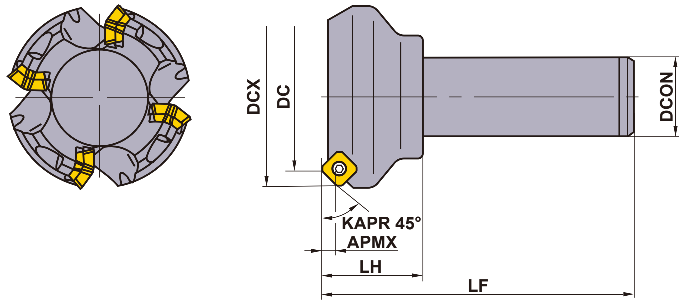
■ARBOR TYPE

KAPR : 45°
GAMP: +20°—+23° GAMF: -13°—-10°

Type	Order Number	Stock R	Stock L	Number of Teeth	DC	DCX	LF	DCON	CBDP	DAH	DCCB	DCSFMS	KWW	L8	WT* (kg)	APMX (mm)	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/L	●	□	6	80	93.2	50	27	23	13	–	56	12.4	7	0.9	6	2
	ASX445-100A07R/L	●	□	7	100	113.2	50	32	26	17	–	70	14.4	8	1.5	6	2
	ASX445-125B08R/L	●	□	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/L	●	□	12	200	212.9	63	60	32	–	135	155	25.7	14.22	5.8	6	5
	ASX445-250C14R/L	★	□	14	250	262.9	63	60	32	–	174	200	25.7	14.22	10.6	6	5
	ASX445-315C18R/L	★	□	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/L	●	□	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

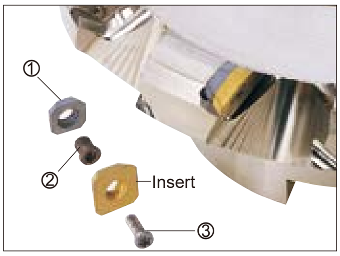
● : Inventory maintained. ★ : Inventory maintained in Japan.
□ : Non stock, produced to order only.



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
ASX445R634S32	★	4	63	75.9	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 ASX445 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.

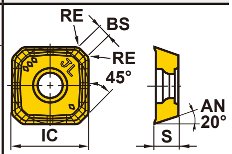
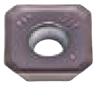
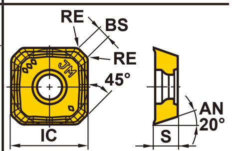
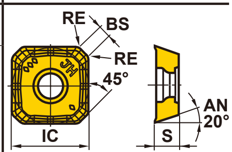
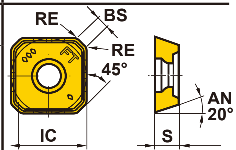
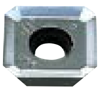
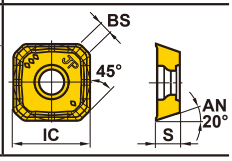
SPARE PARTS ➢ N001
TECHNICAL DATA ➢ P001

INSERTS

Work Material					F7030	MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	VP45N	NX4545		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
S : Chamfer + Hone T : Chamfer

Application	Shape	Order Number	Class	Honing	F7030 (Coated)	MC5020 (Coated)	MP6120 (Coated)	MP6130 (Coated)	MP7130 (Coated)	MP7140 (Coated)	MP9120 (Coated)	MP9130 (Coated)	VP15TF (Coated)	VP30RT (Coated)	VP45N (Coated)	NX4545 (Cermet)	(Cermet)	HTi10 (Carbide)	(Carbide)	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	–	

Dimensions (mm)

Instructions for use of the JP breaker

Note 1) The JP breaker has sharp cutting edges. Wear gloves when handling.

Note 2) When machining aluminium alloy, welding to the cutting edge tends to occur, often leading to insert failure.

Note 3) Wet cutting is recommended.

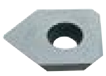
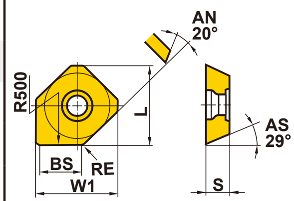
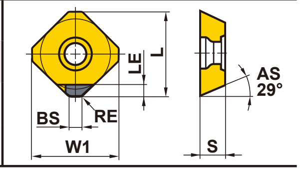
● : Inventory maintained. (10 inserts in one case)
(CBN and PCD wiper inserts are available in 1 piece in one case)

WIPER INSERTS

Work Material			MC5020	VP15TF	NX2525	VP25N	HTi05T	MB710	MD220
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 MC5020	Coated VP15TF	Cermet NX2525	Coated Cermet VP25N	Carbide HTi05T	CBN MB710	PCD MD220	L	LE	W1	S	BS	RE	Geometry
	WEEW13T3AGER8C	E	E	●	●			●			16.6	—	16.48	3.97	7.5	1.5	
	WEEW13T3AGTR8C	E	T			●	●				16.6	—	16.48	3.97	7.5	1.5	
	WEEW13T3AGFR3C	E	F							●	16.6	1.8	16.48	3.97	3.0	1.5	
	WEEW13T3AGTR3C	E	T						●		16.6	1.8	16.48	3.97	3.0	1.5	

Note 1) Wiper inserts are single-cornered.
Note 2) CBN grade MB710 is for cast iron.
Note 3) PCD grade MD220 is for aluminium alloy.

■INSTRUCTIONS FOR USE OF WIPER INSERTS

Fig.1

Fig.2

Note 1) These wiper inserts are single-cornered.
Note 2) 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.)
Note 3) Recommended depth of cut is ap=0.2-0.5(mm). (Be aware of the cutting load if the depth of cut is over the recommendation.)
Note 4) The major cutting edge of a wiper insert is set further inside than a standard insert.
This is to prevent heavy loads on the wiper insert. (To prevent fracture set the feed under 0.2 mm/t.)
Note 5) Excellent finished surface can be obtained with one wiper insert.
Note 6) When the feed per revolution is larger than the width of the wiper edge, install 2 or more wiper inserts equally spaced 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	
	MB710	
S	**VP15TF**	20—50
H	**VP15TF**	40—80
N	**MD220**	650 (300—1000)

● Recommended depth of cut (ap) is 0.2mm-0.5mm and feed per tooth (fz) is up to 0.2mm/t.

SPARE PARTS ➢ N001
TECHNICAL DATA ➢ P001

RECOMMENDED CUTTING CONDITIONS

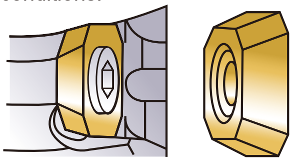
	Work Material	Hardness	Grade	Cutting Speed (m/min)	Finish–Light Cutting		Light–Rough Cutting		Medium–Heavy Cutting	
					Feed per Tooth (mm/t.)	Breaker	Feed per Tooth (mm/t.)	Breaker	Feed per Tooth (mm/t.)	Breaker
P	Mild Steel	≤180HB	F7030	280 (210–350)	0.15 (0.1–0.2)	JL	0.2 (0.1–0.3)	JM	0.3 (0.2–0.4)	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

FEATURES

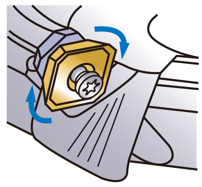
■STABLE, LONG TOOL LIFE, HIGH ACCURACY BODY

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.

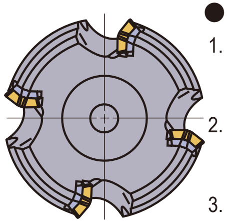


The cutter body is made from a special alloy that provides high strength at high temperature. A special surface treatment improves the corrosion resistance.

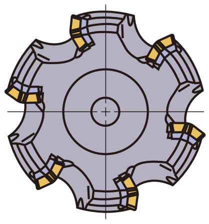
The ASX cutter uses screw-on type inserts that allow easy clamping of the inserts with high location precision. Indexing of the inserts can be performed without completely removing the screw.



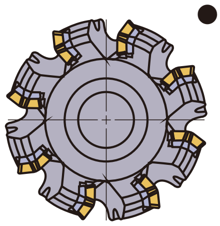
■EFFECTIVE FOR VARIOUS MACHINING APPLICATIONS



● Coarse Pitch Type
1. 1st recommendation for cutting steels and stainless steels.
2. For deep cutting and high feed rates with large-volume chip discharge.
3. Smooth cutting allows longer overhang applications.

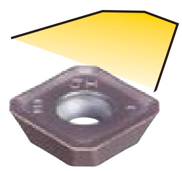
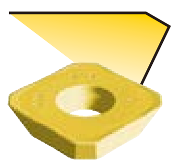


● Fine Pitch Type
1. 1st recommendation for cast iron, hardened steel and heat-resistant alloys.
2. For shallow cutting with low feed rates and low-volume chip discharge.

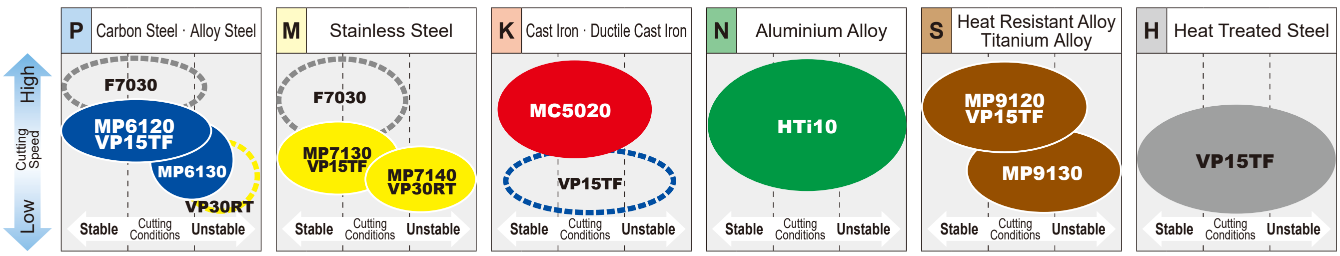


● Extra Fine Pitch Type
1. 1st recommendation for cast iron.
2. For cutting operations where chip discharge volume is small and high table feed is desired.

■CHIPBREAKERS FOR A WIDE RANGE OF APPLICATIONS

JL Finish to Light Cutting Breaker	**JM** Light to Semi-Heavy 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 work 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 M class inserts. Higher fracture-resistant flat-top inserts.
①Workpiece rigidity is low.	**①General cutting.**	**①Interrupted cutting. ②Scaling.**	**①General machining of aluminium and non ferrous metal.**	**①For rough accuracy machining of scaled cast iron.**

■INSERT GRADES FOR A WIDE RANGE OF MATERIALS



Note 1) When machining steel or stainless steel where the emphasis is on surface finish, use the 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

TECHNICAL DATA ➤P001

FACE MILLING
<GENERAL CUTTING>

AHX440S/475S/640S

Selection Reference Table (Cutting Edge Count and Cutting Conditions)

DC	Type	Number of Teeth	AHX440S General Cutting Stock	AHX440S fr (mm/rev)	AHX440S APMX	AHX475S High Feed Machining Stock	AHX475S fr (mm/rev)	AHX475S APMX	AHX640S General Cutting Stock	AHX640S fr (mm/rev)	AHX640S APMX
40	Fine Pitch	3	●	0.6−1.2	3						
	Extra Fine Pitch	4	●	0.8−1.6	3						
50	Fine Pitch	4	●	0.8−1.6	3	●	2.4−4.0	1.6			
	Extra Fine Pitch	5	●	1.0−2.0	3	●	3.0−5.0	1.6			
	Super Extra Fine Pitch	6	●	1.2−2.4	3						
63	Coarse Pitch	4							●	0.8−1.6	6
	Fine Pitch	5	●	1.0−2.0	3	●	3.0−5.0	1.6	●	1.0−2.0	6
	Extra Fine Pitch	6	●	1.2−2.4	3	●	3.6−6.0	1.6			
	Super Extra Fine Pitch	8	●	1.6−3.2	3						
80	Coarse Pitch	4							●	0.8−1.6	6
	Fine Pitch	6	●	1.2−2.4	3	●	3.6−6.0	1.6	●	1.2−2.4	6
	Extra Fine Pitch	8	●	1.6−3.2	3	●	4.8−8.0	1.6			
	Super Extra Fine Pitch	10	●	2.0−4.0	3						
100	Coarse Pitch	5							●	1.0−2.0	6
	Fine Pitch	7	●	1.4−2.8	3	●	4.2−7.0	1.6	●	1.4−2.8	6
	Extra Fine Pitch	9				●	5.4−9.0	1.6			
		10	●	2.0−4.0	3						
	Super Extra Fine Pitch	12	●	2.4−4.8	3						
125	Coarse Pitch	6							●	1.2−2.4	6
	Fine Pitch	8	●	1.6−3.2	3	●	4.8−8.0	1.6	●	1.6−3.2	6
	Extra Fine Pitch	10				●	6.0−10.0	1.6			
		12	●	2.4−4.8	3						
	Super Extra Fine Pitch	14	●	2.8−5.6	3						
160	Coarse Pitch	7							●	1.4−2.8	6
	Fine Pitch	10	●	2.0−4.0	3	●	6.0−10.0	1.6	●	2.0−4.0	6
	Extra Fine Pitch	12				●	7.2−12.0	1.6			
		14	●	2.8−5.6	3						
	Super Extra Fine Pitch	16	●	3.2−6.4	3						
200	Coarse Pitch	8							●	1.6−3.2	6
	Fine Pitch	12							●	2.4−4.8	6

Note 1) fr : Feed rate per revolution (AHX475S : the feed rate per cutter (fz) will be limited by the cutting width ae. Please refer to page K040 for details.)
Note 2) APMX : Maximum depths of cut (AHX440S : the maximum depths of cut will vary depending on the breaker)
Note 3) The depths of cut and feed rate are identical to the recommended conditions for carbon steel and alloy steel.

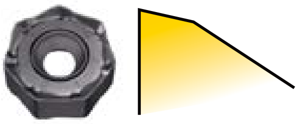
Compatibility with Inserts for AHX Series

The RE = 3.2 mm insert for use with AHX440S can be mounted on AHX475S.
All inserts for use with AHX640 can be mounted on AHX640S (note, however, that the set height will differ).
The inserts for mounting on AHX640W are the MK, HK, and WK breakers.

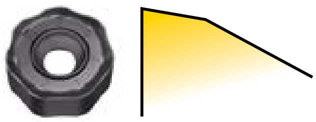
Breaker System

Breaker Series for Varied Cutting Conditions

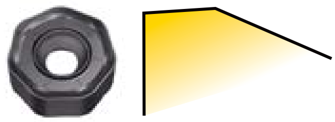
Focus on Cutting Edge Sharpness	Stable Cutting (Thin Sheet, Low Rigidity) ⟷ Unstable Cutting (Interrupted Cutting, With Scale)	Focus on Cutting Edge Strength



L Breaker
Focus on cutting edge sharpness
Low resistance type



M Breaker
1st Recommendation
All-around



R Breaker
Focused on fracture resistance
Reinforced edge type

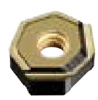
Work Material		Cutting Conditions		
		Stable Cutting	General Cutting	Unstable Cutting
P	AHX440S	L With Wiper M(R0.8) With Wiper	M(R3.2) Shared with AHX475	R Shared with AHX475
	AHX640S		M MP	
M	AHX440S	L With Wiper M(R0.8) With Wiper	M(R3.2)	R
	AHX640S		MM	
K	AHX440S	L With Wiper M(R0.8) With Wiper	M(R3.2) Shared with AHX475	R Shared with AHX475
	AHX640S		MK	HK

Wiper Insert of AHX640S

Based on the number of inserts and the cutting conditions, use of wiper inserts can improve overall surface finishes.

P — **WP** + combination with **MP**
Right-hand 2 corners, left-hand 2 corners.

K — **WK** + combination with **MK**
Right-hand 2 corners, left-hand 2 corners.



FACE MILLING
<GENERAL CUTTING>

50° KAPR

AHX440S

P M K N S H

KAPR : 50°
GAMP : -6° GAMF : -7°

Fig. 1
ø40
ø50
ø63
ø80

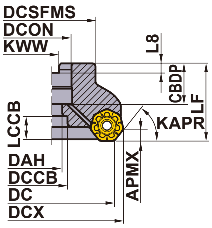


Fig. 2
ø100
ø125

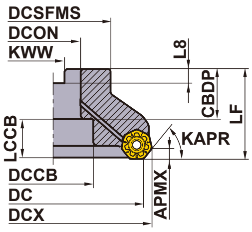
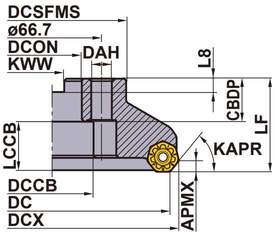


Fig. 3
ø160

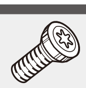
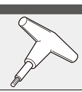


Right hand tool holder only.

DC (mm)	Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm) LF	DCX	DCON	Fig.	WT * (kg)	APMX (mm)
40	**AHX440S-040A03AR**	●	○	3	40	48.4	16	1	0.3	3
	AHX440S-040A04AR	●	○	4	40	48.4	16	1	0.2	3
50	**AHX440S-050A04AR**	●	○	4	40	58.4	22	1	0.4	3
	AHX440S-050A05AR	●	○	5	40	58.4	22	1	0.4	3
	AHX440S-050A06AR	●	○	6	40	58.4	22	1	0.4	3
63	**AHX440S-063A05AR**	●	○	5	40	71.4	22	1	0.6	3
	AHX440S-063A06AR	●	○	6	40	71.4	22	1	0.6	3
	AHX440S-063A08AR	●	○	8	40	71.4	22	1	0.5	3
80	**AHX440S-080A06AR**	●	○	6	50	88.4	27	1	1.1	3
	AHX440S-080A08AR	●	○	8	50	88.4	27	1	1.1	3
	AHX440S-080A10AR	●	○	10	50	88.4	27	1	1.1	3
100	**AHX440S-100B07AR**	●	○	7	50	108.4	32	2	1.6	3
	AHX440S-100B10AR	●	○	10	50	108.4	32	2	1.6	3
	AHX440S-100B12AR	●	○	12	50	108.3	32	2	1.6	3
125	**AHX440S-125B08AR**	●	○	8	63	133.4	40	2	3.0	3
	AHX440S-125B12AR	●	○	12	63	133.4	40	2	3.0	3
	AHX440S-125B14AR	●	○	14	63	133.3	40	2	2.9	3
160	**AHX440S-160C10NR**	●	–	10	63	168.4	40	3	4.8	3
	AHX440S-160C14NR	●	–	14	63	168.4	40	3	4.6	3
	AHX440S-160C16NR	●	–	16	63	168.4	40	3	4.7	3

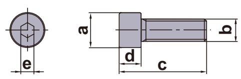
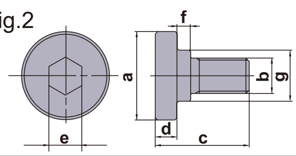
Note 1) The cutter body does not have a set bolt for an arbor. Please order the Set Bolt separately.
Note 2) The above "APMX" will vary depending on the breaker insert.
* WT : Tool Weight

SPARE PARTS

Tool Holder Number	 * Clamp Screw	 Wrench (Insert)
AHX440S	TS35R	TKY15T

* Clamp Torque (N • m) : TS35R=3.5

SET BOLT (SOLD SEPARATELY)

Tool Holder Number	Set Bolt With Coolant Hole Order Number	Set Bolt Without Coolant Hole Order Number	Fig.	Reference Dimensions (mm) a	b	c	d	e	f	g	Geometry
AHX440S-040A◌◌AR	HSC08025H	HSC08040	1	13	M8×1.25	33	8	5	–	–	Fig.1 
AHX440S-050A◌◌AR	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	–	–	
AHX440S-063A◌◌AR	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	–	–	
AHX440S-080A◌◌AR	HSC12035H	HSC12035 (HSC12045)	1	18	M12×1.75	47 57	12	10	–	–	Fig.2 
AHX440S-100B◌◌AR	MBA16033H	–	2	40	M16×2	43	10	14	6	23	
AHX440S-125B◌◌AR	MBA20040H	–	2	50	M20×2.5	54	14	17	6	27	
AHX440S-160C◌◌NR	No coolant hole	–	2	50	M20×2.5	54	14	17	6	27	

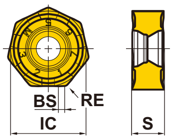
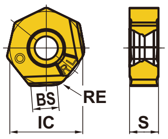
Note 1) Internal coolant is necessary with the set bolt.

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

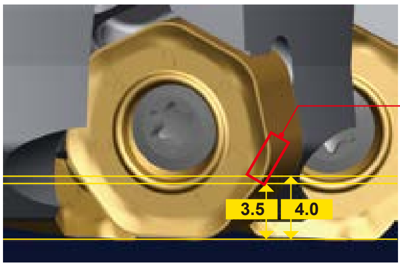
INSERTS

Work Material			MP6120	MP6130	MP7130	MP7140	MC5020	VP15TF
	P	Steel	◖	✤				◖
	M	Stainless Steel			◖	✤		◖
	K	Cast Iron					◖	◖
	H	Hardened Steel						◖

Cutting Conditions (Guide) :
● : Stable Cutting ◖ : General Cutting ✤ : Unstable Cutting
Honing :
E : Round

Application	Shape	Order Number	Class	Honing	Coated MP6120	MP6130	MP7130	MP7140	MC5020	VP15TF	Dimensions (mm) IC	RE	BS	S	APMX	Geometry
Stable Cutting		NNMU130508ZER-L	M	E	●	●	●	●	●	★	13.4	0.8	1	5.77	3	
General Cutting		NNMU130508ZEN-M	M	E	●	●	●	●	●	★	13.4	0.8	1	5.57	* 4	
		NNMU130532ZEN-M	M	E	●	●	●	●	●	★	13.4	3.2	—	5.57	* 4	
Unstable Cutting		NNMU130532ZEN-R	M	E	●	●	●	●	●	★	13.4	3.2	—	5.47	* 4	
Finish Cutting	 Wiper	WNEU1305ZEN4C-M	E	E	●				●	★	13.4	2.7	4	5.1	0.5	

* When not using the Wiper, APMX = 3.5mm



Corner R on Opposite Side

If using corner R on the opposite side, APMX = 4.0 mm
If not using the opposite corner, APMX = 3.5 mm

■INSTRUCTIONS FOR USE OF WIPER INSERTS

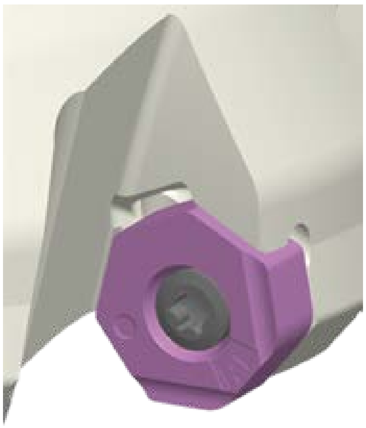


Fig.1

Fig.2

Note 1) These wiper inserts have 2 corners on right hand type and 2 corners for left hand type. Refer to Figure 1.
Note 2) A satisfactory finish surface can be achieved with one wiper insert. However, if the feed rate per revolution will be equal to or greater than the width of the wiper edge, it is recommended to install 2 or more wiper inserts spaced evenly within the cutting body.

MOUNTING DIMENSION ➤ K046
SPARE PARTS ➤ N001
TECHNICAL DATA ➤ P001

RECOMMENDED CUTTING CONDITIONS

Dry Cutting

	Work Material	Hardness	Grade	Vc (m/min)	fz (mm/t.)	ap (mm)
P	Mild Steel	≤180HB	MP6120,VP15TF	250 (200–300)	0.3 (0.2–0.4)	≤3
			MP6130	240 (190–290)	0.3 (0.2–0.4)	≤3
	Carbon Steel,Alloy Steel	180–280HB	MP6120,VP15TF	220 (170–270)	0.3 (0.2–0.4)	≤3
			MP6130	200 (150–250)	0.3 (0.2–0.4)	≤3
	Carbon Steel,Alloy Steel	280–350HB	MP6120,VP15TF	140 (100–180)	0.3 (0.2–0.4)	≤3
			MP6130	120 (90–150)	0.3 (0.2–0.4)	≤3
	Alloy Tool Steel	≤350HB (Annealing)	MP6120,VP15TF	140 (100–180)	0.15 (0.1–0.2)	≤1
			MP6130	120 (90–150)	0.15 (0.1–0.2)	≤1
	Pre-hardened Steel	35–45HRC	MP6120,VP15TF	140 (100–180)	0.15 (0.1–0.2)	≤1
			MP6130	120 (90–150)	0.15 (0.1–0.2)	≤1
M	Austenitic Stainless Steel	≤200HB	MP7130,VP15TF	200 (150–250)	0.2 (0.1–0.3)	≤3
			MP7140	180 (120–230)	0.2 (0.1–0.3)	≤3
		> 200HB	MP7130,VP15TF	150 (100–200)	0.2 (0.1–0.3)	≤3
			MP7140	130 (80–180)	0.2 (0.1–0.3)	≤3
	Ferritic and Maltensitic Stainless Steel	≤200HB	MP7130,VP15TF	200 (150–250)	0.2 (0.1–0.3)	≤3
			MP7140	180 (120–230)	0.2 (0.1–0.3)	≤3
		> 200HB	MP7130,VP15TF	150 (100–200)	0.2 (0.1–0.3)	≤3
			MP7140	130 (80–180)	0.2 (0.1–0.3)	≤3
	Two-phase Stainless Steel	≤280HB	MP7130,VP15TF	140 (100–180)	0.15 (0.05–0.25)	≤3
			MP7140	120 (80–160)	0.15 (0.05–0.25)	≤3
	Precipitation Hardening Stainless Steel	< 450HB	MP7130,VP15TF	130 (100–160)	0.15 (0.05–0.25)	≤3
			MP7140	110 (80–140)	0.15 (0.05–0.25)	≤3
K	Gray Cast Iron	Tensile Strength ≤350MPa	MC5020	220 (150–300)	0.3 (0.2–0.4)	≤3
			VP15TF	180 (130–230)	0.3 (0.2–0.4)	≤3
	Ductile Cast Iron	Tensile Strength ≤450MPa	MC5020	200 (150–250)	0.2 (0.1–0.3)	≤3
			VP15TF	170 (120–220)	0.2 (0.1–0.3)	≤3
	Ductile Cast Iron	Tensile Strength ≤800MPa	MC5020	170 (150–200)	0.2 (0.1–0.3)	≤3
			VP15TF	140 (100–180)	0.2 (0.1–0.3)	≤3
H	Hardened Steel	40–55HRC	VP15TF	80 (60–100)	0.15 (0.1–0.2)	≤1

Wet Cutting

	Work Material	Hardness	Grade	Vc (m/min)	fz (mm/t.)	ap (mm)
M	Austenitic Stainless Steel	≤200HB	MP7130,VP15TF	125 (100–150)	0.15 (0.1–0.2)	≤3
			MP7140	100 (80–140)	0.15 (0.1–0.2)	≤3
		> 200HB	MP7130,VP15TF	100 (75–125)	0.15 (0.1–0.2)	≤3
			MP7140	80 (55–105)	0.15 (0.1–0.2)	≤3
	Ferritic and Maltensitic Stainless Steel	≤200HB	MP7130,VP15TF	125 (100–150)	0.15 (0.1–0.2)	≤3
			MP7140	100 (80–140)	0.15 (0.1–0.2)	≤3
		> 200HB	MP7130,VP15TF	100 (75–125)	0.15 (0.1–0.2)	≤3
			MP7140	80 (55–105)	0.15 (0.1–0.2)	≤3
	Two-phase Stainless Steel	≤280HB	MP7130,VP15TF	80 (60–100)	0.1 (0.05–0.15)	≤3
			MP7140	60 (40–80)	0.1 (0.05–0.15)	≤3
	Precipitation Hardening Stainless Steel	< 450HB	MP7130,VP15TF	70 (50–90)	0.1 (0.05–0.15)	≤3
			MP7140	50 (30–70)	0.1 (0.05–0.15)	≤3

■Cutting Conditions with Wiper Insert

	Work Material	Hardness	Grade	Vc (m/min)	fz (mm/t.)	ap (mm)
P	Mild Steel	≤180HB	**MP6120,VP15TF**	250(200–300)	0.3(0.2–0.4)	≤0.5
	Carbon Steel,Alloy Steel	180–280HB	**MP6120,VP15TF**	220(170–270)	0.3(0.2–0.4)	≤0.5
		280–350HB	**MP6120,VP15TF**	140(100–180)	0.3(0.2–0.4)	≤0.5
	Alloy Tool Steel	≤350HB (Annealing)	**MP6120,VP15TF**	140(100–180)	0.15(0.1–0.2)	≤0.5
	Pre-hardened Steel	35–45HRC	**MP6120,VP15TF**	140(100–180)	0.15(0.1–0.2)	≤0.5
M	Austenitic Stainless Steel	≤200HB	**VP15TF**	125(100–150)	0.15(0.1–0.2)	≤0.5
		> 200HB	**VP15TF**	100(75–125)	0.15(0.1–0.2)	≤0.5
	Ferritic and Maltensitic Stainless Steel	≤200HB	**VP15TF**	125(100–150)	0.15(0.1–0.2)	≤0.5
		> 200HB	**VP15TF**	100(75–125)	0.15(0.1–0.2)	≤0.5
	Two-phase Stainless Steel	≤280HB	**VP15TF**	80(60–100)	0.1(0.05–0.15)	≤0.5
	Precipitation Hardening Stainless Steel	< 450HB	**VP15TF**	70(50–90)	0.1(0.05–0.15)	≤0.5
K	Gray Cast Iron	Tensile Strength ≤350MPa	**MC5020**	320(250–400)	0.3(0.2–0.4)	≤0.5
			VP15TF	220(150–300)	0.3(0.2–0.4)	≤0.5
	Ductile Cast Iron	Tensile Strength ≤450MPa	**MC5020**	250(200–300)	0.2(0.1–0.3)	≤0.5
			VP15TF	200(150–250)	0.2(0.1–0.3)	≤0.5
		Tensile Strength ≤800MPa	**MC5020**	220(200–250)	0.2(0.1–0.3)	≤0.5
			VP15TF	170(150–200)	0.2(0.1–0.3)	≤0.5
H	Hardened Steel	40–55HRC	**VP15TF**	80(60–100)	0.15(0.1–0.2)	≤0.5

Note 1) Refer to the above table and set up cutting conditions according to the applications.
Note 2) When placing emphasis on surface finish quality, wet cutting is recommended. (tool life is lowered compared to dry cutting)
Note 3) The recommended depth of cut differs according to the insert geometry.
Note 4) When clamp rigidity is low and tool overhang is long, we recommend to reduce the cutting speed and the feed rate by 30%.
Note 5) Wet cutting is recommended for good surface finishes when machining stainless steel. (Tool life is short compared to dry cutting.)

FACE MILLING
<GENERAL HIGH FEED CUTTING>

15° KAPR F R

AHX475S

P M K N S H

Fig.1

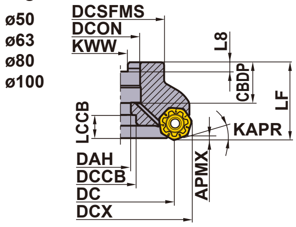
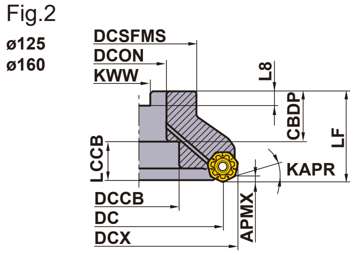


Fig.2



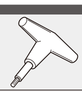
Right hand tool holder only.

KAPR : 15°
GAMP : -6° GAMF : -10°

DC (mm)	Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm)			Fig.	WT* (kg)	APMX (mm)
					LF	DCX	DCON			
50	**AHX475S-050A04AR**	●	○	4	50	65.7	22	1	0.6	1.6
	AHX475S-050A05AR	●	○	5	50	65.7	22	1	0.6	1.6
63	**AHX475S-063A05AR**	●	○	5	50	78.7	22	1	1.0	1.6
	AHX475S-063A06AR	●	○	6	50	78.7	22	1	1.0	1.6
80	**AHX475S-080A06AR**	●	○	6	50	95.6	27	1	1.6	1.6
	AHX475S-080A08AR	●	○	8	50	95.6	27	1	1.6	1.6
100	**AHX475S-100A07AR**	●	○	7	63	115.6	32	1	3.3	1.6
	AHX475S-100A09AR	●	○	9	63	115.6	32	1	3.3	1.6
125	**AHX475S-125B08AR**	●	○	8	63	140.6	40	2	4.0	1.6
	AHX475S-125B10AR	●	○	10	63	140.6	40	2	4.0	1.6
160	**AHX475S-160B10AR**	●	○	10	63	175.6	40	2	6.0	1.6
	AHX475S-160B12AR	●	○	12	63	175.6	40	2	6.0	1.6

Note 1) The cutter body does not have a set bolt for an arbor.
* WT : Tool Weight

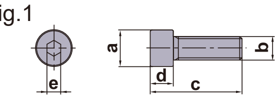
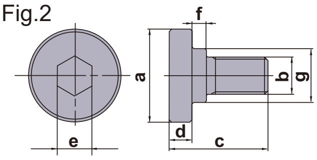
SPARE PARTS

Tool Holder Number	 *	
	Clamp Screw	Wrench (Insert)
AHX475S	TS35R	TKY15T

* Clamp Torque (N • m) : TS35R=3.5

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

SET BOLT (SOLD SEPARATELY)

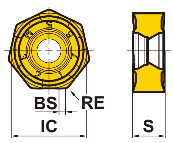
Tool Holder Number	Set Bolt		Fig.	Reference Dimensions (mm)							Geometry
	With Coolant Hole	Without Coolant Hole									
	Order Number	Order Number		a	b	c	d	e	f	g	
AHX475S-050A◌◌AR	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	–	–	Fig.1 
AHX475S-063A◌◌AR	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	–	–	
AHX475S-080A◌◌AR	HSC12035H	HSC12035 (HSC12045)	1	18	M12×1.75	47 57	12	10	–	–	Fig.2 
AHX475S-100B◌◌AR	HSC16040H	–	1	24	M16×2	56	16	14	–	–	
AHX475S-125B◌◌AR	MBA20040H	–	2	50	M20×2.5	54	14	17	6	27	
AHX475S-160C◌◌AR	MBA20040H	–	2	50	M20×2.5	54	14	17	6	27	

Note 1) Internal coolant is necessary with the set bolt.

INSERTS

Work Material		P	Steel	◐	✤		◐		
		K	Cast Iron			◐	◐		
		H	Hardened Steel				◐		

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting
Honing : E : Round

Application	Shape	Order Number	Class	Honing	Coated MP6120	Coated MP6130	Coated MC5020	Coated VP15TF			Dimensions (mm) IC	RE	BS	S	APMX	Geometry
General Cutting		**NNMU130532ZEN-M**	M	E	●	●	●	★			13.4	3.2	–	5.57	1.6	
Unstable Cutting		**NNMU130532ZEN-R**	M	E	●	●	●	★			13.4	3.2	–	5.47	1.6	

MOUNTING DIMENSION ➢ K046
SPARE PARTS ➢ N001
TECHNICAL DATA ➢ P001

RECOMMENDED CUTTING CONDITIONS

■Dry Cutting

	Work Material	Hardness	Grade	Breaker	Vc (m/min)	fz (mm/t.)	ap (mm)	ae (mm)
P	Mild Steel	≤180HB	MP6120	R	150(100–200)	0.6	≤1.6	≤0.5DC
			MP6120	R	150(100–200)	0.8	≤1.6	0.5–0.8DC
			MP6120	M	150(100–200)	1	≤1.6	0.8–1DC
			MP6130	R	130(80–180)	0.6	≤1.6	≤0.5DC
			MP6130	R	130(80–180)	0.8	≤1.6	0.5–0.8DC
			MP6130	M	130(80–180)	1	≤1.6	0.8–1DC
	Carbon Steel,Alloy Steel	180–280HB	MP6120	R	130(80–180)	0.6	≤1.6	≤0.5DC
			MP6120	R	130(80–180)	0.8	≤1.6	0.5–0.8DC
			MP6120	M	130(80–180)	1	≤1.6	0.8–1DC
			MP6130	R	110(60–160)	0.6	≤1.6	≤0.5DC
			MP6130	R	110(60–160)	0.8	≤1.6	0.5–0.8DC
			MP6130	M	110(60–160)	1	≤1.6	0.8–1DC
	Carbon Steel,Alloy Steel	280–350HB	MP6120	R	100(50–150)	0.5	≤1.6	≤0.5DC
			MP6120	R	100(50–150)	0.6	≤1.6	0.5–0.8DC
			MP6120	R	100(50–150)	0.7	≤1.6	0.8–1DC
			MP6130	R	80(30–130)	0.5	≤1.6	≤0.5DC
			MP6130	R	80(30–130)	0.6	≤1.6	0.5–0.8DC
			MP6130	R	80(30–130)	0.7	≤1.6	0.8–1DC
	Alloy Tool Steel	≤350HB (Annealing)	MP6120	R	100(50–150)	0.5	≤1.6	≤0.5DC
			MP6120	R	100(50–150)	0.6	≤1.6	0.5–0.8DC
			MP6120	R	100(50–150)	0.7	≤1.6	0.8–1DC
			MP6130	R	80(30–120)	0.5	≤1.6	≤0.5DC
			MP6130	R	80(30–120)	0.6	≤1.6	0.5–0.8DC
			MP6130	R	80(30–120)	0.7	≤1.6	0.8–1DC
	Pre-hardened Steel	35–45HRC	MP6120	R	100(70–130)	0.5	≤1.6	≤0.5DC
			MP6120	R	100(70–130)	0.6	≤1.6	0.5–0.8DC
			MP6120	R	100(70–130)	0.7	≤1.6	0.8–1DC
			MP6130	R	80(50–110)	0.5	≤1.6	≤0.5DC
			MP6130	R	80(50–110)	0.6	≤1.6	0.5–0.8DC
			MP6130	R	80(50–110)	0.7	≤1.6	0.8–1DC
K	Gray Cast Iron	Tensile Strength ≤350MPa	MC5020	R	150(100–200)	0.6	≤1.6	≤0.5DC
			MC5020	R	150(100–200)	0.8	≤1.6	0.5–0.8DC
			MC5020	M	150(100–200)	1	≤1.6	0.8–1DC
			VP15TF	M	120(80–160)	0.6	≤1.6	≤0.5DC
			VP15TF	M	120(80–160)	0.8	≤1.6	0.5–0.8DC
			VP15TF	M	120(80–160)	1	≤1.6	0.8–1DC
	Ductile Cast Iron	Tensile Strength ≤450MPa	MC5020	R	150(100–200)	0.6	≤1.6	≤0.5DC
			MC5020	R	150(100–200)	0.8	≤1.6	0.5–0.8DC
			MC5020	M	150(100–200)	1	≤1.6	0.8–1DC
			VP15TF	R	120(80–160)	0.6	≤1.6	≤0.5DC
			VP15TF	R	120(80–160)	0.8	≤1.6	0.5–0.8DC
			VP15TF	M	120(80–160)	1	≤1.6	0.8–1DC
	Ductile Cast Iron	Tensile Strength ≤800MPa	MC5020	R	150(100–200)	0.5	≤1.6	≤0.5DC
			MC5020	R	150(100–200)	0.6	≤1.6	0.5–0.8DC
			MC5020	R	150(100–200)	0.7	≤1.6	0.8–1DC
			VP15TF	R	120(80–160)	0.5	≤1.6	≤0.5DC
			VP15TF	R	120(80–160)	0.6	≤1.6	0.5–0.8DC
			VP15TF	R	120(80–160)	0.7	≤1.6	0.8–1DC
H	Hardened Steel	40–55HRC	VP15TF	R	70(50–90)	0.4	≤1.6	≤0.5DC
			VP15TF	R	70(50–90)	0.5	≤1.6	0.5–0.8DC
			VP15TF	R	70(50–90)	0.6	≤1.6	0.8–1DC

Note 1) When clamp rigidity is low and tool overhang is long, we recommend to reduce the cutting speed and the feed rate by 30%.

50° KAPR

AHX640S

P | M | K | N | S | H

KAPR :50°
GAMP:-6° GAMF:-5°

Fig. 1
ø63
ø80

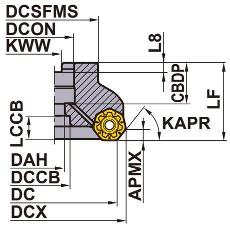


Fig. 2
ø100
ø125

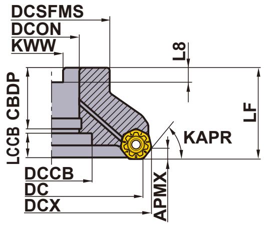


Fig. 3
ø160

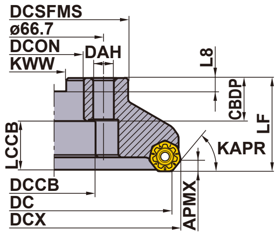
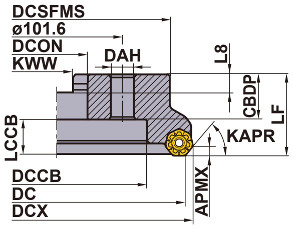
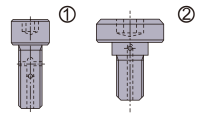


Fig. 4
ø200



Right hand tool holder only.

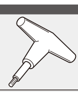
DC	Set Bolt	Geometry
ϕ63	HSC10030H	①
ϕ80	HSC12035H	①
ϕ100	MBA16033H	②
ϕ125	MBA20040H	②
ϕ160	—	—
ϕ200	—	—



DC (mm)	Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm) LF	DCX	DCON	Fig.	WT* (kg)	APMX (mm)
63	**AHX640S-063A04AR**	●	○	4	50	75.55	22	1	0.7	6
	AHX640S-063A05AR	●	○	5	50	75.55	22	1	0.6	6
80	**AHX640S-080A04AR**	●	○	4	50	92.55	27	1	1.1	6
	AHX640S-080A06AR	●	○	6	50	92.55	27	1	1.0	6
100	**AHX640S-100B05AR**	●	○	5	50	112.55	32	2	1.7	6
	AHX640S-100B07AR	●	○	7	50	112.55	32	2	1.6	6
125	**AHX640S-125B06AR**	●	○	6	63	137.55	40	2	3.1	6
	AHX640S-125B08AR	●	○	8	63	137.55	40	2	3.0	6
160	**AHX640S-160C07NR**	●	–	7	63	172.55	40	3	5.4	6
	AHX640S-160C10NR	●	–	10	63	172.55	40	3	5.2	6
200	**AHX640S-200C08NR**	●	–	8	63	212.55	60	4	7.8	6
	AHX640S-200C12NR	●	–	12	63	212.55	60	4	7.5	6

* WT : Tool Weight

SPARE PARTS



Tool Holder Number	Clamp Screw *	Wrench (Insert)
AHX640S	CS5015060T	TKY20T

* Clamp Torque (N • m) : CS5015060T=5.0

● : Inventory maintained.

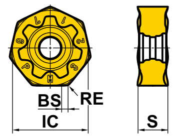
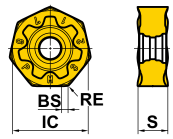
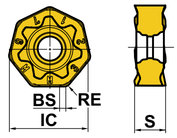
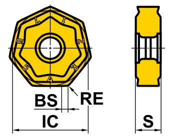
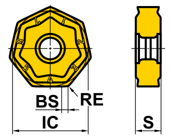
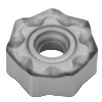
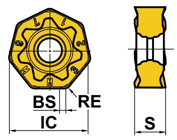
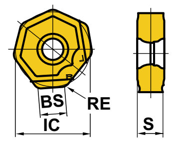
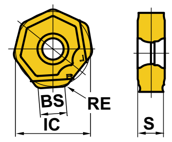
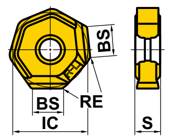
MOUNTING DIMENSION ➤ K046
SPARE PARTS ➤ N001
TECHNICAL DATA ➤ P001

INSERTS

Work Material		MP6120	MP6130	MP7030	MP9120	MP9130	MC5020	VP15TF	VP20RT
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

Application	Shape	Order Number	Class	Honing	MP6120	MP6130	MP7030	MP9120	MP9130	MC5020	VP15TF	VP20RT	IC	RE	BS	S	APMX	Geometry
					Coated								Dimensions (mm)					
For Steel General Cutting		NNMU200708ZEN-M	M	E	●	●							20	0.8	1	7.28	6	
For Steel General Cutting		NNMU200708ZEN-MP	M	E							●		20	0.8	1	7.28	6	
For Stainless Steel		NNMU200712ZER-MM	M	E			●						20	1.2	1	8	6	
For Cast Iron General Cutting		NNMU200608ZEN-MK	M	E						●	★	★	20	0.8	1	6.1	6	
For Cast Iron Strong Cutting Edge Type		NNMU200608ZEN-HK	M	E						●	★	★	20	0.8	1	6.1	6	
For Titanium Alloy and Heat Resistant Alloy		NNMU200712ZER-L	M	E				●	●				20	1.2	1	8	6	
For Steel	 Wiper	WNEU2007ZEN7C-M	E	E	●								20	0.8	7.2	6.85	0.5	
General Cutting	 Wiper	WNEU2007ZEN7C-WP	E	E							●		20	0.8	7.1	6.85	0.5	
For Cast Iron	 Wiper	WNEU2006ZEN7C-WK	E	E						●			20	0.8	7.4	6.55	0.5	

Note 1) The height of cutter when setting MK, HK inserts is different from when setting MP, MM inserts.

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

■INSTRUCTIONS FOR USE OF WIPER INSERTS

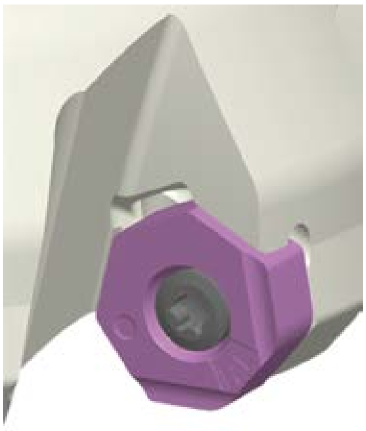


Fig.1

Fig.2

Note 1) These wiper inserts have 2 corners on right hand type and 2 corners for left hand type. Refer to Figure 1.
Note 2) A satisfactory finish surface can be achieved with one wiper insert. However, if the feed rate per revolution will be equal to or greater than the width of the wiper edge, it is recommended to install 2 or more wiper inserts spaced evenly within the cutting body.

RECOMMENDED CUTTING CONDITIONS

■Dry Cutting

	Work Material	Hardness	Grade	Breaker	Vc (m/min)	fz (mm/t.)	ap (mm)	ae (mm)
P	Mild Steel	≤180HB	**MP6120**	**M**	250(200−300)	0.3(0.2−0.4)	≤5	≤0.8DC
			VP15TF	**MP**	250(200−300)	0.3(0.2−0.4)	≤5	≤0.8DC
			MP6130	**M**	220(170−270)	0.4(0.3−0.5)	≤5	≤0.8DC
	Carbon Steel,Alloy Steel	180−280HB	**MP6120**	**M**	220(170−270)	0.3(0.2−0.4)	≤5	≤0.8DC
			VP15TF	**MP**	220(170−270)	0.3(0.2−0.4)	≤5	≤0.8DC
			MP6130	**M**	190(140−240)	0.4(0.3−0.5)	≤5	≤0.8DC
	Carbon Steel,Alloy Steel	280−350HB	**MP6120**	**M**	140(100−180)	0.3(0.2−0.4)	≤5	≤0.8DC
			VP15TF	**MP**	140(100−180)	0.3(0.2−0.4)	≤5	≤0.8DC
			MP6130	**M**	110(70−150)	0.4(0.3−0.5)	≤5	≤0.8DC
	Pre-hardened Steel	≤350HB (Annealing)	**MP6120**	**M**	140(100−180)	0.15(0.1−0.2)	≤3	≤0.8DC
			VP15TF	**MP**	140(100−180)	0.15(0.1−0.2)	≤3	≤0.8DC
			MP6130	**M**	110(70−150)	0.25(0.2−0.3)	≤3	≤0.8DC
	Alloy Tool Steel	35−45HRC	**MP6120**	**M**	140(100−180)	0.15(0.1−0.2)	≤3	≤0.8DC
			VP15TF	**MP**	140(100−180)	0.15(0.1−0.2)	≤5	≤0.8DC
			MP6130	**M**	110(70−150)	0.25(0.2−0.3)	≤3	≤0.8DC
M	Austenitic Stainless Steel	≤200HB	**MP7030**	**MM**	200(150−250)	0.2(0.1−0.3)	≤5	≤0.8DC
	Austenitic Stainless Steel	> 200HB	**MP7030**	**MM**	150(100−200)	0.2(0.1−0.3)	≤5	≤0.8DC
	Duplex Steel	≤280HB	**MP7030**	**MM**	140(100−180)	0.15(0.05−0.25)	≤5	≤0.8DC
	Ferritic and Maltensitic Stainless Steel	≤200HB	**MP7030**	**MM**	200(150−250)	0.2(0.1−0.3)	≤5	≤0.8DC
	Ferritic and Maltensitic Stainless Steel	> 200HB	**MP7030**	**MM**	150(100−200)	0.2(0.1−0.3)	≤5	≤0.8DC
	Precipitation Hardening Stainless Steel	< 450HB	**MP7030**	**MM**	130(100−160)	0.15(0.05−0.25)	≤5	≤0.8DC
K	Gray Cast Iron	Tensile Strength ≤350MPa	**MC5020**	**MK,HK**	220(150−300)	0.3(0.2−0.4)	≤5	≤0.8DC
			VP15TF,VP20RT	**MK,HK**	180(130−230)	0.3(0.2−0.4)	≤5	≤0.8DC
			VP15TF	**MP**	180(130−230)	0.3(0.2−0.4)	≤5	≤0.8DC
	Ductile Cast Iron	Tensile Strength ≤450MPa	**MC5020**	**MK,HK**	200(150−250)	0.2(0.1−0.3)	≤5	≤0.8DC
			VP15TF,VP20RT	**MK,HK**	170(120−220)	0.2(0.1−0.3)	≤5	≤0.8DC
			VP15TF	**MP**	170(120−220)	0.2(0.1−0.3)	≤5	≤0.8DC
	Ductile Cast Iron	Tensile Strength ≤800MPa	**MC5020**	**MK,HK**	170(150−200)	0.2(0.1−0.3)	≤5	≤0.8DC
			VP15TF,VP20RT	**MK,HK**	140(100−180)	0.2(0.1−0.3)	≤5	≤0.8DC
			VP15TF	**MP**	140(100−180)	0.2(0.1−0.3)	≤5	≤0.8DC
H	Hardened Steel	40−55HRC	**VP15TF**	**MP**	80(60−100)	0.15(0.1−0.2)	≤3	≤0.8DC

Note 1) Recommended wet cutting for good surface finishing of stainless steel. (Tool life is shorter when compared to dry cutting.)
Note 2) We recommend wet cutting with internal coolant for titanium alloy and heat resistant alloy.
Note 3) When clamp rigidity is low and tool overhang is long, we recommend to reduce the cutting speed and the feed rate by 30%.

Wet Cutting

	Work Material	Hardness	Breaker	Grade	Vc (m/min)	fz (mm/t.)	ap (mm)	ae (mm)
M	Austenitic Stainless Steel	≤200HB	**MP7030**	**MM**	125(100−150)	0.15(0.1−0.2)	≤5	≤0.8DC
	Austenitic Stainless Steel	> 200HB	**MP7030**	**MM**	100(75−125)	0.15(0.1−0.2)	≤5	≤0.8DC
	Duplex Steel	≤280HB	**MP7030**	**MM**	80(60−100)	0.1(0.05−0.15)	≤5	≤0.8DC
	Ferritic and Maltensitic Stainless Steel	≤200HB	**MP7030**	**MM**	125(100−150)	0.15(0.1−0.2)	≤5	≤0.8DC
	Ferritic and Maltensitic Stainless Steel	> 200HB	**MP7030**	**MM**	100(75−125)	0.15(0.1−0.2)	≤5	≤0.8DC
	Precipitation Hardening Stainless Steel	< 450HB	**MP7030**	**MM**	70(50−90)	0.1(0.05−0.15)	≤5	≤0.8DC
S	Titanium Alloy	−	**MP7030**	**MM**	40(20−50)	0.15(0.1−0.2)	≤3	≤0.6DC
		−	**MP9120**	**L**	60(50−70)	0.1(0.05−0.15)	≤3	≤0.6DC
		−	**MP9130**	**L**	40(20−50)	0.15(0.1−0.2)	≤3	≤0.6DC
	Heat Resistant Alloy	−	**MP7030**	**MM**	40(20−50)	0.15(0.1−0.2)	≤3	≤0.6DC
		−	**MP9120**	**L**	40(20−50)	0.15(0.1−0.2)	≤3	≤0.6DC
		−	**MP9130**	**L**	40(20−50)	0.15(0.1−0.2)	≤3	≤0.6DC

Note 1) Wet cutting for good surface finishes when machining stainless steel. (Tool life is shorter when compared to dry cutting.)
Note 2) We recommend wet cutting with internal coolant for titanium alloy and heat resistant alloy.
Note 3) When clamp rigidity is low and tool overhang is long, we recommend reducing the cutting speed and the feed rate by 30%.

Cutting Conditions with Wiper Insert

	Work Material	Hardness	Main Insert	Grade	Wiper Insert	Grade	Vc (m/min)	fz (mm/t.)	ap (mm)	ae (mm)
P	Mild Steel	≤180HB	**VP15TF**	**MP**	**VP15TF**	**WP**	250(200−300)	0.3(0.2−0.4)	≤0.5	≤0.8DC
			MP6120	**M**	**MP6120**	**M**	250(200−300)	0.3(0.2−0.4)	≤0.5	≤0.8DC
	Carbon Steel,Alloy Steel	180−280HB	**VP15TF**	**MP**	**VP15TF**	**WP**	220(170−270)	0.3(0.2−0.4)	≤0.5	≤0.8DC
			MP6120	**M**	**MP6120**	**M**	220(170−270)	0.3(0.2−0.4)	≤0.5	≤0.8DC
	Carbon Steel,Alloy Steel	280−350HB	**VP15TF**	**MP**	**VP15TF**	**WP**	140(100−180)	0.3(0.2−0.4)	≤0.5	≤0.8DC
			MP6120	**M**	**MP6120**	**M**	140(100−180)	0.3(0.2−0.4)	≤0.5	≤0.8DC
K	Gray Cast Iron	Tensile Strength ≤350MPa	**MC5020**	**MK,HK**	**MC5020**	**WK**	320(250−400)	0.3(0.2−0.4)	≤0.5	≤0.8DC
			VP15TF	**MP**	**VP15TF**	**WP**	220(150−300)	0.3(0.2−0.4)	≤0.5	≤0.8DC
	Ductile Cast Iron	Tensile Strength ≤450MPa	**MC5020**	**MK,HK**	**MC5020**	**WK**	250(200−300)	0.2(0.1−0.3)	≤0.5	≤0.8DC
			VP15TF	**MP**	**VP15TF**	**WP**	200(150−250)	0.2(0.1−0.3)	≤0.5	≤0.8DC
	Ductile Cast Iron	Tensile Strength ≤800MPa	**MC5020**	**MK,HK**	**MC5020**	**WK**	220(200−250)	0.2(0.1−0.3)	≤0.5	≤0.8DC
			VP15TF	**MP**	**VP15TF**	**WP**	170(150−200)	0.2(0.1−0.3)	≤0.5	≤0.8DC
S	Heat Resistant Alloy	−	**VP15TF**	**MP**	**VP15TF**	**WP**	40(20−50)	0.15(0.1−0.2)	≤0.5	≤0.8DC
H	Hardened Steel	40−55HRC	**VP15TF**	**MP**	**VP15TF**	**WP**	80(60−100)	0.15(0.1−0.2)	≤0.5	≤0.8DC

Note 1) When clamp rigidity is low and tool overhang is long, we recommend to reduce the cutting speed and the feed rate by 30%.
Note 2) Please use WP geometry insert in combination with MP or M geometry inserts, and use WK geometry insert in combination with MK or HK geometry inserts

AHX440S, AHX475S, AHX640S MOUNTING DIMENSIONS

Fig. 1

ø40
ø50
ø63
ø80

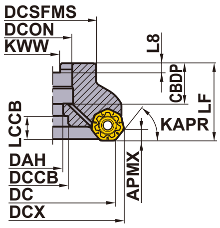


Fig. 2

ø100
ø125

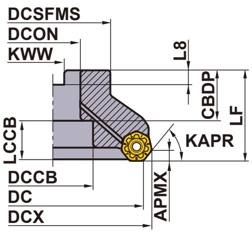
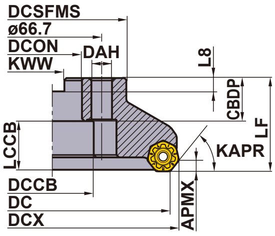


Fig. 3

ø160



Right hand tool holder only.

DCON (mm)	DC (mm)	Order Number	Dimensions(mm)							Fig.
			CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	
16	40	**AHX440S-040A03AR**	18	9	14	13.9	37	8.4	5.6	1
16	40	**AHX440S-040A04AR**	18	9	14	13.9	37	8.4	5.6	1
22	50	**AHX440S-050A04AR**	20	11	17	11.9	47	10.4	6.3	1
22	50	**AHX440S-050A05AR**	20	11	17	11.9	47	10.4	6.3	1
22	50	**AHX440S-050A06AR**	20	11	17	11.9	47	10.4	6.3	1
22	50	**AHX475S-050A04AR**	20	11	17	16.7	47	10.4	6.3	5
22	50	**AHX475S-050A05AR**	20	11	17	16.7	47	10.4	6.3	5
22	63	**AHX440S-063A05AR**	20	11	17	11.9	50	10.4	6.3	1
22	63	**AHX440S-063A06AR**	20	11	17	11.9	50	10.4	6.3	1
22	63	**AHX440S-063A08AR**	20	11	17	11.9	50	10.4	6.3	1
22	63	**AHX475S-063A05AR**	20	11	17	16.7	60	10.4	6.3	5
22	63	**AHX475S-063A06AR**	20	11	17	16.7	60	10.4	6.3	5
22	63	**AHX640S-063A04AR**	20	11	17	16.2	50	10.4	6.3	1
22	63	**AHX640S-063A05AR**	20	11	17	16.2	50	10.4	6.3	1
27	80	**AHX440S-080A06AR**	23	13	20	14.9	56	12.4	7	1
27	80	**AHX440S-080A08AR**	23	13	20	14.9	56	12.4	7	1
27	80	**AHX440S-080A10AR**	23	13	20	14.9	56	12.4	7	1
27	80	**AHX475S-080A06AR**	23	13	20	14.7	76	12.4	7	5
27	80	**AHX475S-080A08AR**	23	13	20	14.7	76	12.4	7	5
27	80	**AHX640S-080A04AR**	23	13	20	15.2	56	12.4	7	1
27	80	**AHX640S-080A06AR**	23	13	20	15.2	56	12.4	7	1

Fig. 4

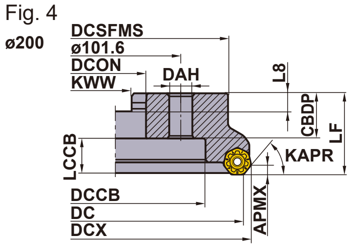


Fig.5

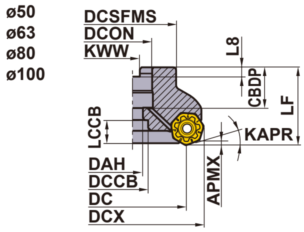
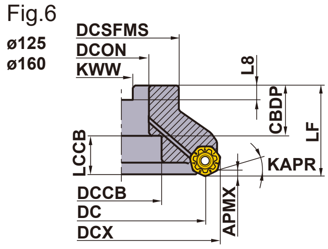


Fig.6



Right hand tool holder only.

DCON (mm)	DC (mm)	Order Number	Dimensions(mm)							Fig.
			CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	
32	100	**AHX440S-100B07AR**	32	–	45	16.9	78	14.4	8	2
32	100	**AHX440S-100B10AR**	32	–	45	16.9	78	14.4	8	2
32	100	**AHX440S-100B12AR**	32	–	45	16.9	78	14.4	8	2
32	100	**AHX475S-100A07AR**	26	17	26	25.7	96	14.4	8	5
32	100	**AHX475S-100A09AR**	26	17	26	25.7	96	14.4	8	5
32	100	**AHX640S-100B05AR**	32	–	45	16.2	78	14.4	8	2
32	100	**AHX640S-100B07AR**	32	–	45	16.2	78	14.4	8	2
40	125	**AHX440S-125B08AR**	40	–	56	21.9	89	16.4	9	2
40	125	**AHX440S-125B12AR**	40	–	56	21.9	89	16.4	9	2
40	125	**AHX440S-125B14AR**	40	–	56	21.9	89	16.4	9	2
40	125	**AHX475S-125B08AR**	40	–	56	21.7	100	16.4	9	6
40	125	**AHX475S-125B10AR**	40	–	56	21.7	100	16.4	9	6
40	125	**AHX640S-125B06AR**	42	–	56	19.2	89	16.4	9	2
40	125	**AHX640S-125B08AR**	42	–	56	19.2	89	16.4	9	2
40	160	**AHX440S-160C10NR**	40	14	56	21.9	100	16.4	9	3
40	160	**AHX440S-160C14NR**	40	14	56	21.9	100	16.4	9	3
40	160	**AHX440S-160C16NR**	40	14	56	21.9	100	16.4	9	3
40	160	**AHX475S-160B10AR**	40	–	56	21.7	100	16.4	9	6
40	160	**AHX475S-160B12AR**	40	–	56	21.7	100	16.4	9	6
40	160	**AHX640S-160C07NR**	29	14	56	32.2	120	16.4	9	3
40	160	**AHX640S-160C10NR**	29	14	56	32.2	120	16.4	9	3
60	200	**AHX640S-200C08NR**	32	18	140	29.2	175	25.7	14.22	4
60	200	**AHX640S-200C12NR**	32	18	140	29.2	175	25.7	14.22	4

FACE MILLING

<HIGH FEED CUTTING FOR CAST IRON>

50° KAPR

AHX640W

P M K N S H

Fig.1
ø80

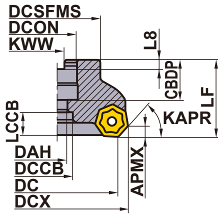


Fig.2
ø100
ø125

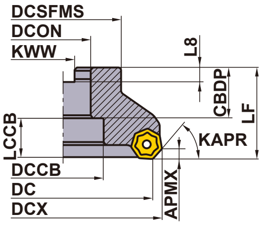


Fig.3
ø160

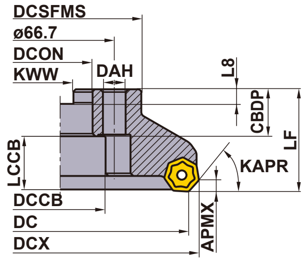


Fig.4
ø200
ø250

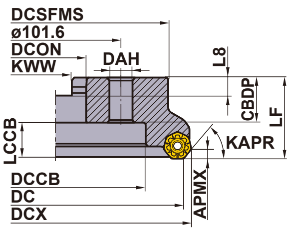
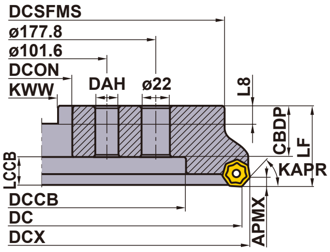


Fig.5
ø315



KAPR : 50°
GAMP: -6° GAMF : -4°

Right hand tool holder shown.

RIGHT HAND TOOL HOLDER

DC (mm)	Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm) LF	DCX	DCON	Fig.	WT* (kg)	APMX (mm)
80	AHX640W-080A08R	●	–	8	50	92.6	27	1	1.5	6
	AHX640W-080A10R	●	–	10	50	92.6	27	1	1.5	6
100	AHX640W-100B10R	●	–	10	50	112.6	32	2	2.1	6
	AHX640W-100B14R	●	–	14	50	112.6	32	2	2.1	6
125	AHX640W-125B12R	●	–	12	63	137.6	40	2	3.1	6
	AHX640W-125B18R	●	–	18	63	137.6	40	2	3.1	6
160	AHX640W-160C16R	●	–	16	63	172.6	40	3	5.6	6
	AHX640W-160C22R	●	–	22	63	172.6	40	3	5.6	6
200	AHX640W-200C20R	●	–	20	63	212.6	60	4	8	6
	AHX640W-200C28R	●	–	28	63	212.6	60	4	8	6
250	AHX640W-250C24R	●	–	24	63	262.6	60	4	12.6	6
	AHX640W-250C36R	●	–	36	63	262.6	60	4	12.6	6
315	AHX640W-315C28R	●	–	28	80	327.6	60	5	31.5	6
	AHX640W-315C44R	●	–	44	80	327.6	60	5	31.5	6

* WT : Tool Weight

LEFT HAND TOOL HOLDER

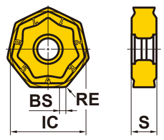
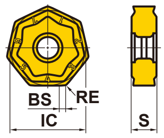
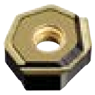
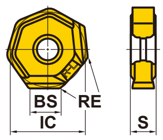
DC (mm)	Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm) LF	DCX	DCON	Fig.	WT (kg)	APMX (mm)
80	AHX640W-080A08L	★	–	8	50	92.6	27	1	1.5	6
	AHX640W-080A10L	★	–	10	50	92.6	27	1	1.5	6
100	AHX640W-100B10L	★	–	10	50	112.6	32	2	2.1	6
	AHX640W-100B14L	★	–	14	50	112.6	32	2	2.1	6
125	AHX640W-125B12L	★	–	12	63	137.6	40	2	3.1	6
	AHX640W-125B18L	★	–	18	63	137.6	40	2	3.1	6
160	AHX640W-160C16L	★	–	16	63	172.6	40	3	5.6	6
	AHX640W-160C22L	★	–	22	63	172.6	40	3	5.6	6
200	AHX640W-200C20L	★	–	20	63	212.6	60	4	8.0	6
	AHX640W-200C28L	★	–	28	63	212.6	60	4	8.0	6
250	AHX640W-250C24L	★	–	24	63	262.6	60	4	12.6	6
	AHX640W-250C36L	★	–	36	63	262.6	60	4	12.6	6
315	AHX640W-315C28L	★	–	28	80	327.6	60	5	31.5	6
	AHX640W-315C44L	★	–	44	80	327.6	60	5	31.5	6

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

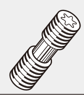
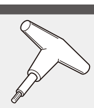
INSERTS

Work Material	K	Cast Iron

Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✱ : Unstable Cutting
Honing : E : Round

Shape	Order Number	Class	Honing	Coated MC5020	Coated VP15TF	Coated VP20RT	Dimensions(mm) IC	RE	BS	S	APMX	Geometry
 General Cutting	NNMU200608ZEN-MK	M	E	●	★	★	20	0.8	1.0	6.55	6	
 Strong Cutting Edge Type	NNMU200608ZEN-HK	M	E	●	★	★	20	0.8	1.0	6.55	6	
 Wiper	WNEU2006ZEN7C-WK	E	E	●			20	0.8	7.4	6.55	0.5	

SPARE PARTS

Tool Holder Number	 Wedge	 Clamp Screw *	 Wrench
AHX640W	CWAHX640WN	LS0622T	TKY15T

* Clamp Torque (N • m) : LS0622T=6.0

RECOMMENDED CUTTING CONDITIONS

■Dry·Wet Cutting

	Work Material	Tensile Strength	Grade	Vc (m/min)	fz (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)

* Please use 2-3 pcs of Wiper inserts in case of 'over 6mm/rev'.

■Finishing (When using wiper insert)

	Work Material	Grade	ap (mm)	Vc (m/min)	fz (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)	

Note 1) With reference to the above examples, adjust the cutting conditions according to the use environment.
Note 2) Tool life when wet cutting is short compared to dry cutting.

MOUNTING DIMENSION ➢ K050
SPARE PARTS ➢ N001
TECHNICAL DATA ➢ P001

AHX640W MOUNTING DIMENSIONS

Fig.1

ø80

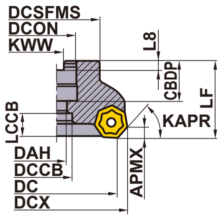


Fig.2

ø100
ø125

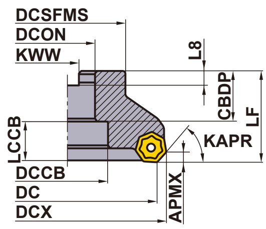


Fig.3

ø160

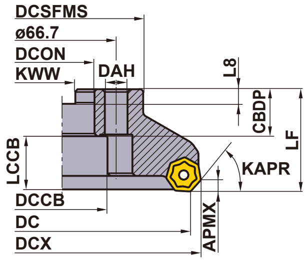


Fig.4

ø200
ø250

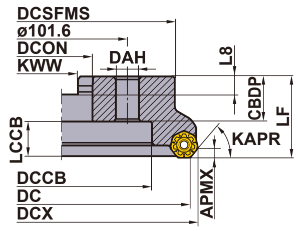
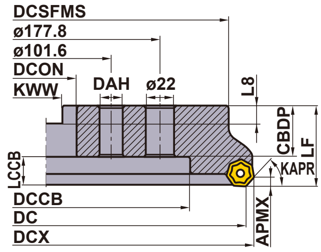


Fig.5

ø315



Right hand tool holder shown.

DCON (mm)	DC (mm)	Order Number	Dimensions(mm)							Fig.
			CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	
27	80	**AHX640W-080A08L**	23	13	20	14.8	56	12.4	7	1
27	80	**AHX640W-080A08R**	23	13	20	14.8	56	12.4	7	1
27	80	**AHX640W-080A10L**	23	13	20	14.8	56	12.4	7	1
27	80	**AHX640W-080A10R**	23	13	20	14.8	56	12.4	7	1
32	100	**AHX640W-100B10L**	32	—	45	16.8	70	14.4	8	2
32	100	**AHX640W-100B10R**	32	—	45	16.8	70	14.4	8	2
32	100	**AHX640W-100B14L**	32	—	45	16.8	70	14.4	8	2
32	100	**AHX640W-100B14R**	32	—	45	16.8	70	14.4	8	2
40	125	**AHX640W-125B12L**	32	—	56	29.8	80	16.4	9	2
40	125	**AHX640W-125B12R**	32	—	56	29.8	80	16.4	9	2
40	125	**AHX640W-125B18L**	32	—	56	29.8	80	16.4	9	2
40	125	**AHX640W-125B18R**	32	—	56	29.8	80	16.4	9	2
40	160	**AHX640W-160C16L**	29	14	56	32.8	100	16.4	9	3
40	160	**AHX640W-160C16R**	29	14	56	32.8	100	16.4	9	3
40	160	**AHX640W-160C22L**	29	14	56	32.8	100	16.4	9	3
40	160	**AHX640W-160C22R**	29	14	56	32.8	100	16.4	9	3
60	200	**AHX640W-200C20L**	32	18	135	29.8	155	25.7	14.22	4
60	200	**AHX640W-200C20R**	32	18	135	29.8	155	25.7	14.22	4
60	200	**AHX640W-200C28L**	32	18	135	29.8	155	25.7	14.22	4
60	200	**AHX640W-200C28R**	32	18	135	29.8	155	25.7	14.22	4
60	250	**AHX640W-250C24L**	32	18	180	29.8	200	25.7	14.22	4
60	250	**AHX640W-250C24R**	32	18	180	29.8	200	25.7	14.22	4
60	250	**AHX640W-250C36L**	32	18	180	29.8	200	25.7	14.22	4
60	250	**AHX640W-250C36R**	32	18	180	29.8	200	25.7	14.22	4
60	315	**AHX640W-315C28L**	57	18	225	21.8	285	25.7	14.22	5
60	315	**AHX640W-315C28R**	57	18	225	21.8	285	25.7	14.22	5
60	315	**AHX640W-315C44L**	57	18	225	21.8	285	25.7	14.22	5
60	315	**AHX640W-315C44R**	57	18	225	21.8	285	25.7	14.22	5

FACE MILLING
<HIGH FEED FINISHING>

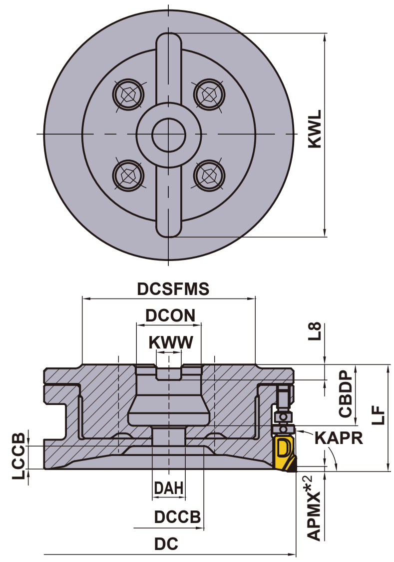
90° KAPR   F

FMAX

P M **K** **N** S H

For Compact and Smaller Machining Center

Fig.1
ø100
ø125



Right hand tool holder only.

■ARBOR TYPE

KAPR: 90°
GAMP: PCD Grade +5° CBN Grade 0°   GAMF: 0°

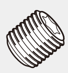
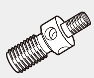
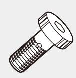
DC (mm)	Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm) LF	DCON	WT *1 (kg)	RPMX (min-1)	Fig.
100	NEW **FMAXR10010CLW**	★	○	10	42	25.4	1.06	22000	1
100	NEW **FMAXR10016CLW**	★	○	16	42	25.4	1.11	22000	1
125	NEW **FMAXR12514CLW**	★	○	14	42	25.4	1.44	19600	1
125	NEW **FMAXR12520CLW**	★	○	20	42	25.4	1.48	19600	1

*1 WT : Tool Weight
*2 For the maximum depth of cut (**APMX**), please refer to recommended cutting conditions (**ap**).
Note 1) The maximum depth of cut should be 2mm or less for ultra high efficiency machining with table feed (**Vf** ≥ 20000mm/min).
Note 2) Rake angle axial **GAMP** varies depending on the insert grade.

MOUNTING DIMENSIONS

DCON (mm)	DC (mm)	Order Number	Dimensions (mm) CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	KWL	Fig.
25.4	100	**FMAXR10010CLW**	24	13	27	9	68	9.5	6	80	1
25.4	100	**FMAXR10016CLW**	24	13	27	9	68	9.5	6	80	1
25.4	125	**FMAXR12514CLW**	24	13	52	9	68	9.5	6	80	1
25.4	125	**FMAXR12520CLW**	24	13	52	9	68	9.5	6	80	1

SPARE PARTS

Insert Clamp Screw *	Micro Adjustment Nut	Large Adjustment Screw	Cutter Set Bolt	Wrench T10	Wrench ø2.5
					
TSS04505S	KSN3	KSS2	HSCX12030H	TKY10T	RKY25S

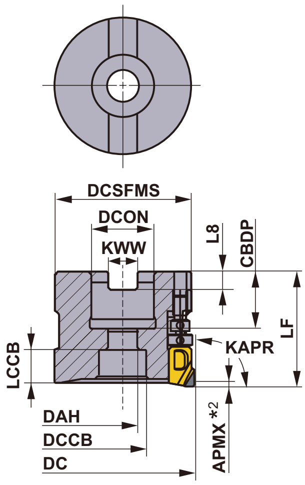
* Clamp Torque (N • m) : TSS04505S=3.5
Note 1) Please refer to the instruction manual included with the cutter body for how to locate the insert and adjust the run out and the balance.

★ : **Inventory maintained in Japan.**

SPARE PARTS ➤ N001
TECHNICAL DATA ➤ P001

FMAX-40/50/63

Fig.1
ø40
ø50
ø63



Right hand tool holder only.

■ARBOR TYPE

KAPR: 90°
GAMP: PCD Grade +5° CBN Grade 0°   GAMF: -6°— -3°

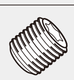
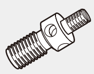
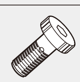
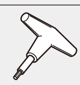
DC (mm)	Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm)		WT*1 (kg)	RPMX (min-1)	Fig.
					LF	DCON			
40	**FMAX-040A04R**	★	○	4	40	16	0.24	30000	1
40	**FMAX-040A06R**	★	○	6	40	16	0.23	30000	1
50	**FMAX-050A08R**	★	○	8	40	22	0.37	30000	1
50	**FMAX-050A10R**	●	○	10	40	22	0.35	30000	1
63	**FMAX-063A10R**	★	○	10	40	22	0.67	27000	1
63	**FMAX-063A12R**	●	○	12	40	22	0.66	27000	1

*1 WT : Tool Weight
*2 For the maximum depth of cut (**APMX**), please refer to recommended cutting conditions (**ap**).
Note 1) The maximum depth of cut for should be 2mm or less for ultra high efficiency machining with table feed (**Vf** ≥ 20000mm/min).
Note 2) Rake angle axial **GAMP** varies depending on the insert grade.

MOUNTING DIMENSIONS

DCON (mm)	DC (mm)	Order Number	Dimensions (mm)								Fig.
			CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	KWL	
16	40	**FMAX-040A04R**	18	9	14	10	37	8.4	5.6	—	1
16	40	**FMAX-040A06R**	18	9	14	10	37	8.4	5.6	—	1
22	50	**FMAX-050A08R**	20	11	17	12	47	10.4	6.3	—	1
22	50	**FMAX-050A10R**	20	11	17	12	47	10.4	6.3	—	1
22	63	**FMAX-063A10R**	20	11	17	12	60	10.4	6.3	—	1
22	63	**FMAX-063A12R**	20	11	17	12	60	10.4	6.3	—	1

SPARE PARTS

DC	Tool Holder Type	Insert Clamp Screw *	Micro Adjustment Nut	Large Adjustment Screw	Cutter Set Bolt	Wrench T10	Wrench ø2.5
							
40	**FMAX-040**	TSS04505S	KSN3	KSS2	HSC08030H	TKY10T	RKY25S
50	**FMAX-050**	TSS04505S	KSN3	KSS2	HSC10030H	TKY10T	RKY25S
63	**FMAX-063**	TSS04505S	KSN3	KSS2	HSC10030H	TKY10T	RKY25S

* Clamp Torque (N • m) : TSS04505S=3.5
Note 1) Please refer to the instruction manual included in the cutter body for how to locate the insert and adjust the run out and the balance.

●: Inventory maintained. ★: Inventory maintained in Japan.

FMAX

Fig.1
ø80

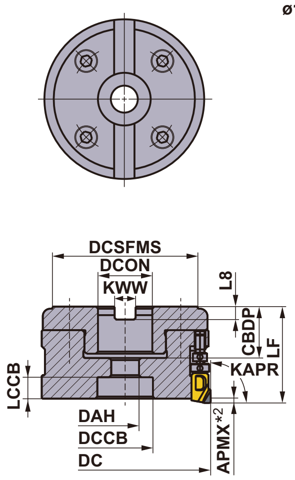
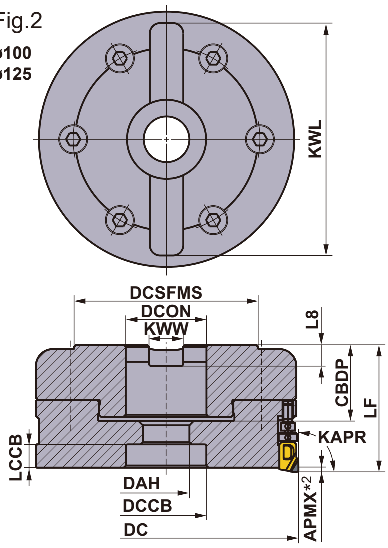


Fig.2
ø100
ø125



Right hand tool holder only.

■ARBOR TYPE

KAPR: 90°
GAMP: PCD Grade +5° CBN Grade 0°   GAMF: 0°

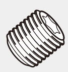
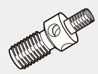
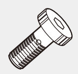
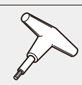
DC (mm)	Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm)		WT*1 (kg)	RPMX (min-1)	Fig.
					LF	DCON			
80	**FMAX-080B14R**	●	○	14	45	27	1.08	24500	1
100	**FMAX-100B18R**	●	○	18	50	32	1.81	22000	2
125	**FMAX-125B24R**	●	○	24	60	40	3.26	19600	2

*1 WT : Tool Weight
*2 For the maximum depth of cut (**APMX**), please refer to recommended cutting conditions (**ap**).
Note 1) The maximum depth of cut for should be 2 mm or less for ultra high efficiency machining with table feed (**Vf** ≥ 20000 mm/min).
Note 2) Rake angle axial **GAMP** varies depending on the insert grade.

MOUNTING DIMENSIONS

DCON (mm)	DC (mm)	Order Number	Dimensions (mm)								Fig.
			CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	KWL	
27	80	**FMAX-080B14R**	24	13	26	11	68	12.4	7	–	1
32	100	**FMAX-100B18R**	32	17	32	10	79	14.4	8	90	2
40	125	**FMAX-125B24R**	36	22	38	12	88	16.4	9	112	2

SPARE PARTS

DC	Tool Holder Type	Insert Clamp Screw *	Micro Adjustment Nut	Large Adjustment Screw	Cutter Set Bolt	Wrench T10	Wrench ø2.5
							
80	**FMAX-080**	TSS04505S	KSN3	KSS2	HSCX12030H	TKY10T	RKY25S
100	**FMAX-100**	TSS04505S	KSN3	KSS2	HSCX16035H	TKY10T	RKY25S
125	**FMAX-125**	TSS04505S	KSN3	KSS2	HSCX20035H	TKY10T	RKY25S

* Clamp Torque (N • m) : TSS04505S = 3.5
Note 1) Please refer to the instruction manual included with the cutter body for how to locate the insert and adjust the run out and the balance.

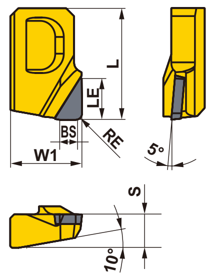
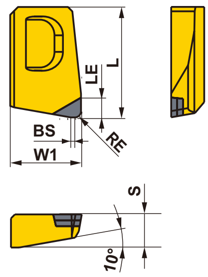
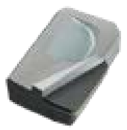
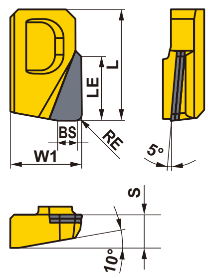
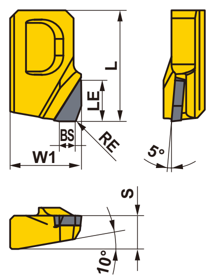
SPARE PARTS ➤ N001
TECHNICAL DATA ➤ P001

K

ROTATING TOOLS

INSERTS

Work Material		MD220	MD2030	MB4120	Cutting Conditions : ● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting						
K	Cast Iron			◐							
N	Non-ferrous Metal	◐	◐								

Shape	Order Number	MD220	MD2030	MB4120	Dimensions (mm) L	LE	W1	S	BS	RE	Geometry
For Aluminium Alloys  General Purpose	GOER1404PXFR2	●	●		14.0	5.0	9.0	4.2	2.0	0.4	
	GOER1408PXFR2	●	●		14.0	5.0	9.0	4.2	2.0	0.8	
For Gray Cast Irons  General Purpose	NEW NP-GOEN1404PXSR05			★	14.0	2.5	9.0	4.2	0.5	0.4	
	NEW NP-GOEN1408PXSR05			★	14.0	2.5	9.0	4.2	0.5	0.8	
For Aluminium Alloys  Long Edge	NEW GOER1408PXFR2-8	★			14.0	8.0	9.0	4.2	2.0	0.8	
For Aluminium Alloys  Burr Prevention	GOER1401ZXFR2	●			14.0	5.0	9.0	4.2	2.0	0.1	

For Aluminium Alloys: Sharp Edge
For Gray Cast Irons: Chamferd and Rounded (0.13mmx15°+R0.01)

● = NEW

Note 1) If general purpose inserts (RE = 0.4mm, 0.8mm), burr prevention inserts and long edge inserts are used together, they will not be able to sufficiently display their full performance. Inserts of the same shape should be used according to the application.
Note 2) The cutting diameter will change depending on the shape. Be particularly careful when cutting near vertical walls, since there is a possibility of interference with the holder.

● : Inventory maintained. ★ : Inventory maintained in Japan.
(CBN and PCD inserts are available in 1 piece in one case)

RECOMMENDED CUTTING CONDITIONS

	Work Material	Properties	Grade	**Vc** (m/min)	**ae** (mm)	**ap** (mm)	**fz** (mm/t.)	Cutting Mode
K	Gray Cast Irons	Tensile Strength ≤350MPa	**MB4120**	1000 (700—1300)	≤ 0.8 DC	≤ 0.5	0.07 (0.05—0.15)	Dry Cutting
N	Aluminium Alloys	Si < 5%	**MD2030 MD220**	2500 (2000—3000)	≤ 0.2 DC	≤ 3.0 (0.5—3.0)	0.08 (0.05—0.2)	Wet Cutting
					≤ 0.5 DC	≤ 2.5 (0.5—2.5)		
					≤ 0.8 DC	≤ 2.0 (0.5—2.0)		
		5% ≤ Si ≤ 10%	**MD2030 MD220**	2500 (2000—3000)	≤ 0.2 DC	≤ 3.0 (0.5—3.0)	0.08 (0.05—0.2)	Wet Cutting
					≤ 0.5 DC	≤ 2.5 (0.5—2.5)		
					≤ 0.8 DC	≤ 2.0 (0.5—2.0)		
		10% < Si < 15%	**MD220 MD2030**	600 (400—800)	≤ 0.2 DC	≤ 3.0 (0.5—3.0)	0.08 (0.05—0.2)	Wet Cutting
					≤ 0.5 DC	≤ 2.5 (0.5—2.5)		
					≤ 0.8 DC	≤ 2.0 (0.5—2.0)		
		Si ≥ 15%	**MD220 MD2030**	600 (400—800)	≤ 0.2 DC	≤ 3.0 (0.5—3.0)	0.08 (0.05—0.2)	Wet Cutting
					≤ 0.5 DC	≤ 2.5 (0.5—2.5)		
					≤ 0.8 DC	≤ 2.0 (0.5—2.0)		

Note 1) Please adjust the depth of cut depending on the width of cut.
Note 2) When using the long edge insert, please select the conditions depending on depths of cut (ap) excluding the length of the gate.

SPARE PARTS ➤ N001
TECHNICAL DATA ➤ P001

SHOULDER MILLING
<GENERAL CUTTING>

90° KAPR

WWX400 NEW

P | M | K | N | S | H

ø50

Fig.1
ø50

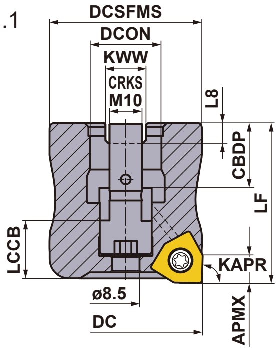
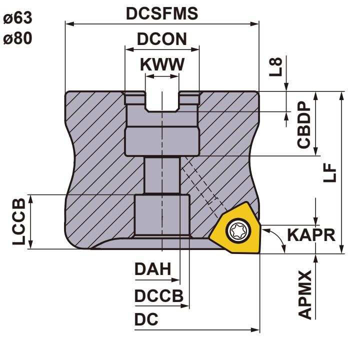


Fig.2
ø63
ø80



Right hand tool holder only.

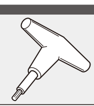
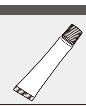
■ARBOR TYPE

KAPR :90°
GAMP:-6° GAMF :-7.2°–-12.8°

DC (mm)	Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm)		APMX	WT*	RMPX	RPMX	Fig.
		R			LF	DCON	(mm)	(kg)		(min⁻¹)	
50	**WWX400-050A03AR**	★	○	3	55	22	8.2	0.5	0.4°	5000	1
50	**WWX400-050A04AR**	●	○	4	55	22	8.2	0.5	0.4°	5000	1
63	**WWX400-063A03AR**	★	○	3	40	22	8.2	0.5	0.26°	14100	2
63	**WWX400-063A04AR**	●	○	4	40	22	8.2	0.5	0.26°	14100	2
63	**WWX400-063A05AR**	●	○	5	40	22	8.2	0.5	0.26°	14100	2
80	**WWX400-080A04AR**	★	○	4	50	27	8.2	1.0	0.16°	12200	2
80	**WWX400-080A05AR**	●	○	5	50	27	8.2	1.0	0.16°	12200	2
80	**WWX400-080A07AR**	●	○	7	50	27	8.2	0.9	0.16°	12200	2
100	**WWX400-100B05AR**	★	○	5	50	32	8.2	1.6	–	10700	3
100	**WWX400-100B07AR**	●	○	7	50	32	8.2	1.5	–	10700	3
100	**WWX400-100B09AR**	●	○	9	50	32	8.2	1.5	–	10700	3
125	**WWX400-125B06AR**	★	○	6	63	40	8.2	3.0	–	9500	3
125	**WWX400-125B08AR**	●	○	8	63	40	8.2	3.0	–	9500	3
125	**WWX400-125B12AR**	★	○	12	63	40	8.2	2.9	–	9500	3
160	**WWX400-160C08NR**	★	–	8	63	40	8.2	4.5	–	8300	4
160	**WWX400-160C10NR**	★	–	10	63	40	8.2	4.4	–	8300	4
160	**WWX400-160C14NR**	★	–	14	63	40	8.2	4.4	–	8300	4
200	**WWX400-200C10NR**	★	–	10	63	60	8.2	6.7	–	7300	5
200	**WWX400-200C12NR**	★	–	12	63	60	8.2	6.7	–	7300	5
200	**WWX400-200C16NR**	★	–	16	63	60	8.2	6.6	–	7300	5
250	**WWX400-250C12NR**	★	–	12	63	60	8.2	11.5	–	6400	5
250	**WWX400-250C14NR**	★	–	14	63	60	8.2	11.5	–	6400	5
250	**WWX400-250C18NR**	★	–	18	63	60	8.2	11.4	–	6400	5

Note 1) A set bolt to the arbor is not supplied with the body. Please refer to page K057, when ordering.
Note 2) The milling cutter with cutting diameter DC=50 mm has a built-in set bolt. The set bolt cannot be replaced. Therefore, absolutely do not disassemble the milling cutter.
Note 3) Please use a set bolt of the FMC type on the cutter body from 63 to 100 in diameter (DC).
Note 4) Please use a set bolt of the FMA type on the cutter body from 125 to 250 in diameter (DC).
* WT : Tool Weight

SPARE PARTS

Tool Holder Type	 * Clamp Screw	 Wrench (Insert)	 Anti-seize Lubricant
WWX400	TS5R	TKY20T	MK1KS

* Clamp Torque (N • m) : TS5R = 5.0

● : Inventory maintained. ★ : Inventory maintained in Japan.

Fig.3

ø100
ø125

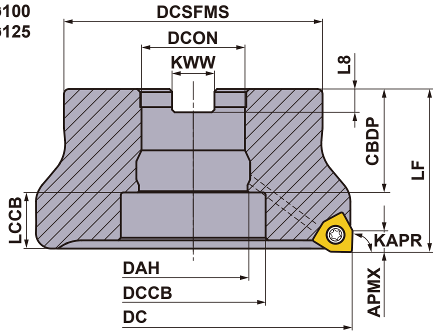
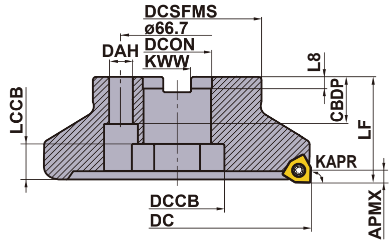


Fig.4

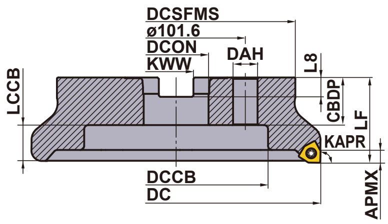
ø160



Right hand tool holder only.

Fig.5

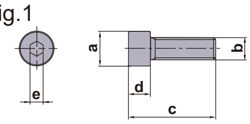
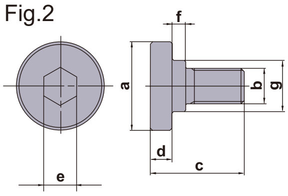
ø200
ø250



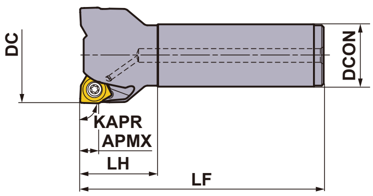
MOUNTING DIMENSIONS

DC (mm)	Order Number	Dimensions (mm)								Fig.
		DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	
50	**WWX400-050A03AR**	22	20	–	–	12.2	47	10.4	6.3	1
50	**WWX400-050A04AR**	22	20	–	–	12.2	47	10.4	6.3	1
63	**WWX400-063A03AR**	22	20	11	17	11.2	50	10.4	6.3	2
63	**WWX400-063A04AR**	22	20	11	17	11.2	50	10.4	6.3	2
63	**WWX400-063A05AR**	22	20	11	17	11.2	50	10.4	6.3	2
80	**WWX400-080A04AR**	27	23	13	20	14.2	56	12.4	7	2
80	**WWX400-080A05AR**	27	23	13	20	14.2	56	12.4	7	2
80	**WWX400-080A07AR**	27	23	13	20	14.2	56	12.4	7	2
100	**WWX400-100B05AR**	32	32	32	45	16.2	78	14.4	8	3
100	**WWX400-100B07AR**	32	32	32	45	16.2	78	14.4	8	3
100	**WWX400-100B09AR**	32	32	32	45	16.2	78	14.4	8	3
125	**WWX400-125B06AR**	40	40	40	56	21.2	89	16.4	9	3
125	**WWX400-125B08AR**	40	40	40	56	21.2	89	16.4	9	3
125	**WWX400-125B12AR**	40	40	40	56	21.2	89	16.4	9	3
160	**WWX400-160C08NR**	40	40	14	56	21.2	100	16.4	9	4
160	**WWX400-160C10NR**	40	40	14	56	21.2	100	16.4	9	4
160	**WWX400-160C14NR**	40	40	14	56	21.2	100	16.4	9	4
200	**WWX400-200C10NR**	60	32	18	135	29.2	160	25.7	14.22	5
200	**WWX400-200C12NR**	60	32	18	135	29.2	160	25.7	14.22	5
200	**WWX400-200C16NR**	60	32	18	135	29.2	160	25.7	14.22	5
250	**WWX400-250C12NR**	60	32	18	180	29.2	210	25.7	14.22	5
250	**WWX400-250C14NR**	60	32	18	180	29.2	210	25.7	14.22	5
250	**WWX400-250C18NR**	60	32	18	180	29.2	210	25.7	14.22	5

SET BOLT (SOLD SEPARATELY)

Tool Holder Type	Set Bolt		Fig.	Reference Dimensions (mm)							Geometry
	With Coolant Hole	Without Coolant Hole									
	Order Number	Order Number		a	b	c	d	e	f	g	
WWX400-063A◌◌AR	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	–	–	Fig.1 
WWX400-080A◌◌AR	HSC12035H	HSC12035 HSC12045	1	18	M12×1.75	47 57	12	10	–	–	
WWX400-100B◌◌AR	MBA16033H	–	2	40	M16×2	43	10	14	6	23	Fig.2 
WWX400-125B◌◌AR	MBA20040H	–	2	50	M20×2.5	54	14	17	6	27	
WWX400-160C◌◌NR	No Coolant Hole	–	2	50	M20×2.5	54	14	17	6	27	
WWX400-200C◌◌NR	No Coolant Hole	–	1	24	M16×2	43	16	14	–	–	
WWX400-250C◌◌NR	No Coolant Hole	–	1	24	M16×2	43	16	14	–	–	

Note 1) Internal coolant is necessary with the set bolt.
Note 2) The milling cutter with cutting diameter DC=50 mm has a built-in set bolt.
Please use a 7 mm Allen wrench to tighten/loosen the set bolt.



Right hand tool holder only.

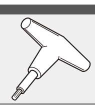
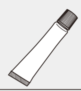
■SHANK TYPE

With Coolant Hole

DC (mm)	Order Number	Stock R	Number of Teeth	Dimensions (mm) LF	DCON	LH	APMX (mm)	WT* (kg)	RMPX	RPMX (min^{-1})
50	**WWX400R5003SA32M**	★	3	125	32	40	8.2	0.8	0.4°	16000
50	**WWX400R5004SA32M**	★	4	125	32	40	8.2	0.8	0.4°	16000
63	**WWX400R6303SA32M**	★	3	125	32	40	8.2	1.0	0.26°	14100
63	**WWX400R6304SA32M**	★	4	125	32	40	8.2	1.0	0.26°	14100
63	**WWX400R6305SA32M**	★	5	125	32	40	8.2	1.0	0.26°	14100
80	**WWX400R8004SA32M**	★	4	125	32	40	8.2	1.3	0.16°	12200
80	**WWX400R8005SA32M**	★	5	125	32	40	8.2	1.3	0.16°	12200
80	**WWX400R8007SA32M**	★	7	125	32	40	8.2	1.2	0.16°	12200

* WT : Tool Weight

SPARE PARTS

Tool Holder Type	 Clamp Screw *	 Wrench (Insert)	 Anti-seize Lubricant
WWX400	TS5R	TKY20T	MK1KS

* Clamp Torque (N • m) : TS5R = 5.0

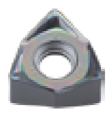
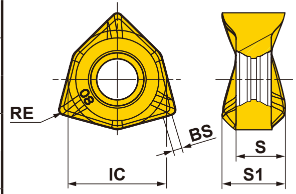
● : Inventory maintained. ★ : Inventory maintained in Japan.
(10 inserts in one case)

INSERTS

Work Material		MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF		TF15	
P	Steels		●	◐				✤			
M	Stainless Steels				●			◐			
K	Cast Irons	◐						✤			
N	Non-ferrous Metals									◐	
S	Heat Resistant Alloys, Titanium Alloys					●	◐				
H	Hardened Steels		◐					●			

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	MP6130	MP7130	MP9120	MP9130	VP15TF		TF15		IC	S	S1	BS	RE	
NEW 	6NGU1409040PNER-L	G	E	★	★	★	●	●	★	★				14	7	9	1.7	0.4	
	6NGU1409080PNER-L	G	E	★	●	●	●	●	●	●				14	7	9	1.3	0.8	
	6NGU1409040PNFR-L	G	F									●		14	7	9	1.7	0.4	
	6NGU1409080PNFR-L	G	F									●		14	7	9	1.3	0.8	
	6NMU1409040PNER-M	M	E	●	●	●	●	●	●	●				14	7	9	1.7	0.4	
	6NMU1409080PNER-M	M	E	●	●	●	●	●	●	●				14	7	9	1.3	0.8	
	6NMU1409080PNER-R	M	E	●	●	●		●	●	●				14	7	9	1.3	0.8	

● ★ = NEW

K

ROTATING TOOLS

SPARE PARTS ➤ N001
TECHNICAL DATA ➤ P001

RECOMMENDED CUTTING CONDITIONS

■ Dry Cutting

Cutting Speed

(mm)

	Work Material	Properties	Cutting Conditions	Grade	ae 0.5DC≥ Vc (m/min)	ae 0.8DC≥ Vc (m/min)	ae DC(Slot) Vc (m/min)
P	Mild Steel	Hardness ≤180HB	●	MP6120	240(200—280)	220(180—260)	200(160—240)
			◖	MP6130	230(190—270)	210(170—250)	190(150—230)
			✤	MP6130,VP15TF	210(170—250)	190(150—230)	170(130—210)
	Carbon Steel Alloy Steel	Hardness 180—280HB	●	MP6120	210(170—250)	190(150—230)	170(130—210)
			◖	MP6130	200(160—240)	180(140—220)	160(120—200)
			✤	MP6130,VP15TF	180(140—220)	160(120—200)	140(100—180)
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 280—350HB ≤350HB (Annealing)	●	MP6120	200(160—240)	180(140—220)	160(120—200)
			◖	MP6130	190(150—230)	170(130—210)	150(110—190)
			✤	MP6130,VP15TF	170(130—210)	150(110—190)	130(90—170)
	Pre-hardened Steel	Hardness 35—45HRC	●	MP6120	140(120—160)	—	—
			◖	MP6130	120(100—140)	—	—
			✤	MP6130,VP15TF	110(90—130)	—	—
M	Austenitic Stainless Steel	Hardness ≤200HB	●	MP7130	180(160—200)	160(140—180)	—
			◖	MP7130,VP15TF	170(150—190)	150(130—170)	—
			✤	MP7130,VP15TF	150(130—170)	130(110—150)	—
	Austenitic Stainless Steel	Hardness >200HB	●	MP7130	170(150—190)	150(130—170)	—
			◖	MP7130,VP15TF	160(140—180)	140(120—160)	—
			✤	MP7130,VP15TF	140(120—160)	120(100—140)	—
	Ferritic and Martensitic Stainless Steel	Hardness ≤200HB	●	MP7130	180(160—200)	160(140—180)	—
			◖	MP7130,VP15TF	170(150—190)	150(130—170)	—
			✤	MP7130,VP15TF	150(130—170)	130(110—150)	—
	Duplex Stainless Steel	Hardness ≤280HB	●	MP7130	160(140—180)	140(120—160)	—
			◖	MP7130,VP15TF	150(130—170)	130(110—150)	—
			✤	MP7130,VP15TF	130(110—150)	110(90—130)	—
	Precipitation Hardening Stainless Steel	Hardness <450HB	●	MP7130	140(120—160)	—	—
			◖	MP7130,VP15TF	130(110—150)	—	—
			✤	MP7130,VP15TF	110(90—130)	—	—
K	Gray Cast Iron	Tensile Strength ≤350MPa	●	MC5020	250(210—290)	230(190—270)	210(170—250)
			◖	MC5020	240(200—280)	220(180—260)	200(160—240)
			◖	VP15TF	240(200—280)	220(180—260)	—
			✤	MC5020,VP15TF	220(180—260)	200(160—240)	180(140—220)
	Ductile Cast Iron	Tensile Strength ≤450MPa	●	MC5020	220(180—160)	200(160—240)	180(140—220)
			◖	MC5020	210(170—250)	190(150—230)	170(130—210)
			◖	VP15TF	210(170—250)	190(150—230)	—
			✤	MC5020,VP15TF	190(150—230)	170(130—210)	150(110—190)
	Ductile Cast Iron	Tensile Strength ≤800MPa	●	MC5020	180(140—220)	160(120—200)	140(100—180)
			◖	MC5020	170(130—210)	150(110—190)	130(90—170)
			◖	VP15TF	170(130—210)	150(110—190)	—
			✤	MC5020,VP15TF	150(110—190)	130(90—170)	110(70—150)
H	Hardened Steel	Hardness 40—55HRC	●	VP15TF	50(30—70)	—	—
			◖	VP15TF	50(30—70)	—	—

Note 1) The recommended cutting speed has been calculated for a depth of cut of 2mm. Please reduce the cutting speed by an appropriate amount corresponding to the increase in cutting depth.

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

■ Wet Cutting
Cutting Speed

(mm)

	Work Material	Properties	Cutting Conditions	Grade	ae 0.5DC≥ Vc (m/min)	ae 0.8DC≥ Vc (m/min)	ae DC(Slot) Vc (m/min)
P	Mild Steel	Hardness ≤180HB	●	MP6120	150(140—160)	130(120—140)	120(110—130)
			◐	MP6130	140(130—150)	120(110—130)	110(100—120)
			✤	MP6130,VP15TF	120(110—130)	100(90—110)	90(80—100)
	Carbon Steel Alloy Steel	Hardness 180—280HB	●	MP6120	150(140—160)	130(120—140)	120(110—130)
			◐	MP6130	140(130—150)	120(110—130)	110(100—120)
			✤	MP6130,VP15TF	120(110—130)	100(90—110)	90(80—100)
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 280—350HB ≤350HB (Annealing)	●	MP6120	140(130—150)	120(110—130)	110(100—120)
			◐	MP6130	130(120—140)	110(100—120)	100(90—110)
			✤	MP6130,VP15TF	110(100—120)	90(80—100)	80(70—90)
	Pre-hardened Steel	Hardness 35—45HRC	●	MP6120	110(100—120)	—	—
			◐	MP6130	100(90—110)	—	—
			✤	MP6130,VP15TF	80(70—90)	—	—
M	Austenitic Stainless Steel	Hardness ≤200HB	●	MP7130	130(120—140)	110(100—120)	—
			◐	MP7130,VP15TF	120(110—130)	100(90—110)	—
			✤	MP7130,VP15TF	100(90—110)	80(70—90)	—
	Austenitic Stainless Steel	Hardness >200HB	●	MP7130	130(120—140)	110(100—120)	—
			◐	MP7130,VP15TF	120(110—130)	100(90—110)	—
			✤	MP7130,VP15TF	100(90—110)	80(70—90)	—
	Ferritic and Martensitic Stainless Steel	Hardness ≤200HB	●	MP7130	130(120—140)	110(100—120)	—
			◐	MP7130,VP15TF	120(110—130)	100(90—110)	—
			✤	MP7130,VP15TF	100(90—110)	80(70—90)	—
	Duplex Stainless Steel	Hardness ≤280HB	●	MP7130	120(110—130)	100(90—110)	—
			◐	MP7130,VP15TF	110(100—120)	90(80—100)	—
			✤	MP7130,VP15TF	90(80—100)	70(60—80)	—
	Precipitation Hardening Stainless Steel	Hardness <450HB	●	MP7130	120(110—130)	—	—
			◐	MP7130,VP15TF	110(100—120)	—	—
			✤	MP7130,VP15TF	90(80—100)	—	—
K	Gray Cast Iron	Tensile Strength ≤350MPa	●	MC5020	170(150—190)	150(130—170)	130(110—150)
			◐	MC5020	160(140—180)	140(120—160)	120(100—140)
			◐	VP15TF	160(140—180)	140(120—160)	—
			✤	MC5020,VP15TF	140(120—160)	120(100—140)	100(80—120)
	Ductile Cast Iron	Tensile Strength ≤450MPa	●	MC5020	170(150—190)	150(130—170)	130(110—150)
			◐	MC5020	160(140—180)	140(120—160)	120(100—140)
			◐	VP15TF	160(140—180)	140(120—160)	—
			✤	MC5020,VP15TF	140(120—160)	120(100—140)	100(80—120)
	Ductile Cast Iron	Tensile Strength ≤800MPa	●	MC5020	160(150—170)	140(130—150)	120(110—130)
			◐	MC5020	150(140—160)	130(120—140)	110(100—120)
			◐	VP15TF	150(140—160)	130(120—140)	—
			✤	MC5020,VP15TF	130(120—140)	110(100—120)	90(80—100)
N	Aluminium Alloy	Si<5%	●	TF15	500(300—900)	500(300—900)	500(300—900)
			◐	TF15	500(300—900)	500(300—900)	500(300—900)
			✤	TF15	400(200—800)	400(200—800)	400(200—800)
S	Titanium Alloy	—	●	MP9120	80(60—100)	—	—
			◐	MP9120	70(50—90)	—	—
			✤	MP9130	60(40—80)	—	—
	Heat Resistant Alloy	—	●	MP9120	60(50—70)	—	—
			◐	MP9120	50(30—60)	—	—
			✤	MP9130	40(20—40)	—	—
H	Hardened Steel	Hardness 40—55HRC	●	VP15TF	50(30—70)	—	—
			◐	VP15TF	50(30—70)	—	—

Note 1) Refer to the above table for cutting conditions according to the applications.

RECOMMENDED CUTTING CONDITIONS

Depth of Cut / Feed per Tooth

	Work Material	Properties	Cutting Conditions	Grade	ae 0.5DC≥ Breaker	ap	fz (mm/t.)
P	Mild Steel	Hardness ≤180HB		MP6120	L,M	≤4.0	0.13(0.10—0.15)
				MP6130	L,M	≤4.0	0.13(0.10—0.15)
					M,R	≤4.0	0.16(0.10—0.20)
				MP6130,VP15TF	M,R	≤4.0	0.13(0.10—0.15)
	Carbon Steel Alloy Steel	Hardness 180—280HB		MP6120	L,M	≤4.0	0.13(0.10—0.15)
				MP6130	L,M	≤4.0	0.13(0.10—0.15)
					M,R	≤4.0	0.16(0.10—0.20)
				MP6130,VP15TF	M,R	≤4.0	0.13(0.10—0.15)
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 280—350HB ≤350HB (Annealing)		MP6120	L,M	≤3.0	0.13(0.10—0.15)
				MP6130	L,M	≤3.0	0.13(0.10—0.15)
					M,R	≤3.0	0.16(0.10—0.20)
				MP6130,VP15TF	M,R	≤3.0	0.13(0.10—0.15)
	Pre-hardened Steel	Hardness 35—45HRC		MP6120	L,M	≤2.0	0.13(0.10—0.15)
				MP6130	L,M	≤2.0	0.13(0.10—0.15)
					M,R	≤2.0	0.16(0.10—0.20)
				MP6130,VP15TF	M,R	≤2.0	0.13(0.10—0.15)
M	Austenitic Stainless Steel	Hardness ≤200HB		MP7130	L,M	≤4.0	0.13(0.10—0.15)
				VP15TF	M	≤4.0	0.16(0.10—0.20)
				MP7130,VP15TF	M	≤4.0	0.13(0.10—0.15)
	Austenitic Stainless Steel	Hardness >200HB		MP7130	L,M	≤4.0	0.13(0.10—0.15)
				MP7130	L,M	≤3.0	0.13(0.10—0.15)
				VP15TF	M	≤3.0	0.16(0.10—0.20)
				MP7130,VP15TF	M	≤3.0	0.13(0.10—0.15)
	Ferritic and Martensitic Stainless Steel	Hardness ≤200HB		MP7130	L,M	≤4.0	0.13(0.10—0.15)
				VP15TF	M	≤4.0	0.16(0.10—0.20)
				MP7130,VP15TF	M	≤3.0	0.13(0.10—0.15)
	Duplex Stainless Steel	Hardness ≤280HB		MP7130	L,M	≤3.0	0.13(0.10—0.15)
				MP7130	L,M	≤4.0	0.13(0.10—0.15)
				VP15TF	M	≤3.0	0.16(0.10—0.20)
				VP15TF	M	≤4.0	0.16(0.10—0.20)
				MP7130,VP15TF	M	≤3.0	0.13(0.10—0.15)
				MP7130,VP15TF	M	≤4.0	0.13(0.10—0.15)
	Precipitation Hardening Stainless Steel	Hardness <450HB		MP7130	L,M	≤2.0	0.13(0.10—0.15)
				MP7130	L,M	≤2.0	0.13(0.10—0.15)
				VP15TF	M	≤2.0	0.16(0.10—0.20)
				MP7130,VP15TF	M	≤2.0	0.13(0.10—0.15)
K	Gray Cast Iron	Tensile Strength ≤350MPa		MC5020	L,M	≤4.0	0.13(0.10—0.15)
				VP15TF	M,R	≤4.0	0.16(0.10—0.20)
				MC5020,VP15TF	M,R	≤4.0	0.13(0.10—0.15)
	Ductile Cast Iron	Tensile Strength ≤800MPa		MC5020	L,M	≤4.0	0.13(0.10—0.15)
				VP15TF	M,R	≤4.0	0.16(0.10—0.20)
				MC5020,VP15TF	M,R	≤4.0	0.13(0.10—0.15)
N	Aluminium Alloy	Si<5%		TF15	L	≤4.0	0.13(0.10—0.15)
S	Titanium Alloy	—		MP9120	L,M	≤2.0	0.10(0.05—0.13)
				MP9130	L,M	≤2.0	0.10(0.05—0.13)
	Heat Resistant Alloy	—		MP9120	L,M	≤2.0	0.10(0.05—0.13)
				MP9130	L,M	≤2.0	0.10(0.05—0.13)
H	Hardened Steel	Hardness 40—55HRC		VP15TF	M	≤2.0	0.05(0.05—0.10)
				VP15TF	M,R	≤2.0	0.05(0.05—0.10)

Note 1) Refer to the above table and set up cutting conditions according to cutting applications.

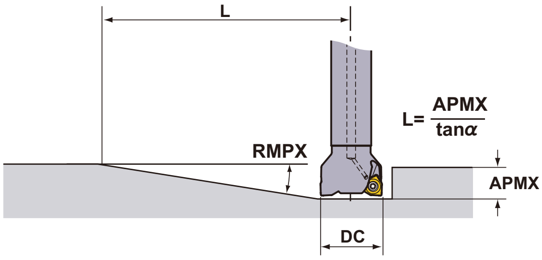
Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✥ : Unstable Cutting

(mm)

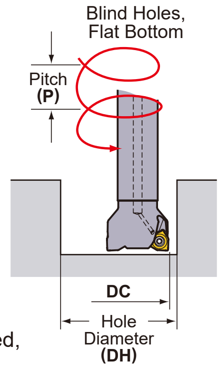
ae						
0.8DC≥			DC(Slot)			Cutting Mode
Breaker	**ap**	**fz** (mm/t.)	Breaker	**ap**	**fz** (mm/t.)	
L,M	≤3.0	0.13(0.10—0.15)	L,M	≤2.0	0.13(0.10—0.15)	Dry, Wet
L,M	≤3.0	0.13(0.10—0.15)	L,M	≤2.0	0.13(0.10—0.15)	Dry, Wet
M,R	≤3.0	0.16(0.10—0.20)	—	—	—	Dry, Wet
M,R	≤3.0	0.13(0.10—0.15)	M	≤2.0	0.13(0.10—0.15)	Dry, Wet
L,M	≤3.0	0.13(0.10—0.15)	L,M	≤2.0	0.13(0.10—0.15)	Dry, Wet
L,M	≤3.0	0.13(0.10—0.15)	L,M	≤2.0	0.13(0.10—0.15)	Dry, Wet
M,R	≤3.0	0.16(0.10—0.20)	—	—	—	Dry, Wet
M,R	≤3.0	0.13(0.10—0.15)	M	≤2.0	0.13(0.10—0.15)	Dry, Wet
L,M	≤3.0	0.13(0.10—0.15)	L,M	≤3.0	0.13(0.10—0.15)	Dry, Wet
L,M	≤3.0	0.13(0.10—0.15)	L,M	≤2.0	0.13(0.10—0.15)	Dry, Wet
M,R	≤3.0	0.16(0.10—0.20)	—	—	—	Dry, Wet
M,R	≤3.0	0.13(0.10—0.15)	M	≤2.0	0.13(0.10—0.15)	Dry, Wet
—	—	—	—	—	—	Dry, Wet
—	—	—	—	—	—	Dry, Wet
—	—	—	—	—	—	Dry, Wet
—	—	—	—	—	—	Dry, Wet
L,M	≤3.0	0.13(0.10—0.15)	—	—	—	Dry, Wet
M	≤3.0	0.16(0.10—0.20)	—	—	—	Dry, Wet
M	≤3.0	0.13(0.10—0.15)	—	—	—	Dry, Wet
L,M	≤3.0	0.13(0.10—0.15)	—	—	—	Dry, Wet
L,M	≤3.0	0.13(0.10—0.15)	—	—	—	Dry, Wet
M	≤3.0	0.16(0.10—0.20)	—	—	—	Dry, Wet
M	≤3.0	0.13(0.10—0.15)	—	—	—	Dry, Wet
L,M	≤3.0	0.13(0.10—0.15)	—	—	—	Dry, Wet
M	≤3.0	0.16(0.10—0.20)	—	—	—	Dry, Wet
M	≤3.0	0.13(0.10—0.15)	—	—	—	Dry, Wet
L,M	≤3.0	0.13(0.10—0.15)	—	—	—	Dry
L,M	≤3.0	0.13(0.10—0.15)	—	—	—	Wet
M	≤3.0	0.16(0.10—0.20)	—	—	—	Dry
M	≤3.0	0.16(0.10—0.20)	—	—	—	Wet
M	≤3.0	0.16(0.10—0.20)	—	—	—	Dry
M	≤3.0	0.13(0.10—0.15)	—	—	—	Wet
—	—	—	—	—	—	Dry, Wet
—	—	—	—	—	—	Dry, Wet
—	—	—	—	—	—	Dry, Wet
—	—	—	—	—	—	Dry, Wet
L,M	≤3.0	0.13(0.10—0.15)	L,M	≤2.0	0.13(0.10—0.15)	Dry, Wet
M,R	≤3.0	0.16(0.10—0.20)	—	—	—	Dry, Wet
M,R	≤3.0	0.13(0.10—0.15)	M,R	≤2.0	0.13(0.10—0.15)	Dry, Wet
L,M	≤3.0	0.13(0.10—0.15)	L,M	≤2.0	0.13(0.10—0.15)	Dry, Wet
M,R	≤3.0	0.16(0.10—0.20)	—	—	—	Dry, Wet
M,R	≤3.0	0.13(0.10—0.15)	M,R	≤2.0	0.13(0.10—0.15)	Dry, Wet
L	≤3.0	0.13(0.10—0.15)	L	≤2.0	0.13(0.10—0.15)	Wet
—	—	—	—	—	0.10(0.05—0.13)	Wet
—	—	—	—	—	0.10(0.05—0.13)	Wet
—	—	—	—	—	0.10(0.05—0.13)	Wet
—	—	—	—	—	0.10(0.05—0.13)	Wet
—	—	—	—	—	0.05(0.05—0.10)	Dry, Wet
—	—	—	—	—	0.05(0.05—0.10)	Dry, Wet

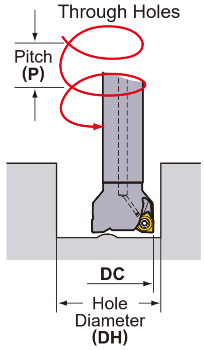
■Ramping / Helical Milling

●Ramping



●Helical Milling





Refer to the table below for cutting conditions. For feed per tooth and cutting speed, follow the cutting conditions for slot milling.

(mm)

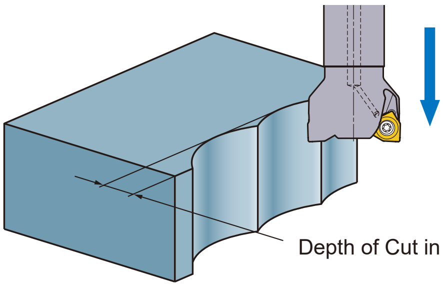
DC	RE	APMX	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling (Through Hole)	
			RMPX	L *	DH max.	P max.	DH min.	P max.	DH min.	P max.
50	0.4	8	0.40°	1175	98.5	1.06	95.2	0.99	82.5	0.7
50	0.8	8	0.40°	1175	97.7	1.05	95.2	0.99	82.5	0.7
63	0.4	8	0.26°	1807	124.5	0.88	121.2	0.83	108.6	0.6
63	0.8	8	0.26°	1807	123.7	0.87	121.2	0.83	108.6	0.6
80	0.4	8	0.16°	2936	158.5	0.69	155.2	0.66	142.6	0.5
80	0.8	8	0.16°	2936	157.7	0.68	155.3	0.66	142.6	0.5

DC = Cutting Diameter
APMX = Depth of Cut Max.
RMPX = Ramping Angle Max.
DH = Desired Hole Diameter
P = Pitch

Note 1) When ramping and helical milling, it is recommended to reduce the feed per tooth.
Note 2) When ramping and helical milling, long continuous chips may be dispersed, take cautionary measures.

<Helical Milling>
To obtain a flat bottom surface when helical milling, it is required to remove “the uncut part” in the centre of the work material during a final pass. When helical milling, make sure that the depth of cut per helical pass doesn’t exceed the maximum depth of cut (**APMX**).

●Plunging



SHOULDER MILLING

<STRONG EDGE TYPE FOR CAST IRON>

90° KAPR

VOX400

P M **K** N S H

Fig.1

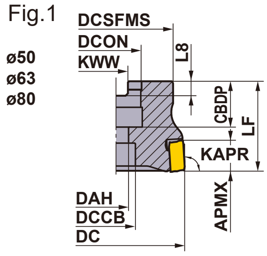


Fig.2

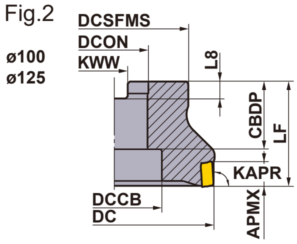
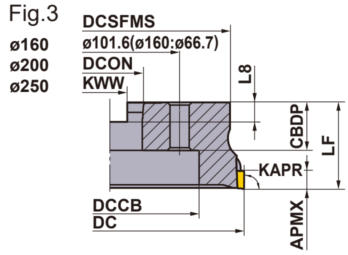


Fig.3



Right hand tool holder only.

■ARBOR TYPE

KAPR : 90°
GAMP : -6° GAMF : -18°

Type	Order Number	Stock R	Number of Teeth	DC	LF	DCON	CBDP	DAH	DCCB	DCSFMS	KWW	L8	*2 WT (kg)	APMX (mm)	Fig.	*1 Clamp Screw	Wrench
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

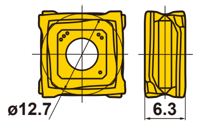
*1 Clamp Torque (N • m) : CS401160T=3.5
*2 WT : Tool Weight

● : Inventory maintained. ★ : Inventory maintained in Japan.

SPARE PARTS ➢ N001
TECHNICAL DATA ➢ P001

INSERTS

Work Material	K	Cast Iron		
Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting			◐	✤

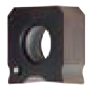
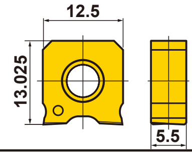
Shape	Order Number	Class	Honing	Coated MC5020	Coated VP15TF	Geometry
	SONX1206PER	N	E	●	●	
	SONX1206PEL	N	E		★	

Right hand tool holder shown.

★ Left hand insert use for the side cutter (special products).

WIPER INSERTS

Work Material	K	Cast Iron	
Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting			◐

Shape	Order Number	Class	Honing	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/t.)
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)

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

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 inserts, 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.

SHOULDER MILLING
<GENERAL CUTTING>

90° KAPR

ASX400

P | M | K | N | S | H

Fig.1
ø50
ø63

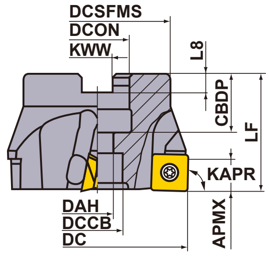


Fig.2
ø80
ø100
ø125

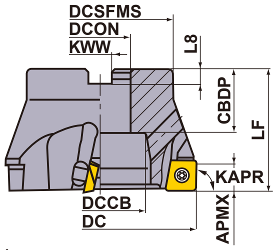


Fig.3
ø160

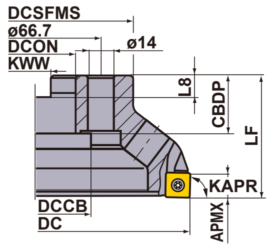
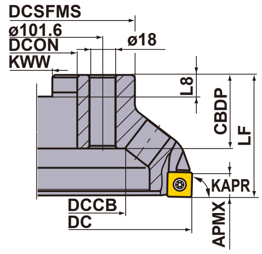


Fig.4
ø200
ø250



■ARBOR TYPE

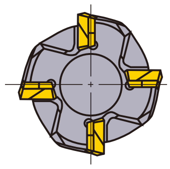
KAPR :90°
GAMP:+11°　　GAMF:-9°—-11°
No coolant hole

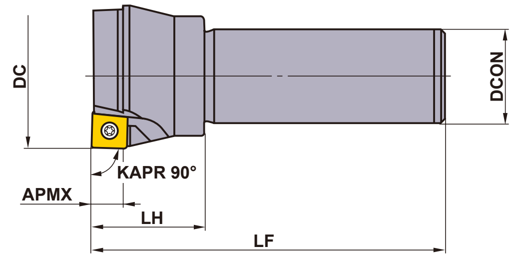
Right hand tool holder only.

Type	Order Number	Stock R	Number of Teeth	DC	LF	DCON	CBDP	DAH	DCCB	DCSFMS	KWW	L8	WT* (kg)	APMX (mm)	Fig.
Coarse Pitch	ASX400-050A03R	●	3	50	40	22	20	11	17	41	10.4	6.3	0.3	10	1
	ASX400-063A04R	●	4	63	40	22	20	11	17	50	10.4	6.3	0.5	10	1
	ASX400-080B04R	●	4	80	50	27	29	—	38	60	12.4	7	0.9	10	2
	ASX400-100B05R	●	5	100	50	32	32	—	45	70	14.4	8	1.4	10	2
	ASX400-125B06R	●	6	125	63	40	32	—	60	80	16.4	9	2.3	10	2
	ASX400-160C08R	●	8	160	63	40	29	—	56	100	16.4	9	3.6	10	3
	ASX400-200C10R	●	10	200	63	60	32	—	135	160	25.7	14.22	6.3	10	4
	ASX400-250C12R	●	12	250	63	60	32	—	180	210	25.7	14.22	10.8	10	4
Fine Pitch	ASX400-050A04R	●	4	50	40	22	20	11	17	41	10.4	6.3	0.3	10	1
	ASX400-063A05R	●	5	63	40	22	20	11	17	50	10.4	6.3	0.5	10	1
	ASX400-080B06R	●	6	80	50	27	29	—	38	60	12.4	7	0.9	10	2
	ASX400-100B07R	●	7	100	50	32	32	—	45	70	14.4	8	1.4	10	2
	ASX400-125B08R	●	8	125	63	40	32	—	60	80	16.4	9	2.2	10	2
	ASX400-160C12R	●	12	160	63	40	29	—	56	100	16.4	9	3.5	10	3
	ASX400-200C16R	●	16	200	63	60	32	—	135	160	25.7	14.22	6.2	10	4
	ASX400-250C18R	●	18	250	63	60	32	—	180	210	25.7	14.22	10.7	10	4
Extra Fine Pitch	ASX400-050A05R	●	5	50	40	22	20	11	17	41	10.4	6.3	0.3	10	1
	ASX400-063A06R	●	6	63	40	22	20	11	17	50	10.4	6.3	0.5	10	1
	ASX400-080B08R	●	8	80	50	27	29	—	38	60	12.4	7	0.9	10	2
	ASX400-100B10R	●	10	100	50	32	32	—	45	70	14.4	8	1.4	10	2
	ASX400-125B12R	●	12	125	63	40	32	—	60	80	16.4	9	2.1	10	2
	ASX400-160C15R	●	15	160	63	40	29	—	56	100	16.4	9	3.4	10	3
	ASX400-200C19R	★	19	200	63	60	32	—	135	160	25.7	14.22	6.2	10	4
	ASX400-250C22R	★	22	250	63	60	32	—	180	210	25.7	14.22	10.5	10	4

* WT : Tool Weight

●: Inventory maintained.　★: Inventory maintained in Japan.





■ SHANK TYPE

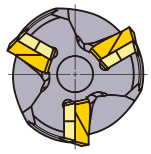
Right hand tool holder only.

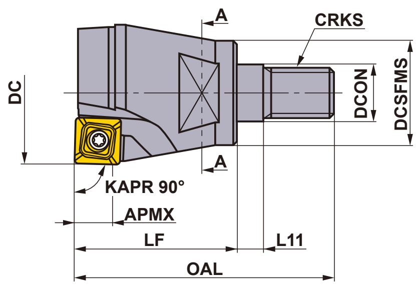
Type	Order Number	Stock	Number of Teeth	Dimensions(mm)				
		R		DC	LF	DCON	LH	APMX
Coarse Pitch	**ASX400R403S32**	★	3	40	125	32	40	10
Fine Pitch	**ASX400R504S32**	★	4	50	125	32	40	10
	ASX400R635S32	★	5	63	125	32	40	10

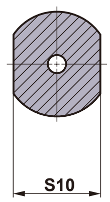
SPARE PARTS

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







A-A

■ SCREW-IN TYPE

Right hand tool holder only.

Order Number	Stock	Teeth	Dimensions (mm)									*2 WT (kg)	Shim	Shim Screw *1	Clamp Screw *1	Wrench (Insert)	Wrench (Shim)
	R		DC	DCON	DCSFMS	OAL	LF	L11	S10	CRKS	APMX						
ASX400R322M16	●	2	32	17	29	65	42	6	22	M16	10	0.3	—	WCS503507H	TPS35	TIP15T	HKY35R
ASX400R403M16	●	3	40	17	29	70	47	6	22	M16	10	0.3	STASX400N	WCS503507H	TPS35	TIP15T	HKY35R

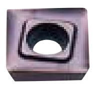
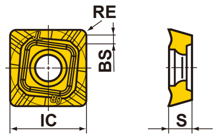
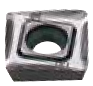
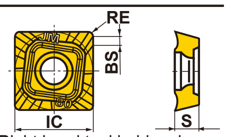
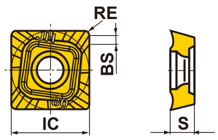
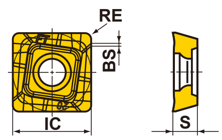
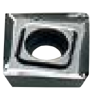
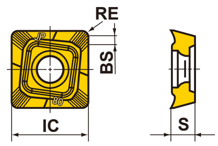
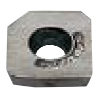
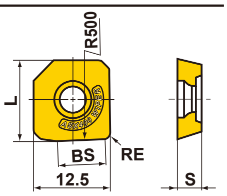
*1 Clamp Torque (N • m) : WCS503507H=5.0, TPS35=3.5
*2 WT : Tool Weight
Note 1) For screw-in type arbors, refer to page K244.

INSERTS

Work Material			F7030	MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	NX4545	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

Application	Shape	Order Number	Class	Honing	Coated: F7030	Coated: MC5020	Coated: MP6120	Coated: MP6130	Coated: MP7130	Coated: MP7140	Coated: MP9120	Coated: MP9130	Coated: VP15TF	Coated: VP30RT	Cermet: NX4545	Cermet: NX2525	Carbide: HTi10	Carbide: HTi05T	Dimensions (mm): L	IC	S	BS	RE	Geometry
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	 Right hand tool holder shown.
		SOMT12T308PEEL-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	
Wiper		WOEW12T308PEER8C	E	E														●	13.2	–	3.97	8	0.8	
		WOEW12T308PETR8C	E	T												●			13.2	–	3.97	8	0.8	

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

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)	0.18 (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 further back than general inserts. Beware of wear of the insert just behind the wiper insert.
- When using the wiper, set the following standard conditions. Depth of Cut (ap) ≤0.5 mm, Feed per Tooth (fz)≤0.2 mm/t.

MULTI-FUNCTIONAL MILLING

WJX09 NEW

P M K N S H

Fig.1
ø40

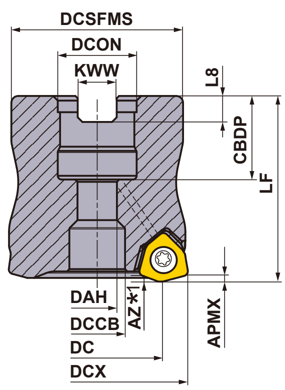
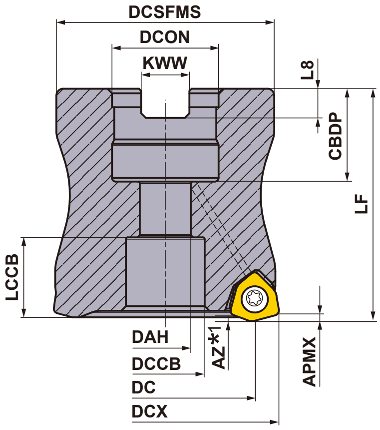
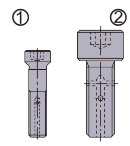


Fig.2
ø50
ø52
ø63
ø66



Right hand tool holder only.

DCON (mm)	Set Bolt	Geometry	
ϕ16	HFF08033H	①	
ϕ22	HSC10030H	②	
ϕ27	HSC12035H		

■ARBOR TYPE

GAMP:-6° GAMF :-11°—-10°
With Coolant Hole

DCX (mm)	Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	LF	DCON	WT*2 (kg)	APMX (mm)	RPMX (min⁻¹)	Fig.	Insert Type
40	**WJX09-040A04AR**	●	4	28.8	40	16	0.2	1.2	23200	1	JOMU0905
40	**WJX09-040A05AR**	●	5	28.8	40	16	0.2	1.2	23200	1	JOMU0905
50	**WJX09-050A04AR**	●	4	38.8	50	22	0.4	1.2	20000	2	JOMU0905
50	**WJX09-050A06AR**	●	6	38.8	50	22	0.4	1.2	20000	2	JOMU0905
52	**WJX09-052A06AR**	●	6	40.8	50	22	0.5	1.2	19500	2	JOMU0905
63	**WJX09-063A05AR**	●	5	51.8	50	22	0.8	1.2	17300	2	JOMU0905
63	**WJX09-063A07AR**	●	7	51.8	50	22	0.8	1.2	17300	2	JOMU0905
63	**WJX09-063X07AR**	●	7	51.8	50	27	0.7	1.2	17300	2	JOMU0905
66	**WJX09-066X07AR**	●	7	54.8	50	27	0.8	1.2	16800	2	JOMU0905

*1 Refer to page K077, for the maximum drilling depth (**AZ**).
*2 WT : Tool Weight
Note 1) The maximum allowable spindle speeds (**RPMX**) are set to ensure tool and insert stability.
Note 2) When using at high spindle speeds, ensure that the tool and arbor are correctly balanced.

MOUNTING DIMENSIONS

DCX (mm)	Order Number	Dimensions (mm) DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
40	**WJX09-040A04AR**	16	18	8.5	12	—	37	8.4	5.6	1
40	**WJX09-040A05AR**	16	18	8.5	12	—	37	8.4	5.6	1
50	**WJX09-050A04AR**	22	20	11	17	17.2	47	10.4	6.3	2
50	**WJX09-050A06AR**	22	20	11	17	17.2	47	10.4	6.3	2
52	**WJX09-052A06AR**	22	20	11	17	17.2	47	10.4	6.3	2
63	**WJX09-063A05AR**	22	20	11	17	17.2	60	10.4	6.3	2
63	**WJX09-063A07AR**	22	20	11	17	17.2	60	10.4	6.3	2
63	**WJX09-063X07AR**	27	23	13	20	16.2	60	12.4	7	2
66	**WJX09-066X07AR**	27	23	13	20	16.2	60	12.4	7	2

●: Inventory maintained. ★: Inventory maintained in Japan.

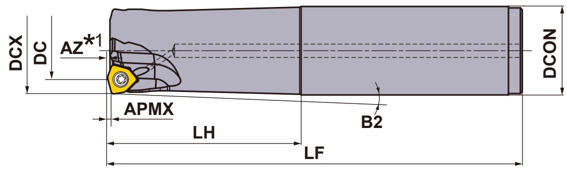


Fig.1

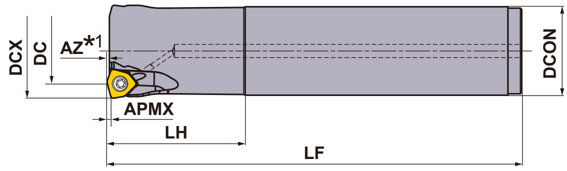


Fig.2

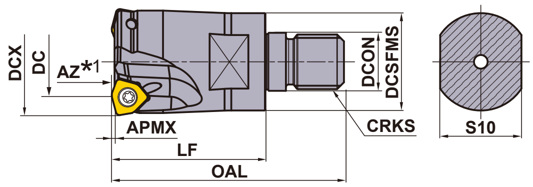
■SHANK TYPE

With Coolant Hole

Right hand tool holder only.

DCX (mm)	Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	LF	LH	DCON	B2	APMX (mm)	RPMX (min^{-1})	Fig.	Insert Type
25	**WJX09R2502SA25S**	●	2	14	140	60	25	1.09°	1.2	33500	1	JOMU0905
25	**WJX09R2503SA25S**	●	3	14	140	60	25	1.09°	1.2	33500	1	JOMU0905
25	**WJX09R2502SA25L**	●	2	14	200	120	25	0.54°	1.2	33500	1	JOMU0905
25	**WJX09R2503SA25L**	★	3	14	200	120	25	0.54°	1.2	33500	1	JOMU0905
25	**WJX09R2502SA25EL**	★	2	14	300	180	25	0.35°	1.2	33500	1	JOMU0905
28	**WJX09R2802SA25S**	★	2	16.9	140	40	25	—	1.2	30300	2	JOMU0905
28	**WJX09R2803SA25S**	●	3	16.9	140	40	25	—	1.2	30300	2	JOMU0905
28	**WJX09R2802SA25L**	●	2	16.9	200	40	25	—	1.2	30300	2	JOMU0905
28	**WJX09R2803SA25L**	★	3	16.9	200	40	25	—	1.2	30300	2	JOMU0905
28	**WJX09R2802SA25EL**	★	2	16.9	300	40	25	—	1.2	30300	2	JOMU0905
32	**WJX09R3202SA32S**	★	2	20.9	150	70	32	0.93°	1.2	27300	1	JOMU0905
32	**WJX09R3203SA32S**	●	3	20.9	150	70	32	0.93°	1.2	27300	1	JOMU0905
32	**WJX09R3202SA32L**	★	2	20.9	200	120	32	0.54°	1.2	27300	1	JOMU0905
32	**WJX09R3203SA32L**	●	3	20.9	200	120	32	0.54°	1.2	27300	1	JOMU0905
32	**WJX09R3202SA32EL**	★	2	20.9	300	180	32	0.35°	1.2	27300	1	JOMU0905
35	**WJX09R3503SA32S**	★	3	23.8	150	50	32	—	1.2	25500	2	JOMU0905
35	**WJX09R3504SA32S**	★	4	23.8	150	50	32	—	1.2	25500	2	JOMU0905
35	**WJX09R3503SA32L**	★	3	23.8	200	50	32	—	1.2	25500	2	JOMU0905
35	**WJX09R3504SA32L**	★	4	23.8	200	50	32	—	1.2	25500	2	JOMU0905
35	**WJX09R3502SA32EL**	★	2	23.8	300	50	32	—	1.2	25500	2	JOMU0905
40	**WJX09R4003SA32S**	★	3	28.8	150	50	32	—	1.2	23200	2	JOMU0905
40	**WJX09R4004SA32S**	●	4	28.8	150	50	32	—	1.2	23200	2	JOMU0905
40	**WJX09R4003SA32L**	★	3	28.8	250	50	32	—	1.2	23200	2	JOMU0905
40	**WJX09R4004SA32L**	★	4	28.8	250	50	32	—	1.2	23200	2	JOMU0905
40	**WJX09R4003SA32EL**	★	3	28.8	300	50	32	—	1.2	23200	2	JOMU0905

*1 Refer to page K077, for the maximum drilling depth (**AZ**).



■SCREW-IN TYPE

With Coolant Hole

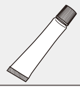
Right hand tool holder only.

DCX (mm)	Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	LF	OAL	DCON	DCSFMS	S10	CRKS	*2 WT (kg)	APMX (mm)	RPMX (min^{-1})	Insert Type
25	**WJX09R2502AM1235**	●	2	14	35	57	12.5	23.5	19	M12	0.1	1.2	33500	JOMU0905
25	**WJX09R2503AM1235**	●	3	14	35	57	12.5	23.5	19	M12	0.1	1.2	33500	JOMU0905
28	**WJX09R2802AM1235**	●	2	16.9	35	57	12.5	23.5	19	M12	0.1	1.2	30300	JOMU0905
28	**WJX09R2803AM1235**	●	3	16.9	35	57	12.5	23.5	19	M12	0.1	1.2	30300	JOMU0905
32	**WJX09R3202AM1645**	●	2	20.9	45	68	17.0	28.5	24	M16	0.2	1.2	27300	JOMU0905
32	**WJX09R3203AM1645**	●	3	20.9	45	68	17.0	28.5	24	M16	0.2	1.2	27300	JOMU0905
35	**WJX09R3502AM1645**	●	2	23.8	45	68	17.0	28.5	24	M16	0.3	1.2	25500	JOMU0905
35	**WJX09R3503AM1645**	●	3	23.8	45	68	17.0	28.5	24	M16	0.2	1.2	25500	JOMU0905
35	**WJX09R3504AM1645**	●	4	23.8	35	68	17.0	28.5	24	M16	0.2	1.2	25500	JOMU0905
40	**WJX09R4003AM1645**	●	3	28.8	45	68	17.0	28.5	24	M16	0.3	1.2	23200	JOMU0905
40	**WJX09R4004AM1645**	●	4	28.8	45	68	17.0	28.5	24	M16	0.3	1.2	23200	JOMU0905
40	**WJX09R4005AM1645**	●	5	28.8	45	68	17.0	28.5	24	M16	0.3	1.2	23200	JOMU0905

*1 Refer to page K077, for the maximum drilling depth (**AZ**).
*2 WT : Tool Weight
Note 1) For screw-in type arbors, refer to page K244.

ARBORS ➤ **K244**
SPARE PARTS ➤ **N001**
TECHNICAL DATA ➤ **P001**

SPARE PARTS

Tool Holder Type	 Clamp Screw *	 Wrench (Insert)	 Anti-seize Lubricant
WJX09	TPS3R	TIP10D	MK1KS

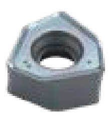
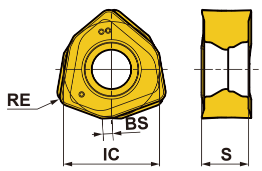
* Clamp Torque (N • m) : TPS3R = 2.0

INSERTS

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

Honing :
E : Round

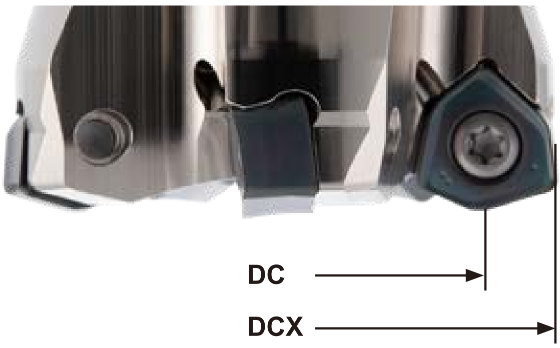
Work Material			MC7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT
	P	Steels	◐	◐	✤					◐	✤
	M	Stainless Steels	◐			◐	✤			◐	✤
	K	Cast Irons								✤	
	S	Heat Resistant Alloys, Titanium Alloys						◐	✤	◐	
	H	Hardened Steels								◐	

Shape	Order Number	Class	Honing	Coated MC7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	Dimensions (mm) IC	S	BS	RE	Geometry
NEW 	**JOMU090512ZZER-L**	M	E	●	●	●	●	●	●	●	●	●	9.525	4.73	0.88	1.2	
	JOMU090512ZZER-M	M	E	●	●	●	●	●	●	●	●	●	9.525	4.75	0.88	1.2	
	JOMU090512ZZER-R	M	E	●	●	●					●	●	9.525	4.83	0.88	1.2	Right hand insert only.

● = NEW

■Cutter Diameter and Flat Surface Milling

The maximum cutting diameter (DCX) shown in the WJX items table is not the same as the possible dimensions for plane cutting.
The possible dimensions for plane cutting are given as the cutting axle DC value. Please note that this is smaller than the DCX value.



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

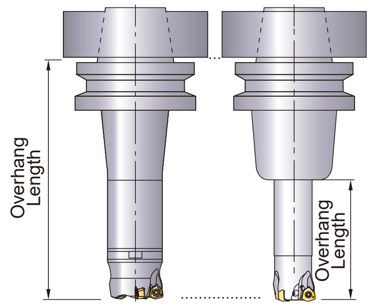
RECOMMENDED CUTTING CONDITIONS

■Correction Value According to Overhang Length

Multiply the recommended cutting conditions by the correction factor x overhang length.

(mm)

Type	Cutting Dia. Max. **DCX**	Overhang Length	Correction Value According		
			Cutting Speed **Vc** (m/min)	Depth of Cut **ap**	Feed **fz**(mm/t.)
Shank Type Screw-in Type	25−40	< 2.5×DCON	100%	100%	100%
		3.0×DCON	90%	100%	90%
		4.0×DCON	85%	90%	85%
		5.0×DCON	80%	85%	80%
		7.5×DCON	70%	75%	75%
Arbor Type	40−66	< 2.5×DCX	100%	100%	100%
		3.0×DCX	85%	100%	90%
		4.0×DCX	80%	80%	80%
		5.0×DCX	75%	75%	60%
		6.0×DCX	70%	70%	40%



DCON=Connection Dia.

■Cutting Speed (Dry Cutting)

(mm)

Work Material	Properties	Cutting Speed **Vc** (m/min)				
P		**MP6130**	**MP6120**	**VP15TF**	**MC7020**	**VP30RT**
Mild Steel	≤180HB	160 (110−200)	170 (120−220)	170 (120−220)	230 (180−280)	140 (100−180)
Carbon Steel Alloy Steel	180−280HB	140 (90−200)	160 (100−220)	160 (100−220)	220 (170−270)	120 (80−170)
Carbon Steel Alloy Steel	280−350HB	140 (90−200)	160 (100−220)	160 (100−220)	220 (170−270)	120 (80−170)
Alloy Tool Steel	≤350HB (Annealing)	140 (90−200)	160 (100−220)	160 (100−220)	220 (170−270)	120 (80−170)
Pre-hardened Steel	35−45HRC	100 (60−140)	120 (80−160)	120 (80−160)	−	90 (50−130)
M		**MP7130**	**MP7140**	**MC7020**	**VP30RT**	
Austenitic Stainless Steel	≤200HB	160 (130−200)	150 (120−180)	220 (170−270)	150 (120−180)	
Austenitic Stainless Steel	>200HB	140 (100−200)	130 (80−180)	190 (140−240)	130 (80−180)	
Ferritic and Martensitic Stainless Steel	≤200HB	150 (100−200)	130 (80−180)	220 (170−270)	130 (80−180)	
Duplex Stainless Steel	≤280HB	130 (80−180)	110 (60−160)	180 (130−230)	110 (60−160)	
Precipitation Hardening Stainless Steel	<450HB	110 (60−160)	90 (50−130)	170 (120−220)	90 (50−130)	
K		**VP15TF**				
Gray Cast Iron	≤350MPa	180 (140−220)				
Ductile Cast Iron	≤450MPa	160 (120−210)				
Ductile Cast Iron	≤800MPa	130 (90−170)				
S		**MP9130**	**MP9120**	**VP15TF**		
Titanium Alloy	−	40 (30−60)	50 (30−65)	50 (30−65)		
Heat Resistant Alloy	−	30 (20−40)	40 (20−50)	40 (20−50)		
H		**VP15TF**				
Hardened Steel	40−55HRC	70 (40−100)				

Note 1) To discharge chips effectively, use an air blow when machining. When the air blow is less effective at discharging chips, we recommend wet cutting.
Note 2) When wet cutting, tool life may become shorter than dry cutting. When carrying out wet cutting for the applications recommended with dry cutting, reduce the cutting speed by 25%.
Note 3) When large vibration occurs, reduce the cutting conditions.
Note 4) For interrupted cutting, reduce the cutting speed and feed rate by 20%.

RECOMMENDED CUTTING CONDITIONS

■Depth of Cut / Feed per Tooth

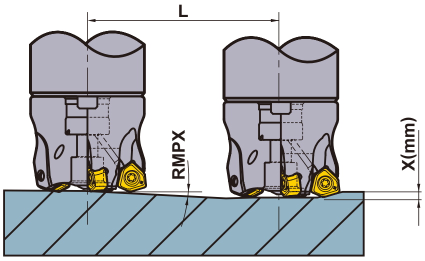
(mm)

	Work Material	Properties	Depth of Cut ap	Breaker	Cutting Dia. Max. DCX=25,28(Z=2) Feed fz(mm/t.)	Cutting Dia. Max. DCX=25,28(Z=3) Feed fz(mm/t.)	Cutting Dia. Max. DCX=32– Feed fz(mm/t.)	Cutting Mode
P	Mild Steel	Hardness ≤180HB	≤0.5	M,R	1.3(0.4–2.0)	1.3(0.4–2.0)	1.5(0.5–2.0)	Dry
				L	1.2(0.4–1.6)	1.2(0.4–1.6)	1.2(0.4–1.6)	
			≤1.0	M,R	1.0(0.3–1.3)	0.8(0.3–1.0)	1.2(0.4–1.5)	
				L	0.8(0.3–1.2)	0.8(0.3–1.0)	0.8(0.3–1.2)	
			≤1.5	M,R	0.6(0.3–1.0)	–	0.8(0.4–1.2)	
	Carbon Steel Alloy Steel	Hardness 180–280HB	≤0.5	M,R	1.3(0.4–1.7)	1.3(0.4–1.7)	1.5(0.4–2.0)	Dry
				L	1.2(0.3–1.5)	1.2(0.3–1.5)	1.2(0.3–1.5)	
			≤1.0	M,R	0.8(0.3–1.0)	0.7(0.3–0.9)	1.0(0.3–1.3)	
				L	0.7(0.2–1.0)	0.7(0.2–0.9)	0.7(0.2–1.0)	
			≤1.5	M,R	0.5(0.3–0.7)	–	0.7(0.3–1.0)	
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 280–350HB ≤350HB (Annealing)	≤0.5	M,R	1.3(0.4–1.7)	1.3(0.4–1.7)	1.5(0.4–2.0)	Dry
				L	1.2(0.3–1.5)	1.2(0.3–1.5)	1.2(0.3–1.5)	
			≤1.0	M,R	0.8(0.3–1.0)	0.7(0.3–0.9)	1.0(0.3–1.3)	
				L	0.7(0.2–1.0)	0.7(0.2–0.9)	0.7(0.2–1.0)	
			≤1.5	M,R	0.5(0.3–0.7)	–	0.7(0.3–1.0)	
	Pre-hardened Steel	Hardness 35–45HRC	≤0.5	M,R	1.0(0.3–1.3)	1.0(0.3–1.3)	1.2(0.3–1.5)	Dry
				L	0.8(0.3–1.2)	0.8(0.3–1.2)	0.8(0.3–1.2)	
			≤1.0	M,R	0.6(0.2–0.8)	0.6(0.2–0.8)	0.8(0.2–1.0)	
				L	0.5(0.2–0.8)	0.5(0.2–0.8)	0.5(0.2–0.8)	
M	Austenitic Stainless Steel	–	≤0.5	L	0.8(0.3–1.0)	0.8(0.3–1.0)	0.8(0.3–1.0)	Dry
				M	1.0(0.4–1.2)	1.0(0.4–1.2)	1.0(0.4–1.2)	
			≤1.0	L	0.6(0.2–0.8)	0.6(0.2–0.8)	0.6(0.2–0.8)	
				M	0.8(0.3–1.0)	0.8(0.3–1.0)	0.8(0.3–1.0)	
	Ferritic and Martensitic Stainless Steel	Hardness ≤200HB	≤0.5	L	0.8(0.3–1.0)	0.8(0.3–1.0)	0.8(0.3–1.0)	Dry
				M	1.0(0.4–1.2)	1.0(0.4–1.2)	1.0(0.4–1.2)	
			≤1.0	L	0.6(0.2–0.8)	0.6(0.2–0.8)	0.6(0.2–0.8)	
				M	0.8(0.3–1.0)	0.8(0.3–1.0)	0.8(0.3–1.0)	
	Duplex Stainless Steel	Hardness ≤280HB	≤0.5	L	0.6(0.3–0.8)	0.6(0.3–0.8)	0.6(0.3–0.8)	Dry
				M	0.7(0.3–1.0)	0.7(0.3–1.0)	0.7(0.3–1.0)	
			≤1.0	L	0.5(0.2–0.7)	0.5(0.2–0.7)	0.5(0.2–0.7)	
				M	0.6(0.3–0.7)	0.6(0.3–0.7)	0.6(0.3–0.7)	
	Precipitation Hardening Stainless Steel	Hardness <450HB	≤0.5	L	0.6(0.3–0.8)	0.6(0.3–0.8)	0.6(0.3–0.8)	Dry
				M	0.7(0.3–1.0)	0.7(0.3–1.0)	0.7(0.3–1.0)	
			≤1.0	L	0.5(0.2–0.7)	0.5(0.2–0.7)	0.5(0.2–0.7)	
				M	0.6(0.3–0.7)	0.6(0.3–0.7)	0.6(0.3–0.7)	
K	Gray Cast Iron	Tensile Strength ≤350MPa	≤0.5	M,R	1.3(0.4–2.0)	1.3(0.4–2.0)	1.5(0.5–2.0)	Dry
				L	1.2(0.4–1.6)	1.2(0.4–1.6)	1.2(0.4–1.6)	
			≤1.0	M,R	1.0(0.3–1.3)	0.8(0.3–1.0)	1.2(0.4–1.5)	
				L	1.0(0.3–1.3)	0.8(0.3–1.0)	1.0(0.3–1.3)	
			≤1.5	M,R	0.6(0.3–1.0)	–	0.8(0.4–1.2)	
	Ductile Cast Iron	Tensile Strength ≤450MPa	≤0.5	M,R	1.3(0.4–1.7)	1.3(0.4–1.7)	1.5(0.4–2.0)	Dry
				L	1.0(0.3–1.3)	1.0(0.3–1.3)	1.0(0.3–1.3)	
			≤1.0	M,R	0.8(0.3–1.0)	0.7(0.3–0.9)	1.0(0.3–1.3)	
				L	0.8(0.2–1.0)	0.7(0.2–0.9)	0.8(0.2–1.2)	
			≤1.5	M,R	0.5(0.3–0.7)	–	0.7(0.3–1.0)	
	Ductile Cast Iron	Tensile Strength ≤800MPa	≤0.5	M,R	1.0(0.2–1.5)	1.0(0.2–1.5)	1.3(0.3–1.7)	Dry
				L	0.8(0.3–1.2)	0.8(0.3–1.2)	0.8(0.3–1.2)	
			≤1.0	M,R	0.8(0.2–1.0)	0.6(0.2–0.8)	1.0(0.3–1.2)	
				L	0.5(0.2–0.8)	0.5(0.2–0.8)	0.5(0.2–0.8)	
S	Titanium Alloy	–	≤0.5	L	0.3(0.2–0.6)	0.3(0.2–0.6)	0.3(0.2–0.6)	Wet
			≤1.0	L	0.3(0.2–0.4)	0.3(0.2–0.4)	0.3(0.2–0.4)	
	Heat Resistant Alloy	–	≤0.5	L,M,R	0.8(0.3–1.2)	0.8(0.3–1.2)	0.8(0.3–1.2)	Wet
			≤1.0	L,M,R	0.7(0.3–1.0)	0.7(0.3–1.0)	0.7(0.3–1.0)	
H	Hardened Steel	Hardness 40–55HRC	≤0.5	R,M	0.6(0.3–1.0)	0.6(0.3–1.0)	0.6(0.3–1.0)	Dry
			≤ 1.0	R,M	0.5(0.3–0.8)	0.4(0.3–0.6)	0.5(0.3–0.8)	

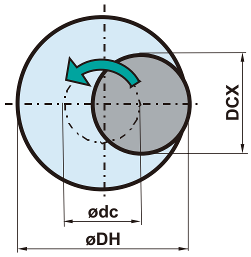
Note 1) To discharge chips effectively, use an air blow when machining. When the air blow is less effective at discharging chips, we recommend wet cutting.
Note 2) When large vibration occurs, reduce the cutting conditions.
Note 3) For interrupted cutting, reduce the cutting speed and feed rate by 20%.
Note 4) If ap is set at 2mm or more, avoid machining on the walls or ramping.

MAXIMUM CAPACITIES BY MODE

■Ramping



■Helical Milling



● How to derive a locus of the centre of the tool.

ødc = øDH - DCX

Locus of the Centre of the Tool | Desired Hole Diameter | Cutting Diameter Maximum

Tool Holder Type	DCX (mm)	DC (mm)	APMX (mm)	Ramping		Helical Milling (Blind Hole, Flat Bottom)		Helical Milling (Through Hole)		AZ (mm)
				RMPX	L (mm) Required Distance for X mm Depth	DH (mm)		DH (mm)	P max. (mm)	
					x = 1 (mm)	Min.	Max.	Min.		
WJX09R25	25	14.0	1.2	4.7°	12.2	38	47	34	1.2	0.8
WJX09R28	28	16.9	1.2	5.6°	10.2	44	53	38	1.2	1.2
WJX09R32	32	20.9	1.2	4.2°	13.7	52	61	46	1.2	1.2
WJX09R35	35	23.8	1.2	3.6°	15.9	58	67	52	1.2	1.2
WJX09R40	40	28.8	1.2	2.9°	19.8	68	77	61	1.2	1.2
WJX09-040	40	28.8	1.2	2.9°	19.8	68	77	61	1.2	1.2
WJX09-050	50	38.8	1.2	2.0°	28.7	88	97	81	1.2	1.2
WJX09-052	52	40.8	1.2	1.9°	30.2	92	101	85	1.2	1.2
WJX09-063	63	51.8	1.2	1.4°	41.0	114	123	107	1.2	1.2
WJX09-066	66	54.8	1.2	1.4°	41.0	120	129	113	1.2	1.2

DCX = Cutting Dia. Max.
APMX = Depth of Cut Max.
DC = Cutting Dia.
RMPX = Ramping Angle Max.
DH = Desired Hole Dia.
AZ = Plunge Depth Max.

Note 1) When ramping and helical milling, it is recommended to reduce the feed per tooth.
Note 2) When ramping, helical milling and drilling, long continuous chips may be dispersed.

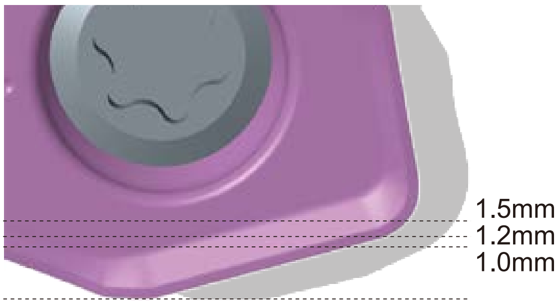
<Helical Milling>
To obtain a flat bottom surface when helical milling, it requires to remove "the uncut part" in the centre of the work material at a final pass.
When helical milling, make sure that the depth of cut per helical pass doesn't exceed the maximum depth of cut (APMX).
<Drilling>
When drilling, set the axial feed per revolution at 0.2 mm/rev or less.

OPERATIONAL GUIDANCE

■Depth of Cut

Refer to the following table for the maximum depth of cut of the WJX. The straight cutting edge extending to the maximum depth of cut (APMX) allows for stable machining even at high depths of cut. For face milling, lowering the feed rate will allow the APMX value to be exceeded, up to depths of cut shown in the following table (when using the corner R). For details on the feed rate, refer to the recommended cutting conditions on page K076.

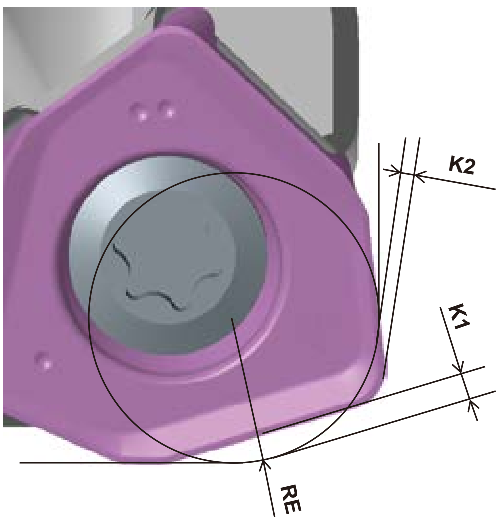
	WJX09
High feed and multi-function machining (APMX)	ap=1.2mm
Low feed and Face machining	ap=1.5mm



WJX09 Conventional Size 09

■Remaining Stock

For CAM, use CAD data (from online catalogs), or use a definition as a radius milling cutter with reference to the following table.
The approximate radius RE, remaining stock K1, and over cutting amount K2 are as shown in the following table.



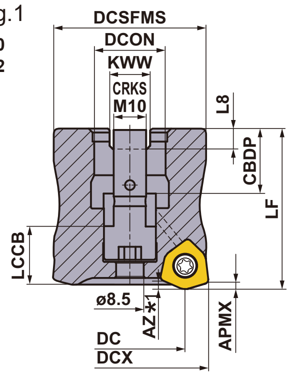
WJX09

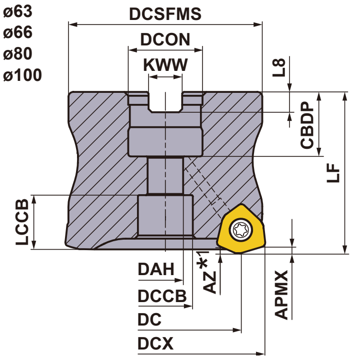
RE (mm)	Remaining Stock **K1**	Cutting Amount **K2**
R2.0 (Recommendation)	0.93	0.00
R2.3	0.86	0.00
R3.0	0.70	0.13

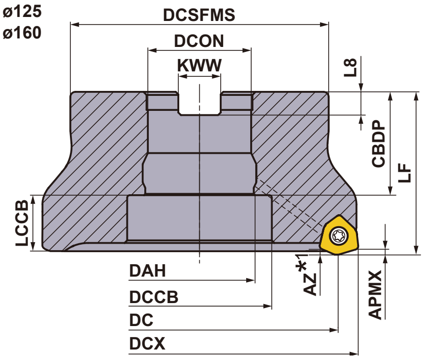
Depth of Cut **ap** (mm)	Remaining Stock **H**
0.5	0.02
1.0	0.07
1.5	–

WJX14

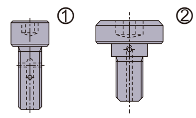
P | M | K | N | S | H







Right hand tool holder only.

DCON (mm)	Set Bolt	Geometry	
ϕ22	HSC10030H	①	
ϕ27	HSC12035H	①	
ϕ32	HSC16040H	①	
ϕ40	MBA20040H	②	
	MBA24045H	②	

Note 1) The tools with cutting diameter maximum DCX = 50mm and 52mm has a built in set bolt. Please use 7mm Allen wrench to tighten / loosen the set bolt.

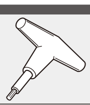
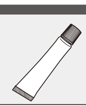
■ARBOR TYPE

GAMP:-7°, -10° GAMF :-10°
With Coolant Hole

DCX (mm)	Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	LF	DCON	WT *2 (kg)	APMX (mm)	RPMX (min^{-1})	Fig.	Insert Type
50	**WJX14-050A03AR**	★	3	34.5	50	22	0.4	2	5000	1	JOMU1407
50	**WJX14-050A04AR**	●	4	34.5	50	22	0.4	2	5000	1	JOMU1407
52	**WJX14-052A04AR**	●	4	36.5	50	22	0.4	2	5000	1	JOMU1407
63	**WJX14-063A04AR**	●	4	47.5	50	22	0.7	2	18200	2	JOMU1407
63	**WJX14-063A05AR**	★	5	47.5	50	22	0.7	2	18200	2	JOMU1407
63	**WJX14-063X05AR**	●	5	47.5	50	27	0.6	2	18200	2	JOMU1407
66	**WJX14-066X05AR**	●	5	50.4	50	27	0.7	2	17700	2	JOMU1407
80	**WJX14-080A05AR**	●	5	64.4	50	27	1.2	2	15600	2	JOMU1407
80	**WJX14-080A06AR**	●	6	64.4	50	27	1.2	2	15600	2	JOMU1407
100	**WJX14-100A06AR**	★	6	84.4	63	32	2.5	2	13500	2	JOMU1407
100	**WJX14-100A07AR**	★	7	84.4	63	32	2.5	2	13500	2	JOMU1407
125	**WJX14-125B07AR**	★	7	109.4	63	40	3.2	2	11600	3	JOMU1407
125	**WJX14-125B09AR**	★	9	109.4	63	40	3.1	2	11600	3	JOMU1407
160	**WJX14-160B09AR**	★	9	144.4	63	40	4.9	2	9900	3	JOMU1407

*1 Refer to page K084, for the maximum drilling depth (**AZ**).
*2 WT : Tool Weight
Note 1) The maximum allowable spindle speeds (**RPMX**) are set to ensure tool and insert stability.
Note 2) Tools with cutting diameter DCX = 50 mm and 52 mm have a built-in set bolt that cannot be replaced.
Therefore, do not disassemble the milling cutter.
Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.

SPARE PARTS

Tool Holder Type	 * Clamp Screw	 Wrench (Insert)	 Anti-seize Lubricant
WJX14	TS5R	TKY20T	MK1KS

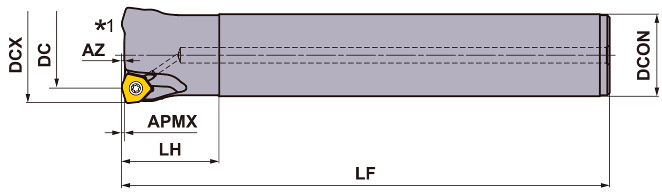
* Clamp Torque (N • m) : TS5R = 5.0

● : Inventory maintained. ★ : Inventory maintained in Japan.

MOUNTING DIMENSION ➤ K080
SPARE PARTS ➤ N001
TECHNICAL DATA ➤ P001

MOUNTING DIMENSIONS

DCX (mm)	Order Number	Dimensions (mm)								Fig.
		DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	
50	**WJX14-050A03AR**	22	20	–	–	18.3	47	10.4	6.3	1
50	**WJX14-050A04AR**	22	20	–	–	18.3	47	10.4	6.3	1
52	**WJX14-052A04AR**	22	20	–	–	18.3	47	10.4	6.3	1
63	**WJX14-063A04AR**	22	20	11	17	16.7	60	10.4	6.3	2
63	**WJX14-063A05AR**	22	20	11	17	16.7	60	10.4	6.3	2
63	**WJX14-063X05AR**	27	23	13	20	15.7	60	12.4	7	2
66	**WJX14-066X05AR**	27	23	13	20	15.7	60	12.4	7	2
80	**WJX14-080A05AR**	27	23	13	20	15.7	76	12.4	7	2
80	**WJX14-080A06AR**	27	23	13	20	15.7	76	12.4	7	2
100	**WJX14-100A06AR**	32	26	17	26	25.7	96	14.4	8	2
100	**WJX14-100A07AR**	32	26	17	26	25.7	96	14.4	8	2
125	**WJX14-125B07AR**	40	40	42	56	21.7	100	16.4	9	3
125	**WJX14-125B09AR**	40	40	42	56	21.7	100	16.4	9	3
160	**WJX14-160B09AR**	40	40	42	56	21.7	100	16.4	9	3



Right hand tool holder only.

■SHANK TYPE

With Coolant Hole

DCX (mm)	Order Number	Stock	Number of Teeth	Dimensions (mm)				APMX (mm)	RPMX (min^{-1})	Insert Type
		R		DC	LF	LH	DCON			
50	**WJX14R5003SA42S**	★	3	34.5	150	50	42	2	21200	JOMU1407
50	**WJX14R5003SA42L**	★	3	34.5	250	50	42	2	21200	JOMU1407

*1 Refer to page K084, for the maximum drilling depth (**AZ**).
Note 1) The maximum allowable spindle speeds (**RPMX**) are set to ensure tool and insert stability.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.

SPARE PARTS

Tool Holder Type	Clamp Screw *	Wrench (Insert)	Anti-seize Lubricant
WJX14	TS5R	TKY20D	MK1KS

* Clamp Torque (N • m) : TS5R = 5.0

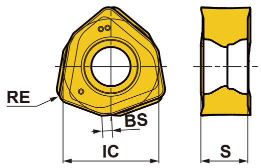
● : Inventory maintained. ★ : Inventory maintained in Japan.
(10 inserts in one case)

INSERTS

Work Material			MC7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT
	P	Steels	◐	◐	✤					◐	✤
	M	Stainless Steels	◐			◐	✤			◐	✤
	K	Cast Irons								✤	
	S	Heat Resistant Alloys, Titanium Alloys						◐	✤	◐	
	H	Hardened Steels								◐	

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

Honing :
E : Round

Shape		Order Number	Class	Honing	Coated									Dimensions (mm)				Geometry
					MC7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	IC	S	BS	RE	
	NEW	JOMU140715ZZER-L	M	E	●	●	●	●	●	●	●	★	★	14	6.58	1.3	1.5	
		JOMU140715ZZER-M	M	E	●	●	●	●	●	●	●	★	★	14	6.63	1.3	1.5	
	NEW	JOMU140715ZZER-R	M	E	●	●	●					●	●	14	6.75	1.3	1.5	

Right hand insert only.

● = NEW

SPARE PARTS ➢ N001
TECHNICAL DATA ➢ P001

RECOMMENDED CUTTING CONDITIONS

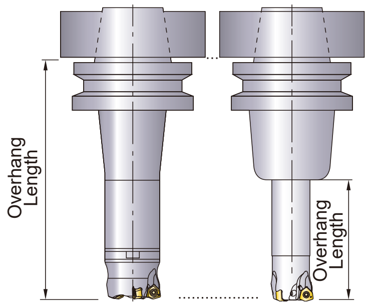
Correction Value According to Overhang Length

Multiply the recommended cutting conditions by the correction factor x overhang length.

(mm)

Type	Cutting Dia. Max. DCX	Overhang Length	Correction Value According		
			Cutting Speed **Vc** (m/min)	Depth of Cut **ap**	Feed **fz**(mm/t.)
Shank Type	50	< 2.5×DCON	100%	100%	100%
		3.0×DCON	90%	100%	90%
		4.0×DCON	80%	80%	90%
Arbor Type	50–80	< 2.5×DCX	100%	100%	100%
		3.0×DCX	85%	100%	90%
		4.0×DCX	80%	80%	80%
		5.0×DCX	75%	75%	60%
		6.0×DCX	70%	70%	40%
	≥100	200	100%	100%	100%
		300	85%	100%	90%
		400	80%	80%	80%

DCON=Connection Dia.



Cutting Speed (Dry Cutting)

(mm)

Work Material	Properties	Cutting Speed **Vc** (m/min)				
P		**MP6130**	**MP6120**	**MC7020**	**VP15TF**	**VP30RT**
Mild Steel	≤180HB	140 (90–180)	150 (100–200)	220 (170–270)	150 (100–200)	120 (80–160)
Carbon Steel Alloy Steel	180–280HB	120 (70–180)	140 (80–200)	200 (150–250)	140 (80–200)	100 (60–150)
Carbon Steel Alloy Steel	280–350HB	120 (70–180)	140 (80–200)	200 (150–250)	140 (80–200)	100 (60–150)
Alloy Tool Steel	≤350HB (Annealing)	120 (70–180)	140 (80–200)	200 (150–250)	140 (80–200)	100 (60–150)
Pre-hardened Steel	35–45HRC	90 (50–130)	110 (70–150)	–	110 (70–150)	80 (40–120)
M		**MP7130**	**MP7140**	**MC7020**	**VP30RT**	
Austenitic Stainless Steel	≤200HB	160 (130–200)	150 (120–180)	220 (170–270)	150 (120–180)	
Austenitic Stainless Steel	>200HB	140 (100–200)	130 (80–180)	190 (140–240)	130 (80–180)	
Ferritic and Martensitic Stainless Steel	≤200HB	150 (100–200)	130 (80–180)	220 (170–270)	130 (80–180)	
Duplex Stainless Steel	≤280HB	130 (80–180)	110 (60–160)	180 (130–230)	110 (60–160)	
Precipitation Hardening Stainless Steel	<450HB	110 (60–160)	90 (50–130)	170 (120–220)	90 (50–130)	
K		**VP15TF**				
Gray Cast Iron	≤350MPa	160 (120–200)				
Ductile Cast Iron	≤450MPa	150 (100–200)				
Ductile Cast Iron	≤800MPa	120 (80–160)				
S		**MP9130**	**MP9120**	**VP15TF**		
Titanium Alloy	–	40 (30–60)	50 (30–65)	50 (30–65)		
Heat Resistant Alloy	–	30 (20–40)	40 (20–50)	40 (20–50)		
H		**VP15TF**				
Hardened Steel	40–55HRC	70 (40–100)				

Note 1) To discharge chips effectively, use an air blow when machining. When the air blow is less effective at discharging chips, we recommend wet cutting.
Note 2) When wet cutting, tool life may become shorter than dry cutting. When carrying out wet cutting for the applications recommended with dry cutting, reduce the cutting speed by 25%.
Note 3) When large vibration occurs, reduce the cutting conditions.
Note 4) For interrupted cutting, reduce the cutting speed and feed rate by 20%.

■ Depth of Cut / Feed per Tooth

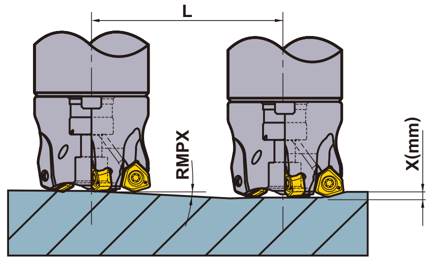
(mm)

	Work Material	Properties	Depth of Cut ap	Breaker	Cutting Dia. Max. DCX=50, 52	Cutting Dia. Max. DCX≧63	Cutting Mode
					Feed **fz**(mm/t.)	Feed **fz**(mm/t.)	
P	Mild Steel	Hardness ≦180HB	≦1.0	M,R	1.5(0.6—2.5)	1.7(0.6—2.8)	Dry
				L	1.2(0.4—2.0)	1.2(0.4—2.0)	
			≦1.5	M,R	1.3(0.6—2.0)	1.5(0.6—2.5)	
				L	1.0(0.4—1.8)	1.0(0.4—1.8)	
			≦2.0	M,R	1.2(0.6—2.0)	1.3(0.6—2.5)	
				L	0.8(0.4—1.7)	0.8(0.4—1.7)	
			≦2.5	M,R	0.8(0.3—1.5)	1.0(0.3—1.6)	
			≦3.0	M,R	0.4(0.2—1.0)	0.5(0.2—1.2)	
	Carbon Steel Alloy Steel	Hardness 180—280HB	≦1.0	M,R	1.5(0.5—2.0)	1.7(0.5—2.5)	Dry
				L	1.0(0.3—1.7)	1.0(0.3—1.7)	
			≦1.5	M,R	1.2(0.5—1.7)	1.3(0.5—2.5)	
				L	0.8(0.3—1.5)	0.8(0.3—1.5)	
			≦2.0	M,R	1.0(0.5—1.5)	1.2(0.5—2.0)	
				L	0.7(0.3—1.2)	0.7(0.3—1.2)	
			≦2.5	M,R	0.7(0.3—1.2)	0.9(0.3—1.5)	
			≦3.0	M,R	0.3(0.2—0.8)	0.4(0.2—1.0)	
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 280—350HB ≦350HB (Annealing)	≦1.0	M,R	1.5(0.5—2.0)	1.7(0.5—2.5)	Dry
				L	1.0(0.3—1.7)	1.0(0.3—1.7)	
			≦1.5	M,R	1.2(0.5—1.7)	1.3(0.5—2.2)	
				L	0.8(0.3—1.5)	0.8(0.3—1.5)	
			≦2.0	M,R	1.0(0.5—1.5)	1.2(0.5—2.0)	
				L	0.7(0.3—1.2)	0.7(0.3—1.2)	
			≦2.5	M,R	0.7(0.3—1.2)	0.9(0.3—1.5)	
			≦3.0	M,R	0.3(0.2—0.8)	0.4(0.2—1.0)	
	Pre-hardened Steel	Hardness 35—45HRC	≦1.0	M,R	1.3(0.4—1.7)	1.5(0.4—2.0)	Dry
				L	0.7(0.3—1.2)	0.7(0.3—1.2)	
			≦1.5	M,R	1.0(0.4—1.5)	1.2(0.4—1.5)	
				L	0.6(0.3—1.0)	0.6(0.3—1.0)	
			≦2.0	M,R	0.8(0.4—1.2)	1.0(0.4—1.3)	
				L	0.5(0.3—0.8)	0.5(0.3—0.8)	
M	Austenitic Stainless Steel	—	≦1.0	L	0.8(0.3—1.2)	0.8(0.3—1.2)	Dry
				M	1.0(0.5—1.2)	1.0(0.5—1.2)	
			≦1.5	L	0.8(0.3—1.0)	0.8(0.3—1.0)	
				M	1.0(0.5—1.0)	1.0(0.5—1.0)	
	Ferritic and Martensitic Stainless Steel	Hardness ≦200HB	≦1.0	L	0.8(0.3—1.2)	0.8(0.3—1.2)	Dry
				M	1.0(0.5—1.2)	1.0(0.5—1.2)	
			≦1.5	L	0.8(0.3—1.0)	0.8(0.3—1.0)	
				M	1.0(0.5—1.0)	1.0(0.5—1.0)	
	Duplex Stainless Steel	Hardness ≦280HB	≦1.0	L	0.6(0.3—1.0)	0.6(0.3—1.0)	Dry
				M	0.8(0.4—1.0)	0.8(0.4—1.0)	
			≦1.5	L	0.6(0.3—0.8)	0.6(0.3—0.8)	
				M	0.8(0.4—0.8)	0.8(0.4—0.8)	
	Precipitation Hardening Stainless Steel	Hardness ＜450HB	≦1	L	0.6(0.3—1.0)	0.6(0.3—1.0)	Dry
				M	0.8(0.4—1.0)	0.8(0.4—1.0)	
			≦1.5	L	0.6(0.3—0.8)	0.6(0.3—0.8)	
				M	0.8(0.4—0.8)	0.8(0.4—0.8)	
K	Gray Cast Iron	Tensile Strength ≦350MPa	≦1	M,R	1.7(0.6—2.5)	1.8(0.6—2.8)	Dry
				L	1.3(0.4—2.0)	1.3(0.4—2.0)	
			≦1.5	M,R	1.5(0.6—2.0)	1.7(0.6—2.5)	
				L	1.2(0.4—1.8)	1.2(0.4—1.8)	
			≦2	M,R	1.3(0.6—2.0)	1.5(0.6—2.5)	
				L	1.0(0.4—1.5)	1.0(0.4—1.5)	
			≦2.5	M,R	0.8(0.3—1.5)	1.0(0.3—1.6)	
			≦3	M,R	0.4(0.2—1.0)	0.5(0.2—1.2)	
	Ductile Cast Iron	Tensile Strength ≦450MPa	≦1	M,R	1.5(0.5—2.0)	1.7(0.5—2.5)	Dry
				L	1.2(0.3—2.0)	1.2(0.3—2.0)	
			≦1.5	M,R	1.3(0.5—1.8)	1.5(0.5—2.0)	
				L	1.0(0.3—1.7)	1.0(0.3—1.7)	
			≦2	M,R	1.2(0.5—1.8)	1.3(0.5—2.0)	
				L	0.8(0.3—1.5)	0.8(0.3—1.5)	
			≦2.5	M,R	0.7(0.3—1.2)	0.9(0.3—1.5)	
			≦3	M,R	0.3(0.2—0.8)	0.4(0.2—1.0)	
	Ductile Cast Iron	Tensile Strength ≦800MPa	≦1	M,R	1.3(0.4—1.8)	1.5(0.4—2.0)	Dry
				L	1.0(0.3—1.7)	1.0(0.3—1.7)	
			≦1.5	M,R	1.2(0.4—1.5)	1.3(0.4—1.8)	
				L	0.8(0.3—1.5)	0.8(0.3—1.5)	
			≦2	M,R	1.0(0.4—1.5)	1.2(0.4—1.8)	
				L	0.7(0.3—1.2)	0.7(0.3—1.2)	
S	Titanium Alloy	—	≦1	L	0.3(0.2—0.6)	0.3(0.2—0.6)	Wet
			≦1.5	L	0.3(0.2—0.5)	0.3(0.2—0.5)	
			≦2	L	0.3(0.2—0.4)	0.3(0.2—0.4)	
	Heat Resistant Alloy	—	≦1	L,M,R	1.0(0.3—1.3)	1.0(0.3—1.3)	Wet
			≦1.5	L,M,R	0.8(0.3—1.2)	0.8(0.3—1.2)	
			≦2	L,M,R	0.7(0.3—1.2)	0.7(0.3—1.2)	
H	Hardened Steel	Hardness 40—55HRC	≦1	R,M	0.8(0.3—1.2)	0.8(0.3—1.2)	Dry
			≦1.5	R,M	0.6(0.3—1.0)	0.6(0.3—1.0)	
			≦2	R,M	0.5(0.3—0.8)	0.5(0.3—0.8)	

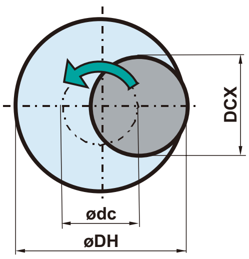
Note 1) To discharge chips effectively, use an air blow when machining. When the air blow is less effective at discharging chips, we recommend wet cutting.
Note 2) When large vibration occurs, reduce the cutting conditions.
Note 3) For interrupted cutting, reduce the cutting speed and feed rate by 20%.
Note 4) If ap is set at 2mm or more, avoid machining on the walls or ramping.

MAXIMUM CAPACITIES BY MODE

■Ramping



■Helical Milling



● How to derive a locus of the centre of the tool.

ødc = øDH - DCX

Locus of the Centre of the Tool — Desired Hole Diameter — Cutting Diameter Maximum

(mm)

Tool Holder Type	DCX	DC	APMX	Ramping			Helical Milling (Blind Hole, Flat Bottom)		Helical Milling (Through Hole)	AZ
				RMPX	L (mm) Required Distance for X mm Depth		DH		DH	
					x = 1	x = 2	Min.	Max.	Min.	
WJX14R50	50	34.5	2	4.4°	13.0	26.0	82	97	73	2.1
WJX14-050	50	34.5	2	4.4°	13.0	26.0	82	97	73	2.1
WJX14-052	52	36.5	2	4.1°	14.0	28.0	86	101	77	2.1
WJX14-063	63	47.5	2	3.0°	19.1	38.2	108	123	99	2.1
WJX14-066	66	50.4	2	2.8°	20.5	40.9	114	129	105	2.1
WJX14-080	80	64.4	2	2.1°	27.3	54.6	142	157	133	2.1
WJX14-100	100	84.4	2	1.5°	38.2	76.4	182	197	173	2.1
WJX14-125	125	109.4	2	1.2°	47.8	95.5	232	247	223	2.1
WJX14-160	160	144.4	2	0.8°	71.7	143.3	302	317	293	2.1

DCX = Cutting Dia. Max. **DC** = Cutting Dia. **DH** = Desired Hole Dia.
APMX = Depth of Cut Max. **RMPX** = Ramping Angle Max. **AZ** = Plunge Depth Max.

Note 1) When ramping and helical milling, it is recommended to reduce the feed per tooth.
Note 2) When ramping, helical milling and drilling, long continuous chips may be scattered so please be careful.

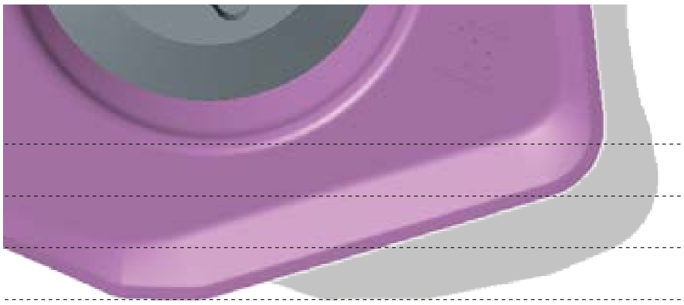
<Helical Milling>
To obtain a flat bottom surface when helical milling, it requires to remove “the uncut part” in the centre of the work material with a final pass.
When helical milling, make sure that the depth of cut per helical pass doesn’t exceed the maximum depth of cut (APMX).
<Drilling>
When drilling, set the axial feed per revolution at 0.2 mm/rev or less.

OPERATIONAL GUIDANCE

■Depth of Cut

Refer to the following table for the maximum depth of cut of the WJX. The straight cutting edge extending to the maximum depth of cut (APMX) allows for stable machining even at high depths of cut. For face milling, lowering the feed rate will allow the APMX value to be exceeded, up to depths of cut shown in the following table (when using the corner R). For details on the feed rate, refer to the recommended cutting conditions on page K083.

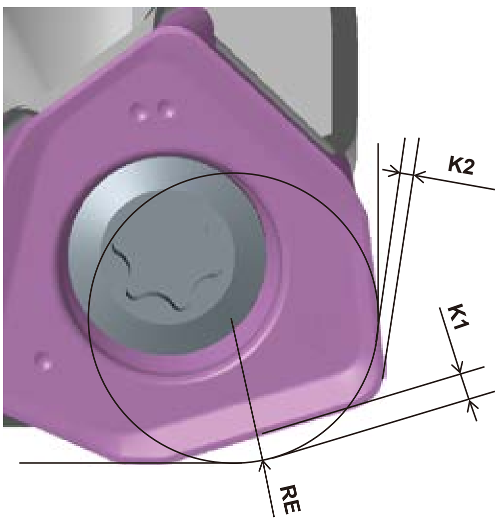
	WJX14
High feed and multi-function machining (APMX)	ap=2.0 mm
Low feed and Face machining	ap=3.0 mm



WJX14 Conventional Size 14

■Remaining Stock

For CAM, use CAD data (from online catalogues), use as a radius milling cutter with reference to the following table.
The approximate radius RE, remaining stock K1, and over cut amount K2 are as shown in the following table.

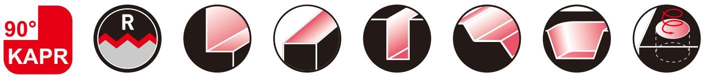


WJX14

RE (mm)	Remaining Stock **K1** (mm)	Cutting Amount **K2** (mm)
R3.0 (Recommendation)	1.41	0.00
R3.2	1.37	0.00
R4.0	1.17	0.10
R5.0	0.92	0.39

Depth of Cut **ap** (mm)	Remaining Stock **H** (mm)
1.0	0.05
1.5	0.08
2.0	0.12

MULTI-FUNCTIONAL MILLING



VPX200

P M K N S H

Fig.1

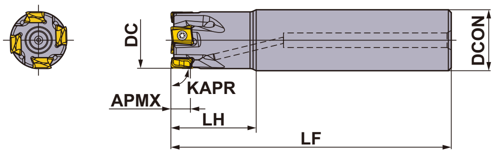
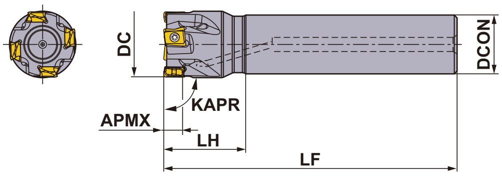


Fig.2



Right hand tool holder only.

■CYLINDRICAL SHANK

With Coolant Hole

DC (mm)	Order Number	Stock R	Number of Teeth	Dimensions (mm) DCON	LF	LH	APMX (mm)	RMPX	RPMX (min^{-1})	WT* (kg)	Fig.	Insert Type
16	**VPX200R1602SA16S**	●	2	16	85	25	8	1.85°	37900	0.11	1	LOGU09
18	**VPX200R1802SA16S**	★	2	16	85	25	8	1.56°	35300	0.12	2	LOGU09
18	**VPX200R1802SA16L**	●	2	16	120	25	8	1.56°	35300	0.17	2	LOGU09
20	**VPX200R2002SA16S**	★	2	16	100	25	8	1.35°	33200	0.14	2	LOGU09
20	**VPX200R2003SA16S**	●	3	16	100	25	8	1.35°	33200	0.14	2	LOGU09
20	**VPX200R2002SA20S**	●	2	20	100	30	8	1.35°	33200	0.21	1	LOGU09
20	**VPX200R2003SA20S**	●	3	20	100	30	8	1.35°	33200	0.21	1	LOGU09
20	**VPX200R2002SA20L**	●	2	20	150	60	8	1.35°	33200	0.32	1	LOGU09
22	**VPX200R2202SA20S**	★	2	20	115	30	8	1.16°	31400	0.26	2	LOGU09
22	**VPX200R2203SA20S**	●	3	20	115	30	8	1.16°	31400	0.25	2	LOGU09
22	**VPX200R2202SA20L**	★	2	20	150	30	8	1.16°	31400	0.34	2	LOGU09
25	**VPX200R2503SA20S**	●	3	20	115	30	8	0.97°	29000	0.26	2	LOGU09
25	**VPX200R2504SA20S**	●	4	20	115	30	8	0.97°	29000	0.26	2	LOGU09
25	**VPX200R2503SA25S**	●	3	25	115	35	8	0.97°	29000	0.39	1	LOGU09
25	**VPX200R2504SA25S**	●	4	25	115	35	8	0.97°	29000	0.39	1	LOGU09
25	**VPX200R2503SA25L**	●	3	25	170	70	8	0.97°	29000	0.57	1	LOGU09
28	**VPX200R2803SA25S**	★	3	25	115	35	8	0.84°	27200	0.41	2	LOGU09
28	**VPX200R2804SA25S**	★	4	25	115	35	8	0.84°	27200	0.41	2	LOGU09
28	**VPX200R2803SA25L**	★	3	25	170	35	8	0.84°	27200	0.61	2	LOGU09
30	**VPX200R3003SA25S**	★	3	25	125	35	8	0.77°	26000	0.46	2	LOGU09
30	**VPX200R3004SA25S**	★	4	25	125	35	8	0.77°	26000	0.46	2	LOGU09
32	**VPX200R3203SA32S**	★	3	32	125	45	8	0.71°	25100	0.70	1	LOGU09
32	**VPX200R3204SA32S**	●	4	32	125	45	8	0.71°	25100	0.70	1	LOGU09
32	**VPX200R3205SA32S**	●	5	32	125	45	8	0.71°	25100	0.70	1	LOGU09
32	**VPX200R3203SA32L**	●	3	32	190	90	8	0.71°	25100	1.06	1	LOGU09
35	**VPX200R3503SA32L**	★	3	32	190	45	8	0.63°	23800	1.14	2	LOGU09
40	**VPX200R4004SA32S**	★	4	32	125	45	8	0.54°	22000	0.81	2	LOGU09
40	**VPX200R4006SA32S**	★	6	32	125	45	8	0.54°	22000	0.80	2	LOGU09
50	**VPX200R5005SA32S**	★	5	32	125	45	8	0.42°	19200	0.91	2	LOGU09
50	**VPX200R5007SA32S**	★	7	32	125	45	8	0.42°	19200	0.91	2	LOGU09

Note 1) The maximum spindle speeds are set to ensure tool and insert stability.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
* WT : Tool Weight

● : Inventory maintained. ★ : Inventory maintained in Japan.

Fig.1

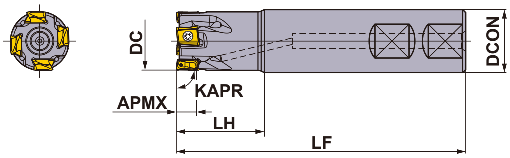
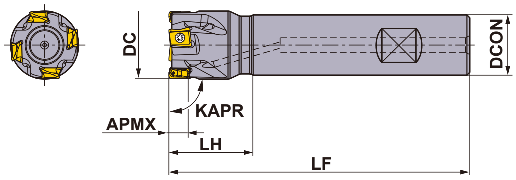


Fig.2



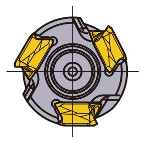
■ WELDON SHANK TYPE

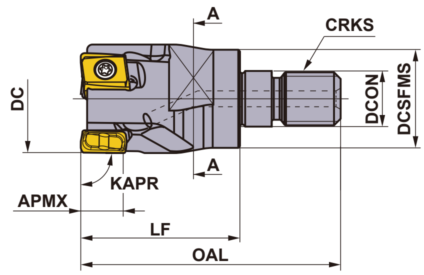
With Coolant Hole

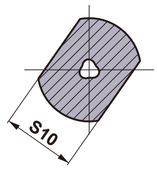
Right hand tool holder only.

DC (mm)	Order Number	Stock R	Number of Teeth	Dimensions (mm) DCON	LF	LH	APMX (mm)	RMPX	RPMX (min^{-1})	WT* (kg)	Fig.	Insert Type
16	**VPX200R1602WA16S**	●	2	16	73	25	8	1.85°	37900	0.09	2	LOGU09
16	**VPX200R1602WA16M**	●	2	16	85	37	8	1.85°	37900	0.11	1	LOGU09
20	**VPX200R2002WA20S**	●	2	20	80	30	8	1.35°	33200	0.17	2	LOGU09
20	**VPX200R2003WA20S**	●	3	20	80	30	8	1.35°	33200	0.16	2	LOGU09
20	**VPX200R2002WA20M**	●	2	20	100	50	8	1.35°	33200	0.2	1	LOGU09
20	**VPX200R2003WA20M**	●	3	20	100	50	8	1.35°	33200	0.2	1	LOGU09
25	**VPX200R2503WA25S**	●	3	25	91	35	8	0.97°	29000	0.29	1	LOGU09
25	**VPX200R2504WA25S**	●	4	25	91	35	8	0.97°	29000	0.29	1	LOGU09
25	**VPX200R2503WA25M**	●	3	25	115	59	8	0.97°	29000	0.37	1	LOGU09
25	**VPX200R2504WA25M**	●	4	25	115	59	8	0.97°	29000	0.37	1	LOGU09
32	**VPX200R3203WA32S**	●	3	32	105	45	8	0.71°	25100	0.58	1	LOGU09
32	**VPX200R3204WA32S**	●	4	32	105	45	8	0.71°	25100	0.57	1	LOGU09
32	**VPX200R3205WA32S**	●	5	32	105	45	8	0.71°	25100	0.57	1	LOGU09
32	**VPX200R3203WA32M**	●	3	32	125	65	8	0.71°	25100	0.68	1	LOGU09
32	**VPX200R3204WA32M**	●	4	32	125	65	8	0.71°	25100	0.68	1	LOGU09
32	**VPX200R3205WA32M**	●	5	32	125	65	8	0.71°	25100	0.68	1	LOGU09

Note 1) The maximum spindle speeds are set to ensure tool and insert stability.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
* WT : Tool Weight







A-A Section

Right hand tool holder only.

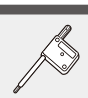
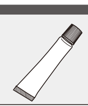
■SCREW-IN TYPE

With Coolant Hole

DC (mm)	Order Number	Stock	Number of Teeth	Dimensions (mm)						WT* (kg)	APMX (mm)	RMPX	Insert Type
		R		DCON	DCSFMS	OAL	LF	S10	CRKS				
16	**VPX200R1602AM0830**	●	2	8.5	14.5	48	30	10	M08	0.03	8	1.85°	LOGU09
18	**VPX200R1802AM0830**	★	2	8.5	14.5	48	30	10	M08	0.04	8	1.56°	LOGU09
20	**VPX200R2002AM1030**	●	2	10.5	18.5	49	30	14	M10	0.06	8	1.35°	LOGU09
20	**VPX200R2003AM1030**	●	3	10.5	18.5	49	30	14	M10	0.06	8	1.35°	LOGU09
22	**VPX200R2202AM1030**	★	2	10.5	18.5	49	30	14	M10	0.06	8	1.16°	LOGU09
22	**VPX200R2203AM1030**	★	3	10.5	18.5	49	30	14	M10	0.06	8	1.16°	LOGU09
25	**VPX200R2503AM1235**	●	3	12.5	23.5	57	35	19	M12	0.11	8	0.97°	LOGU09
25	**VPX200R2504AM1235**	●	4	12.5	23.5	57	35	19	M12	0.11	8	0.97°	LOGU09
32	**VPX200R3203AM1640**	●	3	17.0	28.5	63	40	24	M16	0.21	8	0.71°	LOGU09
32	**VPX200R3204AM1640**	●	4	17.0	28.5	63	40	24	M16	0.21	8	0.71°	LOGU09
32	**VPX200R3205AM1640**	●	5	17.0	28.5	63	40	24	M16	0.21	8	0.71°	LOGU09
35	**VPX200R3503AM1640**	★	3	17.0	28.5	63	40	24	M16	0.24	8	0.63°	LOGU09
35	**VPX200R3505AM1640**	★	5	17.0	28.5	63	40	24	M16	0.23	8	0.63°	LOGU09
40	**VPX200R4004AM1640**	●	4	17.0	28.5	63	40	24	M16	0.26	8	0.54°	LOGU09
40	**VPX200R4006AM1640**	●	6	17.0	28.5	63	40	24	M16	0.26	8	0.54°	LOGU09

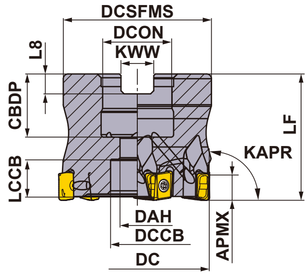
Note 1) For screw-in type arbors, refer to K244.
* WT : Tool Weight

SPARE PARTS

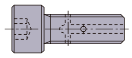
DC (mm)	Tool Holder Type	 *		
		Clamp Screw	Wrench	Anti-seize Lubricant
16	**VPX200R16**	TPS27F1	TIP07F	MK1KS
18	**VPX200R18**	TPS27F1	TIP07F	MK1KS
20	**VPX200R20**	TPS27F1	TIP07F	MK1KS
22	**VPX200R22**	TPS27F2	TIP07F	MK1KS
25	**VPX200R25**	TPS27F2	TIP07F	MK1KS
28	**VPX200R28**	TPS27F2	TIP07F	MK1KS
30	**VPX200R30**	TPS27F2	TIP07F	MK1KS
32	**VPX200R32**	TPS27F2	TIP07F	MK1KS
35	**VPX200R35**	TPS27F2	TIP07F	MK1KS
40	**VPX200R40**	TPS27F2	TIP07F	MK1KS
50	**VPX200R50**	TPS27F2	TIP07F	MK1KS

* Clamp Torque (N • m) : TPS27F1=1.0,TPS27F2=1.0

● : Inventory maintained. ★ : Inventory maintained in Japan.



Right hand tool holder only.

DC	Set Bolt	Geometry
ϕ32, ϕ40	HSC08025H	
ϕ50, ϕ63	HSC10030H	

■ARBOR TYPE

KAPR: 90°
GAMP: -6° GAMF : -25°
With Coolant Hole

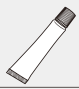
DC (mm)	Order Number	Stock	Number of Teeth	Dimensions (mm)		WT* (kg)	APMX (mm)	RMPX	RPMX (min^{-1})	Insert Type
		R		LF	DCON					
32	**VPX200-032A03AR**	●	3	35	16	0.11	8	0.71°	25100	LOGU09
32	**VPX200-032A05AR**	●	5	35	16	0.11	8	0.71°	25100	LOGU09
40	**VPX200-040A04AR**	●	4	40	16	0.23	8	0.54°	22000	LOGU09
40	**VPX200-040A06AR**	●	6	40	16	0.22	8	0.54°	22000	LOGU09
50	**VPX200-050A05AR**	●	5	40	22	0.36	8	0.42°	19200	LOGU09
50	**VPX200-050A07AR**	●	7	40	22	0.36	8	0.42°	19200	LOGU09
63	**VPX200-063A06AR**	●	6	40	22	0.66	8	0.32°	16700	LOGU09
63	**VPX200-063A09AR**	●	9	40	22	0.66	8	0.32°	16700	LOGU09

Note 1) The maximum spindle speeds are set to ensure tool and insert stability.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
* WT : Tool Weight

MOUNTING DIMENSIONS

DC (mm)	Order Number	Dimensions (mm)							
		DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
32	**VPX200-032A03AR**	16	18	9	14	8	30	8.4	5.6
32	**VPX200-032A05AR**	16	18	9	14	8	30	8.4	5.6
40	**VPX200-040A04AR**	16	18	9	14	13	37	8.4	5.6
40	**VPX200-040A06AR**	16	18	9	14	13	37	8.4	5.6
50	**VPX200-050A05AR**	22	20	11	17	11	47	10.4	6.3
50	**VPX200-050A07AR**	22	20	11	17	11	47	10.4	6.3
63	**VPX200-063A06AR**	22	20	11	17	11	60	10.4	6.3
63	**VPX200-063A09AR**	22	20	11	17	11	60	10.4	6.3

SPARE PARTS

Tool Holder Type	 *		
	Clamp Screw	Wrench	Anti-seize Lubricant
VPX200	TPS27F2	TIP07F	MK1KS

* Clamp Torque (N • m) : TPS27F2=1.0

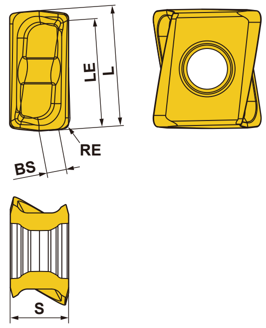
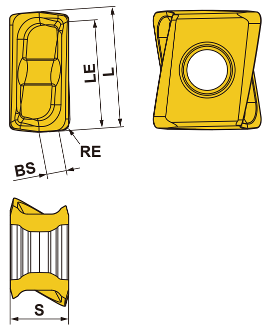
ARBORS ➢ K244
SPARE PARTS ➢ N001
TECHNICAL DATA ➢ P001

INSERTS

Work Material			MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF		TF15	
	P	Steels		◐	✤				◐			
	M	Stainless Steels				◐			◐			
	K	Cast Irons	◐						✤			
	N	Non-ferrous Metals									◐	
	S	Heat Resistant Alloys, Titanium Alloys					◐	✤	◐			
	H	Hardened Steels							◐			

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

Honing :
E : Round **F** : Sharp

Shape	Order Number	Class	Honing	Coated MC5020	Coated MP6120	Coated MP6130	Coated MP7130	Coated MP9120	Coated MP9130	Coated VP15TF		Carbide TF15		L	RE	LE	S	BS	Geometry
Low Cutting Resistance **L** Breaker NEW 	**LOGU0904020PNER-L**	G	E	★	★	★	★	★	★	★				8.7	0.2	7.6	4.3	1.7	 Right hand insert only.
	LOGU0904040PNER-L	G	E	●	●	●	●	●	●	★				8.7	0.4	7.6	4.3	1.5	
	LOGU0904080PNER-L	G	E	●	●	●	●	●	●	★				8.7	0.8	7.6	4.3	1.2	
	LOGU0904100PNER-L	G	E	★	★	★	★	★	★	★				8.7	1.0	7.6	4.3	1.0	
	LOGU0904120PNER-L	G	E	★	★	★	★	★	★	★				8.7	1.2	7.6	4.3	0.8	
	LOGU0904160PNER-L	G	E	●	●	●	●	●	●	★				8.7	1.6	7.6	4.3	0.5	
	LOGU0904020PNFR-L	G	F									●		8.7	0.2	7.6	4.3	1.7	
	LOGU0904040PNFR-L	G	F									●		8.7	0.4	7.6	4.3	1.5	
	LOGU0904080PNFR-L	G	F									●		8.7	0.8	7.6	4.3	1.2	
	LOGU0904100PNFR-L	G	F									★		8.7	1.0	7.6	4.3	1.0	
	LOGU0904120PNFR-L	G	F									★		8.7	1.2	7.6	4.3	0.8	
	LOGU0904160PNFR-L	G	F									★		8.7	1.6	7.6	4.3	0.5	
General Use **M** Breaker 	**LOGU0904020PNER-M**	G	E	★	★	★	★	★	★	★				8.7	0.2	7.6	4.3	1.7	 Right hand insert only.
	LOGU0904040PNER-M	G	E	●	●	●	●	●	●	★				8.7	0.4	7.6	4.3	1.6	
	LOGU0904080PNER-M	G	E	●	●	●	●	●	●	★				8.7	0.8	7.6	4.3	1.2	
	LOGU0904100PNER-M	G	E	★	★	★	★	★	★	★				8.7	1.0	7.6	4.3	1.0	
	LOGU0904120PNER-M	G	E	★	★	★	★	★	★	★				8.7	1.2	7.6	4.3	0.9	
	LOGU0904160PNER-M	G	E	●	●	●	●	●	●	★				8.7	1.6	7.6	4.3	0.5	
	LOGU0904020PNFR-M	G	F									●		8.7	0.2	7.6	4.3	1.7	
	LOGU0904040PNFR-M	G	F									●		8.7	0.4	7.6	4.3	1.6	
	LOGU0904080PNFR-M	G	F									●		8.7	0.8	7.6	4.3	1.2	
	LOGU0904100PNFR-M	G	F									★		8.7	1.0	7.6	4.3	1.0	
	LOGU0904120PNFR-M	G	F									★		8.7	1.2	7.6	4.3	0.9	
	LOGU0904160PNFR-M	G	F									★		8.7	1.6	7.6	4.3	0.5	

Dimensions (mm)

● ★ = NEW

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

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

CHIPBREAKER RECOMMENDATION

■ Chipbreaker Selection Table

	Work Material	Properties	Cutting Conditions	Chipbreaker		Grade	
				1st Recommendation	2nd Recommendation	1st Recommendation	2nd Recommendation
P	Mild Steel	Hardness ≤180HB	● ◐	L	M	MP6120	VP15TF
			✤	M	L	MP6130	—
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 180-350HB ≤350HB (Annealing)	●	L	M	MP6120	VP15TF
			◐	M	L	MP6120	VP15TF
			✤	M	L	MP6130	—
	Pre-hardened Steel	Hardness 35—45HRC	● ◐	M	L	MP6120	VP15TF
			✤	M	L	MP6130	—
M	Austenitic Stainless Steel	Hardness ≤280HB	● ◐	L	M	MP7130	VP15TF
			✤	M	L	MP7130	—
		Hardness >200HB	● ◐	L	M	MP7130	VP15TF
			✤	M	L	MP7130	—
	Duplex Stainless Steel	Hardness ≤280HB	● ◐	L	M	MP7130	VP15TF
			✤	M	L	MP7130	—
	Ferritic and Martensitic Stainless Steel	—	● ◐	L	M	MP7130	VP15TF
			✤	M	L	MP7130	—
	Precipitation Hardening Stainless Steel	Hardness <450HB	● ◐	L	M	MP7130	VP15TF
			✤	M	L	MP7130	—
K	Gray Cast Iron	Tensile Strength ≤350MPa	● ◐	M	L	MC5020	VP15TF
			✤	M	L	VP15TF	—
	Ductile Cast Iron	Tensile Strength ≤800MPa	● ◐	M	L	MC5020	VP15TF
			✤	M	L	VP15TF	—
N	Aluminium Alloy	Content Si<5%	● ◐	L	M	TF15	—
			✤	M	L	TF15	—
S	Titanium Alloy (Ti-6Al-4V,etc.)	—	● ◐	L	M	MP9120	VP15TF
			✤	M	L	MP9130	—
	Titanium Alloy (Ti-5Al-5V-5Mo-3Cr,etc.)	—	● ◐	L	M	MP9120	VP15TF
			✤	M	L	MP9130	—
	Heat Resistant Alloy	—	● ◐	M	L	MP9120	VP15TF
			✤	M	L	MP9130	—
H	Hardened Steel	Hardness 40—55HRC	● ◐ ✤	M	—	VP15TF	—

SPARE PARTS ➤N001
TECHNICAL DATA ➤P001

RECOMMENDED CUTTING CONDITIONS

■ Dry Cutting

Cutting Speed

	Work Material	Properties	Cutting Conditions	Grade	ae (mm) ≤0.25DC	0.25–0.5DC	0.5–0.75DC	DC(Slot)
					Vc (m/min)			
P	Mild Steel	Hardness ≤180HB	● ◐	MP6120,VP15TF	230 (180–270)	220 (170–260)	180 (140–210)	180 (140–210)
			✤	MP6130	200 (150–240)	190 (140–230)	150 (110–180)	150 (110–180)
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 180–350HB ≤350HB (Annealing)	● ◐	MP6120,VP15TF	180 (140–210)	170 (130–200)	140 (110–160)	140 (110–160)
			✤	MP6130	150 (110–180)	140 (100–170)	110 (80–130)	110 (80–130)
	Pre-hardened Steel	Hardness 35–45HRC	● ◐	MP6120,VP15TF	120 (90–140)	110 (80–130)	100 (70–120)	100 (70–120)
			✤	MP6130	100 (80–120)	90 (70–110)	80 (60–100)	80 (60–100)
M	Austenitic Stainless Steel	Hardness ≤200HB	● ◐ ✤	MP7130,VP15TF	180 (140–210)	170 (130–200)	140 (110–160)	140 (110–160)
		Hardness >200HB	● ◐ ✤	MP7130,VP15TF	150 (110–180)	140 (100–160)	110 (80–130)	110 (80–130)
	Duplex Stainless Steel	Hardness ≤280HB	● ◐ ✤	MP7130,VP15TF	140 (110–170)	130 (90–150)	100 (70–120)	100 (70–120)
	Ferritic and Martensitic Stainless Steel	–	● ◐ ✤	MP7130,VP15TF	180 (140–210)	170 (130–200)	140 (110–160)	140 (110–160)
	Precipitation Hardening Stainless Steel	Hardness <450HB	● ◐ ✤	MP7130,VP15TF	130 (100–160)	120 (80–140)	90 (60–110)	90 (60–110)
K	Gray Cast Iron	Tensile Strength ≤350MPa	● ◐	MC5020	250 (200–300)	240 (190–290)	210 (160–260)	210 (160–260)
			● ◐ ✤	VP15TF	200 (150–250)	190 (140–240)	160 (110–210)	160 (110–210)
	Ductile Cast Iron	Tensile Strength ≤800MPa	● ◐	MC5020	180 (150–200)	170 (140–190)	150 (120–170)	150 (120–170)
			● ◐ ✤	VP15TF	130 (100–150)	120 (90–140)	100 (80–120)	100 (80–120)
N	Aluminium Alloy	Content Si<5%	● ◐ ✤	TF15	600 (400–1000)	600 (400–1000)	600 (400–1000)	600 (400–1000)
H	Hardened Steel	Hardness 40–55HRC	● ◐ ✤	VP15TF	90 (70–100)	85 (60–100)	70 (50–80)	70 (50–80)

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.
Note 2) Chattering and vibrations are more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.
- When tool overhang is long (using a long shank, screw-in type, etc.)
- Rigidity of machine, work material or attachment of work material is low
- At a corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radial direction (ae) is 0.5 DC or more.
Note 4) Wet cutting is recommended, when focusing on the surface finish. (Service life is shorter than for dry cutting.)
Note 5) When using higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

Depth of Cut / Feed per Tooth

	Work Material	Properties	ae	Cutting Conditions	DC (mm) ø16–ø18 ap	fz (mm/t.)	ø20–ø25 ap	fz (mm/t.)	ø28–ø63 ap	fz (mm/t.)
P	Mild Steel	Hardness ≤180HB	≤0.25DC	● ◐ ✤	≤6	0.10–0.15	≤8	0.10–0.20	≤8	0.10–0.25
			0.25–0.5DC	● ◐ ✤	≤5	0.08–0.12	≤8	0.10–0.15	≤8	0.10–0.20
			0.5–0.75DC	● ◐ ✤	≤4	0.08–0.12	≤6	0.08–0.12	≤6	0.10–0.15
			DC(Slot)	● ◐ ✤	≤2	0.06–0.10	≤4	0.06–0.10	≤4	0.08–0.12
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 180–280HB	≤0.25DC	● ◐ ✤	≤6	0.10–0.15	≤8	0.10–0.20	≤8	0.10–0.25
			0.25–0.5DC	● ◐ ✤	≤5	0.08–0.12	≤8	0.10–0.15	≤8	0.10–0.20
			0.5–0.75DC	● ◐ ✤	≤4	0.08–0.12	≤6	0.08–0.12	≤6	0.10–0.15
			DC(Slot)	● ◐ ✤	≤2	0.06–0.10	≤4	0.06–0.10	≤4	0.08–0.12
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 280–350HB ≤350HB (Annealing)	≤0.25DC	● ◐ ✤	≤6	0.10–0.15	≤8	0.10–0.15	≤8	0.10–0.20
			0.25–0.5DC	● ◐ ✤	≤5	0.08–0.12	≤8	0.08–0.12	≤8	0.10–0.15
			0.5–0.75DC	● ◐ ✤	≤4	0.08–0.12	≤6	0.06–0.10	≤6	0.08–0.12
			DC(Slot)	● ◐ ✤	≤2	0.06–0.10	≤4	0.06–0.10	≤4	0.05–0.10
	Pre-hardened Steel	Hardness 35–45HRC	≤0.25DC	● ◐ ✤	≤6	0.10–0.15	≤8	0.10–0.15	≤8	0.10–0.20
			0.25–0.5DC	● ◐ ✤	≤5	0.08–0.12	≤8	0.08–0.12	≤8	0.10–0.15
			0.5–0.75DC	● ◐ ✤	≤4	0.08–0.12	≤6	0.06–0.10	≤6	0.08–0.12
			DC(Slot)	● ◐ ✤	≤2	0.06–0.10	≤4	0.06–0.10	≤4	0.06–0.10

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

Depth of Cut / Feed per Tooth

	Work Material	Properties	ae	Cutting Conditions	DC (mm) ø16–ø18 ap	ø16–ø18 fz (mm/t.)	ø20–ø25 ap	ø20–ø25 fz (mm/t.)	ø28–ø63 ap	ø28–ø63 fz (mm/t.)
M	Austenitic Stainless Steel	–	≤0.25DC	● ◐	≤6	0.10–0.15	≤8	0.10–0.20	≤8	0.10–0.20
				✤	≤6	0.08–0.12	≤8	0.08–0.15	≤8	0.08–0.15
			0.25–0.5DC	● ◐	≤5	0.08–0.12	≤8	0.08–0.15	≤8	0.08–0.15
				✤	≤5	0.06–0.10	≤8	0.08–0.12	≤8	0.08–0.12
			0.5–0.75DC	● ◐	≤4	0.06–0.10	≤6	0.08–0.12	≤6	0.08–0.12
				✤	≤4	0.06–0.08	≤6	0.06–0.10	≤6	0.06–0.10
			DC(Slot)	● ◐	≤2	0.06–0.10	≤4	0.06–0.10	≤4	0.06–0.10
				✤	≤2	0.06–0.08	≤4	0.06–0.08	≤4	0.06–0.08
	Duplex Stainless Steel	Hardness ≤280HB	≤0.25DC	● ◐	≤6	0.10–0.15	≤8	0.10–0.20	≤8	0.10–0.20
				✤	≤6	0.08–0.12	≤8	0.08–0.15	≤8	0.08–0.15
			0.25–0.5DC	● ◐	≤5	0.08–0.12	≤8	0.08–0.15	≤8	0.08–0.15
				✤	≤5	0.06–0.10	≤8	0.08–0.12	≤8	0.08–0.12
			0.5–0.75DC	● ◐	≤4	0.06–0.10	≤6	0.08–0.12	≤6	0.08–0.12
				✤	≤4	0.06–0.08	≤6	0.06–0.10	≤6	0.06–0.10
			DC(Slot)	● ◐	≤2	0.06–0.10	≤4	0.06–0.10	≤4	0.06–0.10
				✤	≤2	0.06–0.08	≤4	0.06–0.08	≤4	0.06–0.08
	Ferritic and Martensitic Stainless Steel	–	≤0.25DC	● ◐	≤6	0.10–0.15	≤8	0.10–0.20	≤8	0.10–0.20
				✤	≤6	0.08–0.12	≤8	0.08–0.15	≤8	0.08–0.15
			0.25–0.5DC	● ◐	≤5	0.08–0.12	≤8	0.08–0.15	≤8	0.08–0.15
				✤	≤5	0.06–0.10	≤8	0.08–0.12	≤8	0.08–0.12
			0.5–0.75DC	● ◐	≤4	0.06–0.10	≤6	0.08–0.12	≤6	0.08–0.12
				✤	≤4	0.06–0.08	≤6	0.06–0.10	≤6	0.06–0.10
			DC(Slot)	● ◐	≤2	0.06–0.10	≤4	0.06–0.10	≤4	0.06–0.10
				✤	≤2	0.06–0.08	≤4	0.06–0.08	≤4	0.06–0.08
	Precipitation Hardening Stainless Steel	Hardness <450HB	≤0.25DC	● ◐	≤6	0.10–0.15	≤8	0.10–0.15	≤8	0.10–0.15
				✤	≤6	0.08–0.12	≤8	0.08–0.12	≤8	0.08–0.12
			0.25–0.5DC	● ◐	≤5	0.08–0.12	≤8	0.08–0.12	≤8	0.08–0.12
				✤	≤5	0.06–0.10	≤8	0.08–0.12	≤8	0.08–0.12
			0.5–0.75DC	● ◐	≤4	0.06–0.10	≤6	0.06–0.10	≤6	0.06–0.10
				✤	≤4	0.06–0.08	≤6	0.06–0.08	≤6	0.06–0.08
			DC(Slot)	● ◐	≤2	0.06–0.10	≤4	0.06–0.10	≤4	0.06–0.10
				✤	≤2	0.06–0.08	≤4	0.06–0.08	≤4	0.06–0.08
K	Gray Cast Iron	Tensile Strength ≤350MPa	≤0.25DC	● ◐	≤6	0.10–0.15	≤8	0.10–0.20	≤8	0.10–0.25
				✤	≤6	0.08–0.12	≤8	0.08–0.15	≤8	0.10–0.20
			0.25–0.5DC	● ◐	≤5	0.08–0.12	≤8	0.08–0.15	≤8	0.10–0.20
				✤	≤5	0.06–0.10	≤8	0.08–0.12	≤8	0.10–0.15
			0.5–0.75DC	● ◐	≤4	0.08–0.12	≤6	0.08–0.12	≤6	0.10–0.15
				✤	≤4	0.08–0.12	≤6	0.06–0.10	≤6	0.08–0.12
			DC(Slot)	● ◐	≤2	0.06–0.10	≤4	0.06–0.10	≤4	0.08–0.15
				✤	≤2	0.06–0.08	≤4	0.06–0.08	≤4	0.08–0.10
	Ductile Cast Iron	Tensile Strength ≤800MPa	≤0.25DC	● ◐	≤6	0.10–0.15	≤8	0.10–0.20	≤8	0.10–0.20
				✤	≤6	0.08–0.12	≤8	0.10–0.15	≤8	0.10–0.15
			0.25–0.5DC	● ◐	≤5	0.08–0.12	≤8	0.10–0.15	≤8	0.10–0.15
				✤	≤5	0.06–0.10	≤8	0.08–0.12	≤8	0.08–0.12
			0.5–0.75DC	● ◐	≤4	0.08–0.12	≤6	0.08–0.12	≤6	0.08–0.12
				✤	≤4	0.08–0.12	≤6	0.06–0.10	≤6	0.06–0.10
			DC(Slot)	● ◐	≤2	0.06–0.10	≤4	0.06–0.10	≤4	0.06–0.10
				✤	≤2	0.06–0.08	≤4	0.06–0.08	≤4	0.06–0.08
N	Aluminium Alloy	Content Si<5%	≤0.25DC	● ◐	≤6	0.10–0.20	≤8	0.10–0.25	≤8	0.10–0.25
				✤	≤6	0.10–0.15	≤8	0.10–0.20	≤8	0.10–0.20
			0.25–0.5DC	● ◐	≤5	0.10–0.15	≤8	0.10–0.20	≤8	0.10–0.20
				✤	≤5	0.08–0.12	≤8	0.10–0.15	≤8	0.10–0.15
			0.5–0.75DC	● ◐	≤4	0.08–0.12	≤6	0.06–0.15	≤6	0.08–0.15
				✤	≤4	0.06–0.10	≤6	0.06–0.15	≤6	0.08–0.15
			DC(Slot)	● ◐	≤2	0.06–0.10	≤4	0.06–0.15	≤4	0.08–0.15
				✤	≤2	0.06–0.08	≤4	0.06–0.12	≤4	0.08–0.12
H	Hardened Steel	Hardness 40–55HRC	≤0.25DC	● ◐	≤4	0.08–0.15	≤4	0.08–0.15	≤4	0.08–0.15
				✤	≤4	0.08–0.12	≤4	0.08–0.12	≤4	0.08–0.12
			0.25–0.5DC	● ◐	≤3	0.08–0.12	≤3	0.08–0.12	≤3	0.08–0.12
				✤	≤3	0.06–0.10	≤3	0.08–0.10	≤3	0.06–0.10
			0.5–0.75DC	● ◐	≤2	0.06–0.10	≤2	0.08–0.10	≤2	0.06–0.10
				✤	≤2	0.06–0.08	≤2	0.06–0.08	≤2	0.06–0.08
			DC(Slot)	● ◐	≤1	0.06–0.10	≤1	0.06–0.10	≤1	0.06–0.10
				✤	≤1	0.06–0.08	≤1	0.06–0.08	≤1	0.06–0.08

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.
Note 2) Chattering and vibrations are more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.
- When tool overhang is long (using a long shank, screw-in type, etc.)
- Rigidity of machine, work material or attachment of work material is low
- At a corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radial direction (ae) is 0.5 DC or more.
Note 4) Wet cutting is recommended, when focusing on the surface finish. (Service life is shorter than for dry cutting.)
Note 5) When using higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

RECOMMENDED CUTTING CONDITIONS

■ Wet Cutting

Cutting Speed

	Work Material	Properties	Cutting Conditions	Grade	ae (mm) ≤0.25DC	ae (mm) 0.25—0.5DC	ae (mm) 0.5—0.75DC	ae (mm) DC(Slot)
					Vc (m/min)			
P	Mild Steel	Hardness ≤180HB	● ◐ ✤	MP6120 MP6130 VP15TF	140 (100—190)	130 (90—180)	100 (70—120)	100 (70—120)
P	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 180—350HB ≤350HB (Annealing)	● ◐ ✤	MP6120 MP6130 VP15TF	120 (90—140)	110 (80—130)	100 (70—120)	100 (70—120)
P	Pre-hardened Steel	Hardness 35—45HRC	● ◐ ✤	MP6120 MP6130 VP15TF	100 (80—120)	90 (70—110)	80 (60—100)	80 (60—100)
M	Austenitic Stainless Steel	Hardness ≤200HB	● ◐ ✤	MP7130,VP15TF	120 (100—150)	110 (90—140)	90 (70—120)	90 (70—120)
M		Hardness >200HB	● ◐ ✤	MP7130,VP15TF	100 (80—130)	90 (70—110)	70 (50—100)	70 (50—100)
M	Duplex Stainless Steel	Hardness ≤280HB	● ◐ ✤	MP7130,VP15TF	100 (80—130)	90 (70—120)	70 (50—100)	70 (50—100)
M	Ferritic and Martensitic Stainless Steel	—	● ◐ ✤	MP7130,VP15TF	120 (100—150)	110 (90—140)	90 (70—120)	90 (70—120)
M	Precipitation Hardening Stainless Steel	Hardness <450HB	● ◐ ✤	MP7130,VP15TF	90 (70—120)	80 (60—110)	60 (40—90)	60 (40—90)
K	Gray Cast Iron	Tensile Strength ≤350MPa	● ◐	MC5020	180 (160—220)	170 (150—210)	150 (130—190)	150 (130—190)
K			● ◐ ✤	VP15TF	130 (100—150)	120 (90—140)	100 (80—120)	100 (80—120)
K	Ductile Cast Iron	Tensile Strength ≤800MPa	● ◐	MC5020	160 (140—180)	150 (130—170)	130 (110—150)	130 (110—150)
K			● ◐ ✤	VP15TF	110 (80—140)	100 (70—130)	80 (60—120)	80 (60—120)
N	Aluminium Alloy	Content Si<5%	● ◐ ✤	TF15	600 (400—1000)	600 (400—1000)	600 (400—1000)	600 (400—1000)
S	Titanium Alloy (Ti-6Al-4V,etc.)	—	● ◐	MP9120,VP15TF	50 (40—70)	50 (40—70)	50 (40—70)	50 (40—70)
S			✤	MP9130	40 (30—60)	40 (30—60)	40 (30—60)	40 (30—60)
S	Titanium Alloy (Ti-5Al-5V-5Mo-3Cr,etc.)	—	● ◐ ✤	MP9120 MP9130 VP15TF	30 (20—40)	30 (20—40)	30 (20—40)	30 (20—40)
S	Heat Resistant Alloy	—	● ◐	MP9120,VP15TF	40 (30—60)	40 (30—60)	40 (30—60)	40 (30—60)
S			✤	MP9130	30 (20—40)	30 (20—40)	30 (20—40)	30 (20—40)
H	Hardened Steel	Hardness 40—55HRC	● ◐ ✤	VP15TF	90 (70—100)	85 (60—100)	70 (50—80)	70 (50—80)

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.

Note 2) Chattering and vibrations are more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.
- When tool overhang is long (using a long shank, screw-in type, etc.)
- Rigidity of machine, work material or attachment of work material is low
- At a corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radial direction (ae) is 0.5 DC or more.

Note 4) Wet cutting is recommended, when focusing on the surface finish. (Service life is shorter than for dry cutting.)

Note 5) When using higher than recommended conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

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

Depth of Cut / Feed per Tooth

	Work Material	Properties	ae	Cutting Conditions	DC (mm)					
					ø16—ø18		ø20—ø25		ø28—ø63	
					ap	fz (mm/t.)	ap	fz (mm/t.)	ap	fz (mm/t.)
P	Mild Steel	Hardness ≤180HB	≤0.25DC	● ◐ ✤	≤6	0.10—0.15	≤8	0.10—0.20	≤8	0.10—0.25
			0.25—0.5DC	● ◐ ✤	≤5	0.08—0.12	≤8	0.10—0.15	≤8	0.10—0.20
			0.5—0.75DC	● ◐ ✤	≤4	0.08—0.12	≤6	0.08—0.12	≤6	0.10—0.15
			DC(Slot)	● ◐ ✤	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.08—0.12
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 180—280HB	≤0.25DC	● ◐ ✤	≤6	0.10—0.15	≤8	0.10—0.20	≤8	0.10—0.25
			0.25—0.5DC	● ◐ ✤	≤5	0.08—0.12	≤8	0.10—0.15	≤8	0.10—0.20
			0.5—0.75DC	● ◐ ✤	≤4	0.08—0.12	≤6	0.08—0.12	≤6	0.10—0.15
			DC(Slot)	● ◐ ✤	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.08—0.12
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 280—350HB ≤350HB (Annealing)	≤0.25DC	● ◐ ✤	≤6	0.10—0.15	≤8	0.10—0.15	≤8	0.10—0.20
			0.25—0.5DC	● ◐ ✤	≤5	0.08—0.12	≤8	0.08—0.12	≤8	0.10—0.15
			0.5—0.75DC	● ◐ ✤	≤4	0.08—0.12	≤6	0.06—0.10	≤6	0.08—0.12
			DC(Slot)	● ◐ ✤	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.06—0.10
	Pre-hardened Steel	Hardness 35—45HRC	≤0.25DC	● ◐ ✤	≤6	0.10—0.15	≤8	0.10—0.15	≤8	0.10—0.20
			0.25—0.5DC	● ◐ ✤	≤5	0.08—0.12	≤8	0.08—0.12	≤8	0.10—0.15
			0.5—0.75DC	● ◐ ✤	≤4	0.08—0.12	≤6	0.06—0.10	≤6	0.08—0.12
			DC(Slot)	● ◐ ✤	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.06—0.10
M	Austenitic Stainless Steel	—	≤0.25DC	● ◐	≤6	0.10—0.15	≤8	0.10—0.20	≤8	0.10—0.20
				✤	≤6	0.08—0.12	≤8	0.08—0.15	≤8	0.08—0.15
			0.25—0.5DC	● ◐	≤5	0.08—0.12	≤8	0.08—0.15	≤8	0.08—0.15
				✤	≤5	0.06—0.10	≤8	0.08—0.12	≤8	0.08—0.12
			0.5—0.75DC	● ◐	≤4	0.06—0.10	≤6	0.08—0.12	≤6	0.08—0.12
				✤	≤4	0.06—0.08	≤6	0.06—0.10	≤6	0.06—0.10
			DC(Slot)	● ◐	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.06—0.10
				✤	≤2	0.06—0.08	≤4	0.06—0.08	≤4	0.06—0.08
	Duplex Stainless Steel	Hardness ≤280HB	≤0.25DC	● ◐	≤6	0.10—0.15	≤8	0.10—0.20	≤8	0.10—0.20
				✤	≤6	0.08—0.12	≤8	0.08—0.15	≤8	0.08—0.15
			0.25—0.5DC	● ◐	≤5	0.08—0.12	≤8	0.08—0.15	≤8	0.08—0.12
				✤	≤5	0.06—0.10	≤8	0.08—0.12	≤8	0.08—0.12
			0.5—0.75DC	● ◐	≤4	0.06—0.10	≤6	0.08—0.12	≤6	0.08—0.12
				✤	≤4	0.06—0.08	≤6	0.06—0.10	≤6	0.06—0.10
			DC(Slot)	● ◐	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.06—0.10
				✤	≤2	0.06—0.08	≤4	0.06—0.08	≤4	0.06—0.08
	Ferritic and Martensitic Stainless Steel	—	≤0.25DC	● ◐	≤6	0.10—0.15	≤8	0.10—0.20	≤8	0.10—0.20
				✤	≤6	0.08—0.12	≤8	0.08—0.15	≤8	0.08—0.15
			0.25—0.5DC	● ◐	≤5	0.08—0.12	≤8	0.08—0.15	≤8	0.08—0.15
				✤	≤5	0.06—0.10	≤8	0.08—0.12	≤8	0.08—0.12
			0.5—0.75DC	● ◐	≤4	0.06—0.10	≤6	0.08—0.12	≤6	0.08—0.12
				✤	≤4	0.06—0.08	≤6	0.06—0.10	≤6	0.05—0.10
			DC(Slot)	● ◐	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.05—0.10
				✤	≤2	0.06—0.08	≤4	0.06—0.08	≤4	0.05—0.08
	Precipitation Hardening Stainless Steel	Hardness <450HB	≤0.25DC	● ◐	≤6	0.10—0.15	≤8	0.10—0.15	≤8	0.10—0.15
				✤	≤6	0.08—0.12	≤8	0.08—0.12	≤8	0.08—0.12
			0.25—0.5DC	● ◐	≤5	0.08—0.12	≤8	0.08—0.12	≤8	0.08—0.12
				✤	≤5	0.06—0.10	≤8	0.08—0.12	≤8	0.08—0.12
			0.5—0.75DC	● ◐	≤4	0.06—0.10	≤6	0.06—0.10	≤6	0.05—0.10
				✤	≤4	0.06—0.08	≤6	0.06—0.08	≤6	0.05—0.08
			DC(Slot)	● ◐	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.05—0.10
				✤	≤2	0.06—0.08	≤4	0.06—0.08	≤4	0.05—0.08
K	Gray Cast Iron	Tensile Strength ≤350MPa	≤0.25DC	● ◐	≤6	0.10—0.15	≤8	0.10—0.20	≤8	0.10—0.25
				✤	≤6	0.08—0.12	≤8	0.08—0.15	≤8	0.10—0.20
			0.25—0.5DC	● ◐	≤5	0.08—0.12	≤8	0.08—0.15	≤8	0.10—0.20
				✤	≤5	0.06—0.10	≤8	0.08—0.12	≤8	0.10—0.15
			0.5—0.75DC	● ◐	≤4	0.08—0.12	≤6	0.06—0.10	≤6	0.10—0.15
				✤	≤4	0.08—0.12	≤6	0.06—0.10	≤6	0.08—0.12
			DC(Slot)	● ◐	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.08—0.15
				✤	≤2	0.06—0.08	≤4	0.06—0.08	≤4	0.06—0.10
	Ductile Cast Iron	Tensile Strength ≤800MPa	≤0.25DC	● ◐	≤6	0.10—0.15	≤8	0.10—0.20	≤8	0.10—0.20
				✤	≤6	0.08—0.12	≤8	0.10—0.15	≤8	0.10—0.15
			0.25—0.5DC	● ◐	≤5	0.08—0.12	≤8	0.10—0.15	≤8	0.10—0.15
				✤	≤5	0.06—0.10	≤8	0.08—0.12	≤8	0.08—0.12
			0.5—0.75DC	● ◐	≤4	0.08—0.12	≤6	0.08—0.12	≤6	0.08—0.12
				✤	≤4	0.08—0.12	≤6	0.08—0.12	≤6	0.06—0.10
			DC(Slot)	● ◐	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.06—0.10
				✤	≤2	0.06—0.08	≤4	0.06—0.08	≤4	0.06—0.08

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.
Note 2) Chattering and vibrations are more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.
- When tool overhang is long (using a long shank, screw-in type, etc.)
- Rigidity of machine, work material or attachment of work material is low
- At a corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radial direction (ae) is 0.5 DC or more.
Note 4) Wet cutting is recommended, when focusing on the surface finish. (Service life is shorter than for dry cutting.)
Note 5) When using higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

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

RECOMMENDED CUTTING CONDITIONS

■ Wet Cutting

Depth of Cut / Feed per Tooth

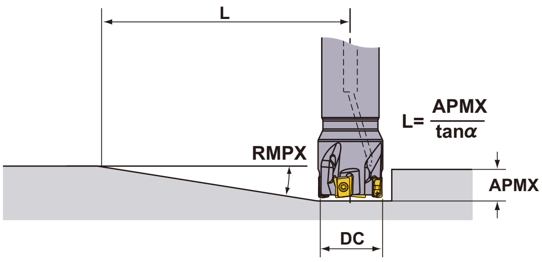
	Work Material	Properties	ae	Cutting Conditions	DC (mm) ø16–ø18 ap	ø16–ø18 fz (mm/t.)	ø20–ø25 ap	ø20–ø25 fz (mm/t.)	ø28–ø63 ap	ø28–ø63 fz (mm/t.)
N	Aluminium Alloy	Content Si<5%	≤0.25DC	● ◐	≤6	0.10–0.20	≤8	0.10–0.25	≤8	0.10–0.25
				✤	≤6	0.10–0.15	≤8	0.10–0.20	≤8	0.10–0.20
			0.25–0.5DC	● ◐	≤5	0.10–0.15	≤8	0.10–0.20	≤8	0.10–0.20
				✤	≤5	0.08–0.12	≤8	0.10–0.15	≤8	0.10–0.15
			0.5–0.75DC	● ◐	≤4	0.08–0.12	≤6	0.06–0.15	≤6	0.08–0.15
				✤	≤4	0.06–0.10	≤6	0.06–0.15	≤6	0.08–0.15
			DC(Slot)	● ◐	≤2	0.06–0.10	≤4	0.06–0.15	≤4	0.08–0.15
				✤	≤2	0.06–0.08	≤4	0.06–0.12	≤4	0.08–0.12
S	Titanium Alloy (Ti-6Al-4V,etc.)	–	≤0.25DC	● ◐ ✤	≤6	0.08–0.15	≤8	0.08–0.15	≤8	0.08–0.15
			0.25–0.5DC	● ◐ ✤	≤5	0.08–0.12	≤8	0.08–0.12	≤8	0.08–0.12
			0.5–0.75DC	● ◐ ✤	≤4	0.06–0.10	≤6	0.06–0.10	≤6	0.06–0.10
			DC(Slot)	● ◐ ✤	≤2	0.06–0.10	≤4	0.06–0.10	≤4	0.06–0.10
	Titanium Alloy (Ti-5Al-5V-5Mo-3Cr,etc.)	–	≤0.25DC	● ◐ ✤	≤6	0.08–0.12	≤8	0.08–0.12	≤8	0.08–0.12
			0.25–0.5DC	● ◐ ✤	≤5	0.08–0.12	≤8	0.08–0.12	≤8	0.08–0.12
			0.5–0.75DC	● ◐ ✤	≤4	0.06–0.10	≤6	0.06–0.10	≤6	0.06–0.10
			DC(Slot)	● ◐ ✤	≤2	0.06–0.10	≤4	0.06–0.10	≤4	0.06–0.10
	Heat Resistant Alloy	–	≤0.25DC	● ◐ ✤	≤6	0.08–0.12	≤8	0.08–0.12	≤8	0.08–0.12
			0.25–0.5DC	● ◐ ✤	≤5	0.08–0.12	≤8	0.08–0.12	≤8	0.08–0.12
			0.5–0.75DC	● ◐ ✤	≤4	0.06–0.10	≤6	0.06–0.10	≤6	0.06–0.10
			DC(Slot)	● ◐ ✤	≤2	0.06–0.10	≤4	0.06–0.10	≤4	0.06–0.10
H	Hardened Steel	Hardness 40–55HRC	≤0.25DC	● ◐	≤4	0.08–0.15	≤4	0.08–0.15	≤4	0.08–0.15
				✤	≤4	0.08–0.12	≤4	0.08–0.12	≤4	0.08–0.12
			0.25–0.5DC	● ◐	≤3	0.08–0.12	≤3	0.08–0.12	≤3	0.08–0.12
				✤	≤3	0.06–0.10	≤3	0.06–0.10	≤3	0.06–0.10
			0.5–0.75DC	● ◐	≤2	0.06–0.10	≤2	0.06–0.10	≤2	0.06–0.10
				✤	≤2	0.06–0.10	≤2	0.06–0.10	≤2	0.06–0.10
			DC(Slot)	● ◐	≤1	0.06–0.10	≤1	0.06–0.10	≤1	0.06–0.10
				✤	≤1	0.06–0.10	≤1	0.06–0.10	≤1	0.06–0.10

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.
Note 2) Chattering and vibrations are more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.
- When tool overhang is long (using a long shank, screw-in type, etc.)
- Rigidity of machine, work material or attachment of work material is low
- At a corner radius during pocket milling

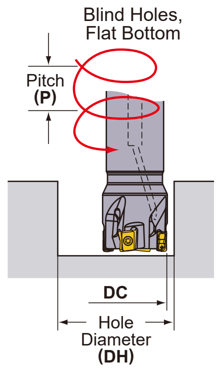
Note 3) A type with fewer teeth is recommended when the depth of cut in the radial direction (ae) is 0.5 DC or more.
Note 4) Wet cutting is recommended, when focusing on the surface finish. (Service life is shorter than for dry cutting.)
Note 5) When using higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

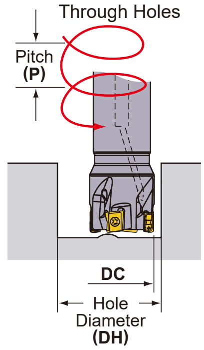
■ Ramping / Helical Cutting

● Ramping



● Helical Cutting





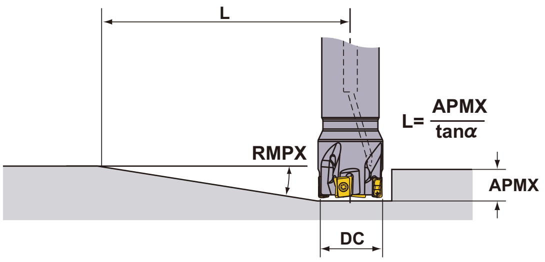
Refer to the table below for cutting conditions. For feed per tooth and cutting speed, follow the cutting conditions for slot milling.

DC (mm)	RE (mm)	Ramping		Helical Cutting (Blind Hole, Flat Bottom)				Helical Cutting (Through Hole)	
		RMPX	**L** (mm) *	**DH max.** (mm)	**P max.** (mm)	**DH min.** (mm)	**P max.** (mm)	**DH min.** (mm)	**P max.** (mm)
16	0.2	1.85°	248	31.0	1.5	27.5	1.2	24.2	0.8
	0.4	1.85°	248	30.6	1.5	27.5	1.2	24.2	0.8
	0.8	1.85°	248	29.8	1.4	27.5	1.2	24.2	0.8
	1.0	1.85°	248	29.4	1.4	27.5	1.2	24.2	0.8
	1.2	1.85°	248	29.0	1.3	27.5	1.2	24.2	0.8
	1.6	1.85°	248	28.2	1.2	27.5	1.2	24.2	0.8
18	0.2	1.56°	294	35.0	1.5	31.5	1.2	28.1	0.9
	0.4	1.56°	294	34.6	1.4	31.5	1.2	28.1	0.9
	0.8	1.56°	294	33.8	1.4	31.5	1.2	28.1	0.9
	1.0	1.56°	294	33.4	1.3	31.5	1.2	28.1	0.9
	1.2	1.56°	294	33.0	1.3	31.5	1.2	28.1	0.9
	1.6	1.56°	294	32.2	1.2	31.5	1.2	28.1	0.9
20	0.2	1.35°	340	39.0	1.4	35.5	1.1	32.0	0.9
	0.4	1.35°	340	38.6	1.4	35.5	1.1	32.0	0.9
	0.8	1.35°	340	37.8	1.3	35.5	1.1	32.0	0.9
	1.0	1.35°	340	37.4	1.3	35.5	1.1	32.0	0.9
	1.2	1.35°	340	37.0	1.3	35.5	1.1	32.0	0.9
	1.6	1.35°	340	36.2	1.2	35.5	1.1	32.0	0.9
22	0.2	1.16°	396	43.0	1.3	39.5	1.1	36.0	0.9
	0.4	1.16°	396	42.6	1.3	39.5	1.1	36.0	0.9
	0.8	1.16°	396	41.8	1.3	39.5	1.1	36.0	0.9
	1.0	1.16°	396	41.4	1.2	39.5	1.1	36.0	0.9
	1.2	1.16°	396	41.0	1.2	39.5	1.1	36.0	0.9
	1.6	1.16°	396	40.2	1.2	39.5	1.1	36.0	0.9
25	0.2	0.97°	473	49.0	1.3	45.5	1.1	42.0	0.9
	0.4	0.97°	473	48.6	1.3	45.5	1.1	42.0	0.9
	0.8	0.97°	473	47.8	1.2	45.5	1.1	42.0	0.9
	1.0	0.97°	473	47.4	1.2	45.5	1.1	42.0	0.9
	1.2	0.97°	473	47.0	1.2	45.5	1.1	42.0	0.9
	1.6	0.97°	473	46.2	1.1	45.5	1.1	42.0	0.9
28	0.2	0.84°	546	55.0	1.2	51.5	1.1	48.0	0.9
	0.4	0.84°	546	54.6	1.2	51.5	1.1	48.0	0.9
	0.8	0.84°	546	53.8	1.2	51.5	1.1	48.0	0.9
	1.0	0.84°	546	53.4	1.2	51.5	1.1	48.0	0.9
	1.2	0.84°	546	53.0	1.2	51.5	1.1	48.0	0.9
	1.6	0.84°	546	52.2	1.1	51.5	1.1	48.0	0.9
30	0.2	0.77°	596	59.0	1.2	55.5	1.1	52.0	0.9
	0.4	0.77°	596	58.6	1.2	55.5	1.1	52.0	0.9
	0.8	0.77°	596	57.8	1.2	55.5	1.1	52.0	0.9
	1.0	0.77°	596	57.4	1.2	55.5	1.1	52.0	0.9
	1.2	0.77°	596	57.0	1.1	55.5	1.1	52.0	0.9
	1.6	0.77°	596	56.2	1.1	55.5	1.1	52.0	0.9
32	0.2	0.71°	646	62.8	1.2	59.4	1.1	56.0	0.9
	0.4	0.71°	646	62.4	1.2	59.4	1.1	56.0	0.9
	0.8	0.71°	646	61.6	1.2	59.4	1.1	56.0	0.9
	1.0	0.71°	646	61.2	1.1	59.4	1.1	56.0	0.9
	1.2	0.71°	646	60.8	1.1	59.4	1.1	56.0	0.9
	1.6	0.71°	646	60.0	1.1	59.4	1.1	56.0	0.9

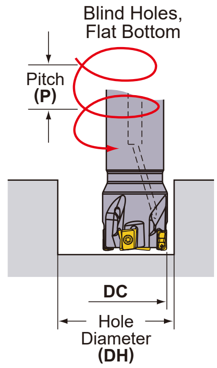
Note 1) When machining a highly ductile work material with the ramping angles in the table above, chips may be elongated.
* Shows the distance until a maximum depth of cut of 8 mm is achieved at the maximum ramping angle L (= 8/tan α).

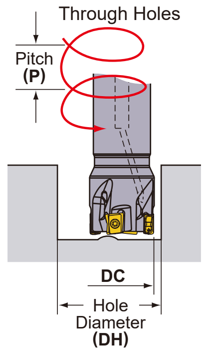
■Ramping / Helical Cutting

●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.

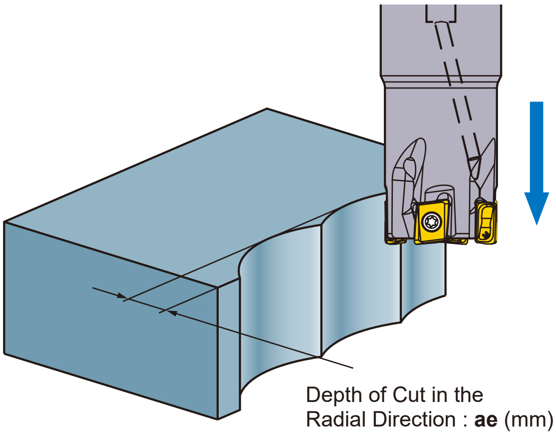
DC (mm)	RE (mm)	Ramping		Helical Cutting (Blind Hole, Flat Bottom)				Helical Cutting (Through Hole)	
		RMPX	L (mm) *	DH max. (mm)	P max. (mm)	DH min. (mm)	P max. (mm)	DH min. (mm)	P max. (mm)
35	0.2	0.63°	728	69.0	1.2	65.5	1.1	62.0	0.9
	0.4	0.63°	728	68.6	1.2	65.5	1.1	62.0	0.9
	0.8	0.63°	728	67.8	1.1	65.5	1.1	62.0	0.9
	1.0	0.63°	728	67.4	1.1	65.5	1.1	62.0	0.9
	1.2	0.63°	728	67.0	1.1	65.5	1.1	62.0	0.9
	1.6	0.63°	728	66.2	1.1	65.5	1.1	62.0	0.9
40	0.2	0.54°	849	78.8	1.2	75.4	1.0	72.0	0.9
	0.4	0.54°	849	78.4	1.1	75.4	1.0	72.0	0.9
	0.8	0.54°	849	77.6	1.1	75.4	1.0	72.0	0.9
	1.0	0.54°	849	77.2	1.1	75.4	1.0	72.0	0.9
	1.2	0.54°	849	76.8	1.1	75.4	1.0	72.0	0.9
	1.6	0.54°	849	76.0	1.1	75.4	1.0	72.0	0.9
50	0.2	0.42°	1092	98.8	1.1	95.4	1.0	92.0	1.0
	0.4	0.42°	1092	98.4	1.1	95.4	1.0	92.0	1.0
	0.8	0.42°	1092	97.6	1.1	95.4	1.0	92.0	1.0
	1.0	0.42°	1092	97.2	1.1	95.4	1.0	92.0	1.0
	1.2	0.42°	1092	96.8	1.1	95.4	1.0	92.0	1.0
	1.6	0.42°	1092	96.0	1.1	95.4	1.0	92.0	1.0
63	0.2	0.32°	1433	124.8	1.1	121.4	1.0	118.0	1.0
	0.4	0.32°	1433	124.4	1.1	121.4	1.0	118.0	1.0
	0.8	0.32°	1433	123.6	1.1	121.4	1.0	118.0	1.0
	1.0	0.32°	1433	123.2	1.1	121.4	1.0	118.0	1.0
	1.2	0.32°	1433	122.8	1.1	121.4	1.0	118.0	1.0
	1.6	0.32°	1433	122.0	1.0	121.4	1.0	118.0	1.0

Note 1) When machining a highly ductile work material with the ramping angles in the table above, chips may be elongated.
* Shows the distance until a maximum depth of cut of 8 mm is achieved at the maximum ramping angle L (= 8/tan α).

For Plunging and Drilling

See the tables to the right for cutting conditions. Follow the cutting conditions for slot milling regarding feed per tooth and cutting speed.

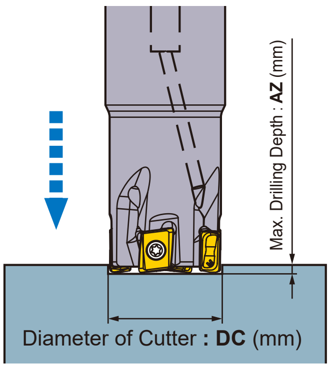
Plunging



DC (mm)	ae max. (mm)
16	3.9
18	3.9
20	3.9
22	4.0
25	4.0
28	4.0
30	4.0
32	4.0
35	4.0
40	4.0
50	4.0
63	4.0

Note 1) No step feed necessary.

Drilling



DC (mm)	AZ max. (mm)
16	0.3
18	0.3
20	0.3
22	0.3
25	0.3
28	0.3
30	0.3
32	0.3
35	0.3
40	0.3
50	0.3
63	0.3

Note 1) Exercise due caution as chips scatter easily.
Note 2) Use compressed air to eliminate chips (or coolant for when machining aluminium alloy).

MULTI-FUNCTIONAL MILLING

90° KAPR

VPX300

P M K N S H

Fig.1

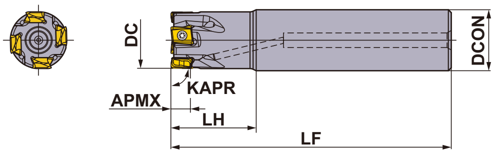
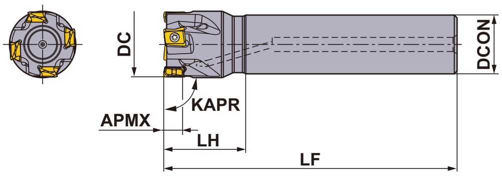


Fig.2



Right hand tool holder only.

CYLINDRICAL SHANK

With Coolant Hole

DC (mm)	Order Number	Stock	Number of Teeth	Dimensions (mm)			APMX (mm)	RMPX	RPMX (min^{-1})	WT* (kg)	Fig.	Insert Type
		R		DCON	LF	LH						
25	**VPX300R2502SA25S**	●	2	25	115	35	11	2.13°	24100	0.38	1	LOGU12
25	**VPX300R2502SA25L**	●	2	25	170	70	11	2.13°	24100	0.56	1	LOGU12
28	**VPX300R2802SA25S**	★	2	25	115	35	11	1.77°	22500	0.40	2	LOGU12
28	**VPX300R2802SA25L**	★	2	25	170	35	11	1.77°	22500	0.60	2	LOGU12
30	**VPX300R3002SA25S**	★	2	25	125	35	11	1.61°	21500	0.45	2	LOGU12
30	**VPX300R3003SA25S**	★	3	25	125	35	11	1.61°	21500	0.44	2	LOGU12
32	**VPX300R3202SA32S**	●	2	32	125	45	11	1.47°	20600	0.69	1	LOGU12
32	**VPX300R3203SA32S**	●	3	32	125	45	11	1.47°	20600	0.68	1	LOGU12
32	**VPX300R3203SA32L**	●	3	32	190	90	11	1.47°	20600	1.04	1	LOGU12
35	**VPX300R3503SA32L**	★	3	32	190	45	11	1.28°	19500	1.10	2	LOGU12
40	**VPX300R4003SA32S**	●	3	32	125	45	11	1.06°	17900	0.76	2	LOGU12
40	**VPX300R4004SA32S**	●	4	32	125	45	11	1.06°	17900	0.76	2	LOGU12
50	**VPX300R5004SA32S**	★	4	32	125	45	11	0.79°	15500	0.89	2	LOGU12
50	**VPX300R5006SA32S**	★	6	32	125	45	11	0.79°	15500	0.88	2	LOGU12

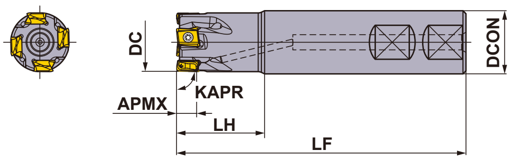
Note 1) The maximum spindle speeds are set to ensure tool and insert stability.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
* WT : Tool Weight

● : Inventory maintained. ★ : Inventory maintained in Japan.

K

ROTATING TOOLS

Fig.1



Right hand tool holder only.

K

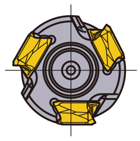
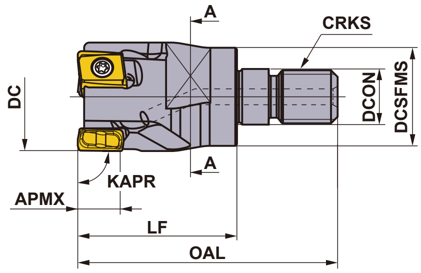
ROTATING TOOLS

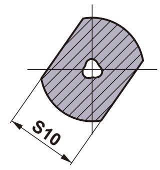
■WELDON SHANK TYPE

With Coolant Hole

DC (mm)	Order Number	Stock R	Number of Teeth	Dimensions (mm) DCON	LF	LH	APMX (mm)	RMPX	RPMX (min^{-1})	WT* (kg)	Fig.	Insert Type
25	**VPX300R2502WA25S**	●	2	25	91	35	11	2.13°	24100	0.29	1	LOGU12
32	**VPX300R3202WA32S**	●	2	32	105	45	11	1.47°	20600	0.56	1	LOGU12
32	**VPX300R3203WA32S**	●	3	32	105	45	11	1.47°	20600	0.55	1	LOGU12

Note 1) The maximum spindle speeds are set to ensure tool and insert stability.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
* WT : Tool Weight



A-A Section

Right hand tool holder only.

■SCREW-IN TYPE

With Coolant Hole

DC (mm)	Order Number	Stock R	Number of Teeth	DCON	DCSFMS	OAL	LF	S10	CRKS	WT* (kg)	APMX (mm)	RMPX	Insert Type
				Dimensions (mm)									
25	**VPX300R2502AM1235**	●	2	12.5	23.5	57	35	19	M12	0.10	11	2.13°	LOGU12
28	**VPX300R2802AM1235**	★	2	12.5	23.5	57	35	19	M12	0.12	11	1.77°	LOGU12
32	**VPX300R3202AM1640**	●	2	17.0	28.5	63	40	24	M16	0.20	11	1.47°	LOGU12
32	**VPX300R3203AM1640**	●	3	17.0	28.5	63	40	24	M16	0.19	11	1.47°	LOGU12
35	**VPX300R3502AM1640**	★	2	17.0	28.5	63	40	24	M16	0.22	11	1.28°	LOGU12
35	**VPX300R3503AM1640**	★	3	17.0	28.5	63	40	24	M16	0.22	11	1.28°	LOGU12
40	**VPX300R4003AM1640**	●	3	17.0	28.5	63	40	24	M16	0.26	11	1.06°	LOGU12
40	**VPX300R4004AM1640**	●	4	17.0	28.5	63	40	24	M16	0.26	11	1.06°	LOGU12

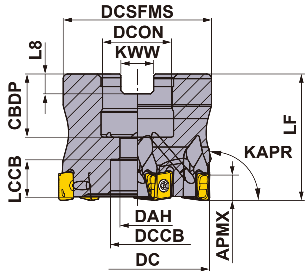
Note 1) For screw-in type arbors, refer to K244.
* WT : Tool Weight

SPARE PARTS

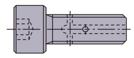
DC (mm)	Tool Holder Type	Clamp Screw *	Wrench	Anti-seize Lubricant
25	**VPX300R25**	TPS40F1	TIP15W	MK1KS
28	**VPX300R28**	TPS40F1	TIP15W	MK1KS
30	**VPX300R30**	TPS40F1	TIP15W	MK1KS
32	**VPX300R32**	TPS40F1	TIP15W	MK1KS
35	**VPX300R35**	TPS40F1	TIP15W	MK1KS
40	**VPX300R40**	TPS40F1	TIP15W	MK1KS
50	**VPX300R50**	TPS40F1	TIP15W	MK1KS

* Clamp Torque (N • m) : TPS40F1=3.0

● : Inventory maintained. ★ : Inventory maintained in Japan.



Right hand tool holder only.

DC (mm)	Set Bolt	Geometry
ϕ40	HSC08025H	
ϕ50, ϕ63	HSC10030H	
ϕ80	HSC12035H	

■ARBOR TYPE

KAPR: 90°
GAMP: -6° GAMF : -22.5°
With Coolant Hole

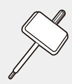
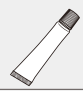
DC (mm)	Order Number	Stock	Number of Teeth	Dimensions (mm)		WT* (kg)	APMX (mm)	RMPX	RPMX (min^{-1})	Insert Type
		R		LF	DCON					
40	**VPX300-040A03AR**	●	3	40	16	0.21	11	1.06°	17900	LOGU12
40	**VPX300-040A04AR**	●	4	40	16	0.21	11	1.06°	17900	LOGU12
50	**VPX300-050A04AR**	●	4	40	22	0.34	11	0.79°	15500	LOGU12
50	**VPX300-050A06AR**	●	6	40	22	0.33	11	0.79°	15500	LOGU12
63	**VPX300-063A06AR**	●	6	40	22	0.61	11	0.60°	13400	LOGU12
63	**VPX300-063A08AR**	●	8	40	22	0.62	11	0.60°	13400	LOGU12
80	**VPX300-080A07AR**	●	7	50	27	0.99	11	0.45°	11500	LOGU12
80	**VPX300-080A10AR**	●	10	50	27	0.99	11	0.45°	11500	LOGU12

Note 1) The maximum spindle speeds are set to ensure tool and insert stability.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
* WT : Tool Weight

MOUNTING DIMENSIONS

DC (mm)	Order Number	Dimensions (mm)							
		DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
40	**VPX300-040A03AR**	16	18	9	14	12.4	37	8.4	5.6
40	**VPX300-040A04AR**	16	18	9	14	12.4	37	8.4	5.6
50	**VPX300-050A04AR**	22	20	11	17	10.4	47	10.4	6.3
50	**VPX300-050A06AR**	22	20	11	17	10.4	47	10.4	6.3
63	**VPX300-063A06AR**	22	20	11	17	10.4	60	10.4	6.3
63	**VPX300-063A08AR**	22	20	11	17	10.4	60	10.4	6.3
80	**VPX300-080A07AR**	27	23	13	20	13.4	56	12.4	7.0
80	**VPX300-080A10AR**	27	23	13	20	13.4	56	12.4	7.0

SPARE PARTS

Tool Holder Type	 *		
	Clamp Screw	Wrench	Anti-seize Lubricant
VPX300	TPS40F1	TIP15W	MK1KS

* Clamp Torque (N • m) : TPS40F1 = 3.0

ARBORS ➤K244
SPARE PARTS ➤N001
TECHNICAL DATA ➤P001

INSERTS

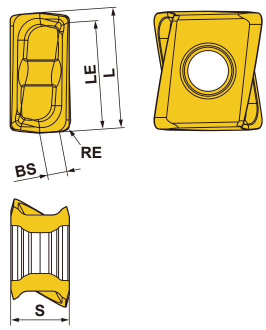
Work Material		MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	TF15
P	Steels		◐	✤				◐	
M	Stainless Steels				◐			◐	
K	Cast Irons	◐						✤	
N	Non-ferrous Metals								◐
S	Heat Resistant Alloys, Titanium Alloys					◐	✤	◐	
H	Hardened Steels							◐	

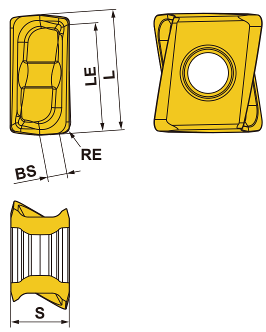
Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

Honing :
E : Round **F** : Sharp

Shape	Order Number	Class	Honing	Coated MC5020	Coated MP6120	Coated MP6130	Coated MP7130	Coated MP9120	Coated MP9130	Coated VP15TF	Carbide TF15	L	RE	LE	S	BS	Geometry
Low Cutting Resistance **L** Breaker	LOGU1207020PNER-L	G	E	★	★	★	★	★	★	★		12.4	0.2	11.3	7.0	3.0	
	LOGU1207040PNER-L	G	E	●	●	●	●	●	●	★		12.4	0.4	11.3	7.0	2.8	
	LOGU1207080PNER-L	G	E	●	●	●	●	●	●	★		12.4	0.8	11.3	7.0	2.6	
	LOGU1207100PNER-L	G	E	★	★	★	★	★	★	★		12.4	1.0	11.3	7.0	2.5	
	LOGU1207120PNER-L	G	E	●	●	●	●	●	●	★		12.4	1.2	11.3	7.0	2.4	
	LOGU1207160PNER-L	G	E	●	●	●	●	●	●	★		12.4	1.6	11.3	7.0	1.8	
	LOGU1207200PNER-L	G	E	●	●	●	●	●	●	★		12.4	2.0	11.3	7.0	1.4	
NEW	LOGU1207240PNER-L	G	E	●	●	●	●	●	●	★		12.4	2.4	11.3	7.0	1.2	
	LOGU1207300PNER-L	G	E	★	★	★	★	★	★	★		12.4	3.0	11.3	7.0	0.6	
	LOGU1207320PNER-L	G	E	●	●	●	●	●	●	★		12.4	3.2	11.3	7.0	0.4	
	LOGU1207020PNFR-L	G	F								★	12.4	0.2	11.3	7.0	3.0	
	LOGU1207040PNFR-L	G	F								●	12.4	0.4	11.3	7.0	2.8	
	LOGU1207080PNFR-L	G	F								●	12.4	0.8	11.3	7.0	2.6	
	LOGU1207100PNFR-L	G	F								★	12.4	1.0	11.3	7.0	2.5	
	LOGU1207120PNFR-L	G	F								●	12.4	1.2	11.3	7.0	2.4	
	LOGU1207160PNFR-L	G	F								●	12.4	1.6	11.3	7.0	1.8	
	LOGU1207200PNFR-L	G	F								●	12.4	2.0	11.3	7.0	1.4	
	LOGU1207240PNFR-L	G	F								●	12.4	2.4	11.3	7.0	1.2	
	LOGU1207300PNFR-L	G	F								★	12.4	3.0	11.3	7.0	0.6	
	LOGU1207320PNFR-L	G	F								●	12.4	3.2	11.3	7.0	0.4	Right hand insert only.
General Use **M** Breaker	LOGU1207020PNER-M	G	E	★	★	★	★	★	★	★		12.4	0.2	11.3	7.0	3.0	
	LOGU1207040PNER-M	G	E	●	●	●	●	●	●	★		12.4	0.4	11.3	7.0	2.8	
	LOGU1207080PNER-M	G	E	●	●	●	●	●	●	★		12.4	0.8	11.3	7.0	2.4	
	LOGU1207100PNER-M	G	E	★	★	★	★	★	★	★		12.4	1.0	11.3	7.0	2.3	
	LOGU1207120PNER-M	G	E	●	●	●	●	●	●	★		12.4	1.2	11.3	7.0	2.1	
	LOGU1207160PNER-M	G	E	●	●	●	●	●	●	★		12.4	1.6	11.3	7.0	1.7	
	LOGU1207200PNER-M	G	E	●	●	●	●	●	●	★		12.4	2.0	11.3	7.0	1.4	
	LOGU1207240PNER-M	G	E	●	●	●	●	●	●	★		12.4	2.4	11.3	7.0	1.0	
	LOGU1207300PNER-M	G	E	★	★	★	★	★	★	★		12.4	3.0	11.3	7.0	0.5	
	LOGU1207320PNER-M	G	E	●	●	●	●	●	●	★		12.4	3.2	11.3	7.0	0.3	
	LOGU1207020PNFR-M	G	F								★	12.4	0.2	11.3	7.0	3.0	
	LOGU1207040PNFR-M	G	F								●	12.4	0.4	11.3	7.0	2.8	
	LOGU1207080PNFR-M	G	F								●	12.4	0.8	11.3	7.0	2.4	
	LOGU1207100PNFR-M	G	F								★	12.4	1.0	11.3	7.0	2.3	
	LOGU1207120PNFR-M	G	F								●	12.4	1.2	11.3	7.0	2.1	
	LOGU1207160PNFR-M	G	F								●	12.4	1.6	11.3	7.0	1.7	
	LOGU1207200PNFR-M	G	F								●	12.4	2.0	11.3	7.0	1.4	
	LOGU1207240PNFR-M	G	F								●	12.4	2.4	11.3	7.0	1.0	
	LOGU1207300PNFR-M	G	F								★	12.4	3.0	11.3	7.0	0.5	
	LOGU1207320PNFR-M	G	F								●	12.4	3.2	11.3	7.0	0.3	Right hand insert only.

Dimensions (mm)





● ★ = NEW

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

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

CHIPBREAKER RECOMMENDATION

■ Chipbreaker Selection Table

	Work Material	Properties	Cutting Conditions	Chipbreaker		Grade	
				1st Recommendation	2nd Recommendation	1st Recommendation	2nd Recommendation
P	Mild Steel	Hardness ≤180HB	● ◐	L	M	MP6120	VP15TF
			✤	M	L	MP6130	–
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 180-350HB ≤350HB (Annealing)	●	L	M	MP6120	VP15TF
			◐	M	L	MP6120	VP15TF
			✤	M	L	MP6130	–
	Pre-hardened Steel	Hardness 35–45HRC	● ◐	M	L	MP6120	VP15TF
			✤	M	L	MP6130	–
M	Austenitic Stainless Steel	Hardness ≤280HB	● ◐	L	M	MP7130	VP15TF
			✤	M	L	MP7130	–
		Hardness >200HB	● ◐	L	M	MP7130	VP15TF
			✤	M	L	MP7130	–
	Duplex Stainless Steel	Hardness ≤280HB	● ◐	L	M	MP7130	VP15TF
			✤	M	L	MP7130	–
	Ferritic and Martensitic Stainless Steel	–	● ◐	L	M	MP7130	VP15TF
			✤	M	L	MP7130	–
	Precipitation Hardening Stainless Steel	Hardness <450HB	● ◐	L	M	MP7130	VP15TF
			✤	M	L	MP7130	–
K	Gray Cast Iron	Tensile Strength ≤350MPa	● ◐	M	L	MC5020	VP15TF
			✤	M	L	VP15TF	–
	Ductile Cast Iron	Tensile Strength ≤800MPa	● ◐	M	L	MC5020	VP15TF
			✤	M	L	VP15TF	–
N	Aluminium Alloy	Content Si<5%	● ◐	L	M	TF15	–
			✤	M	L	TF15	–
S	Titanium Alloy (Ti-6Al-4V,etc.)	–	● ◐	L	M	MP9120	VP15TF
			✤	M	L	MP9130	–
	Titanium Alloy (Ti-5Al-5V-5Mo-3Cr,etc.)	–	● ◐	L	M	MP9120	VP15TF
			✤	M	L	MP9130	–
	Heat Resistant Alloy	–	● ◐	M	L	MP9120	VP15TF
			✤	M	L	MP9130	–
H	Hardened Steel	Hardness 40–55HRC	● ◐ ✤	M	–	VP15TF	–

RECOMMENDED CUTTING CONDITIONS

■ Dry Cutting

Cutting Speed

	Work Material	Properties	Cutting Conditions	Insert Grade	ae (mm) ≤0.25DC	0.25–0.5DC	0.5–0.75DC	DC(Slot)
					Vc (m/min)			
P	Mild Steel	Hardness ≤180HB	● ◐	MP6120, VP15TF	230 (180–270)	220 (170–260)	180 (140–210)	180 (140–210)
			✽	MP6130	200 (150–240)	190 (170–260)	150 (110–180)	150 (110–180)
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 180–350HB ≤350HB (Annealing)	● ◐	MP6120, VP15TF	180 (140–210)	170 (130–200)	140 (110–160)	140 (110–180)
			✽	MP6130	150 (110–180)	140 (100–170)	110 (80–130)	110 (80–130)
	Pre-hardened Steel	Hardness 35–45HRC	● ◐	MP6120, VP15TF	120 (90–140)	110 (80–130)	100 (70–120)	100 (70–120)
			✽	MP6130	100 (80–120)	90 (70–110)	80 (60–100)	80 (60–100)
M	Austenitic Stainless Steel	Hardness ≤200HB	● ◐ ✽	MP7130, VP15TF	180 (140–210)	170 (130–200)	140 (110–160)	140 (110–160)
		Hardness >200HB	● ◐ ✽	MP7130, VP15TF	150 (110–180)	140 (100–160)	110 (80–130)	110 (80–130)
	Duplex Stainless Steel	Hardness ≤280HB	● ◐ ✽	MP7130, VP15TF	140 (110–170)	130 (90–150)	100 (70–120)	100 (70–120)
	Ferritic and Martensitic Stainless Steel	–	● ◐ ✽	MP7130, VP15TF	180 (140–210)	170 (130–200)	140 (110–160)	140 (110–160)
	Precipitation Hardening Stainless Steel	Hardness <450HB	● ◐ ✽	MP7130, VP15TF	130 (100–160)	120 (80–140)	90 (60–110)	90 (60–110)
K	Gray Cast Iron	Tensile Strength ≤350MPa	● ◐	MC5020	250 (200–300)	240 (190–290)	210 (160–260)	210 (160–260)
			● ◐ ✽	VP15TF	200 (150–250)	190 (140–240)	160 (110–210)	160 (110–210)
	Ductile Cast Iron	Tensile Strength ≤800MPa	● ◐	MC5020	180 (150–200)	170 (140–190)	150 (120–170)	150 (120–170)
			● ◐ ✽	VP15TF	130 (100–150)	120 (90–140)	100 (80–120)	100 (80–120)
N	Aluminium Alloy	Content Si<5%	● ◐ ✽	TF15	600 (400–1000)	600 (400–1000)	600 (400–1000)	600 (400–1000)
H	Hardened Steel	Hardness 40–55HRC	● ◐ ✽	VP15TF	90 (70–100)	85 (60–100)	70 (50–80)	70 (50–80)

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.
Note 2) Chattering and vibrations are more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.
- When tool overhang is long (using a long shank, screw-in type, etc.)
- Rigidity of machine, work material or attachment of work material is low
- At a corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radial direction (ae) is 0.5 DC or more.
Note 4) Wet cutting is recommended, when focusing on the surface finish. (Service life is shorter than for dry cutting.)
Note 5) When using higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

Depth of Cut / Feed per Tooth

	Work Material	Properties	ae (mm)	Cutting Conditions	DC (mm) ø25 ap (mm)	ø25 fz (mm/t.)	ø28–ø80 ap (mm)	ø28–ø80 fz (mm/t.)
P	Mild Steel	Hardness ≤180HB	≤0.25DC	● ◐ ✽	≤11	0.10 – 0.20	≤11	0.10 – 0.30
			0.25–0.5DC	● ◐ ✽	≤11	0.10 – 0.15	≤11	0.10 – 0.25
			0.5–0.75DC	● ◐ ✽	≤8	0.08 – 0.12	≤8	0.10 – 0.20
			DC(Slot)	● ◐ ✽	≤5	0.06 – 0.10	≤5	0.08 – 0.15
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 180–280HB	≤0.25DC	● ◐ ✽	≤11	0.10 – 0.20	≤11	0.10 – 0.30
			0.25–0.5DC	● ◐ ✽	≤11	0.10 – 0.15	≤11	0.10 – 0.25
			0.5–0.75DC	● ◐ ✽	≤8	0.08 – 0.12	≤8	0.10 – 0.20
			DC(Slot)	● ◐ ✽	≤5	0.06 – 0.10	≤5	0.08 – 0.15
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 280–350HB ≤350HB (Annealing)	≤0.25DC	● ◐ ✽	≤11	0.10 – 0.15	≤11	0.10 – 0.25
			0.25–0.5DC	● ◐ ✽	≤11	0.08 – 0.12	≤11	0.10 – 0.20
			0.5–0.75DC	● ◐ ✽	≤8	0.06 – 0.10	≤8	0.10 – 0.15
			DC(Slot)	● ◐ ✽	≤5	0.06 – 0.10	≤5	0.08 – 0.12
	Pre-hardened Steel	Hardness 35–45HRC	≤0.25DC	● ◐ ✽	≤11	0.10 – 0.15	≤11	0.10 – 0.25
			0.25–0.5DC	● ◐ ✽	≤11	0.08 – 0.12	≤11	0.10 – 0.20
			0.5–0.75DC	● ◐ ✽	≤8	0.06 – 0.10	≤8	0.10 – 0.15
			DC(Slot)	● ◐ ✽	≤5	0.06 – 0.10	≤5	0.08 – 0.12

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

Depth of Cut / Feed per Tooth

	Work Material	Properties	ae (mm)	Cutting Conditions	DC (mm) ø25 ap (mm)	DC (mm) ø25 fz (mm/t.)	DC (mm) ø28–ø80 ap (mm)	DC (mm) ø28–ø80 fz (mm/t.)
M	Austenitic Stainless Steel	–	≤0.25DC	● ◐	≤11	0.10–0.20	≤11	0.10–0.20
				✤	≤11	0.08–0.15	≤11	0.08–0.15
			0.25–0.5DC	● ◐	≤11	0.08–0.15	≤11	0.08–0.15
				✤	≤11	0.08–0.12	≤11	0.08–0.12
			0.5–0.75DC	● ◐	≤8	0.08–0.12	≤8	0.08–0.12
				✤	≤8	0.06–0.10	≤8	0.06–0.10
			DC(Slot)	● ◐	≤5	0.06–0.10	≤5	0.06–0.10
				✤	≤5	0.06–0.08	≤5	0.06–0.08
	Duplex Stainless Steel	Hardness ≤280HB	≤0.25DC	● ◐	≤11	0.10–0.20	≤11	0.10–0.20
				✤	≤11	0.08–0.15	≤11	0.08–0.15
			0.25–0.5DC	● ◐	≤11	0.08–0.15	≤11	0.08–0.15
				✤	≤11	0.08–0.12	≤11	0.08–0.12
			0.5–0.75DC	● ◐	≤8	0.08–0.12	≤8	0.08–0.12
				✤	≤8	0.06–0.10	≤8	0.06–0.10
			DC(Slot)	● ◐	≤5	0.06–0.10	≤5	0.06–0.10
				✤	≤5	0.06–0.08	≤5	0.06–0.08
	Ferritic and Martensitic Stainless Steel	–	≤0.25DC	● ◐	≤11	0.10–0.20	≤11	0.10–0.20
				✤	≤11	0.08–0.15	≤11	0.08–0.15
			0.25–0.5DC	● ◐	≤11	0.08–0.15	≤11	0.08–0.15
				✤	≤11	0.08–0.12	≤11	0.08–0.12
			0.5–0.75DC	● ◐	≤8	0.08–0.12	≤8	0.08–0.12
				✤	≤8	0.06–0.10	≤8	0.06–0.10
			DC(Slot)	● ◐	≤5	0.06–0.10	≤5	0.06–0.10
				✤	≤5	0.06–0.08	≤5	0.06–0.08
	Precipitation Hardening Stainless Steel	Hardness <450HB	≤0.25DC	● ◐	≤11	0.10–0.15	≤11	0.10–0.15
				✤	≤11	0.08–0.12	≤11	0.08–0.12
			0.25–0.5DC	● ◐	≤11	0.08–0.12	≤11	0.08–0.12
				✤	≤11	0.08–0.12	≤11	0.06–0.10
			0.5–0.75DC	● ◐	≤8	0.06–0.10	≤8	0.06–0.10
				✤	≤8	0.06–0.08	≤8	0.06–0.08
			DC(Slot)	● ◐	≤5	0.06–0.10	≤5	0.06–0.10
				✤	≤5	0.06–0.08	≤5	0.06–0.08
K	Gray Cast Iron	Tensile Strength ≤350MPa	≤0.25DC	● ◐	≤11	0.10–0.20	≤11	0.10–0.30
				✤	≤11	0.08–0.15	≤11	0.10–0.25
			0.25–0.5DC	● ◐	≤11	0.08–0.15	≤11	0.10–0.25
				✤	≤11	0.08–0.12	≤11	0.10–0.20
			0.5–0.75DC	● ◐	≤8	0.08–0.12	≤8	0.10–0.20
				✤	≤8	0.06–0.10	≤8	0.08–0.15
			DC(Slot)	● ◐	≤5	0.06–0.10	≤5	0.08–0.15
				✤	≤5	0.06–0.08	≤5	0.08–0.12
	Ductile Cast Iron	Tensile Strength ≤800MPa	≤0.25DC	● ◐	≤11	0.10–0.20	≤11	0.10–0.25
				✤	≤11	0.10–0.15	≤11	0.10–0.20
			0.25–0.5DC	● ◐	≤11	0.10–0.15	≤11	0.10–0.20
				✤	≤11	0.08–0.12	≤11	0.10–0.15
			0.5–0.75DC	● ◐	≤8	0.08–0.12	≤8	0.10–0.15
				✤	≤8	0.08–0.12	≤8	0.08–0.12
			DC(Slot)	● ◐	≤5	0.06–0.10	≤5	0.08–0.12
				✤	≤5	0.06–0.08	≤5	0.06–0.10
N	Aluminium Alloy	Content Si<5%	≤0.25DC	● ◐	≤11	0.10–0.25	≤11	0.10–0.25
				✤	≤11	0.10–0.20	≤11	0.10–0.20
			0.25–0.5DC	● ◐	≤11	0.10–0.20	≤11	0.10–0.20
				✤	≤11	0.10–0.15	≤11	0.10–0.15
			0.5–0.75DC	● ◐	≤8	0.06–0.15	≤8	0.08–0.15
				✤	≤8	0.06–0.15	≤8	0.08–0.15
			DC(Slot)	● ◐	≤5	0.06–0.15	≤5	0.08–0.15
				✤	≤5	0.06–0.15	≤5	0.08–0.12
H	Hardened Steel	Hardness 40–55HRC	≤0.25DC	● ◐	≤5	0.08–0.15	≤5	0.08–0.15
				✤	≤5	0.08–0.12	≤5	0.08–0.12
			0.25–0.5DC	● ◐	≤4	0.08–0.12	≤4	0.08–0.12
				✤	≤4	0.06–0.10	≤4	0.06–0.10
			0.5–0.75DC	● ◐	≤3	0.06–0.10	≤3	0.06–0.10
				✤	≤3	0.06–0.08	≤3	0.06–0.08
			DC(Slot)	● ◐	≤2	0.06–0.10	≤2	0.06–0.10
				✤	≤2	0.06–0.08	≤2	0.06–0.08

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.
Note 2) Chattering and vibrations are more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.
- When tool overhang is long (using a long shank, screw-in type, etc.)
- Rigidity of machine, work material or attachment of work material is low
- At a corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radial direction (ae) is 0.5 DC or more.
Note 4) Wet cutting is recommended, when focusing on the surface finish. (Service life is shorter than for dry cutting.)
Note 5) When using higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

RECOMMENDED CUTTING CONDITIONS

■ Wet Cutting

Cutting Speed

	Work Material	Properties	Cutting Conditions	Insert Grade	ae (mm) ≤0.25DC Vc (m/min)	ae (mm) 0.25–0.5DC Vc (m/min)	ae (mm) 0.5–0.75DC Vc (m/min)	ae (mm) DC(Slot) Vc (m/min)
P	Mild Steel	Hardness ≤180HB	● ◐ ✣	MP6120 MP6130 VP15TF	140 (100–190)	130 (90–180)	100 (70–120)	100 (70–120)
P	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 180–350HB ≤350HB (Annealing)	● ◐ ✣	MP6120 MP6130 VP15TF	120 (90–140)	110 (80–130)	100 (70–120)	100 (70–120)
P	Pre-hardened Steel	Hardness 35–45HRC	● ◐ ✣	MP6120 MP6130 VP15TF	100 (80–120)	90 (70–110)	80 (60–100)	80 (60–100)
M	Austenitic Stainless Steel	Hardness ≤200HB	● ◐ ✣	MP7130, VP15TF	120 (100–150)	110 (90–140)	90 (70–120)	90 (70–120)
M	Austenitic Stainless Steel	Hardness >200HB	● ◐ ✣	MP7130, VP15TF	100 (80–130)	90 (70–120)	70 (50–100)	70 (50–100)
M	Duplex Stainless Steel	Hardness ≤280HB	● ◐ ✣	MP7130, VP15TF	100 (80–130)	90 (70–120)	70 (50–100)	70 (50–100)
M	Ferritic and Martensitic Stainless Steel	–	● ◐ ✣	MP7130, VP15TF	120 (100–150)	110 (90–140)	90 (70–120)	90 (70–120)
M	Precipitation Hardening Stainless Steel	Hardness <450HB	● ◐ ✣	MP7130, VP15TF	90 (70–120)	80 (60–110)	60 (40–90)	60 (40–90)
K	Gray Cast Iron	Tensile Strength ≤350MPa	● ◐	MC5020	180 (160–220)	170 (150–210)	150 (130–190)	150 (130–190)
K	Gray Cast Iron	Tensile Strength ≤350MPa	● ◐ ✣	VP15TF	130 (100–150)	120 (90–140)	100 (80–120)	100 (80–120)
K	Ductile Cast Iron	Tensile Strength ≤800MPa	● ◐	MC5020	160 (140–180)	150 (130–170)	130 (110–150)	130 (110–150)
K	Ductile Cast Iron	Tensile Strength ≤800MPa	● ◐ ✣	VP15TF	110 (80–140)	100 (70–130)	80 (60–120)	80 (60–120)
N	Aluminium Alloy	Content Si<5%	● ◐ ✣	TF15	600 (400–1000)	600 (400–1000)	600 (400–1000)	600 (400–1000)
S	Titanium Alloy (Ti-6Al-4V,etc.)	–	● ◐	MP9120, VP15TF	50 (40–70)	50 (40–70)	50 (40–70)	50 (40–70)
S	Titanium Alloy (Ti-6Al-4V,etc.)	–	✣	MP9130	40 (30–60)	40 (30–60)	40 (30–60)	40 (30–60)
S	Titanium Alloy (Ti-5Al-5V-5Mo-3Cr,etc.)	–	● ◐	MP9120, VP15TF	30 (20–40)	30 (20–40)	30 (20–40)	30 (20–40)
S	Titanium Alloy (Ti-5Al-5V-5Mo-3Cr,etc.)	–	✣	MP9130	30 (20–40)	30 (20–40)	30 (20–40)	30 (20–40)
S	Heat Resistant Alloy	–	● ◐	MP9120, VP15TF	40 (30–60)	40 (30–60)	40 (30–60)	40 (30–60)
S	Heat Resistant Alloy	–	✣	MP9130	30 (20–40)	30 (20–40)	30 (20–40)	30 (20–40)
H	Hardened Steel	Hardness 40–55HRC	● ◐ ✣	VP15TF	90 (70–100)	85 (60–100)	70 (50–80)	70 (50–80)

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.

Note 2) Chattering and vibrations are more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.
- When tool overhang is long (using a long shank, screw-in type, etc.)
- Rigidity of machine, work material or attachment of work material is low
- At a corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radial direction (ae) is 0.5 DC or more.

Note 4) Wet cutting is recommended, when focusing on the surface finish. (Service life is shorter than for dry cutting.)

Note 5) When using higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

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

Depth of Cut / Feed per Tooth

	Work Material	Properties	**ae** (mm)	Cutting Conditions	**DC** (mm)			
					ø25		ø28–ø80	
					ap (mm)	**fz** (mm/t.)	**ap** (mm)	**fz** (mm/t.)
P	Mild Steel	Hardness ≤180HB	≤0.25DC	● ◐ ✤	≤11	0.10–0.20	≤11	0.10–0.30
			0.25–0.5DC	● ◐ ✤	≤11	0.10–0.15	≤11	0.10–0.25
			0.5–0.75DC	● ◐ ✤	≤8	0.08–0.12	≤8	0.10–0.20
			DC(Slot)	● ◐ ✤	≤5	0.06–0.10	≤5	0.08–0.15
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 180–280HB	≤0.25DC	● ◐ ✤	≤11	0.10–0.20	≤11	0.10–0.30
			0.25–0.5DC	● ◐ ✤	≤11	0.10–0.15	≤11	0.10–0.25
			0.5–0.75DC	● ◐ ✤	≤8	0.08–0.12	≤8	0.10–0.20
			DC(Slot)	● ◐ ✤	≤5	0.06–0.10	≤5	0.08–0.15
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 280–350HB ≤350HB (Annealing)	≤0.25DC	● ◐ ✤	≤11	0.10–0.15	≤11	0.10–0.25
			0.25–0.5DC	● ◐ ✤	≤11	0.08–0.12	≤11	0.10–0.20
			0.5–0.75DC	● ◐ ✤	≤8	0.06–0.10	≤8	0.10–0.15
			DC(Slot)	● ◐ ✤	≤5	0.06–0.10	≤5	0.08–0.12
	Pre-hardened Steel	Hardness 35–45HRC	≤0.25DC	● ◐ ✤	≤11	0.10–0.15	≤11	0.10–0.25
			0.25–0.5DC	● ◐ ✤	≤11	0.08–0.12	≤11	0.10–0.20
			0.5–0.75DC	● ◐ ✤	≤8	0.06–0.10	≤8	0.10–0.15
			DC(Slot)	● ◐ ✤	≤5	0.06–0.10	≤5	0.08–0.12
M	Austenitic Stainless Steel	–	≤0.25DC	● ◐	≤11	0.10–0.20	≤11	0.10–0.20
				✤	≤11	0.08–0.15	≤11	0.08–0.15
			0.25–0.5DC	● ◐	≤11	0.08–0.12	≤11	0.08–0.15
				✤	≤11	0.06–0.10	≤11	0.08–0.12
			0.5–0.75DC	● ◐	≤8	0.06–0.10	≤8	0.08–0.12
				✤	≤8	0.06–0.10	≤8	0.06–0.10
			DC(Slot)	● ◐	≤5	0.06–0.10	≤5	0.06–0.10
				✤	≤5	0.06–0.08	≤5	0.06–0.08
	Duplex Stainless Steel	Hardness ≤280HB	≤0.25DC	● ◐	≤11	0.10–0.20	≤11	0.10–0.20
				✤	≤11	0.08–0.15	≤11	0.08–0.15
			0.25–0.5DC	● ◐	≤11	0.08–0.15	≤11	0.08–0.15
				✤	≤11	0.08–0.12	≤11	0.08–0.12
			0.5–0.75DC	● ◐	≤8	0.08–0.12	≤8	0.08–0.12
				✤	≤8	0.06–0.10	≤8	0.06–0.10
			DC(Slot)	● ◐	≤5	0.06–0.10	≤5	0.06–0.10
				✤	≤5	0.06–0.08	≤5	0.06–0.08
	Ferritic and Martensitic Stainless Steel	–	≤0.25DC	● ◐	≤11	0.10–0.20	≤11	0.10–0.20
				✤	≤11	0.08–0.15	≤11	0.08–0.15
			0.25–0.5DC	● ◐	≤11	0.08–0.15	≤11	0.08–0.15
				✤	≤11	0.08–0.12	≤11	0.08–0.12
			0.5–0.75DC	● ◐	≤8	0.08–0.12	≤8	0.08–0.12
				✤	≤8	0.06–0.10	≤8	0.06–0.10
			DC(Slot)	● ◐	≤5	0.06–0.10	≤5	0.06–0.10
				✤	≤5	0.06–0.08	≤5	0.06–0.08
	Precipitation Hardening Stainless Steel	Hardness <450HB	≤0.25DC	● ◐	≤11	0.10–0.15	≤11	0.10–0.15
				✤	≤11	0.08–0.12	≤11	0.08–0.12
			0.25–0.5DC	● ◐	≤11	0.08–0.12	≤11	0.08–0.12
				✤	≤11	0.08–0.12	≤11	0.08–0.12
			0.5–0.75DC	● ◐	≤8	0.06–0.10	≤8	0.06–0.10
				✤	≤8	0.06–0.08	≤8	0.06–0.08
			DC(Slot)	● ◐	≤5	0.06–0.10	≤5	0.06–0.10
				✤	≤5	0.06–0.08	≤5	0.06–0.08

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.
Note 2) Chattering and vibrations are more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.
- When tool overhang is long (using a long shank, screw-in type, etc.)
- Rigidity of machine, work material or attachment of work material is low
- At corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radial direction (ae) is 0.5 DC or more.
Note 4) Wet cutting is recommended, when focusing on the surface finish. (Service life is shorter than for dry cutting.)
Note 5) When using higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

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

RECOMMENDED CUTTING CONDITIONS

■ Wet Cutting

Depth of Cut / Feed per Tooth

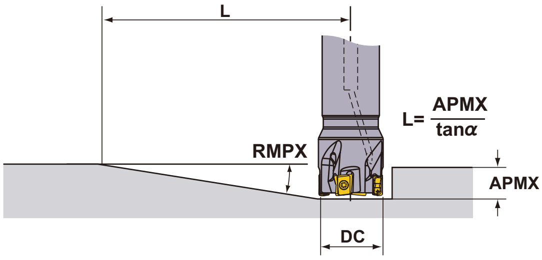
	Work Material	Properties	ae (mm)	Cutting Conditions	DC (mm) ø25 ap (mm)	DC (mm) ø25 fz (mm/t.)	DC (mm) ø28–ø80 ap (mm)	DC (mm) ø28–ø80 fz (mm/t.)
K	Gray Cast Iron	Tensile Strength ≤350MPa	≤0.25DC	● ◐	≤11	0.10–0.20	≤11	0.10–0.30
				✤	≤11	0.08–0.15	≤11	0.10–0.25
			0.25–0.5DC	● ◐	≤11	0.08–0.15	≤11	0.10–0.25
				✤	≤11	0.08–0.12	≤11	0.10–0.20
			0.5–0.75DC	● ◐	≤8	0.08–0.12	≤8	0.10–0.20
				✤	≤8	0.06–0.10	≤8	0.08–0.15
			DC(Slot)	● ◐	≤5	0.06–0.10	≤5	0.08–0.15
				✤	≤5	0.06–0.08	≤5	0.08–0.12
	Ductile Cast Iron	Tensile Strength ≤800MPa	≤0.25DC	● ◐	≤11	0.10–0.20	≤11	0.10–0.25
				✤	≤11	0.10–0.15	≤11	0.10–0.20
			0.25–0.5DC	● ◐	≤11	0.10–0.15	≤11	0.10–0.20
				✤	≤11	0.08–0.12	≤11	0.10–0.15
			0.5–0.75DC	● ◐	≤8	0.08–0.12	≤8	0.10–0.15
				✤	≤8	0.06–0.10	≤8	0.08–0.12
			DC(Slot)	● ◐	≤5	0.06–0.10	≤5	0.08–0.12
				✤	≤5	0.06–0.08	≤5	0.06–0.10
N	Aluminium Alloy	Content Si<5%	≤0.25DC	● ◐	≤11	0.10–0.25	≤11	0.10–0.25
				✤	≤11	0.10–0.20	≤11	0.10–0.20
			0.25–0.5DC	● ◐	≤11	0.10–0.20	≤11	0.10–0.20
				✤	≤11	0.10–0.15	≤11	0.10–0.15
			0.5–0.75DC	● ◐	≤8	0.06–0.15	≤8	0.08–0.15
				✤	≤8	0.06–0.15	≤8	0.08–0.15
			DC(Slot)	● ◐	≤5	0.06–0.15	≤5	0.08–0.15
				✤	≤5	0.06–0.15	≤5	0.08–0.12
S	Titanium Alloy (Ti-6Al-4V,etc.)	–	≤0.25DC	● ◐ ✤	≤11	0.08–0.15	≤11	0.08–0.15
			0.25–0.5DC	● ◐ ✤	≤11	0.08–0.12	≤11	0.08–0.12
			0.5–0.75DC	● ◐ ✤	≤8	0.06–0.10	≤8	0.06–0.10
			DC(Slot)	● ◐ ✤	≤5	0.06–0.10	≤5	0.06–0.10
	Titanium Alloy (Ti-5Al-5V-5Mo-3Cr,etc.)	–	≤0.25DC	● ◐ ✤	≤11	0.08–0.12	≤11	0.08–0.12
			0.25–0.5DC	● ◐ ✤	≤11	0.08–0.12	≤11	0.08–0.12
			0.5–0.75DC	● ◐ ✤	≤8	0.06–0.10	≤8	0.06–0.10
			DC(Slot)	● ◐ ✤	≤5	0.06–0.10	≤5	0.06–0.10
	Heat Resistant Alloy	–	≤0.25DC	● ◐ ✤	≤11	0.08–0.12	≤11	0.08–0.12
			0.25–0.5DC	● ◐ ✤	≤11	0.08–0.12	≤11	0.08–0.12
			0.5–0.75DC	● ◐ ✤	≤8	0.06–0.10	≤8	0.06–0.10
			DC(Slot)	● ◐ ✤	≤5	0.06–0.10	≤5	0.06–0.10
H	Hardened Steel	Hardness 40–55HRC	≤0.25DC	● ◐	≤5	0.08–0.15	≤5	0.08–0.15
				✤	≤5	0.08–0.12	≤5	0.08–0.12
			0.25–0.5DC	● ◐	≤4	0.08–0.12	≤4	0.08–0.12
				✤	≤4	0.06–0.10	≤4	0.06–0.10
			0.5–0.75DC	● ◐	≤3	0.06–0.10	≤3	0.06–0.10
				✤	≤3	0.06–0.10	≤3	0.06–0.08
			DC(Slot)	● ◐	≤2	0.06–0.10	≤2	0.06–0.10
				✤	≤2	0.06–0.10	≤2	0.06–0.08

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.
Note 2) Chattering and vibrations are more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.
- When tool overhang is long (using a long shank, screw-in type, etc.)
- Rigidity of machine, work material or attachment of work material is low
- At a corner radius during pocket milling

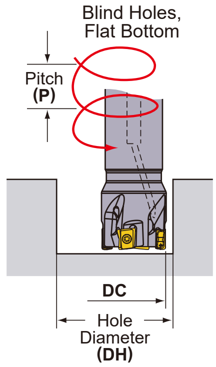
Note 3) A type with fewer teeth is recommended when the depth of cut in the radial direction (ae) is 0.5 DC or more.
Note 4) Wet cutting is recommended, when focusing on the surface finish. (Service life is shorter than for dry cutting.)
Note 5) When using higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

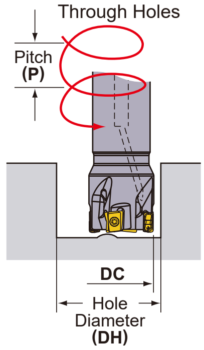
■ Ramping / Helical Cutting

● Ramping



● Helical Cutting





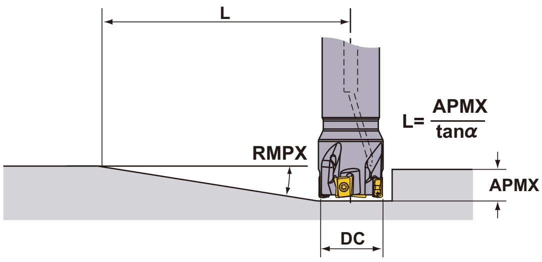
Refer to the table below for cutting conditions. For feed per tooth and cutting speed, follow the cutting conditions for slot milling.

DC (mm)	RE (mm)	Ramping		Helical Cutting (Blind Hole, Flat Bottom)				Helical Cutting (Through Hole)	
		RMPX	L (mm) *	DH max. (mm)	P max. (mm)	DH min. (mm)	P max. (mm)	DH min. (mm)	P max. (mm)
25	0.2	2.13°	296	49.0	2.8	42.7	2.1	36.9	1.4
	0.4	2.13°	296	48.6	2.8	42.7	2.1	36.9	1.4
	0.8	2.13°	296	47.8	2.7	42.7	2.1	36.9	1.4
	1.0	2.13°	296	47.4	2.6	42.7	2.1	36.9	1.4
	1.2	2.13°	296	47.0	2.6	42.7	2.1	36.9	1.4
	1.6	2.13°	296	46.2	2.5	42.7	2.1	36.9	1.4
	2.0	2.13°	296	45.4	2.4	42.7	2.1	36.9	1.4
	2.4	2.13°	296	44.6	2.3	42.7	2.1	36.9	1.4
	3.0	2.13°	296	43.4	2.2	42.7	2.1	36.9	1.4
	3.2	2.13°	296	43.0	2.1	42.7	2.1	36.9	1.4
28	0.2	1.77°	356	55.0	2.6	48.7	2.0	42.7	1.4
	0.4	1.77°	356	54.6	2.6	48.7	2.0	42.7	1.4
	0.8	1.77°	356	53.8	2.5	48.7	2.0	42.7	1.4
	1.0	1.77°	356	53.4	2.5	48.7	2.0	42.7	1.4
	1.2	1.77°	356	53.0	2.4	48.7	2.0	42.7	1.4
	1.6	1.77°	356	52.2	2.4	48.7	2.0	42.7	1.4
	2.0	1.77°	356	51.4	2.3	48.7	2.0	42.7	1.4
	2.4	1.77°	356	50.6	2.2	48.7	2.0	42.7	1.4
	3.0	1.77°	356	49.4	2.1	48.7	2.0	42.7	1.4
	3.2	1.77°	356	49.0	2.0	48.7	2.0	42.7	1.4
30	0.2	1.61°	392	59.0	2.6	52.7	2.0	46.6	1.5
	0.4	1.61°	392	58.6	2.5	52.7	2.0	46.6	1.5
	0.8	1.61°	392	57.8	2.5	52.7	2.0	46.6	1.5
	1.0	1.61°	392	57.4	2.4	52.7	2.0	46.6	1.5
	1.2	1.61°	392	57.0	2.4	52.7	2.0	46.6	1.5
	1.6	1.61°	392	56.2	2.3	52.7	2.0	46.6	1.5
	2.0	1.61°	392	55.4	2.2	52.7	2.0	46.6	1.5
	2.4	1.61°	392	54.6	2.2	52.7	2.0	46.6	1.5
	3.0	1.61°	392	53.4	2.1	52.7	2.0	46.6	1.5
	3.2	1.61°	392	53.0	2.0	52.7	2.0	46.6	1.5
32	0.2	1.47°	429	63.0	2.5	56.7	2.0	50.6	1.5
	0.4	1.47°	429	62.6	2.5	56.7	2.0	50.6	1.5
	0.8	1.47°	429	61.8	2.4	56.7	2.0	50.6	1.5
	1.0	1.47°	429	61.4	2.4	56.7	2.0	50.6	1.5
	1.2	1.47°	429	61.0	2.3	56.7	2.0	50.6	1.5
	1.6	1.47°	429	60.2	2.3	56.7	2.0	50.6	1.5
	2.0	1.47°	429	59.4	2.2	56.7	2.0	50.6	1.5
	2.4	1.47°	429	58.6	2.1	56.7	2.0	50.6	1.5
	3.0	1.47°	429	57.4	2.1	56.7	2.0	50.6	1.5
	3.2	1.47°	429	57.0	2.0	56.7	2.0	50.6	1.5
35	0.2	1.28°	493	69.0	2.4	62.8	1.9	56.6	1.5
	0.4	1.28°	493	68.6	2.4	62.8	1.9	56.6	1.5
	0.8	1.28°	493	67.8	2.3	62.8	1.9	56.6	1.5
	1.0	1.28°	493	67.4	2.3	62.8	1.9	56.6	1.5
	1.2	1.28°	493	67.0	2.2	62.8	1.9	56.6	1.5
	1.6	1.28°	493	66.2	2.2	62.8	1.9	56.6	1.5
	2.0	1.28°	493	65.4	2.1	62.8	1.9	56.6	1.5
	2.4	1.28°	493	64.6	2.1	62.8	1.9	56.6	1.5
	3.0	1.28°	493	63.4	2.0	62.8	1.9	56.6	1.5
	3.2	1.28°	493	63.0	2.0	62.8	1.9	56.6	1.5

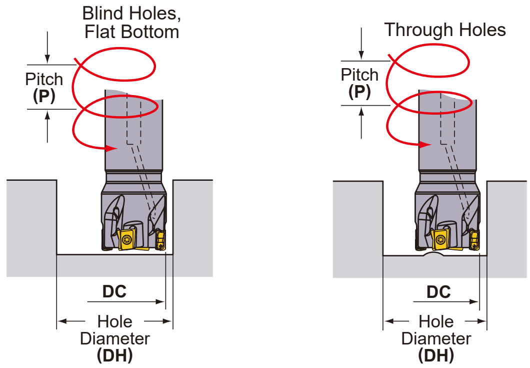
Note 1) When machining a highly ductile work material with the ramping angles in the table above, chips may be elongated.
* Shows the distance until a maximum depth of cut of 11 mm is achieved at the maximum ramping angle L (= 11/tan α).

■ 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.

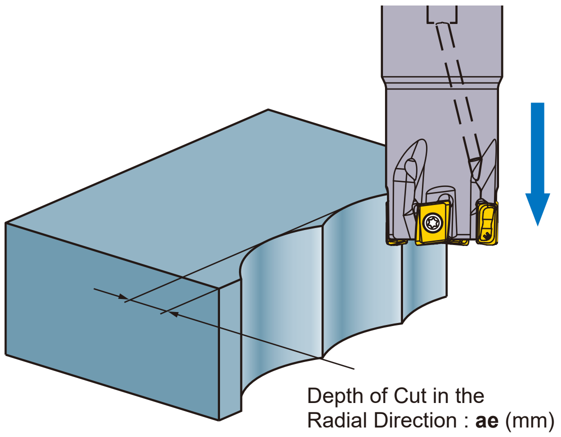
DC (mm)	RE (mm)	Ramping		Helical Cutting (Blind Hole, Flat Bottom)				Helical Cutting (Through Hole)	
		RMPX	L (mm) *	DH max. (mm)	P max. (mm)	DH min. (mm)	P max. (mm)	DH min. (mm)	P max. (mm)
40	0.2	1.06°	595	78.8	2.3	72.7	1.9	66.5	1.5
	0.4	1.06°	595	78.4	2.2	72.7	1.9	66.5	1.5
	0.8	1.06°	595	77.6	2.2	72.7	1.9	66.5	1.5
	1.0	1.06°	595	77.2	2.2	72.7	1.9	66.5	1.5
	1.2	1.06°	595	76.8	2.1	72.7	1.9	66.5	1.5
	1.6	1.06°	595	76.0	2.1	72.7	1.9	66.5	1.5
	2.0	1.06°	595	75.2	2.0	72.7	1.9	66.5	1.5
	2.4	1.06°	595	74.4	2.0	72.7	1.9	66.5	1.5
	3.0	1.06°	595	73.2	1.9	72.7	1.9	66.5	1.5
	3.2	1.06°	595	72.8	1.9	72.7	1.9	66.5	1.5
50	0.2	0.79°	798	98.8	2.1	92.7	1.8	86.5	1.6
	0.4	0.79°	798	98.4	2.1	92.7	1.8	86.5	1.6
	0.8	0.79°	798	97.6	2.1	92.7	1.8	86.5	1.6
	1.0	0.79°	798	97.2	2.0	92.7	1.8	86.5	1.6
	1.2	0.79°	798	96.8	2.0	92.7	1.8	86.5	1.6
	1.6	0.79°	798	96.0	2.0	92.7	1.8	86.5	1.6
	2.0	0.79°	798	95.2	2.0	92.7	1.8	86.5	1.6
	2.4	0.79°	798	94.4	1.9	92.7	1.8	86.5	1.6
	3.0	0.79°	798	93.2	1.9	92.7	1.8	86.5	1.6
	3.2	0.79°	798	92.8	1.9	92.7	1.8	86.5	1.6
63	0.2	0.6°	1051	124.8	2.0	118.7	1.8	112.5	1.6
	0.4	0.6°	1051	124.4	2.0	118.7	1.8	112.5	1.6
	0.8	0.6°	1051	123.6	2.0	118.7	1.8	112.5	1.6
	1.0	0.6°	1051	123.2	2.0	118.7	1.8	112.5	1.6
	1.2	0.6°	1051	122.8	2.0	118.7	1.8	112.5	1.6
	1.6	0.6°	1051	122.0	1.9	118.7	1.8	112.5	1.6
	2.0	0.6°	1051	121.2	1.9	118.7	1.8	112.5	1.6
	2.4	0.6°	1051	120.4	1.9	118.7	1.8	112.5	1.6
	3.0	0.6°	1051	119.2	1.9	118.7	1.8	112.5	1.6
	3.2	0.6°	1051	118.8	1.8	118.7	1.8	112.5	1.6
80	0.2	0.45°	1401	158.8	1.9	152.6	1.8	146.5	1.6
	0.4	0.45°	1401	158.4	1.9	152.7	1.8	146.5	1.6
	0.8	0.45°	1401	157.6	1.9	152.7	1.8	146.5	1.6
	1.0	0.45°	1401	157.2	1.9	152.7	1.8	146.5	1.6
	1.2	0.45°	1401	156.8	1.9	152.7	1.8	146.5	1.6
	1.6	0.45°	1401	156.0	1.9	152.7	1.8	146.5	1.6
	2.0	0.45°	1401	155.2	1.9	152.7	1.8	146.5	1.6
	2.4	0.45°	1401	154.4	1.8	152.7	1.8	146.5	1.6
	3.0	0.45°	1401	153.2	1.8	152.7	1.8	146.5	1.6
	3.2	0.45°	1401	152.8	1.8	152.7	1.8	146.5	1.6

Note 1) When machining a highly ductile work material with the ramping angles in the table above, chips may be elongated.
* Shows the distance until a maximum depth of cut of 11 mm is achieved at the maximum ramping angle L (= 11/tan α).

For Plunging and Drilling

See the tables to the right for cutting conditions. Follow the cutting conditions for slot milling regarding feed per tooth and cutting speed.

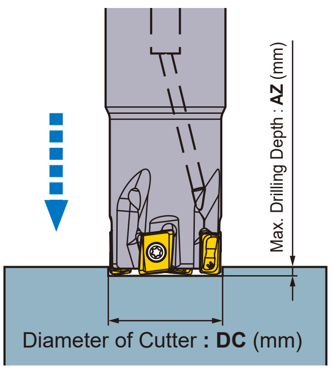
Plunging



DC (mm)	ae max. (mm)
25	6.5
28	6.6
30	6.6
32	6.6
35	6.7
40	6.7
50	6.7
63	6.7
80	6.7

Note 1) No step feed necessary.

Drilling



DC (mm)	AZ max. (mm)
25	0.55
28	0.55
30	0.55
32	0.55
35	0.55
40	0.55
50	0.55
63	0.55
80	0.55

Note 1) Exercise due caution as chips scatter easily.
Note 2) Use compressed air to eliminate chips (or coolant for when machining aluminium alloy).

DEEP SHOULDER MILLING

90° KAPR

VPX200 NEW

P M K N S H

LONG CUTTING EDGE

Fig.1

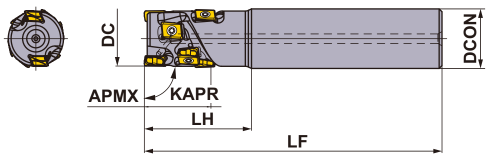
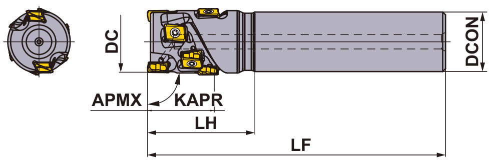


Fig.2



Right hand tool holder only.

■CYLINDRICAL SHANK

With Coolant Hole

DC (mm)	Order Number	Stock	Number of Flutes	Total	Dimensions (mm)			APMX (mm)	RMPX	WT *2 (kg)	Fig.	*1 Insert Type
		R			DCON	LF	LH					
20	VPX200R202SA20S01404	●	2	4	20	100	30	14	1.35°	0.21	1	LOGU09
22	VPX200R222SA20S01404	●	2	4	20	115	30	14	1.16°	0.26	2	LOGU09
25	VPX200R252SA25S02106	●	2	6	25	115	35	21	0.97°	0.39	1	LOGU09
25	VPX200R252SA25S02808	●	2	8	25	125	45	28	0.97°	0.41	1	LOGU09
28	VPX200R282SA25S02106	★	2	6	25	115	35	21	0.84°	0.40	2	LOGU09
28	VPX200R282SA25S02808	★	2	8	25	125	45	28	0.84°	0.43	2	LOGU09
32	VPX200R322SA32S02808	★	2	8	32	125	45	28	0.71°	0.68	1	LOGU09
32	VPX200R323SA32S02812	●	3	12	32	125	45	28	0.71°	0.67	1	LOGU09
32	VPX200R322SA32S03510	★	2	10	32	130	50	35	0.71°	0.70	1	LOGU09
32	VPX200R323SA32S03515	●	3	15	32	130	50	35	0.71°	0.68	1	LOGU09
35	VPX200R352SA32S02808	★	2	8	32	125	45	28	0.63°	0.72	2	LOGU09
35	VPX200R353SA32S02812	★	3	12	32	125	45	28	0.63°	0.71	2	LOGU09
35	VPX200R352SA32S03510	★	2	10	32	130	50	35	0.63°	0.74	2	LOGU09
35	VPX200R353SA32S03515	★	3	15	32	130	50	35	0.63°	0.73	2	LOGU09
40	VPX200R403SA32S03515	★	3	15	32	130	50	35	0.54°	0.81	2	LOGU09
40	VPX200R404SA32S03520	●	4	20	32	130	50	35	0.54°	0.80	2	LOGU09
40	VPX200R403SA32S04218	★	3	18	32	140	60	42	0.54°	0.88	2	LOGU09
40	VPX200R404SA32S04224	★	4	24	32	140	60	42	0.54°	0.86	2	LOGU09

*1 Corner radius RE 0.8mm is recommended for the peripheral cutting edges except the bottom cutting edge (end cutting).
Insert RE 0.2mm and 0.4 mm can also be used for the peripheral cutting edges.

*2 WT : Tool Weight

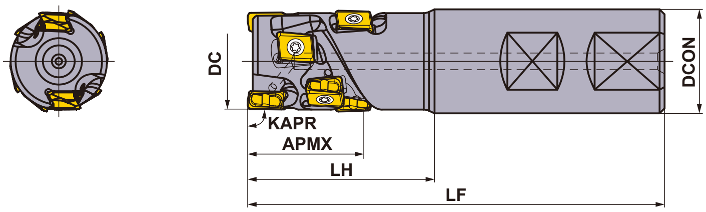
SPARE PARTS

DC (mm)	Tool Holder Type	Clamp Screw *	Wrench	Anti-seize Lubricant
20	VPX200R20	TPS27F1	TIP07F	MK1KS
22	VPX200R22	TPS27F2	TIP07F	MK1KS
25	VPX200R25	TPS27F2	TIP07F	MK1KS
28	VPX200R28	TPS27F2	TIP07F	MK1KS
32	VPX200R32	TPS27F2	TIP07F	MK1KS
35	VPX200R35	TPS27F2	TIP07F	MK1KS
40	VPX200R40	TPS27F2	TIP07F	MK1KS

* Clamp Torque (N • m) : TPS27F1 = 1.0,TPS27F2 = 1.0

● : Inventory maintained. ★ : Inventory maintained in Japan.

Fig.1



Right hand tool holder only.

■WELDON SHANK TYPE

With Coolant Hole

DC (mm)	Order Number	Stock R	Number of Flutes	Total	Dimensions (mm) DCON	LF	LH	APMX (mm)	RMPX	WT *2 (kg)	Fig.	Insert Type *1
20	**VPX200R202WA20S01404**	●	2	4	20	80	30	14	1.35°	0.16	1	LOGU09
25	**VPX200R252WA25S02106**	●	2	6	25	91	35	21	0.97°	0.29	1	LOGU09
25	**VPX200R252WA25S02808**	●	2	8	25	101	45	28	0.97°	0.32	1	LOGU09
32	**VPX200R322WA32S02808**	●	2	8	32	105	45	28	0.71°	0.55	1	LOGU09
32	**VPX200R323WA32S02812**	●	3	12	32	105	45	28	0.71°	0.54	1	LOGU09
32	**VPX200R322WA32S03510**	●	2	10	32	110	50	35	0.71°	0.57	1	LOGU09
32	**VPX200R323WA32S03515**	●	3	15	32	110	50	35	0.71°	0.55	1	LOGU09

*1 Corner radius RE 0.8mm is recommended for the peripheral cutting edges except the bottom cutting edge (end cutting).
Insert RE 0.2mm and 0.4 mm can also be used for the peripheral cutting edges.
*2 WT : Tool Weight

SPARE PARTS

DC (mm)	Tool Holder Type	Clamp Screw *	Wrench	Anti-seize Lubricant
20	**VPX200R20**	TPS27F1	TIP07F	MK1KS
25	**VPX200R25**	TPS27F2	TIP07F	MK1KS
32	**VPX200R32**	TPS27F2	TIP07F	MK1KS

* Clamp Torque (N • m) : TPS27F1 = 1.0,TPS27F2 = 1.0

Fig.1

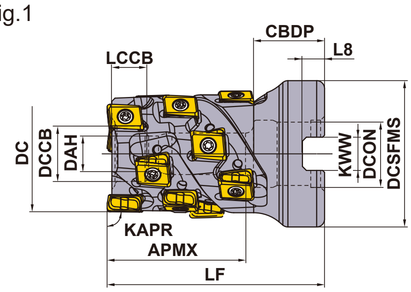
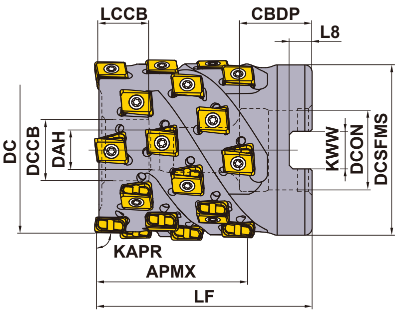
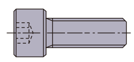


Fig.2



Right hand tool holder only.

DC (mm)	APMX	Set Bolt	Geometry
ϕ32	35	HSC08045	
ϕ40	42	HSC08050	
ϕ50	42	HSC10045	

■SHELL TYPE

KAPR: 90°
GAMP: -6° GAMF : -25°
With Coolant Hole

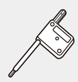
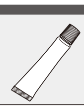
DC (mm)	Order Number	Stock R	Number of Flutes	Total	Dimensions (mm) LF	DCON	WT *2 (kg)	APMX (mm)	RMPX	Fig.	*1 Insert Type
32	**VPX200-032A02A035R10**	★	2	10	55	16	0.22	35	0.71°	1	LOGU09
32	**VPX200-032A03A035R15**	●	3	15	55	16	0.20	35	0.71°	1	LOGU09
40	**VPX200-040A03A042R18**	★	3	18	60	16	0.34	42	0.54°	2	LOGU09
40	**VPX200-040A04A042R24**	●	4	24	60	16	0.33	42	0.54°	2	LOGU09
50	**VPX200-050A04A042R24**	★	4	24	60	22	0.55	42	0.42°	2	LOGU09
50	**VPX200-050A05A042R30**	★	5	30	60	22	0.54	42	0.42°	2	LOGU09

*1 Corner radius RE 0.8mm is recommended for the peripheral cutting edges except the bottom cutting edge (end cutting).
Insert RE 0.2mm and 0.4 mm can also be used for the peripheral cutting edges.
*2 WT : Tool Weight

MOUNTING DIMENSIONS

DC (mm)	Order Number	Dimensions (mm) DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
32	**VPX200-032A02A035R10**	16	18	9	14	8	37	8.4	5.6
32	**VPX200-032A03A035R15**	16	18	9	14	8	37	8.4	5.6
40	**VPX200-040A03A042R18**	16	18	9	14	8	37	8.4	5.6
40	**VPX200-040A04A042R24**	16	18	9	14	8	37	8.4	5.6
50	**VPX200-050A04A042R24**	22	20	11	17	13	47	10.4	6.3
50	**VPX200-050A05A042R30**	22	20	11	17	13	47	10.4	6.3

SPARE PARTS

Tool Holder Type	 * Clamp Screw	 Wrench	 Anti-seize Lubricant
VPX200	TPS27F2	TIP07F	MK1KS

* Clamp Torque (N • m) : TPS27F2 = 1.0

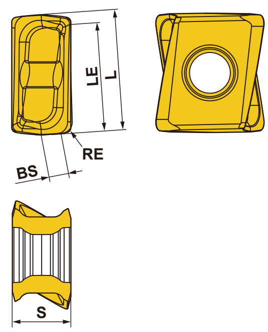
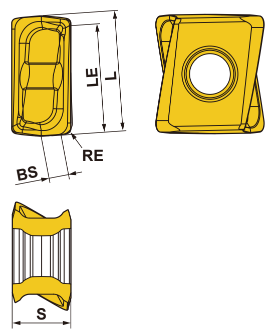
● : Inventory maintained. ★ : Inventory maintained in Japan.
(10 inserts in one case)

INSERTS

Work Material			MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	TF15
	P	Steels		◐	✣				◐	
	M	Stainless Steels				◐			◐	
	K	Cast Irons	◐						✣	
	N	Non-ferrous Metals								◐
	S	Heat Resistant Alloys, Titanium Alloys					◐	✣	◐	
	H	Hardened Steels							◐	

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

Honing :
E : Round **F :** Sharp

Shape	Order Number	Class	Honing	Coated MC5020	Coated MP6120	Coated MP6130	Coated MP7130	Coated MP9120	Coated MP9130	Coated VP15TF	Carbide TF15	L	RE	LE	S	BS	Geometry
Low Cutting Resistance **L** Breaker NEW 	**LOGU0904020PNER-L**	G	E	★	★	★	★	★	★	★		8.7	0.2	7.6	4.3	1.7	 Right hand insert only.
	LOGU0904040PNER-L	G	E	●	●	●	●	●	●	★		8.7	0.4	7.6	4.3	1.5	
	LOGU0904080PNER-L	G	E	●	●	●	●	●	●	★		8.7	0.8	7.6	4.3	1.2	
	LOGU0904100PNER-L	G	E	★	★	★	★	★	★	★		8.7	1.0	7.6	4.3	1.0	
	LOGU0904120PNER-L	G	E	★	★	★	★	★	★	★		8.7	1.2	7.6	4.3	0.8	
	LOGU0904160PNER-L	G	E	●	●	●	●	●	●	★		8.7	1.6	7.6	4.3	0.5	
	LOGU0904020PNFR-L	G	F								●	8.7	0.2	7.6	4.3	1.7	
	LOGU0904040PNFR-L	G	F								●	8.7	0.4	7.6	4.3	1.5	
	LOGU0904080PNFR-L	G	F								●	8.7	0.8	7.6	4.3	1.2	
	LOGU0904100PNFR-L	G	F								★	8.7	1.0	7.6	4.3	1.0	
	LOGU0904120PNFR-L	G	F								★	8.7	1.2	7.6	4.3	0.8	
	LOGU0904160PNFR-L	G	F								★	8.7	1.6	7.6	4.3	0.5	
General Use **M** Breaker 	**LOGU0904020PNER-M**	G	E	★	★	★	★	★	★	★		8.7	0.2	7.6	4.3	1.7	 Right hand insert only.
	LOGU0904040PNER-M	G	E	●	●	●	●	●	●	★		8.7	0.4	7.6	4.3	1.6	
	LOGU0904080PNER-M	G	E	●	●	●	●	●	●	★		8.7	0.8	7.6	4.3	1.2	
	LOGU0904100PNER-M	G	E	★	★	★	★	★	★	★		8.7	1.0	7.6	4.3	1.0	
	LOGU0904120PNER-M	G	E	★	★	★	★	★	★	★		8.7	1.2	7.6	4.3	0.9	
	LOGU0904160PNER-M	G	E	●	●	●	●	●	●	★		8.7	1.6	7.6	4.3	0.5	
	LOGU0904020PNFR-M	G	F								●	8.7	0.2	7.6	4.3	1.7	
	LOGU0904040PNFR-M	G	F								●	8.7	0.4	7.6	4.3	1.6	
	LOGU0904080PNFR-M	G	F								●	8.7	0.8	7.6	4.3	1.2	
	LOGU0904100PNFR-M	G	F								★	8.7	1.0	7.6	4.3	1.0	
	LOGU0904120PNFR-M	G	F								★	8.7	1.2	7.6	4.3	0.9	
	LOGU0904160PNFR-M	G	F								★	8.7	1.6	7.6	4.3	0.5	

● ★ = NEW

SPARE PARTS ➤ N001
TECHNICAL DATA ➤ P001

K

ROTATING TOOLS

CHIPBREAKER RECOMMENDATION

■ Chipbreaker Selection Table

	Work Material	Properties	Cutting Conditions	Chipbreaker		Grade	
				1st Recommendation	2nd Recommendation	1st Recommendation	2nd Recommendation
P	Mild Steel	Hardness ≤180HB		L	M	MP6120	VP15TF
				M	L	MP6130	–
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 180-350HB ≤350HB (Annealing)		L	M	MP6120	VP15TF
				M	L	MP6120	VP15TF
				M	L	MP6130	–
	Pre-hardened Steel	Hardness 35–45HRC		M	L	MP6120	VP15TF
				M	L	MP6130	–
M	Austenitic Stainless Steel	Hardness ≤280HB		L	M	MP7130	VP15TF
				M	L	MP7130	–
		Hardness >200HB		L	M	MP7130	VP15TF
				M	L	MP7130	–
	Duplex Stainless Steel	Hardness ≤280HB		L	M	MP7130	VP15TF
				M	L	MP7130	–
	Ferritic and Martensitic Stainless Steel	–		L	M	MP7130	VP15TF
				M	L	MP7130	–
	Precipitation Hardening Stainless Steel	Hardness <450HB		L	M	MP7130	VP15TF
				M	L	MP7130	–
K	Gray Cast Iron	Tensile Strength ≤350MPa		M	L	MC5020	VP15TF
				M	L	VP15TF	–
	Ductile Cast Iron	Tensile Strength ≤800MPa		M	L	MC5020	VP15TF
				M	L	VP15TF	–
N	Aluminium Alloy	Content Si<5%		L	M	TF15	–
				M	L	TF15	–
S	Titanium Alloy (Ti-6Al-4V,etc.)	–		L	M	MP9120	VP15TF
				M	L	MP9130	–
	Titanium Alloy (Ti-5Al-5V-5Mo-3Cr,etc.)	–		L	M	MP9120	VP15TF
				M	L	MP9130	–
	Heat Resistant Alloy	–		M	L	MP9120	VP15TF
				M	L	MP9130	–
H	Hardened Steel	Hardness 40–55HRC		M	–	VP15TF	–

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

RECOMMENDED CUTTING CONDITIONS

■ Cutting Speed

(mm)

	Work Material	Properties	Cutting Conditions	Grade	ae ≤0.25DC	ae 0.25–0.5DC	ae 0.5–0.75DC	ae DC(Slot)	Cutting Mode
					Vc (m/min)				
P	Mild Steel	Hardness ≤180HB	● ◐	MP6120,VP15TF	140(100–190)	130(90–180)	100(70–120)	100(70–120)	Dry, Wet
			✤	MP6130	140(100–190)	130(90–180)	100(70–120)	100(70–120)	Dry, Wet
	Carbon Steel Alloy Steel	Hardness 180–350HB	● ◐	MP6120,VP15TF	120(90–140)	110(80–130)	100(70–120)	100(70–120)	Dry, Wet
			✤	MP6130	120(90–140)	110(80–130)	100(70–120)	100(70–120)	Dry, Wet
	Pre-hardened Steel	Hardness 180–350HB	● ◐	MP6120,VP15TF	100(80–120)	90(70–110)	80(60–100)	80(60–100)	Dry, Wet
			✤	MP6130	100(80–120)	90(70–110)	80(60–100)	80(60–100)	Dry, Wet
M	Austenitic Stainless Steel	Hardness ≤200HB	● ◐	MP7130,VP15TF	120(100–150)	110(90–140)	90(70–120)	90(70–120)	Dry, Wet
			✤	MP7130	120(100–150)	110(90–140)	90(70–120)	90(70–120)	Dry, Wet
		Hardness >200HB	● ◐	MP7130,VP15TF	100(80–130)	90(70–120)	70(50–100)	70(50–100)	Dry, Wet
			✤	MP7130	100(80–130)	90(70–120)	70(50–100)	70(50–100)	Dry, Wet
	Ferritic and Martensitic Stainless Steel	–	● ◐	MP7130,VP15TF	120(100–150)	110(90–140)	90(70–120)	90(70–120)	Dry, Wet
			✤	MP7130	120(100–150)	110(90–140)	90(70–120)	90(70–120)	Dry, Wet
	Duplex Stainless Steel	Hardness ≤280HB	● ◐	MP7130,VP15TF	100(80–130)	90(70–120)	70(50–100)	70(50–100)	Dry, Wet
			✤	MP7130	100(80–130)	90(70–120)	70(50–100)	70(50–100)	Dry, Wet
	Precipitation Hardening Stainless Steel	Hardness <450HB	● ◐	MP7130,VP15TF	90(70–120)	80(60–110)	60(40–90)	60(40–90)	Dry, Wet
			✤	MP7130	90(70–120)	80(60–110)	60(40–90)	60(40–90)	Dry, Wet
K	Gray Cast Iron	Tensile Strength ≤350MPa	● ◐	MC5020	180(160–220)	170(150–210)	150(130–190)	150(130–190)	Dry, Wet
			◐ ✤	VP15TF	130(100–150)	120(90–140)	100(80–120)	100(80–120)	Dry, Wet
	Ductile Cast Iron	Tensile Strength ≤800MPa	● ◐	MC5020	160(140–180)	150(130–170)	130(110–150)	130(110–150)	Dry, Wet
			◐ ✤	VP15TF	110(80–140)	100(70–130)	80(60–120)	80(60–120)	Dry, Wet
N	Aluminium Alloy	Content Si<5%	● ◐ ✤	TF15	600(400–1000)	600(400–1000)	600(400–1000)	600(400–1000)	Dry, Wet
S	Titanium Alloy (Ti-6Al-4V etc.)	–	● ◐	MP9120	50(40–70)	50(40–70)	50(40–70)	50(40–70)	Wet
			●	VP15TF	50(40–70)	50(40–70)	50(40–70)	50(40–70)	Wet
			◐ ✤	MP9130	50(40–70)	50(40–70)	50(40–70)	50(40–70)	Wet
	Titanium Alloy (Ti-6Al-5V-5Mo-3Cr etc.)	–	● ◐	MP9120	30(20–40)	30(20–40)	30(20–40)	30(20–40)	Wet
			●	VP15TF	30(20–40)	30(20–40)	30(20–40)	30(20–40)	Wet
			◐ ✤	MP9130	30(20–40)	30(20–40)	30(20–40)	30(20–40)	Wet
	Heat Resistant Alloy	–	● ◐	MP9120	40(30–60)	40(30–60)	40(30–60)	40(30–60)	Wet
			●	VP15TF	40(30–60)	40(30–60)	40(30–60)	40(30–60)	Wet
			◐ ✤	MP9130	40(30–60)	40(30–60)	40(30–60)	40(30–60)	Wet

Note 1) If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.
Note 2) Chattering and vibrations are more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.
- When tool overhang is long
- Rigidity of machine, work material or attachment of work material is low
- At a corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radial direction (ae) is 0.5 DC or more.
Note 4) Wet cutting is recommended, when focusing on the surface finish. (Service life is shorter than for dry cutting.)
Note 5) When using higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

RECOMMENDED CUTTING CONDITIONS

Depth of Cut / Feed per Tooth

(mm)

	Work Material	Properties	ae	Cutting Conditions	DC			
					ø20–ø28		ø32–ø50	
					ap	fz (mm/t.)	ap	fz (mm/t.)
P	Mild Steel	Hardness ≤180HB	≤0.25DC		≤14	0.13 (0.10–0.15)	≤APMX	0.15 (0.10–0.20)
			0.25–0.5DC		≤8	0.10 (0.08–0.12)	≤28	0.13 (0.10–0.15)
			0.5–0.75DC		≤6	0.10 (0.08–0.12)	≤14	0.10 (0.08–0.12)
			DC(Slot)		≤4	0.08 (0.06–0.10)	≤4	0.08 (0.06–0.10)
	Carbon Steel Alloy Steel	Hardness 180–280HB	≤0.25DC		≤14	0.13 (0.10–0.15)	≤APMX	0.15 (0.10–0.20)
			0.25–0.5DC		≤8	0.10 (0.08–0.12)	≤28	0.13 (0.10–0.15)
			0.5–0.75DC		≤6	0.10 (0.08–0.12)	≤14	0.10 (0.08–0.12)
			DC(Slot)		≤4	0.08 (0.06–0.10)	≤4	0.08 (0.06–0.10)
	Carbon Steel Alloy Steel	Hardness 280–350HB	≤0.25DC		≤14	0.13 (0.10–0.15)	≤APMX	0.13 (0.10–0.15)
			0.25–0.5DC		≤8	0.10 (0.08–0.12)	≤28	0.10 (0.08–0.12)
			0.5–0.75DC		≤6	0.10 (0.08–0.12)	≤14	0.08 (0.06–0.10)
			DC(Slot)		≤4	0.08 (0.06–0.10)	≤4	0.08 (0.06–0.10)
	Pre-hardened Steel	Hardness 35–45HRC	≤0.25DC		≤14	0.13 (0.10–0.15)	≤APMX	0.13 (0.10–0.15)
			0.25–0.5DC		≤8	0.10 (0.08–0.12)	≤28	0.10 (0.08–0.12)
			0.5–0.75DC		≤6	0.10 (0.08–0.12)	≤14	0.08 (0.06–0.10)
			DC(Slot)		≤4	0.08 (0.06–0.10)	≤4	0.08 (0.06–0.10)
M	Austenitic Stainless Steel	–	≤0.25DC		≤14	0.13 (0.10–0.15)	≤APMX	0.15 (0.10–0.20)
					≤14	0.10 (0.08–0.12)	≤APMX	0.12 (0.08–0.15)
			0.25–0.5DC		≤8	0.10 (0.08–0.12)	≤28	0.12 (0.08–0.15)
					≤8	0.08 (0.06–0.10)	≤28	0.10 (0.08–0.12)
			0.5–0.75DC		≤6	0.08 (0.06–0.10)	≤14	0.10 (0.08–0.12)
					≤6	0.07 (0.06–0.08)	≤14	0.08 (0.06–0.10)
			DC(Slot)		≤4	0.08 (0.06–0.10)	≤4	0.08 (0.06–0.10)
					≤4	0.07 (0.06–0.08)	≤4	0.07 (0.06–0.08)
	Ferritic and Martensitic Stainless Steel	Hardness ≤200HB	≤0.25DC		≤14	0.13 (0.10–0.15)	≤APMX	0.15 (0.10–0.20)
					≤14	0.10 (0.08–0.12)	≤APMX	0.12 (0.08–0.15)
			0.25–0.5DC		≤8	0.10 (0.08–0.12)	≤28	0.12 (0.08–0.15)
					≤8	0.08 (0.06–0.10)	≤28	0.10 (0.08–0.12)
			0.5–0.75DC		≤6	0.08 (0.06–0.10)	≤14	0.10 (0.08–0.12)
					≤6	0.07 (0.06–0.08)	≤14	0.08 (0.06–0.10)
			DC(Slot)		≤4	0.08 (0.06–0.10)	≤4	0.08 (0.06–0.10)
					≤4	0.07 (0.06–0.08)	≤4	0.07 (0.06–0.08)
	Duplex Stainless Steel	Hardness ≤280HB	≤0.25DC		≤14	0.13 (0.10–0.15)	≤APMX	0.15 (0.10–0.20)
					≤14	0.10 (0.08–0.12)	≤APMX	0.12 (0.08–0.15)
			0.25–0.5DC		≤8	0.10 (0.08–0.12)	≤28	0.12 (0.08–0.15)
					≤8	0.08 (0.06–0.10)	≤28	0.10 (0.08–0.12)
			0.5–0.75DC		≤6	0.08 (0.06–0.10)	≤14	0.10 (0.08–0.12)
					≤6	0.07 (0.06–0.08)	≤14	0.08 (0.06–0.10)
			DC(Slot)		≤4	0.08 (0.06–0.10)	≤4	0.08 (0.06–0.10)
					≤4	0.07 (0.06–0.08)	≤4	0.07 (0.06–0.08)
	Precipitation Hardening Stainless Steel	Hardness <450HB	≤0.25DC		≤14	0.13 (0.10–0.15)	≤APMX	0.13 (0.10–0.15)
					≤14	0.10 (0.08–0.12)	≤APMX	0.10 (0.08–0.12)
			0.25–0.5DC		≤8	0.10 (0.08–0.12)	≤28	0.10 (0.08–0.12)
					≤8	0.08 (0.06–0.10)	≤28	0.10 (0.08–0.12)
			0.5–0.75DC		≤6	0.08 (0.06–0.10)	≤14	0.08 (0.06–0.10)
					≤6	0.07 (0.06–0.08)	≤14	0.07 (0.06–0.08)
			DC(Slot)		≤4	0.08 (0.06–0.10)	≤4	0.08 (0.06–0.10)
					≤4	0.07 (0.06–0.08)	≤4	0.07 (0.06–0.08)

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

(mm)

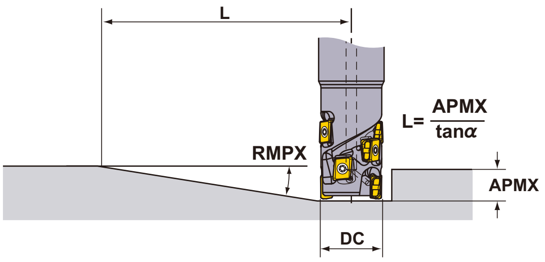
	Work Material	Properties	ae	Cutting Conditions	DC			
					ø20–ø28		ø32–ø50	
					ap	fz (mm/t.)	ap	fz (mm/t.)
K	Gray Cast Iron	Tensile Strength ≤350MPa	≤0.25DC	● ◐	≤14	0.13 (0.10–0.15)	≤APMX	0.15 (0.10–0.20)
				✤	≤14	0.10 (0.08–0.12)	≤APMX	0.12 (0.08–0.15)
			0.25–0.5DC	● ◐	≤8	0.10 (0.08–0.12)	≤28	0.12 (0.08–0.15)
				✤	≤8	0.08 (0.06–0.10)	≤28	0.10 (0.08–0.12)
			0.5–0.75DC	● ◐	≤6	0.10 (0.08–0.12)	≤14	0.10 (0.08–0.12)
				✤	≤6	0.08 (0.06–0.10)	≤14	0.08 (0.06–0.10)
			DC(Slot)	● ◐	≤4	0.08 (0.06–0.10)	≤4	0.08 (0.06–0.10)
				✤	≤4	0.07 (0.06–0.08)	≤4	0.07 (0.06–0.08)
	Ductile Cast Iron	–	≤0.25DC	● ◐	≤14	0.13 (0.10–0.15)	≤APMX	0.15 (0.10–0.20)
				✤	≤14	0.10 (0.08–0.12)	≤APMX	0.13 (0.10–0.15)
			0.25–0.5DC	● ◐	≤8	0.10 (0.08–0.12)	≤28	0.13 (0.10–0.15)
				✤	≤8	0.08 (0.06–0.10)	≤28	0.10 (0.08–0.12)
			0.5–0.75DC	● ◐	≤6	0.10 (0.08–0.12)	≤14	0.10 (0.08–0.12)
				✤	≤6	0.08 (0.06–0.10)	≤14	0.08 (0.06–0.10)
			DC(Slot)	● ◐	≤4	0.08 (0.06–0.10)	≤4	0.08 (0.06–0.10)
				✤	≤4	0.07 (0.06–0.08)	≤4	0.07 (0.06–0.08)
N	Aluminium Alloy	Content Si<5%	≤0.25DC	● ◐	≤14	0.15 (0.10–0.20)	≤APMX	0.18 (0.10–0.25)
				✤	≤14	0.13 (0.10–0.15)	≤APMX	0.15 (0.10–0.20)
			0.25–0.5DC	● ◐	≤8	0.13 (0.10–0.15)	≤28	0.15 (0.10–0.20)
				✤	≤8	0.10 (0.08–0.12)	≤28	0.13 (0.10–0.15)
			0.5–0.75DC	● ◐	≤6	0.10 (0.08–0.12)	≤14	0.11 (0.06–0.15)
				✤	≤6	0.08 (0.06–0.10)	≤14	0.11 (0.06–0.15)
			DC(Slot)	● ◐	≤4	0.08 (0.06–0.10)	≤4	0.11 (0.06–0.15)
				✤	≤4	0.07 (0.06–0.08)	≤4	0.09 (0.06–0.12)
S	Titanium Alloy (Ti-6Al-4V etc.)	–	≤0.25DC	● ◐ ✤	≤14	0.12 (0.08–0.15)	≤APMX	0.12 (0.08–0.15)
			0.25–0.5DC	● ◐ ✤	≤8	0.10 (0.08–0.12)	≤28	0.10 (0.08–0.12)
			0.5–0.75DC	● ◐ ✤	≤6	0.08 (0.06–0.10)	≤14	0.08 (0.06–0.10)
			DC(Slot)	● ◐ ✤	≤4	0.08 (0.06–0.10)	≤4	0.08 (0.06–0.10)
	Titanium Alloy (Ti-5Al-5V-5Mo-3Cr etc.)	–	≤0.25DC	● ◐ ✤	≤14	0.10 (0.08–0.12)	≤APMX	0.10 (0.08–0.12)
			0.25–0.5DC	● ◐ ✤	≤8	0.10 (0.08–0.12)	≤28	0.10 (0.08–0.12)
			0.5–0.75DC	● ◐ ✤	≤6	0.08 (0.06–0.10)	≤14	0.08 (0.06–0.10)
			DC(Slot)	● ◐ ✤	≤4	0.08 (0.06–0.10)	≤4	0.08 (0.06–0.10)
	Heat Resistant Alloy	–	≤0.25DC	● ◐ ✤	≤14	0.10 (0.08–0.12)	≤APMX	0.10 (0.08–0.12)
			0.25–0.5DC	● ◐ ✤	≤8	0.10 (0.08–0.12)	≤28	0.10 (0.08–0.12)
			0.5–0.75DC	● ◐ ✤	≤6	0.08 (0.06–0.10)	≤14	0.08 (0.06–0.10)
			DC(Slot)	● ◐ ✤	≤4	0.08 (0.06–0.10)	≤4	0.08 (0.06–0.10)

Note 1) If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.
Note 2) Chattering and vibrations are more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.
- When tool overhang is long
- Rigidity of machine, work material or attachment of work material is low
- At a corner radius during pocket milling

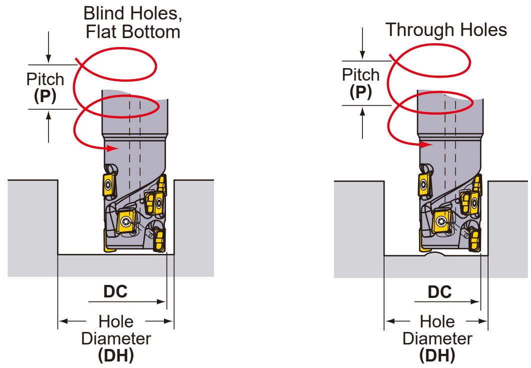
Note 3) A type with fewer teeth is recommended when the depth of cut in the radial direction (ae) is 0.5 DC or more.
Note 4) Wet cutting is recommended, when focusing on the surface finish. (Service life is shorter than for dry cutting.)
Note 5) When using higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

■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.

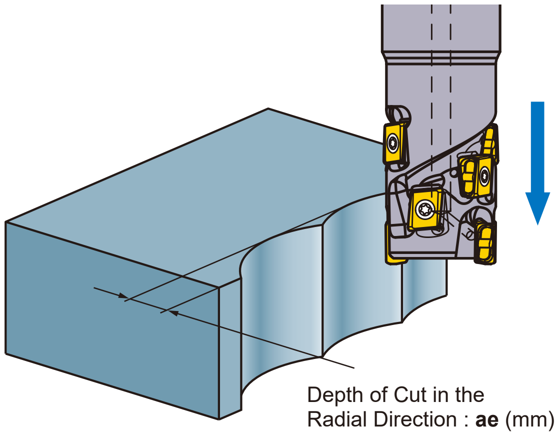
DC (mm)	RE (mm)	Ramping		Helical Cutting (Blind Hole, Flat Bottom)				Helical Cutting (Through Hole)	
		RMPX	L * (mm)	DH max. (mm)	P max. (mm)	DH min. (mm)	P max. (mm)	DH min. (mm)	P max. (mm)
20	0.2	1.35°	340	39.0	1.4	35.5	1.1	32.0	0.9
	0.4	1.35°	340	38.6	1.4	35.5	1.1	32.0	0.9
	0.8	1.35°	340	37.8	1.3	35.5	1.1	32.0	0.9
	1.0	1.35°	340	37.4	1.3	35.5	1.1	32.0	0.9
	1.2	1.35°	340	37.0	1.3	35.5	1.1	32.0	0.9
	1.6	1.35°	340	36.2	1.2	35.5	1.1	32.0	0.9
22	0.2	1.16°	396	43.0	1.3	39.5	1.1	36.0	0.9
	0.4	1.16°	396	42.6	1.3	39.5	1.1	36.0	0.9
	0.8	1.16°	396	41.8	1.3	39.5	1.1	36.0	0.9
	1.0	1.16°	396	41.4	1.2	39.5	1.1	36.0	0.9
	1.2	1.16°	396	41.0	1.2	39.5	1.1	36.0	0.9
	1.6	1.16°	396	40.2	1.2	39.5	1.1	36.0	0.9
25	0.2	0.97°	473	49.0	1.3	45.5	1.1	42.0	0.9
	0.4	0.97°	473	48.6	1.3	45.5	1.1	42.0	0.9
	0.8	0.97°	473	47.8	1.2	45.5	1.1	42.0	0.9
	1.0	0.97°	473	47.4	1.2	45.5	1.1	42.0	0.9
	1.2	0.97°	473	47.0	1.2	45.5	1.1	42.0	0.9
	1.6	0.97°	473	46.2	1.1	45.5	1.1	42.0	0.9
28	0.2	0.84°	546	55.0	1.2	51.5	1.1	48.0	0.9
	0.4	0.84°	546	54.6	1.2	51.5	1.1	48.0	0.9
	0.8	0.84°	546	53.8	1.2	51.5	1.1	48.0	0.9
	1.0	0.84°	546	53.4	1.2	51.5	1.1	48.0	0.9
	1.2	0.84°	546	53.0	1.2	51.5	1.1	48.0	0.9
	1.6	0.84°	546	52.2	1.1	51.5	1.1	48.0	0.9
32	0.2	0.71°	646	62.8	1.2	59.4	1.1	56.0	0.9
	0.4	0.71°	646	62.4	1.2	59.4	1.1	56.0	0.9
	0.8	0.71°	646	61.6	1.2	59.4	1.1	56.0	0.9
	1.0	0.71°	646	61.2	1.1	59.4	1.1	56.0	0.9
	1.2	0.71°	646	60.8	1.1	59.4	1.1	56.0	0.9
	1.6	0.71°	646	60.0	1.1	59.4	1.1	56.0	0.9
35	0.2	0.63°	728	69.0	1.2	65.5	1.1	62.0	0.9
	0.4	0.63°	728	68.6	1.2	65.5	1.1	62.0	0.9
	0.8	0.63°	728	67.8	1.1	65.5	1.1	62.0	0.9
	1.0	0.63°	728	67.4	1.1	65.5	1.1	62.0	0.9
	1.2	0.63°	728	67.0	1.1	65.5	1.1	62.0	0.9
	1.6	0.63°	728	66.2	1.1	65.5	1.1	62.0	0.9
40	0.2	0.54°	849	78.8	1.2	75.4	1.0	72.0	0.9
	0.4	0.54°	849	78.4	1.1	75.4	1.0	72.0	0.9
	0.8	0.54°	849	77.6	1.1	75.4	1.0	72.0	0.9
	1.0	0.54°	849	77.2	1.1	75.4	1.0	72.0	0.9
	1.2	0.54°	849	76.8	1.1	75.4	1.0	72.0	0.9
	1.6	0.54°	849	76.0	1.1	75.4	1.0	72.0	0.9
50	0.2	0.42°	1092	98.8	1.1	95.4	1.0	92.0	1.0
	0.4	0.42°	1092	98.4	1.1	95.4	1.0	92.0	1.0
	0.8	0.42°	1092	97.6	1.1	95.4	1.0	92.0	1.0
	1.0	0.42°	1092	97.2	1.1	95.4	1.0	92.0	1.0
	1.2	0.42°	1092	96.8	1.1	95.4	1.0	92.0	1.0
	1.6	0.42°	1092	96.0	1.1	95.4	1.0	92.0	1.0

Note 1) When machining a highly ductile work material with the ramping angles in the table above, chips may be elongated.
* Shows the distance until a maximum depth of cut of 8 mm is achieved at the maximum ramping angle L (= 8/tan α).

For Plunging and Drilling

See the tables to the right for cutting conditions. Follow the cutting conditions for slot milling regarding feed per tooth and cutting speed.

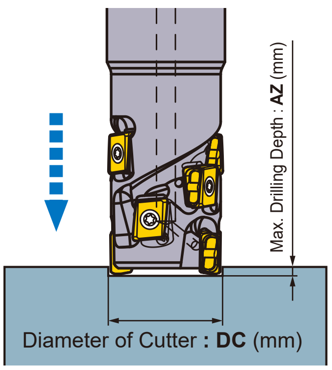
● Plunging



DC (mm)	**ae max.** (mm)
20	3.9
22	4.0
25	4.0
28	4.0
32	4.0
35	4.0
40	4.0
50	4.0

Note 1) No step feed necessary.

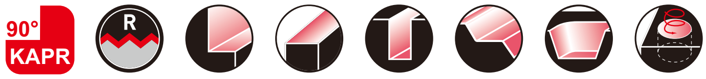
● Drilling



DC (mm)	**AZ max.** (mm)
20	0.3
22	0.3
25	0.3
28	0.3
32	0.3
35	0.3
40	0.3
50	0.3

Note 1) Exercise due caution as chips scatter easily.
Note 2) Use compressed air to eliminate chips (or coolant for when machining aluminium alloy).

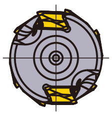
DEEP SHOULDER MILLING

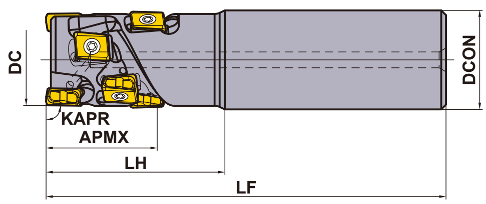


VPX300 NEW

LONG CUTTING EDGE

P M K N S H





Right hand tool holder only.

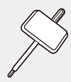
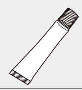
■CYLINDRICAL SHANK

With Coolant Hole

DC (mm)	Order Number	Stock R	Number of Flutes	Total	Dimensions (mm) DCON	LF	LH	APMX (mm)	RMPX	WT *2 (kg)	Insert Type *1
40	**VPX300R402SA32S02104**	●	2	4	32	125	45	21	1.06°	0.78	LOGU12
40	**VPX300R402SA32S03106**	●	2	6	32	130	50	31	1.06°	0.79	LOGU12
40	**VPX300R402SA32S04208**	●	2	8	32	140	60	42	1.06°	0.84	LOGU12

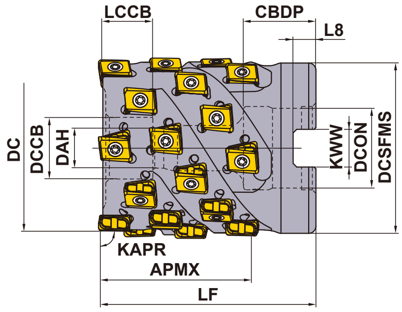
*1 Corner radius RE 0.8mm is recommended for the peripheral cutting edges except the bottom cutting edge (end cutting).
Insert RE 0.2mm and 0.4 mm can also be used for the peripheral cutting edges.
*2 WT : Tool Weight

SPARE PARTS

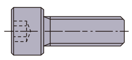
DC (mm)	Tool Holder Type	 Clamp Screw *	 Wrench	 Anti-seize Lubricant
40	**VPX300R40**	TPS40F1	TIP15W	MK1KS

* Clamp Torque (N • m) : TPS40F1 = 3.5

● : Inventory maintained. ★ : Inventory maintained in Japan.



Right hand tool holder only.

Order Number	APMX	Set Bolt	Geometry
VPX300-040A02A031	31	HSC08040	
VPX300-040A02A042	42	HSC08050	
VPX300-050A03A031	31	HSC10040	
VPX300-050A03A042	42	HSC10050	
VPX300-050A03A052	52	HSC10060	
VPX300-063A04A042	42	HSC12050	
VPX300-063A04A052	52	HSC12060	
VPX300-080A05A052	52	HSC12060	
VPX300-080A05A063	63	HSC12070	
VPX300R08005CA052	52	HSC16055	
VPX300R08005CA063	63	HSC16065	

■SHELL TYPE

KAPR: 90°
GAMP: -6° GAMF : -22.5°
With Coolant Hole
DCON = mm size

DC (mm)	Order Number	Stock	Number of Flutes	Total	Dimensions (mm)		WT *2 (kg)	APMX (mm)	RMPX	*1 Insert Type
		R			LF	DCON				
40	**VPX300-040A02A031R06**	●	2	6	50	16	0.26	31	1.06°	LOGU12
40	**VPX300-040A02A042R08**	●	2	8	60	16	0.31	42	1.06°	LOGU12
50	**VPX300-050A03A031R09**	●	3	9	55	22	0.47	31	0.79°	LOGU12
50	**VPX300-050A03A042R12**	●	3	12	65	22	0.55	42	0.79°	LOGU12
50	**VPX300-050A03A052R15**	●	3	15	75	22	0.63	52	0.79°	LOGU12
63	**VPX300-063A04A042R16**	★	4	16	65	27	0.92	42	0.6°	LOGU12
63	**VPX300-063A04A052R20**	★	4	20	75	27	1.06	52	0.6°	LOGU12
80	**VPX300-080A05A052R25**	★	5	25	75	27	1.94	52	0.45°	LOGU12
80	**VPX300-080A05A063R30**	★	5	30	85	27	2.20	63	0.45°	LOGU12

DCON = inch size

DC (mm)	Order Number	Stock	Number of Flutes	Total	Dimensions (mm)		WT (kg)	APMX (mm)	RMPX	Insert Type
		R			LF	DCON				
80	**VPX300R08005CA05225**	★	5	25	75	31.75	1.81	52	0.45°	LOGU12
80	**VPX300R08005CA06330**	★	5	30	85	31.75	2.06	63	0.45°	LOGU12

*1 Corner radius RE 0.8mm is recommended for the peripheral cutting edges except the bottom cutting edge (end cutting).
Insert RE 0.2mm and 0.4 mm can also be used for the peripheral cutting edges.
*2 WT : Tool Weight

MOUNTING DIMENSIONS

DC (mm)	Order Number	Dimensions (mm)							
		DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
40	**VPX300-040A02A031R06**	16	18	9	14	8.4	37	8.4	5.6
40	**VPX300-040A02A042R08**	16	18	9	14	8.4	37	8.4	5.6
50	**VPX300-050A03A031R09**	22	20	11	17	12.4	47	10.4	6.3
50	**VPX300-050A03A042R12**	22	20	11	17	12.4	47	10.4	6.3
50	**VPX300-050A03A052R15**	22	20	11	17	12.4	47	10.4	6.3
63	**VPX300-063A04A042R16**	27	23	13	20	12.4	76	12.4	7.0
63	**VPX300-063A04A052R20**	27	23	13	20	12.4	76	12.4	7.0
80	**VPX300-080A05A052R25**	27	23	13	20	12.4	76	12.4	7.0
80	**VPX300-080A05A063R30**	27	23	13	20	12.4	76	12.4	7.0
80	**VPX300R08005CA05225**	31.75	32	17	26	17.4	76	12.7	8.0
80	**VPX300R08005CA06330**	31.75	32	17	26	17.4	76	12.7	8.0

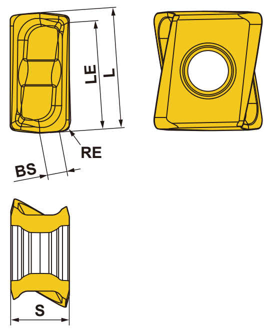
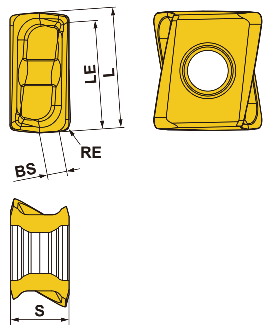
SPARE PARTS ➤N001
TECHNICAL DATA ➤P001

INSERTS

Work Material		MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	TF15
P	Steels		◐	✤				◐	
M	Stainless Steels				◐			◐	
K	Cast Irons	◐						✤	
N	Non-ferrous Metals								◐
S	Heat Resistant Alloys, Titanium Alloys					◐	✤	◐	
H	Hardened Steels							◐	

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

Honing :
E : Round **F** : Sharp

Shape	Order Number	Class	Honing	Coated MC5020	Coated MP6120	Coated MP6130	Coated MP7130	Coated MP9120	Coated MP9130	Coated VP15TF	Carbide TF15	Dimensions (mm) L	RE	LE	S	BS	Geometry
Low Cutting Resistance **L** Breaker	LOGU1207020PNER-L	G	E	★	★	★	★	★	★	★		12.4	0.2	11.3	7.0	3.0	
	LOGU1207040PNER-L	G	E	●	●	●	●	●	●	★		12.4	0.4	11.3	7.0	2.8	
	LOGU1207080PNER-L	G	E	●	●	●	●	●	●	★		12.4	0.8	11.3	7.0	2.6	
	LOGU1207100PNER-L	G	E	★	★	★	★	★	★	★		12.4	1.0	11.3	7.0	2.5	
	LOGU1207120PNER-L	G	E	●	●	●	●	●	●	★		12.4	1.2	11.3	7.0	2.4	
	LOGU1207160PNER-L	G	E	●	●	●	●	●	●	★		12.4	1.6	11.3	7.0	1.8	
	LOGU1207200PNER-L	G	E	●	●	●	●	●	●	★		12.4	2.0	11.3	7.0	1.4	
NEW	LOGU1207240PNER-L	G	E	●	●	●	●	●	●	★		12.4	2.4	11.3	7.0	1.2	
	LOGU1207300PNER-L	G	E	★	★	★	★	★	★	★		12.4	3.0	11.3	7.0	0.6	
	LOGU1207320PNER-L	G	E	●	●	●	●	●	●	★		12.4	3.2	11.3	7.0	0.4	
	LOGU1207020PNFR-L	G	F								★	12.4	0.2	11.3	7.0	3.0	
	LOGU1207040PNFR-L	G	F								●	12.4	0.4	11.3	7.0	2.8	
	LOGU1207080PNFR-L	G	F								●	12.4	0.8	11.3	7.0	2.6	
	LOGU1207100PNFR-L	G	F								★	12.4	1.0	11.3	7.0	2.5	
	LOGU1207120PNFR-L	G	F								●	12.4	1.2	11.3	7.0	2.4	
	LOGU1207160PNFR-L	G	F								●	12.4	1.6	11.3	7.0	1.8	
	LOGU1207200PNFR-L	G	F								●	12.4	2.0	11.3	7.0	1.4	
	LOGU1207240PNFR-L	G	F								●	12.4	2.4	11.3	7.0	1.2	
	LOGU1207300PNFR-L	G	F								★	12.4	3.0	11.3	7.0	0.6	
	LOGU1207320PNFR-L	G	F								●	12.4	3.2	11.3	7.0	0.4	Right hand insert only.
General Use **M** Breaker	LOGU1207020PNER-M	G	E	★	★	★	★	★	★	★		12.4	0.2	11.3	7.0	3.0	
	LOGU1207040PNER-M	G	E	●	●	●	●	●	●	★		12.4	0.4	11.3	7.0	2.8	
	LOGU1207080PNER-M	G	E	●	●	●	●	●	●	★		12.4	0.8	11.3	7.0	2.4	
	LOGU1207100PNER-M	G	E	★	★	★	★	★	★	★		12.4	1.0	11.3	7.0	2.3	
	LOGU1207120PNER-M	G	E	●	●	●	●	●	●	★		12.4	1.2	11.3	7.0	2.1	
	LOGU1207160PNER-M	G	E	●	●	●	●	●	●	★		12.4	1.6	11.3	7.0	1.7	
	LOGU1207200PNER-M	G	E	●	●	●	●	●	●	★		12.4	2.0	11.3	7.0	1.4	
	LOGU1207240PNER-M	G	E	●	●	●	●	●	●	★		12.4	2.4	11.3	7.0	1.0	
	LOGU1207300PNER-M	G	E	★	★	★	★	★	★	★		12.4	3.0	11.3	7.0	0.5	
	LOGU1207320PNER-M	G	E	●	●	●	●	●	●	★		12.4	3.2	11.3	7.0	0.3	
	LOGU1207020PNFR-M	G	F								★	12.4	0.2	11.3	7.0	3.0	
	LOGU1207040PNFR-M	G	F								●	12.4	0.4	11.3	7.0	2.8	
	LOGU1207080PNFR-M	G	F								●	12.4	0.8	11.3	7.0	2.4	
	LOGU1207100PNFR-M	G	F								★	12.4	1.0	11.3	7.0	2.3	
	LOGU1207120PNFR-M	G	F								●	12.4	1.2	11.3	7.0	2.1	
	LOGU1207160PNFR-M	G	F								●	12.4	1.6	11.3	7.0	1.7	
	LOGU1207200PNFR-M	G	F								●	12.4	2.0	11.3	7.0	1.4	
	LOGU1207240PNFR-M	G	F								●	12.4	2.4	11.3	7.0	1.0	
	LOGU1207300PNFR-M	G	F								★	12.4	3.0	11.3	7.0	0.5	
	LOGU1207320PNFR-M	G	F								●	12.4	3.2	11.3	7.0	0.3	Right hand insert only.

● ★ = NEW

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

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

CHIPBREAKER RECOMMENDATION

■ Chipbreaker Selection Table

	Work Material	Properties	Cutting Conditions	Chipbreaker		Grade	
				1st Recommendation	2nd Recommendation	1st Recommendation	2nd Recommendation
P	Mild Steel	Hardness ≤180HB	● ◐	L	M	MP6120	VP15TF
			✤	M	L	MP6130	–
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 180-350HB ≤350HB (Annealing)	●	L	M	MP6120	VP15TF
			◐	M	L	MP6120	VP15TF
			✤	M	L	MP6130	–
	Pre-hardened Steel	Hardness 35–45HRC	● ◐	M	L	MP6120	VP15TF
			✤	M	L	MP6130	–
M	Austenitic Stainless Steel	Hardness ≤280HB	● ◐	L	M	MP7130	VP15TF
			✤	M	L	MP7130	–
		Hardness >200HB	● ◐	L	M	MP7130	VP15TF
			✤	M	L	MP7130	–
	Duplex Stainless Steel	Hardness ≤280HB	● ◐	L	M	MP7130	VP15TF
			✤	M	L	MP7130	–
	Ferritic and Martensitic Stainless Steel	–	● ◐	L	M	MP7130	VP15TF
			✤	M	L	MP7130	–
	Precipitation Hardening Stainless Steel	Hardness <450HB	● ◐	L	M	MP7130	VP15TF
			✤	M	L	MP7130	–
K	Gray Cast Iron	Tensile Strength ≤350MPa	● ◐	M	L	MC5020	VP15TF
			✤	M	L	VP15TF	–
	Ductile Cast Iron	Tensile Strength ≤800MPa	● ◐	M	L	MC5020	VP15TF
			✤	M	L	VP15TF	–
N	Aluminium Alloy	Content Si<5%	● ◐	L	M	TF15	–
			✤	M	L	TF15	–
S	Titanium Alloy (Ti-6Al-4V,etc.)	–	● ◐	L	M	MP9120	VP15TF
			✤	M	L	MP9130	–
	Titanium Alloy (Ti-5Al-5V-5Mo-3Cr,etc.)	–	● ◐	L	M	MP9120	VP15TF
			✤	M	L	MP9130	–
	Heat Resistant Alloy	–	● ◐	M	L	MP9120	VP15TF
			✤	M	L	MP9130	–
H	Hardened Steel	Hardness 40–55HRC	● ◐ ✤	M	–	VP15TF	–

RECOMMENDED CUTTING CONDITIONS

■ Cutting Speed

(mm)

	Work Material	Properties	Cutting Conditions	Grade	ae ≤0.25DC	ae 0.25—0.5DC	ae 0.5—0.75DC	ae DC(Slot)	Cutting Mode
					Vc (m/min)				
P	Mild Steel	Hardness ≤180HB		MP6120,VP15TF	140(100—190)	130(90—180)	100(70—120)	100(70—120)	Dry, Wet
				MP6130	140(100—190)	130(90—180)	100(70—120)	100(70—120)	Dry, Wet
	Carbon Steel Alloy Steel	Hardness 180—350HB		MP6120,VP15TF	120(90—140)	110(80—130)	100(70—120)	100(70—120)	Dry, Wet
				MP6130	120(90—140)	110(80—130)	100(70—120)	100(70—120)	Dry, Wet
	Pre-hardened Steel	Hardness 180—350HB		MP6120,VP15TF	100(80—120)	90(70—110)	80(60—100)	80(60—100)	Dry, Wet
				MP6130	100(80—120)	90(70—110)	80(60—100)	80(60—100)	Dry, Wet
M	Austenitic Stainless Steel	Hardness ≤200HB		MP7130,VP15TF	120(100—150)	110(90—140)	90(70—120)	90(70—120)	Dry, Wet
				MP7130	120(100—150)	110(90—140)	90(70—120)	90(70—120)	Dry, Wet
		Hardness >200HB		MP7130,VP15TF	100(80—130)	90(70—120)	70(50—100)	70(50—100)	Dry, Wet
				MP7130	100(80—130)	90(70—120)	70(50—100)	70(50—100)	Dry, Wet
	Ferritic and Martensitic Stainless Steel	—		MP7130,VP15TF	120(100—150)	110(90—140)	90(70—120)	90(70—120)	Dry, Wet
				MP7130	120(100—150)	110(90—140)	90(70—120)	90(70—120)	Dry, Wet
	Duplex Stainless Steel	Hardness ≤280HB		MP7130,VP15TF	100(80—130)	90(70—120)	70(50—100)	70(50—100)	Dry, Wet
				MP7130	100(80—130)	90(70—120)	70(50—100)	70(50—100)	Dry, Wet
	Precipitation Hardening Stainless Steel	Hardness <450HB		MP7130,VP15TF	90(70—120)	80(60—110)	60(40—90)	60(40—90)	Dry, Wet
				MP7130	90(70—120)	80(60—110)	60(40—90)	60(40—90)	Dry, Wet
K	Gray Cast Iron	Tensile Strength ≤350MPa		MC5020	180(160—220)	170(150—210)	150(130—190)	150(130—190)	Dry, Wet
				VP15TF	130(100—150)	120(90—140)	100(80—120)	100(80—120)	Dry, Wet
	Ductile Cast Iron	Tensile Strength ≤800MPa		MC5020	160(140—180)	150(130—170)	130(110—150)	130(110—150)	Dry, Wet
				VP15TF	110(80—140)	100(70—130)	80(60—120)	80(60—120)	Dry, Wet
N	Aluminium Alloy	Content Si<5%		TF15	600(400—1000)	600(400—1000)	600(400—1000)	600(400—1000)	Dry, Wet
S	Titanium Alloy (Ti-6Al-4V etc.)	—		MP9120	50(40—70)	50(40—70)	50(40—70)	50(40—70)	Wet
				VP15TF	50(40—70)	50(40—70)	50(40—70)	50(40—70)	Wet
				MP9130	50(40—70)	50(40—70)	50(40—70)	50(40—70)	Wet
	Titanium Alloy (Ti-6Al-5V-5Mo-3Cr etc.)	—		MP9120	30(20—40)	30(20—40)	30(20—40)	30(20—40)	Wet
				VP15TF	30(20—40)	30(20—40)	30(20—40)	30(20—40)	Wet
				MP9130	30(20—40)	30(20—40)	30(20—40)	30(20—40)	Wet
	Heat Resistant Alloy	—		MP9120	40(30—60)	40(30—60)	40(30—60)	40(30—60)	Wet
				VP15TF	40(30—60)	40(30—60)	40(30—60)	40(30—60)	Wet
				MP9130	40(30—60)	40(30—60)	40(30—60)	40(30—60)	Wet

Note 1) If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.
Note 2) Chattering and vibrations are more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.
- When tool overhang is long
- Rigidity of machine, work material or attachment of work material is low
- At a corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radial direction (ae) is 0.5 DC or more.
Note 4) Wet cutting is recommended, when focusing on the surface finish. (Service life is shorter than for dry cutting.)
Note 5) When using higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

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

■ Depth of Cut / Feed per Tooth

(mm)

	Work Material	Properties	ae	Cutting Conditions	DC ø40 ap	DC ø40 fz (mm/t.)	DC ø50–ø80 ap	DC ø50–ø80 fz (mm/t.)
P	Mild Steel	Hardness ≤180HB	≤0.25DC	● ◐ ✤	≤APMX	0.15 (0.10–0.20)	≤APMX	0.18 (0.10–0.25)
			0.25–0.5DC	● ◐ ✤	≤APMX	0.13 (0.10–0.15)	≤31	0.15 (0.10–0.20)
			0.5–0.75DC	● ◐ ✤	≤21	0.10 (0.08–0.12)	≤21	0.13 (0.10–0.15)
			DC(Slot)	● ◐ ✤	≤5	0.08 (0.06–0.10)	≤5	0.10 (0.08–0.12)
	Carbon Steel Alloy Steel	Hardness 180–280HB	≤0.25DC	● ◐ ✤	≤APMX	0.15 (0.10–0.20)	≤APMX	0.18 (0.10–0.25)
			0.25–0.5DC	● ◐ ✤	≤APMX	0.13 (0.10–0.15)	≤31	0.15 (0.10–0.20)
			0.5–0.75DC	● ◐ ✤	≤21	0.10 (0.08–0.12)	≤21	0.13 (0.10–0.15)
			DC(Slot)	● ◐ ✤	≤5	0.08 (0.06–0.10)	≤5	0.10 (0.08–0.12)
	Carbon Steel Alloy Steel	Hardness 280–350HB	≤0.25DC	● ◐ ✤	≤APMX	0.13 (0.10–0.15)	≤APMX	0.15 (0.10–0.20)
			0.25–0.5DC	● ◐ ✤	≤APMX	0.10 (0.08–0.12)	≤31	0.13 (0.10–0.15)
			0.5–0.75DC	● ◐ ✤	≤21	0.08 (0.06–0.10)	≤21	0.10 (0.08–0.12)
			DC(Slot)	● ◐ ✤	≤5	0.08 (0.06–0.10)	≤5	0.08 (0.06–0.10)
	Pre-hardened Steel	Hardness 35–45HRC	≤0.25DC	● ◐ ✤	≤APMX	0.13 (0.10–0.15)	≤APMX	0.15 (0.10–0.20)
			0.25–0.5DC	● ◐ ✤	≤APMX	0.10 (0.08–0.12)	≤31	0.13 (0.10–0.15)
			0.5–0.75DC	● ◐ ✤	≤21	0.08 (0.06–0.10)	≤21	0.10 (0.08–0.12)
			DC(Slot)	● ◐ ✤	≤5	0.08 (0.06–0.10)	≤5	0.08 (0.06–0.10)
M	Austenitic Stainless Steel	–	≤0.25DC	● ◐	≤APMX	0.15 (0.10–0.20)	≤APMX	0.15 (0.10–0.20)
				✤	≤APMX	0.12 (0.08–0.15)	≤APMX	0.12 (0.08–0.15)
			0.25–0.5DC	● ◐	≤APMX	0.12 (0.08–0.15)	≤31	0.12 (0.08–0.15)
				✤	≤APMX	0.10 (0.08–0.12)	≤31	0.10 (0.08–0.12)
			0.5–0.75DC	● ◐	≤21	0.10 (0.08–0.12)	≤21	0.10 (0.08–0.12)
				✤	≤21	0.08 (0.06–0.10)	≤21	0.08 (0.06–0.10)
			DC(Slot)	● ◐	≤5	0.08 (0.06–0.10)	≤5	0.08 (0.06–0.10)
				✤	≤5	0.07 (0.06–0.08)	≤5	0.07 (0.06–0.08)
	Ferritic and Martensitic Stainless Steel	Hardness ≤200HB	≤0.25DC	● ◐	≤APMX	0.15 (0.10–0.20)	≤APMX	0.15 (0.10–0.20)
				✤	≤APMX	0.12 (0.08–0.15)	≤APMX	0.12 (0.08–0.15)
			0.25–0.5DC	● ◐	≤APMX	0.12 (0.08–0.15)	≤31	0.12 (0.08–0.15)
				✤	≤APMX	0.10 (0.08–0.12)	≤31	0.10 (0.08–0.12)
			0.5–0.75DC	● ◐	≤21	0.10 (0.08–0.12)	≤21	0.10 (0.08–0.12)
				✤	≤21	0.08 (0.06–0.10)	≤21	0.08 (0.05–0.10)
			DC(Slot)	● ◐	≤5	0.08 (0.06–0.10)	≤5	0.08 (0.05–0.10)
				✤	≤5	0.07 (0.06–0.08)	≤5	0.07 (0.05–0.08)
	Duplex Stainless Steel	Hardness ≤280HB	≤0.25DC	● ◐	≤APMX	0.15 (0.10–0.20)	≤APMX	0.15 (0.10–0.20)
				✤	≤APMX	0.12 (0.08–0.15)	≤APMX	0.12 (0.08–0.15)
			0.25–0.5DC	● ◐	≤APMX	0.12 (0.08–0.15)	≤31	0.12 (0.08–0.15)
				✤	≤APMX	0.10 (0.08–0.12)	≤31	0.10 (0.08–0.12)
			0.5–0.75DC	● ◐	≤21	0.10 (0.08–0.12)	≤21	0.10 (0.08–0.12)
				✤	≤21	0.08 (0.06–0.10)	≤21	0.08 (0.06–0.10)
			DC(Slot)	● ◐	≤5	0.08 (0.06–0.10)	≤5	0.08 (0.06–0.10)
				✤	≤5	0.07 (0.06–0.08)	≤5	0.07 (0.06–0.08)
	Precipitation Hardening Stainless Steel	Hardness <450HB	≤0.25DC	● ◐	≤APMX	0.13 (0.10–0.15)	≤APMX	0.13 (0.10–0.15)
				✤	≤APMX	0.10 (0.08–0.12)	≤APMX	0.10 (0.08–0.12)
			0.25–0.5DC	● ◐	≤APMX	0.10 (0.08–0.12)	≤31	0.10 (0.08–0.12)
				✤	≤APMX	0.10 (0.08–0.12)	≤31	0.10 (0.08–0.12)
			0.5–0.75DC	● ◐	≤21	0.08 (0.06–0.10)	≤21	0.08 (0.05–0.10)
				✤	≤21	0.07 (0.06–0.08)	≤21	0.07 (0.05–0.08)
			DC(Slot)	● ◐	≤5	0.08 (0.06–0.10)	≤5	0.08 (0.05–0.10)
				✤	≤5	0.07 (0.06–0.08)	≤5	0.07 (0.05–0.08)

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

RECOMMENDED CUTTING CONDITIONS

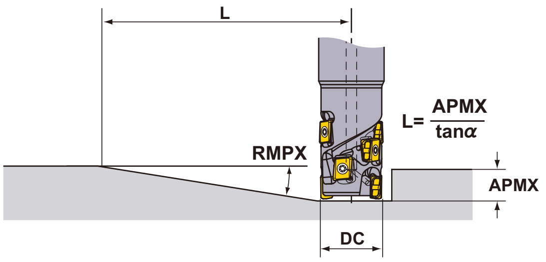
■ Depth of Cut / Feed per Tooth

(mm)

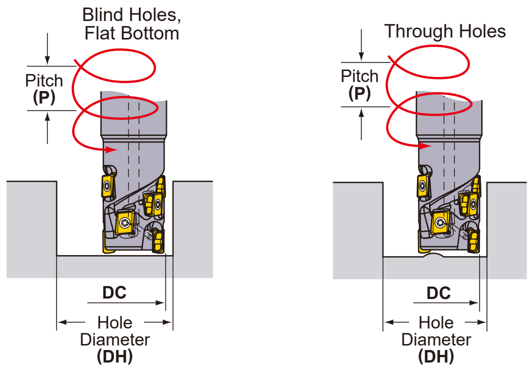
	Work Material	Properties	ae	Cutting Conditions	DC			
					ø40		ø50—ø80	
					ap	fz (mm/t.)	ap	fz (mm/t.)
K	Gray Cast Iron	Tensile Strength ≤350MPa	≤0.25DC	● ◐	≤APMX	0.15 (0.10—0.20)	≤APMX	0.18 (0.10—0.25)
				✽	≤APMX	0.12 (0.08—0.15)	≤APMX	0.15 (0.10—0.20)
			0.25—0.5DC	● ◐	≤APMX	0.12 (0.08—0.15)	≤31	0.15 (0.10—0.20)
				✽	≤APMX	0.10 (0.08—0.12)	≤31	0.13 (0.10—0.15)
			0.5—0.75DC	● ◐	≤21	0.10 (0.08—0.12)	≤21	0.13 (0.10—0.15)
				✽	≤21	0.08 (0.06—0.10)	≤21	0.10 (0.08—0.12)
			DC(Slot)	● ◐	≤5	0.08 (0.06—0.10)	≤5	0.12 (0.08—0.15)
				✽	≤5	0.07 (0.06—0.08)	≤5	0.08 (0.06—0.10)
	Ductile Cast Iron	–	≤0.25DC	● ◐	≤APMX	0.15 (0.10—0.20)	≤APMX	0.15 (0.10—0.20)
				✽	≤APMX	0.13 (0.10—0.15)	≤APMX	0.13 (0.10—0.15)
			0.25—0.5DC	● ◐	≤APMX	0.13 (0.10—0.15)	≤31	0.13 (0.10—0.15)
				✽	≤APMX	0.10 (0.08—0.12)	≤31	0.10 (0.08—0.12)
			0.5—0.75DC	● ◐	≤21	0.10 (0.08—0.12)	≤21	0.10 (0.08—0.12)
				✽	≤21	0.08 (0.06—0.10)	≤21	0.08 (0.06—0.10)
			DC(Slot)	● ◐	≤5	0.08 (0.06—0.10)	≤5	0.08 (0.06—0.10)
				✽	≤5	0.07 (0.06—0.08)	≤5	0.07 (0.06—0.08)
N	Aluminium Alloy	Content Si<5%	≤0.25DC	● ◐	≤APMX	0.18 (0.10—0.25)	≤APMX	0.18 (0.10—0.25)
				✽	≤APMX	0.15 (0.10—0.20)	≤APMX	0.15 (0.10—0.20)
			0.25—0.5DC	● ◐	≤APMX	0.15 (0.10—0.20)	≤31	0.15 (0.10—0.20)
				✽	≤APMX	0.13 (0.10—0.15)	≤31	0.13 (0.10—0.15)
			0.5—0.75DC	● ◐	≤21	0.11 (0.06—0.15)	≤21	0.12 (0.08—0.15)
				✽	≤21	0.11 (0.06—0.15)	≤21	0.12 (0.08—0.15)
			DC(Slot)	● ◐	≤5	0.11 (0.06—0.15)	≤5	0.12 (0.08—0.15)
				✽	≤5	0.09 (0.06—0.12)	≤5	0.10 (0.08—0.12)
S	Titanium Alloy (Ti-6Al-4V etc.)	–	≤0.25DC	● ◐ ✽	≤APMX	0.12 (0.08—0.15)	≤APMX	0.12 (0.08—0.15)
			0.25—0.5DC	● ◐ ✽	≤APMX	0.10 (0.08—0.12)	≤31	0.10 (0.08—0.12)
			0.5—0.75DC	● ◐ ✽	≤21	0.08 (0.06—0.10)	≤21	0.08 (0.06—0.10)
			DC(Slot)	● ◐ ✽	≤5	0.08 (0.06—0.10)	≤5	0.08 (0.06—0.10)
	Titanium Alloy (Ti-5Al-5V-5Mo-3Cr etc.)	–	≤0.25DC	● ◐ ✽	≤APMX	0.10 (0.08—0.12)	≤APMX	0.10 (0.08—0.12)
			0.25—0.5DC	● ◐ ✽	≤APMX	0.10 (0.08—0.12)	≤31	0.10 (0.08—0.12)
			0.5—0.75DC	● ◐ ✽	≤21	0.08 (0.06—0.10)	≤21	0.08 (0.06—0.10)
			DC(Slot)	● ◐ ✽	≤5	0.08 (0.06—0.10)	≤5	0.08 (0.06—0.10)
	Heat Resistant Alloy	–	≤0.25DC	● ◐ ✽	≤APMX	0.10 (0.08—0.12)	≤APMX	0.10 (0.08—0.12)
			0.25—0.5DC	● ◐ ✽	≤APMX	0.10 (0.08—0.12)	≤31	0.10 (0.08—0.12)
			0.5—0.75DC	● ◐ ✽	≤21	0.08 (0.06—0.10)	≤21	0.08 (0.06—0.10)
			DC(Slot)	● ◐ ✽	≤5	0.08 (0.06—0.10)	≤5	0.08 (0.06—0.10)

■ 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.

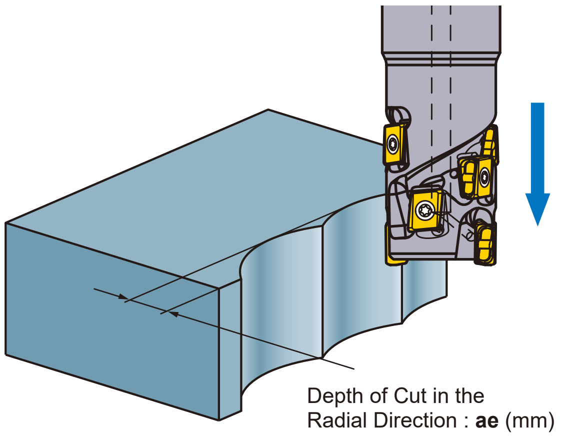
DC (mm)	RE (mm)	Ramping		Helical Cutting (Blind Hole, Flat Bottom)				Helical Cutting (Through Hole)	
		RMPX	L (mm) *	DH max. (mm)	P max. (mm)	DH min. (mm)	P max. (mm)	DH min. (mm)	P max. (mm)
40	0.2	1.06°	595	78.8	2.3	72.7	1.9	66.5	1.5
	0.4	1.06°	595	78.4	2.2	72.7	1.9	66.5	1.5
	0.8	1.06°	595	77.6	2.2	72.7	1.9	66.5	1.5
	1.0	1.06°	595	77.2	2.2	72.7	1.9	66.5	1.5
	1.2	1.06°	595	76.8	2.1	72.7	1.9	66.5	1.5
	1.6	1.06°	595	76.0	2.1	72.7	1.9	66.5	1.5
	2.0	1.06°	595	75.2	2.0	72.7	1.9	66.5	1.5
	2.4	1.06°	595	74.4	2.0	72.7	1.9	66.5	1.5
	3.0	1.06°	595	73.2	1.9	72.7	1.9	66.5	1.5
	3.2	1.06°	595	72.8	1.9	72.7	1.9	66.5	1.5
50	0.2	0.79°	798	98.8	2.1	92.7	1.8	86.5	1.6
	0.4	0.79°	798	98.4	2.1	92.7	1.8	86.5	1.6
	0.8	0.79°	798	97.6	2.1	92.7	1.8	86.5	1.6
	1.0	0.79°	798	97.2	2.0	92.7	1.8	86.5	1.6
	1.2	0.79°	798	96.8	2.0	92.7	1.8	86.5	1.6
	1.6	0.79°	798	96.0	2.0	92.7	1.8	86.5	1.6
	2.0	0.79°	798	95.2	2.0	92.7	1.8	86.5	1.6
	2.4	0.79°	798	94.4	1.9	92.7	1.8	86.5	1.6
	3.0	0.79°	798	93.2	1.9	92.7	1.8	86.5	1.6
	3.2	0.79°	798	92.8	1.9	92.7	1.8	86.5	1.6
63	0.2	0.6°	1051	124.8	2.0	118.7	1.8	112.5	1.6
	0.4	0.6°	1051	124.4	2.0	118.7	1.8	112.5	1.6
	0.8	0.6°	1051	123.6	2.0	118.7	1.8	112.5	1.6
	1.0	0.6°	1051	123.2	2.0	118.7	1.8	112.5	1.6
	1.2	0.6°	1051	122.8	2.0	118.7	1.8	112.5	1.6
	1.6	0.6°	1051	122.0	1.9	118.7	1.8	112.5	1.6
	2.0	0.6°	1051	121.2	1.9	118.7	1.8	112.5	1.6
	2.4	0.6°	1051	120.4	1.9	118.7	1.8	112.5	1.6
	3.0	0.6°	1051	119.2	1.9	118.7	1.8	112.5	1.6
	3.2	0.6°	1051	118.8	1.8	118.7	1.8	112.5	1.6
80	0.2	0.45°	1401	158.8	1.9	152.6	1.8	146.5	1.6
	0.4	0.45°	1401	158.4	1.9	152.7	1.8	146.5	1.6
	0.8	0.45°	1401	157.6	1.9	152.7	1.8	146.5	1.6
	1.0	0.45°	1401	157.2	1.9	152.7	1.8	146.5	1.6
	1.2	0.45°	1401	156.8	1.9	152.7	1.8	146.5	1.6
	1.6	0.45°	1401	156.0	1.9	152.7	1.8	146.5	1.6
	2.0	0.45°	1401	155.2	1.9	152.7	1.8	146.5	1.6
	2.4	0.45	1401	154.4	1.8	152.7	1.8	146.5	1.6
	3.0	0.45	1401	153.2	1.8	152.7	1.8	146.5	1.6
	3.2	0.45	1401	152.8	1.8	152.7	1.8	146.5	1.6

Note 1) When machining a highly ductile work material with the ramping angles in the table above, chips may be elongated.
* Shows the distance until a maximum depth of cut of 11 mm is achieved at the maximum ramping angle L (= 11/tan α).

For Plunging and Drilling

See the tables to the right for cutting conditions. Follow the cutting conditions for slot milling regarding feed per tooth and cutting speed.

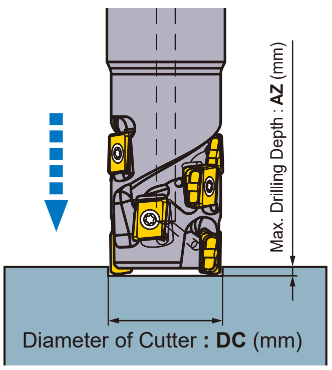
● Plunging



DC (mm)	**ae max.** (mm)
40	6.7
50	6.7
63	6.7
80	6.7

Note 1) No step feed necessary.

● Drilling



DC (mm)	**AZ max.** (mm)
40	0.55
50	0.55
63	0.55
80	0.55

Note 1) Exercise due caution as chips scatter easily.
Note 2) Use compressed air to eliminate chips (or coolant for when machining aluminium alloy).

MULTI FUNCTIONAL MILLING

90° KAPR

APX3000

P M K N S H

Fig.1

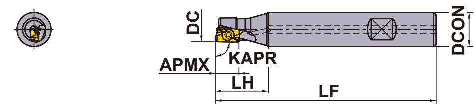


Fig.2

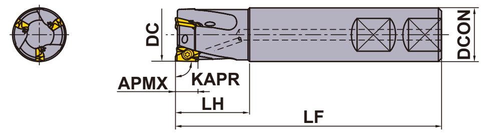
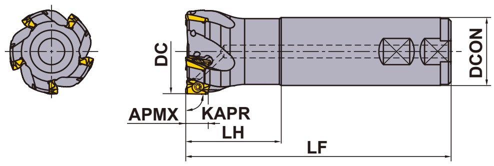


Fig.3



Right hand tool holder only.

■WELDON SHANK TYPE

KAPR :90°
With Coolant Hole

DC (mm)	Order Number	Stock R	Number of Teeth	Dimensions(mm) DCON	LF	LH	WT* (kg)	APMX (mm)	RMPX	RPMX (min-1)	Fig.	Insert Type
12	**APX3000R121WA16SA**	●	1	16	85	25	0.10	10	6.0°	10500	1	AO□T12
14	**APX3000R141WA16SA**	●	1	16	85	25	0.11	10	6.0°	9000	1	AO□T12
16	**APX3000R162WA16SA**	●	2	16	85	25	0.11	10	11.3°	20900	2	AO□T12
18	**APX3000R182WA16SA**	●	2	16	85	25	0.11	10	8.6°	19600	3	AO□T12
18	**APX3000R182WA16LA**	●	2	16	120	25	0.16	10	8.6°	19600	3	AO□T12
20	**APX3000R202WA20SA**	●	2	20	100	30	0.21	10	6.9°	18500	2	AO□T12
20	**APX3000R203WA20SA**	●	3	20	100	30	0.21	10	6.9°	18500	2	AO□T12
20	**APX3000R202WA20LA**	●	2	20	150	60	0.32	10	6.9°	18500	2	AO□T12
22	**APX3000R223WA20SA**	●	3	20	115	30	0.25	10	5.7°	17600	3	AO□T12
22	**APX3000R222WA20LA**	●	2	20	150	30	0.34	10	5.7°	17600	3	AO□T12
25	**APX3000R252WA25SA**	●	2	25	115	35	0.38	10	4.6°	16400	2	AO□T12
25	**APX3000R253WA25SA**	●	3	25	115	35	0.38	10	4.6°	16400	2	AO□T12
25	**APX3000R254WA25SA**	●	4	25	115	35	0.38	10	4.6°	16400	2	AO□T12
25	**APX3000R253WA25LA**	●	3	25	170	70	0.51	10	4.6°	16400	2	AO□T12
28	**APX3000R284WA25SA**	●	4	25	115	35	0.40	10	3.8°	15500	3	AO□T12
28	**APX3000R283WA25LA**	●	3	25	170	35	0.61	10	3.8°	15500	3	AO□T12
30	**APX3000R304WA32SA**	●	4	32	125	45	0.64	10	3.4°	14900	1	AO□T12
32	**APX3000R323WA32SA**	●	3	32	125	45	0.68	10	3.1°	14400	2	AO□T12
32	**APX3000R324WA32SA**	●	4	32	125	45	0.67	10	3.1°	14400	2	AO□T12
32	**APX3000R325WA32SA**	●	5	32	125	45	0.68	10	3.1°	14400	2	AO□T12
35	**APX3000R353WA32LA**	●	3	32	190	45	1.11	10	2.7°	13700	3	AO□T12
40	**APX3000R403WA32SA**	□	3	32	125	45	0.75	10	2.2°	12800	3	AO□T12
40	**APX3000R405WA32SA**	●	5	32	125	45	0.75	10	2.2°	12800	3	AO□T12
40	**APX3000R406WA32SA**	●	6	32	125	45	0.76	10	2.2°	12800	3	AO□T12

Note 1) When using inserts with corner radius RE≥2.4mm, machining of the holder is required as shown on page K137.
Note 2) The maximum allowable spindle speeds (**RPMX**) 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.
* WT : Tool Weight

● : Inventory maintained. □ : Non stock, produced to order only.

Fig.1

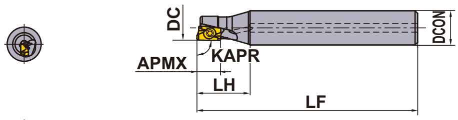


Fig.2

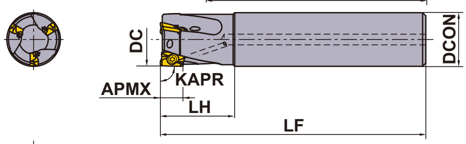
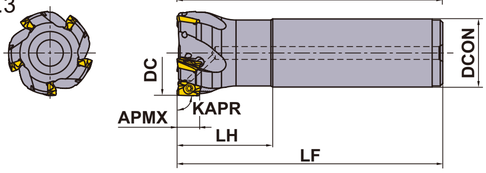


Fig.3



Right hand tool holder only.

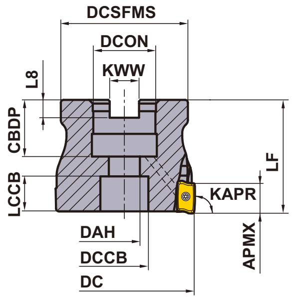
■STRAIGHT SHANK TYPE

KAPR :90°
With Coolant Hole

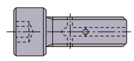
DC (mm)	Order Number	Stock R	Number of Teeth	Dimensions(mm) DCON	LF	LH	WT* (kg)	APMX (mm)	RMPX	RPMX (min-1)	Fig.	Insert Type
12	**APX3000R121SA16SA**	★	1	16	85	25	0.10	10	6.0°	10500	1	AO□T12
14	**APX3000R141SA16SA**	★	1	16	85	25	0.11	10	6.0°	9000	1	AO□T12
16	**APX3000R162SA16SA**	●	2	16	85	25	0.11	10	11.3°	20900	2	AO□T12
18	**APX3000R182SA16SA**	★	2	16	85	25	0.11	10	8.6°	19600	3	AO□T12
18	**APX3000R182SA16LA**	●	2	16	120	25	0.16	10	8.6°	19600	3	AO□T12
18	**APX3000R182SA16ELA**	●	2	16	180	25	0.25	10	8.6°	19600	3	AO□T12
20	**APX3000R202SA20SA**	★	2	20	100	30	0.21	10	6.9°	18500	2	AO□T12
20	**APX3000R203SA20SA**	●	3	20	100	30	0.21	10	6.9°	18500	2	AO□T12
20	**APX3000R202SA20LA**	●	2	20	150	60	0.32	10	6.9°	18500	2	AO□T12
20	**APX3000R202SA20ELA**	★	2	20	200	70	0.42	10	6.9°	18500	2	AO□T12
22	**APX3000R223SA20SA**	●	3	20	115	30	0.25	10	5.7°	17600	3	AO□T12
22	**APX3000R222SA20LA**	●	2	20	150	30	0.34	10	5.7°	17600	3	AO□T12
22	**APX3000R222SA20ELA**	★	2	20	200	30	0.45	10	5.7°	17600	3	AO□T12
25	**APX3000R252SA25SA**	★	2	25	115	35	0.38	10	4.6°	16400	2	AO□T12
25	**APX3000R253SA25SA**	★	3	25	115	35	0.38	10	4.6°	16400	2	AO□T12
25	**APX3000R254SA25SA**	●	4	25	115	35	0.38	10	4.6°	16400	2	AO□T12
25	**APX3000R252SA25LA**	★	2	25	170	70	0.51	10	4.6°	16400	2	AO□T12
25	**APX3000R253SA25LA**	★	3	25	170	70	0.51	10	4.6°	16400	2	AO□T12
25	**APX3000R252SA25ELA**	★	2	25	220	80	0.75	10	4.6°	16400	2	AO□T12
25	**APX3000R253SA25ELA**	★	3	25	220	80	0.75	10	4.6°	16400	2	AO□T12
28	**APX3000R284SA25SA**	★	4	25	115	35	0.40	10	3.8°	15500	3	AO□T12
28	**APX3000R282SA25LA**	★	2	25	170	35	0.61	10	3.8°	15500	3	AO□T12
28	**APX3000R283SA25LA**	★	3	25	170	35	0.61	10	3.8°	15500	3	AO□T12
28	**APX3000R282SA25ELA**	★	2	25	220	35	0.80	10	3.8°	15500	3	AO□T12
28	**APX3000R283SA25ELA**	★	3	25	220	35	0.79	10	3.8°	15500	3	AO□T12
30	**APX3000R304SA32SA**	★	4	32	125	45	0.64	10	3.4°	14900	2	AO□T12
32	**APX3000R323SA32SA**	★	3	32	125	45	0.68	10	3.1°	14400	2	AO□T12
32	**APX3000R324SA32SA**	★	4	32	125	45	0.67	10	3.1°	14400	2	AO□T12
32	**APX3000R325SA32SA**	★	5	32	125	45	0.68	10	3.1°	14400	2	AO□T12
32	**APX3000R322SA32LA**	★	2	32	190	90	1.07	10	3.1°	14400	2	AO□T12
32	**APX3000R323SA32LA**	★	3	32	190	90	1.05	10	3.1°	14400	2	AO□T12
32	**APX3000R322SA32ELA**	★	2	32	260	100	1.47	10	3.1°	14400	2	AO□T12
32	**APX3000R323SA32ELA**	★	3	32	260	100	1.45	10	3.1°	14400	2	AO□T12
35	**APX3000R352SA32LA**	★	2	32	190	45	1.12	10	2.7°	13700	3	AO□T12
35	**APX3000R353SA32LA**	★	3	32	190	45	1.11	10	2.7°	13700	3	AO□T12
35	**APX3000R352SA32ELA**	★	2	32	260	45	1.53	10	2.7°	13700	3	AO□T12
35	**APX3000R353SA32ELA**	★	3	32	260	45	1.52	10	2.7°	13700	3	AO□T12
40	**APX3000R403SA32SA**	★	3	32	125	45	0.75	10	2.2°	12800	3	AO□T12
40	**APX3000R405SA32SA**	★	5	32	125	45	0.75	10	2.2°	12800	3	AO□T12
40	**APX3000R406SA32SA**	★	6	32	125	45	0.76	10	2.2°	12800	3	AO□T12
50	**APX3000R507SA32SA**	★	7	32	125	45	0.90	10	1.7°	11300	3	AO□T12
63	**APX3000R638SA32SA**	★	8	32	125	45	1.04	10	1.3°	10000	3	AO□T12

Note 1) When using inserts with corner radius RE≥2.4mm, machining of the holder is required as shown on page K137.
Note 2) The maximum allowable spindle speeds (**RPMX**) 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.
* WT : Tool Weight

● : Inventory maintained. ★ : Inventory maintained in Japan.



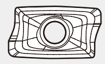
Right hand tool holder only.

DC (mm)	Set Bolt	Geometry
32, 40	HSC08030H	
50, 63	HSC10030H	
80	HSC12035H	
100	HSC16040H	

■ARBOR TYPE

KAPR :90°
GAMP:+7°—+21°　GAMF:+15°—+27°

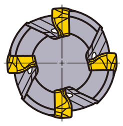
With Coolant Hole

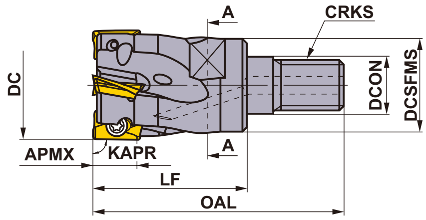
DC (mm)	Order Number	Stock	Number of Teeth	Dimensions(mm)		WT* (kg)	APMX (mm)	RMPX	RPMX (min-1)	
		R		LF	DCON					Insert Type
32	**APX3000-032A05RA**	●	5	40	16	0.2	10	3.1°	14400	AO□T12
40	**APX3000-040A06RA**	●	6	40	16	0.3	10	2.2°	12800	AO□T12
50	**APX3000-050A07RA**	●	7	40	22	0.4	10	1.7°	11300	AO□T12
63	**APX3000-063A08RA**	●	8	40	22	0.7	10	1.3°	10000	AO□T12
80	**APX3000-080A09RA**	●	9	50	27	1.3	10	1.0°	8800	AO□T12
100	**APX3000-100A11RA**	●	11	63	32	2.2	10	0.8°	7800	AO□T12

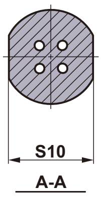
Note 1) When using inserts with corner radius RE≥2.4mm, machining of the holder is required as shown on page K137.
Note 2) The maximum allowable spindle speeds (**RPMX**) are set to ensure tool and insert stability.
Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
* WT : Tool Weight

MOUNTING DIMENSIONS

DC (mm)	Order Number	Dimensions(mm)							
		DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
32	**APX3000-032A05RA**	16	18	9	14	10.22	30	8.4	5.6
40	**APX3000-040A06RA**	16	18	9	14	10.35	34	8.4	5.6
50	**APX3000-050A07RA**	22	20	11	17	12.35	45	10.4	6.3
63	**APX3000-063A08RA**	22	20	11	17	12.35	55	10.4	6.3
80	**APX3000-080A09RA**	27	23	13	20	16.35	70	12.4	7
100	**APX3000-100A11RA**	32	26	17	26	26.35	80	14.4	8



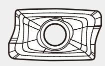




■SCREW-IN TYPE

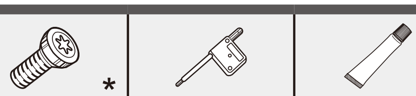
Right hand tool holder only.

KAPR : 90°
With Coolant Hole

DC (mm)	Order Number	Stock R	Number of Teeth	Dimensions(mm) DCON	DCSFMS	OAL	LF	S10	CRKS	WT* (kg)	APMX (mm)	RMPX	 Insert Type
16	**APX3000R162M08A**	●	2	8.5	13	48	30	10	M8	0.1	10	11.3°	AO◌T12
18	**APX3000R182M08A30**	★	2	8.5	13	48	30	10	M8	0.1	10	8.6°	AO◌T12
20	**APX3000R203M10A**	●	3	10.5	18	49	30	14	M10	0.1	10	6.9°	AO◌T12
22	**APX3000R223M10A30**	★	3	10.5	18	49	30	14	M10	0.1	10	5.7°	AO◌T12
25	**APX3000R254M12A**	●	4	12.5	21	57	35	19	M12	0.2	10	4.6°	AO◌T12
28	**APX3000R284M12A35**	★	4	12.5	21	57	35	19	M12	0.2	10	3.8°	AO◌T12
30	**APX3000R304M16A40**	★	4	17	29	63	40	24	M16	0.3	10	3.4°	AO◌T12
32	**APX3000R325M16A**	●	5	17	29	63	40	24	M16	0.3	10	3.1°	AO◌T12
35	**APX3000R355M16A40**	★	5	17	29	63	40	24	M16	0.3	10	2.7°	AO◌T12
40	**APX3000R406M16A**	●	6	17	29	63	40	24	M16	0.3	10	2.2°	AO◌T12

Note 1) When using inserts with corner radius RE≥2.4mm, machining of the holder is required as shown on page K137.
Note 2) For screw-in type arbors, refer to page K244.
* WT : Tool Weight

SPARE PARTS



DC (mm)	Tool Holder Type	DC (mm)	Tool Holder Type	Clamp Screw *	Wrench	Anti-seize Lubricant
12	**APX3000R12**	14	**APX3000R14**	TPS25	TIP07F	MK1KS
16	**APX3000R16**	18	**APX3000R18**	TPS25	TIP07F	MK1KS
20	**APX3000R20**			TPS25	TIP07F	MK1KS
22	**APX3000R22**	25	**APX3000R25**	TPS25-1	TIP07F	MK1KS
28	**APX3000R28**	30	**APX3000R30**	TPS25-1	TIP07F	MK1KS
32	**APX3000R32**	32	**APX3000-032**	TPS25-1	TIP07F	MK1KS
35	**APX3000R35**			TPS25-1	TIP07F	MK1KS
40	**APX3000R40**	40	**APX3000-040**	TPS25-1	TIP07F	MK1KS
50	**APX3000R50**	50	**APX3000-050**	TPS25-1	TIP07F	MK1KS
63	**APX3000R63**	63	**APX3000-063**	TPS25-1	TIP07F	MK1KS
80	**APX3000-080**			TPS25-1	TIP07F	MK1KS
100	**APX3000-100**			TPS25-1	TIP07F	MK1KS

* Clamp Torque (N • m) : TPS25 = 1.0, TPS25-1 = 1.0

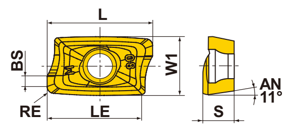
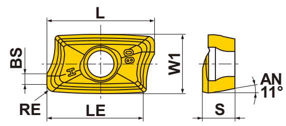
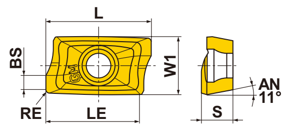
● : Inventory maintained. ★ : Inventory maintained in Japan.
(10 inserts in one case)

INSERTS

Work Material			MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	VP20RT	TF15
	P	Steels		◐	✤				◐	◐	
	M	Stainless Steels				◐			◐	◐	
	K	Cast Irons	◐						✤	✤	
	N	Non-ferrous Metals									◐
	S	Heat Resistant Alloys, Titanium Alloys					◐	✤	◐		
	H	Hardened Steels							◐		

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

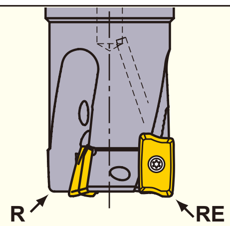
Honing :
E : Round F : Sharp

Shape	Order Number	Class	Honing	Coated MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	VP20RT	Carbide TF15	Dimensions (mm) L	LE	W1	S	BS	RE*	Geometry
General **M** Breaker 	AOMT123602PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	1.8	0.2	
	AOMT123604PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	1.6	0.4	
	AOMT123608PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	1.2	0.8	
	AOMT123610PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	1.0	1.0	
	AOMT123612PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	0.8	1.2	
	AOMT123616PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	0.4	1.6	
	AOMT123620PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	0.4	2.0	
	AOMT123624PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	0.4	2.4	
	AOMT123630PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	0.4	3.0	
	AOMT123632PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	0.4	3.2	
Strong Cutting Edge Type **H** Breaker 	AOMT123604PEER-H	M	E	●	●	●	●	●	●	●	●		12	10	6.6	3.6	1.6	0.4	
	AOMT123608PEER-H	M	E	●	●	●	●	●	●	●	●		12	10	6.6	3.6	1.2	0.8	
	AOMT123616PEER-H	M	E	●	●	●	●	●	●	●	●		12	10	6.6	3.6	0.4	1.6	
For Machining of Aluminium Alloys **GM** Breaker 	AOGT123602PEFR-GM	G	F									●	12	10	6.6	3.6	1.8	0.2	
	AOGT123604PEFR-GM	G	F									●	12	10	6.6	3.6	1.6	0.4	
	AOGT123608PEFR-GM	G	F									●	12	10	6.6	3.6	1.2	0.8	

* Corner radius RE is different from the work material of R shape depending on the axial rake angle of the body.

Note on Use of Inserts with Large Corner Radii

When using inserts with corner radius RE≥R2.4mm, please machine the holder with a radius form as shown in the table.



RE (mm)	**R** (mm)
2.4	1.9
3.0	2.5
3.2	2.7

R : Holder End Radius
RE : Insert Corner Radius

K

ROTATING TOOLS

ARBORS ➤ K244
SPARE PARTS ➤ N001
TECHNICAL DATA ➤ P001

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED

	Work Material	Hardness	Insert: Grade Priority 1st	Insert: Grade Priority 2nd	Insert: Breaker		ae (mm) ≤0.25DC	ae (mm) 0.25–0.5DC	ae (mm) 0.5–0.75DC	ae (mm) DC (Slot)
							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 PER TOOTH

	Work Material	Hardness	ae (mm)	DC (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

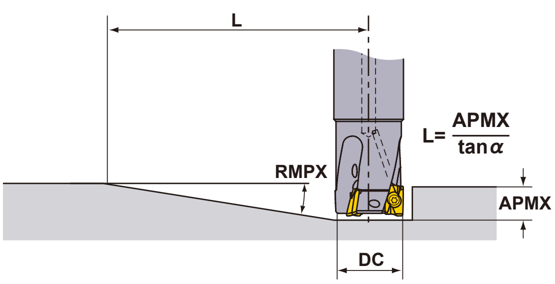
	Work Material	Hardness	**ae** (mm)	**DC** (mm) ø12–ø16 Depth of Cut **ap** (mm)	ø12–ø16 Feed per Tooth **fz** (mm/t.)	ø18–ø25 Depth of Cut **ap** (mm)	ø18–ø25 Feed per Tooth **fz** (mm/t.)	ø28–ø100 Depth of Cut **ap** (mm)	ø28–ø100 Feed per Tooth **fz** (mm/t.)
N	Aluminium Alloy	–	≤0.25DC	≤4	0.15	≤4	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.

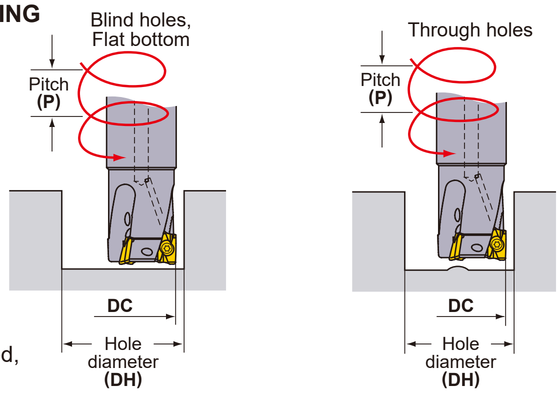
Note 3) In case of coarse and fine pitch cutters, the coarse pitch type is recommended to prevent vibration.
Note 4) For heavy interrupted and unstable cutting, the H breaker is first recommendation.

■RAMPING/HELICAL CUTTING

●RAMPING



●HELICAL CUTTING

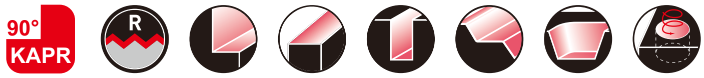


Refer to the table below for cutting conditions. For feed per tooth and cutting speed, follow the cutting conditions for slot milling.

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)	Helical Cutting (Blind Hole, Flat Bottom): Maximum Pitch **P max.**(mm)	Helical Cutting (Blind Hole, Flat Bottom): Minimum Hole Diameter **DH min.**(mm)	Helical Cutting (Blind Hole, Flat Bottom): Maximum Pitch **P max.**(mm)	Helical Cutting (Through Hole): Minimum Hole Diameter **DH min.**(mm)	Helical Cutting (Through Hole): 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 1) 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 formula below.
{(cutting edge diameter DC)−(corner radius)−0.2)}×2

MULTI FUNCTIONAL MILLING



APX4000

P M K N S H

Fig.1

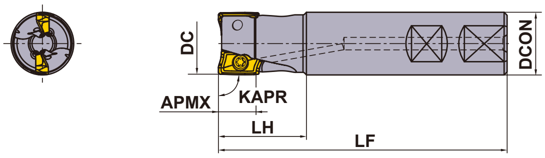
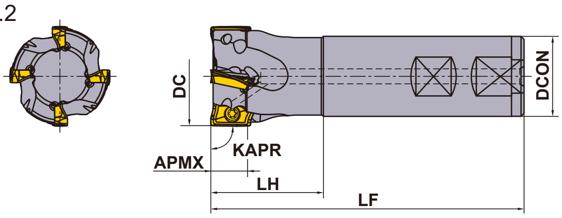


Fig.2



■WELDON SHANK TYPE

KAPR :90°
With Coolant Hole

Right hand tool holder only.

DC (mm)	Order Number	Stock R	Number of Teeth	Dimensions(mm) DCON	LF	LH	WT* (kg)	APMX (mm)	RMPX	RPMX (min-1)	Fig.	Insert Type
25	**APX4000R252WA25SA**	●	2	25	115	35	0.40	15	11°	18900	1	AO□T18
25	**APX4000R252WA25LA**	●	2	25	170	35	0.61	15	11°	18900	1	AO□T18
25	**APX4000R252WA25ELA**	●	2	25	220	80	0.76	15	11°	18900	1	AO□T18
28	**APX4000R282WA25LA**	●	2	25	170	35	0.63	15	9°	17700	2	AO□T18
28	**APX4000R282WA25ELA**	●	2	25	220	35	0.81	15	9°	17700	2	AO□T18
32	**APX4000R323WA32SA**	●	3	32	125	45	0.71	15	7°	16300	1	AO□T18
32	**APX4000R323WA32LA**	●	3	32	190	45	1.11	15	7°	16300	1	AO□T18
32	**APX4000R323WA32ELA**	●	3	32	260	100	1.49	15	7°	16300	1	AO□T18
35	**APX4000R353WA32LA**	●	3	32	190	45	1.14	15	6°	15400	2	AO□T18
40	**APX4000R403WA32SA**	●	3	32	125	45	0.80	15	6°	14200	2	AO□T18
40	**APX4000R404WA32SA**	●	4	32	125	45	0.80	15	6°	14200	2	AO□T18
40	**APX4000R404WA32LA**	●	4	32	190	45	1.19	15	6°	14200	2	AO□T18

Note 1) When using inserts with corner radius RE≥3.2mm, machining of the holder is required as shown on page K144.
Note 2) The maximum allowable spindle speeds (**RPMX**) 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.
* WT : Tool Weight

●: Inventory maintained. ★: Inventory maintained in Japan.

Fig.1

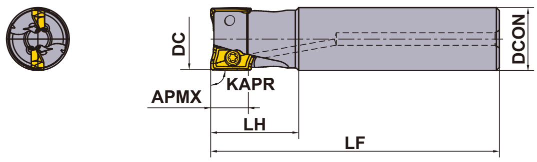
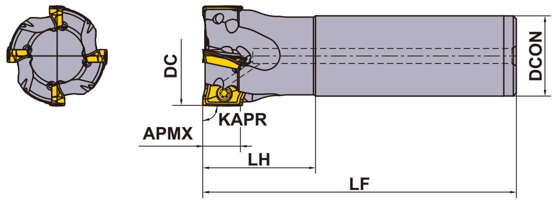


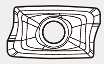
Fig.2



■STRAIGHT SHANK TYPE

KAPR :90°
With Coolant Hole

Right hand tool holder only.

DC (mm)	Order Number	Stock R	Number of Teeth	Dimensions(mm) DCON	LF	LH	WT* (kg)	APMX (mm)	RMPX	RPMX (min^{-1})	Fig.	 Insert Type
25	**APX4000R252SA25SA**	★	2	25	115	35	0.40	15	11.0°	18900	1	AO□T18
25	**APX4000R252SA25LA**	★	2	25	170	35	0.61	15	11.0°	18900	1	AO□T18
25	**APX4000R252SA25ELA**	★	2	25	220	80	0.76	15	11.0°	18900	1	AO□T18
28	**APX4000R282SA25LA**	★	2	25	170	35	0.63	15	9.0°	17700	2	AO□T18
28	**APX4000R282SA25ELA**	★	2	25	220	35	0.81	15	9.0°	17700	2	AO□T18
32	**APX4000R322SA32SA**	★	2	32	125	45	0.71	15	7.0°	16300	1	AO□T18
32	**APX4000R323SA32SA**	★	3	32	125	45	0.71	15	7.0°	16300	1	AO□T18
32	**APX4000R322SA32LA**	★	2	32	190	45	1.11	15	7.0°	16300	1	AO□T18
32	**APX4000R323SA32LA**	★	3	32	190	45	1.11	15	7.0°	16300	1	AO□T18
32	**APX4000R322SA32ELA**	★	2	32	260	100	1.49	15	7.0°	16300	1	AO□T18
32	**APX4000R323SA32ELA**	★	3	32	260	100	1.49	15	7.0°	16300	1	AO□T18
35	**APX4000R352SA32LA**	★	2	32	190	45	1.14	15	6.0°	15400	2	AO□T18
35	**APX4000R353SA32LA**	★	3	32	190	45	1.14	15	6.0°	15400	2	AO□T18
35	**APX4000R352SA32ELA**	★	2	32	260	45	1.57	15	6.0°	15400	2	AO□T18
35	**APX4000R353SA32ELA**	★	3	32	260	45	1.57	15	6.0°	15400	2	AO□T18
40	**APX4000R403SA32SA**	★	3	32	125	45	0.80	15	6.0°	14200	2	AO□T18
40	**APX4000R404SA32SA**	★	4	32	125	45	0.80	15	6.0°	14200	2	AO□T18
40	**APX4000R402SA32LA**	★	2	32	190	45	1.19	15	6.0°	14200	2	AO□T18
40	**APX4000R403SA32LA**	★	3	32	190	45	1.19	15	6.0°	14200	2	AO□T18
40	**APX4000R404SA32LA**	★	4	32	190	45	1.19	15	6.0°	14200	2	AO□T18
40	**APX4000R402SA32ELA**	★	2	32	260	45	1.62	15	6.0°	14200	2	AO□T18
40	**APX4000R403SA32ELA**	★	3	32	260	45	1.62	15	6.0°	14200	2	AO□T18
40	**APX4000R404SA32ELA**	★	4	32	260	45	1.62	15	6.0°	14200	2	AO□T18
50	**APX4000R504SA32SA**	★	4	32	125	45	0.93	15	4.0°	12400	2	AO□T18
50	**APX4000R505SA32SA**	★	5	32	125	45	0.93	15	4.0°	12400	2	AO□T18
63	**APX4000R634SA32SA**	★	4	32	125	45	1.15	15	3.0°	10800	2	AO□T18
63	**APX4000R636SA32SA**	★	6	32	125	45	1.15	15	3.0°	10800	2	AO□T18

Note 1) When using inserts with corner radius RE≧3.2mm, machining of the holder is required as shown on page K144.
Note 2) The maximum allowable spindle speeds (**RPMX**) 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.
* WT : Tool Weight

Fig.1

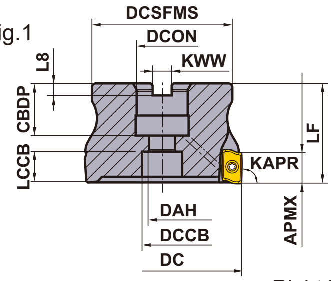
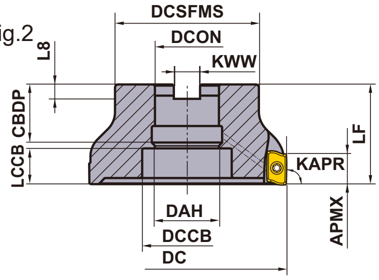
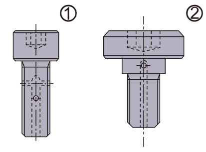


Fig.2



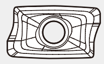
Right hand tool holder only.

DC (mm)	Set Bolt	Geometry	
40	HSC08030H	①	
50, 63	HSC10030H	①	
80	HSC12035H	①	
100	HSC16040H	①	
125	MBA20040H	②	
160	MBA24045H	②	

■ARBOR TYPE

KAPR :90°
GAMP:+15°—+22° GAMF:+21°—+28°

With Coolant Hole

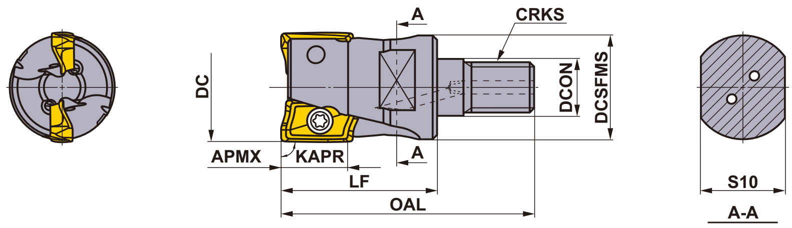
DC (mm)	Order Number	Stock R	Number of Teeth	Dimensions(mm) LF	Dimensions(mm) DCON	WT* (kg)	APMX (mm)	RMPX	RPMX (min-1)	Fig.	 Insert Type
40	**APX4000-040A04RA**	●	4	40	16	0.2	15	6.0°	14200	1	AO◌T18
50	**APX4000-050A05RA**	●	5	40	22	0.3	15	4.0°	12400	1	AO◌T18
63	**APX4000-063A06RA**	●	6	40	22	0.5	15	3.0°	10800	1	AO◌T18
80	**APX4000-080A07RA**	●	7	50	27	1.2	15	2.0°	9300	1	AO◌T18
100	**APX4000-100A08RA**	●	8	50	32	2.1	15	1.5°	8100	1	AO◌T18
125	**APX4000-125A09RA**	●	9	63	40	3.3	15	1.0°	7100	2	AO◌T18
160	**APX4000-160A10RA**	●	10	63	40	4.8	15	1.0°	6100	2	AO◌T18

Note 1) When using inserts with corner radius RE≥3.2mm, machining of the holder is required as shown on page K144.
Note 2) The maximum allowable spindle speeds (**RPMX**) 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.
* WT : Tool Weight

MOUNTING DIMENSIONS

DC (mm)	Order Number	Dimensions(mm) DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
40	**APX4000-040A04RA**	16	18	9	14	10.08	34	8.4	5.6
50	**APX4000-050A05RA**	22	20	11	17	12.26	45	10.4	6.3
63	**APX4000-063A06RA**	22	20	11	17	12.35	50	10.4	6.3
80	**APX4000-080A07RA**	27	23	13	20	15.35	60	12.4	7
100	**APX4000-100A08RA**	32	26	17	27	17.35	70	14.4	8
125	**APX4000-125A09RA**	40	40	42	56	22.35	90	16.4	9
160	**APX4000-160A10RA**	40	40	42	72	22.35	100	16.4	9

● : Inventory maintained. ★ : Inventory maintained in Japan.



Right hand tool holder only.

■SCREW-IN TYPE

With Coolant Hole

DC (mm)	Order Number	Stock R	Number of Teeth	DCON	DCSFMS	OAL	LF	S10	CRKS	WT* (kg)	APMX (mm)	RMPX	Insert Type
				Dimensions(mm)									
25	**APX4000R252M12A35**	●	2	12.5	23.5	57	35	19	M12	0.2	15	11.0°	AO◌T18
28	**APX4000R282M12A35**	●	2	12.5	23.5	57	35	19	M12	0.2	15	9.0°	AO◌T18
32	**APX4000R322M16A40**	★	2	17	28.5	63	40	24	M16	0.3	15	7.0°	AO◌T18
32	**APX4000R323M16A40**	●	3	17	28.5	63	40	24	M16	0.3	15	7.0°	AO◌T18
35	**APX4000R352M16A40**	★	2	17	28.5	63	40	24	M16	0.3	15	6.0°	AO◌T18
35	**APX4000R353M16A40**	★	3	17	28.5	63	40	24	M16	0.3	15	6.0°	AO◌T18
40	**APX4000R403M16A40**	★	3	17	28.5	63	40	24	M16	0.3	15	6.0°	AO◌T18
40	**APX4000R404M16A40**	●	4	17	28.5	63	40	24	M16	0.3	15	6.0°	AO◌T18

Note 1) When using inserts with corner radius RE≥3.2mm, machining of the holder is required as shown on page K144.
Note 2) For screw-in type arbors, refer to page K244.
* WT : Tool Weight

SPARE PARTS

DC (mm)	Tool Holder Type	DC (mm)	Tool Holder Type	Clamp Screw *	Wrench	Anti-seize Lubricant
25	**APX4000R25**	28	**APX4000R28**	TPS4	TIP15W	MK1KS
32	**APX4000R32**	35	**APX4000R35**	TPS4	TIP15W	MK1KS
40	**APX4000R40**	40	**APX4000-040**	TPS43	TIP15W	MK1KS
50	**APX4000R50**	50	**APX4000-050**	TPS43	TIP15W	MK1KS
63	**APX4000R63**	63	**APX4000-063**	TPS43	TIP15W	MK1KS
		80	**APX4000-080**	TPS43	TIP15W	MK1KS
		100	**APX4000-100**	TPS43	TIP15W	MK1KS
		125	**APX4000-125**	TPS43	TIP15W	MK1KS
		160	**APX4000-160**	TPS43	TIP15W	MK1KS

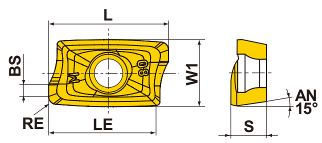
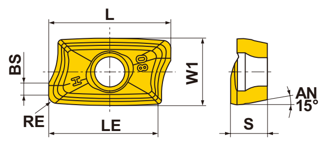
* Clamp Torque (N • m) : TPS4 = 4.0, TPS43 = 4.0

INSERTS

Work Material			MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	VP20RT
	P	Steels		◐	✤				◐	◐
	M	Stainless Steels				◐			◐	◐
	K	Cast Irons	◐						✤	✤
	S	Heat Resistant Alloys, Titanium Alloys					◐	✤	◐	✤
	H	Hardened Steels							◐	

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

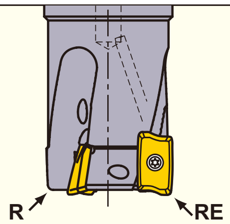
Honing :
E : Round

Shape	Order Number	Class	Honing	Coated MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	VP20RT	Dimensions (mm) L	LE	W1	S	BS	RE *	Geometry
General **M** Breaker 	**AOMT184804PEER-M**	M	E		●	●	●	●	●	●	●	18	15	9	4.8	1.8	0.4	
	AOMT184808PEER-M	M	E		●	●	●	●	●	●	●	18	15	9	4.8	1.4	0.8	
	AOMT184810PEER-M	M	E		●			●	●	●		18	15	9	4.8	1.0	1.0	
	AOMT184812PEER-M	M	E		●			●	●	●		18	15	9	4.8	0.8	1.2	
	AOMT184816PEER-M	M	E		●	●	●	●	●	●	●	18	15	9	4.8	0.4	1.6	
	AOMT184820PEER-M	M	E		●			●	●	●		18	15	9	4.8	0.4	2.0	
Strong Cutting Edge Type **H** Breaker 	**AOMT184804PEER-H**	M	E	●	●	●	●	●	●	●	●	18	15	9	4.8	1.8	0.4	
	AOMT184808PEER-H	M	E	●	●	●	●	●	●	●	●	18	15	9	4.8	1.4	0.8	
	AOMT184816PEER-H	M	E	●	●	●	●	●	●	●	●	18	15	9	4.8	0.4	1.6	
	AOMT184832PEER-H	M	E			●	●				●	18	15	9	4.8	0.4	3.2	
	AOMT184840PEER-H	M	E			●	●				●	18	15	9	4.8	0.4	4.0	
	AOMT184850PEER-H	M	E			●	●				●	18	15	9	4.8	–	5.0	
	AOMT184864PEER-H	M	E			●	●				●	18	15	9	4.8	–	6.35	

* Corner radius RE is different from the work material of R shape depending on the axial rake angle of the body.

Note on Use of Inserts with Large Corner Radii

When using inserts with corner radius RE≧R3.2mm, please machine the holder with a radius form as shown in the table.



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

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

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED

	Work Material	Hardness	Insert Grade Priority 1st	Insert Grade Priority 2nd	Breaker		ae (mm) ≤0.25DC	ae (mm) 0.25–0.5DC	ae (mm) 0.5–0.75DC	ae (mm) 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 PER TOOTH

	Work Material	Hardness	**ae** (mm)	Depth of Cut **ap** (mm)	Feed per Tooth **fz** (mm/t.) Cutter Diameter **DC** (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

RECOMMENDED CUTTING CONDITIONS

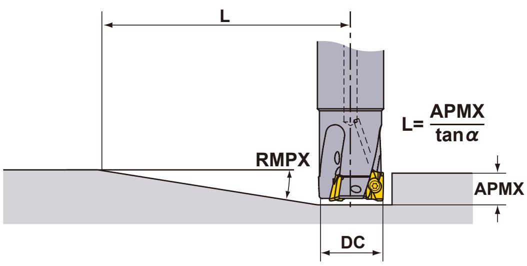
DEPTH OF CUT AND FEED PER TOOTH

	Work Material	Hardness	**ae** (mm)	Depth of Cut **ap** (mm)	Feed per Tooth **fz** (mm/t.) Cutter Diameter **DC** (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

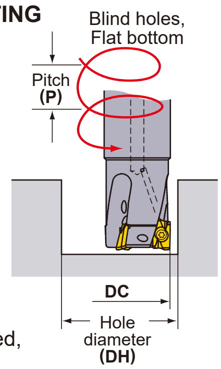
Note 1) These cutting conditions are a guide to the standard shank type and the arbor type.
Please make adjustments according to the machining conditions.
Note 2) Vibration is liable to occur in certain cases. Please reduce the depth of cut and / or reduce cutting conditions in the following cases.
• 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.

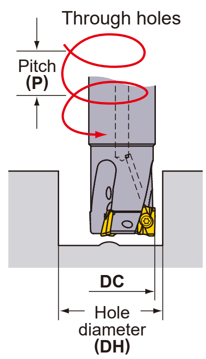
■RAMPING/HELICAL CUTTING

●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

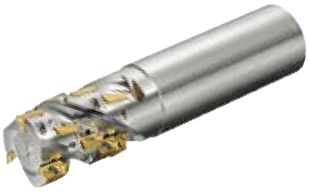
Note 1) When machining highly ductile materials with ramping angles above, chips could be continuous.
In this case, decrease the ramping angle or feed per tooth.
*1 L (=15 / tan α). Cutters' moving distance until depth of cut reaches 15mm at a maximum ramping angle.
*2 In case corner radius of 0.8mm. Other than that, calculate using the fromula below.
{(cutting edge diameter DC)—(corner radius)—0.2)}×2

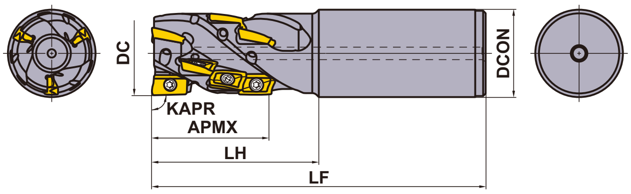
90° KAPR R

APX3000

LONG CUTTING EDGE

P M K N S H





Right hand tool holder only.

■SHANK TYPE

DC (mm)	Order Number	Stock R	Coolant Hole	Number of Flutes	Total	Dimensions(mm) DCON	LF	LH	WT* (kg)	APMX (mm)	Insert Type
20	**APX3KR2004SN20S028A**	★	–	1	4	20	125	45	0.27	28	AO◌T12
25	**APX3KR2506SA25S028A**	●	○	2	6	25	125	45	0.40	28	AO◌T12
25	**APX3KR2508SA25M037A**	●	○	2	8	25	130	50	0.41	37	AO◌T12
32	**APX3KR3208SA32S037A**	★	○	2	8	32	130	50	0.70	37	AO◌T12
32	**APX3KR3210SA32M046A**	★	○	2	10	32	140	60	0.74	46	AO◌T12
32	**APX3KR3212SA32S037A**	★	○	3	12	32	130	50	0.67	37	AO◌T12
32	**APX3KR3215SA32M046A**	★	○	3	15	32	140	60	0.71	46	AO◌T12
40	**APX3KR4015SA42S046A**	★	○	3	15	42	140	60	1.24	46	AO◌T12
40	**APX3KR4018SA42M055A**	★	○	3	18	42	150	70	1.31	55	AO◌T12

Note 1) When using inserts with corner radius RE≥2.4mm, machining of the holder is required as shown on page K149.
Note 2) Corner radius RE 0.8mm is recommended for the peripheral cutting edges except the bottom cutting edge (end cutting).
Inserts RE 0.2mm and 0.4mm can also be used.
* WT : Tool Weight

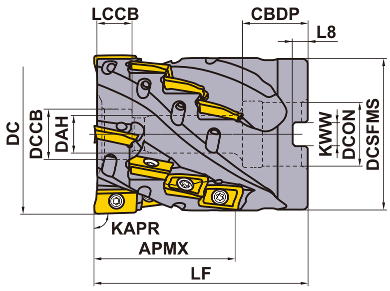
SPARE PARTS

DC (mm)	Tool Holder Type	Clamp Screw *	Wrench	Anti-seize Lubricant
20	**APX3KR20**	TPS25	TIP07F	MK1KS
25	**APX3KR25**	TPS25-1	TIP07F	MK1KS
32	**APX3KR32**	TPS25-1	TIP07F	MK1KS
40	**APX3KR40**	TPS25-1	TIP07F	MK1KS
40	**APX3K-040**	TPS25-1	TIP07F	MK1KS
50	**APX3K-050**	TPS25-1	TIP07F	MK1KS

* Clamp Torque (N • m) : TPS25 = 1.0, TPS25-1 = 1.0

● : Inventory maintained. ★ : Inventory maintained in Japan.

SPARE PARTS ➢ N001
TECHNICAL DATA ➢ P001

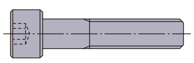


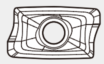
Right hand tool holder only.

■SHELL TYPE

With Coolant Hole

KAPR : 90°
GAMP : +12° GAMF : +6°

DC (mm)	Set Bolt	Geometry
40	HSC08040	
50	HSC10045	

DC (mm)	Order Number	Stock	Number of Flutes	Total	Dimensions(mm)		WT* (kg)	APMX (mm)	
		R			LF	DCON			Insert Type
40	**APX3K-040A16A037RA**	★	4	16	50	16	0.25	37	AO◌T12
50	**APX3K-050A20A046RA**	★	4	20	60	22	0.54	46	AO◌T12

Note 1) When using inserts with corner radius RE≥2.4mm, machining of the holder is required as shown on page K149.
Note 2) Corner radius RE 0.8mm is recommended for the peripheral cutting edges except the bottom cutting edge (end cutting).
Inserts RE 0.2mm and 0.4mm can also be used.
Note 3) Coolant can be supplied from the end face of the centering location bore in the arbor. However, it cannot be supplied from the set bolt.
* WT : Tool Weight

MOUNTING DIMENSIONS

DC (mm)	Order Number	Dimensions(mm)							
		DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
40	**APX3K-040A16A037RA**	16	18	9	14	9.9	38.5	8.4	5.6
50	**APX3K-050A20A046RA**	22	20	11	17	11.9	48.4	10.4	6.3

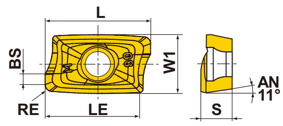
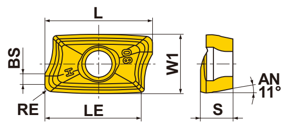
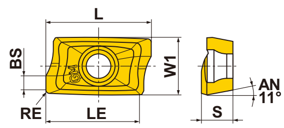
●: Inventory maintained. ★: Inventory maintained in Japan.
(10 inserts in one case)

INSERTS

Work Material			MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	VP20RT	TF15
Work Material	P	Steels		◐	✤				◐	◐	
	M	Stainless Steels				◐			◐	◐	
	K	Cast Irons	◐						✤	✤	
	N	Non-ferrous Metals									◐
	S	Heat Resistant Alloys, Titanium Alloys					◐	✤	◐		
	H	Hardened Steels							◐		

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

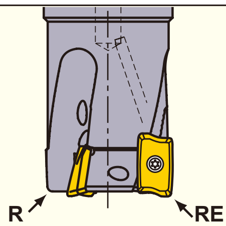
Honing :
E : Round F : Sharp

Shape	Order Number	Class	Honing	Coated MC5020	Coated MP6120	Coated MP6130	Coated MP7130	Coated MP9120	Coated MP9130	Coated VP15TF	Coated VP20RT	Carbide TF15	Dimensions (mm) L	LE	W1	S	BS	RE *	Geometry
General **M** Breaker 	AOMT123602PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	1.8	0.2	
	AOMT123604PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	1.6	0.4	
	AOMT123608PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	1.2	0.8	
	AOMT123610PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	1.0	1.0	
	AOMT123612PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	0.8	1.2	
	AOMT123616PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	0.4	1.6	
	AOMT123620PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	0.4	2.0	
	AOMT123624PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	0.4	2.4	
	AOMT123630PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	0.4	3.0	
	AOMT123632PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	0.4	3.2	
Strong Cutting Edge Type **H** Breaker 	AOMT123604PEER-H	M	E	●	●	●	●	●	●	●	●		12	10	6.6	3.6	1.6	0.4	
	AOMT123608PEER-H	M	E	●	●	●	●	●	●	●	●		12	10	6.6	3.6	1.2	0.8	
	AOMT123616PEER-H	M	E	●	●	●	●	●	●	●	●		12	10	6.6	3.6	0.4	1.6	
For Machining of Aluminium Alloys **GM** Breaker 	AOGT123602PEFR-GM	G	F									●	12	10	6.6	3.6	1.8	0.2	
	AOGT123604PEFR-GM	G	F									●	12	10	6.6	3.6	1.6	0.4	
	AOGT123608PEFR-GM	G	F									●	12	10	6.6	3.6	1.2	0.8	

* Corner radius RE is different from the work material of R shape depending on the axial rake angle of the body.

Note on Use of Inserts with Large Corner Radii

When using inserts with corner radius RE≥R2.4mm, please machine the holder with a radius form as shown in the table.



RE (mm)	R (mm)
2.4	1.9
3.0	2.5
3.2	2.7

R : Holder End Radius
RE : Insert Corner Radius

K
ROTATING TOOLS

SPARE PARTS ➢ N001
TECHNICAL DATA ➢ P001

RECOMMENDED CUTTING CONDITIONS

■CUTTING SPEED

	Work Material	Insert				ae (mm)		
		Grade Priority		Breaker		≤0.25DC	0.25–0.75DC	DC (Slot)
		1st	2nd			Vc (m/min)		
P	Mild Steel	MP6120	VP15TF	M	H	180(140–220)	150(110–180)	120(100–140)
P	Mild Steel	MP6130	VP20RT	M	H	160(120–200)	130(100–160)	100(80–120)
P	Carbon Steel Alloy Steel, Alloy Tool Steel	MP6120	VP15TF	M	H	150(100–200)	120(90–150)	100(80–120)
P	Carbon Steel Alloy Steel, Alloy Tool Steel	MP6130	VP20RT	M	H	130(90–170)	90(70–110)	80(60–100)
P	Pre-hardened Steel	MP6120	VP15TF	M	H	120(80–160)	100(70–130)	90(50–120)
P	Pre-hardened Steel	MP6130	VP20RT	M	H	100(70–130)	90(60–120)	70(50–100)
M	Stainless Steel	MP7130	–	M	–	150(120–180)	120(100–140)	100(80–120)
K	Gray Cast Iron	MC5020	–	H	–	200(150–250)	180(150–210)	–
K	Gray Cast Iron	VP15TF	–	M	H	180(120–240)	150(100–200)	100(60–140)
K	Ductile Cast Iron	VP15TF	–	M	H	160(120–200)	140(100–180)	80(60–100)
N	Aluminium Alloy	TF15	MP9120	GM	M	400(200–800)	400(200–800)	400(200–800)
S	Titanium Alloy	MP9130	–	M	–	40(30–60)	–	40(30–60)
S	Titanium Alloy	MP9120	–	M	–	50(40–70)	–	50(40–70)
S	Heat Resistant Alloy	MP9120	VP15TF	M	H	40(30–60)	–	40(30–60)
S	Heat Resistant Alloy	MP9130	VP20RT	M	H	30(20–40)	–	30(20–40)

■DEPTH OF CUT / FEED PER TOOTH

	Work Material	Characteristics	ae	DC (mm)					
				ø20		ø25		ø32–ø50	
				ap	fz (mm/t.)	ap	fz (mm/t.)	ap	fz (mm/t.)
P	Mild Steel	≤180HB	≤0.25DC	≤28	0.15	≤37	0.17	≤55	0.2
P	Mild Steel	≤180HB	0.25-0.75DC	≤28	0.12	≤37	0.15	≤55	0.17
P	Mild Steel	≤180HB	DC (Slot)	≤18	0.08	≤18	0.08	≤18	0.08
P	Carbon Steel Alloy Steel	180–280HB	≤0.25DC	≤28	0.12	≤37	0.15	≤55	0.17
P	Carbon Steel Alloy Steel	180–280HB	0.25-0.75DC	≤28	0.1	≤37	0.12	≤55	0.15
P	Carbon Steel Alloy Steel	180–280HB	DC (Slot)	≤18	0.08	≤18	0.08	≤18	0.08
P	Tool Alloy Steel	≤350HB (Annealing)	≤0.25DC	≤28	0.12	≤37	0.15	≤55	0.17
P	Tool Alloy Steel	≤350HB (Annealing)	0.25-0.75DC	≤28	0.1	≤37	0.12	≤55	0.15
P	Tool Alloy Steel	≤350HB (Annealing)	DC (Slot)	≤18	0.08	≤18	0.08	≤18	0.08
P	Pre-hardened Steel	35–45HRC	≤0.25DC	≤28	0.12	≤37	0.15	≤55	0.17
P	Pre-hardened Steel	35–45HRC	0.25-0.75DC	≤28	0.1	≤37	0.12	≤55	0.15
P	Pre-hardened Steel	35–45HRC	DC (Slot)	≤18	0.08	≤18	0.08	≤18	0.08
M	Ferritic and Martensitic Stainless Steel	–	≤0.25DC	≤28	0.12	≤37	0.15	≤55	0.17
M	Ferritic and Martensitic Stainless Steel	–	0.25-0.75DC	≤28	0.1	≤37	0.12	≤55	0.15
M	Ferritic and Martensitic Stainless Steel	–	DC (Slot)	≤18	0.08	≤18	0.08	≤18	0.08
M	Duplex Stainless Steel	≤280HB	≤0.25DC	≤28	0.12	≤37	0.15	≤55	0.17
M	Duplex Stainless Steel	≤280HB	0.25-0.75DC	≤28	0.1	≤37	0.12	≤55	0.15
M	Duplex Stainless Steel	≤280HB	DC (Slot)	≤18	0.08	≤18	0.08	≤18	0.08
M	Precipitation Hardening Stainless Steel	<450HB	≤0.25DC	≤28	0.12	≤37	0.15	≤55	0.17
M	Precipitation Hardening Stainless Steel	<450HB	0.25-0.75DC	≤28	0.1	≤37	0.12	≤55	0.15
M	Precipitation Hardening Stainless Steel	<450HB	DC (Slot)	≤18	0.08	≤18	0.08	≤18	0.08
K	Gray Cast Iron	Tensile Strength ≤350MPa	≤0.25DC	≤28	0.15	≤37	0.17	≤55	0.2
K	Gray Cast Iron	Tensile Strength ≤350MPa	0.25-0.75DC	≤28	0.12	≤37	0.15	≤55	0.17
K	Gray Cast Iron	Tensile Strength ≤350MPa	DC (Slot)	≤18	0.1	≤18	0.1	≤18	0.1
K	Ductile Cast Iron	Tensile Strength ≤800MPa	≤0.25DC	≤28	0.12	≤37	0.15	≤55	0.17
K	Ductile Cast Iron	Tensile Strength ≤800MPa	0.25-0.75DC	≤28	0.1	≤37	0.12	≤55	0.15
K	Ductile Cast Iron	Tensile Strength ≤800MPa	DC (Slot)	≤18	0.08	≤18	0.08	≤18	0.08
N	Aluminium Alloy	–	≤0.25DC	≤28	0.15	≤37	0.17	≤55	0.2
N	Aluminium Alloy	–	0.25-0.75DC	–	–	≤9	0.17	≤9	0.2
N	Aluminium Alloy	–	DC (Slot)	–	–	≤9	0.17	≤9	0.2
S	Titanium Alloy	≤350HB	≤0.25DC	≤28	0.1	≤37	0.1	≤55	0.1
S	Titanium Alloy	≤350HB	0.25-0.75DC	–	–	–	–	–	–
S	Titanium Alloy	≤350HB	DC (Slot)	≤18	0.06	≤18	0.06	≤18	0.06
S	Heat Resistant Alloy	–	≤0.25DC	≤28	0.08	≤37	0.08	≤55	0.08
S	Heat Resistant Alloy	–	0.25-0.75DC	–	–	–	–	–	–
S	Heat Resistant Alloy	–	DC (Slot)	≤18	0.05	≤18	0.05	≤18	0.05

Note 1) The above cutting conditions are determined based on high rigidity machine and work materials, where no vibration occurred.
Please adjust processing conditions if the vibration is generated.

DEEP SHOULDER MILLING

APX4000

P M K N S H

LONG CUTTING EDGE

Fig.1

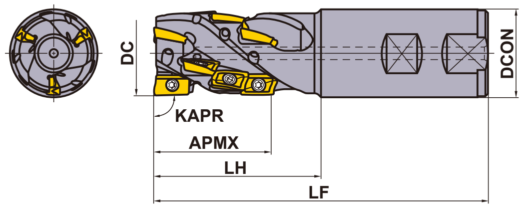
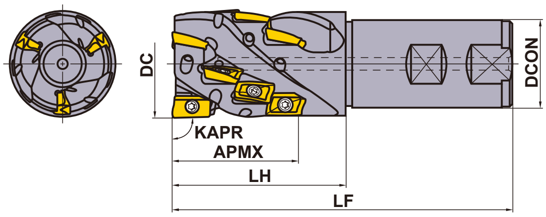


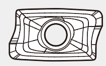
Fig.2



■SHANK TYPE

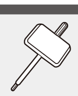
KAPR :90°
With Coolant Hole

Right hand tool holder only.

DC (mm)	Order Number	Stock R	Number of Flutes	Total	Dimensions(mm) DCON	LF	LH	WT* (kg)	APMX (mm)	Fig.	 Insert Type
40	**APX4KR4008WA40S056A**	●	2	8	40	150	80	1.54	56	1	AO◌T18
40	**APX4KR4012WA40S056A**	●	3	12	40	150	80	1.54	56	1	AO◌T18
50	**APX4KR5012WA40S056A**	●	3	12	40	150	80	1.76	56	2	AO◌T18
50	**APX4KR5018WA40M084A**	●	3	18	40	180	110	2.18	84	2	AO◌T18

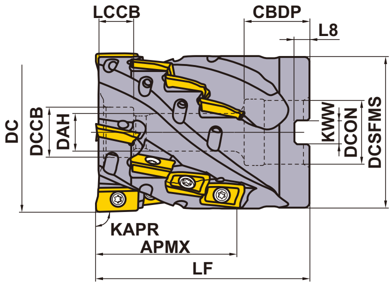
Note 1) When using inserts with corner radius RE≧3.2mm, machining of the holder is required as shown on page K153.
Note 2) Only corner radius RE 0.4mm and 0.8mm can be used for the peripheral cutting edges expect the bottom cutting edge (the end cuttting edge).
* WT : Tool Weight

SPARE PARTS

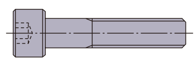
 *		
Clamp Screw	Wrench	Anti-seize Lubricant
TPS43	TIP15W	MK1KS

* Clamp Torque (N • m) : TPS43 = 4.0

● : Inventory maintained.



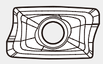
Right hand tool holder only.

DC (mm)	Set Bolt	Geometry
50	HSC10050	
63	HSC12070	

■SHELL TYPE

With Coolant Hole

KAPR :90°
GAMP:+12° GAMF:+6°

DC (mm)	Order Number	Stock	Number of Flutes	Total	Dimensions(mm)		WT* (kg)	APMX (mm)	
		R			LF	DCON			Insert Type
50	**APX4K-050A09A042RA**	●	3	9	65	22	0.75	42	AO◌T18
63	**APX4K-063A16A056RA**	●	4	16	85	27	1.63	56	AO◌T18

Note 1) When using inserts with corner radius RE≥3.2mm, machining of the holder is required as shown on page K153.
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) Coolant can be supplied from the end face of the centering location bore in the arbor. However, it cannot be supplied from the set bolt.
* WT : Tool Weight

MOUNTING DIMENSIONS

DC (mm)	Order Number	Dimensions(mm)							
		DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
50	**APX4K-050A09A042RA**	22	22	11	17	12.5	48	10.4	6.3
63	**APX4K-063A16A056RA**	27	28	13	20	14	60.7	12.4	7

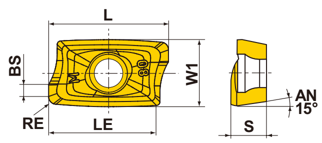
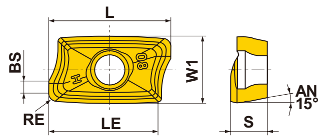
● : Inventory maintained.
(10 inserts in one case)

INSERTS

Work Material			MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	VP20RT
Work Material	P	Steels		◐	✤				◐	◐
	M	Stainless Steels				◐			◐	◐
	K	Cast Irons	◐						✤	✤
	S	Heat Resistant Alloys, Titanium Alloys					◐	✤	◐	✤
	H	Hardened Steels							◐	

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

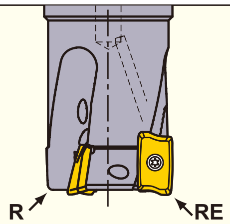
Honing :
E : Round

Shape	Order Number	Class	Honing	Coated MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	VP20RT	Dimensions (mm) L	LE	W1	S	BS	RE*	Geometry
General **M** Breaker 	**AOMT184804PEER-M**	M	E		●	●	●	●	●	●	●	18	15	9	4.8	1.8	0.4	
	AOMT184808PEER-M	M	E		●	●	●	●	●	●	●	18	15	9	4.8	1.4	0.8	
	AOMT184810PEER-M	M	E		●			●	●	●		18	15	9	4.8	1.0	1.0	
	AOMT184812PEER-M	M	E		●			●	●	●		18	15	9	4.8	0.8	1.2	
	AOMT184816PEER-M	M	E		●	●	●	●	●	●	●	18	15	9	4.8	0.4	1.6	
	AOMT184820PEER-M	M	E		●			●	●	●		18	15	9	4.8	0.4	2.0	
Strong Cutting Edge Type **H** Breaker 	**AOMT184804PEER-H**	M	E	●	●	●	●	●	●	●	●	18	15	9	4.8	1.8	0.4	
	AOMT184808PEER-H	M	E	●	●	●	●	●	●	●	●	18	15	9	4.8	1.4	0.8	
	AOMT184816PEER-H	M	E	●	●	●	●	●	●	●	●	18	15	9	4.8	0.4	1.6	
	AOMT184832PEER-H	M	E			●	●				●	18	15	9	4.8	0.4	3.2	
	AOMT184840PEER-H	M	E			●	●				●	18	15	9	4.8	0.4	4.0	
	AOMT184850PEER-H	M	E			●	●				●	18	15	9	4.8	–	5.0	
	AOMT184864PEER-H	M	E			●	●				●	18	15	9	4.8	–	6.35	

* Corner radius RE is different from the work material of R shape depending on the axial rake angle of the body.

Note on Use of Inserts with Large Corner Radii

When using inserts with corner radius RE≥R3.2mm, please machine the holder with a radius form as shown in the table.



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

K

ROTATING TOOLS

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED

	Work Material	Hardness	Insert: Grade: 1st Recommendation	Insert: Grade: 2nd Recommendation	Insert: Breaker		Cutting Width **ae** (mm): ≤0.15DC	Cutting Width **ae** (mm): 0.15–0.3DC	Cutting Width **ae** (mm): 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 PER TOOTH

	Work Material	Characteristics	Cutting Width **ae** (mm)	Depth of Cut **ap** (mm)	Feed per Tooth **fz** (mm/t.), Cutter Diameter **DC** (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 1) The above cutting conditions are determined based on high rigidity machine and work materials, where no vibration occurred.
Please adjust processing conditions if vibration is generated.

MULTI FUNCTIONAL MILLING

<ALUMINIUM ALLOY TO DIFFICULT-TO-CUT MATERIAL CUTTING>

AXD4000

P M K **N** **S** H

Fig. 1

ø40

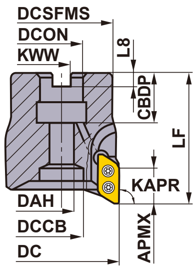


Fig. 2

ø50
ø63
ø80
ø100

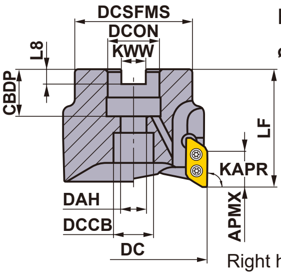
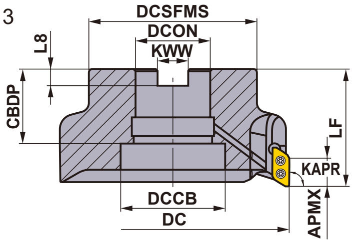


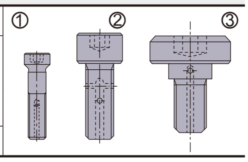
Fig. 3

ø125



Right hand tool holder only.

Cutter Diameter DC (mm)	Set Bolt	Geometry
φ40	HFF08043H	①
φ50, φ63	HSC10030H	②
φ80	HSC12035H	②
φ100	HSC16040H	②
φ125	MBA20040H	③



ARBOR TYPE

KAPR :90°
GAMP:+14°—15° GAMF:+21°—+26°

Type	Insert Corner Radius RE	Order Number	Stock R	Number of Teeth	DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	DCCB	WT *2 (kg)	APMX (mm)	Max. Allowable Revolution (min^{-1})	Fig.	Clamp Screw *1	Wrench	Anti-seize Lubricant	Insert
A Type	0.4 – 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○○
		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	15.5	27000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-100A06RA	●	6	100	63	32	26	17	78	14.4	8	26	2	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 – 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	14.8	27000	2	TS3SB	TKY08D	MK1KS	
		AXD4000-100A06RB	●	6	100	63	32	26	17	78	14.4	8	26	2	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 revolutions are set to ensure tool and insert stability.
Before operating the tool read the operational guidance on page K168.
Note 2) When using the tool at high spindle speeds, ensure that the tool and milling 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.
*1 Clamp Torque (N • m) : TS3SB=1.5
Use the clamp screw by setting the bundled screw.
*2 WT : Tool Weight

● : Inventory maintained. ★ : Inventory maintained in Japan.

Fig.1

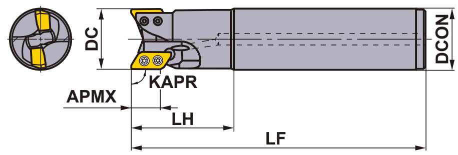
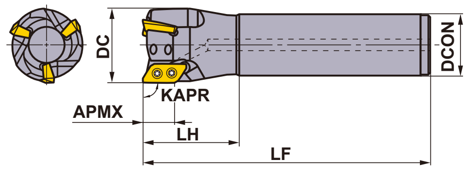


Fig.2



■SHANK TYPE

KAPR :90°

Right hand tool holder only.

Type	Insert Corner Radius RE	Order Number	Stock R	Number of Teeth	DC	LF	LH	DCON	APMX (mm)	Max. Allowable Revolution (min^{-1})	Fig.	Clamp Screw *	Wrench	Anti-seize Lubricant	Insert
A Type	0.4 – 3.2	AXD4000R201SA20SA	●	1	20	110	35	20	15.5	15000	1	TS3SBS	TKY08D	MK1KS	XDGX1750○○
		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	
		AXD4000R282SA25SA	●	2	28	125	50	25	15.5	48500	2	TS3SB	TKY08D	MK1KS	
		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	
		AXD4000R352SA32SA	●	2	35	150	50	32	15.5	45000	2	TS3SB	TKY08D	MK1KS	
		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	
		AXD4000R403SA32ELA	★	3	40	250	50	32	15.5	41000	2	TS3SB	TKY08D	MK1KS	
B Type	4.0 – 5.0	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	
		AXD4000R282SA25SB	★	2	28	125	50	25	14.8	48500	2	TS3SB	TKY08D	MK1KS	
		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	
		AXD4000R352SA32SB	★	2	35	150	50	32	14.8	45000	2	TS3SB	TKY08D	MK1KS	
		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	
		AXD4000R403SA32ELB	★	3	40	250	50	32	14.8	41000	2	TS3SB	TKY08D	MK1KS	

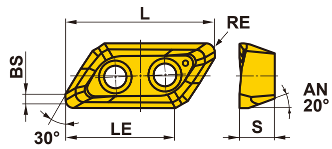
Note 1) The maximum allowable revolutions are set to ensure tool and insert stability.
Before operating the tool read the operational guidance on page K168.
Note 2) When using the tool at high spindle speeds, ensure that the tool and milling chuck are correctly balanced.
Note 3) Note for inserts with 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

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

INSERTS

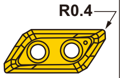
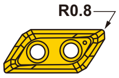
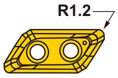
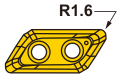
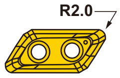
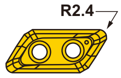
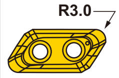
Work Material			LC15TF	MP9120		TF15	
Work Material	N	Aluminium Alloy	◐	✤		✤	
	S	Titanium Alloy		◐			

Cutting Conditions (Guide):
● :Stable Cutting ◐ :General Cutting ✤ :Unstable Cutting
Honing : F :Sharp **E** :Round

Shape	Order Number	Class	Honing	Stock: Coated LC15TF	Stock: Coated MP9120		Stock: Carbide TF15		Dimensions (mm) L	LE	S	BS	RE*	Geometry
GL Breaker 	**XDGX175004PDFR-GL**	G	F	★			●		23	16.9	5	1.7	0.4	
	XDGX175008PDFR-GL	G	F	★			●		23	17	5	1.3	0.8	
	XDGX175012PDFR-GL	G	F	★			●		23	17	5	0.9	1.2	
	XDGX175016PDFR-GL	G	F	★			●		22	16.4	5	1.4	1.6	
	XDGX175020PDFR-GL	G	F	★			●		22	16.4	5	1.0	2.0	
	XDGX175024PDFR-GL	G	F	★			●		22	16.4	5	0.6	2.4	
	XDGX175030PDFR-GL	G	F	★			●		21.1	16.1	5	0.8	3.0	
	XDGX175032PDFR-GL	G	F	★			●		21.1	16.1	5	0.6	3.2	
	XDGX175040PDFR-GL	G	F	★			●		20	15.6	5	0.8	4.0	
	XDGX175050PDFR-GL	G	F	★			●		19.4	15.3	5	0.4	5.0	
GM Breaker 	**XDGX175004PDER-GM**	G	E		●				23	17	5	1.7	0.4	
	XDGX175008PDER-GM	G	E		●				23	17	5	1.2	0.8	
	XDGX175012PDER-GM	G	E		●				23	17	5	0.9	1.2	
	XDGX175016PDER-GM	G	E		●				22	15.9	5	1.3	1.6	
	XDGX175020PDER-GM	G	E		●				22	15.9	5	0.8	2.0	
	XDGX175024PDER-GM	G	E		●				22	15.9	5	0.4	2.4	
	XDGX175030PDER-GM	G	E		●				21.1	16	5	0.6	3.0	
	XDGX175032PDER-GM	G	E		●				21.1	16	5	0.4	3.2	
	XDGX175040PDER-GM	G	E		●				20	14.8	5	0.5	4.0	
	XDGX175050PDER-GM	G	E		●				19.4	15	5	0.3	5.0	
GM Breaker 	**XDGX175004PDFR-GM**	G	F				●		23	17	5	1.7	0.4	
	XDGX175008PDFR-GM	G	F				●		23	17	5	1.2	0.8	
	XDGX175012PDFR-GM	G	F				●		23	17	5	0.9	1.2	
	XDGX175016PDFR-GM	G	F				●		22	15.9	5	1.3	1.6	
	XDGX175020PDFR-GM	G	F				●		22	15.9	5	0.8	2.0	
	XDGX175024PDFR-GM	G	F				●		22	15.9	5	0.4	2.4	
	XDGX175030PDFR-GM	G	F				●		21.1	16	5	0.6	3.0	
	XDGX175032PDFR-GM	G	F				●		21.1	16	5	0.4	3.2	
	XDGX175040PDFR-GM	G	F				●		20	14.8	5	0.5	4.0	
	XDGX175050PDFR-GM	G	F				●		19.4	15	5	0.3	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.

■ HOLDER AND INSERT CORNER RADIUS COMBINATION

Holder	**A** Type Holder								**B** Type Holder	
	AXD4000–○○○○○○○A AXD4000R○○○○○○○○A								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-○○

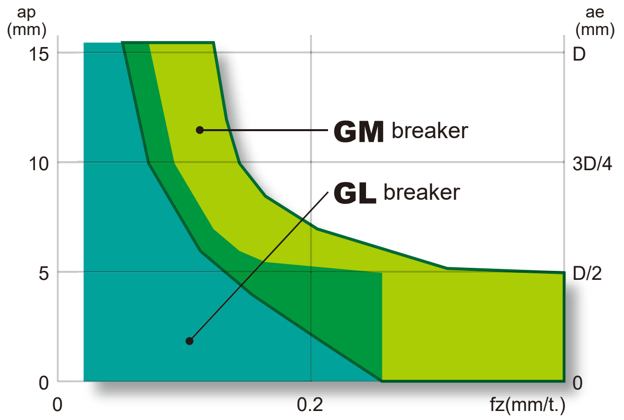
Please note that there is no compatibility between an insert for A type holder and for B type holder.

SPARE PARTS ➤ N001
TECHNICAL DATA ➤ P001

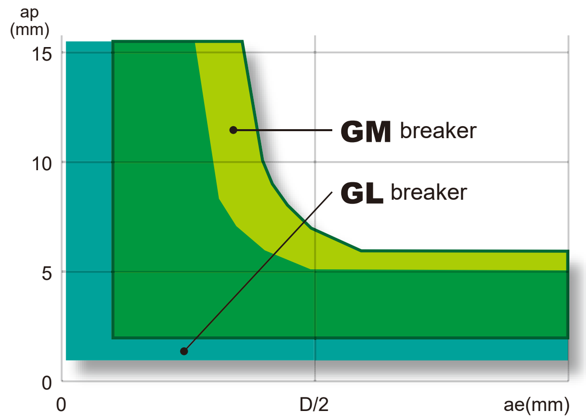
AXD4000 Selection of insert

It is necessary to choose the best insert according to the cutting conditions. Please select an insert from the tables below.
1st recommendation for stable cutting condition is the GL breaker with a strong cutting edge.

Selection of insert according to the feed per tooth and the required cutting depth



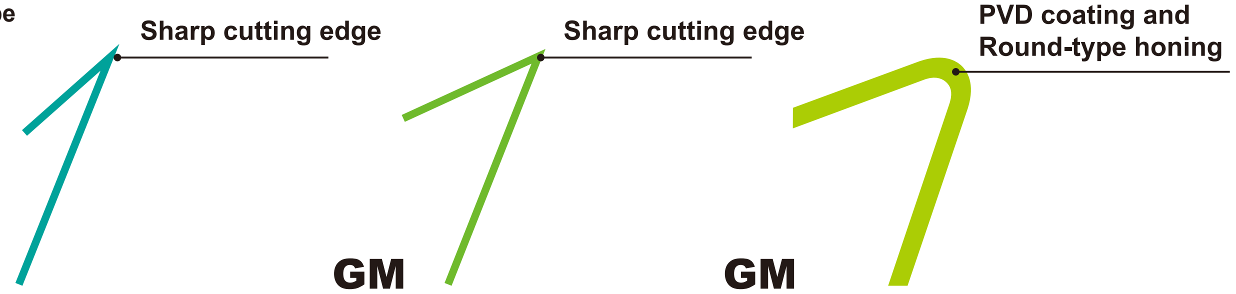
Selection of insert according to the width of cut and the required cutting depth



1st recommendation for machining aluminium alloys is GL breaker.
Under high-load conditions such as deep or high feed cutting, it is advisable to use the GM breaker.

Selection of insert according to cutting edge

Insert type

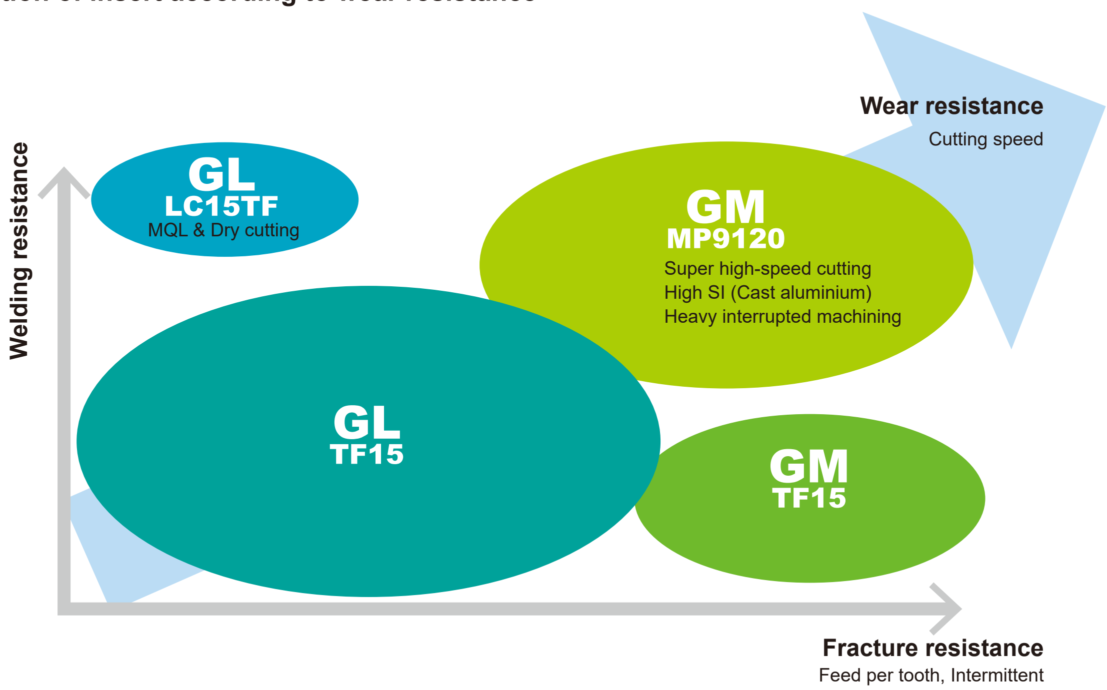


GL
TF15/LC15TF
Low cutting resistance

GM
TF15
Tougher cutting edge

GM
MP9120
Tougher cutting edge & wear resistance
Machining of difficult-to-cut materials & aluminium

Selection of insert according to wear resistance



RECOMMENDED CUTTING CONDITIONS

■Cutting Speed

	Work Material		Grade	Breaker	Cutting Speed **Vc** (m/min)
N	Aluminium Alloy (A6061, A7075 etc)	**Si<5%**	**TF15 LC15TF**	**GL**	1000 (200–3000)
			TF15 MP9120	**GM**	1000 (200–3000)
	Aluminium Alloy (AC4B, ADC12, A390 etc)	**5%≤Si≤10% Si>10%**	**MP9120**	**GM**	1000 (200–3000)
S	Titanium Alloy (Ti-6Al-4V etc)	–	**MP9120**	**GM**	40 (30–60)

■Depth of Cut / Feed per Tooth

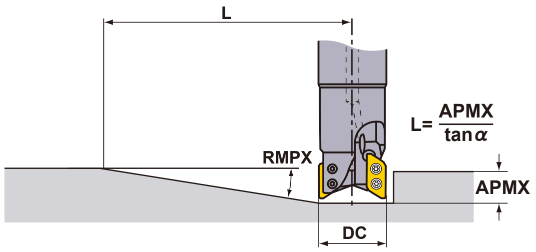
	Work Material		Breaker	Cutting Width **ae** (mm)	Depth of Cut **ap** (mm)	Feed per Tooth (mm/t.) Cutting Edge Diameter **DC** (mm) **20**	**25, 28**	**32, 35**	**40**	**50, 63, 80**	**100, 125**
N	Aluminium Alloy (A6061, A7075 etc)	**Si<5%**	**GL**	≤0.25 DC	≤ 5	≤ 0.05	≤ 0.25	≤ 0.25	≤ 0.25	≤ 0.25	≤ 0.25
					≤ 10	≤ 0.05	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2
					≤ 14.5	≤ 0.05	≤ 0.15	≤ 0.15	≤ 0.15	≤ 0.15	≤ 0.15
				≤0.5 DC	≤ 5	≤ 0.05	≤ 0.25	≤ 0.25	≤ 0.25	≤ 0.25	≤ 0.25
					≤ 10	–	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2
					≤ 14.5	–	≤ 0.15	≤ 0.15	≤ 0.15	≤ 0.15	≤ 0.15
				≤0.75 DC	≤ 5	≤ 0.05	≤ 0.25	≤ 0.25	≤ 0.25	≤ 0.25	≤ 0.25
					≤ 10	–	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2
					≤ 14.5	–	≤ 0.15	≤ 0.15	≤ 0.15	≤ 0.15	≤ 0.15
				DC (Slot)	≤ 5	≤ 0.05	≤ 0.25	≤ 0.25	≤ 0.25	≤ 0.25	≤ 0.25
	Aluminium Alloy (A6061, A7075 etc)	**Si<5%**	**GM**	≤0.25 DC	≤ 5	≤ 0.05	≤ 0.35	≤ 0.35	≤ 0.4	≤ 0.4	≤ 0.4
					≤ 10	≤ 0.05	≤ 0.3	≤ 0.3	≤ 0.35	≤ 0.35	≤ 0.35
					≤ 14.5	≤ 0.05	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.3	≤ 0.3
				≤0.5 DC	≤ 5	≤ 0.05	≤ 0.35	≤ 0.35	≤ 0.35	≤ 0.4	≤ 0.4
					≤ 10	–	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.35	≤ 0.35
					≤ 14.5	–	≤ 0.2	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.3
				≤0.75 DC	≤ 5	≤ 0.05	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.35	≤ 0.35
					≤ 10	–	≤ 0.25	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.3
					≤ 14.5	–	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.25	≤ 0.25
				DC (Slot)	≤ 5	≤ 0.05	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.35	≤ 0.35
	Aluminium Alloy (AC4B etc) Aluminium Alloy (ADC12, A390 etc)	**5%≤Si≤10% Si>10%**	**GM**	≤0.25 DC	≤ 5	≤ 0.05	≤ 0.35	≤ 0.35	≤ 0.4	≤ 0.4	≤ 0.4
					≤ 10	≤ 0.05	≤ 0.3	≤ 0.3	≤ 0.35	≤ 0.35	≤ 0.35
					≤ 14.5	≤ 0.05	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.3	≤ 0.3
				≤0.5 DC	≤ 5	≤ 0.05	≤ 0.35	≤ 0.35	≤ 0.35	≤ 0.4	≤ 0.4
					≤ 10	–	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.35	≤ 0.35
					≤ 14.5	–	≤ 0.2	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.3
				≤0.75 DC	≤ 5	≤ 0.05	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.35	≤ 0.35
					≤ 10	–	≤ 0.25	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.3
					≤ 14.5	–	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.25	≤ 0.25
				DC (Slot)	≤ 5	≤ 0.05	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.35	≤ 0.35
S	Titanium Alloy (Ti-6Al-4V etc)	–	**GM**	≤0.25 DC	≤ 5	≤ 0.05	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1
					≤ 10	≤ 0.05	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1
					≤ 14.5	≤ 0.05	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1
				≤0.5 DC	≤ 5	≤ 0.05	≤ 0.08	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1
					≤ 10	–	≤ 0.08	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1
					≤ 14.5	–	≤ 0.08	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1
				≤0.75 DC	≤ 5	≤ 0.05	≤ 0.05	≤ 0.08	≤ 0.1	≤ 0.1	≤ 0.1
					≤ 10	–	≤ 0.05	≤ 0.08	≤ 0.1	≤ 0.1	≤ 0.1
					≤ 14.5	–	≤ 0.05	≤ 0.08	≤ 0.1	≤ 0.1	≤ 0.1
				DC (Slot)	≤ 5	≤ 0.05	≤ 0.05	≤ 0.05	≤ 0.05	≤ 0.05	≤ 0.05

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.

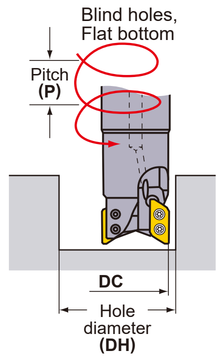
Note 2) Vibrations may occur in the following conditions:
When using long tool overhang.
When pocket machining corner radii.
When the workpiece has poor clamping rigidity or when the machine rigidity or workpiece rigidity is low, vibrations can occur easily, if so, reduce cutting conditions such as width and depth of cut and feed per tooth.

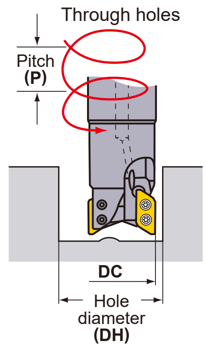
■RAMPING/HELICAL MILLING

●RAMPING



●HELICAL MILLING





RAMPING/HELICAL MILLING (Aluminium Alloy)

Holder Type	Cutting Edge Diameter DC (mm)	Insert Corner R RE (mm)	Ramping: Maximum Ramping Angle RMPX	Ramping: Minimum Distance L *1 (mm)	Helical Milling (Blind Hole, Flat Bottom): Maximum Hole Diameter DH max. (mm)	Helical Milling (Blind Hole, Flat Bottom): Maximum Pitch P max. (mm)	Helical Milling (Blind Hole, Flat Bottom): Minimum Hole Diameter DH min. (mm)	Helical Milling (Blind Hole, Flat Bottom): Maximum Pitch P max. (mm)	Helical Milling: Minimum Hole Diameter DH min. (mm)	Helical Milling: 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	31.6	8
		1.6—2.4	22.0°	39	44.7 *3	13	44.4	13	31.6	8
		3.0—3.2	18.7°	46	43.1 *4	12	43	12	31.6	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	45.5	11
		1.6—2.4	14.7°	60	58.7 *3	13	58.3	13	45.5	11
		3.0—3.2	13.8°	64	57.1 *4	12	56.8	12	45.5	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	61.5	13
		1.6—2.4	10.4°	85	74.3 *3	13	74.2	13	61.5	12
		3.0—3.2	9.7°	91	72.7 *4	12	72.7	12	61.5	11
	50	0.4—1.2	8.2°	108	96.7 *2	14	95.6	14	81.4	14
		1.6—2.4	7.6°	117	94.3 *3	13	94	13	81.4	13
		3.0—3.2	6.9°	129	92.7 *4	12	92.4	12	81.4	11
	63	0.4—1.2	6.1°	146	122.7 *2	14	121.6	14	107.4	14
		1.6—2.4	5.6°	159	120.3 *3	13	119.9	13	107.4	13
		3.0—3.2	5.2°	171	118.7 *4	12	118.4	12	107.4	12
	80	0.4—1.2	4.6°	193	156.7 *2	14	155.6	14	141.4	14
		1.6—2.4	4.2°	212	154.3 *3	13	153.9	13	141.4	13
		3.0—3.2	3.8°	234	152.7 *4	12	152.4	12	141.4	12
	100	0.4—1.2	3.5°	254	196.7 *2	14	195.5	14	181.5	14
		1.6—2.4	3.2°	278	194.3 *3	13	193.9	13	181.5	13
		3.0—3.2	2.9°	306	192.7 *4	12	192.3	12	181.5	12
	125	0.4—1.2	2.7°	329	246.7 *2	14	245.5	14	231.5	14
		1.6—2.4	2.5°	356	244.3 *3	13	243.8	13	231.5	13
		3.0—3.2	2.3°	386	242.7 *4	12	242.3	12	231.5	12

Note 1) Ramping, helical cutting, and drilling are not recommended for machining of steel and titanium alloys.
*1 Using the maximum ramping angle, the distance to reach the maximum depth of cut is as follows:
L= (maximum depth of cut ap/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

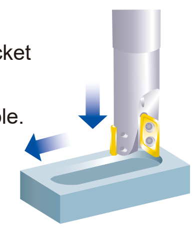
Holder Type	Cutting Edge Diameter **DC** (mm)	Insert Corner R **RE** (mm)	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling	
			Maximum Ramping Angle **RMPX**	Minimum Distance **L** *1 (mm)	Maximum Hole Diameter **DH max.** (mm)	Maximum Pitch **P max.** (mm)	Minimum Hole Diameter **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	31.7	5
		5	13.7°	61	39.5	9	40.6	9	31.7	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	45.5	9
		5	12°	70	53.5	9	54.3	9	45.5	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	61.5	10
		5	8.2°	103	69.1	9	70.1	9	61.5	9
	50	4	6.3°	135	91.1	10	90.6	10	81.3	10
		5	5.8°	146	89.1	9	89.8	9	81.3	9
	63	4	4.6°	184	117.1	10	116.6	10	107.4	10
		5	4.2°	202	115.1	9	115.7	9	107.3	9
	80	4	3.4°	250	151.1	10	150.5	10	141.4	10
		5	3.1°	274	149.1	9	149.6	9	141.4	9
	100	4	2.6°	326	191.1	10	190.5	10	181.4	10
		5	2.4°	354	189.1	9	189.6	9	181.4	9
	125	4	2°	424	241.1	10	240.5	10	231.4	10
		5	1.8°	471	239.1	9	239.6	9	229.9	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 ap/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 (Aluminium Alloy)

Type	Insert Corner R **RE** (mm)	Max.Drilling Depth (mm) — Cutting Edge Diameter **DC** (mm)					
		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.

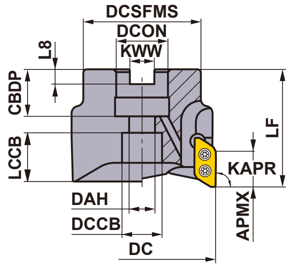


MULTI FUNCTIONAL MILLING
<FOR ALUMINIUM ALLOY CUTTING>

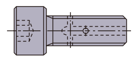
AXD4000A NEW

P M K **N** S H

ø50

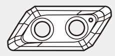


Right hand tool holder only.

Cutter Diameter DC (mm)	Set Bolt	Geometry
ϕ50	HSC10030H	

■ARBOR TYPE

KAPR : 90°
GAMP : +10°   GAMF : +21°
With Coolant Hole

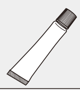
DC	Type	Insert Corner Radius RE	Order Number	Stock R	Number of Teeth	Dimensions (mm) LF	Dimensions (mm) DCON	WT (kg)	APMX (mm)	RPMX (min^{-1})	 Insert Type
50	D	0.4–3.2	**AXD4000A-050A04RD**	●	4	50	22	0.4	15.5	34000	XDGX1750
50	E	4.0–5.0	**AXD4000A-050A04RE**	●	4	50	22	0.4	14.8	34000	XDGX1750

Note 1) The maximum allowable revolutions are set to ensure tool and insert stability.
RPMX (max. rev/min) for holders must also be considered.
Note 2) Tool should be set with balancing quality of G6.3 (ISO1940) or ISO16084, in case over 6000 min^{-1} spindle rotation.
Note 3) When using the tool at high spindle speeds, ensure that the tool and chuck are correctly balanced.
Note 4) Note for inserts with a corner radius of 1.6 and above, as corner radius increases the LF dimensions decrease.

MOUNTING DIMENSIONS

DC	Order Number	Dimensions (mm) DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
50	**AXD4000A-050A04RD**	22	20	11	17	15.4	45	10.4	6.3
50	**AXD4000A-050A04RE**	22	20	11	17	14.6	45	10.4	6.3

SPARE PARTS

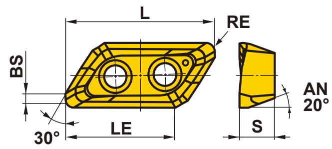
 *		
Clamp Screw	Wrench	Anti-seize Lubricant
TPS3SB	TIP10D	MK1KS

* Clamp Torque (N • m) : TPS3SB = 3.0
Note 1) Clamp screw and wrench of AXD4000A are different from AXD4000.

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

INSERTS

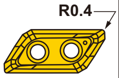
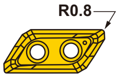
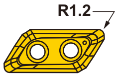
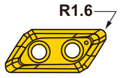
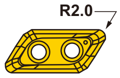
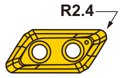
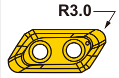
Work Material	N	Aluminium Alloys							Cutting Conditions (Guide): ●:Stable Cutting ◐:General Cutting ✤:Unstable Cutting Honing: F:Sharp E:Round
			◐	✤			◐	✤	

Shape	Order Number	Class	Honing	Stock Coated LC15TF	Stock Coated MP9120			Stock Carbide MT2010 (NEW)	Stock Carbide TF15	Dimensions (mm) L	LE	S	BS	RE*	Geometry
Strong Cutting Edge Type **GM** Breaker 	XDGX175004PDFR-GM	G	F					●	●	23.0	17.0	5	1.7	0.4	
	XDGX175008PDFR-GM	G	F					●	●	23.0	17.0	5	1.2	0.8	
	XDGX175012PDFR-GM	G	F					★	●	23.0	17.0	5	0.9	1.2	
	XDGX175016PDFR-GM	G	F					●	●	22.0	15.9	5	1.3	1.6	
	XDGX175020PDFR-GM	G	F					●	●	22.0	15.9	5	0.8	2.0	
	XDGX175024PDFR-GM	G	F					★	●	22.0	15.9	5	0.4	2.4	
	XDGX175030PDFR-GM	G	F					●	●	21.1	16.0	5	0.6	3.0	
	XDGX175032PDFR-GM	G	F					●	●	21.1	16.0	5	0.4	3.2	
	XDGX175040PDFR-GM	G	F					●	●	20.0	14.8	5	0.5	4.0	
	XDGX175050PDFR-GM	G	F					★	●	19.4	15.0	5	0.3	5.0	
Strong Cutting Edge Fracture Resistance Type **GM** Breaker 	XDGX175004PDER-GM	G	E		●					23.0	17.0	5	1.7	0.4	
	XDGX175008PDER-GM	G	E		●					23.0	17.0	5	1.2	0.8	
	XDGX175012PDER-GM	G	E		●					23.0	17.0	5	0.9	1.2	
	XDGX175016PDER-GM	G	E		●					22.0	15.9	5	1.3	1.6	
	XDGX175020PDER-GM	G	E		●					22.0	15.9	5	0.8	2.0	
	XDGX175024PDER-GM	G	E		●					22.0	15.9	5	0.4	2.4	
	XDGX175030PDER-GM	G	E		●					21.1	16.0	5	0.6	3.0	
	XDGX175032PDER-GM	G	E		●					21.1	16.0	5	0.4	3.2	
	XDGX175040PDER-GM	G	E		●					20.0	14.8	5	0.5	4.0	
	XDGX175050PDER-GM	G	E		●					19.4	15.0	5	0.3	5.0	
Low Cutting Resistance **GL** Breaker 	XDGX175004PDFR-GL	G	F	★					●	23.0	16.9	5	1.7	0.4	
	XDGX175008PDFR-GL	G	F	★					●	23.0	17.0	5	1.3	0.8	
	XDGX175012PDFR-GL	G	F	★					●	23.0	17.0	5	0.9	1.2	
	XDGX175016PDFR-GL	G	F	★					●	22.0	16.4	5	1.4	1.6	
	XDGX175020PDFR-GL	G	F	★					●	22.0	16.4	5	1.0	2.0	
	XDGX175024PDFR-GL	G	F	★					●	22.0	16.4	5	0.6	2.4	
	XDGX175030PDFR-GL	G	F	★					●	21.1	16.1	5	0.8	3.0	
	XDGX175032PDFR-GL	G	F	★					●	21.1	16.1	5	0.6	3.2	
	XDGX175040PDFR-GL	G	F	★					●	20.0	15.6	5	0.8	4.0	
	XDGX175050PDFR-GL	G	F	★					●	19.4	15.3	5	0.4	5.0	

* The insert nose R differs from radius from the radius formed on the workpiece after machining due to the effects of the axial rake angle at the time of setting. GM breaker is recommended if the priority is on the dimensional precision of the workpiece corner radius.

● = NEW

HOLDER AND INSERT CORNER RADIUS COMBINATION

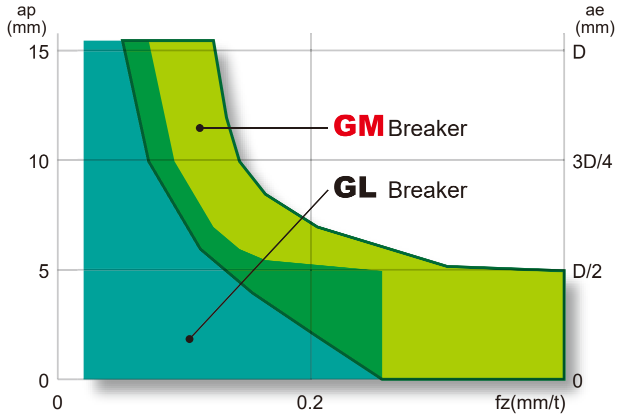
Holder	**D** Type Holder								**E** Type Holder	
	AXD4000A–050A04RD								**AXD4000A–050A04RE**	
Applicable Insert Corner R (RE)										
	XDGX 175004PD◌R-◌◌	XDGX 175008PD◌R-◌◌	XDGX 175012PD◌R-◌◌	XDGX 175016PD◌R-◌◌	XDGX 175020PD◌R-◌◌	XDGX 175024PD◌R-◌◌	XDGX 175030PD◌R-◌◌	XDGX 175032PD◌R-◌◌	XDGX 175040PD◌R-◌◌	XDGX 175050PD◌R-◌◌

Note 1) Other combinations of holder and insert corner R are not acceptable.

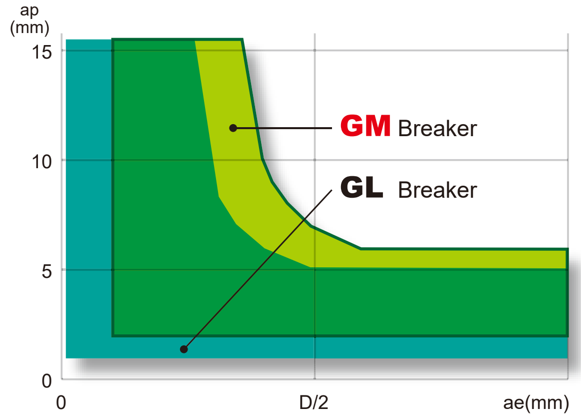
AXD4000A Selection of Insert

It is necessary to choose the best insert according to the cutting conditions. Please select an insert from the tables below.
1st recommendation for efficient, high load machining with a high speed spindle is the GM breaker with a strong cutting edge.

Selection of insert according to the feed per tooth and the required cutting depth

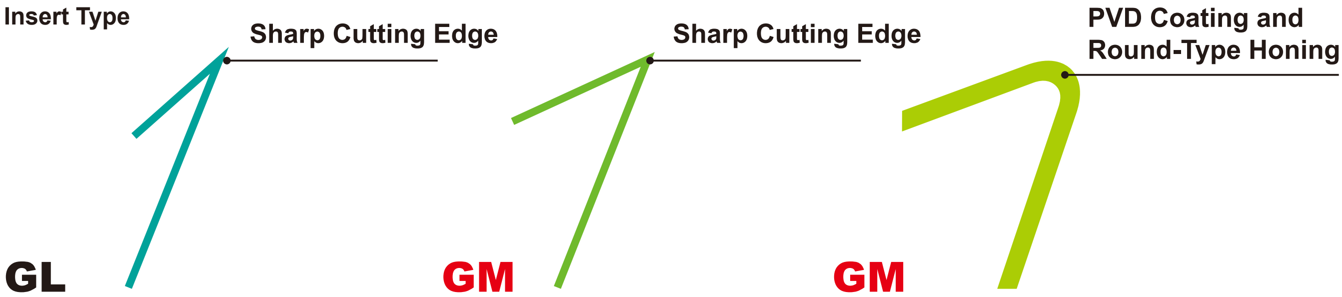


Selection of insert according to the width of cut and the required cutting depth



1st recommendation for machining aluminium alloys is GL breaker.
Under high-load conditions such as deep or high feed cutting, it is advisable to use the GM breaker.

Selection of Insert According to Cutting Edge

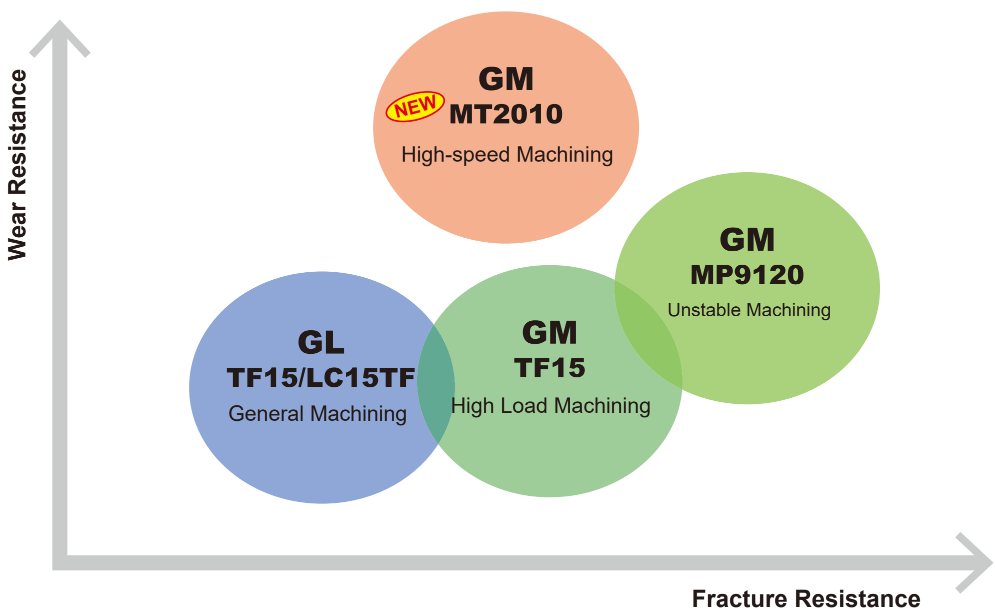


GL
TF15/LC15TF
Low Cutting Resistance
LC15TF : Excellent welding resistance.

GM
MT2010/TF15
Tougher Cutting Edge

GM
MP9120
Strong Fracture Resistant Cutting Edge

Selection of insert according to wear resistance



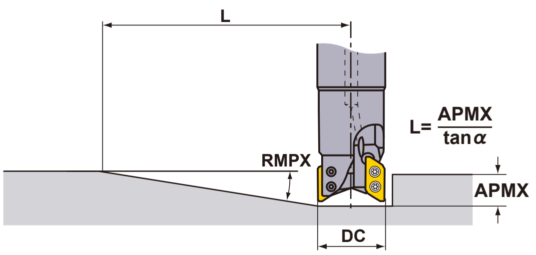
RECOMMENDED CUTTING CONDITIONS

	Work Material	Properties	Grade	Breaker	Cutting Speed **Vc** (m/min)	Cutting Width **ae** (mm)	Depth of Cut **ap** (mm)	Feed per Tooth (mm/t.)
N	Aluminium Alloys (A7050, A7075, A2024, A6061 etc) Aluminium-lithium Alloy	Content Si＜5%	MT2010 TF15 MP9120	**GM**	4000(2000—5000)	≤0.5 DC	≤ 5	≤ 0.35
							≤ 10	≤ 0.30
							≤ 14.5	≤ 0.25
						≤0.75 DC	≤ 5	≤ 0.30
							≤ 10	≤ 0.25
							≤ 14.5	≤ 0.20
						DC (Slot)	≤ 5	≤ 0.30
			TF15 LC15TF	**GL**	4000(2000—5000)	≤0.75 DC	≤ 5	≤ 0.20
							≤ 10	≤ 0.15
							≤ 14.5	≤ 0.10
						DC (Slot)	≤ 5	≤ 0.20

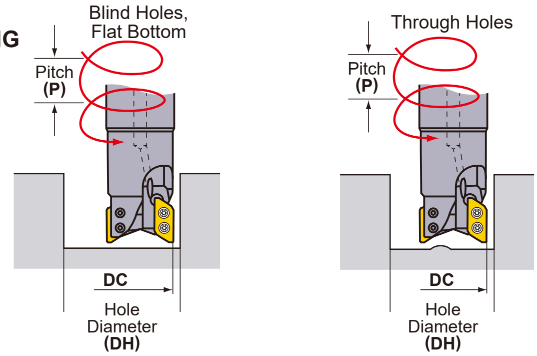
Note 1) The above cutting conditions are determined based on high work materials and machine rigidity, where no vibration occurred.
If vibrations occur make adjustments according to the machining conditions.
Note 2) Vibrations may occur in the following conditions:
- When using a long tool overhang.
- When pocket machining corner radii.
- When the work materials has poor clamping rigidity or when the machine rigidity or work material rigidity is low, vibrations can occur easily, if so, reduce cutting conditions such as width and depth of cut and feed per tooth.

RAMPING / HELICAL MILLING / DRILLING

● RAMPING



● HELICAL MILLING



Refer to the table below for cutting conditions. For feed per tooth and cutting speed, follow the cutting conditions for slot milling.

DC (mm)	Type	Insert Corner R **RE** (mm)	Ramping		Helical Milling (Blind Hole, Flat Bottom)			Helical Milling (Through Hole)		Drilling
			RMPX	**L** (mm) *1	**DH max.** (mm)	**DH min.** (mm)	**P max.** (mm)	**DH min.** (mm)	**P max.** (mm)	
50	D	0.4—1.2	8.2°	108	96.8 *2	95.4	14	81.2	14	5.5
		1.6—2.4	7.6°	117	94.4 *3	93.6	13	81.2	13	5.0
		3.0—3.2	6.9°	129	92.8 *4	92.0	12	81.2	12	4.5
	E	4.0	6.3°	135	91.2	90.0	10	81.2	10	3.9
		5.0	5.8°	146	89.2	88.8	9	81.2	9	3.6

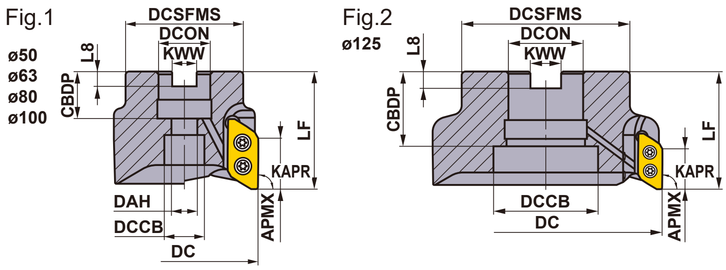
*1 Using the maximum ramping angle, the distance to reach the maximum depth of cut is as follows:
L= (maximum depth of cut APMX/tan α). Maximum depth of cut D type is 15.5mm, E type is 14.8mm.
*2 Corner radius of 1.2mm. For other corner radii, use the following formula. {(cutting edge diameter DC)—(corner radius RE)—0.3}×2
*3 Corner radius of 2.4mm. For other corner radii, use the following formula. {(cutting edge diameter DC)—(corner radius RE)—0.3}×2
*4 Corner radius of 3.2mm. For other corner radii, use the following formula. {(cutting edge diameter DC)—(corner radius RE)—0.3}×2
Note 1) The recommended ramping feed is 0.05mm/t. or under.

MULTI FUNCTIONAL MILLING
<FOR ALUMINIUM ALLOY CUTTING>

90° KAPR

AXD7000

P M K **N** S H



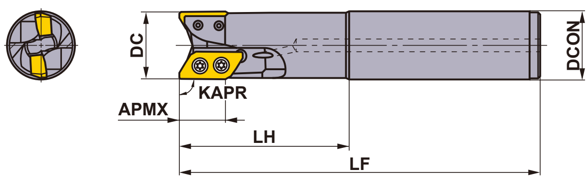
Right hand tool holder only.

Cutter Diameter DC (mm)	Set Bolt		Geometry
ϕ50, ϕ63	HSC10030H	①	① ②
ϕ80	HSC12035H		
ϕ100	HSC16040H		
ϕ125	MBA20040H	②	

■ARBOR TYPE

KAPR :90°
GAMP:+11° GAMF:+26°—+29°

Type	Insert Corner Radius RE	Order Number	Stock R	Number of Teeth	DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	DCCB	*2 WT (kg)	APMX (mm)	Max. Allowable Revolution (min^{-1})	Fig.	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Insert
A Type	0.8 | 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□□
		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 | 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	



■SHANK TYPE

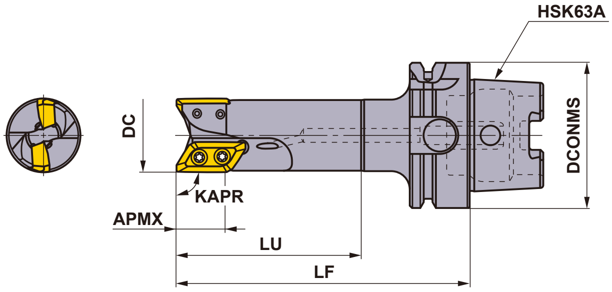
KAPR:90°

Right hand tool holder only.

Type	Insert Corner Radius RE	Order Number	Stock R	Number of Teeth	DC	LF	LH	DCON	APMX (mm)	Max. Allowable Revolution (min^{-1})	*1 Clamp Screw	Wrench	Anti-seize Lubricant	Insert
A Type	0.8 | 3.2	**AXD7000R322SA32SA**	●	2	32	170	80	32	21	41000	TS4SB	TKY15D	MK1KS	XDGX2270□□
		AXD7000R402SA40SA	●	2	40	170	80	40	21	36000	TS4SBL	TKY15D	MK1KS	
B Type	4.0 | 5.0	**AXD7000R322SA32SB**	●	2	32	170	80	32	20.4	41000	TS4SB	TKY15D	MK1KS	
		AXD7000R402SA40SB	●	2	40	170	80	40	20.4	36000	TS4SBL	TKY15D	MK1KS	

Note 1) The maximum allowable spindle speeds are set to ensure tool and insert stability.
Before use read the operational guidance on page K168.
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 LH dimensions decrease.
*1 Clamp Torque (N • m) : TS4SB=3.5, TS4SBL=3.5
Use the clamp screw by setting the bundled screw.
*2 WT : Tool Weight

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



■ HSK63A MONOBLOCK

KAPR :90°

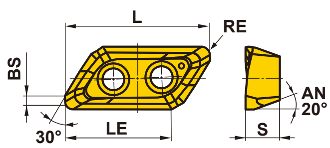
Right hand tool holder only.

Type	Insert Corner RE	Order Number	Stock R	Number of Teeth	DC	LF	LU	DCONMS	APMX (mm)	RMPX *2	Max. Allowable Revolution (min^{-1})	Clamp Screw *1	Wrench	Anti-seize Lubricant	Insert
A type	0.8 – 3.2	AXD7000R03202A-H63A	●	2	32	127	80	63	21	19°	41000	TS4SB	TKY15D	MK1KS	XDGX2270○○ PDFR-GL
		AXD7000R04002A-H63A	●	2	40	132	85	63	21	13°	36000	TS4SBL	TKY15D	MK1KS	
		AXD7000R05003A-H63A	●	3	50	137	90	63	21	9°	30000	TS4SBL	TKY15D	MK1KS	

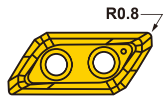
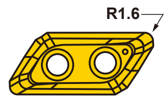
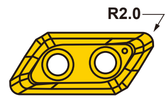
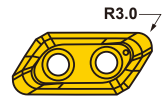
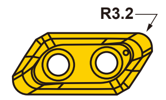
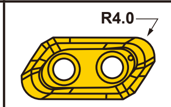
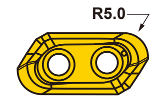
Note 1) The maximum allowable spindle speeds are set to ensure tool and insert stability.
Before use read the operational guidance on page K168.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
Note 3) Note for inserts with a corner radius of 3.0 and above, as corner radius increases the LF and LU dimensions decrease.
Note 4) There is no hole for a data chip
Note 5) The HSK63A shank type has a built-in coolant pipe for installation.
*1 Clamp Torque (N • m) : TS4SB=3.5, TS4SBL=3.5
*2 RMPX : Max. Ramping Angle

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	Coated	Coated	Coated	Carbide TF15	Carbide	Dimensions (mm) L	LE	S	BS	RE	Geometry
	XDGX227008PDFR-GL	G	F	★				●		30	21.6	7	2.0	0.8	
	XDGX227016PDFR-GL	G	F	★				●		30	21.7	7	1.2	1.6	
	XDGX227020PDFR-GL	G	F	★				●		30	21.7	7	0.8	2.0	
	XDGX227030PDFR-GL	G	F	★				●		28.8	21.2	7	0.8	3.0	
	XDGX227032PDFR-GL	G	F	★				●		28.8	21.2	7	0.6	3.2	
	XDGX227040PDFR-GL	G	F	★				●		27.5	20.6	7	0.9	4.0	
	XDGX227050PDFR-GL	G	F	★				●		27	20.3	7	0.4	5.0	

■ HOLDER AND INSERT CORNER RADIUS COMBINATION

Holder	A Type Holder					B Type Holder	
	AXD7000−○○○○○○○A AXD7000R○○○○○○○○A AXD7000R○○○○○A-H63A					AXD7000−○○○○○○○B AXD7000R○○○○○○○○B	
Applicable Insert Corner R **(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

Please note that there is no compatibility between an insert for A type holder and that of for B type holder.

SPARE PARTS ➤ N001
TECHNICAL DATA ➤ P001

■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 above the revolutions shown in Table 2, replacing the clamp screw simultaneously with insert replacement is recommended.
6) Check that there is no clearance at the insert seat surface.

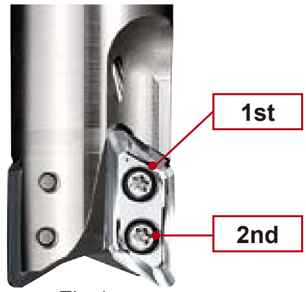
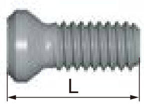


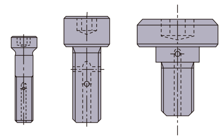
Fig.1

Type	**AXD4000**		**AXD7000**		
Cutting Edge Diameter **DC**(mm)	ø20	ø25−ø125	ø32	ø40−ø125	 L
Clamp Screw Number	TS3SBS	TS3SB	TS4SB	TS4SBL	
Overall Length **L**(mm)	6.5	8	9	10.5	

Installation of arbor type

1) Clean the inside and face of the hole and the arbor face before installing the body to the arbor.
2) Set the body to the arbor and tighten it. 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.

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

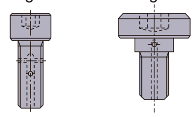
Geometry	Set Bolt	Clamp Torque (N•m)	Cutting Edge Diameter **DC**(mm)	Fig
Fig.1 Fig.2 	HSC10030H	40	ø50, ø63	1
	HSC12035H	80	ø80	1
	HSC16040H	150	ø100	1
	MBA20040H	320	ø120	2

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 better based on ISO1940. It is also recommended to replace the clamp screws with new ones when changing inserts. Furthermore,ensure to use machines with safety measures in case of cutter breakage.

Note 1) 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 when handling the inserts.

RECOMMENDED CUTTING CONDITIONS

■Cutting Speed

Work Material			Grade	Breaker	Cutting Speed **Vc** (m/min)
N	Aluminium Alloy	**Si<5%**	**LC15TF**	**GL**	1000 (200–3000)
			TF15	**GL**	1000 (200–3000)
		5%≤Si≤10% Si>10%	**LC15TF**	**GL**	1000 (200–3000)

■Depth of Cut / Feed per Tooth

Work Material			Breaker	Cutting Width **ae** (mm)	Depth of Cut **ap** (mm)	Feed per Tooth (mm/t.) Cutting Edge Diameter **DC** (mm) 32	40	50, 63, 80	100, 125
N	Aluminium Alloy	**Si<5%**	**GL**	≤0.25 DC	≤ 5	≤ 0.35	≤ 0.4	≤ 0.4	≤ 0.4
					≤ 10	≤ 0.3	≤ 0.35	≤ 0.35	≤ 0.35
					≤ 15	≤ 0.25	≤ 0.3	≤ 0.3	≤ 0.3
					≤ 20	≤ 0.2	≤ 0.25	≤ 0.25	≤ 0.25
				≤0.5 DC	≤ 5	≤ 0.35	≤ 0.35	≤ 0.4	≤ 0.4
					≤ 10	≤ 0.3	≤ 0.3	≤ 0.35	≤ 0.35
					≤ 15	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.3
					≤ 20	≤ 0.2	≤ 0.2	≤ 0.25	≤ 0.25
				≤0.75 DC	≤ 5	≤ 0.3	≤ 0.3	≤ 0.35	≤ 0.35
					≤ 10	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.3
					≤ 15	≤ 0.2	≤ 0.2	≤ 0.25	≤ 0.25
					≤ 20	≤ 0.15	≤ 0.15	≤ 0.2	≤ 0.2
				DC (Slot)	≤ 5	≤ 0.25	≤ 0.3	≤ 0.35	≤ 0.35
					≤ 10	≤ 0.2	≤ 0.25	≤ 0.3	≤ 0.3
					≤ 15	≤ 0.15	≤ 0.2	≤ 0.25	≤ 0.25
					≤ 20	≤ 0.1	≤ 0.15	≤ 0.2	≤ 0.2
		5%≤Si≤10% Si>10%	**GL**	≤0.25 DC	≤ 5	≤ 0.35	≤ 0.4	≤ 0.4	≤ 0.4
					≤ 10	≤ 0.3	≤ 0.35	≤ 0.35	≤ 0.35
					≤ 15	≤ 0.25	≤ 0.3	≤ 0.3	≤ 0.3
					≤ 20	≤ 0.2	≤ 0.25	≤ 0.25	≤ 0.25
				≤0.5 DC	≤ 5	≤ 0.35	≤ 0.35	≤ 0.4	≤ 0.4
					≤ 10	≤ 0.3	≤ 0.3	≤ 0.35	≤ 0.35
					≤ 15	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.3
					≤ 20	≤ 0.2	≤ 0.2	≤ 0.25	≤ 0.25
				≤0.75 DC	≤ 5	≤ 0.3	≤ 0.3	≤ 0.35	≤ 0.35
					≤ 10	≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.3
					≤ 15	≤ 0.2	≤ 0.2	≤ 0.25	≤ 0.25
					≤ 20	≤ 0.15	≤ 0.15	≤ 0.2	≤ 0.2
				DC (Slot)	≤ 5	≤ 0.25	≤ 0.3	≤ 0.35	≤ 0.35
					≤ 10	≤ 0.2	≤ 0.25	≤ 0.3	≤ 0.3
					≤ 15	≤ 0.15	≤ 0.2	≤ 0.25	≤ 0.25
					≤ 20	≤ 0.1	≤ 0.15	≤ 0.2	≤ 0.2

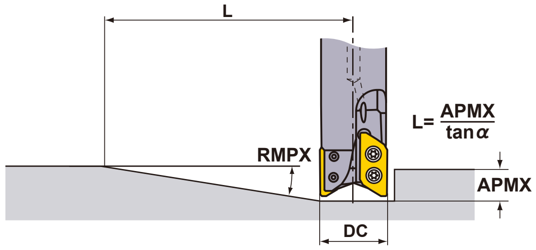
Note 1) The above cutting conditions are determined based on high workpiece and machine rigidity, where no vibration occurred. If vibrations occur make adjustments according to the machining conditions.

Note 2) Vibrations may occur in the following conditions:

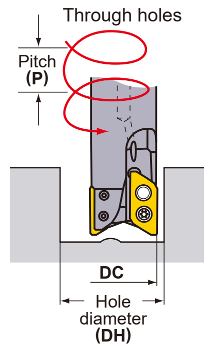
- When using long tool overhang.
- When pocket machining corner radii.
- When the workpiece has poor clamping rigidity or when the machine rigidity or workpiece rigidity is low, vibrations can occur easily, if so, reduce cutting conditions such as width and depth of cut and feed per tooth.

RAMPING/HELICAL MILLING

● RAMPING



● HELICAL MILLING



RAMPING/HELICAL MILLING (ALUMINIUM ALLOY)

Type	DC (mm)	RE (mm)	Ramping	
			RMPX	L (mm) *1
A type	32	0.8 - 2.4	19°	61
		3,3.2	18°	65
	40	0.8 - 2.4	14°	85
		3, 3.2	13°	91
	50	0.8 - 2.4	10°	120
		3, 3.2	9°	133
	63	0.8 - 2.4	8°	150
		3, 3.2	7°	172
	80	0.8 - 2.4	6°	200
		3, 3.2	5°	241
	100	0.8 - 2.4	4°	301
		3, 3.2	4°	301
	125	0.8 - 2.4	3°	401
		3, 3.2	3°	401
B type	32	4, 5	18°	63
	40	4, 5	11°	105
	50	4, 5	8°	146
	63	4, 5	6°	195
	80	4, 5	4°	292
	100	4, 5	3°	390
	125	4, 5	2°	585

Type	DC (mm)	RE (mm)	Helical Milling	
			DH min. (mm)	P max. (mm)
A type	32	0.8 - 2.4	41	8
		3, 3.2	41	7
	40	0.8 - 2.4	57	10
		3, 3.2	57	9
	50	0.8 - 2.4	77	12
		3, 3.2	77	11
	63	0.8 - 2.4	103	13
		3, 3.2	103	12
	80	0.8 - 2.4	137	14
		3, 3.2	137	12
	100	0.8 - 2.4	177	14
		3, 3.2	177	13
	125	0.8 - 2.4	227	15
		3, 3.2	227	13
B type	32	4	41	7
		5	41	6
	40	4	57	9
		5	57	8
	50	4	77	10
		5	77	9
	63	4	103	10
		5	103	10
	80	4	137	11
		5	137	10
	100	4	177	11
		5	177	10
	125	4	227	11
		5	227	11

Note 1) The recommended ramping feed is 0.05 mm/t. or under.
Ramping, helical milling and drilling are not recommended for machining of steel and titanium alloys.

*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 20.4 mm.

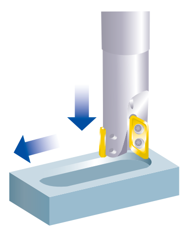
*2 The maximum diameter when machining a blind hole with a flat face using a corner radius of 0.8 mm for A type and 4 mm for B type.
For other corner radii, use the formula below.
{(cutting edge diameter DC)−(corner radius)−0.3}×2

*3 The minimum diameter when machining a blind hole with a flat face using a corner radius of 0.8 mm for A type and 4 mm for B type.
For other corner radii, use the formula below.
{(cutting edge diameter DC)−(corner radius)−(Width of wiper edge BS)−0.1}×2

Max. Drilling Depth (Aluminium Alloy)

Type	Insert corner radius RE (mm)	Max. Drilling Depth (mm)
Type A	0.8 − 2.4	5
	3, 3.2	4.5
Type B	4	4
	5	3.5

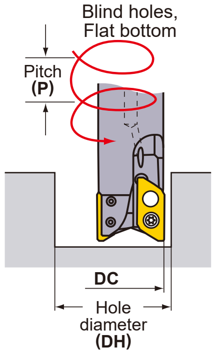
AXD7000 can be effectively used for pocket machining without the need for a prepared hole.



K

ROTATING TOOLS

● **HELICAL MILLING**



RAMPING/HELICAL MILLING (ALUMINIUM ALLOY)

Type	DC (mm)	RE (mm)	BS (mm)	Helical Milling (Blind Hole, Flat Bottom) DH max. *2 (mm)	P max. (mm)	DH min. *3 (mm)	P max. (mm)
A type	32	0.8	2	61.9	20	58.3	20
		1.6	1.2	60.3	19	58.3	19
		2	0.8	59.5	18	58.3	18
		2.4	0.4	58.7	18	58.3	18
		3	0.8	57.5	17	56.2	17
		3.2	0.6	57.1	17	56.2	17
	40	0.8	2	77.9	20	74.3	20
		1.6	1.2	76.3	19	74.3	19
		2	0.8	75.5	18	74.3	18
		2.4	0.4	74.7	18	74.3	18
		3	0.8	73.5	17	72.2	17
		3.2	0.6	73.1	17	72.2	17
	50	0.8	2	97.5	20	94.1	20
		1.6	1.2	95.9	19	94.1	19
		2	0.8	95.1	18	94.1	18
		2.4	0.4	94.3	18	94.1	18
		3	0.8	93.1	17	92.1	17
		3.2	0.6	92.7	17	92.1	17
	63	0.8	2	123.5	20	120.1	19
		1.6	1.2	121.9	19	120.1	19
		2	0.8	121.1	18	120.1	18
		2.4	0.4	120.3	18	120.1	18
		3	0.8	119.1	17	118	16
		3.2	0.6	118.7	17	118	16
	80	0.8	2	157.5	19	154.1	18
		1.6	1.2	155.9	19	154.1	18
		2	0.8	155.1	18	154.1	18
		2.4	0.4	154.3	18	154.1	18
		3	0.8	153.1	16	152	16
		3.2	0.6	152.7	16	152	16
	100	0.8	2	197.5	18	194.1	18
		1.6	1.2	195.9	18	194.1	18
		2	0.8	195.1	18	194.1	18
		2.4	0.4	194.3	18	194.1	18
		3	0.8	193.1	15	192	15
		3.2	0.6	192.7	15	192	15
	125	0.8	2	247.5	18	244.1	17
		1.6	1.2	245.9	17	244.1	17
		2	0.8	245.1	17	244.1	17
		2.4	0.4	244.3	17	244.1	17
		3	0.8	243.1	15	242	15
		3.2	0.6	242.7	15	242	15
B type	32	4	0.9	55.5	16	54	16
		5	0.4	53.5	15	53.1	15
	40	4	0.9	71.5	16	70	16
		5	0.4	69.5	15	69	14
	50	4	0.9	91.1	15	89.8	15
		5	0.4	89.1	14	88.9	14
	63	4	0.9	117.1	14	115.8	14
		5	0.4	115.1	13	114.9	13
	80	4	0.9	151.1	14	149.8	13
		5	0.4	149.1	12	148.9	12
	100	4	0.9	191.1	13	189.8	13
		5	0.4	189.1	12	188.8	12
	125	4	0.9	241.1	13	239.8	13
		5	0.4	239.1	12	238.8	12

Note 1) The recommended ramping feed is 0.05mm/t. 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 21 mm, B type is 20.4 mm.

*2 The maximum diameter when machining a blind hole with a flat face using a corner radius of 0.8 mm for A type and 4 mm 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 0.8 mm for A type and 4 mm for B type.
Other than that, find by ussing the formula below.
{(cutting edge diameter DC)−(corner radius)−(Width of wiper edge BS)−0.1}×2

MULTI FUNCTIONAL MILLING

90° KAPR

AQX

P M K N S H

Fig.1

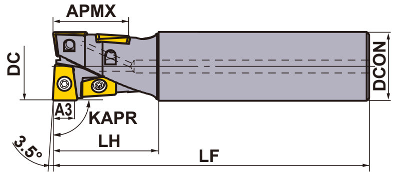
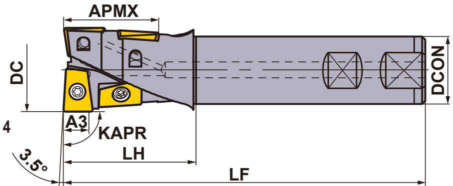


Fig.2



STANDARD EDGE TYPE

KAPR :90°

Right hand tool holder only.

Type	Order Number	Stock R	Coolant Hole	DC	LF	DCON	LH	A3 *1	APMX *2	Type (Fig.)	Clamp Screw *3	Wrench	Insert
Standard	AQXR164SA16S	●	○	16	120	16	30	4.5	17.6	1	TS2A	①TKY06F	QOG/MT0830R-G1/M2
	AQXR164SN16S	★	–	16	120	16	30	4.5	17.6	1	TS2A	①TKY06F	
	AQXR174SA16S	●	○	17	120	16	30	4.5	17.6	1	TS2A	①TKY06F	
	AQXR174SN16S	★	–	17	120	16	30	4.5	17.6	1	TS2A	①TKY06F	
	AQXR204SA20S	●	○	20	130	20	35	6	22	1	TS25	①TKY08F	QOG/MT1035R-G1/M2
	AQXR204SN20S	★	–	20	130	20	35	6	22	1	TS25	①TKY08F	
	AQXR214SA20S	●	○	21	130	20	35	6	22	1	TS25	①TKY08F	
	AQXR214SN20S	★	–	21	130	20	35	6	22	1	TS25	①TKY08F	
	AQXR254SA25S	●	○	25	140	25	40	7.5	27.5	1	TS33	②TKY08D	QOG/MT1342R-G1/M2
	AQXR254SN25S	★	–	25	140	25	40	7.5	27.5	1	TS33	②TKY08D	
	AQXR264SA25S	●	○	26	140	25	40	7.5	27.5	1	TS33	②TKY08D	
	AQXR264SN25S	★	–	26	140	25	40	7.5	27.5	1	TS33	②TKY08D	
	AQXR324SA32S	●	○	32	150	32	50	9.5	35.2	1	TS407	②TKY15D	QOG/MT1651R-G1/M2
	AQXR324SN32S	★	–	32	150	32	50	9.5	35.2	1	TS407	②TKY15D	
	AQXR334SA32S	●	○	33	150	32	50	9.5	35.2	1	TS407	②TKY15D	
	AQXR334SN32S	★	–	33	150	32	50	9.5	35.2	1	TS407	②TKY15D	
	AQXR354SA32S	●	○	35	150	32	50	11	40	1	TS407	②TKY15D	QOG/MT1856R-G1/M2
	AQXR354SN32S	★	–	35	150	32	50	11	40	1	TS407	②TKY15D	
	AQXR404SA32S	●	○	40	160	32	60	12	44	1	TS55	②TKY25D	QOG/MT2062R-G1/M2
	AQXR404SN32S	★	–	40	160	32	60	12	44	1	TS55	②TKY25D	
	AQXR504WA40S	●	○	50	170	40	70	15	55	2	TS6S	③TKY30T	QOG/MT2576R-G1/M2
	AQXR504SA42S	★	○	50	170	42	70	15	55	1	TS6S	③TKY30T	
	AQXR504SN42S	★	–	50	170	42	70	15	55	1	TS6S	③TKY30T	
Long	AQXR164SA16L	●	○	16	175	16	50	4.5	17.6	1	TS2A	①TKY06F	QOG/MT0830R-G1/M2
	AQXR164SN16L	★	–	16	175	16	50	4.5	17.6	1	TS2A	①TKY06F	
	AQXR174SA16L	●	○	17	175	16	30	4.5	17.6	1	TS2A	①TKY06F	
	AQXR174SN16L	★	–	17	175	16	30	4.5	17.6	1	TS2A	①TKY06F	
	AQXR204SA20L	●	○	20	185	20	60	6	22	1	TS25	①TKY08F	QOG/MT1035R-G1/M2
	AQXR204SN20L	★	–	20	185	20	60	6	22	1	TS25	①TKY08F	
	AQXR214SA20L	●	○	21	185	20	35	6	22	1	TS25	①TKY08F	
	AQXR214SN20L	★	–	21	185	20	35	6	22	1	TS25	①TKY08F	
	AQXR254SA25L	●	○	25	220	25	75	7.5	27.5	1	TS33	②TKY08D	QOG/MT1342R-G1/M2
	AQXR254SN25L	★	–	25	220	25	75	7.5	27.5	1	TS33	②TKY08D	
	AQXR264SA25L	●	○	26	220	25	40	7.5	27.5	1	TS33	②TKY08D	
	AQXR264SN25L	★	–	26	220	25	40	7.5	27.5	1	TS33	②TKY08D	
	AQXR324SA32L	●	○	32	230	32	90	9.5	35.2	1	TS407	②TKY15D	QOG/MT1651R-G1/M2
	AQXR324SN32L	★	–	32	230	32	90	9.5	35.2	1	TS407	②TKY15D	
	AQXR334SA32L	●	○	33	230	32	50	9.5	35.2	1	TS407	②TKY15D	
	AQXR334SN32L	★	–	33	230	32	50	9.5	35.2	1	TS407	②TKY15D	
	AQXR354SA32L	●	○	35	230	32	50	11	40	1	TS407	②TKY15D	QOG/MT1856R-G1/M2
	AQXR354SN32L	★	–	35	230	32	50	11	40	1	TS407	②TKY15D	
	AQXR404SA32L	●	○	40	240	32	60	12	44	1	TS55	②TKY25D	QOG/MT2062R-G1/M2
	AQXR404SN32L	★	–	40	240	32	60	12	44	1	TS55	②TKY25D	
	AQXR504WA40L	●	○	50	250	40	70	15	55	2	TS6S	③TKY30T	QOG/MT2576R-G1/M2
	AQXR504SA42L	★	○	50	250	42	70	15	55	1	TS6S	③TKY30T	
	AQXR504SN42L	★	–	50	250	42	70	15	55	1	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. ★ : Inventory maintained in Japan.

Fig.1

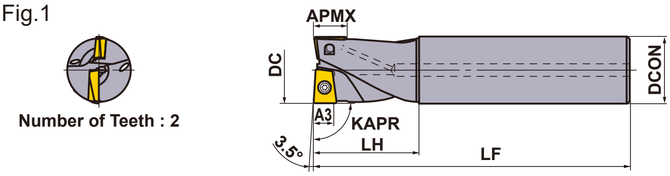
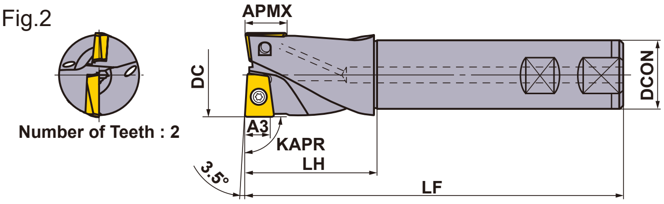


Fig.2



■ SHORT EDGE TYPE

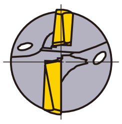
KAPR :90°

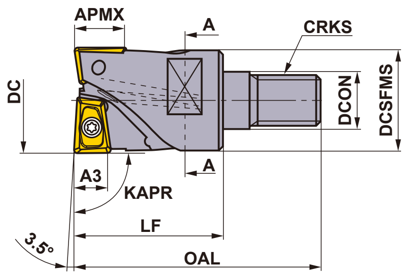
Right hand tool holder only.

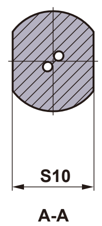
Type	Order Number	Stock	Coolant Hole	Dimensions (mm)						Type (Fig.)	*3	① ② ③	
		R		DC	LF	DCON	LH	A3 *1	APMX *2		Clamp Screw	Wrench	Insert
Standard	AQXR162SA16S	●	○	16	120	16	30	4.5	7.4	1	TS2A	①TKY06F	QOG/MT0830R-G1/M2
	AQXR162SN16S	★	–	16	120	16	30	4.5	7.4	1	TS2A	①TKY06F	
	AQXR172SA16S	●	○	17	120	16	30	4.5	7.4	1	TS2A	①TKY06F	
	AQXR172SN16S	★	–	17	120	16	30	4.5	7.4	1	TS2A	①TKY06F	
	AQXR202SA20S	●	○	20	130	20	35	6	9.2	1	TS25	①TKY08F	QOG/MT1035R-G1/M2
	AQXR202SN20S	★	–	20	130	20	35	6	9.2	1	TS25	①TKY08F	
	AQXR212SA20S	●	○	21	130	20	35	6	9.2	1	TS25	①TKY08F	
	AQXR212SN20S	★	–	21	130	20	35	6	9.2	1	TS25	①TKY08F	
	AQXR252SA25S	●	○	25	140	25	40	7.5	11.5	1	TS33	②TKY08D	QOG/MT1342R-G1/M2
	AQXR252SN25S	★	–	25	140	25	40	7.5	11.5	1	TS33	②TKY08D	
	AQXR262SA25S	●	○	26	140	25	40	7.5	11.5	1	TS33	②TKY08D	
	AQXR262SN25S	★	–	26	140	25	40	7.5	11.5	1	TS33	②TKY08D	
	AQXR322SA32S	●	○	32	150	32	50	9.5	14.5	1	TS407	②TKY15D	QOG/MT1651R-G1/M2
	AQXR322SN32S	★	–	32	150	32	50	9.5	14.5	1	TS407	②TKY15D	
	AQXR332SA32S	●	○	33	150	32	50	9.5	14.5	1	TS407	②TKY15D	
	AQXR332SN32S	★	–	33	150	32	50	9.5	14.5	1	TS407	②TKY15D	
	AQXR352SA32S	●	○	35	150	32	50	11	16	1	TS407	②TKY15D	QOG/MT1856R-G1/M2
	AQXR352SN32S	★	–	35	150	32	50	11	16	1	TS407	②TKY15D	
	AQXR402SA32S	●	○	40	160	32	60	12	18	1	TS55	②TKY25D	QOG/MT2062R-G1/M2
	AQXR402SN32S	★	–	40	160	32	60	12	18	1	TS55	②TKY25D	
	AQXR502WA40S	●	○	50	170	40	70	15	23	2	TS6S	③TKY30T	QOG/MT2576R-G1/M2
	AQXR502SA42S	★	○	50	170	42	70	15	23	1	TS6S	③TKY30T	
	AQXR502SN42S	★	–	50	170	42	70	15	23	1	TS6S	③TKY30T	
Long	AQXR162SA16L	●	○	16	175	16	50	4.5	7.4	1	TS2A	①TKY06F	QOG/MT0830R-G1/M2
	AQXR162SN16L	★	–	16	175	16	50	4.5	7.4	1	TS2A	①TKY06F	
	AQXR172SA16L	●	○	17	175	16	30	4.5	7.4	1	TS2A	①TKY06F	
	AQXR172SN16L	★	–	17	175	16	30	4.5	7.4	1	TS2A	①TKY06F	
	AQXR202SA20L	●	○	20	185	20	60	6	9.2	1	TS25	①TKY08F	QOG/MT1035R-G1/M2
	AQXR202SN20L	★	–	20	185	20	60	6	9.2	1	TS25	①TKY08F	
	AQXR212SA20L	●	○	21	185	20	35	6	9.2	1	TS25	①TKY08F	
	AQXR212SN20L	★	–	21	185	20	35	6	9.2	1	TS25	①TKY08F	
	AQXR252SA25L	●	○	25	220	25	75	7.5	11.5	1	TS33	②TKY08D	QOG/MT1342R-G1/M2
	AQXR252SN25L	★	–	25	220	25	75	7.5	11.5	1	TS33	②TKY08D	
	AQXR262SA25L	●	○	26	220	25	40	7.5	11.5	1	TS33	②TKY08D	
	AQXR262SN25L	★	–	26	220	25	40	7.5	11.5	1	TS33	②TKY08D	
	AQXR322SA32L	●	○	32	230	32	90	9.5	14.5	1	TS407	②TKY15D	QOG/MT1651R-G1/M2
	AQXR322SN32L	★	–	32	230	32	90	9.5	14.5	1	TS407	②TKY15D	
	AQXR332SA32L	●	○	33	230	32	50	9.5	14.5	1	TS407	②TKY15D	
	AQXR332SN32L	★	–	33	230	32	50	9.5	14.5	1	TS407	②TKY15D	
	AQXR352SA32L	●	○	35	230	32	50	11	16	1	TS407	②TKY15D	QOG/MT1856R-G1/M2
	AQXR352SN32L	★	–	35	230	32	50	11	16	1	TS407	②TKY15D	
	AQXR402SA32L	●	○	40	240	32	60	12	18	1	TS55	②TKY25D	QOG/MT2062R-G1/M2
	AQXR402SN32L	★	–	40	240	32	60	12	18	1	TS55	②TKY25D	
	AQXR502WA40L	●	○	50	250	40	70	15	23	2	TS6S	③TKY30T	QOG/MT2576R-G1/M2
	AQXR502SA42L	★	○	50	250	42	70	15	23	1	TS6S	③TKY30T	
	AQXR502SN42L	★	–	50	250	42	70	15	23	1	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 ➤ N001
TECHNICAL DATA ➤ P001







■ SCREW-IN TYPE

KAPR :90°

Right hand tool holder only.

Order Number	Stock	Coolant Hole	Dimensions (mm)									*4 WT (kg)	*3	① ②	
	R		DC	DCON	DCSFMS	OAL	LF	S10	CRKS	A3 *1	APMX *2		Clamp Screw	Wrench	Insert
AQXR162M08A30	●	○	16	8.5	14.7	48	30	10	M8	4.5	7.4	0.1	TS2A	①TKY06F	QO○T0830R-○○
AQXR172M08A30	●	○	17	8.5	14.5	48	30	10	M8	4.5	7.4	0.1	TS2A	①TKY06F	
AQXR202M10A30	●	○	20	10.5	18.6	49	30	14	M10	6	9.2	0.2	TS25	①TKY08F	QO○T1035R-○○
AQXR212M10A30	●	○	21	10.5	18.5	49	30	14	M10	6	9.2	0.2	TS25	①TKY08F	
AQXR252M12A35	●	○	25	12.5	23.5	57	35	19	M12	7.5	11.5	0.2	TS33	②TKY08D	QO○T1342R-○○
AQXR262M12A35	●	○	26	12.5	23.5	57	35	19	M12	7.5	11.5	0.2	TS33	②TKY08D	
AQXR322M16A40	●	○	32	17	28.5	63	40	24	M16	9.5	14.5	0.3	TS407	②TKY15D	QO○T1651R-○○
AQXR332M16A40	●	○	33	17	28.5	63	40	24	M16	9.5	14.5	0.3	TS407	②TKY15D	
AQXR352M16A40	●	○	35	17	28.5	63	40	24	M16	11	16	0.3	TS407	②TKY15D	QO○T1856R-○○
AQXR402M16A45	●	○	40	17	28.5	68	45	24	M16	12	18	0.3	TS55	②TKY25D	QO○T2062R-○○

Note 1) For screw-in type arbors, refer to page K244.
*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

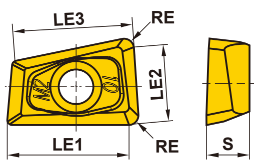
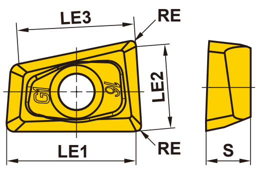
● : Inventory maintained. ★ : Inventory maintained in Japan.
(10 inserts in one case)

INSERTS

Work Material			MP6120	MP6130	MP7130	MP7140	MP9120	VP15TF	VP30RT	HTi10
	P	Steel	●	◐				◐	✤	
	M	Stainless Steel			◐	✤		◐	✤	
	K	Cast Iron						✤	✤	◐
	N	Non-ferrous Metal								◐
	S	Heat-resistant Alloy, Titanium Alloy					◐	◐	✤	
	H	Hardened Materials						◐		

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

Honing:
E: Round F: Sharp

Shape	Order Number	DC	Class	Honing	Coated MP6120	MP6130	MP7130	MP7140	MP9120	VP15TF	VP30RT	Carbide HTi10	Dimensions (mm) LE1	LE2	LE3	S	RE	Geometry
	QOMT0830R-M2	ϕ16,17	M	E	●	●	●	●	●	●	●		7.3	4.4	7.3	3	0.8	
	QOMT1035R-M2	ϕ20,21	M	E	●	●	●	●	●	●	●		9.5	5.9	9.3	3.5	0.8	
	QOMT1342R-M2	ϕ25,26	M	E	●	●	●	●	●	●	●		12	7.6	11.6	4.2	0.8	
	QOMT1651R-M2	ϕ32,33	M	E	●	●	●	●	●	●	●		15.4	9.9	14.6	5.1	0.8	
	QOMT1856R-M2	ϕ35	M	E	●	●	●	●	●	●	●		16.9	10.9	16	5.6	0.8	
	QOMT2062R-M2	ϕ40	M	E	●	●	●	●	●	●	●		19.4	12.6	18.1	6.2	0.8	
	QOMT2576R-M2	ϕ50	M	E	●	●	●	●	●	●	●		24.8	16.1	23.1	7.6	0.8	
	QOGT0830R-G1	ϕ16,17	G	E*	★				★	●		●	7.7	4.9	7.3	3	0.4	
	QOGT1035R-G1	ϕ20,21	G	E*	★				★	●		●	9.9	6.4	9.3	3.5	0.4	
	QOGT1342R-G1	ϕ25,26	G	E*	★				★	●		●	12.4	8.1	11.6	4.2	0.4	
	QOGT1651R-G1	ϕ32,33	G	E*	★				★	●		●	15.8	10.4	14.6	5.1	0.4	
	QOGT1856R-G1	ϕ35	G	E*	★				★	●		●	17.3	11.4	16	5.6	0.4	
	QOGT2062R-G1	ϕ40	G	E*	★				★	●		●	19.8	13.1	18.1	6.2	0.4	
	QOGT2576R-G1	ϕ50	G	E*	★				★	●		●	25.2	16.6	23.1	7.6	0.4	

* HTi10 insert honing is "F" type.

RECOMMENDED CUTTING CONDITIONS

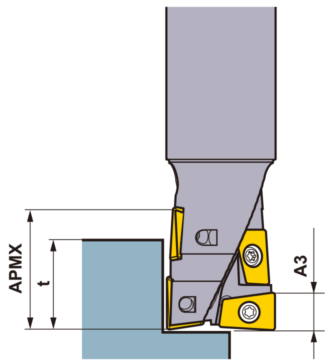
CUTTING SPEED

	Work Material	No.	Hardness	Breaker	Cutting Speed for Different Grades **Vc** (m/min)		
P					**MP6120**	**VP15TF**	**MP6130**
	Mild Steel	1	≤180HB	M2/G1	200 (170—240)	180 (150—220)	160 (130—200)
	Carbon Steel, Alloy Steel	2	180—350HB	M2	180 (140—220)	160 (120—200)	140 (100—180)
M					**MP7130**	**MP7140**	**VP30RT(VP15TF)**
	Austenitic Stainless Steel	1	≤200HB	M2/G1	170 (120—200)	160 (100—180)	150 (120—180)
	Austenitic Stainless Steel	2	>200HB	M2			
	Ferritic and Martensitic Stainless Steel	3	≤200HB	M2			
	Ferritic and Martensitic Stainless Steel	4	>200HB	M2			
K					**VP15TF**		
	Gray Cast Iron	1	≤350MPa	M2	180 (150—220)	—	—
	Ductile Cast Iron	2	≤450MPa	M2	180 (150—220)	—	—
N					**HTi10**		
	Aluminium Alloy	1	Si<5%	G1	500 (200—800)	—	—
	Aluminium Alloy	2	5%≤Si≤10%	G1	100 (50—300)	—	—
	Aluminium Alloy	3	Si>5%	G1	100 (50—300)	—	—
S					**MP9120**		
	Titanium Alloy*	1	—	M2	50 (30—70)	—	—
H					**VP15TF**		
	Hardened Steel	1	40—55HRC	M2	80 (50—120)	—	—

* Wet cutting is recommended for Titanium alloy.

SPARE PARTS ➤ N001
TECHNICAL DATA ➤ P001

RECOMMENDED CUTTING CONDITIONS

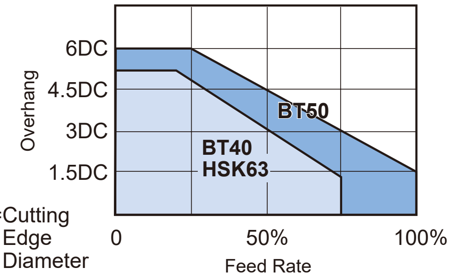


● A3 is the depth of cut for the full dual insert portion at the end of the cutting edge.
● Beyond the range of A3 where overlapping occurs, there is an area where the cutting edge becomes a single insert, not forming full dual insert configuration. Therefore, please pay special attention to the relationship between depth of cut and feed.
● In general, the edge at the border of cut tends to suffer from damage. At large depths of cut, applying the following depth of cut (**t**), at which the edge is full dual insert at the border of cut is recommended to prevent damage to the cutting edge.

(mm)

Tool 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

* Figures for A3 and APMX are shown in the standard holder tables on the previous pages.



* **DC**=Cutting Edge Diameter

● Chatter vibration and other problems tend to occur at operations where overhang length is large and/or machine rigidity is low, resulting in unstable machining.
● Please reduce feed accordingly, using the above chart as a guideline.

■ CUTTING CONDITIONS FOR SHOULDER MILLING

	Work Material	No.	Hardness	ϕ16, 17			ϕ20, 21			ϕ25, 26		
				ap (mm)	ae (mm)	fr (mm/rev)	ap (mm)	ae (mm)	fr (mm/rev)	ap (mm)	ae (mm)	fr (mm/rev)
P	Mild Steel	1	≤180HB	≤4.5	≤8	0.25	≤6	≤10	0.3	≤7.5	≤12.5	0.35
				4.5–12	≤5	0.16	6–14	≤7	0.25	7.5–17	≤8	0.28
				12–17	≤3	0.1	14–22	≤4	0.18	17–27	≤5	0.2
	Carbon Steel Alloy Steel	2	180–350HB	≤4.5	≤8	0.2	≤6	≤10	0.25	≤7.5	≤12.5	0.3
				4.5–12	≤4	0.14	6–14	≤6	0.2	7.5–17	≤7	0.25
				12–17	≤2	0.08	14–22	≤3	0.16	17–27	≤4	0.18
M	Stainless Steel	1,2,3,4	–	≤4.5	≤8	0.2	≤6	≤10	0.25	≤7.5	≤12.5	0.3
				4.5–12	≤4	0.14	6–14	≤6	0.2	7.5–17	≤7	0.25
				12–17	≤2	0.08	14–22	≤3	0.16	17–27	≤4	0.18
K	Cast Iron	1,2	–	≤4.5	≤8	0.25	≤6	≤10	0.3	≤7.5	≤12.5	0.35
				4.5–12	≤5	0.16	6–14	≤7	0.25	7.5–17	≤8	0.28
				12–17	≤3	0.1	14–22	≤4	0.18	17–27	≤5	0.2
N	Aluminium Alloy	1,2,3	–	≤4.5	≤11	0.3	≤6	≤14	0.35	≤7.5	≤12.5	0.4
				4.5–12	≤8	0.21	6–14	≤10	0.3	7.5–17	≤7	0.33
				12–17	≤5	0.15	14–22	≤6	0.23	17–27	≤4	0.25
S	Titanium Alloy	1	–	≤4.5	≤8	0.14	≤6	≤10	0.18	≤7.5	≤17.5	0.21
				4.5–12	≤4	0.1	6–14	≤6	0.14	7.5–17	≤12.5	0.18
				12–17	≤2	0.06	14–22	≤3	0.11	17–27	≤7.5	0.13
H	Hardened Steel	1	40–55HRC	≤4.5	≤5	0.16	≤6	≤6	0.2	≤7.5	≤7	0.22
				4.5–12	≤3	0.1	6–14	≤4	0.16	7.5–17	≤4	0.18
				12–17	≤1	0.06	14–22	≤2	0.12	17–27	≤2	0.14

	Work Material	No.	Hardness	ϕ32, 33			ϕ35			ϕ40			ϕ50		
				ap (mm)	ae (mm)	fr (mm/rev)	ap (mm)	ae (mm)	fr (mm/rev)	ap (mm)	ae (mm)	fr (mm/rev)	ap (mm)	ae (mm)	fr (mm/rev)
P	Mild Steel	1	≤180HB	≤9.5	≤16	0.4	≤11	≤17.5	0.45	≤12	≤20	0.5	≤15	≤25	0.6
				9.5–22	≤11	0.32	11–25	≤12	0.35	12–28	≤13	0.4	15–35	≤16	0.5
				22–35	≤6	0.25	25–40	≤6.5	0.28	28–44	≤7	0.3	35–55	≤10	0.35
	Carbon Steel Alloy Steel	2	180–350HB	≤9.5	≤16	0.35	≤11	≤17.5	0.37	≤12	≤20	0.4	≤15	≤25	0.5
				9.5–22	≤10	0.28	11–25	≤11	0.3	12–28	≤12	0.32	15–35	≤14	0.4
				22–35	≤5	0.2	25–40	≤5.5	0.22	28–44	≤6	0.25	35–55	≤8	0.3
M	Stainless Steel	1,2,3,4	–	≤9.5	≤16	0.35	≤11	≤17.5	0.37	≤12	≤20	0.4	≤15	≤25	0.5
				9.5–22	≤10	0.28	11–25	≤12	0.3	12–28	≤12	0.32	15–35	≤14	0.4
				22–35	≤5	0.2	25–40	≤6.5	0.22	28–44	≤6	0.25	35–55	≤8	0.3
K	Cast Iron	1,2	–	≤9.5	≤16	0.4	≤11	≤17.5	0.45	≤12	≤20	0.5	≤15	≤25	0.6
				9.5–22	≤11	0.32	11–25	≤12	0.35	12–28	≤13	0.4	15–35	≤16	0.5
				22–35	≤6	0.25	25–40	≤6.5	0.28	28–44	≤7	0.3	35–55	≤10	0.35
N	Aluminium Alloy	1,2,3	–	≤9.5	≤16	0.45	≤11	≤17.5	0.5	≤12	≤20	0.55	≤15	≤25	0.65
				9.5–22	≤10	0.37	11–25	≤12	0.4	12–28	≤12	0.45	15–35	≤14	0.55
				22–35	≤5	0.3	25–40	≤6.5	0.32	28–44	≤6	0.35	35–55	≤8	0.4
S	Titanium Alloy	1	–	≤9.5	≤23	0.25	≤11	≤24.5	0.26	≤12	≤28	0.28	≤15	≤35	0.35
				9.5–22	≤16	0.2	11–25	≤17.5	0.21	12–28	≤20	0.22	15–35	≤25	0.28
				22–35	≤10	0.14	25–40	≤10.5	0.15	28–44	≤12	0.18	35–55	≤15	0.21
H	Hardened Steel	1	40–55HRC	≤9.5	≤8	0.25	≤11	≤9	0.28	≤12	≤10	0.3	≤15	≤14	0.35
				9.5–22	≤5	0.2	11–25	≤5.5	0.22	12–28	≤6	0.24	15–35	≤8	0.3
				22–35	≤2	0.16	25–40	≤2	0.17	28–44	≤2	0.18	35–55	≤4	0.22

Note 1) Please pay special attention on the depth of cut when using the short edge type.
Note 2) When using the G1 breaker (VP15TF), please reduce the feed rate by 20%.
Note 3) For the details of No., please refer to the cutting speed on page K175.

CUTTING CONDITIONS FOR SLOT MILLING

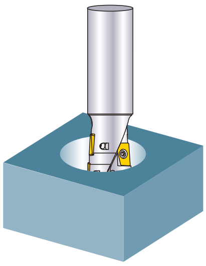
	Work Material	No.	Hardness	φ16, 17		φ20, 21		φ25, 26	
				ap (mm)	fr (mm/rev)	ap (mm)	fr (mm/rev)	ap (mm)	fr (mm/rev)
P	Mild Steel	1	≦180HB	≦4.5	0.16	≦6	0.18	≦7.5	0.2
				4.5–12	0.1	6–14	0.14	7.5–17	0.16
				12–17	0.07	14–22	0.1	17–27	0.12
	Carbon Steel Alloy Steel	2	180–350HB	≦4.5	0.14	≦6	0.16	≦7.5	0.18
				4.5–12	0.09	6–14	0.12	7.5–17	0.14
				12–17	0.05	14–22	0.1	17–27	0.1
M	Stainless Steel	1,2,3,4	–	≦4.5	0.14	≦6	0.16	≦7.5	0.18
				4.5–12	0.09	6–14	0.12	7.5–17	0.14
				12–17	0.05	14–22	0.1	17–27	0.1
K	Gray Cast Iron	1	≦350MPa	≦4.5	0.16	≦6	0.18	≦7.5	0.2
				4.5–12	0.1	6–14	0.14	7.5–17	0.16
				12–17	0.07	14–22	0.1	17–27	0.12
N	Aluminium Alloy	1,2,3	–	≦4.5	0.18	≦6	0.2	≦7.5	0.22
				4.5–12	0.12	6–14	0.16	7.5–17	0.18
				12–17	0.09	14–22	0.12	17–27	0.14
S	Titanium Alloy	1	–	≦4.5	0.1	≦6	0.12	≦7.5	0.15
				4.5–12	0.05	6–14	0.08	7.5–17	0.1
				12–17	0.03	14–22	0.05	17–27	0.08
H	Hardened Steel	1	40–55HRC	≦4.5	0.1	≦6	0.12	≦7.5	0.14
				4.5–12	0.07	6–14	0.1	7.5–17	0.12
				–	–	–	–	–	–

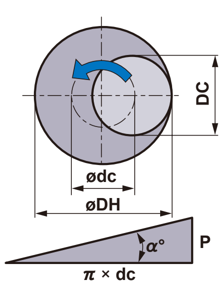
	Work Material	No.	Hardness	φ32, 33		φ35		φ40		φ50	
				ap (mm)	fr (mm/rev)	ap (mm)	fr (mm/rev)	ap (mm)	fr (mm/rev)	ap (mm)	fr (mm/rev)
P	Mild Steel	1	≦180HB	≦9.5	0.25	≦11	0.27	≦12	0.3	≦15	0.35
				9.5–22	0.2	11–25	0.22	12–28	0.25	15–35	0.3
				22–35	0.14	25–40	0.16	28–44	0.18	35–55	0.22
	Carbon Steel Alloy Steel	2	180–350HB	≦9.5	0.2	≦11	0.22	≦12	0.25	≦15	0.3
				9.5–22	0.16	11–25	0.18	12–28	0.2	15–35	0.25
				22–35	0.12	25–40	0.13	28–44	0.14	35–55	0.16
M	Stainless Steel	1,2,3,4	–	≦9.5	0.2	≦11	0.22	≦12	0.25	≦15	0.3
				9.5–22	0.16	11–25	0.18	12–28	0.2	15–35	0.25
				22–35	0.12	25–40	0.13	28–44	0.14	35–55	0.16
K	Gray Cast Iron	1	≦350MPa	≦9.5	0.25	≦11	0.27	≦12	0.3	≦15	0.35
				9.5–22	0.2	11–25	0.22	12–28	0.25	15–35	0.3
				22–35	0.14	25–40	0.16	28–44	0.18	35–55	0.22
N	Aluminium Alloy	1,2,3	–	≦9.5	0.27	≦11	0.3	≦12	0.32	≦15	0.37
				9.5–22	0.22	11–25	0.25	12–28	0.27	15–35	0.32
				22–35	0.16	25–40	0.18	28–44	0.2	35–55	0.25
S	Titanium Alloy	1	–	≦9.5	0.18	≦11	0.2	≦12	0.23	≦15	0.25
				9.5–22	0.12	11–25	0.15	12–28	0.2	15–35	0.23
				22–35	0.1	25–40	0.12	28–44	0.15	35–55	0.18
H	Hardened Steel	1	40–55HRC	≦9.5	0.16	≦11	0.17	≦12	0.18	≦15	0.22
				9.5–22	0.12	11–25	0.13	12–28	0.14	15–35	0.16
				–	–	–	–	–	–	–	–

Note 1) Please pay special attention on the depth of cut when using the short edge type.
Note 2) When using the G1 breaker (VP15TF), please reduce the feed rate by 20%.
Note 3) For the details of No., please refer to the cutting speed on page K175.

RECOMMENDED CUTTING CONDITIONS

■FOR HELICAL CUTTING





- How to derive a locus of the centre of the tool.
- Depth of cut per pass.
- Min. machined hole diameter for helical cutting : 1.2DC
  Max. machined hole diameter for helical cutting : 1.8DC
- For chip discharge, please always apply air blow.
  (When machining aluminium, please use coolant.)
- When using G1 breaker (VP15TF), please reduce the feed rate by 20%.

$$\text{Ø dc} = \text{Ø DH} - \text{DC}$$

Ø dc: Locus of the centre of the tool; Ø DH: Desired hole diameter; DC: Cutting edge diameter

$$P = \pi \times dc \times \tan\alpha°$$

(Note) $\alpha° \leq 3°$

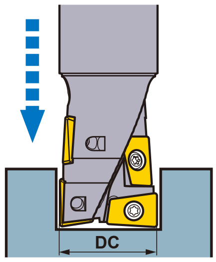
Work Material		No.	Hardness	ϕ16, 17				ϕ20, 21				ϕ25, 26			
				DH (mm)	APMX (mm)	fr (mm/rev)	P (mm/pass)	DH (mm)	APMX (mm)	fr (mm/rev)	P (mm/pass)	DH (mm)	APMX (mm)	fr (mm/rev)	P (mm/pass)
P	Mild Steel	1	≤180HB	20	8	0.16	0.44	24	10	0.18	0.44	30	12.5	0.2	0.55
				25	12	0.14	0.99	30	15	0.16	1.1	38	19	0.18	1.43
				29	16	0.12	1.43	36	20	0.14	1.76	45	25	0.16	2.2
	Carbon Steel Alloy Steel	2	180−350HB	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	0.1	1.07	36	20	0.12	1.32	45	25	0.14	1.65
M	Stainless Steel	1,2,3,4	−	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	0.1	0.71	36	10	0.12	0.88	45	12.5	0.14	1.1
K	Gray Cast Iron	1	≤350MPa	20	10	0.16	0.55	24	14	0.18	0.55	30	18	0.2	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	1,2,3	−	20	10	0.18	0.44	24	14	0.2	0.44	30	18	0.22	0.55
				25	13	0.16	0.99	30	17	0.18	1.1	38	21	0.2	1.43
				29	16	0.14	1.43	36	20	0.16	1.76	45	25	0.18	2.2
S	Titanium Alloy	1	−	20	3	0.1	0.22	24	4	0.11	0.22	30	5	0.13	0.27
				25	5	0.08	0.49	30	7	0.1	0.55	38	9	0.11	0.71
				29	8	0.07	0.71	36	10	0.08	0.88	45	12.5	0.1	1.1
H	Hardened Steel	1	40−55HRC	20	3	0.1	0.22	24	4	0.12	0.22	30	5	0.14	0.27
				25	5	0.08	0.49	30	7	0.1	0.55	38	9	0.12	0.71
				29	8	0.06	0.71	36	10	0.08	0.88	45	12.5	0.1	1.1

Work Material		No.	Hardness	ϕ32, 33				ϕ35				ϕ40				ϕ50			
				DH (mm)	APMX (mm)	fr (mm/rev)	P (mm/pass)	DH (mm)	APMX (mm)	fr (mm/rev)	P (mm/pass)	DH (mm)	APMX (mm)	fr (mm/rev)	P (mm/pass)	DH (mm)	APMX (mm)	fr (mm/rev)	P (mm/pass)
P	Mild Steel	1	≤180HB	38	16	0.25	0.66	42	18	0.28	0.77	48	20	0.3	0.88	60	25	0.35	1.1
				48	24	0.22	1.76	53	27	0.24	1.97	60	30	0.26	2.19	75	38	0.3	2.74
				58	32	0.2	2.85	63	35	0.21	3.07	72	40	0.22	3.51	90	50	0.26	4.39
	Carbon Steel Alloy Steel	2	180−350HB	38	16	0.2	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	0.2	2.63	90	50	0.24	3.29
M	Stainless Steel	1,2,3,4	−	38	6	0.2	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	1.1	75	18	0.26	1.37
				58	16	0.16	1.43	63	18	0.18	1.53	72	20	0.2	1.75	90	25	0.27	2.19
K	Gray Cast Iron	1	≤350MPa	38	22	0.25	0.82	42	25	0.28	0.95	48	28	0.3	1.1	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	0.3	3.43
				58	32	0.2	3.57	63	35	0.21	3.84	72	40	0.22	4.39	90	50	0.26	5.49
N	Aluminium Alloy	1,2,3	−	38	22	0.27	0.66	42	25	0.3	0.77	48	28	0.32	0.88	60	35	0.37	1.1
				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
S	Titanium Alloy	1	−	38	6	0.14	0.33	42	7	0.15	0.38	48	8	0.18	0.44	60	10	0.2	0.55
				48	11	0.13	0.88	53	13	0.14	0.99	60	14	0.15	1.1	75	18	0.18	1.37
				58	16	0.11	1.43	63	18	0.13	1.53	72	20	0.14	1.75	90	25	0.17	2.19
H	Hardened Steel	1	40−55HRC	38	6	0.16	0.33	42	7	0.17	0.38	48	8	0.18	0.44	60	10	0.2	0.55
				48	11	0.14	0.88	53	13	0.15	0.99	60	14	0.16	1.1	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

Note 1) Helical grooving is strongly recommended for machining tempered steel.
Note 2) When using G1 breaker (VP15TF), please reduce the feed rate by 20%.
Note 3) For the details please refer to the cutting speed on page K175.

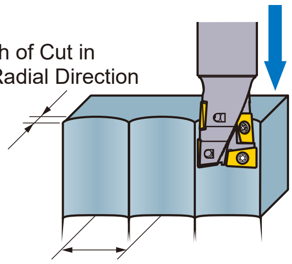
FOR DRILLING AND PLUNGING

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 coolant to ensure efficient chip disposal.
- The chips generated can dispel in any direction, ensure that adequate safety precautions are taken.

Plunging



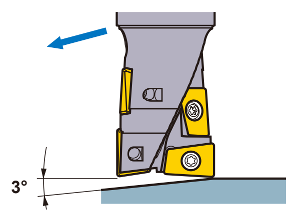
- The feed for plunging is the same as the feed for drilling.
- No step feed necessary.
- Please refer to the following table for the depth of cut for plunging operations.

Depth of Cut in the Radial Direction	≤ 0.4DC
Pick Feed	≤ 0.5DC

	Work Material	No.	Hardness	φ16, 17		φ20, 21		φ25, 26		φ32, 33, 35		φ40		φ50	
				fr (mm/rev)	Step (mm)	fr (mm/rev)	Step (mm)	fr (mm/rev)	Step (mm)	fr (mm/rev)	Step (mm)	fr (mm/rev)	Step (mm)	fr (mm/rev)	Step (mm)
P	Mild Steel	1	≤180HB	0.035	0.2	0.045	0.3	0.05	0.3	0.055	0.3	0.06	0.3	0.065	0.3
P	Carbon Steel Alloy Steel	2	180−350HB	0.03	0.2	0.04	0.3	0.045	0.3	0.05	0.3	0.055	0.3	0.06	0.3
M	Stainless Steel	1,2,3,4	−	0.03	0.15	0.04	0.25	0.045	0.25	0.05	0.25	0.055	0.25	0.06	0.25
K	Gray Cast Iron	1	≤350MPa	0.04	0.4	0.05	0.5	0.06	0.5	0.065	0.5	0.07	0.5	0.075	0.5
N	Aluminium Alloy	1,2,3	−	0.04	0.2	0.05	0.3	0.06	0.3	0.065	0.3	0.07	0.3	0.075	0.3
H	Hardened Steel	1	40−55HRC	0.02	0.15	0.03	0.25	0.035	0.25	0.04	0.25	0.045	0.25	0.05	0.25

Note 1) Helical grooving is strongly recommended for machining tempered steel.
Note 2) When using G1 breaker (VP15TF), please reduce the feed rate by 20%.
Note 3) For the details please refer to the cutting speed on page K175.

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.

MULTI FUNCTIONAL MILLING

AJX

P M K N S H

Fig.1

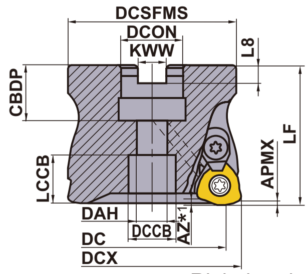
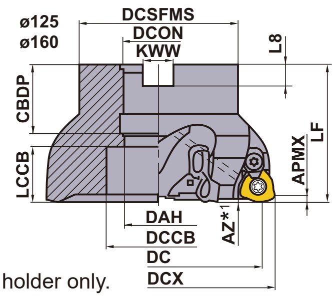
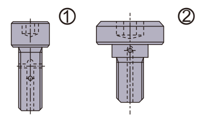


Fig.2



Right hand tool holder only.

(mm)

DCX / DCON mm size	Set Bolt		Geometry
ϕ50, ϕ52, ϕ63, ϕ66	HSC10030H	①	
ϕ80	HSC12035H	①	
ϕ100	HSC16040H	①	
ϕ125, ϕ160	MBA20040H	②	

■ARBOR TYPE

With Coolant Hole

AJX09 GAMP :+8° GAMF :-6°
AJX12 GAMP :+8° GAMF :-5°—-4°
AJX14 GAMP :+8° GAMF :-5°—-3°

DCX (mm)	Order Number	Stock R	Number of Teeth	Dimensions (mm) DC	LF	DCON	WT*2 (kg)	APMX (mm)	RMPX	Fig.	Insert Type
50	**AJX12-050A03R**	●	3	38.3	50	22	0.4	1.2	2°	1	JDM◌1204
50	**AJX12-050A04R**	●	4	38.3	50	22	0.4	1.2	2°	1	JDM◌1204
50	**AJX09-050A05R**	●	5	40	50	22	0.5	1.2	1.1°	1	JDM◌09T3
52	**AJX12-052A03R**	□	3	40.3	50	22	0.4	1.2	1.8°	1	JDM◌1204
52	**AJX12-052A04R**	●	4	40.3	50	22	0.4	1.2	1.8°	1	JDM◌1204
52	**AJX09-052A05R**	●	5	42	50	22	0.4	1.2	1.1°	1	JDM◌09T3
63	**AJX14-063A03R**	★	3	51.1	50	22	0.7	1.2	2.8°	1	JDM◌1405
63	**AJX14-063A04R**	●	4	51.1	50	22	0.7	1.2	2.8°	1	JDM◌1405
63	**AJX12-063A05R**	●	5	51.3	50	22	0.9	1.2	1.5°	1	JDM◌1204
66	**AJX14-066A03R**	□	3	54.1	50	22	0.7	1.2	2.5°	1	JDM◌1405
66	**AJX14-066A04R**	●	4	54.1	50	22	0.7	1.2	2.5°	1	JDM◌1405
66	**AJX12-066A05R**	●	5	54.3	50	22	0.8	1.2	2.5°	1	JDM◌1204
80	**AJX14-080A04R**	★	4	68.1	50	27	1.2	1.2	1.8°	1	JDM◌1405
80	**AJX14-080A05R**	●	5	68.1	50	27	1.2	1.2	1.8°	1	JDM◌1405
80	**AJX12-080A06R**	●	6	68.3	50	27	1.2	1.2	1.1°	1	JDM◌1204
100	**AJX14-100A05R**	●	5	88.1	63	32	2.4	1.2	1.2°	1	JDM◌1405
100	**AJX14-100A06R**	●	6	88.1	63	32	2.4	1.2	1.2°	1	JDM◌1405
100	**AJX12-100A07R**	●	7	88.3	63	32	2.6	1.2	0.8°	1	JDM◌1204
125	**AJX14-125B05R**	★	5	113.2	63	40	3.3	1.2	0.8°	2	JDM◌1405
125	**AJX14-125B07R**	●	7	113.2	63	40	3.3	1.2	0.8°	2	JDM◌1405
160	**AJX14-160B06R**	★	6	148.2	63	40	5	1.2	0.5°	2	JDM◌1405
160	**AJX14-160B08R**	★	8	148.2	63	40	5	1.2	0.5°	2	JDM◌1405

*1 Refer to page K187, for the max. drilling depth (**AZ**).

*2 WT : Tool Weight

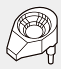
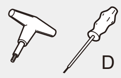
Note 1) Refer to page K187, for the max. depth of cut (**APMX**) and max. drilling depth (**AZ**).

●: Inventory maintained. ★: Inventory maintained in Japan.
□: Non stock, produced to order only.

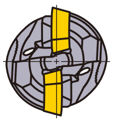
MOUNTING DIMENSIONS

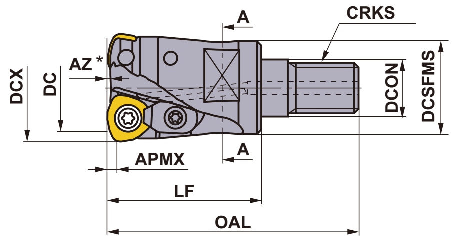
DCX (mm)	Order Number	Dimensions (mm)								Fig.
		DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	
50	**AJX12-050A03R**	22	20	11	17	17.28	47	10.4	6.3	1
50	**AJX12-050A04R**	22	20	11	17	17.28	47	10.4	6.3	1
50	**AJX09-050A05R**	22	20	11	17	17.31	47	10.4	6.3	1
52	**AJX12-052A03R**	22	20	11	17	17.28	47	10.4	6.3	1
52	**AJX12-052A04R**	22	20	11	17	17.28	47	10.4	6.3	1
52	**AJX09-052A05R**	22	20	11	17	17.31	47	10.4	6.3	1
63	**AJX14-063A03R**	22	20	11	17	17.16	60	10.4	6.3	1
63	**AJX14-063A04R**	22	20	11	17	17.16	60	10.4	6.3	1
63	**AJX12-063A05R**	22	20	11	17	17.28	60	10.4	6.3	1
66	**AJX14-066A03R**	22	20	11	17	17.16	60	10.4	6.3	1
66	**AJX14-066A04R**	22	20	11	17	17.16	60	10.4	6.3	1
66	**AJX12-066A05R**	22	20	11	17	17.28	60	10.4	6.3	1
80	**AJX14-080A04R**	27	23	13	19	16.16	76	12.4	7	1
80	**AJX14-080A05R**	27	23	13	19	16.16	76	12.4	7	1
80	**AJX12-080A06R**	27	23	13	19	16.28	76	12.4	7	1
100	**AJX14-100A05R**	32	26	17	26	26.16	96	14.4	8	1
100	**AJX14-100A06R**	32	26	17	26	26.16	96	14.4	8	1
100	**AJX12-100A07R**	32	26	17	26	26.28	96	14.4	8	1
125	**AJX14-125B05R**	40	40	—	56	22.14	100	16.4	9	2
125	**AJX14-125B07R**	40	40	—	56	22.14	100	16.4	9	2
160	**AJX14-160B06R**	40	40	—	56	22.14	100	16.4	9	2
160	**AJX14-160B08R**	40	40	—	56	22.14	100	16.4	9	2

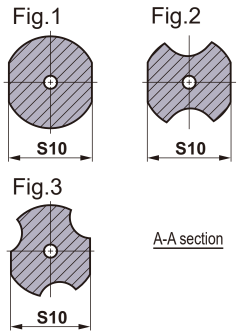
SPARE PARTS

Tool Holder Type	 *		 *		 T D
	Clamp Screw	Clamp Bridge	Clamp Bridge Screw	Spring	Wrench
AJX09	TS351	AMS3	AJS3010T10	ASS2	TKY10D
AJX12	TS43	AMS4	AJS4012T15	ASS2	TKY15T
AJX14	TS54	AMS5	AJS5014T25	ASS3	TKY25T

* Clamp Torque (N • m) : TS351=2.5, TS43=3.5, TS54=7.5, AJS3010T10=2.5, AJS4012T15=3.5, AJS5014T25=7.5







■SCREW-IN TYPE

With Coolant Hole

Right hand tool holder only.

DCX (mm)	Order Number	Stock	Number of Teeth	Dimensions (mm)							*2 WT (kg)	APMX (mm)	RMPX	Fig.	Shank Type	Insert Type
		R		DC	LF	OAL	DCON	DCSFMS	S10	CRKS						
16	**AJX06R162AM08**	●	2	8.9	25	43	8.5	13	10	M8	0.1	0.6	3°	2	SC16M08	JOM○06T2
17	**AJX06R172AM08**	●	2	9.9	25	43	8.5	13	10	M8	0.1	0.6	2.5°	2	SC16M08	JOM○06T2
20	**AJX08R202AM10**	●	2	11.4	28	47	10.5	18	15	M10	0.1	0.9	3.5°	2	SC20M10	JOM○0803
20	**AJX06R203AM10**	●	3	12.9	28	47	10.5	18	15	M10	0.1	0.6	1.5°	3	SC20M10	JOM○06T2
22	**AJX08R222AM10**	●	2	13.4	28	47	10.5	18	15	M10	0.1	0.9	3°	2	SC20M10	JOM○0803
22	**AJX06R223AM10**	●	3	14.9	28	47	10.5	18	15	M10	0.1	0.6	1°	3	SC20M10	JOM○06T2
25	**AJX09R252AM12**	●	2	14.9	36	58	12.5	21	17	M12	0.2	1.2	4°	2	SC25M12	JDM○09T3
25	**AJX08R253AM12**	●	3	16.4	36	58	12.5	21	17	M12	0.1	0.9	2°	1	SC25M12	JOM○0803
28	**AJX09R282AM12**	●	2	17.9	36	58	12.5	21	17	M12	0.2	1.2	3°	2	SC25M12	JDM○09T3
28	**AJX08R283AM12**	●	3	19.4	36	58	12.5	21	17	M12	0.1	0.9	1.7°	1	SC25M12	JOM○0803
30	**AJX12R302AM16**	●	2	18.3	47	70	17	29	22	M16	0.3	1.2	4.5°	2	SC32M16	JDM○1204
30	**AJX09R303AM16**	●	3	20	47	70	17	29	22	M16	0.2	1.2	2.7°	1	SC32M16	JDM○09T3
32	**AJX12R322AM16**	●	2	20.3	47	70	17	29	22	M16	0.3	1.2	4°	2	SC32M16	JDM○1204
32	**AJX09R323AM16**	●	3	21.9	47	70	17	29	22	M16	0.2	1.2	2.5°	1	SC32M16	JDM○09T3
35	**AJX12R352AM16**	●	2	23.3	47	70	17	29	22	M16	0.3	1.2	3.5°	2	SC32M16	JDM○1204
35	**AJX09R353AM16**	●	3	24.9	47	70	17	29	22	M16	0.2	1.2	2°	1	SC32M16	JDM○09T3
40	**AJX12R403AM16**	●	3	28.3	60	83	17	29	22	M16	0.3	1.2	3°	2	SC32M16	JDM○1204
40	**AJX09R404AM16**	●	4	29.9	60	83	17	29	22	M16	0.2	1.2	1.5°	1	SC32M16	JDM○09T3

*1 Refer to page K187, for the max. drilling depth (**AZ**).

*2 WT : Tool Weight

Note 1) Refer to page K187, for the max. depth of cut (**APMX**) and max. drilling depth (**AZ**).

Note 2) For screw-in type arbors, refer to page K244.

●: Inventory maintained. ★: Inventory maintained in Japan.

Fig.1

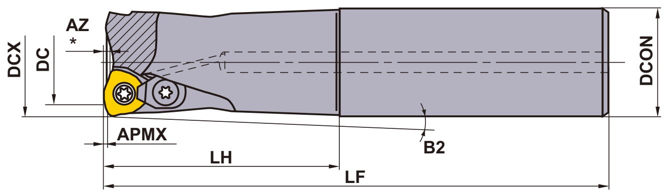
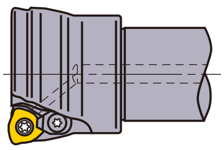


Fig.2



Right hand tool holder only.

■STRAIGHT SHANK TYPE

With Coolant Hole

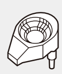
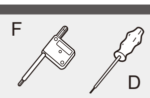
DCX (mm)	Order Number	Stock	Number of Teeth	Dimensions (mm)				B2	APMX (mm)	RMPX	Fig.	Insert Type
		R		LF	DC	LH	DCON					
16	**AJX06R162SA16ES**	●	2	70	8.9	20	16	3.5°	0.6	3°	1	JOM◌06T2
16	**AJX06R162SA16S**	●	2	110	8.9	30	16	2.25°	0.6	3°	1	JOM◌06T2
16	**AJX06R162SA16L**	●	2	150	8.9	70	16	0.93°	0.6	3°	1	JOM◌06T2
16	**AJX06R162SA16EL**	★	2	200	8.9	100	16	0.64°	0.6	3°	1	JOM◌06T2
17	**AJX06R172SA16ES**	●	2	70	9.9	20	16	–	0.6	2.5°	1	JOM◌06T2
17	**AJX06R172SA16S**	●	2	110	9.9	20	16	–	0.6	2.5°	1	JOM◌06T2
17	**AJX06R172SA16L**	●	2	150	9.9	20	16	–	0.6	2.5°	1	JOM◌06T2
17	**AJX06R172SA16EL**	★	2	200	9.9	20	16	–	0.6	2.5°	1	JOM◌06T2
20	**AJX08R202SA20S**	●	2	130	11.4	50	20	1.34°	0.9	3.5°	1	JOM◌0803
20	**AJX06R203SA20S**	●	3	130	12.9	50	20	1.31°	0.6	1.5°	1	JOM◌06T2
20	**AJX08R202SA20L**	●	2	180	11.4	100	20	0.65°	0.9	3.5°	1	JOM◌0803
20	**AJX06R203SA20L**	●	3	180	12.9	100	20	0.64°	0.6	1.5°	1	JOM◌06T2
20	**AJX08R202SA20EL**	★	2	250	11.4	130	20	0.5°	0.9	3.5°	1	JOM◌0803
22	**AJX08R222SA20S**	●	2	130	13.4	30	20	–	0.9	3°	1	JOM◌0803
22	**AJX06R223SA20S**	●	3	130	14.9	30	20	–	0.6	1°	1	JOM◌06T2
22	**AJX08R222SA20L**	●	2	180	13.4	30	20	–	0.9	3°	1	JOM◌0803
22	**AJX06R223SA20L**	●	3	180	14.9	30	20	–	0.6	1°	1	JOM◌06T2
22	**AJX08R222SA20EL**	★	2	250	13.4	30	20	–	0.9	3°	1	JOM◌0803
25	**AJX09R252SA25S**	●	2	140	14.9	60	25	1.1°	1.2	4°	1	JDM◌09T3
25	**AJX08R253SA25S**	●	3	140	16.4	60	25	1.1°	0.9	2°	1	JOM◌0803
25	**AJX09R252SA25L**	●	2	200	14.9	120	25	0.54°	1.2	4°	1	JDM◌09T3
25	**AJX08R253SA25L**	●	3	200	16.4	120	25	0.54°	0.9	2°	1	JOM◌0803
25	**AJX09R252SA25EL**	★	2	300	14.9	180	25	0.36°	1.2	4°	1	JDM◌09T3
28	**AJX09R282SA25S**	●	2	140	17.9	40	25	–	1.2	3°	1	JDM◌09T3
28	**AJX08R283SA25S**	●	3	140	19.4	40	25	–	0.9	1.7°	1	JOM◌0803
28	**AJX09R282SA25L**	●	2	200	17.9	40	25	–	1.2	3°	1	JDM◌09T3
28	**AJX08R283SA25L**	●	3	200	19.4	40	25	–	0.9	1.7°	1	JOM◌0803
28	**AJX09R282SA25EL**	★	2	300	17.9	40	25	–	1.2	3°	1	JDM◌09T3
30	**AJX12R302SA32S**	●	2	150	18.3	70	32	1.82°	1.2	4.5°	1	JDM◌1204
30	**AJX09R303SA32S**	●	3	150	20	70	32	1.79°	1.2	2.7°	1	JDM◌09T3
30	**AJX12R302SA32L**	●	2	200	18.3	120	32	1.04°	1.2	4.5°	1	JDM◌1204
30	**AJX09R303SA32L**	●	3	200	20	120	32	1.03°	1.2	2.7°	1	JDM◌09T3
30	**AJX12R302SA32EL**	★	2	300	18.3	180	32	0.69°	1.2	4.5°	1	JDM◌1204
32	**AJX12R322SA32S**	●	2	150	20.3	70	32	0.96°	1.2	4°	1	JDM◌1204
32	**AJX09R323SA32S**	●	3	150	21.9	70	32	0.94°	1.2	2.5°	1	JDM◌09T3
32	**AJX12R322SA32L**	●	2	200	20.3	120	32	0.55°	1.2	4°	1	JDM◌1204
32	**AJX09R323SA32L**	●	3	200	21.9	120	32	0.54°	1.2	2.5°	1	JDM◌09T3
32	**AJX12R322SA32EL**	★	2	300	20.3	180	32	0.36°	1.2	4°	1	JDM◌1204
35	**AJX12R352SA32S**	●	2	150	23.3	50	32	–	1.2	3.5°	1	JDM◌1204
35	**AJX09R353SA32S**	●	3	150	24.9	50	32	–	1.2	2°	1	JDM◌09T3
35	**AJX12R352SA32L**	●	2	200	23.3	50	32	–	1.2	3.5°	1	JDM◌1204
35	**AJX09R353SA32L**	●	3	200	24.9	50	32	–	1.2	2°	1	JDM◌09T3
35	**AJX12R352SA32EL**	★	2	300	23.3	50	32	–	1.2	3.5°	1	JDM◌1204

* Refer to page K187, for the max. drilling depth (**AZ**).
Note 1) Refer to page K187, for the max. depth of cut (**APMX**) and max. drilling depth (**AZ**).

DCX (mm)	Order Number	Stock	Number of Teeth	Dimensions (mm)				B2	APMX (mm)	RMPX	Fig.	Insert Type
		R		LF	DC	LH	DCON					
40	**AJX12R403SA32S**	●	3	150	28.3	50	32	—	1.2	3°	1	JDM◌1204
40	**AJX09R404SA32S**	●	4	150	29.9	50	32	—	1.2	1.5°	1	JDM◌09T3
40	**AJX12R403SA32L**	●	3	250	28.3	50	32	—	1.2	3°	1	JDM◌1204
40	**AJX09R404SA32L**	●	4	250	29.9	50	32	—	1.2	1.5°	1	JDM◌09T3
40	**AJX12R402SA32EL**	★	2	350	28.3	50	32	—	1.2	3°	1	JDM◌1204
40	**AJX12R403SA40S**	●	3	150	28.3	70	40	0.35°	1.2	0.95°	1	JDM◌1204
40	**AJX09R404SA40S**	●	4	150	29.9	70	40	1.8°	1.2	1.8°	1	JDM◌09T3
40	**AJX12R403SA40L**	□	3	250	28.3	70	40	0.35°	1.2	0.95°	1	JDM◌1204
40	**AJX09R404SA40L**	□	4	250	29.9	70	40	0.43°	1.2	0.92°	1	JDM◌09T3
40	**AJX12R402SA40EL**	□	2	350	28.3	70	40	0.35°	1.2	0.95°	1	JDM◌1204
40	**AJX12R403SA42S**	★	3	150	28.3	70	42	1.79°	1.2	3°	1	JDM◌1204
40	**AJX12R403SA42L**	★	3	250	28.3	70	42	1.79°	1.2	3°	1	JDM◌1204
40	**AJX12R402SA42EL**	★	2	350	28.3	70	42	1.79°	1.2	3°	1	JDM◌1204
50	**AJX14R503SA40S**	●	3	150	38.2	50	40	—	1.2		1	JDM◌1405
50	**AJX14R503SA40L**	□	3	250	38.2	50	40	—	1.2		1	JDM◌1405
50	**AJX14R503SA42S**	★	3	150	38.2	50	42	—	1.2	4.2°	1	JDM◌1405
50	**AJX14R503SA42L**	★	3	250	38.1	50	42	—	1.2	4.2°	1	JDM◌1405
63	**AJX14R634SA40S**	□	4	150	51.1	50	40	—	1.2		2	JDM◌1405
63	**AJX14R634SA40L**	□	4	250	51.1	50	40	—	1.2		2	JDM◌1405
63	**AJX14R634SA42S**	★	4	150	51.1	50	42	—	1.2	2.8°	2	JDM◌1405
63	**AJX14R634SA42L**	★	4	250	51.1	50	42	—	1.2	2.8°	2	JDM◌1405

Note 1) Refer to page K187, for the max. drilling depth (**AZ**).
Note 2) Refer to page K187, for the max. depth of cut (**APMX**) and max. drilling depth (**AZ**).

SPARE PARTS

Tool Holder Type	 *		 *		
	Clamp Screw	Clamp Bridge	Clamp Bridge Screw	Spring	Wrench
AJX06R162	TS25	—	—	—	TKY08F
AJX06R172	TS25	—	—	—	TKY08F
AJX06R203	TS25	—	—	—	TKY08F
AJX06R223	TS25	—	—	—	TKY08F
AJX08R202	TS33	—	—	—	TKY08D
AJX08R222	TS33	—	—	—	TKY08D
AJX08R253	TS33	—	—	—	TKY08D
AJX08R283	TS33	—	—	—	TKY08D
AJX09R252	TS351	AMS3	AJS3010T10	ASS2	TKY10D
AJX09R282	TS351	AMS3	AJS3010T10	ASS2	TKY10D
AJX09R303	TS351	AMS3	AJS3010T10	ASS2	TKY10D
AJX09R323	TS351	AMS3	AJS3010T10	ASS2	TKY10D
AJX09R353	TS351	AMS3	AJS3010T10	ASS2	TKY10D
AJX09R404	TS351	AMS3	AJS3010T10	ASS2	TKY10D
AJX12R302	TS407	AMS4	AJS4012T15	ASS2	TKY15D
AJX12R322	TS43	AMS4	AJS4012T15	ASS2	TKY15D
AJX12R352	TS43	AMS4	AJS4012T15	ASS2	TKY15D
AJX12R402	TS43	AMS4	AJS4012T15	ASS2	TKY15D
AJX12R403	TS43	AMS4	AJS4012T15	ASS2	TKY15D
AJX14R503	TS54	AMS5	AJS5014T25	ASS3	TKY25D
AJX14R634	TS54	AMS5	AJS5014T25	ASS3	TKY25D

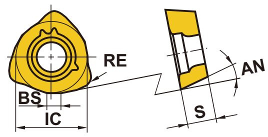
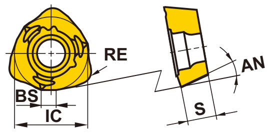
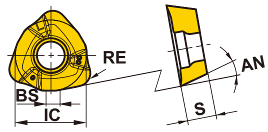
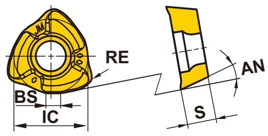
* Clamp Torque (N • m) : TS25=1.0, TS33=1.0, TS351=2.5, TS407=3.5, TS43=3.5, TS54=7.5, AJS3010T10=2.5, AJS4012T15=3.5, AJS5014T25=7.5

● : Inventory maintained. ★ : Inventory maintained in Japan.
□ : Non stock, produced to order only. (10 inserts in one case)

INSERTS

Work Material			FH7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	MP9140	VP15TF	VP30RT
	P	Steel	◐	◐	✣						◐	✣
	M	Stainless Steel				◐	✣				◐	✣
	K	Cast Iron	◐								✣	✣
	S	Heat-resistant Alloy, Titanium Alloy						◐	✣	✣	◐	✣
	H	Hardened Materials									◐	

Cutting Conditions : ● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting

Shape	Order Number	Class	FH7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	MP9140 (NEW)	VP15TF	VP30RT	IC	S	BS	RE	AN	Geometry
Partial Profile FT Breaker 	JOMW06T215ZZSR-FT	M	●	●	●	●	●	●	●		●	●	6.35	2.78	1.2	1.5	13°	
	JOMW080320ZZSR-FT	M	●	●	●	●	●	●	●		●	●	8	3.18	1.4	2	13°	
	JDMW09T320ZDSR-FT	M	●	●	●	●	●	●	●		●	●	9.525	3.97	1.8	2	15°	
	JDMW120420ZDSR-FT	M	●	●	●	●	●	●	●		●	●	12	4.76	2.5	2	15°	
	JDMW140520ZDSR-FT	M	●	●	●	●	●	●	●		●	●	14	5.56	2.8	2	15°	
Strong Cutting Edge Type ST Breaker 	JDMT120420ZDSR-ST	M	●	●	●	●	●				●	●	12	4.76	2.5	2	15°	
	JDMT140520ZDSR-ST	M	●	●	●	●	●				●	●	14	5.56	2.8	2	15°	
Focus on cutting edge sharpness (For Difficult-to-cut Materials) JL Breaker 	JOMT06T216ZZER-JL	M				●	●	●	●	●			6.35	2.78	1.2	1.6	13°	
	JOMT080322ZZER-JL	M				●	●	●	●	●			8	3.18	1.4	2.2	13°	
	JDMT09T323ZDER-JL	M				●	●	●	●	●			9.525	3.97	1.8	2.3	15°	
	JDMT120423ZDER-JL	M				●	●	●	●	●			12	4.76	2.5	2.3	15°	
	JDMT140523ZDER-JL	M				●	●	●	●	●			14	5.56	2.8	2.3	15°	
Focus on cutting edge sharpness (For General Cutting) JM Breaker 	JOMT06T215ZZSR-JM	M	●	●	●	●	●	●	●		●	●	6.35	2.78	1.2	1.5	13°	
	JOMT080320ZZSR-JM	M	●	●	●	●	●	●	●		●	●	8	3.18	1.4	2	13°	
	JDMT09T320ZDSR-JM	M	●	●	●	●	●	●	●		●	●	9.525	3.97	1.8	2	15°	
	JDMT120420ZDSR-JM	M	●	●	●	●	●	●	●		●	●	12	4.76	2.5	2	15°	
	JDMT140520ZDSR-JM	M	●	●	●	●	●	●	●		●	●	14	5.56	2.8	2	15°	

Note 1) Setting height for ST chipbreaker is slightly different from that of other chipbreakers.
If you use ST chipbreaker, check the setting height.

● = NEW

K

ROTATING TOOLS

SPARE PARTS ➢N001
TECHNICAL DATA ➢P001

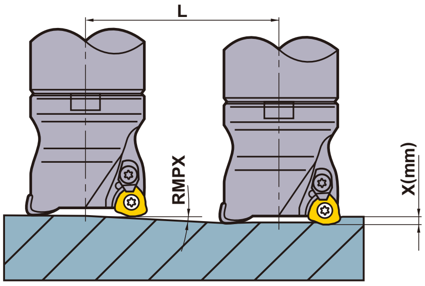
RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED

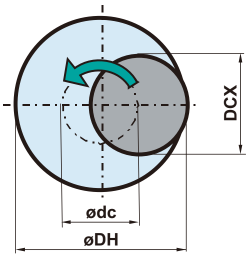
	Work Material	Characteristics	Cutting Speed (m/min) for Different Grades			
P			FH7020	MP6120	MP6130	VP30RT
	Mild Steel	Hardness ≤180HB	170 (120—220)	150 (100—200)	130 (80—180)	110 (60—160)
	Carbon Steel Alloy Steel	Hardness 180—280HB	150 (100—200)	130 (80—180)	110 (60—160)	90 (40—140)
	Carbon Steel Alloy Steel	Hardness 280—350HB	130 (80—180)	100 (50—150)	80 (30—130)	60 (20—110)
	Alloy Tool Steel	Hardness ≤350HB (Annealing)	130 (80—180)	100 (50—150)	80 (30—120)	60 (20—90)
	Pre-hardened Steel	Hardness 35—45HRC	—	100 (70—130)	80 (50—110)	80 (30—90)
M			MP7130	MP7140		
	Stainless Steel	Hardness ≤270HB	140 (100—180)	120 (80—160)	—	—
K			FH7020	VP15TF		
	Gray Cast Iron	Tensile Strength ≤350MPa	150 (100—200)	—	—	—
	Ductile Cast Iron	Tensile Strength ≤800MPa	—	120 (80—160)	—	—
S			MP9120	MP9130	MP9140	
	Heat Resistant Alloy	Hardness ≤350HB	30 (20—40)	25 (20—35)	20 (15—30)	—
	Titanium Alloy	—	50 (40—60)	45 (30—55)	40 (30—50)	
H			VP15TF			
	Hardened Steel	Hardness 40—55HRC	70 (50—90)	—	—	—

MAXIMUM CAPACITIES BY MODE

■RAMPING



■HELICAL DRILLING



- How to derive a locus of the centre of the tool.

ødc = øDH - DCX

Locus of the centre of the tool — Desired hole diameter — Cutting Diameter Maximum

- For the depth of cut per pass, refer to the cutting conditions above for helical drilling.
- 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 0.2 mm/rev or less.
- The long chips generated can disperse, ensure that adequate safety precautions are taken.

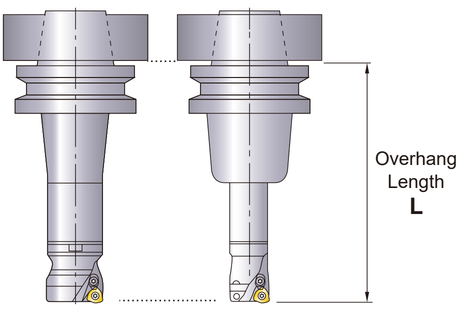
	Tool Holder Type	DCX (mm)	DC (mm)	APMX (mm)		Ramping					Helical Drilling		AZ (mm)
						RMPX	L Required distance for X mm depth (mm)				DH (mm)		
				FT/JM/ST Breaker	JL Breaker		X=1	X=1.2	X=1.5	X=2	Min	Max	
Shank type/Screw-in type	**AJX06**	16	8.9	1	0.6	3°	19.1	—	—	—	23	29	0.3
	AJX06	17	9.9	1	0.6	2.5°	22.9	—	—	—	25	31	0.3
	AJX06	20	12.9	1	0.6	1.5°	38.2	—	—	—	31	37	0.3
	AJX06	22	14.9	1	0.6	1°	57.3	—	—	—	35	41	0.3
	AJX08	20	11.4	1.5	0.9	3.5°	16.3	19.6	24.5	—	27	36	0.5
	AJX08	22	13.4	1.5	0.9	3°	19.1	22.9	28.6	—	31	40	0.5
	AJX08	25	16.4	1.5	0.9	2°	28.6	34.4	43	—	37	46	0.5
	AJX08	28	19.4	1.5	0.9	1.7°	33.7	40.4	50.5	—	43	52	0.5
	AJX09	25	14.9	2	1.2	4°	14.3	17.2	21.5	28.6	33	46	1
	AJX09	28	17.9	2	1.2	3°	19.1	22.9	28.6	38.1	39	52	1
	AJX09	30	20	2	1.2	2.7°	21.2	25.4	31.8	42.4	43	56	1
	AJX09	32	21.9	2	1.2	2.5°	22.9	27.5	34.4	45.8	47	60	1
	AJX09	35	24.9	2	1.2	2°	28.6	34.4	43	57.3	53	66	1
	AJX09	40	29.9	2	1.2	1.5°	38.2	45.8	57.3	76.4	63	76	1
	AJX12	30	18.3	2	1.2	4.5°	12.7	15.2	19	25.4	39	56	1.5
	AJX12	32	20.3	2	1.2	4°	14.3	17.2	21.4	28.6	41	60	1.5
	AJX12	35	23.3	2	1.2	3.5°	16.3	19.6	24.5	32.7	47	66	1.5
	AJX12	40	28.3	2	1.2	3°	19.1	22.9	28.6	38.2	57	76	1.5
	AJX14	50	38.2	2	1.2	4.2°	13.6	16.3	20.4	27.2	72	96	2
	AJX14	63	51.1	2	1.2	2.8°	20.4	24.5	30.7	40.9	98	122	2
Arbor type	**AJX09**	50	40	2	1.2	1.1°	52.1	62.5	78.1	104.2	83	96	1
	AJX12	50	38.3	2	1.2	2°	28.6	34.4	43	57.3	77	96	1.5
	AJX12	63	51.3	2	1.2	1.5°	38.2	45.8	57.3	76.4	103	122	1.5
	AJX12	80	68.3	2	1.2	1.1°	52.1	62.5	78.1	104.2	137	156	1.5
	AJX12	100	88.3	2	1.2	0.8°	71.6	85.9	107.4	143.2	177	196	1.5
	AJX14	63	51.1	2	1.2	2.8°	20.4	24.5	30.7	40.9	98	122	2
	AJX14	80	68.1	2	1.2	1.8°	31.8	38.2	47.7	63.6	132	156	2
	AJX14	100	88.1	2	1.2	1.2°	47.7	57.3	71.6	95.5	172	196	2
	AJX14	125	113.2	2	1.2	0.8°	71.6	85.9	107.4	143.2	222	246	2
	AJX14	160	148.2	2	1.2	0.5°	114.6	137.5	171.9	229.2	292	316	2

RECOMMENDED CUTTING CONDITIONS

■DEPTH OF CUT / FEED

	Work Material	Characteristics	Shank Type / Screw-in Type								
			DCX=ø16, ø17			DCX=ø20, ø22			DCX=ø25, ø28		
			L	ap	fz (mm/t.)	L	ap	fz (mm/t.)	L	ap	fz (mm/t.)
P	Mild Steel	Hardness ≤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	Hardness 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	Hardness 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	Hardness ≤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	Hardness 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	Hardness ≤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	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	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	Hardness ≤350HB	140	0.6	0.6	160	0.8	0.6	170	1.0	0.6
			180	0.4	0.4	210	0.6	0.4	230	0.8	0.4
	Titanium Alloy	—	210	0.3	0.3	240	0.4	0.3	290	0.6	0.3
H	Hardened Steel	Hardness 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

① Overhang Length **L**



② Main Spindle Revolution
n(min^{-1})=(Recommended Cutting Speed x 1000)÷(DCX x 3.14)

③ Table Feed Rate
Vf(mm/min)=n x Feed per Tooth x Number of Teeth

④ Recommended width of cut (ae) is more than 60% of the cutting edge diameter (DCX).

⑤ The 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 this case, reduce the depth of cut and table feed rate.

⑥ Use 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 work material.

⑦ A cutter body with coarse pitch is recommended for unstable cutting caused by a long tool overhang.

⑧ Use the "sharp" JM chipbreaker to lower cutting forces or when long tool overhangs are used.

⑨ Heavy chips are generated when machining with the AJX. To avoid chip jamming-related problems, use air blow while machining to discharging chips effectively.

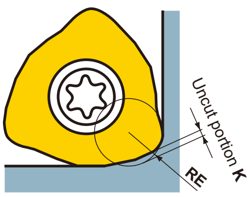
⑩ The maximum depth of cut of JL breaker is different in the insert size.
06 size is up to 0.6 mm, 08 size is up to 0.9 mm, and 09,12,14 size is up to 1.2 mm.

(mm)

Shank Type / Screw-in Type												Arbor Type					
DCX=ø30, ø32, ø35			**DCX=ø40** (**ø32** Shank)			**DCX=ø40** (**ø42** Shank)			**DCX=ø50, ø63**			**DCX=ø50, ø63**			**DCX=ø80, ø100, ø125, ø160**		
L	**ap**	**fz** (mm/t.)	**L**	**ap**	**fz** (mm/t.)	**L**	**ap**	**fz** (mm/t.)	**L**	**ap**	**fz** (mm/t.)	**L**	**ap**	**fz** (mm/t.)	**L**	**ap**	**fz** (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	—	—	—	—	—	—	—	—	—

* Depth of cut of JL breaker is up to 1.2 mm.

NOTE FOR PROGRAMMING



When using the AJX, please programme as an RE radius cutter. The approximate uncut portions for the programme are as follows.

(mm)

Insert Size	Breaker	Approx. **RE**	Uncut Portion **K**
06	**FT / JM**	2.0	0.33
	JL	2.5	0.32
08	**FT / JM**	2.5	0.46
	JL	2.0	0.40
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 1) The uncut portion may change slightly depending on cutting conditions.

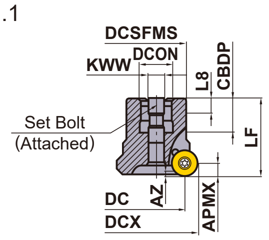
MULTI FUNCTIONAL MILLING

R KAPR

BRP

P M K N S H

Fig.1
ø40
ø42



Set an attached bolt.

Fig.2
ø50
ø52
ø63
ø66
ø80

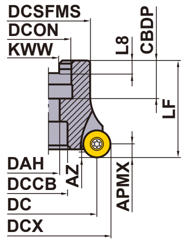
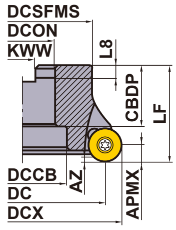


Fig.3
ø100



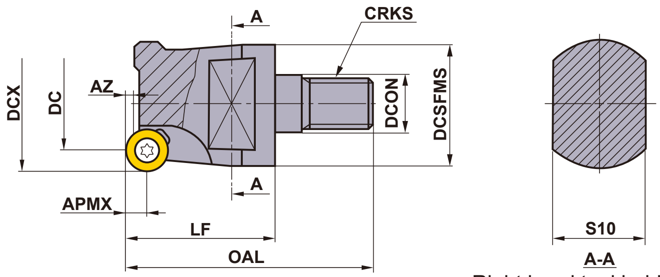
ARBOR TYPE

GAMP:+5°
GAMF:-4°–0°

Right hand tool holder only.

Cutting Edge R (APMX)	Order Number	Stock R	Number of Teeth	DCX	DC	DCSFMS	LF	DCON	CBDP	DAH	KWW	L8	DCCB	*2 WT (kg)	Max. Depth of Cut (mm) APMX	AZ	*1 Clamp Screw	Wrench	Set Bolt	Type (Fig.)
6	BRP6P-040A03R	★	3	40	27.9	30	40	16	18	—	8.4	5.6	—	0.4	6	4	TS43	TKY15D	HDS08030	1
	BRP6P-050A04R	★	4	50	37.8	41	50	22	20	11	10.4	6.3	—	0.5	6	4	TS43	TKY15D	—	2
	BRP6P-063A05R	★	5	63	50.8	42	50	22	20	11	10.4	6.3	—	0.7	6	4	TS43	TKY15D	—	2
	BRP6N-042A04R	●	4	42	29.8	30	40	16	18	—	8.4	5.6	—	0.4	6	4	TS43	TKY15D	HDS08030	1
	BRP6N-050A04R	●	4	50	37.8	41	50	22	20	11	10.4	6.3	—	0.5	6	4	TS43	TKY15D	—	2
	BRP6N-052A05R	●	5	52	39.8	41	63	22	20	11	10.4	6.3	—	0.5	6	4	TS43	TKY15D	—	2
	BRP6N-063A05R	●	5	63	50.8	42	50	22	20	11	10.4	6.3	—	0.7	6	4	TS43	TKY15D	—	2
	BRP6N-066A06R	●	6	66	53.8	42	63	22	20	11	10.4	6.3	—	0.7	6	4	TS43	TKY15D	—	2
	BRP6N-080A06R	●	6	80	67.8	60	50	27	22	13	12.4	8	—	1.2	6	4	TS43	TKY15D	—	2
8	BRP8P-063A04R	★	4	63	46.8	42	50	22	20	11	10.4	6.3	—	0.7	8	5.5	TS54	TKY25D	—	2
	BRP8N-063A04R	●	4	63	46.8	42	50	22	20	11	10.4	6.3	—	0.7	8	5.5	TS54	TKY25D	—	2
	BRP8N-080A06R	●	6	80	63.8	60	50	27	22	13	12.4	8	—	1.2	8	5.5	TS54	TKY25D	—	2
	BRP8N-100B07R	●	7	100	83.8	70	50	32	32	—	14.4	8	45	1.6	8	5.5	TS54	TKY25D	—	3

*1 Clamp Torque (N • m) : TS43=3.5, TS54=7.5
*2 WT : Tool Weight



SCREW-IN TYPE

Right hand tool holder only.

Type	Order Number	Stock R	Number of Teeth	DCX	DC	OAL	LF	DCON	DCSFMS	S10	CRKS	APMX	AZ	* Clamp Screw	Wrench	Insert
BRP4	BRP4NR161M08	●	1	16	7.8	46	28	8.5	13	10	M8	4	1	CS250560T	TKY08F	①RPMW08T2M0E/T ②RPMT08T2M0E-JS
	BRP4NR202M10	●	2	20	11.8	47	28	10.5	18	15	M10	4	2			
	BRP4NR253M12	●	3	25	16.8	54	32	12.5	21	17	M12	4	2			
	BRP4NR323M16	●	3	32	23.8	59	36	17	29	22	M16	4	2			
BRP5	BRP5NR201M10	●	1	20	9.8	51	32	10.5	18	15	M10	5	1.2	CS350760T	TKY15F	①RPMW10T3M0E/T ②RPMT10T3M0E-JS
	BRP5NR252M12	●	2	25	14.8	54	32	12.5	21	17	M12	5	2.5	CS350860T		
	BRP5NR323M12	●	3	32	21.8	58	36	12.5	21	17	M12	5	2.5			
	BRP5NR323M16	●	3	32	21.8	59	36	17	29	22	M16	5	2.5			
BRP6	BRP6NR322M16	●	2	32	19.8	58	35	17	29	22	M16	6	4	TS43	TKY15F	①RPMW1204M0E/T ②RPMW1204M0E-JS
	BRP6NR403M16	●	3	40	27.8	66	43	17	29	22	M16	6	4			
	BRP6NR424M16	●	4	42	29.8	66	43	17	29	22	M16	6	4			

Note 1) For screw-in type arbors, refer to page K244.
* Clamp Torque (N • m) : CS250560T=1.0, CS350760T=3.5, CS350860T=3.5, TS43=3.5

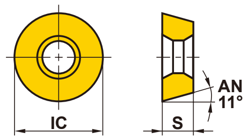
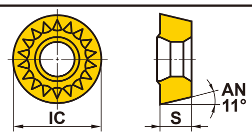
● : Inventory maintained. ★ : Inventory maintained in Japan.
□ : Non stock, produced to order only. (10 inserts in one case)

INSERTS

Work Material		F7010	F7030	VP15TF	AP20M	NX2525	NX4545	UTi20T
P	Steel	●	◐	◐	◐	●	◐	◐
M	Stainless Steel	◐	◐	◐	◐	●	◐	◐
K	Cast Iron			✱		●		✱
S	Heat-resistant Alloy, Titanium Alloy			◐				
H	Hardened Materials			◐				

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

Honing:
E: Round T: Chamfer

Shape	Order Number	Class	Honing	Coated F7010	Coated F7030	Coated VP15TF	Coated AP20M	Cermet NX2525	Cermet NX4545	Carbide UTi20T	Dimensions (mm) IC	Dimensions (mm) S	Geometry
	**RPMW08T2M0E**	M	E							●	8	2.78	
	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	

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED (m/min)

	Work Material	Hardness	Coated F7030	Coated VP15TF	Carbide 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	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 1) Cutting speeds shown in bold type are for the recommended first choice grades.

FEED PER TOOTH (mm/t.)

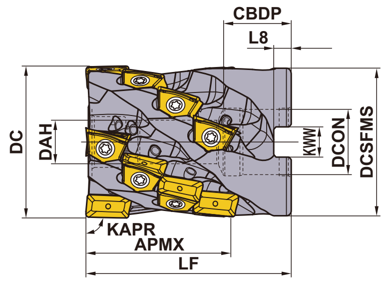
Type	Depth of Cut (mm) 1	2	3	4	5	6	7	8
BRP4	0.40	0.30	0.20	0.10	—	—	—	—
BRP5	0.40	0.35	0.30	0.20	0.10	—	—	—
BRP6	0.50	0.40	0.30	0.25	0.23	0.20	—	—
BRP8	0.60	0.50	0.45	0.40	0.33	0.30	0.25	0.20

ARBORS ➢ K244
SPARE PARTS ➢ N001
TECHNICAL DATA ➢ P001

DEEP SHOULDER MILLING
<MILLING FOR TITANIUM ALLOY>

VFX5

P M K N **S** H



Right hand tool holder only.

■SHELL TYPE

KAPR :90°

Order Number	Stock	Number of Flutes	Total	Dimensions (mm)								APMX (mm)	WT* (kg)
	R			DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8		
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

● : Inventory maintained.

SPARE PARTS

Order Number	Clamp Screw *2	Number	Seal Washer	Wrench	Coolant Nozzle *3	Number	Anti-seize Lubricant	Set Bolt	Number of Insert: End Cutting Edge XNMU1607 ○○R-○○	Number of Insert: Peripheral *1 Cutting Edge 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 except the end cutting edge.
*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.

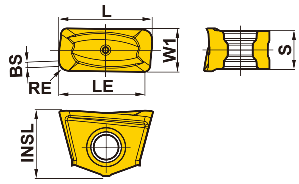
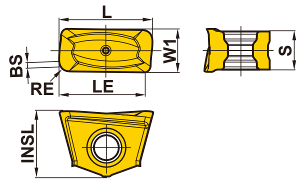
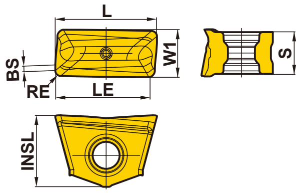
	≦1Mpa (≦20 l/min.)	←Standard→	**≧5Mpa (≧30 l/min.)**	**≧7Mpa (≧50 l/min.)**
Nozzle Dia.	ø0.6mm	ø0.8mm	ø1.2mm	ø1.6mm
Order Number	**HSD04004H06**	**HSD04004H08**	**HSD04004H12**	**HSD04004H16**

* Clamp Torque (N • m) : HSD0400H○○=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

INSERTS

Work Material	S	Heat-resistant Alloy, Titanium Alloy					Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting						
			✤										

Shape	Order Number	Stock / Coated: MP9130				Dimensions (mm): L	LE	W1	INSL	S	BS	RE	Geometry
General Purpose 	XNMU160708R-MS	●				16.0	13.4	7.0	11.1	6.5	1.0	0.8	
	XNMU160712R-MS	●				16.0	13.8	7.0	11.1	6.5	1.0	1.2	
	XNMU160716R-MS	●				16.0	13.8	7.0	11.1	6.5	1.0	1.6	
	XNMU160724R-MS	●				16.0	13.8	7.0	11.1	6.5	1.0	2.4	
	*1 XNMU160732R-MS	●				17.3	14.4	7.0	11.1	6.5	—	3.2	
	*1 XNMU160740R-MS	●				18.9	15.2	7.0	11.1	6.5	—	4.0	
Cutting Edge Enhancement Type 	XNMU160708R-HS	●				16.0	13.4	7.0	11.1	6.5	1.0	0.8	
Chip Processing Type 	XNMU160708R-LS	●				16.0	13.4	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

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

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 APMX (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-6Al-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

Note 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.
Note 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.
Note 3) The maximum depth of cut (apmx) varies according to the machine rigidity and power.

DEEP SHOULDER MILLING

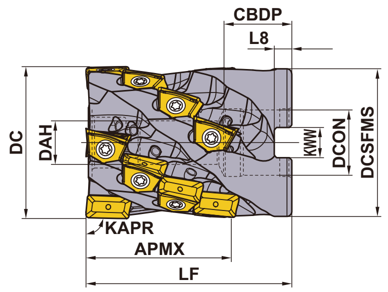
<MILLING FOR TITANIUM ALLOY>

90° KAPR

R

VFX6

P M K N **S** H



Right hand tool holder only.

SHELL TYPE

KAPR :90°

Order Number	Stock	Number of Flutes	Total	Dimensions (mm)								APMX (mm)	WT* (kg)
	R			DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8		
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

● : Inventory maintained.

SPARE PARTS

Order Number	Clamp Screw *2	Number	Seal Washer	Wrench	Coolant Nozzle *3	Number	Anti-seize Lubricant	Set Bolt	Number of Insert: End Cutting Edge XNMU1909 ○○R-○○	Number of Insert: Peripheral *1 Cutting Edge 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.

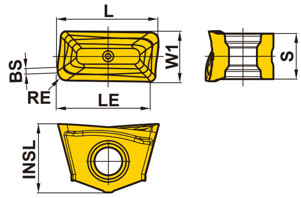
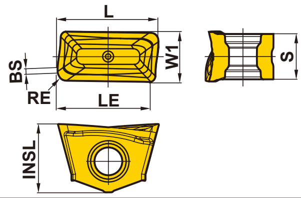
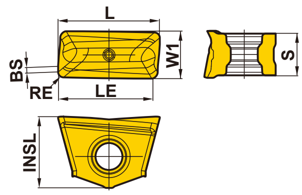
	≤1Mpa (≤20 l/min.)	←Standard→	**≥5Mpa (≥30 l/min.)**	**≥7Mpa (≥50 l/min.)**
Nozzle Dia.	ø0.6mm	ø0.8mm	ø1.2mm	ø1.6mm
Order Number	**HSD04004H06**	**HSD04004H08**	**HSD04004H12**	**HSD04004H16**

* Clamp Torque (N • m) : HSD0400H○○=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

INSERTS

Work Material	S	Heat-resistant Alloy, Titanium Alloy	✤	Cutting Conditions (Guide) : ● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

Shape	Order Number	Stock / Coated MP9130				L	LE	W1	INSL	S	BS	RE	Geometry
General Purpose 	XNMU190912R-MS	●				19.1	16.5	9.5	12.7	8.5	1.0	1.2	
	XNMU190916R-MS	●				19.1	16.5	9.5	12.7	8.5	1.0	1.6	
	XNMU190924R-MS	●				19.1	16.6	9.5	12.7	8.5	1.0	2.4	
	*1 XNMU190932R-MS	●				20.2	17.1	9.5	12.7	8.5	—	3.2	
	*1 XNMU190940R-MS	●				21.8	17.8	9.5	12.7	8.5	—	4.0	
	*1 XNMU190950R-MS	●				21.8	17.8	9.5	12.7	8.5	—	5.0	
Cutting Edge Enhancement Type 	XNMU190912R-HS	●				19.1	16.5	9.5	12.7	8.5	1.0	1.2	
Chip Processing Type 	XNMU190912R-LS	●				19.1	16.5	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

● : Inventory maintained.
(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 **APMX** (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-6Al-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

Note 1) Please note that machining performance varies depending on the conditions such as machine rigidity, work clamping rigidity, coolant supply system, pressure and flow volume etc.

Note 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.

Note 3) The maximum depth of cut (apmx) varies according to the machine rigidity and power.

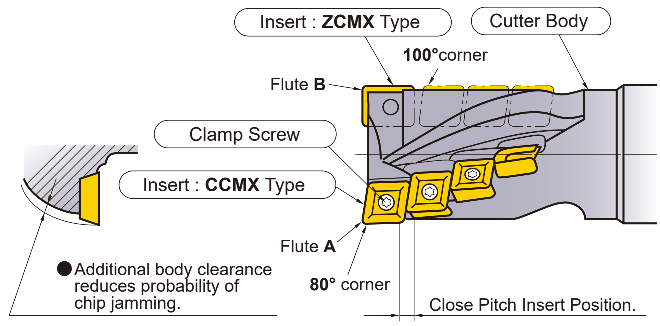
DEEP SHOULDER MILLING

90° KAPR

DCCC

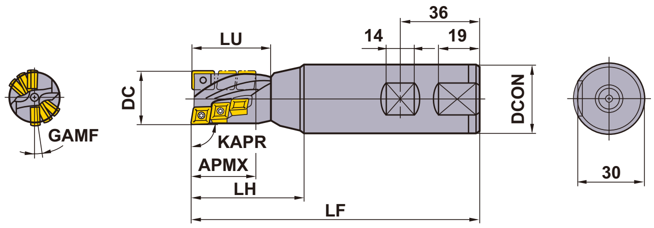
P M K N S H

DESIGN FEATURES OF DCCC TYPE END MILL

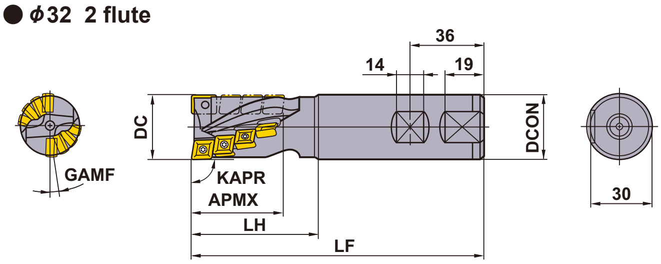


- All 4 cutting edges of CCMX insert are utilized, 80° corners in flute "A" and 100° corners on flute "B".

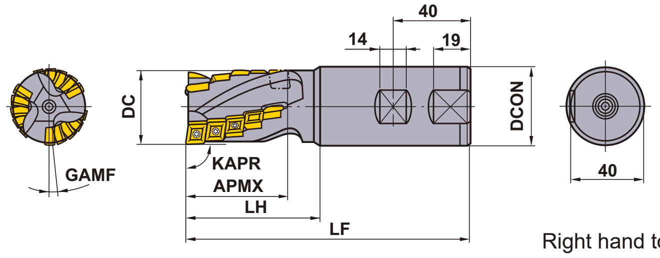
● φ25 2 flute



● φ32 2 flute



● φ40 3 flute



Right hand tool holder only.

WELDON SHANK TYPE

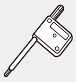
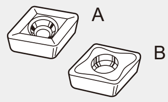
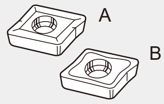
KAPR : 90°

DC (mm)	Order Number	Stock	Dimensions (mm)					GAMF	WT* (kg)	Number of Teeth		Peripheral and Bottom		Bottom insert only	
			LF	DCON	LH	LU	APMX			Bottom	Total	Type	Number of Teeth	Type	Number of Teeth
25	**DCCCR2506S32**	●	130	32	50	36	27	8°	0.6	2	6	CCMX08	5	ZCMX08	1
25	**DCCCR2510S32**	●	150	32	70	56	44	8°	0.7	2	10	CCMX08	9	ZCMX08	1
32	**DCCCR3208S32**	●	140	32	60	–	43	8°36′	0.8	2	8	CCMX09	7	ZCMX09	1
32	**DCCCR3212S32**	●	160	32	80	–	63	8°36′	0.8	2	12	CCMX09	11	ZCMX09	1
40	**DCCCR4015S40**	●	150	40	70	–	53	5°31′	1.3	3	15	CCMX09	14	ZCMX09	1
40	**DCCCR4015S42**	★	150	42	70	–	53	5°31′	1.3	3	15	CCMX09	14	ZCMX09	1
40	**DCCCR4024S40**	●	180	40	100	–	83	5°31′	1.4	3	24	CCMX09	23	ZCMX09	1
40	**DCCCR4024S42**	★	180	42	100	–	83	5°31′	1.4	3	24	CCMX09	23	ZCMX09	1

* WT : Tool Weight

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

SPARE PARTS

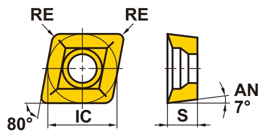
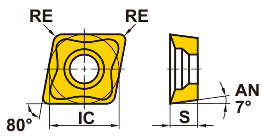
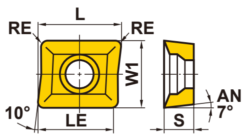
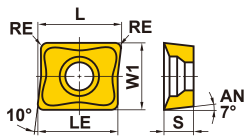
Tool Holder Number	 *				
				Insert	
	Clamp Screw	Wrench	Wrench	Peripheral and Bottom Insert	Bottom Insert (One Pocket Only)
DCCCR25	CS300890T	TKY08F	TKY08DS	CCMX083508EN-A	ZCMX083508ER-A
DCCCR32 **DCCCR40**	CS350990T	TKY10F	TKY10DS	CCMX09T308EN-A or B	ZCMX09T308ER-A or B

* Clamp Torque (N • m) : CS300890T=1.0, CS350990T=2.5

INSERTS

Work Material			F7030	VP15TF	UP20M		UTi20T	
	P	Steel	◐	◐	◐		◐	
	M	Stainless Steel	◐	◐	◐		◐	
	K	Cast Iron		✤			✤	

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting
Honing : E : Round

Shape	Order Number	Class	Honing	Coated				Carbide		Dimensions (mm)						Geometry
				F7030	VP15TF	UP20M		UTi20T		L	LE	W1	IC	S	RE	
	**CCMX083508EN-A**	M	E	●		★		★		–	–	–	7.94	3.5	0.8	
	CCMX09T308EN-A	M	E	●	●	★		★		–	–	–	9.525	3.97	0.8	
Strong Cutting Edge Type 	**CCMX09T308EN-B**	M	E	●				★		–	–	–	9.525	3.97	0.8	
	**ZCMX083508ER-A**	M	E	●				★		11.0	8.5	7.94	–	3.5	0.8	
	ZCMX09T308ER-A	M	E	●	●	●		★		12.7	11.0	9.525	–	3.97	0.8	
Strong Cutting Edge Type 	**ZCMX09T308ER-B**	M	E	●		★				12.7	11.0	9.525	–	3.97	0.8	

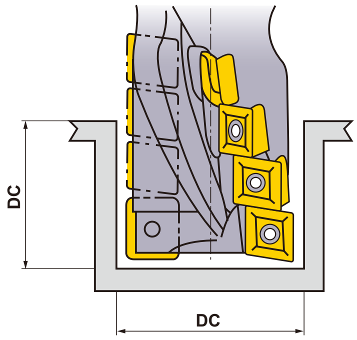
K

ROTATING TOOLS

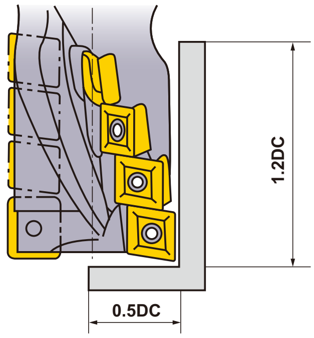
RECOMMENDED CUTTING CONDITIONS

Cutting Mode

A : Slot Milling (APMX Short Type)



B : Shoulder Milling (APMX Short Type)

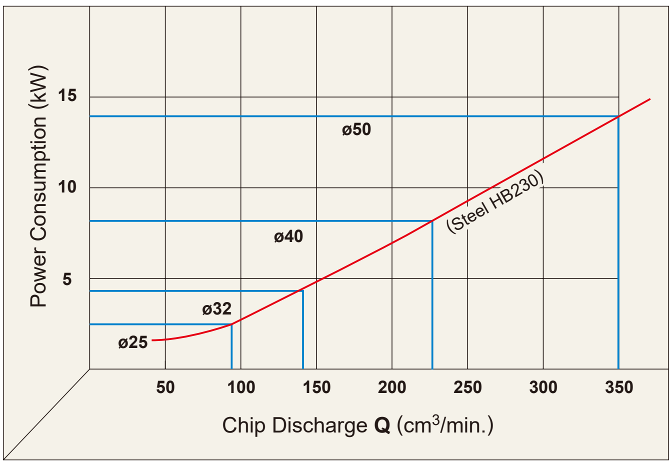


	Work Material	Hardness	Grade	Cutting Mode	Cutting Speed (m/min)	Table Feed (mm/min) ϕ25	Table Feed (mm/min) ϕ32	Table Feed (mm/min) ϕ40
P	Mild Steel	≤180HB	F7030	A	200 (160–240)	120 (100–140)	120 (100–140)	120 (100–140)
			F7030	B	200 (160–240)	200 (180–220)	200 (180–220)	230 (200–250)
	Carbon Steel Alloy Steel	180–280HB	F7030	A	160 (130–180)	120 (100–140)	120 (100–140)	140 (120–150)
			F7030	B	160 (130–180)	150 (120–180)	150 (120–180)	180 (150–200)
		280–350HB	F7030	A	160 (130–180)	100 (80–120)	100 (80–120)	130 (100–150)
			F7030	B	160 (130–180)	120 (100–140)	120 (100–140)	150 (120–180)
M	Stainless Steel	≤200HB	F7030	A	80 (60–100)	70 (50–90)	70 (50–90)	70 (50–90)
			F7030	B	130 (100–160)	100 (80–120)	100 (80–120)	120 (100–140)
K	Cast Iron	Tensile Strength ≤450MPa	UTI20T	A	120 (100–140)	200 (180–220)	200 (180–220)	230 (200–250)
			UTI20T	B	120 (100–140)	230 (200–250)	230 (200–250)	260 (240–280)

- 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

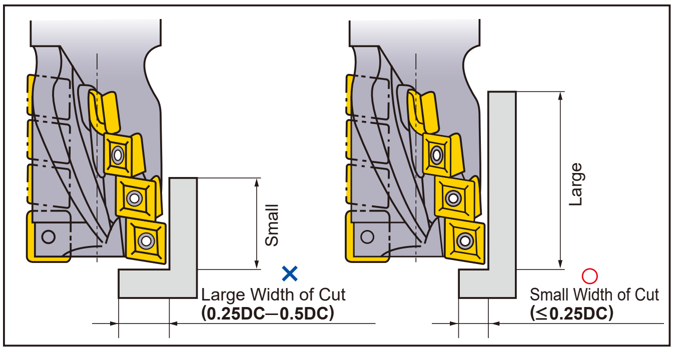
■POWER CONSUMPTION

- Please use the chart below for reference, please select the conditions that suits the machines power.
- Chip Discharge Q (cm^3/min.)=Table Feed x Depth of Cut x Cutting Width÷1000



■FOR USE OF APMX LONG TYPE

- When the overhang from the milling chuck is long, a large width of cut will cause chattering and tool breakage.
- Keep the width of cut small and the depth of cut in axial direction large. (See the following illustration.)
- For slot milling, keep the table feed at not more than half the value listed in the above table. (Use the APMX Short type as much as possible.)

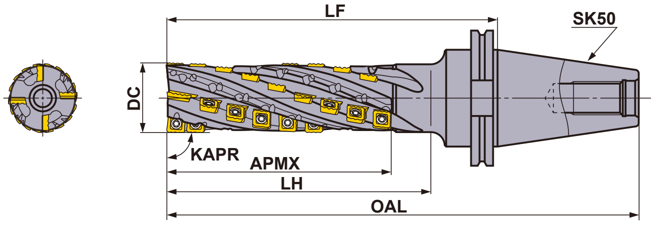


DEEP SHOULDER MILLING

SPX

P M K N S H

● SK50 shank type

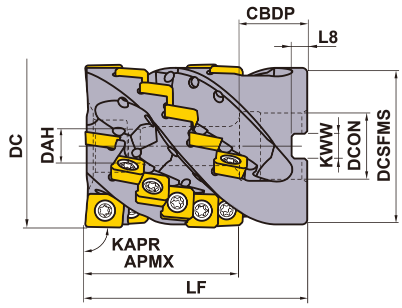


KAPR :90°

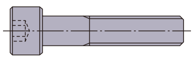
Order Number	Stock	Number of Teeth			Dimensions (mm)					Number of Insert		
										Bottom On-edge A	Bottom On-edge B	Peripheral
		Flutes	Total	Bottom	DC	OAL	LH	LF	APMX	JPMX 190412-○○	MPMX 120412-○○	SPMX 120408-○○
SPX4R06324SK50NS	□	2	24	4	63	289.6	140	188	110	2	2	20
SPX4R06334SK50NM	□	2	34	4	63	339.6	190	238	157	2	2	30
SPX4R06344SK50NL	□	2	44	4	63	389.6	240	288	205	2	2	40
SPX4R06356SK50NX	□	2	56	4	63	439.6	290	338	261	2	2	52

□ : Non stock, produced to order only.

SPARE PARTS ➢ N001
TECHNICAL DATA ➢ P001



Right hand tool holder only.

Cutter Diameter **DC** (mm)	Set Bolt	Geometry
ϕ63	HSC12070	
ϕ80	HSC16065	

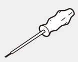
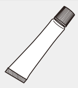
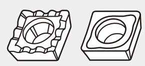
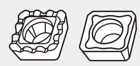
■SHELL TYPE

KAPR :90°

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	DCSFMS	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 1) 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

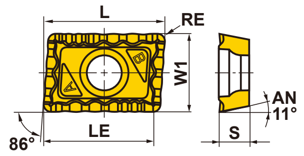
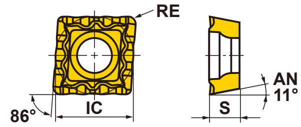
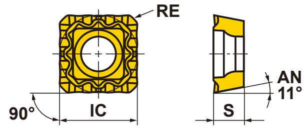
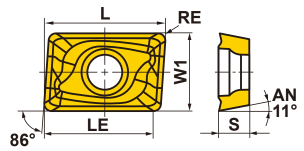
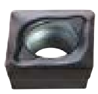
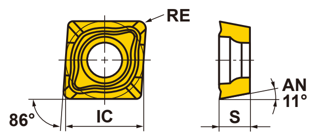
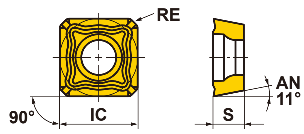
* Clamp Torque (N • m) : TS55=7.5

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

INSERTS

Work Material			VP15TF	VP20RT
	P	Steel	◐	◐
	M	Stainless Steel	◐	◐
	K	Cast Iron	✤	✤
	S	Heat-resistant Alloy, Titanium Alloy	◐	✤

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

Type	Shape	Order Number	Class	VP15TF (Coated)	VP20RT (Coated)	L	LE	W1	IC	S	RE	Geometry
Wavy cutting edge type (WH Breaker) – Bottom On-edge A		JPMX190412-WH	M	●	●	19.81	17.6	12.7	—	4.76	1.2	
		⁎ JPMX140412-WH	M	●	●	15.04	12.9	12.7	—	4.76	1.2	
Wavy cutting edge type (WH Breaker) – Bottom On-edge B		MPMX120412-WH	M	●	●	—	—	—	12.7	4.76	1.2	
Wavy cutting edge type (WH Breaker) – Peripheral		SPMX120408-WH	M	●	●	—	—	—	12.7	4.76	0.8	
Straight cutting edge type (JM Breaker) – Bottom On-edge A		JPMX190412-JM	M	●	●	19.81	17.6	12.7	—	4.83	1.2	
		⁎ JPMX140412-JM	M	●	●	15.04	12.9	12.7	—	4.79	1.2	
Straight cutting edge type (JM Breaker) – Bottom On-edge B		MPMX120412-JM	M	●	●	—	—	—	12.7	4.79	1.2	
Straight cutting edge type (JM Breaker) – Peripheral		SPMX120408-JM	M	●	●	—	—	—	12.7	4.80	0.8	

Dimensions (mm): L, LE, W1, IC, S, RE

⁎ Only for use with a shell type holder.

SPARE PARTS ➢ N001
TECHNICAL DATA ➢ P001

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 machining conditions if vibration is generated.

Note 2) If the cutting angle between the tool and workpiece exceeds 90º 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.

■CUTTING CONDITIONS FOR 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 machining conditions if vibration is generated.

Note 2) For slotting, please use high rigidity tools such as SPX4R05016WNES/BT50NES.

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 machining conditions if vibration is generated.

■CUTTING CONDITIONS FOR 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 machining conditions if vibration is generated.

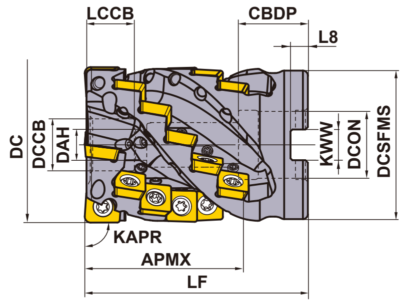
DEEP SHOULDER MILLING

<CUTTING FOR TITANIUM ALLOY>

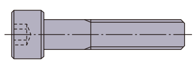
90° KAPR

ASPX NEW

P M K N **S** H



Right hand tool holder only.

Cutter Diameter **DC** (mm)	Set Bolt	Geometry
ϕ50	HSC10070	
ϕ63	HSC12070	
ϕ80	HSC16080	

SHELL TYPE

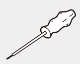
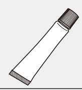
KAPR: 90°
With Coolant Hole : Shell type should be combined with a through coolant arbor.

DC (mm)	Order Number	Stock	Number of Flutes	Total	Dimensions (mm)		WT (kg)	APMX (mm)
		R			LF	DCON		
50	**ASPX4-050A03A054RA15**	●	3	15	85	22	0.6	54
63	**ASPX4-063A04A064RA24**	●	4	24	90	27	1.0	64
80	**ASPX4-080A05A075RA35**	●	5	35	100	32	2.0	75

MOUNTING DIMENSIONS

DC (mm)	Order Number	Dimensions (mm)							
		DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
50	**ASPX4-050A03A054RA15**	22	21	10.5	17	14	47	10.4	6.3
63	**ASPX4-063A04A064RA24**	27	28	12.5	21	19	60	12.4	7
80	**ASPX4-080A05A075RA35**	32	28	16.5	27	20	76	14.4	8

SPARE PARTS

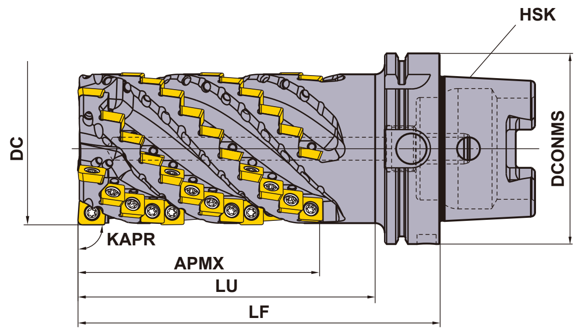
Tool Holder Type	 *						Number of Insert	
	Clamp Screw	Seal Washer	Wrench	Coolant Nozzle	Number	Anti-seize Lubricant	JPGX	SPGX
ASPX4-050A	TS55	W10-S1	TKY25D	HSD04004H08	18	MK1KS	3	12
ASPX4-063A	TS55	W12-S1	TKY25D	HSD04004H08	28	MK1KS	4	20
ASPX4-080A	TS55	W16-S1	TKY25D	HSD04004H08	40	MK1KS	5	30

⋆ Clamp Torque (N • m) : TS55 = 5.0

	≦1Mpa (≦20 l/min.)	←Standard→	≧5Mpa (≧30 l/min.)	≧7Mpa (≧50 l/min.)	To Plug a Coolant Hole
Nozzle Dia.	ø0.6mm	ø0.8mm	ø1.2mm	ø1.6mm	–
Order Number	**HSD04004H06**	**HSD04004H08**	**HSD04004H12**	**HSD04004H16**	**HSS04004**

Note 1) Coolant nozzles are available with varying diameters for adjusting coolant pressure.
Select the correct nozzle according to the specification.
Note 2) Use HSS04004 (JIS B 1177 flat point M4x4, clamp torque 1.5 Nm) to plug the coolant hole.

● : Inventory maintained. ⋆ : Inventory maintained in Japan.



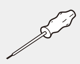
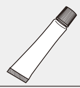
The standard type is right-handed (R) only.
The HSK shank type has a built-in movable coolant pipe for installation.

■HSK SHANK TYPE

KAPR: 90°
With Coolant Hole

DC	Order Number	Stock	Number of Flutes	Total	Dimensions (mm)			HSK	APMX
		R			LF	LU	DCONMS		(mm)
80	**ASPX4R0805H100A127SA**	★	5	60	190	156	100	HSK-A100	127
80	**ASPX4R0805H125A127SA**	★	5	60	190	156	125	HSK-A125	127

SPARE PARTS

Tool Holder Type	 *					Number of Insert	
	Clamp Screw	Wrench	Coolant Nozzle	Number	Anti-seize Lubricant	JPGX	SPGX
ASPX4R0805H100A	TS55	TKY25D	HSD04004H08	65	MK1KS	5	55
ASPX4R0805H125A	TS55	TKY25D	HSD04004H08	65	MK1KS	5	55

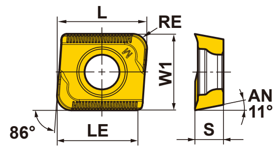
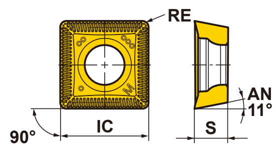
* Clamp Torque (N • m) : TS55 = 5.0

SPARE PARTS ➤N001
TECHNICAL DATA ➤P001

INSERTS

Work Material	S	Heat-resistant Alloy, Titanium Alloy	◐

Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting ✤: Unstable Cutting
Honing :
E : Round

	Shape	Order Number	Class	Honing	Coated MP9140	L	LE	W1	IC	S	RE	Geometry
Bottom	 2 Corner	JPGX1404080PPER-JM	G	E	●	15.12	13.4	12.7	—	4.8	0.8	
		JPGX1404120PPER-JM	G	E	●	15.06	13.3	12.7	—	4.8	1.2	
		JPGX1404160PPER-JM	G	E	●	15.00	13.3	12.7	—	4.8	1.6	
		JPGX1404240PPER-JM	G	E	●	14.88	13.2	12.7	—	4.8	2.4	
		JPGX1404320PPER-JM	G	E	●	14.72	13.1	12.7	—	4.8	3.2	
		JPGX1404400PPER-JM	G	E	●	14.64	13.0	12.7	—	4.8	4.0	
		JPGX1404500PPER-JM	G	E	●	14.49	13.0	12.7	—	4.8	5.0	
		JPGX1404635PPER-JM	G	E	●	14.29	12.9	12.7	—	4.8	6.35	
Peripheral	 4 Corner	SPGX1204100PPER-JM	G	E	●	—	—	—	12.7	4.8	1.0	

RECOMMENDED CUTTING CONDITIONS

	Work Material	Cutting Width **ae** (mm)	Cutting Speed **Vc** (m/min)	Feed per Tooth **fz** (mm/t.)
S	Ti Alloys Ti-6Al-4V,Ti-6Al-4V-ELI Ti-10V-2Fe-3Al Ti-5Al-5V-5Mo-3Cr etc.	ae≤0.5DC	60(50—80)	0.12(0.10—0.14)
		0.5DC<ae<0.8DC	50(40—60)	0.10(0.08—0.12)
		ae≥0.8DC	40(50—60)	0.08(0.06—0.10)

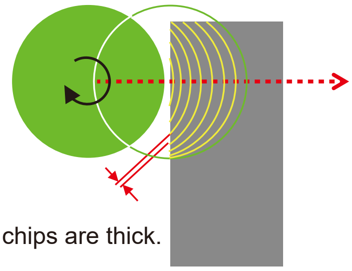
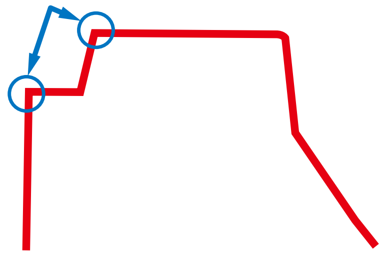
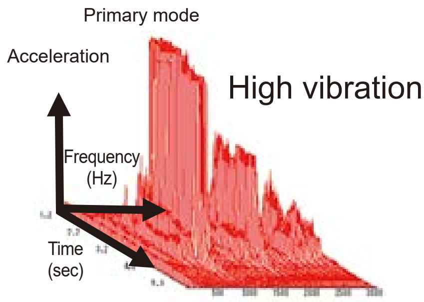
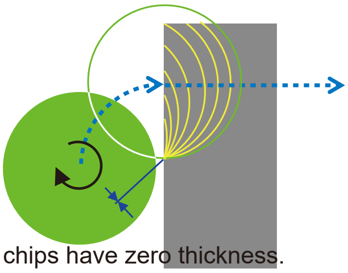
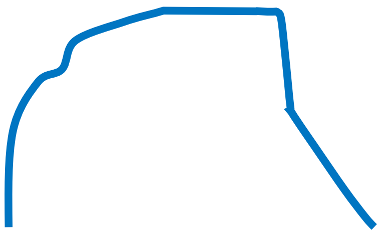
Note 1) The cutting performance depends on machine and clamping rigidity, as well as the supply and pressure of the coolant. Adjust as necessary.
Note 2) Use a machine and spindle size suitable for heavy machining of titanium alloys. (7/24 taper #50 or #60, or high rigidity HSK-A100 or A125, with an output of 15kW or higher and torque of 500 Nm or higher for a rotation speed of 500min-1 or less).
Caution, at high load cutting conditions the output power of the machine spindle may be exceeded.
Note 3) If chatter and vibration or machine overloading occur, it is recommended to reduce the depth of cut ap.
Note 4) The coolant system combines internal and external lubrication, it is recommended to supply coolant in ample quantities.
Note 5) A gradual roll feed into the workpiece and use of down cutting (climb milling) is recommended. (refer to page K211)

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

How to Use

Positive Effects of a Roll Into Cutting Approach

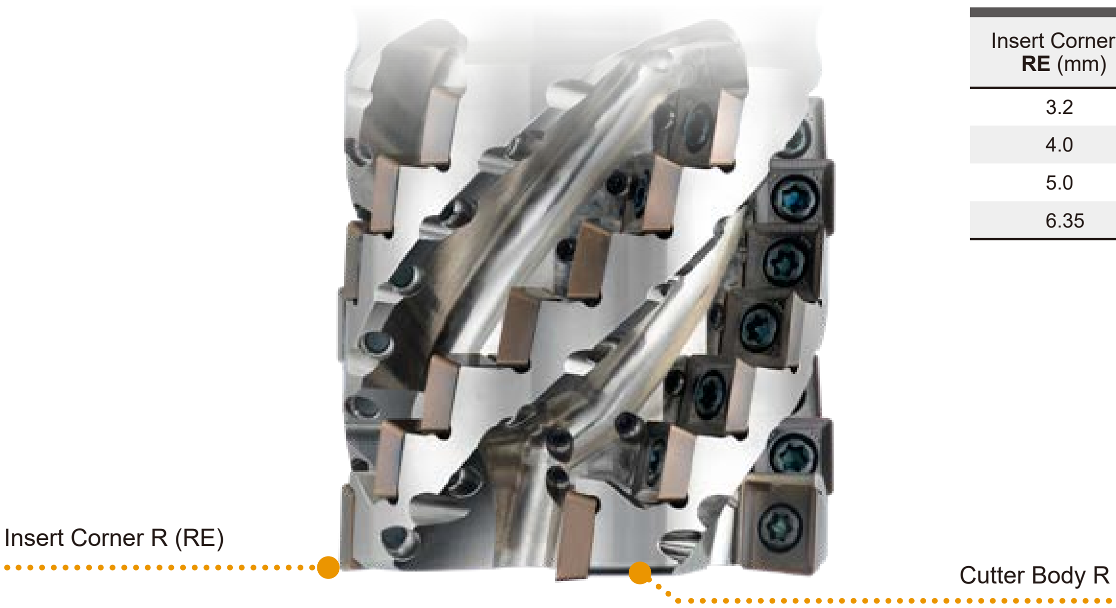
The roll into cutting approach can control sharp increases in cutting loads and prevent sudden chipping of inserts which is likely to occur at the start of machining.

Approach Method	Cutting Load Simulation	Cutting Vibration Frequency
Direct Approach  Exit chips are thick.	Cutting load increases suddenly. High risk of chipping. 	
Roll Into Cutting Approach  Exit chips have zero thickness.	Cutting load increases smoothly. 	

Down cutting (climb milling) is recommended.

Notes on Use of Inserts with Large Corner Radii

When using inserts with corner radius RE≥R3.2mm, please machine the cutter body with a radius form as shown on the table below.



Insert Corner R **RE** (mm)	Cutter Body Radius **R** (mm)
3.2	3.0
4.0	4.0
5.0	5.0
6.35	6.2

BALL NOSE END MILL

SRF/SRB

P | M | K | N | S | H

Fig.1

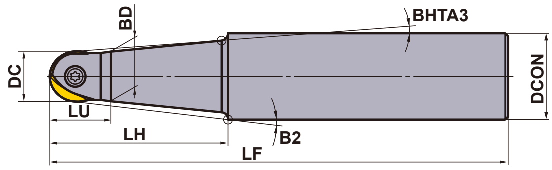


Fig.2

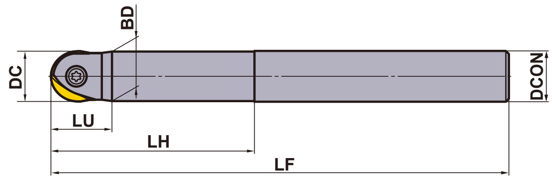
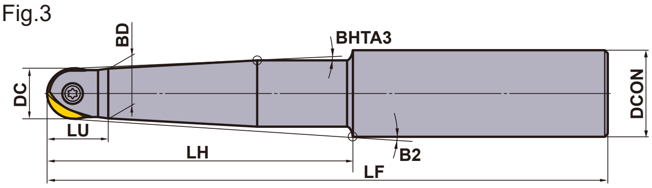


Fig.3



Right hand tool holder only.

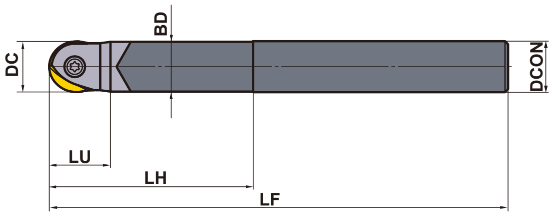
STEEL SHANK TYPE

Type	Order Number	Stock	Number of Teeth	Dimensions (mm)									Fig.	Clamp Screw *1	Wrench ①②	Insert
		R		RE*2	DC	DCON	LF	BD	LH	LU	B2	BHTA3				
Standard	**SRFH10S12M**	●	1	5	10	12	110	9.5	40	13	1.63°	1.5°	1	RS3008T	①TKY08D	SRFT10 SRBT10
	SRFH12S16M	●	1	6	12	16	120	11.5	50	15	2.6°	1.5°	1	RS3510T	①TKY10D	SRFT12 SRBT12
	SRFH16S20M	●	1	8	16	20	130	15.5	50	20	2.73	1.5°	1	RS4015T	②TKY15T	SRFT16 SRBT16
	SRFH20S25M	●	1	10	20	25	150	19.5	70	24	2.38°	1.5°	1	RS5020T	②TKY20T	SRFT20 SRBT20
	SRFH25S32M	●	1	12.5	25	32	180	24.5	80	30	2.97°	1.5°	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	1.5°	1.5°	1	RS3008T	①TKY08D	SRFT10 SRBT10
	SRFH12S16L	●	1	6	12	16	160	11.5	70	15	1.78°	1.5°	1	RS3510T	①TKY10D	SRFT12 SRBT12
	SRFH16S20L	●	1	8	16	20	160	15.5	70	20	1.85°	1.5°	1	RS4015T	②TKY15T	SRFT16 SRBT16
	SRFH20S25L	●	1	10	20	25	180	19.5	80	24	2.05°	1.5°	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	2.28°	1.5°	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	1.5°	1.5°	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	1.5°	1.5°	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

*1 Clamp Torque (N • m) : RS3008T=1.5, RS3510T=2.5, RS4015T=3.3, RS5020T=5.0, RS6025T=7.5, RS8030T=10.0
*2 RE is shown for insert corner R.

● : Inventory maintained. ★ : Inventory maintained in Japan.

Fig.1



Right hand tool holder only.

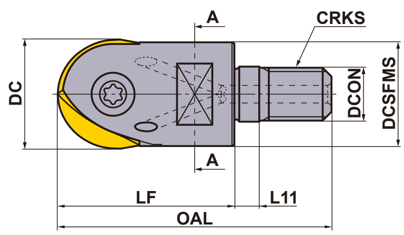
■CARBIDE SHANK TYPE

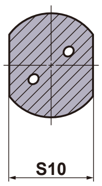
Type	Order Number	Stock R	Number of Teeth	RE*2	DC	DCON	LF	BD	LH	LU	Fig.	Clamp Screw *1	Wrench	Insert
Standard	**SRFH10S10MW**	●	1	5	10	10	110	9.5	40	13	1	RS3008T	①TKY08D	SRFT10 SRBT10
	SRFH12S12MW	●	1	6	12	12	120	11.5	50	15	1	RS3510T	①TKY10D	SRFT12 SRBT12
	SRFH16S16MW	●	1	8	16	16	130	15.5	50	20	1	RS4015T	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.

*1 Clamp Torque (N • m) : RS3008T=1.5, RS3510T=2.5, RS4015T=3.3, RS5020T=5.0, RS6025T=7.5, RS8030T=10.0

*2 RE is shown for insert corner R.





A-A section

■SCREW-IN TYPE

Right hand tool holder only.

Order Number	Stock R	Coolant Hole	Number of Teeth	RE*2	DC	DCON	DCSFMS	OAL	LF	L11	S10	CRKS	*3 WT (kg)	Clamp Screw *1	Wrench	Insert
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 K244.

*1 Clamp Torque (N • m) : RS4015T=3.3, RS5020T=5.0, RS6025T=7.5, RS8030T=10.0

*2 RE is shown for insert corner R.

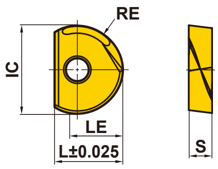
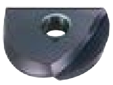
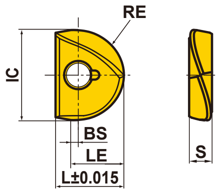
*3 WT : Tool Weight

ARBORS ➤ K244
SPARE PARTS ➤ N001
TECHNICAL DATA ➤ P001

INSERTS

Work Material			EP6120	VP15TF	MP8010
	P	Steel	◐	◐	
	M	Stainless Steel		◐	
	K	Cast Iron		✤	●
	N	Non-ferrous Metal	◐		
	H	Hardened Steel	◐	◐	●

Cutting Conditions :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

Shape	Order Number	Coated EP6120	Coated VP15TF	Coated MP8010	Dimensions (mm) IC	RE Corner R	RE Tolerance	L	LE	BS	S	Geometry
	**SRBT10**		●		10	5	±0.02	8.5	5	—	2.6	
	SRBT12		●		12	6	±0.02	10	6	—	3	
	SRBT16		●		16	8	±0.025	12	8	—	4	
	SRBT20		●		20	10	±0.025	15	10	—	5	
	SRBT25		●		25	12.5	±0.035	18.5	12.5	—	6	
	SRBT30		●		30	15	±0.035	22.5	15	—	7	
	SRBT32		●		32	16	±0.035	23.5	16	—	7	
	**SRFT10**	●	●	●	10	5	±0.006	8.5	5.5	0.5	2.6	
	SRFT12	●	●	●	12	6	±0.006	10	6.5	0.5	3	
	SRFT16	●	●	●	16	8	±0.006	12	9	1	4	
	SRFT20	●	●	●	20	10	±0.006	15	11	1	5	
	SRFT25	●	●	●	25	12.5	±0.006	18.5	13.5	1	6	
	SRFT30	●	●	●	30	15	±0.006	22.5	16	1	7	
	SRFT32	●	●	●	32	16	±0.006	23.5	17	1	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 to prevent the screw seizing, MK1KS, and to fasten with recommended torque.

● : Inventory maintained.
(2 inserts in one case)

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	≤180HB	**EP6120**	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
P	Carbon Steel, Alloy Steel	180—280HB	**EP6120**	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
P	Carbon Steel, Alloy Steel	180—280HB	**VP15TF**	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
P	Carbon Steel, Alloy Steel	280—350HB	**EP6120**	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
P	Pre-Hardened Steel	35—45HRC	**EP6120**	150 (80—200)	0.2 (0.1—0.3)	≤0.05DC
P	Pre-Hardened Steel	35—45HRC	**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	Alloy Tool Steel	≤350HB	**VP15TF**	150 (80—200)	0.2 (0.1—0.3)	≤0.05DC
K	Gray Cast Iron	Tensile Strength ≤350MPa	**MP8010**	250 (80—450)	0.2 (0.1—0.3)	≤0.05DC
K	Ductile Cast Iron	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 actual machine condition, referring to the above values.
Note 2) For end mills with a carbide shank, it is possible to set about 20% higher cutting conditions.
Note 3) Please note the following when machining hardened steel with MP8010.
- Shorten the overhang length as much as possible.
- Carbide shank type is recommended.
- Please note especially the setting of the depth of cut to prevent fracturing.

CUTTING SPEED FORMULAE

1. Employing $\theta°$ ➡ Calculate cutting speed at point P.
(Cutting speed at the cutting depth border for oblique machining)

$$\text{Formula : Cutting Speed} = \frac{\pi \cdot DC \cdot \sin\theta \cdot n}{1000}\ \text{(m/min)}$$

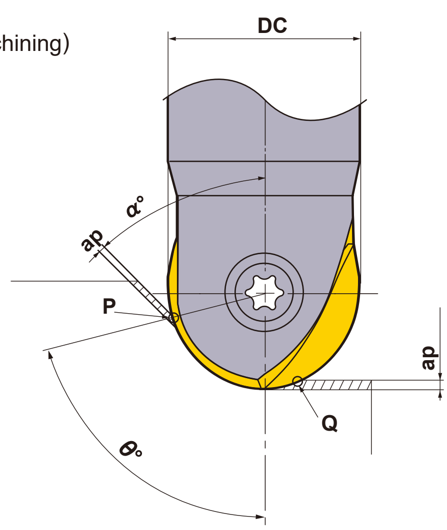
$$\theta° = \cos^{-1}\left(\frac{DC-2ap}{DC}\right)+90-\alpha$$

n : Spindle Speed (min^{-1})

2. Employing ap ➡ Calculate cutting speed at point Q.
(Cutting speed at the cutting depth border)

$$\text{Formula : Cutting Speed} = \frac{2\pi n\sqrt{ap\,(DC-ap)}}{1000}\ \text{(m/min)}$$

n : Spindle Speed (min^{-1})
DC : Cutting Edge Diameter (mm)
ap : Depth of Cut (mm)



RADIUS END MILL

SUF

P M K N S H

Fig.1

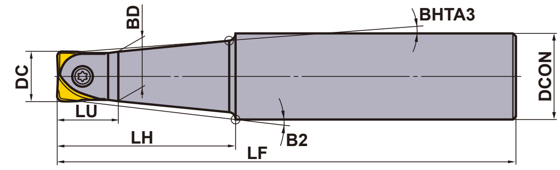


Fig.2

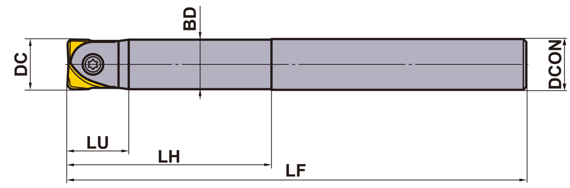
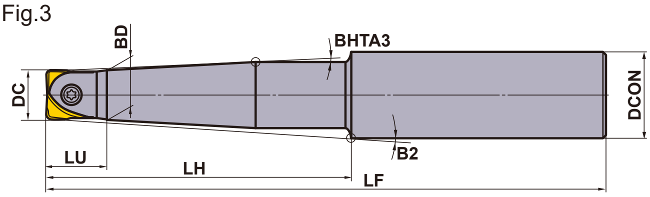


Fig.3



■STEEL SHANK TYPE

Right hand tool holder only.

Type	Order Number	Stock R	Number of Teeth	DC	DCON	LF	BD	LH	LU	B2	BHTA3	Fig.	Clamp Screw *	Wrench ① ②	Insert
Standard	SRFH10S12M	●	1	10	12	110	9.5	40	13	1.63°	—	1	RS3008T	①TKY08D	SUFT10R○○
	SRFH12S16M	●	1	12	16	120	11.5	50	15	2.60°	—	1	RS3510T	①TKY10D	SUFT12R○○
	SRFH16S20M	●	1	16	20	130	15.5	50	20	2.73°	—	1	RS4015T	②TKY15T	SUFT16R○○
	SRFH20S25M	●	1	20	25	150	19.5	70	24	2.38°	1.5°	1	RS5020T	②TKY20T	SUFT20R○○
	SRFH25S32M	●	1	25	32	180	24.5	80	30	2.97°	1.5°	1	RS6025T	②TKY25T	SUFT25R○○
	SRFH30S32M	●	1	30	32	200	29.5	100	35	—	—	2	RS8030T	②TKY30T	SUFT30R○○
	SRFH32S32M	●	1	32	32	200	31.5	100	35	—	—	2	RS8030T	②TKY30T	SUFT32R○○
Semi-long	SRFH10S12L	●	1	10	12	150	9.5	60	13	1.5°	—	1	RS3008T	①TKY08D	SUFT10R○○
	SRFH12S16L	●	1	12	16	160	11.5	70	15	1.78°	—	1	RS3510T	①TKY10D	SUFT12R○○
	SRFH16S20L	●	1	16	20	160	15.5	70	20	1.85°	—	1	RS4015T	②TKY15T	SUFT16R○○
	SRFH20S25L	●	1	20	25	180	19.5	80	24	2.05°	1.5°	1	RS5020T	②TKY20T	SUFT20R○○
	SRFH20S20L80	●	1	20	20	180	19.5	80	24	—	—	2	RS5020T	②TKY20T	SUFT20R○○
	SRFH25S32L	★	1	25	32	200	24.5	100	30	2.28°	1.5°	1	RS6025T	②TKY25T	SUFT25R○○
	SRFH25S25L100	●	1	25	25	200	24.5	100	30	—	—	2	RS6025T	②TKY25T	SUFT25R○○
	SRFH30S32L	★	1	30	32	230	29.5	130	35	—	—	2	RS8030T	②TKY30T	SUFT30R○○
Long	SRFH20S25E	●	1	20	25	220	19.5	120	24	1.5°	1.5°	3	RS5020T	②TKY20T	SUFT20R○○
	SRFH20S20E120	●	1	20	20	220	19.5	120	24	—	—	2	RS5020T	②TKY20T	SUFT20R○○
	SRFH25S32E	●	1	25	32	250	24.5	150	30	1.5°	1.5°	3	RS6025T	②TKY25T	SUFT25R○○
	SRFH25S25E150	●	1	25	25	250	24.5	150	30	—	—	2	RS6025T	②TKY25T	SUFT25R○○
	SRFH30S32E	●	1	30	32	300	29.5	200	35	—	—	2	RS8030T	②TKY30T	SUFT30R○○

* Clamp Torque (N • m) : RS3008T=1.5, RS3510T=2.5, RS4015T=3.3, RS5020T=5.0, RS6025T=7.5, RS8030T=10.0

● : Inventory maintained. ★ : Inventory maintained in Japan.

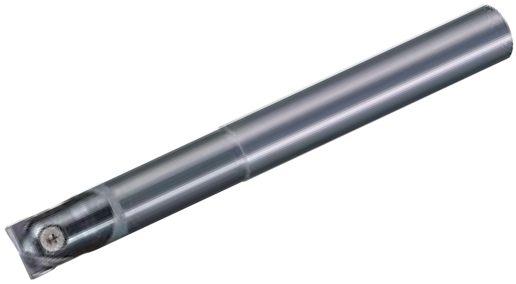
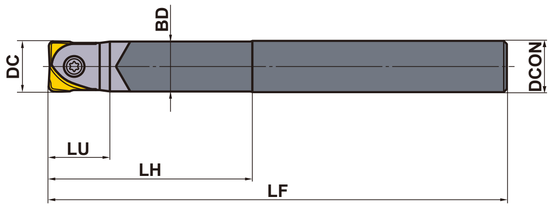


Fig.1

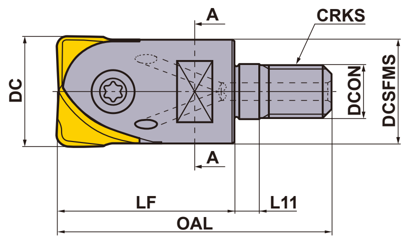


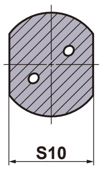
■CARBIDE SHANK TYPE

Right hand tool holder only.

Type	Order Number	Stock R	Number of Teeth	DC	DCON	LF	BD	LH	LU	Fig.	Clamp Screw *	Wrench	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.
* 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	DC	DCON	DCSFMS	OAL	LF	L11	S10	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 K244.
*1 Clamp Torque (N • m) : RS4015T=3.3, RS5020T=5.0, RS6025T=7.5, RS8030T=10.0
*2 WT : Tool Weight

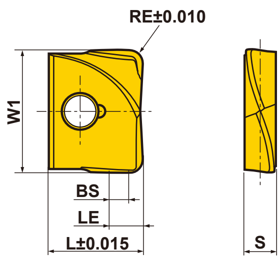
ARBORS ➤ K244
SPARE PARTS ➤ N001
TECHNICAL DATA ➤ P001

INSERTS

Work Material		MP8010	VP15TF
P	Steel		◐
M	Stainless Steel		◐
K	Cast Iron	●	✤
H	Hardened Steel	●	◐

Cutting Conditions :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

Shape	Order Number	Coated MP8010	Coated VP15TF	Dimensions (mm) W1	RE	BS	LE	L	S	Geometry
	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. It is recommended to use the special lubricant MK1KS to preventing the screw seizing and to tighten to the recommended torque.

● : Inventory maintained. ★ : 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)
	Pre-Hardened Steel	≤45HRC	**VP15TF**	150 (80—200)	≤0.05DC	≤0.05DC	0.15 (≤0.3)
	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)
	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)
	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)
	Pre-Hardened Steel	≤45HRC	**VP15TF**	150 (80—200)	≤0.02DC	≤DC	0.15 (≤0.3)
	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)
	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)
	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.

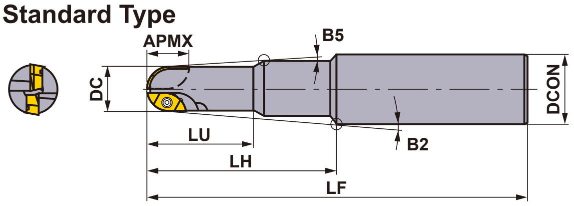
Note 1) This cutting condition is the standard condition when using the steel standard shank type. If vibration or chipping of the insert occurs on the cutting edge, please decrease the cutting condition as width of cut, depth of cut and feed per tooth depending on the situation.
Note 2) Cutting speed is calculated at the peripheral edge of the tool. Calculate spindle speed in the following way.
Spindle speed of cutting tool $n(min^{-1})=1000\times$Cutting speed Vc ÷Diameter of cutting tool DC÷3.14
Note 3) Please note the following when machining hardened steel with MP8010.
- Shorten the overhang length as much as possible.
- Use with carbide shank recommended.
- Note the setting of the depth of cut especially to prevent the fracture.

BALL NOSE END MILL

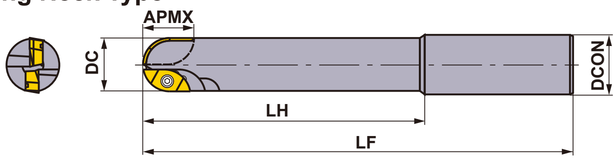
SRM2

P | M | K | N | S | H

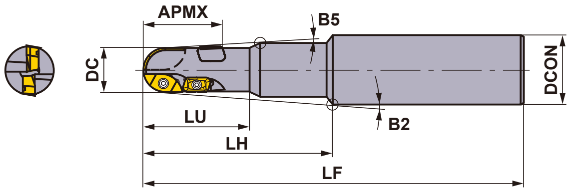
● Standard Type



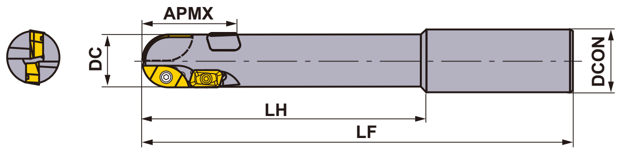
● Long Neck Type



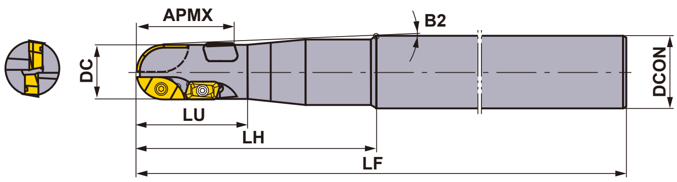
● Long Cutting Edge Type



● Long Neck Cutting Edge Type



● Extra Long Cutting Edge Type



Right hand tool holder only.

Type	Order Number	Stock R	Coolant Hole	Number of Teeth	RE *2	DC	DCON	LF	LH	LU	APMX	B2	B5	Clamp Screw *1 Inner, Outer	Clamp Screw *1 Peripheral	Wrench Inner, Outer	Wrench Peripheral	Insert Inner	Insert Outer	Insert Peripheral
Standard	**SRM2160SNM**	★	–	2	8	16	20	130	50	25	12	2.8°	1.5°	TS25H	–	①TKY08D	–	SRG16C SRM16C-M	SRG16E SRM16E-M	–
	SRM2160SAM	●	○	2	8	16	20	130	50	25	12	2.8°	1.5°	TS25H	–	①TKY08D	–	SRG16C SRM16C-M	SRG16E SRM16E-M	–
	SRM2200SNM	★	–	2	10	20	25	150	70	35	14	2.45°	1.5°	TS32	–	①TKY08D	–	SRG20C SRM20C-M	SRG20E SRM20E-M	–
	SRM2200SAM	●	○	2	10	20	25	150	70	35	14	2.45°	1.5°	TS32	–	①TKY08D	–	SRG20C SRM20C-M	SRG20E SRM20E-M	–
	SRM2250SNM	★	–	2	12.5	25	32	180	80	40	19	3.22°	1.5°	TS43	–	②TKY15T	–	SRG25C SRM25C-M	SRG25E SRM25E-M	–
	SRM2250SAM	●	○	2	12.5	25	32	180	80	40	19	3.22°	1.5°	TS43	–	②TKY15T	–	SRG25C SRM25C-M	SRG25E SRM25E-M	–
	SRM2300SNM	★	–	2	15	30	32	200	100	50	24	0.73°	0.5°	TS55	–	②TKY25T	–	SRG30C SRM30C-M	SRG30E SRM30E-M	–
	SRM2300SAM	●	○	2	15	30	32	200	100	50	24	0.73°	0.5°	TS55	–	②TKY25T	–	SRG30C SRM30C-M	SRG30E SRM30E-M	–
	SRM2320SAM	●	–	2	16	32	32	200	100	45	28	0.5°	0.5°	TS55	–	②TKY25T	–	SRG32C SRM32C-M	SRG32E SRM32E-M	–

*1 Clamp Torque (N • m) : TS25H=1.7, TS25=1.0, TS32=2.0, TS43=3.5, TS55=7.5

*2 RE is shown for insert corner R.

● : Inventory maintained. ★ : Inventory maintained in Japan.

Type	Order Number	Stock R	Coolant Hole	Number of Teeth	RE *2	DC	DCON	LF	LH	LU	APMX	B2	B5	Clamp Screw: Inner, Outer *1	Clamp Screw: Peripheral *1	Wrench: Inner, Outer	Wrench: Peripheral	Insert: Inner	Insert: Outer	Insert: Peripheral
Long Cutting Edge	**SRM2200SNL**	★	–	4	10	20	25	150	70	35	30	2.45°	1.5°	TS32	TS25	①TKY08D	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-◌2
	SRM2200SAL	●	○	4	10	20	25	150	70	35	30	2.45°	1.5°	TS32	TS25	①TKY08D	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-◌2
	SRM2250SNL	★	–	4	12.5	25	32	180	80	40	37	3.22°	1.5°	TS43	TS25	②TKY15T	③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-◌2
	SRM2250SAL	●	○	4	12.5	25	32	180	80	40	37	3.22°	1.5°	TS43	TS25	②TKY15T	③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-◌2
	SRM2300SNL	★	–	4	15	30	32	200	100	50	44	0.73°	0.5°	TS55	TS43	②TKY25T	③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-◌2
	SRM2300SAL	★	○	4	15	30	32	200	100	50	44	0.73°	0.5°	TS55	TS43	②TKY25T	③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-◌2
	SRM2320SAL	●	–	4	16	32	32	200	100	60	44	0.5°	0.5°	TS55	TS43	②TKY25T	③TKY15F	SRG32C SRM32C-M	SRG32E SRM32E-M	APMT1604 PDER-◌2
Long Neck	**SRM2160SNF**	★	–	2	8	16	16	150	70	–	12	–	–	TS25H	–	①TKY08D	–	SRG16C SRM16C-M	SRG16E SRM16E-M	–
	SRM2160SAF	★	○	2	8	16	16	150	70	–	12	–	–	TS25H	–	①TKY08D	–	SRG16C SRM16C-M	SRG16E SRM16E-M	–
	SRM2200SNF	★	–	2	10	20	20	180	100	–	14	–	–	TS32	–	①TKY08D	–	SRG20C SRM20C-M	SRG20E SRM20E-M	–
	SRM2200SAF	★	○	2	10	20	20	180	100	–	14	–	–	TS32	–	①TKY08D	–	SRG20C SRM20C-M	SRG20E SRM20E-M	–
	SRM2250SNF	★	–	2	12.5	25	25	200	120	–	19	–	–	TS43	–	②TKY15T	–	SRG25C SRM25C-M	SRG25E SRM25E-M	–
	SRM2250SAF	★	○	2	12.5	25	25	200	120	–	19	–	–	TS43	–	②TKY15T	–	SRG25C SRM25C-M	SRG25E SRM25E-M	–
	SRM2300SNF	★	–	2	15	30	32	230	150	–	24	–	–	TS55	–	②TKY25T	–	SRG30C SRM30C-M	SRG30E SRM30E-M	–
	SRM2300SAF	★	○	2	15	30	32	230	150	–	24	–	–	TS55	–	②TKY25T	–	SRG30C SRM30C-M	SRG30E SRM30E-M	–
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	1.5°	–	TS32	TS25	①TKY08D	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-◌2
	SRM2200SALL	★	○	4	10	20	25	250	120	35	30	1.5°	–	TS32	TS25	①TKY08D	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-◌2
	SRM2250SNLL	★	–	4	12.5	25	32	300	170	37	37	1.5°	–	TS43	TS25	②TKY15T	③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-◌2
	SRM2250SALL	★	○	4	12.5	25	32	300	170	37	37	1.5°	–	TS43	TS25	②TKY15T	③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-◌2
	SRM2300SNLL	★	–	4	15	30	32	350	100	50	44	1.5°	–	TS55	TS43	③TKY25T	③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-◌2
	SRM2300SALL	★	○	4	15	30	32	350	100	50	44	1.5°	–	TS55	TS43	③TKY25T	③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-◌2

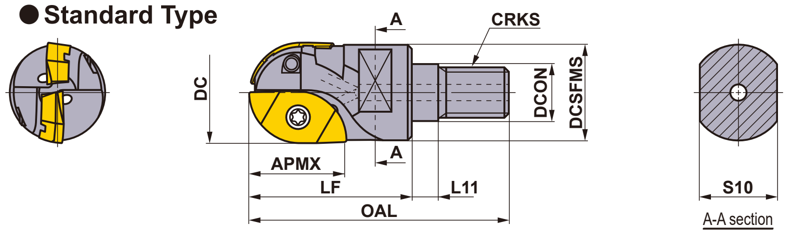
*1 Clamp Torque (N • m) : TS25H=1.7, TS25=1.0, TS32=2.0, TS43=3.5, TS55=7.5

*2 RE is shown for insert corner R.

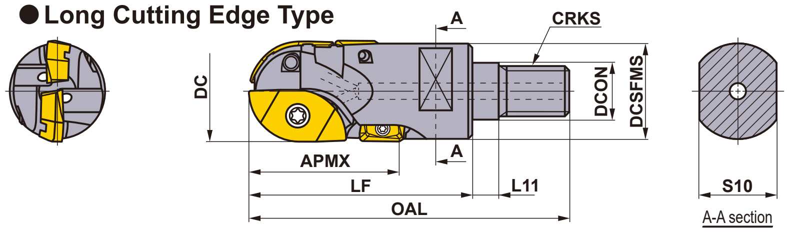
SPARE PARTS ➤ N001

TECHNICAL DATA ➤ P001

● Standard Type



● Long Cutting Edge Type



■ SCREW-IN TYPE

Right hand tool holder only.

Type	Order Number	Stock R	Coolant Hole	RE *2	DC	DCON	DCSFMS	OAL	LF	L11	S10	CRKS	APMX	*3 WT (kg)	Clamp Screw *1 Inner, Outer	Clamp Screw *1 Peripheral	Wrench ①②③	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
	SRM2200M10L	□	—	10	20	10.5	18.6	66	47	6	15	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
	SRM2250M12L	□	—	12.5	25	12.5	23.5	77	55	6	17	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
	SRM2300M16L	□	—	15	30	17	28.3	86	63	6	22	M16	44	0.3	TS55	TS43	②TKY15T ③TKY08F	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
	SRM2320M16L	□	—	16	32	17	29.0	86	63	6	22	M16	44	0.3	TS55	TS43	②TKY15T ③TKY08F	SRG32C SRM32C-M	SRG32E SRM32E-M	APMT1604 PDER-◌2

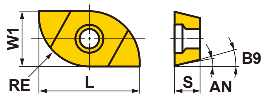
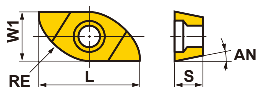
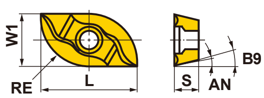
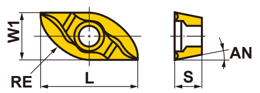
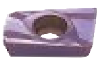
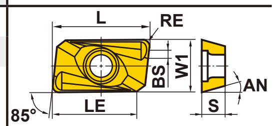
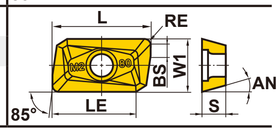
Note 1) For screw-in type arbors, refer to page K244.
*1 Clamp Torque (N • m) : TS25H=1.7, TS25=1.0, TS32=2.0, TS43=3.5, TS55=7.5
*2 RE is shown for insert corner R.
*3 WT : Tool Weight

● : Inventory maintained. ★ : Inventory maintained in Japan.
□ : Non stock, produced to order only. (10 inserts in one case)

INSERTS

Work Material			F7030	MP6120	MP9120	VP15TF
	P	Steel	◐	◐		◐
	M	Stainless Steel	◐			◐
	K	Cast Iron				✤
	S	Heat-resistant Alloy, Titanium Alloy			◐	◐
	H	Hardened Steel				◐

Cutting Conditions :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

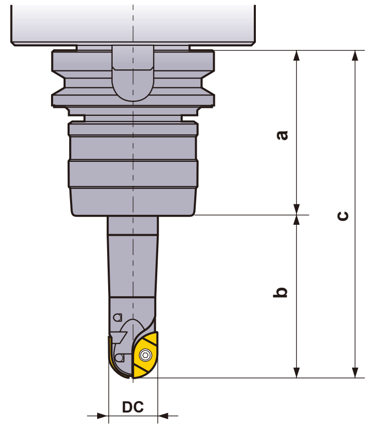
Type	Shape	Order Number	Class	Coated F7030	Coated MP6120	Coated MP9120	Coated VP15TF	RE	L	LE	W1	S	BS	AN	B9	Geometry
Inner	Strong Cutting Edge Type 	SRG16C	G		●	★	●	8	16	—	8.2	3.5	—	11°	—	
		SRG20C	G		●	★	●	10	19	—	10.2	4.6	—	10°	18°	
		SRG25C	G		●	★	●	12.5	24	—	12.8	5.5	—	10°	18°	
		SRG30C	G		●	★	●	15	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 *1	Strong Cutting Edge Type 	APMT1135PDER-H2	M	●			●	0.8	11.25	9	6.35	3.5	1.2	11°	—	
		APMT1604PDER-H2	M	●			●	0.8	17.11	14	9.525	4.76	1.4	11°	—	
	Low Resistance Type 	APMT1135PDER-M2	M	●			●	0.8	11.18	9	6.35	3.5	1.2	11°	—	
		APMT1604PDER-M2	M	●			●	0.8	17.10	14	9.525	4.76	1.4	11°	—	

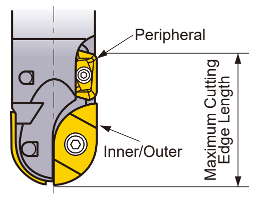
(Low-resistance inner or outer inserts are precision M class type.)
*1 Selection guide for peripheral cutting edges : The first recommendation is the super sharp M breaker (APMT....PDER-M2).
When cutting edge strength is particularly important, use the H breaker (APMT....PDER-H2).

ARBORS ➤ K244
SPARE PARTS ➤ N001
TECHNICAL DATA ➤ P001

RECOMMENDED CUTTING CONDITIONS

SRM2 Ø16—Ø32





(Long Cutting Edge)

Tool Overhang

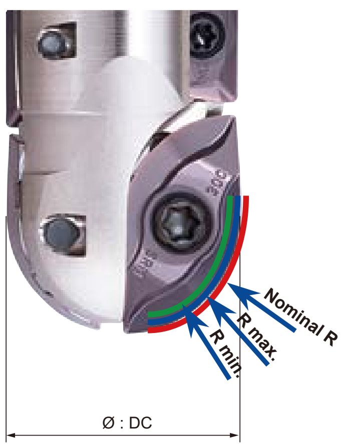
The recommended cutting conditions are chosen based on deflection, vibration and surface finish when using a BT50 arbor under the conditions below -**"a"**, a length from the gauge line to the arbor end face and **"b"**, neck length (tool overhang from the arbor).

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. Please refer to recommended cutting conditions for recommended depth of cut **ap**.

■ Radius tolerance and other dimensions with an insert mounted in the body



Radial tolerance

Cutting Edge Diameter DC	Nominal R	Tolerance	R min.	R max.
16	8	G	7.925	7.975
		M	7.910	7.970
20	10	G	9.925	9.975
		M	9.910	9.970
25	12.5	G	12.425	12.475
		M	12.410	12.470
30	15	G	14.925	14.975
		M	14.910	14.970

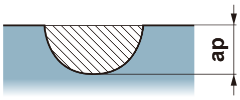
Dimensions with an insert mounted in the body

Cutting Edge Diameter DC	Tolerance	DC min.	DC max.
16	G	15.800	16.000
	M	15.770	15.990
20	G	19.800	20.000
	M	19.770	19.990
25	G	24.800	25.000
	M	24.770	24.990
30	G	29.800	30.000
	M	29.770	29.990

*M : Precision M class

■SLOT MILLING

Cutting Mode



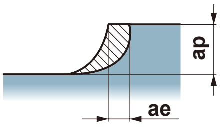
N : Revolution (min^{-1})
F : Table Feed (mm/min)

	Work Material	Hardness	Cutting Speed (m/min)	Insert Grade, Type	Holder Type	φ16 N	φ16 F	φ16 ap	φ20 N	φ20 F	φ20 ap	φ25 N	φ25 F	φ25 ap	φ30 N	φ30 F	φ30 ap
P	Carbon Steel Alloy Steel	180−280HB	160 (120−200)	**MP6120** **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)	**MP6120** **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)	**MP6120** **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)	**MP6120** **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
S	Titanium Alloy	≦350HB	50 (30-60)	**MP9120**	Standard	995	100	4	796	80	4	637	64	6	531	53	7.5
					Long Neck	995	100	2	796	80	2	637	64	4	531	53	3
					Extra Long	−	−	−	796	80	1	637	64	2.5	531	53	1.5
	Heat Resistant Alloy	−	40 (30-60)	**MP9120**	Standard	796	80	4	637	64	4	510	51	6	425	43	7.5
					Long Neck	796	80	2	637	64	2	510	51	4	425	43	3
					Extra Long	−	−	−	637	64	1	510	51	2.5	425	43	1.5

RECOMMENDED CUTTING CONDITIONS

■SHOULDER MILLING (Cutting Depth : Small)

Cutting Mode

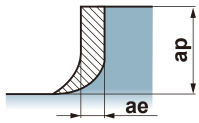


N : Revolution (min^{-1})
F : Table Feed (mm/min)

	Work Material	Hardness	Cutting Speed (m/min)	Insert Grade, Type	Holder Type	φ16 N	φ16 F	φ16 ap	φ16 ae	φ20 N	φ20 F	φ20 ap	φ20 ae	φ25 N	φ25 F	φ25 ap	φ25 ae	φ30 N	φ30 F	φ30 ap	φ30 ae
P	Carbon Steel Alloy Steel	180–280HB	200 (160–250)	MP6120 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)	MP6120 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)	MP6120 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)	MP6120 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
S	Titanium Alloy	≤350HB	50 (30-60)	MP9120	Standard	995	299	4	4	796	239	4	5	637	191	6	7.5	531	159	7.5	3
					Long Neck	995	299	2	2	796	239	2	3	637	191	4	4	531	159	3	1.5
					Extra Long	—	—	—	—	796	239	1	2	637	191	2.5	1.5	531	159	1.5	1
	Heat Resistant Alloy	—	40 (30-60)	MP9120	Standard	796	239	4	4	637	191	4	5	510	153	6	7.5	425	128	7.5	3
					Long Neck	796	239	2	2	637	191	2	3	510	153	4	4	425	128	3	1.5
					Extra Long	—	—	—	—	637	191	1	2	510	153	2.5	1.5	425	128	1.5	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)	MP6120 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)	MP6120 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)	MP6120 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)	MP6120 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	—	—	—	—	—	—	—	—
S	Titanium Alloy	≦350HB	50 (30-60)	MP9120	Standard	995	199	4	2	796	159	4	3	637	127	6	4	531	106	7.5	3
					Long Neck	995	199	2	1	796	159	2	2	637	127	4	1.5	531	106	3	1.5
					Extra Long	—	—	—	—	796	159	1	1	637	127	2.5	—	531	106	1.5	—
	Heat Resistant Alloy	—	40 (30-60)	MP9120	Standard	796	159	4	2	637	127	4	3	510	102	6	4	425	85	7.5	3
					Long Neck	796	159	2	1	637	127	2	2	510	102	4	1.5	425	85	3	1.5
					Extra Long	—	—	—	—	637	127	1	1	510	102	2.5	—	425	85	1.5	—

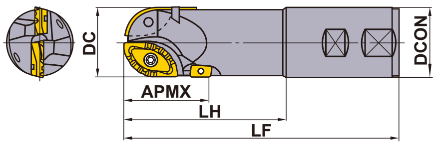
BALL NOSE END MILL

R KAPR

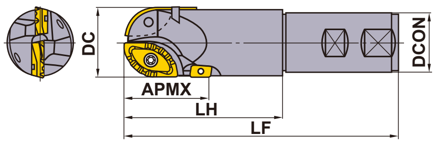
SRM2 ø40 ø50

P M K N S H

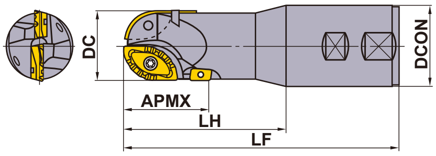
● Weldon Type (Fig.1)



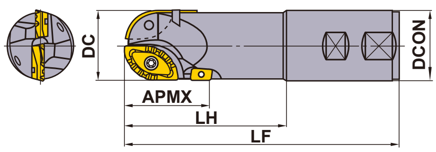
● Weldon Type (Fig.2)



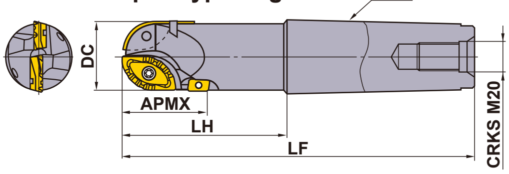
● Weldon Type (Fig.3)



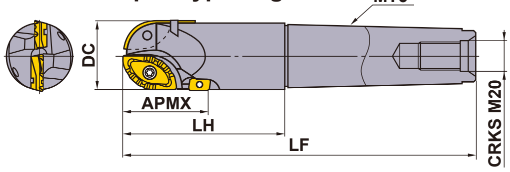
● Weldon Type (Fig.4)



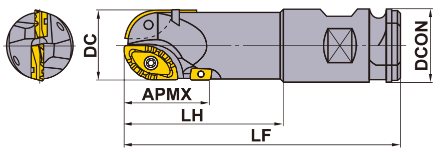
● Morse Taper Type (Fig.5)



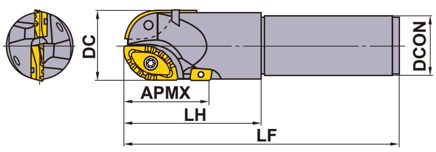
● Morse Taper Type (Fig.6)



● Combination Type (Fig.7)



● Straight Type (Fig.8)



Right hand tool holder only.

Type		Order Number	Stock R	Number of Teeth	Dimensions (mm) RE *2	DC	DCON	LF	LH	APMX	Type (Fig.)	Clamp Screw Inner/Outer *1	Clamp Screw Peripheral *1	Wrench Inner/Outer	Wrench Peripheral	Insert Inner	Insert Outer	Insert Peripheral
Weldon Type	Short	SRM2400I40NLS	●	2	20	40	40	190	120	54	1	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604PDER-◌2
		SRM2400I50NLS	□	2	20	40	50	200	120	54	3	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604PDER-◌2
		SRM2500I40NLS	●	2	25	50	40	190	120	63	2	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604PDER-◌2
		SRM2500I50NLS	□	2	25	50	50	200	120	63	4	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604PDER-◌2
	Medium	SRM2400I40NLM	□	2	20	40	40	220	150	54	1	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604PDER-◌2
		SRM2400I50NLM	□	2	20	40	50	230	150	54	3	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604PDER-◌2
		SRM2500I40NLM	□	2	25	50	40	220	150	63	2	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604PDER-◌2
		SRM2500I50NLM	□	2	25	50	50	230	150	63	4	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604PDER-◌2
Morse Taper Type	Short	SRM2400MNLS	□	2	20	40	—	256	120	54	5	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604PDER-◌2
		SRM2500MNLS	★	2	25	50	—	256	120	63	6	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604PDER-◌2
	Medium	SRM2400MNLM	●	2	20	40	—	286	150	54	5	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604PDER-◌2
		SRM2500MNLM	★	2	25	50	—	286	150	63	6	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604PDER-◌2
Combination Type	Short	SRM2400WNLS	★	2	20	40	50.8	200	120	54	7	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604PDER-◌2
		SRM2500WNLS	★	2	25	50	50.8	200	120	63	7	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604PDER-◌2
	Medium	SRM2400WNLM	★	2	20	40	50.8	250	170	54	7	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604PDER-◌2
		SRM2500WNLM	★	2	25	50	50.8	250	170	63	7	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604PDER-◌2
	Long	SRM2500WNLL	★	2	25	50	50.8	300	220	63	7	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604PDER-◌2
		SRM2500WNLX	★	2	25	50	50.8	350	270	63	7	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604PDER-◌2
Straight Type	Short	SRM2400SNLS	★	2	20	40	42	200	100	54	8	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604PDER-◌2
		SRM2500SNLS	★	2	25	50	42	200	100	63	8	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604PDER-◌2
	Medium	SRM2400SNLM	★	2	20	40	42	250	150	54	8	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604PDER-◌2
		SRM2500SNLM	★	2	25	50	42	250	100	63	8	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604PDER-◌2

*1 Clamp Torque (N • m) : TS43=6.0, TS6=10.0, TS6S=10.0 *2 RE is shown for insert corner R.

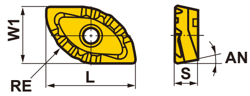
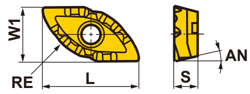
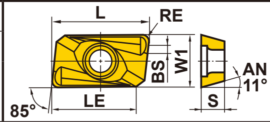
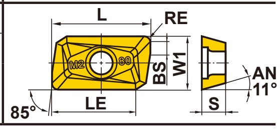
● : Inventory maintained. ★ : Inventory maintained in Japan.

□ : Non stock, produced to order only. (10 inserts in one case) (Inserts with asterisk (*2) are available in 2 piece in one case)

INSERTS

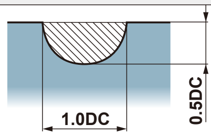
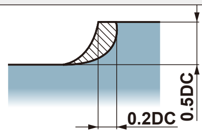
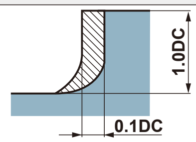
Work Material		P	Steel	K	Cast Iron

Cutting Conditions : ● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

Type	Shape	Order Number	Class	Coated F7030	Coated VP15TF	Coated VP20RT	Coated VP30RT	Dimensions (mm) RE	L	LE	W1	S	BS	AN	Geometry
Inner		*2 SRG40C	G		●	●	●	20	36	—	20.5	8.0	—	11°	
		*2 SRG50C	G		●	●	●	25	40	—	26	8.5	—	11°	
Outer		*2 SRG40E	G		●	●	●	20	32	—	16.6	8.0	—	11°	
		*2 SRG50E	G		●	●	●	25	35.8	—	20	8.5	—	11°	
*1 Peripheral	Strong Cutting Edge Type 	APMT1604PDER-H2	M	●	●			0.8	11.71	14	9.525	4.76	1.4	11°	
	Low Resistance Type 	APMT1604PDER-M2	M	●	●			0.8	17.10	14	9.525	4.76	1.4	11°	

(Low-resistance inner or outer inserts are precision M class type.)
*1 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).

RECOMMENDED CUTTING CONDITIONS

Cutting Mode	A : Slot Milling	B : Shoulder Milling (Standard Type)	C : Shoulder Milling (Long Cutting Edge Type)
			

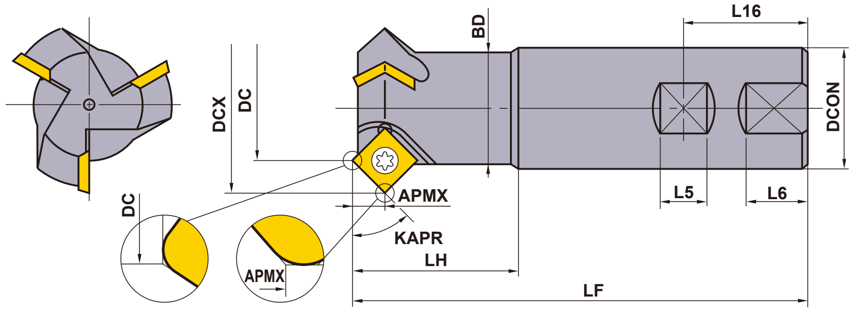
	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)	Cutting Mode
P	Alloy Tool Steel	≤250HB	**VP20RT VP30RT**	160 (120—200)	0.12 (0.08—0.2)	A
					0.2 (0.1—0.4)	B
					0.15 (0.1—0.3)	C
	Alloy Tool Steel	≤250HB	**VP20RT VP30RT**	200 (160—250)	0.2 (0.1—0.3)	A
					0.3 (0.1—0.4)	B
					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

CHAMFER MILLING

60° KAPR 45° KAPR 30° KAPR R

CESP/CFSP/CGSP

P M K N S H



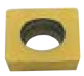
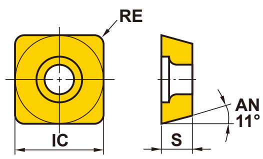
Right hand tool holder only.

Order Number	Stock	Number of Teeth	Dimensions (mm)											Clamp Screw *	Wrench ① ②	Insert
	R		KAPR	DC	DCX	LF	DCON	BD	LH	L16	L5	L6	APMX	Clamp Screw	Wrench	Insert
CESPR081S20	●	1	60°	8	19.6	110	20	19.5	40	25	11	—	10.2	TS52	①TKY25R	SPMW1203○○
CESPR161S20	●	1	60°	16	27.8	110	20	19.5	40	25	11	—	10.2	TS5	①TKY25R	SPMW1203○○
CESPR323S32	●	3	60°	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○○
CFSPR041S16L	●	1	45°	4	15.7	110	16	14.4	50	24	10	—	5.9	TS4	②TKY15F	SPMW0903○○
CFSPR081S20	●	1	45°	8	24.6	110	20	19.5	40	25	11	—	8.3	TS5	①TKY25R	SPMW1203○○
CFSPR161S20	●	1	45°	16	32.6	110	20	19.5	40	25	11	—	8.3	TS5	①TKY25R	SPMW1203○○
CFSPR323S32	●	3	45°	32	48.6	125	32	31.5	45	36	14	19	8.3	TS5	①TKY25R	SPMW1203○○
CGSPR081S20	●	1	30°	8	28.4	110	20	19.5	40	25	11	—	5.9	TS5	①TKY25R	SPMW1203○○
CGSPR161S20	●	1	30°	16	36.4	110	20	19.5	40	25	11	—	5.9	TS5	①TKY25R	SPMW1203○○
CGSPR323S32	●	3	30°	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

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

INSERTS

Work Material				VP15TF	UP20M			NX2525	NX4545	UTi20T	HTi10	Cutting Conditions :			
P	Steel			◐	◐			●	◐	◐		● : Stable Cutting	◐ : General Cutting	✱ : Unstable Cutting	
K	Cast Iron			✱				●		✱	◐				
				Coated				Cermet		Carbide		Dimensions (mm)			
Shape	Order Number	Class	Honing	VP15TF	UP20M			NX2525	NX4545	UTi20T	HTi10	IC	S	RE	Geometry
	SPMW090304	M	E*	★	●			●	●	●	●	9.525	3.18	0.4	
	SPMW090308	M	E*	★	●			★	★	●	●	9.525	3.18	0.8	
	SPMW120304	M	E*	★	●			●	●	●	●	12.7	3.18	0.4	
	SPMW120308	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	Feed per Tooth (mm/t.) 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

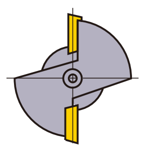
● Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x DC)
● Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

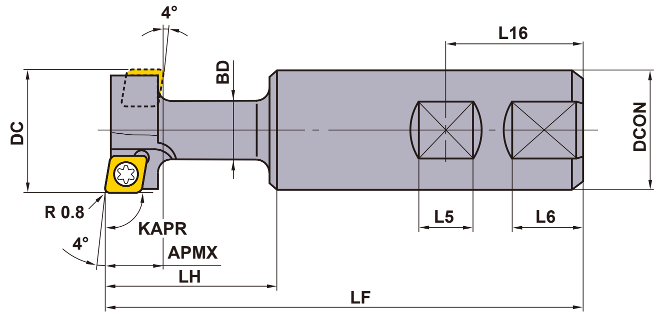
SPARE PARTS ➤ N001
TECHNICAL DATA ➤ P001

T-SLOT MILLING

TSMP

P M K N S H





KAPR :90°

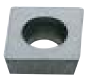
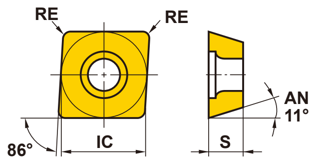
Right hand tool holder only.

Order Number	T Slot Nomenclature	Stock	Number of Teeth	Dimensions (mm)									Clamp Screw*	Wrench ① ②	Insert
		R		DC	LF	DCON	BD	LH	L16	L5	L6	APMX			
TSMPR252S25	14	●	2	25	112	25	12.5	33.2	32	12	17	11	TS3	①TKY08D	MPMW070308
TSMPR322S32	18	●	2	32	120	32	16	41.2	36	14	19	14	TS4	②TKY15R	MPMW090308
TSMPR402S32	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

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

INSERTS

Work Material	P	Steel	●		Cutting Conditions : ● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting		
	K	Cast Iron	✤				
Shape	Order Number	Class	Carbide UTi20T	Dimensions (mm) IC	S	RE	Geometry
	**MPMW070308**	M	●	7.94	3.18	0.8	
	MPMW090308	M	●	9.525	3.18	0.8	
	MPMW120408	M	●	12.7	4.76	0.8	

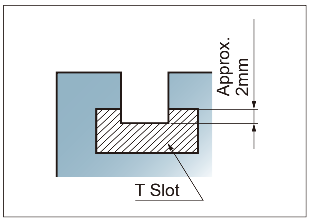
RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed (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

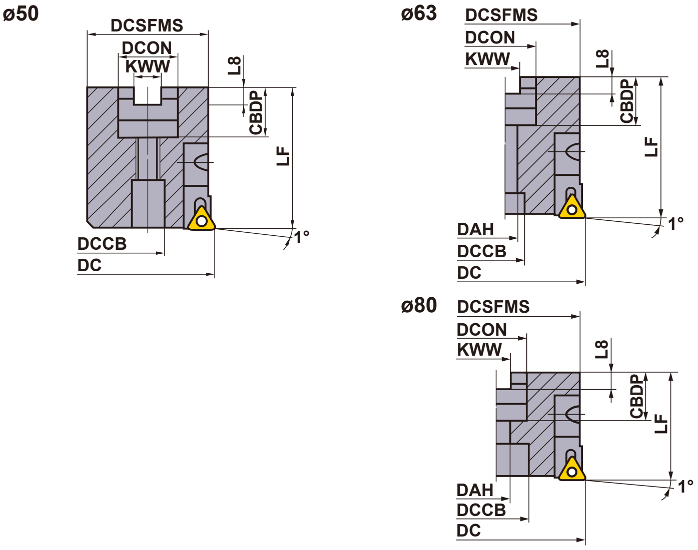
● When T slot machining steel, the workpiece must be pre-machined as shown in the drawing, so as to ensure smooth chip evacuation.
● Slots to be machined must be free from chips for smooth machining.



VERTICAL FEED MILLING

PMF

P M K N S H



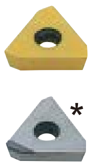
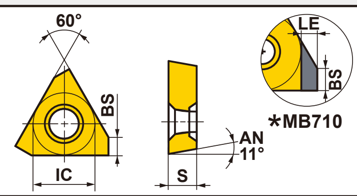
Right hand tool holder only.

Order Number	Stock R	Number of Teeth	DC	LF	DCON	CBDP	DAH	DCCB	KWW	L8	DCSFMS	Cartridge	Clamp Screw *	Radial Screw	Set Bolt (Cartridge) *	Wrench	Wrench	Set Bolt	Insert
PMF05004A22R	★	4	50	63	22	20	—	12	10.4	6.3	48	PMFA13R	TS254	TSS04005	HBH06012	TKY08F	HKY40R HKY50R	①HDS10031	TPEW 1303 ZP◌R2
PMF06306A22R	★	6	63	63	22	20	11	18	10.4	6.3	60	PMFA13R	TS254	TSS04005	HBH06012	TKY08F	HKY40R	②HSC10050	
PMF08008A27R	●	8	80	50	27	23	13.5	30	12.4	7	75	PMFA13R	TS254	TSS04005	HBH06012	TKY08F	HKY40R	②HSC12035	

* Clamp Torque (N • m) : TS254=1.0, HBH06012=8.5

INSERTS

Cutting Conditions : ● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

Work Material			VP15TF	AP10H			MB710						
P	Steel		◐	◐									
K	Cast Iron		✤	◐			◐						
Shape	**Order Number**	**Class**	**Coated VP15TF**	**Coated AP10H**	**Coated**	**Coated**	**CBN MB710**	**CBN**	**Dimensions (mm) IC**	**LE**	**S**	**BS**	**Geometry**
	TPEW1303ZPER2	E	●	●					7.94	—	3.18	2	
	* TPEW1303ZPTR2	E					●		7.94	1.5	3.18	2	

● : Inventory maintained. ★ : Inventory maintained in Japan.
(10 inserts in one case) (CBN inserts are available in 1 piece in one case.)

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)	

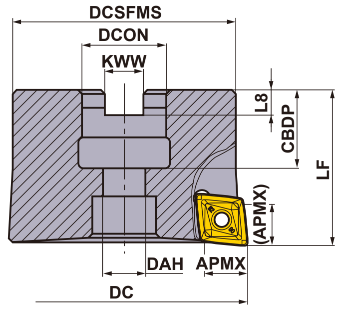
	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)
K	Ductile Cast Iron	Tensile Strength 360—500MPa	AP10H	250 (150—350)	0.1 (0.05—0.15)
			MB710	1000 (800—1200)	
	Ductile Cast Iron	Tensile Strength 500—800MPa	AP10H	200 (100—300)	0.1 (0.05—0.15)
			MB710	1000 (800—1200)	

● 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 0.1 mm.
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.).

VERTICAL FEED MILLING

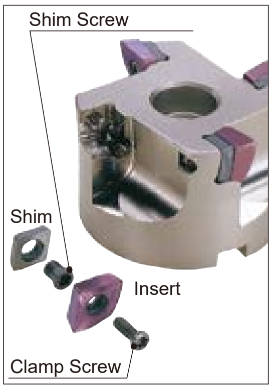
PMR

P | M | K | N | S | H



Right hand tool holder only.

Type	Order Number	Stock R	Number of Teeth	DC	LF	DCON	CBDP	DAH	DCSFMS	KWW	L8	APMX	Insert
Metric	**PMR405003A22R**	★	3	50	40	22	20	11	45	10.4	6.3	11	CPMT1205ZPEN-M2/3
	PMR405203A22R	□	3	52	40	22	20	11	47	10.4	6.3	11	CPMT1205ZPEN-M2/3
	PMR406304A22R	★	4	63	40	22	20	11	57	10.4	6.3	11	CPMT1205ZPEN-M2/3
	PMR406604A27R	□	4	66	50	27	23	13	60	12.4	7	11	CPMT1205ZPEN-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



SPARE PARTS

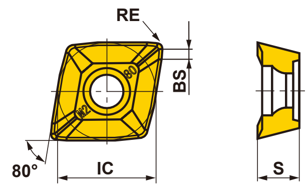
Tool Holder Number	Shim	Shim Screw *	Clamp Screw *	Wrench (Insert)	Wrench (Shim)	Set Bolt
PMR405003A22R	STPMR4N	WCS503507H	①TPS35	①TIP15T	HKY35R	HSC10035
PMR405203A22R	STPMR4N	WCS503507H	①TPS35	①TIP15T	HKY35R	HSC10035
PMR406304A22R	STPMR4N	WCS503507H	①TPS35	①TIP15T	HKY35R	HSC10035
PMR406604A22R	STPMR4N	WCS503507H	①TPS35	①TIP15T	HKY35R	HSC10035
PMR405003BR	STPMR4N	WCS503507H	①TPS35	①TIP15T	HKY35R	HSC10035
PMR406304BR	STPMR4N	WCS503507H	①TPS35	①TIP15T	HKY35R	HSC10035

* Clamp Torque (N • m) : TPS35=3.5, CSF401260T=5.0, WCS503507H=5.0, WCS604010H=7.0

● : Inventory maintained. ★ : Inventory maintained in Japan.
□ : Non stock, produced to order only. (10 inserts in one case)

INSERTS

Work Material			VP15TF				Cutting Conditions :
	P	Steel	◐				● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting
	K	Cast Iron	✤				

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	

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%.

MULTI FUNCTIONAL MILLING

KAPR

ARP

P | M | K | N | S | H

K

ROTATING TOOLS

Fig.1

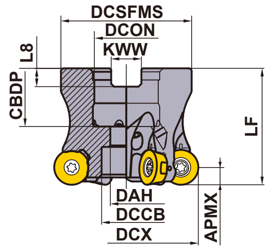
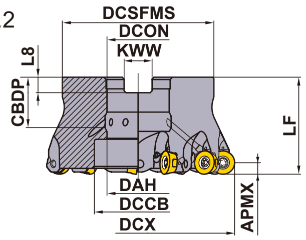
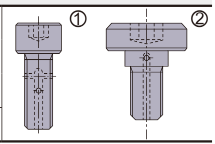


Fig.2



Right hand (R) only for the standard.

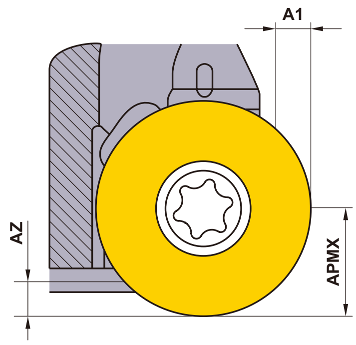
Cutter Diameter DCX (mm)	Set Bolt		Geometry
φ40	HSC08025H		
φ50, φ63	HSC10030H	①	
φ80	HSC12035H		
φ100	MBA16033H	②	

■ARBOR TYPE

GAMP:+4° GAMF:-6°

Type	Cutting Edge R (APMX)	Order Number	Stock R	Coolant Hole	Number of Teeth	DCX	DCSFMS	LF	DCON	CBDP	DAH	DCCB	KWW	L8	★WT (kg)	APMX	A1	AZ	RMPX	Fig.
Fine Pitch	5	ARP5P-040A05AR	●	○	5	40	34	40	16	18	9	14	8.4	5.6	0.15	5.0	2.0	1.30	2.8°	1
		ARP5P-042A05AR	●	○	5	42	34	40	16	18	9	14	8.4	5.6	0.16	5.0	2.5	1.4	2.8°	1
		ARP5P-050A06AR	●	○	6	50	45	40	22	20	11	17	10.4	6.3	0.27	5.0	2.0	1.85	2.9°	1
		ARP5P-052A06AR	●	○	6	52	45	40	22	20	11	17	10.4	6.3	0.29	5.0	2.5	2	3.0°	1
		ARP5P-063A07AR	●	○	7	63	50	40	22	20	11	17	10.4	6.3	0.46	5.0	2.5	2.50	3.0°	1
Extra Fine Pitch	5	ARP5P-042A06AR	●	○	6	42	34	40	16	18	9	14	8.4	5.6	1.6	5.0	2.5	1.4	2.8°	1
		ARP5P-050A07AR	●	○	7	50	45	40	22	20	11	17	10.4	6.3	0.27	5.0	2.0	1.85	2.9°	1
		ARP5P-052A07AR	●	○	7	52	45	40	22	20	11	17	10.4	6.3	0.29	5.0	2.5	2	3.0°	1
		ARP5P-063A08AR	●	○	8	63	50	40	22	20	11	17	10.4	6.3	0.46	5.0	2.5	2.50	3.0°	1
Fine Pitch	6	ARP6P-040A04AR	●	○	4	40	34	40	16	18	9	13.4	8.4	5.6	0.15	6.0	2.0	1.15	2.7°	1
		ARP6P-050A05AR	●	○	5	50	45	40	22	20	11	17	10.4	6.3	0.26	6.0	2.0	1.70	2.9°	1
		ARP6P-052A05AR	●	○	5	52	45	40	22	20	11	17	10.4	6.3	0.28	6.0	2.5	1.8	2.9°	1
		ARP6P-063A06AR	●	○	6	63	50	40	22	20	11	17	10.4	6.3	0.44	6.0	2.5	2.50	3.1°	1
		ARP6P-066X06AR	●	○	6	66	56	50	27	23	13	20	12.4	7	0.64	6.0	2.5	2.5	2.9°	1
		ARP6P-080A08AR	●	○	8	80	56	50	27	23	13	20	12.4	7	0.88	6.0	2.5	2.50	2.3°	1
		ARP6P-100B09AR	●	○	9	100	78	50	32	26	32	45	14.4	8	1.47	6.0	2.5	2.50	1.7°	2
Extra Fine Pitch	6	ARP6P-050A06AR	●	○	6	50	45	40	22	20	11	17	10.4	6.3	0.25	6.0	2.0	1.70	2.9°	1
		ARP6P-052A06AR	●	○	6	52	45	40	22	20	11	17	10.4	6.3	0.27	6.0	2.5	1.8	2.9°	1
		ARP6P-063A07AR	●	○	7	63	50	40	22	20	11	17	10.4	6.3	0.44	6.0	2.5	2.50	3.1°	1
		ARP6P-066X07AR	●	○	7	66	56	50	27	23	13	20	12.4	7	0.64	6.0	2.5	2.5	2.9°	1
		ARP6P-080A09AR	●	○	9	80	56	50	27	23	13	20	12.4	7	0.88	6.0	2.5	2.50	2.3°	1
		ARP6P-100B11AR	●	○	11	100	78	50	32	26	32	45	14.4	8	1.45	6.0	2.5	2.50	1.7°	2

★ WT : Tool Weight



● : Inventory maintained. ★ : Inventory maintained in Japan.

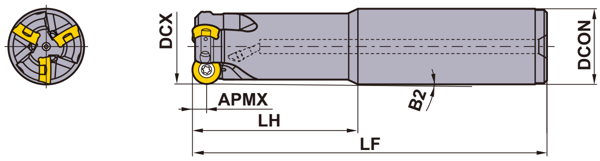


Fig.1

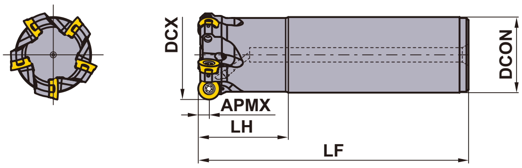


Fig.2

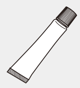
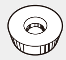
■SHANK TYPE

GAMP:+4° GAMF:-6°—-7°

Type	Cutting Edge R (APMX)	Order Number	Stock R	Coolant Hole	Number of Teeth	Dimensions (mm) DCX	DCON	LF	LH	B2	* WT (kg)	Max. Depth of Cut (mm) APMX	A1	AZ	RMPX	Fig.
Standard	5	**ARP5PR2503SA25M**	★	○	3	25	25	140	60	1.10°	0.42	5.0	1.0	0.40	1.8°	1
		ARP5PR3204SA32M	★	○	4	32	32	150	70	0.92°	0.77	5.0	1.0	0.65	1.9°	1
Long	5	**ARP5PR2502SA25L**	★	○	2	25	25	180	80	0.80°	0.56	5.0	1.0	0.40	1.8°	1
		ARP5PR3203SA32L	★	○	3	32	32	200	120	0.51°	1.01	5.0	1.0	0.65	1.9°	1
Standard	6	**ARP6PR3203SA32M**	★	○	3	32	32	150	70	0.94°	0.76	6.0	1.0	0.60	2.0°	1
		ARP6PR4004SA32M	★	○	4	40	32	150	50	–	0.85	6.0	2.5	1.15	2.7°	2
		ARP6PR5005SA42M	★	○	5	50	42	150	50	–	1.47	6.0	2.5	1.70	2.9°	2
Long	6	**ARP6PR3202SA32L**	★	○	2	32	32	200	120	0.52°	1.00	6.0	1.0	0.60	2.0°	1
		ARP6PR4003SA32L	★	○	3	40	32	250	50	–	1.48	6.0	2.5	1.15	2.7°	2
		ARP6PR5004SA42L	★	○	4	50	42	250	50	–	2.53	6.0	2.5	1.70	2.9°	2

⁎ WT : Tool Weight

SPARE PARTS

Tool Holder Number	 ⁎1 Insert Screw	 Wrench	 Anti-seize Lubricant	 Insert
ARP5	TPS351B	TIP10D	MK1KS	RP◌T1040M0E4-◌
ARP6	TPS4	TIP15D	MK1KS	RP◌T1248M0E4-◌

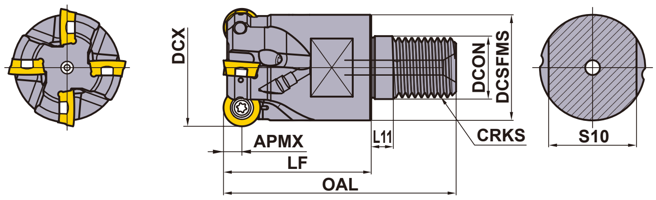
⁎1 Clamp Torque (N • m) : TPS351B=2.5,TPS4=3.5

⁎2 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) : HSD0400H◌◌=1.5

⁎3 The part number for a blank screw without a through nozzle is HSS04004.



■SCREW-IN TYPE

GAMP:+4° GAMF:-6°—-7°

Type	Cutting Edge R (APMX)	Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm)								* WT (kg)	Max. Depth of Cut (mm)			RMPX
			R			DCX	DCON	DCSFMS	OAL	LF	L11	S10	CRKS		APMX	A1	AZ	
Standard	5	ARP5PR2502AM1235	●	○	2	25	12.5	23.5	57	35	6	19	M12	0.10	5.0	–	0.40	1.8°
		ARP5PR3203AM1640	●	○	3	32	17.0	28.5	63	40	6	24	M16	0.16	5.0	1.0	0.65	1.9°
Fine Pitch	5	ARP5PR2503AM1235	●	○	3	25	12.5	23.5	57	35	6	19	M12	0.09	5.0	–	0.40	1.8°
		ARP5PR3204AM1640	●	○	4	32	17.0	28.5	63	40	6	24	M16	0.15	5.0	1.0	0.65	1.9°
Standard	6	ARP6PR3202AM1640	●	○	2	32	17.0	28.5	63	40	6	24	M16	0.18	6.0	1.0	0.60	2.0°
		ARP6PR4003AM1640	●	○	3	40	17.0	28.5	63	40	6	24	M16	0.20	6.0	2.5	1.15	2.7°
Fine Pitch	6	ARP6PR3203AM1640	●	○	3	32	17.0	28.5	63	40	6	24	M16	0.17	6.0	1.0	0.60	2.0°
		ARP6PR4004AM1640	●	○	4	40	17.0	28.5	63	40	6	24	M16	0.20	6.0	2.5	1.15	2.7°

* WT : Tool Weight

Note 1) For screw-in type arbors, refer to page K244.

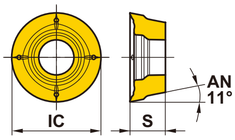
●: Inventory maintained.
(10 inserts in one case)

INSERTS

Work Material			MC7020	MP7130	MP9130	MP9140
	M	Stainless Steels	◐	◐		
	S	Heat-resistant Alloys, Titanium Alloys			◐	◐

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

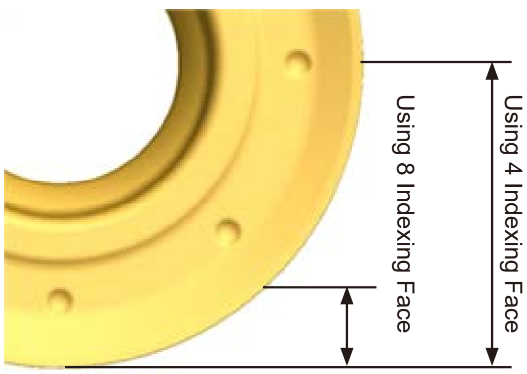
Honing :
E : Round

Shape	Holder	Order Number	Type	Class	Honing	Coated MC7020	MP7130	MP9130	MP9140 (NEW)	Dimensions (mm) IC	S	APMX (mm) 4 Seats	8 Seats	Geometry
	ARP5	RPHT1040M0E4-L	Low Resistance, High Precision	H	E	●	●	●		10	3.97	5.0	–	
		RPMT1040M0E4-L	Low Resistance	M	E	●	●	●		10	3.97	5.0	–	
		NEW RPMT1040M0E8-L1	Low Resistance, 8 Seats	M	E	●	●	●	●	10	3.97	5.0	1.4	
		NEW RPMT1040M0E4-L2	Low Resistance, High Rigidity	M	E				●	10	3.97	5.0	–	
		RPHT1040M0E4-M	General, High Precision	H	E	●	●	●		10	3.97	5.0	–	
		RPMT1040M0E4-M	General Purpose	M	E	●	●	●		10	3.97	5.0	–	
		NEW RPMT1040M0E8-M1	General, 8 Seats	M	E	●	●	●	●	10	3.97	5.0	1.4	
		NEW RPMT1040M0E4-M2	General, High Rigidity	M	E				●	10	3.97	5.0	–	
		RPHT1040M0E4-R	Reinforced Edge, High Precision	H	E	●	●	●		10	3.97	5.0	–	
		RPMT1040M0E4-R	Reinforced Edge	M	E	●	●	●		10	3.97	5.0	–	
		NEW RPMT1040M0E8-R1	Reinforced Edge, 8 Seats	M	E	●	●	●		10	3.97	5.0	1.4	
	ARP6	RPHT1248M0E4-L	Low Resistance, High Precision	H	E	●	●	●		12	4.76	6.0	–	
		RPMT1248M0E4-L	Low Resistance	M	E	●	●	●		12	4.76	6.0	–	
		NEW RPMT1248M0E8-L1	Low Resistance, 8 Seats	M	E	●	●	●	●	12	4.76	6.0	1.7	
		NEW RPMT1248M0E4-L2	Low Resistance, High Rigidity	M	E				●	12	4.76	6.0	–	
		RPHT1248M0E4-M	General, High Precision	H	E	●	●	●		12	4.76	6.0	–	
		RPMT1248M0E4-M	General Purpose	M	E	●	●	●		12	4.76	6.0	–	
		NEW RPMT1248M0E8-M1	General, 8 Seats	M	E	●	●	●	●	12	4.76	6.0	1.7	
		NEW RPMT1248M0E4-M2	General, High Rigidity	M	E				●	12	4.76	6.0	–	
		RPHT1248M0E4-R	Reinforced Edge, High Precision	H	E	●	●	●		12	4.76	6.0	–	
		RPMT1248M0E4-R	Reinforced Edge	M	E	●	●	●		12	4.76	6.0	–	
		NEW RPMT1248M0E8-R1	Reinforced Edge, 8 Seats	M	E	●	●	●		12	4.76	6.0	1.7	

● = NEW

Depth of cut (ap) for 8 indexing face insert

8 indexing face type inserts can also be used at the same depth of cut as the 4 face type insert.



RECOMMENDED CUTTING CONDITIONS

Dry cutting

	Work Material	Hardness	Grade	Vc (m/min)	fz (mm/t.)
M	Austenitic Stainless Steel	≤200HB	MC7020	220 (170–270)	0.2 (0.1–0.35)
			MP7130	200 (150–250)	0.2 (0.1–0.35)
	Austenitic Stainless Steel	>200HB	MC7020	190 (140–240)	0.2 (0.1–0.35)
			MP7130	170 (120–220)	0.2 (0.1–0.35)
	Two-phase Stainless Steel	≤280HB	MC7020	180 (130–230)	0.2 (0.1–0.35)
			MP7130	160 (110–210)	0.2 (0.1–0.35)
	Ferritic and Martensitic Stainless Steel	≤200MPa	MC7020	240 (190–290)	0.2 (0.1–0.35)
			MP7130	200 (150–250)	0.2 (0.1–0.35)
	Ferritic and Martensitic Stainless Steel	>200HB	MC7020	240 (190–290)	0.2 (0.1–0.35)
			MP7130	200 (150–250)	0.2 (0.1–0.35)
	Hardened Stainless Steel	<450HB	MC7020	170 (120–220)	0.2 (0.1–0.35)
			MP7130	150 (100–200)	0.2 (0.1–0.35)

Wet cutting

	Work Material	Hardness	Grade	Vc (m/min)	fz (mm/t.)
M	Austenitic Stainless Steel	≤200HB	MC7020	150 (100–200)	0.2 (0.1–0.35)
			MP7130	130 (80–180)	0.2 (0.1–0.35)
	Austenitic Stainless Steel	>200HB	MC7020	120 (70–170)	0.2 (0.1–0.35)
			MP7130	100 (80–150)	0.2 (0.1–0.35)
	Two-phase Stainless Steel	≤280HB	MC7020	120 (70–170)	0.2 (0.1–0.35)
			MP7130	100 (80–150)	0.2 (0.1–0.35)
	Ferritic and Martensitic Stainless Steel	≤200MPa	MC7020	170 (120–220)	0.2 (0.1–0.35)
			MP7130	130 (80–180)	0.2 (0.1–0.35)
	Ferritic and Martensitic Stainless Steel	>200HB	MC7020	170 (120–220)	0.2 (0.1–0.35)
			MP7130	130 (80–180)	0.2 (0.1–0.35)
	Hardened Stainless Steel	<450HB	MC7020	110 (60–160)	0.2 (0.1–0.35)
			MP7130	90 (50–140)	0.2 (0.1–0.35)
S	Titanium Alloy	–	MP9130	45 (30–55)	0.1 (0.05–0.15)
	Heat Resistant Alloy	–	MP9130	35 (15–45)	0.1 (0.05–0.15)

Note 1) Actual cutting conditions are estimated to avoid chatter vibration with high rigidity of a machine or workpiece.
Make appropriate adjustments when chatter and/or insert chipping occurs during cutting.
Use with lowered conditions when there is a big overhang and/or when pocket-cutting.
Note 2) The setting level for feeding 1 blade is ap = 2.5mm with ARP5 axial cutting. With ARP6, use ap = 3mm.
Use while matching the ap fluctuation and correction value F of the respective table.
Ex. Feed for the recommended 1 blade when ARP5,SUS304, MP7130,ap=1: 0.2 mm/t.×1.5 (correction value F)=0.3 mm/t.
Note 3) For grooving, use feed at the recommended 70% level. For ramping, drilling, and plunging, use 50% level.
Note 4) Internal coolant is recommended in titanium alloy and heat resistant alloy cutting.
When the coolant nozzle separately sold is used, it is more effective.

MAXIMUM CAPACITIES BY EACH CUTTING

Cutting Edge APMX (mm)	Maximum hole diameter DCX (mm)	Order Number	Install	Type	Recommendation (mm) ap	ae	Ramping RMPX(deg)	Helical Drilling Smallest hole DH min.(mm)	Largest hole DH max.(mm)	Drilling Depth Maximum AZ(mm)	Plunging AE1(mm)
5	25	**ARP5PR2502AM1235**	Screw-in	Standard	≤2.5	≤1.00DCX	1.8°	40	48	0.40	—
		ARP5PR2503AM1235	Screw-in	Fine Pitch	≤1.5	≤1.00DCX	1.8°	40	48	0.40	—
		ARP5PR2503SA25M	Shank	Standard	≤1.5	≤1.00DCX	1.8°	40	48	0.40	1.0
		ARP5PR2502SA25L	Shank	Long	≤1.5	≤1.00DCX	1.8°	40	48	0.40	1.0
	32	**ARP5PR3203AM1640**	Screw-in	Standard	≤2.5	≤1.00DCX	1.9°	54	62	0.65	1.0
		ARP5PR3204AM1640	Screw-in	Fine Pitch	≤2.5	≤1.00DCX	1.9°	54	62	0.65	1.0
		ARP5PR3204SA32M	Shank	Standard	≤2.5	≤1.00DCX	1.9°	54	62	0.65	1.0
		ARP5PR3203SA32L	Shank	Long	≤2.5	≤1.00DCX	1.9°	54	62	0.65	1.0
	40	**ARP5P-040A05AR**	Arbor	Fine Pitch	≤2.5	≤1.00DCX	2.8°	70	78	1.30	2.0
	50	**ARP5P-050A06AR**	Arbor	Fine Pitch	≤2.5	≤1.00DCX	2.9°	90	98	1.85	2.0
		ARP5P-050A07AR	Arbor	Extra Fine Pitch	≤1.5	≤1.00DCX	2.9°	90	98	1.85	2.0
	63	**ARP5P-063A07AR**	Arbor	Fine Pitch	≤2.5	≤0.75DCX	3.0°	116	124	2.50	2.5
		ARP5P-063A08AR	Arbor	Extra Fine Pitch	≤1.5	≤0.75DCX	3.0°	116	124	2.50	2.5
6	32	**ARP6PR3202AM1640**	Screw-in	Standard	≤3.5	≤1.00DCX	2.0°	52	62	0.60	1.0
		ARP6PR3203AM1640	Screw-in	Fine Pitch	≤3.5	≤1.00DCX	2.0°	52	62	0.60	1.0
		ARP6PR3203SA32M	Shank	Standard	≤3.5	≤1.00DCX	2.0°	52	62	0.60	1.0
		ARP6PR3202SA32L	Shank	Long	≤3.5	≤1.00DCX	2.0°	52	62	0.60	1.0
	40	**ARP6PR4003AM1640**	Screw-in	Standard	≤3.5	≤1.00DCX	2.7°	68	78	1.15	2.5
		ARP6PR4004AM1640	Screw-in	Fine Pitch	≤3.5	≤1.00DCX	2.7°	68	78	1.15	2.5
		ARP6PR4004SA32M	Shank	Standard	≤3.5	≤1.00DCX	2.7°	68	78	1.15	2.5
		ARP6PR4003SA32L	Shank	Long	≤3.5	≤1.00DCX	2.7°	68	78	1.15	2.5
		ARP6P-040A04AR	Arbor	Fine Pitch	≤3.5	≤1.00DCX	2.7°	68	78	1.15	2.0
	50	**ARP6PR5005SA42M**	Shank	Standard	≤3.5	≤1.00DCX	2.9°	88	98	1.70	2.5
		ARP6PR5004SA42L	Shank	Long	≤3.5	≤1.00DCX	2.9°	88	98	1.70	2.5
		ARP6P-050A05AR	Arbor	Fine Pitch	≤3.5	≤1.00DCX	2.9°	88	98	1.70	2.0
		ARP6P-050A06AR	Arbor	Extra Fine Pitch	≤2.5	≤1.00DCX	2.9°	88	98	1.70	2.0
	63	**ARP6P-063A06AR**	Arbor	Fine Pitch	≤3.5	≤0.75DCX	3.1°	114	124	2.50	2.5
		ARP6P-063A07AR	Arbor	Extra Fine Pitch	≤2.5	≤0.75DCX	3.1°	114	124	2.50	2.5
	80	**ARP6PR08008CA**	Arbor	Fine Pitch	≤3.5	≤0.60DCX	2.3°	148	158	2.50	2.5
		ARP6PR08009CA	Arbor	Extra Fine Pitch	≤2.5	≤0.60DCX	2.3°	148	158	2.50	2.5
	100	**ARP6PR10009DA**	Arbor	Fine Pitch	≤3.5	≤0.50DCX	1.7°	188	198	2.50	2.5
		ARP6PR10011DA	Arbor	Extra Fine Pitch	≤2.5	≤0.50DCX	1.7°	188	198	2.50	2.5

Note 1) Tool body durability may weaken when the amount of axial cutting exceeds ARP5 = 5 mm and ARP6 = 6 mm.
Note 2) When drilling, be careful of long scattered cutting chips.
Note 3) When cutting helical holes, do not exceed the largest APMX cutting depth per one rotation.
Note 4) Calculate using the following formula for centre tool tracks and ϕdc when cutting helical holes : Centre tool tracks ϕdc=desired hole diameter ϕDH tool diameter ϕDCX
Note 5) For preventing trouble with cutting chip biting, especially when grooving, ramping, helical cutting, and drilling, thoroughly eliminate cutting chips with an air blower or the like.
Note 6) Chip pockets are small for on small diameter cutters. Use with caution the ae and ap feed due to the possibility of cutting blockage.
Note 7) When cutting large ae with large diameter cutter, blockage from long chips is possible. Regulate ap and feed.

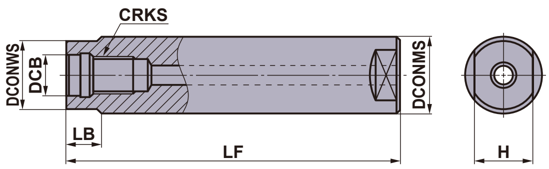
■ CORRECTION LEVEL F FEED AMOUNT FOR 1 BLADE, BASED ON AXIAL CUTTING AP FLUCTUATION

Holder	ap=0.5mm	ap=1mm	ap=1.5mm	ap=2mm	ap=2.5mm	ap=3mm	ap=3.5mm	ap=4mm	ap=5mm	ap=6mm
ARP5	2.3	1.5	1.2	1.1	1.0	0.9	0.8	0.8	0.8	–
ARP6	2.5	1.7	1.3	1.1	1.0	1.0	0.9	0.9	0.8	0.8

Note 1) Tool body durability may weaken, when the amount of axial cutting exceeds ARP5=5mm and ARP6=6mm.

ARBORS

■STRAIGHT SHANK ARBOR



Type	Order Number	Stock	Dimensions (mm)						
			DCB	DCONMS	DCONWS	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.

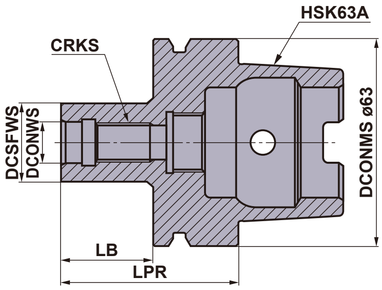
②Tighten the head at the recommended torque and ensure that there is no gap between the head and arbor.

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 may produce risk of injuries or burns.
●Do not handle the cutting tools with bare hands as this may cause injuries.

★ : Inventory maintained in Japan.

HSK63A SHANK ARBOR



Order Number	Stock	Dimensions (mm)				
		DCONWS	DCSFWS	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

Note 1) The HSK63A shank type has a built-in coolant pipe for installation.

MAXIMUM ALLOWABLE REVOLUTION FOR CUTTER

Diameter (mm)	WSX445		ASX445		WWX400		ASX400		FMAX	
	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	19000	3.5	–	–	–	–	–	–	30000	3.5
50	17000	3.5	18000	3.5	5000	5.0	18000	3.5	30000	3.5
63	15000	3.5	16000	3.5	14100	5.0	16000	3.5	27000	3.5
80	14000	3.5	14000	3.5	12200	5.0	14000	3.5	24500	3.5
100	12000	3.5	13000	3.5	10700	5.0	13000	3.5	22000	3.5
125	11000	3.5	12000	3.5	9500	5.0	12000	3.5	19600	3.5
160	9500	3.5	10000	3.5	8300	5.0	10000	3.5	–	–
200	8500	3.5	9000	3.5	7300	5.0	9000	3.5	–	–
250	–	–	8000	3.5	6400	5.0	8000	3.5	–	–
315	–	–	6500	3.5	–	–	–	–	–	–

Diameter (mm)	AHX440S		AHX475S		AHX640S		AHX640W		WJX14	
	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	21000	3.5	–	–	–	–	–	–	–	–
50	19800	3.5	18300	3.5	–	–	–	–	5000	5.0
52	–	–	–	–	–	–	–	–	5000	5.0
63	18300	3.5	17200	3.5	12000	5	–	–	18200	5.0
66	–	–	–	–	–	–	–	–	17700	5.0
80	16500	3.5	15700	3.5	10000	5	8900	6	15600	5.0
100	14600	3.5	14000	3.5	8700	5	7800	6	13500	5.0
125	12600	3.5	12200	3.5	7500	5	6600	6	11600	5.0
160	10200	3.5	9900	3.5	6100	5	5300	6	9900	5.0
200	–	–	–	–	5100	5	4100	6	–	–
250	–	–	–	–	–	–	2900	6	–	–
315	–	–	–	–	–	–	1700	6	–	–

Diameter (mm)	AXD4000		AXD7000		VPX200		VPX300		WJX09	
	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)
16	–	–	–	–	37900	1.0	–	–	–	–
18	–	–	–	–	35300	1.0	–	–	–	–
20	15000	1.5	–	–	33200	1.0	–	–	–	–
22	–	–	–	–	31400	1.0	–	–	–	–
25	49000	1.5	–	–	29000	1.0	24100	3.0	33500	2.0
28	48500	1.5	–	–	27200	1.0	22500	3.0	30300	2.0
30	–	–	–	–	26000	1.0	21500	3.0	–	–
32	48000	1.5	41000	3.5	25100	1.0	20600	3.0	27300	2.0
35	45000	1.5	–	–	23800	1.0	19500	3.0	25500	2.0
40	41000	1.5	36000	3.5	22000	1.0	17900	3.0	23200	2.0
50	35000	1.5	30000	3.5	19200	1.0	15500	3.0	20000	2.0
52	–	–	–	–	–	–	–	–	19500	2.0
63	30000	1.5	25000	3.5	16700	1.0	13400	3.0	17300	2.0
66	–	–	–	–	–	–	–	–	16800	2.0
80	27000	1.5	23000	3.5	–	–	11500	3.0	–	–
100	23000	1.5	19000	3.5	–	–	–	–	–	–
125	20000	1.5	16000	3.5	–	–	–	–	–	–
160	–	–	–	–	–	–	–	–	–	–

Note 1) All values shown on this chart are based on the insert being properly seated in pocket and torqued to the recommended values.

LIST OF CUTTING EDGE DIAMETER TOLERANCES

Cutter Type	Cutting Edge Diameter Tolerance (mm)	Cutter Type	Cutting Edge Diameter Tolerance (mm)
AJX	−0.1 −0.4	**CBMP**	0 −0.3
APX3000 **Arbor Type**	−0.1 −0.4	**PMF**	0 −0.3
APX3000 **Shank Type**	−0.1 −0.2	**PMR**	0 −0.3
APX3000 **Long Cutting Edge Type**	−0.1 −0.3	**SPX**	−0.1 −0.3
APX4000 **Arbor Type**	−0.1 −0.4	**SRF**	0 −0.027
APX4000 **Shank Type**	−0.1 −0.2	**SRM**	−0.05 −0.15
APX4000 **Long Cutting Edge Type**	−0.1 −0.3	**SUF**	0 −0.02
AQX	−0.1 −0.3	**TSMP**	−0.1 −0.3
ARP **Arbor Type**	−0.1 −0.3	**VFX5, VFX6** **Shell Type**	−0.1 −0.3
ARP **Shank Type**	−0.1 −0.2	**VOX400** **Arbor Type**	−0.1 −0.4
ASX400	0 −0.3	**VPX** **Arbor Type**	−0.1 −0.3
AXD4000 **Arbor Type**	−0.1 −0.4	**VPX** **Shank Type**	−0.1 −0.2
AXD4000 **Shank Type**	−0.1 −0.2	**VPX** **Long Cutting Edge Type**	−0.1 −0.3
AXD7000 **Arbor Type**	−0.1 −0.4	**WJX** **Arbor Type**	−0.1 −0.3
AXD7000 **Shank Type**	−0.1 −0.2	**WJX** **Shank Type**	−0.1 −0.3
BRP	−0.1 −0.3	**WWX400** **Arbor Type**	−0.1 −0.3
CBJP	0 −0.3	**WWX400** **Shank Type**	−0.1 −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.)

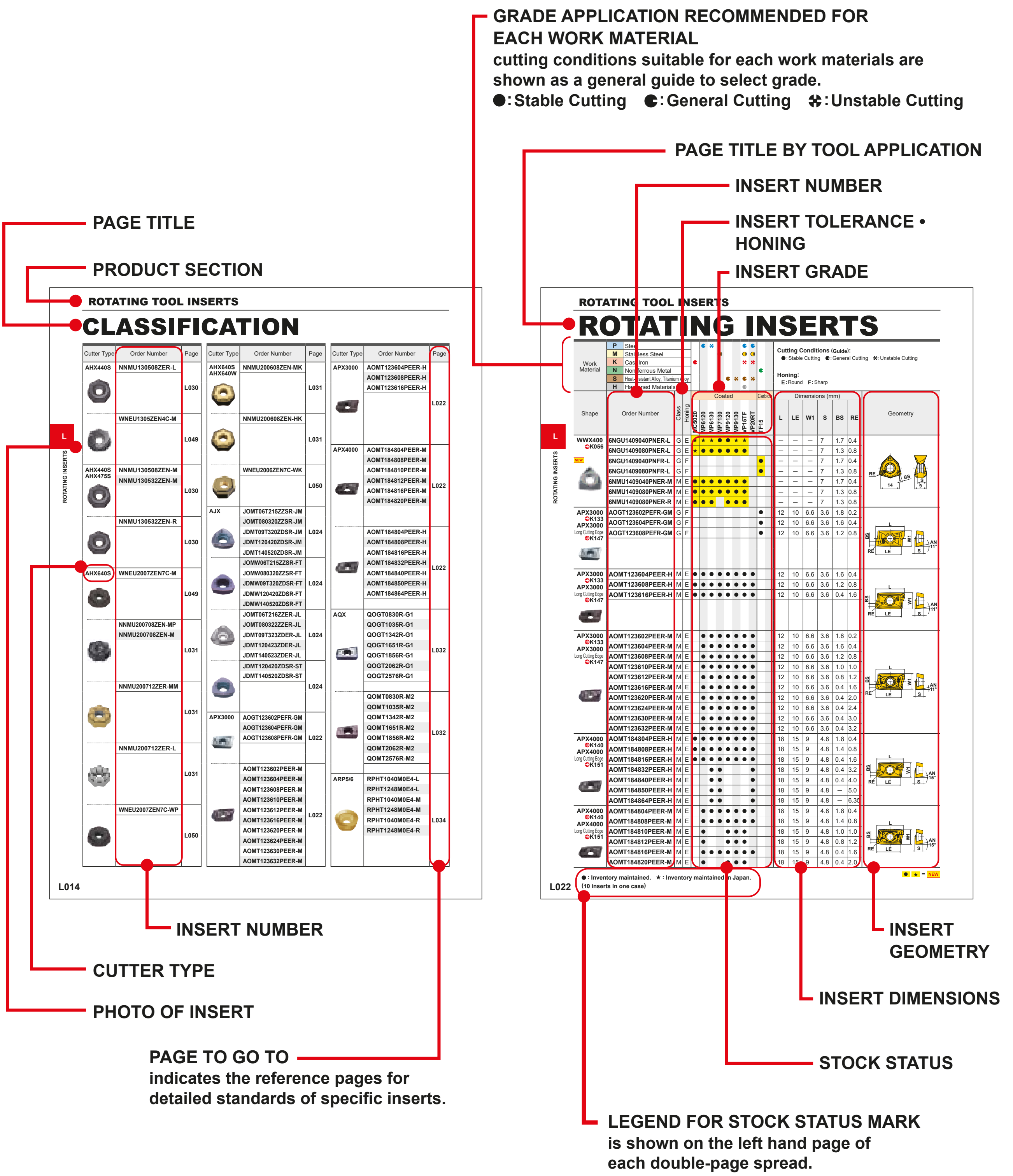
HOW TO READ THE STANDARD OF ROTATING TOOL INSERTS

●How the section of milling inserts is organised

①Organised according to cutter type.
②Cutters are arranged in alphabetical order.

●How the standards for milling inserts are organised

①Classified into milling inserts, wiper inserts and drilling inserts.
②Arranged alphabetically by order number.



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

INDEXABLE MILLING TOOLS

INSERT STANDARDS
CBN & PCD INSERT STANDARDS
INSERT GRADES

IDENTIFICATION

Symbol	Insert Shape	
6	Special Design	–
N	Heptagonal	
O	Octagonal	
S	Square	
T	Triangular	
C	Rhombic 80°	
M	Rhombic 86°	
A	Parallelogram 85°	
R	Round	
L	Rectangular	
J	Special Design	–
X	Special Design	–
W	Wiper	–

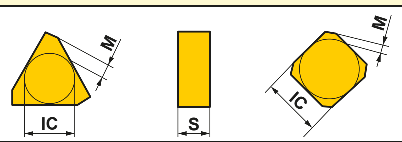
①Insert Shape

Symbol	Normal Clearance AN
C	**7°**
D	**15°**
E	**20°**
F	**25°**
G	**30°**
N	**0°**
P	**11°**
O	Other
X	Other

②Normal Clearance

S ① **E** ② **E** ③ **R** ④

③Tolerance 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.

④Fixing and / or for Chipbreaker

Symbol	Hole	Hole Configuration	Chipbreaker	Figure
W	With Hole	Cylindrical Hole + One Countersink (40°–60°)	No	
T	With Hole		Single Sided	
U	With Hole	Cylindrical Hole + Countersink (40°–60°)	Double Sided	
B	With Hole	Cylindrical Hole + One Countersink (70°–90°)	No	
N	Without Hole	–	No	
R	Without Hole	–	Single Sided	
X	–	–	–	Special Design

Symbol	Honing
F	Sharp
E	Round
T	Chamfer
S	Chamfer+Hone
X	Round (small)
Z	Chamfer (Strong Cutting Edge Type)

⑨Cutting Edge Condition

Symbol R	Symbol C	Symbol S	Symbol T	Diameter of Inscribed Circle (mm)
	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

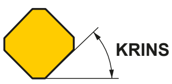
⑤Insert Size

Symbol	Insert Thickness (mm)
03	3.18
T3	3.97
04	4.76

⑥Insert Thickness

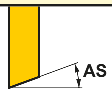
12 ⑤ **03** ⑥ **A** ⑦ **F** ⑧ **E** ⑨ **R** ⑩ **1** ⑪ - **JS** ⑫

⑦Cutting Edge Angle



Symbol	Cutting Edge Angle
A	45°
E	75°
P	90°
Z	Other Angle

⑧Clearance of Wiper Insert

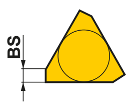


Symbol	Clearance Angle
D	15°
E	20°
F	25°
G	30°
N	0°
P	11°

⑩Cutting Direction

L	Left
N	Neutral
R	Right

⑪Width of Wiper Edge



(mm)

Symbol	BS
1	1.4 (1.94 only for TEKN)
2	2.4

⑫Chipbreaker

Symbol	Name
FT	FT Breaker
HS	HS Breaker
JH	JH Breaker
JM	JM Breaker
JS	JS Breaker
JL	JL Breaker
JP	JP Breaker
LS	LS Breaker
MM	MM Breaker
MS	MS Breaker
L	L Breaker
M	M Breaker
R	R Breaker

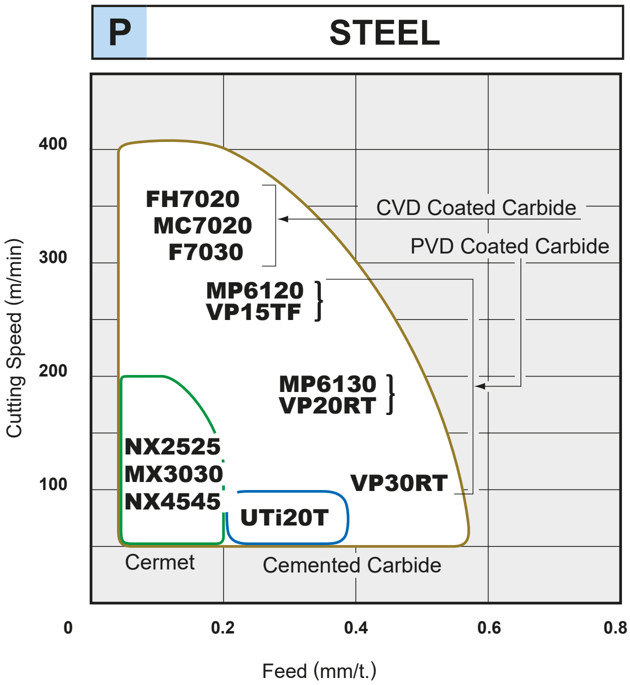
GRADES FOR MILLING

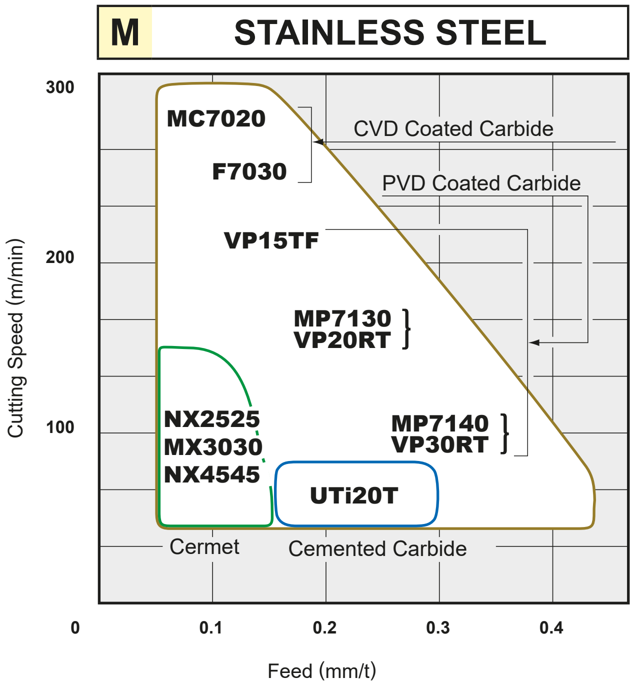
●INDEXABLE INSERT GRADES FOR MILLING

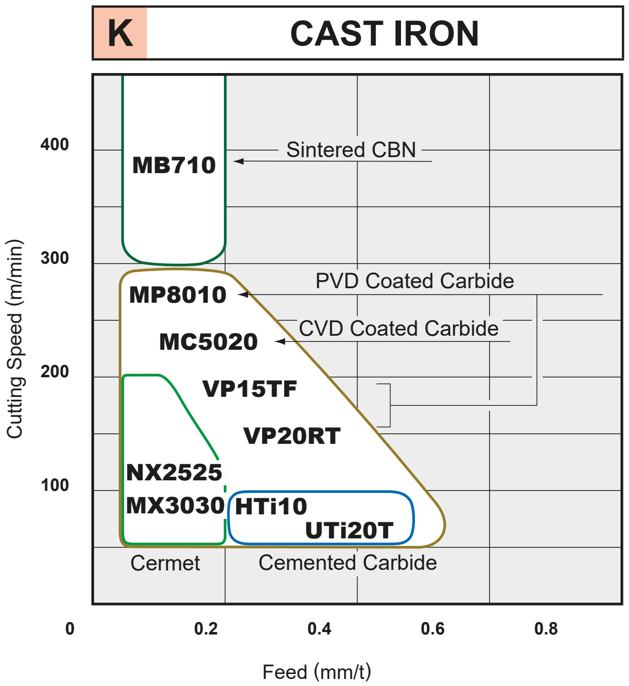
ISO		Coated Carbide CVD	Coated Carbide PVD	Coated Cermet	Cermet	Cemented Carbide	CBN (Sintered CBN)	PCD (Sintered Diamond)
Steel	P	MC7020, FH7020, F7030	MP6120, VP15TF, MP6130, UP20M, VP20RT, VP30RT	VP25N	NX2525, MX3020, MX3030, NX4545	UTi20T		
Stainless Steel	M	MC7020, F7030	VP15TF, MP7130, MP7030, UP20M, VP20RT, MP7140, VP30RT	VP25N	NX2525, MX3020, MX3030, NX4545	UTi20T		
Cast Iron	K	MC5020	MP8010, VP15TF, VP20RT	VP25N	NX2525, MX3020, MX3030	HTi05T, HTi10, UTi20T	MB710, NEW MB4120	
Non-Ferrous Metal	N		LC15TF			HTi10, TF15		MD220, MD2030
Heat Resistant Alloy • Ti Alloy	S		MP9120, VP15TF, MP9130, NEW MP9140					
Hardened Materials	H		MP8010, VP15TF					

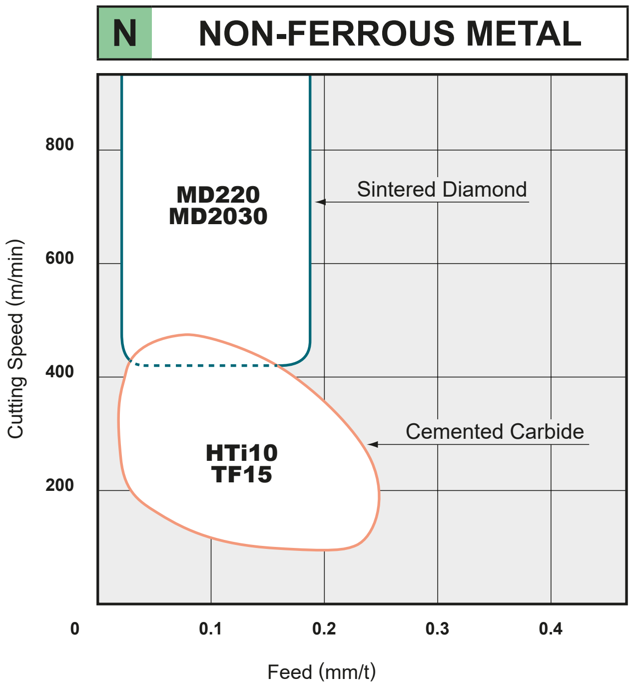
Scale: 10, 20, 30, 40

MILLING APPLICATION RANGE





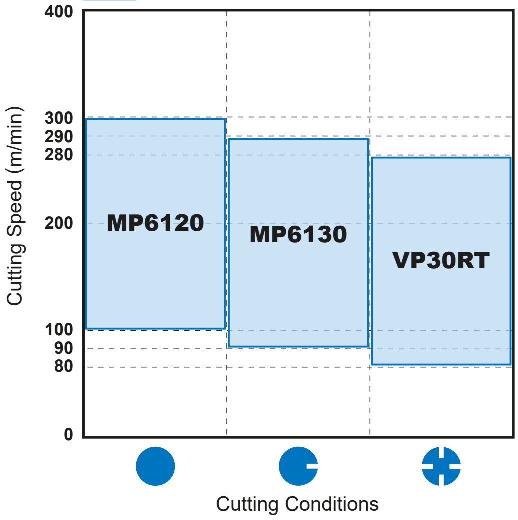




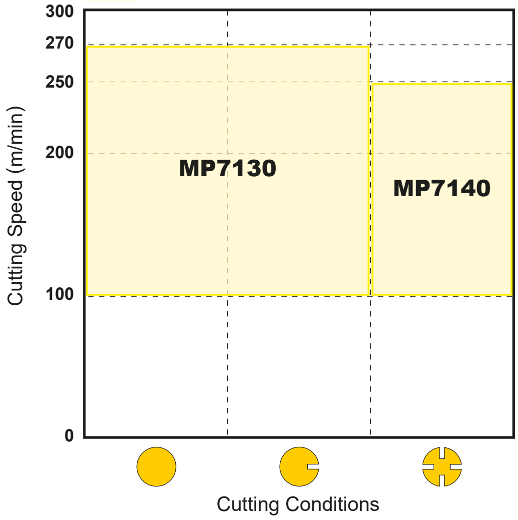
MILLING APPLICATION RANGE

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

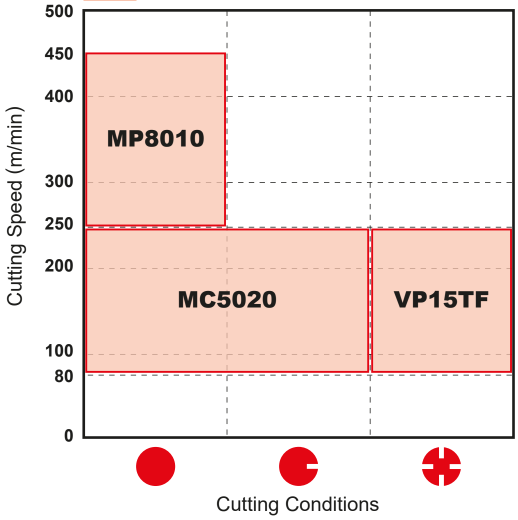
P STEEL (Medium-Rough Cutting)



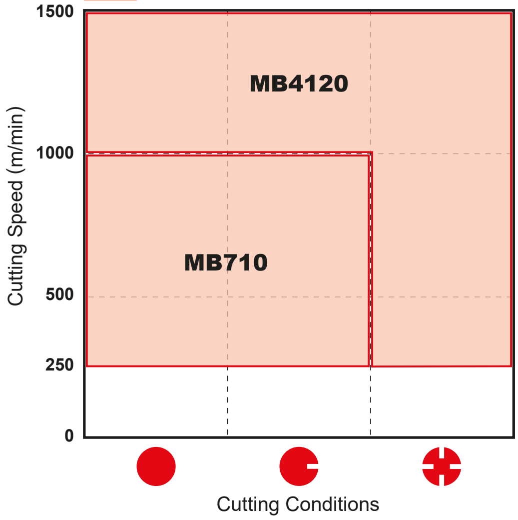
M STAINLESS STEEL



K CAST IRON



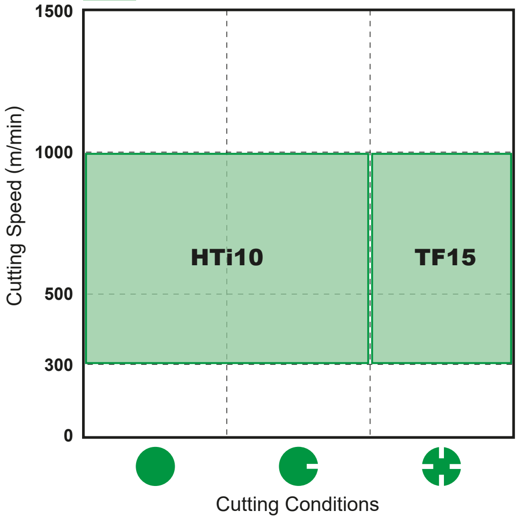
K CAST IRON (CBN)



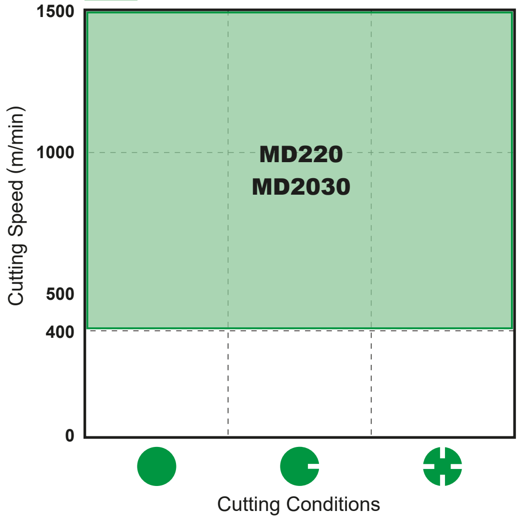
■CUTTING CONDITIONS

●	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

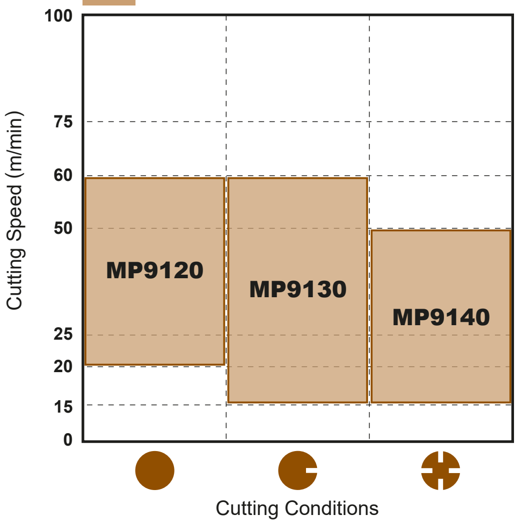
N NON-FERROUS METAL



N NON-FERROUS METAL (PCD)



S HEAT RESISTANT ALLOY, TITANIUM ALLOY



COATED CARBIDE (CVD&PVD)

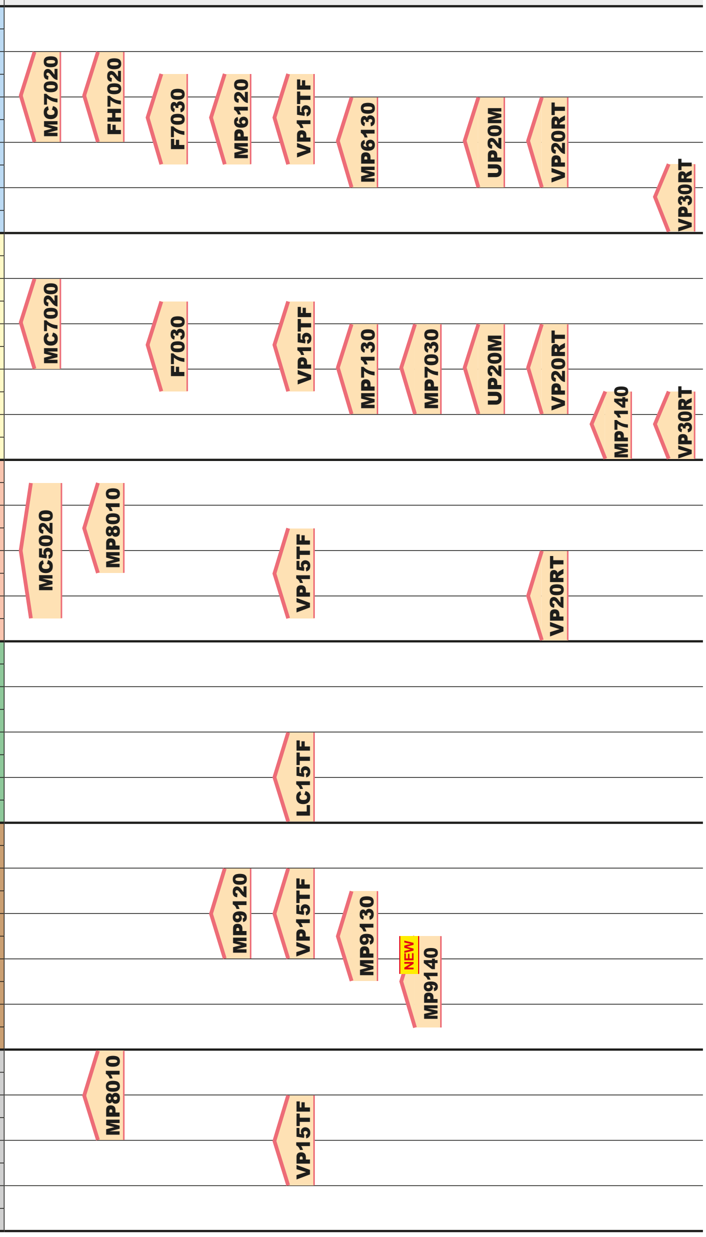
<CVD>
- Special tough fibrous structure improves wear and fracture resistance.
- It covers a wide application range and reduces the number of tools required.

<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 substrate.

■SELECTION STANDARD

MILLING

Work Material	Recommended Grade	ISO	Application Range
P Steel	F7030 MC7020 MP6120 MP6130 VP15TF	P (10, 20, 30, 40)	
M Stainless Steel	F7030 MC7020 MP7030 MP7130 MP7140 VP15TF	M (10, 20, 30, 40)	
K Cast Iron	MC5020 VP15TF	K (10, 20, 30)	
N Aluminium Alloy	LC15TF	N (10, 20, 30)	
S Heat Resistant Alloy Ti Alloy	MP9120 VP15TF MP9130 NEW MP9140	S (10, 20, 30, 40)	
H Hardened Materials	MP8010 VP15TF	H (10, 20, 30)	



■GRADE CHARACTERISTICS

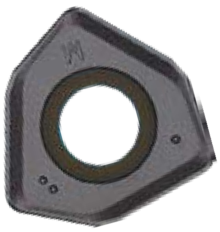
Grade	Substrate Hardness (HRA)	Coating Layer Composition	Coating Layer Thickness
MC5020	91.0	TiCN-Al_2O_3-Ti Compound	Thick
MC7020	88.8	TiCN-Al_2O_3 Compound	Thick
FH7020	89.0	TiCN-Al_2O_3-Ti Compound	Thick
F7030	88.8	TiCN-Al_2O_3-TiN	Thin
MP6120	91.5	(Al,Ti,Cr)N	Thin
MP6130	90.5	(Al,Ti,Cr)N	Thin
MP7030	90.5	(Al,Ti)N-Ti Compound	Thin
MP7130	90.5	(Al,Ti)N-Ti Compound	Thin
MP7140	88.8	(Al,Ti)N-Ti Compound	Thin

Grade	Substrate Hardness (HRA)	Coating Layer Composition	Coating Layer Thickness
MP8010	93.5	(Al,Ti,Si)N	Thin
MP9120	91.5	(Al,Ti,Cr)N	Thin
MP9130	90.5	(Al,Ti,Cr)N	Thin
NEW **MP9140**	89.0	(Al,Ti)N	Thin
VP15TF	91.5	(Al,Ti)N	Thin
VP20RT	90.5	(Al,Ti)N	Thin
VP30RT	88.8	(Al,Ti)N	Thin
UP20M	90.5	Ti Compound	Thin

Note 1) Internal hardness represent typical values shown as hardness.

For machining of steels and stainless steels

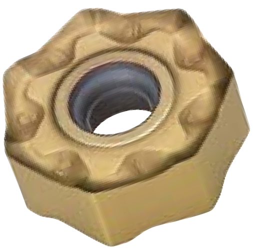
MC7020



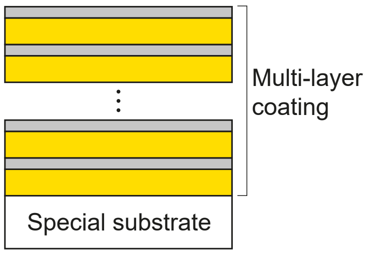
The micro-grain wear resistant Al_2O_3 and fibrous TiCN layers deliver excellent wear resistance during high speed cutting. Use of a specially developed cemented carbide that provides superior resistance to fracture and thermal cracking prevents the cutting edge from sudden breakage..

For machining of stainless steel

MP7030



MP7030 has a multi-layer coating based on a newly developed Ti-compound. It provides superior wear and fracture resistance during stainless steel machining. A special tough cemented carbide substrate gives excellent performance when machining difficult-to-cut materials such as stainless steel.



For Heat-resistant and Titanium Alloys

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 and welding resistance because of a low coefficient of friction when machining titanium alloy.

NEW

MP9140

The new technology Al-(Al, Ti)N coating provides stabilisation of the high hardness phase and succeeds in dramatically improving wear, crater and welding resistance.

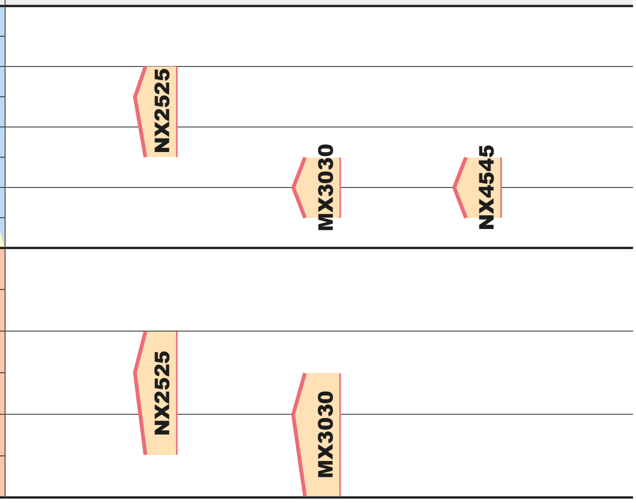
CERMET

- NX2525 for high speed milling.
- NX4545, MX3030 for general milling.

■SELECTION STANDARD

MILLING

Work Material		Recommended Grade	ISO	Application Range
P–M	Steel Stainless Steel	**NX2525**	P–M (10, 20, 30)	
		MX3030 **NX4545**		
K	Cast Iron	**NX2525**	K (10, 20)	
		MX3030		



Note 1) 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)
NX2525	92.2
MX3030	90.0
NX4545	90.0

Note 1) Internal hardness represent typical values shown as hardness.

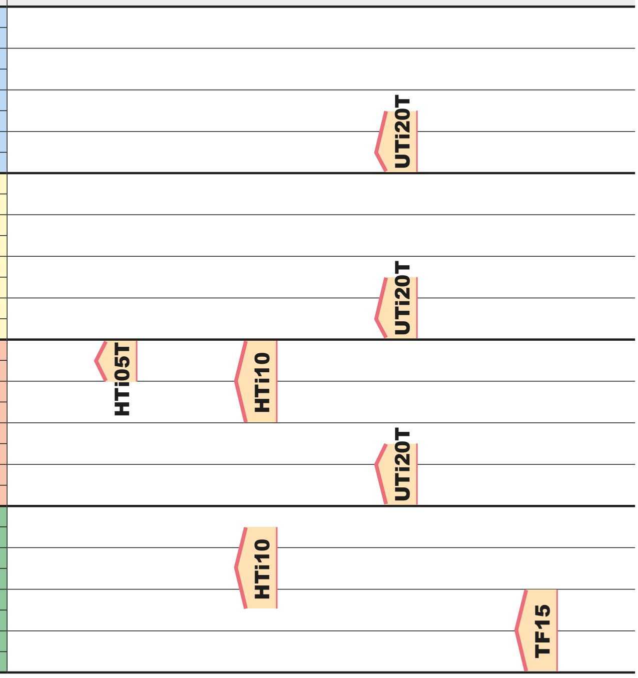
CEMENTED CARBIDE

● **The grades available 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	ISO	Application Range
P	Steel	**UTi20T**	P 10 20 30	
M	Stainless Steel	**UTi20T**	M 10 20 30	
K	Cast Iron	**HTi05T**	K 10 20 30	
		HTi10		
		UTi20T		
N	Non-Ferrous Metal	**HTi10**	N 10 20 30	
		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

■GRADE CHARACTERISTICS

ISO	Grade	Hardness (HRA)
P / M	**UTi20T**	90.5
K / N	**HTi05T**	92.5
	HTi10	92.0
N	**TF15**	91.5

Note 1) Internal hardness represent typical values shown as hardness.

CBN (SINTERED CBN)

●MB710 and MB730 for cast iron finishing.

■SELECTION STANDARD / RECOMMENDED CUTTING CONDITIONS

FINISHING

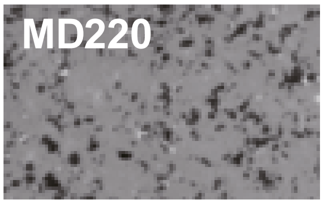
Work Material		Structure	Cutting Speed (m/min) 250 500 750 1000 1250	Feed (mm/t)	Depth of Cut (mm)	Coolant
Grey Cast Iron	DIN GG25	Ferritic + Pearilitic	MB710	−0.3	−0.5	Dry
	DIN GG30	Pearilitic				

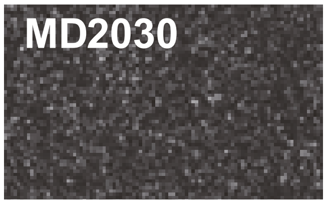
■FEATURES AND BASE

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	–

PCD (SINTERED DIAMOND)

- Suitable for cutting non-ferrous metals such as aluminium alloy.
- Suitable for extremely high speed finishing.





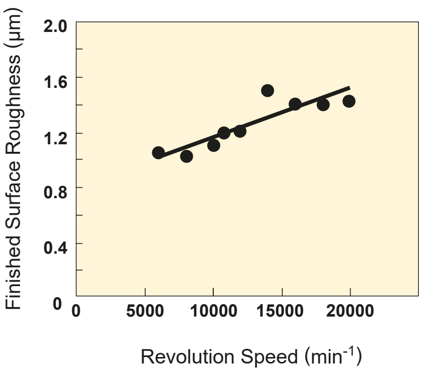
■GRADE FEATURES

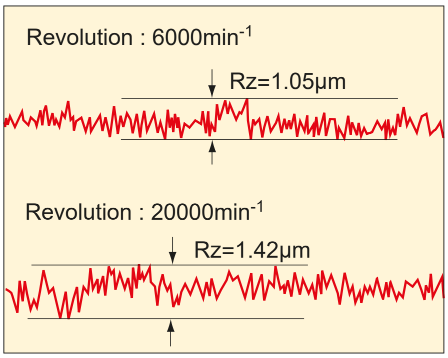
Grade	Features
MD220	Excellent in the balance between wear resistance and fracture resistance. For a wide range of tooling applications.
MD2030	Improved fracture resistance when used in unstable applications. The stability of the cutting edge can meet a wide variety of work material and cutting conditions.

■RECOMMENDED CUTTING CONDITIONS

Work Material	Cutting Speed (m/min)	Grade	Feed per Tooth (mm/t)	Depth of Cut (mm)
Aluminium Alloy (Si ≤12%)	2000–3000	**MD2030 MD220**	–0.2	–3.0
Aluminium Alloy (Si ≥13%)	400–800			

■CUTTING PERFORMANCE





<Cutting Conditions>
Workpiece : Aluminium Alloy
Insert : NP-GDCW1240PDFR2
Grade : MD220
Tool : V10000R0406D
Feed : 0.2mm/t
Depth of Cut : 0.5mm
Width of Cut : 80mm
Dry Cutting

CLASSIFICATION

Cutter Type	Order Number	Page
AHX440S 	NNMU130508ZER-L	L030
	WNEU1305ZEN4C-M	L049
AHX440S AHX475S 	NNMU130508ZEN-M	L030
	NNMU130532ZEN-M	
	NNMU130532ZEN-R	L030
AHX640S 	WNEU2007ZEN7C-M	L049
	NNMU200708ZEN-MP	L031
	NNMU200708ZEN-M	
	NNMU200712ZER-MM	L031
	NNMU200712ZER-L	L031
	WNEU2007ZEN7C-WP	L050

Cutter Type	Order Number	Page
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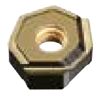	WNEU2006ZEN7C-WK	L050
AJX 	JOMT06T215ZZSR-JM	L024
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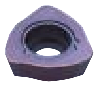	JOMW06T215ZZSR-FT	L024
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	JOMT06T216ZZER-JL	L024
	JOMT080322ZZER-JL	
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	JDMT120423ZDER-JL	
	JDMT140523ZDER-JL	
	JDMT120420ZDSR-ST	L024
	JDMT140520ZDSR-ST	
APX3000 	AOGT123602PEFR-GM	L022
	AOGT123604PEFR-GM	
	AOGT123608PEFR-GM	
	AOMT123602PEER-M	L022
	AOMT123604PEER-M	
	AOMT123608PEER-M	
	AOMT123610PEER-M	
	AOMT123612PEER-M	
	AOMT123616PEER-M	
	AOMT123620PEER-M	
	AOMT123624PEER-M	
	AOMT123630PEER-M	
	AOMT123632PEER-M	

Cutter Type	Order Number	Page
APX3000 	AOMT123604PEER-H	L022
	AOMT123608PEER-H	
	AOMT123616PEER-H	
APX4000 	AOMT184804PEER-M	L022
	AOMT184808PEER-M	
	AOMT184810PEER-M	
	AOMT184812PEER-M	
	AOMT184816PEER-M	
	AOMT184820PEER-M	
	AOMT184804PEER-H	L022
	AOMT184808PEER-H	
	AOMT184816PEER-H	
	AOMT184832PEER-H	
	AOMT184840PEER-H	
	AOMT184850PEER-H	
	AOMT184864PEER-H	
AQX 	QOGT0830R-G1	L032
	QOGT1035R-G1	
	QOGT1342R-G1	
	QOGT1651R-G1	
	QOGT1856R-G1	
	QOGT2062R-G1	
	QOGT2576R-G1	
	QOMT0830R-M2	L032
	QOMT1035R-M2	
	QOMT1342R-M2	
	QOMT1651R-M2	
	QOMT1856R-M2	
	QOMT2062R-M2	
	QOMT2576R-M2	
ARP5/6 	RPHT1040M0E4-L	L034
	RPHT1248M0E4-L	
	RPHT1040M0E4-M	
	RPHT1248M0E4-M	
	RPHT1040M0E4-R	
	RPHT1248M0E4-R	

Cutter Type	Order Number	Page
ARP5/6 	RPMT1040M0E4-L	L034
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	NEW RPMT1040M0E4-L2	
	RPMT1248M0E4-L	
	NEW RPMT1248M0E8-L1	
	NEW RPMT1248M0E4-L2	
	RPMT1040M0E4-M	
	NEW RPMT1040M0E8-M1	
	NEW RPMT1040M0E4-M2	
	RPMT1248M0E4-M	
	NEW RPMT1248M0E8-M1	
	NEW RPMT1248M0E4-M2	
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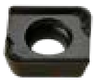
ASPX NEW 	JPGX1404080PPER-JM	L025
	JPGX1404120PPER-JM	
	JPGX1404160PPER-JM	
	JPGX1404240PPER-JM	
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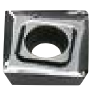
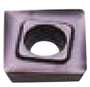
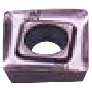
	SPGX1204100PPER-JM	L040
ASX400 	SOGT12T308PEFR-JP	L038
	SOET12T308PEER-JL	L038
	SOMT12T308PEER-JM	L038
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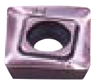
Cutter Type	Order Number	Page
ASX400 	SOMT12T308PEER-JH	L038
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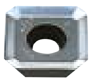
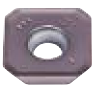
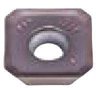
ASX445 	SEGT13T3AGFN-JP	L036
	SEET13T3AGEN-JL	L036
	SEMT13T3AGSN-JM	L037
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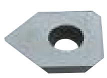	WEEW13T3AGER8C	L049
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Cutter Type	Order Number	Page
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	XDGX175012PDFR-GL	
	XDGX175016PDFR-GL	
	XDGX175020PDFR-GL	
	XDGX175024PDFR-GL	
	XDGX175030PDFR-GL	
	XDGX175032PDFR-GL	
	XDGX175040PDFR-GL	
	XDGX175050PDFR-GL	
	XDGX175004PDER-GM	L046
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	XDGX175004PDFR-GM	L046
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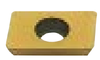
BAE 	AEMW150304ER	L023
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CLASSIFICATION

Cutter Type	Order Number	Page
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	APMT1135PDER-M1	
	APMT1135PDER-M2	
	APMT1135PDER-H1	L023
	APMT1135PDER-H2	
	APMT1135PDER-H3	
	APMT1135PDER-H4	
	APMT1135PDER-H6	
BAP400 	APGT1604PDFR-G2	L023
BAP400 SRM2 	APMT1604PDER-M2	L023
	APMT1604PDER-H1	L023
	APMT1604PDER-H2	
	APMT1604PDER-H4	
	APMT1604PDER-H6	
	APMT1604PDER-H8	
BF407 	SFAN1203ZFFR2	L037
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	SFCN1203ZFFR2	
BN425 DN 	SNC43B2S	L037
	SNMF43B2G	L037

Cutter Type	Order Number	Page
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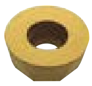
	RPMT1204M0E-JS	
	RPMT1606M0E-JS	
	RPMW08T2M0E	L034
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	RPMW10T3M0E	
	RPMW10T3M0T	
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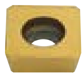
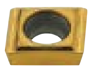
	RPMW1606M0T	
BSP 	SPMB1204APT	L040
CBJP TAB 	JPMT060204-E	L025
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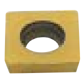
CESP CFSP CGSP 	SPMW090304	L040
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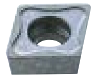
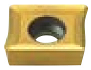
Cutter Type	Order Number	Page
DCCC 	CCMX09T308EN-B	L024
	ZCMX083508ER-A	L048
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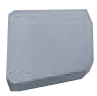
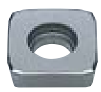
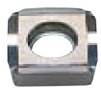
	WPC42EEER10C	L050
FF3000 	SPCA53Z	L039
	SPCG53Z	L039

Cutter Type	Order Number	Page
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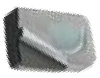
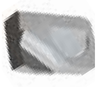
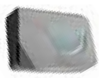
	GOER1408PXFR2	
NEW 	GOER1408PXFR2-8	L051
	GOER1401ZXFR2	L051
NEW 	NP-GOEN1404PXSR05	L051
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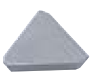
	SEEN1203AFTN3	
	SEER1203AFEN-JS	L035
NSE300 SE300 	TECN1603PEFR1W	L044
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Cutter Type	Order Number	Page
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	TEEN1603PEFR1	L044
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	TEEN1603PETR1	
	TEEN1603PESR1	
	TEEN1603PEZR1	
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NSE400 	TEER2204PEER-JS	L044
NSE400 SE400 	TECN2204PEFR1	L044
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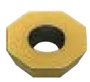
OCTACUT 	OEMX12T3ETR1	L031
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	OEMX1705EER1-JS	
	OEMX1705ETR1-JS	
	REMX1705SN	L033

Cutter Type	Order Number	Page
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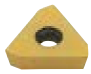
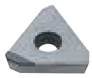
	REMX1705EN-JS	
PMF 	TPEW1303ZPER2	L045
	TPEW1303ZPTR2	L052
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	RDHX07T1M0E	
	RDHX07T1M0S	
	RDHX0702M0E	
	RDHX0702M0S	
	RDHX1003M0E	
	RDHX1003M0S	
	RDHX12T3M0E	L032
	RDHX12T3M0S	
	RDHX1604M0E	
	RDHX1604M0S	
	RDMX07T1M0E	L033
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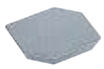
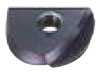
	RDMX0702M0T	
	RDMX1003M0E	
	RDMX1003M0S	
	RDMX1003M0T	
	RDMX12T3M0E	
	RDMX12T3M0S	
	RDMX12T3M0T	
	RDMX1604M0E	
	RDMX1604M0S	
	RDMX1604M0T	

CLASSIFICATION

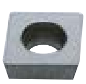
Cutter Type	Order Number	Page
RRD 	RDZX0501M0E	L033
	RDZX07T1M0E	
	RDZX0702M0E	
	RDZX1003M0E	
	RDZX1003M0S	
	RDZX12T3M0E	
	RDZX12T3M0S	
	RDZX1604M0E	
	RDZX1604M0S	
PMR 	CPMT1205ZPEN-M2	L024
	CPMT1205ZPEN-M3	
	CPMT1906ZPEN-M2	
	CPMT1906ZPEN-M3	
SE415 	SEEN1203EFFR1	L035
	SEEN1203EFER1	
	SEEN1203EFTR1	
	SEEN1203EFTR3	
	SEEN1203EFSR1	
	SEER1203EFER-JS	L036
	SECN1203EFFR1	L051
	WEC42EFTR5C	L049
SE515 	SECN1504EFTR1	L036
	SEEN1504EFER1	
	SEEN1504EFTR1	
	SEEN1504EFSR1	
	WEC53EFTR5C	L049

Cutter Type	Order Number	Page
SE545 	SEEN1504AFEN1	L035
	SEEN1504AFTN1	
	SEEN1504AFTN3	
	SEEN1504AFSN1	
	SEER1504AFEN-JS	L035
	WEC53AFTR5C	L049
SG20 	RGEN2004M0EN	L033
	RGEN2004M0SN	
SPX 	JPMX140412-JM	L025
	JPMX190412-JM	
	JPMX140412-WH	L025
	JPMX190412-WH	
	MPMX120412-JM	L030
	MPMX120412-WH	L030
	SPMX120408-JM	L041
	SPMX120408-WH	L041

Cutter Type	Order Number	Page
SRB 	SRBT10	L042
	SRBT12	
	SRBT16	
	SRBT20	
	SRBT25	
	SRBT30	
	SRBT32	
SRF 	SRFT10	L042
	SRFT12	
	SRFT16	
	SRFT20	
	SRFT25	
	SRFT30	
	SRFT32	
SRM2 	SRG16C	L042
	SRG20C	
	SRG25C	
	SRG30C	
	SRG32C	
	SRG16E	L042
	SRG20E	
	SRG25E	
	SRG30E	
	SRG32E	
	SRM16C-M	L043
	SRM20C-M	
	SRM25C-M	
	SRM30C-M	
	SRM32C-M	
	SRM16E-M	L043
	SRM20E-M	
	SRM25E-M	
	SRM30E-M	
	SRM32E-M	
SRM2 ϕ40 ϕ50 	SRG40C	L042
	SRG50C	
	SRG40E	L042
	SRG50E	
	APMT1135PDER-M2	L023
	APMT1604PDER-M2	

ROTATING INSERTS

L

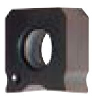
Cutter Type	Order Number	Page
SRM2 ϕ40 ϕ50 	APMT1135PDER-H2	L023
	APMT1604PDER-H2	
SUF 	SUFT10R05	L043
	SUFT10R10	
	SUFT10R20	
	SUFT12R05	
	SUFT12R10	
	SUFT12R20	
	SUFT12R30	
	SUFT16R05	
	SUFT16R10	
	SUFT16R15	
	SUFT16R20	
	SUFT16R30	
	SUFT20R05	
	SUFT20R10	
	SUFT20R15	
	SUFT20R20	
	SUFT20R30	
	SUFT25R05	
	SUFT25R10	
	SUFT25R20	
	SUFT25R30	
	SUFT30R05	
	SUFT30R10	
	SUFT30R20	
	SUFT30R30	
	SUFT32R05	
	SUFT32R10	
	SUFT32R20	
TBE1 	SPMT120408-A	L040
TSMP 	MPMW070308	L030
	MPMW090308	
	MPMW120408	

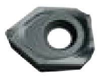
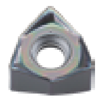
Cutter Type	Order Number	Page
DCV3 Side Cutter NEW 	LNGU090604PNER-M	L026
	LNGU090604PNEL-M	
	LNGU090608PNER-M	
	LNGU090608PNEL-M	
	LNGU090612PNER-M	
	LNGU090612PNEL-M	
	LNGU090616PNER-M	
	LNGU090616PNEL-M	
	LNGU090620PNER-M	
	LNGU090620PNEL-M	
	LNGU090624PNER-M	
	LNGU090624PNEL-M	
	LNGU090630PNER-M	
	LNGU090630PNEL-M	
	LNGU090640PNER-M	
	LNGU090640PNEL-M	
DCV4 Side Cutter 	LNGU130804PNER-M	L026
	LNGU130804PNEL-M	
	LNGU130808PNER-M	
	LNGU130808PNEL-M	
	LNGU130820PNER-M	
	LNGU130820PNEL-M	
	LNGU130830PNER-M	
	LNGU130830PNEL-M	
	LNGU130840PNER-M	
	LNGU130840PNEL-M	
	LNGU130850PNER-M	
	LNGU130850PNEL-M	
NEW 	LNGU130804PNER-R	L026
	LNGU130804PNEL-R	
	LNGU130808PNER-R	
	LNGU130808PNEL-R	
	LNGU130812PNER-R	
	LNGU130812PNEL-R	
	LNGU130816PNER-R	
	LNGU130816PNEL-R	
	LNGU130820PNER-R	
	LNGU130820PNEL-R	
	LNGU130824PNER-R	
	LNGU130824PNEL-R	
	LNGU130830PNER-R	
	LNGU130830PNEL-R	
	LNGU130840PNER-R	
	LNGU130840PNEL-R	
	LNGU130850PNER-R	
	LNGU130850PNEL-R	

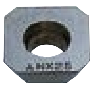
Cutter Type	Order Number	Page
DCV4 Side Cutter 	LNGU171004PNER-R	L027
	LNGU171004PNEL-R	
	LNGU171008PNER-R	
	LNGU171008PNEL-R	
	LNGU171012PNER-R	
	LNGU171012PNEL-R	
	LNGU171016PNER-R	
	LNGU171016PNEL-R	
	LNGU171020PNER-R	
	LNGU171020PNEL-R	
	LNGU171024PNER-R	
	LNGU171024PNEL-R	
	LNGU171030PNER-R	
	LNGU171030PNEL-R	
	LNGU171040PNER-R	
	LNGU171040PNEL-R	
	LNGU171050PNER-R	
	LNGU171050PNEL-R	
	LNGU171060PNER-R	
	LNGU171060PNEL-R	
	LNGU171070PNER-R	
	LNGU171070PNEL-R	
VPX200 NEW 	LOGU0904020PNER-L	L028
	LOGU0904040PNER-L	
	LOGU0904080PNER-L	
	LOGU0904100PNER-L	
	LOGU0904120PNER-L	
	LOGU0904160PNER-L	
	LOGU0904020PNFR-L	
	LOGU0904040PNFR-L	
	LOGU0904080PNFR-L	
	LOGU0904100PNFR-L	
	LOGU0904120PNFR-L	
	LOGU0904160PNFR-L	
	LOGU0904020PNER-M	L028
	LOGU0904040PNER-M	
	LOGU0904080PNER-M	
	LOGU0904100PNER-M	
	LOGU0904120PNER-M	
	LOGU0904160PNER-M	
	LOGU0904020PNFR-M	
	LOGU0904040PNFR-M	
	LOGU0904080PNFR-M	
	LOGU0904100PNFR-M	
	LOGU0904120PNFR-M	
	LOGU0904160PNFR-M	

CLASSIFICATION

Cutter Type	Order Number	Page
VPX300 NEW 	LOGU1207020PNER-L	L029
	LOGU1207040PNER-L	
	LOGU1207080PNER-L	
	LOGU1207100PNER-L	
	LOGU1207120PNER-L	
	LOGU1207160PNER-L	
	LOGU1207200PNER-L	
	LOGU1207240PNER-L	
	LOGU1207300PNER-L	
	LOGU1207320PNER-L	
	LOGU1207020PNFR-L	
	LOGU1207040PNFR-L	
	LOGU1207080PNFR-L	
	LOGU1207100PNFR-L	
	LOGU1207120PNFR-L	
	LOGU1207160PNFR-L	
	LOGU1207200PNFR-L	
	LOGU1207240PNFR-L	
	LOGU1207300PNFR-L	
	LOGU1207320PNFR-L	
	LOGU1207020PNER-M	L029
	LOGU1207040PNER-M	
	LOGU1207080PNER-M	
	LOGU1207100PNER-M	
	LOGU1207120PNER-M	
	LOGU1207160PNER-M	
	LOGU1207200PNER-M	
	LOGU1207240PNER-M	
	LOGU1207300PNER-M	
	LOGU1207320PNER-M	
	LOGU1207020PNFR-M	
	LOGU1207040PNFR-M	
	LOGU1207080PNFR-M	
	LOGU1207100PNFR-M	
	LOGU1207120PNFR-M	
	LOGU1207160PNFR-M	
	LOGU1207200PNFR-M	
	LOGU1207240PNFR-M	
	LOGU1207300PNFR-M	
	LOGU1207320PNFR-M	

Cutter Type	Order Number	Page
VFX5 	XNMU160708R-MS	L047
	XNMU160712R-MS	
	XNMU160716R-MS	
	XNMU160724R-MS	
	XNMU160732R-MS	
	XNMU160740R-MS	
	XNMU160708R-HS	L047
	XNMU160708R-LS	L047
VFX6 	XNMU190912R-MS	L047
	XNMU190916R-MS	
	XNMU190924R-MS	
	XNMU190932R-MS	
	XNMU190940R-MS	
	XNMU190950R-MS	
	XNMU190912R-HS	L047
	XNMU190912R-LS	L047
VOX400 	SONX1206PER	L038
	SONX1206PEL	
	WOEX1206PER5C	L050
VIPER 	TPNX1605N	L045

Cutter Type	Order Number	Page
WJX09 WJX14 	NEW JOMU090512ZZER-L	L025
	NEW JOMU140715ZZER-L	
	NEW JOMU090512ZZER-M	
	JOMU140715ZZER-M	
	NEW JOMU090512ZZER-R	
	NEW JOMU140715ZZER-R	
WSX445 	SNGU140812ANFR-L	L037
	SNGU140812ANFL-L	
	SNGU140812ANER-L	
	SNGU140812ANEL-L	
	SNGU140812ANER-M	
	SNGU140812ANEL-M	
	SNMU140812ANER-M	
	SNMU140812ANEL-M	
	SNMU140812ANER-R	
	SNMU140812ANEL-R	
	SNMU140812ANER-H	
	WNGU1406ANEN8C-M	L050
WWX400 NEW 	6NGU1409040PNER-L	L022
	6NGU1409080PNER-L	
	6NGU1409040PNFR-L	
	6NGU1409080PNFR-L	
	6NMU1409040PNER-M	
	6NMU1409080PNER-M	
	6NMU1409080PNER-R	
Corner Angle 0° 11° Positive 	TPEN1603PPR	L045
	TPEN1603PPN	
	TPEN2204PDR	
	TPEN2204PDL	
	TPNN2204PDR	L045
Corner Angle 15° 11° Positive 	SPEN1203EDR	L039
	SPEN1203EDL	
	SPEN1504EDR	
	SPEN1504EDL	
	SPNN1203EDR	L041

Cutter Type	Order Number	Page
Corner Angle 45° 15° Positive 	SDEN1203AEN	L035
Corner Angle 45° 20° Positive 	SEER1204AFEN-JS	L035
	SEEW1204AFTN	L036
	SEMN1204AZTN	L036
Negative 	SNEN1204EN	L037
	SNEN1504EN	
	SNMN120408	L038
	SNMN120412	
11° Positive 	SPGN120304	L040
	SPGN120308	
	SPGN120312	
	SPGN150404	
	SPGN150408	
	SPMN120304	
	SPMN120304T	
	SPMN120308	
	SPMN120312	
	SPMN120408	
	SPMN120412	
	SPMN150408	
	SPMN150412	

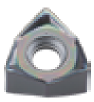
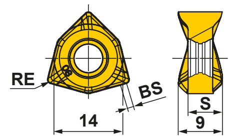
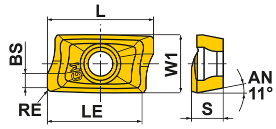
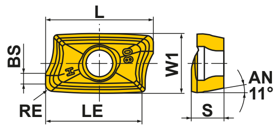
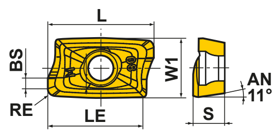
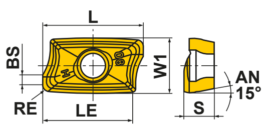
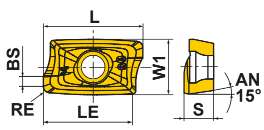
Cutter Type	Order Number	Page
11° Positive 	TPMN160304	L045
	TPMN160308	
	TPMN160312	
	TPMN220404	
	TPMN220408	
	TPMN220408T	
	TPMN220412	

ROTATING INSERTS

Work Material			MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	VP20RT	TF15
	P	Steel		◐	✤				◐	◐	
	M	Stainless Steel				◐			◐	◐	
	K	Cast Iron	◐						✤	✤	
	N	Non-ferrous Metal									◐
	S	Heat-resistant Alloy, Titanium Alloy					◐	✤	◐	✤	
	H	Hardened Materials							◐		

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

Honing: E:Round F:Sharp

Shape	Order Number	Class	Honing	Coated MC5020	Coated MP6120	Coated MP6130	Coated MP7130	Coated MP9120	Coated MP9130	Coated VP15TF	Coated VP20RT	Carbide TF15	L	LE	W1	S	BS	RE	Geometry
WWX400 ➲K056 NEW 	6NGU1409040PNER-L	G	E	★	★	★	●	●	★	★			—	—	—	7	1.7	0.4	
	6NGU1409080PNER-L	G	E	★	●	●	●	●	●	●			—	—	—	7	1.3	0.8	
	6NGU1409040PNFR-L	G	F									●	—	—	—	7	1.7	0.4	
	6NGU1409080PNFR-L	G	F									●	—	—	—	7	1.3	0.8	
	6NMU1409040PNER-M	M	E	●	●	●	●	●	●	●			—	—	—	7	1.7	0.4	
	6NMU1409080PNER-M	M	E	●	●	●	●	●	●	●			—	—	—	7	1.3	0.8	
	6NMU1409080PNER-R	M	E	●	●	●		●	●	●			—	—	—	7	1.3	0.8	
APX3000 ➲K133 APX3000 Long Cutting Edge ➲K147 	AOGT123602PEFR-GM	G	F									●	12	10	6.6	3.6	1.8	0.2	
	AOGT123604PEFR-GM	G	F									●	12	10	6.6	3.6	1.6	0.4	
	AOGT123608PEFR-GM	G	F									●	12	10	6.6	3.6	1.2	0.8	
APX3000 ➲K133 APX3000 Long Cutting Edge ➲K147 	AOMT123604PEER-H	M	E	●	●	●	●	●	●	●	●		12	10	6.6	3.6	1.6	0.4	
	AOMT123608PEER-H	M	E	●	●	●	●	●	●	●	●		12	10	6.6	3.6	1.2	0.8	
	AOMT123616PEER-H	M	E	●	●	●	●	●	●	●	●		12	10	6.6	3.6	0.4	1.6	
APX3000 ➲K133 APX3000 Long Cutting Edge ➲K147 	AOMT123602PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	1.8	0.2	
	AOMT123604PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	1.6	0.4	
	AOMT123608PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	1.2	0.8	
	AOMT123610PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	1.0	1.0	
	AOMT123612PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	0.8	1.2	
	AOMT123616PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	0.4	1.6	
	AOMT123620PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	0.4	2.0	
	AOMT123624PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	0.4	2.4	
	AOMT123630PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	0.4	3.0	
	AOMT123632PEER-M	M	E		●	●	●	●	●	●	●		12	10	6.6	3.6	0.4	3.2	
APX4000 ➲K140 APX4000 Long Cutting Edge ➲K151 	AOMT184804PEER-H	M	E	●	●	●	●	●	●	●	●		18	15	9	4.8	1.8	0.4	
	AOMT184808PEER-H	M	E	●	●	●	●	●	●	●	●		18	15	9	4.8	1.4	0.8	
	AOMT184816PEER-H	M	E	●	●	●	●	●	●	●	●		18	15	9	4.8	0.4	1.6	
	AOMT184832PEER-H	M	E			●	●				●		18	15	9	4.8	0.4	3.2	
	AOMT184840PEER-H	M	E			●	●				●		18	15	9	4.8	0.4	4.0	
	AOMT184850PEER-H	M	E			●	●				●		18	15	9	4.8	—	5.0	
	AOMT184864PEER-H	M	E			●	●				●		18	15	9	4.8	—	6.35	
APX4000 ➲K140 APX4000 Long Cutting Edge ➲K151 	AOMT184804PEER-M	M	E		●	●	●	●	●	●	●		18	15	9	4.8	1.8	0.4	
	AOMT184808PEER-M	M	E		●	●	●	●	●	●	●		18	15	9	4.8	1.4	0.8	
	AOMT184810PEER-M	M	E		●			●	●	●			18	15	9	4.8	1.0	1.0	
	AOMT184812PEER-M	M	E		●			●	●	●			18	15	9	4.8	0.8	1.2	
	AOMT184816PEER-M	M	E		●	●	●	●	●	●	●		18	15	9	4.8	0.4	1.6	
	AOMT184820PEER-M	M	E		●			●	●	●			18	15	9	4.8	0.4	2.0	

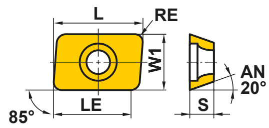
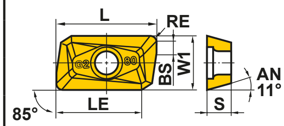
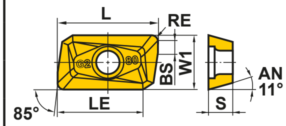
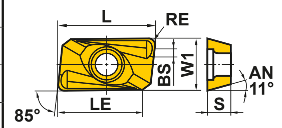
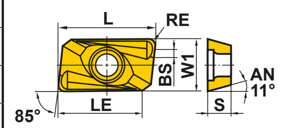
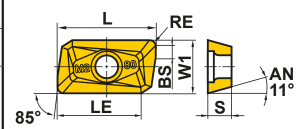
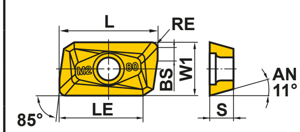
● : Inventory maintained. ★ : Inventory maintained in Japan. (10 inserts in one case)

● ★ = NEW

Work Material				F7030	VP15TF	UP20M	NX2525	NX4545	UTi20T	HTi10
	P	Steel		◐	◐	◐	●	◐	◐	
	M	Stainless Steel		◐	◐	◐	●	◐	◐	
	K	Cast Iron			✣		●		✣	◐
	N	Non-ferrous Metal								◐
	S	Heat-resistant Alloy, Titanium Alloy			◐					
	H	Hardened Materials			◐					

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

Honing:
E:Round F:Sharp

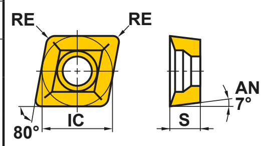
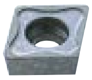
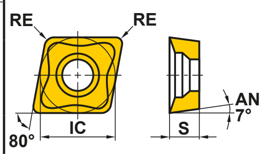
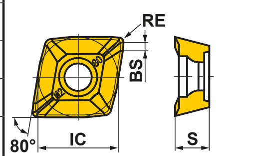
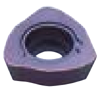
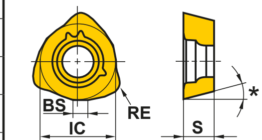
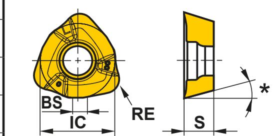
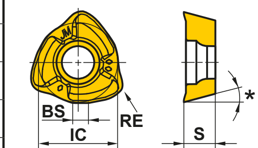
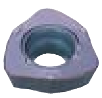
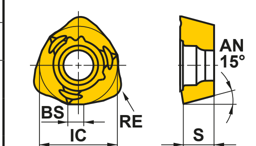
Shape	Order Number	Class	Honing	F7030 (Coated)	VP15TF (Coated)	UP20M (Coated)	NX2525 (Cermet)	NX4545 (Cermet)	UTi20T (Carbide)	HTi10 (Carbide)	L	LE	W1	S	BS	RE	Geometry
BAE 	**AEMW150304ER**	M	E			★	●		●		16.696	15.2	9.525	3.18	—	0.4	
	AEMW150308ER	M	E			★	★		●		16.623	14.8	9.525	3.18	—	0.8	
	AEMW19T304ER	M	E			★	●				20.161	18.4	12.7	3.97	—	0.4	
	AEMW19T308ER	M	E			★	★				20.088	18.0	12.7	3.97	—	0.8	
BAP300 	**APGT1135PDFR-G2**	G	F							●	11.3	9.7	6.35	3.5	1.2	0.8	
BAP400 	**APGT1604PDFR-G2**	G	F							●	17.02	14	9.525	4.76	1.4	0.8	
BAP300 SRM2 ➲K220 	**APMT1135PDER-H1**	M	E	●	●		●	★		●	11.25	9	6.35	3.5	1.5	0.4	
	APMT1135PDER-H2	M	E	●	●		●	●		●	11.25	9	6.35	3.5	1.2	0.8	
	APMT1135PDER-H3	M	E	●							11.26	9	6.35	3.5	0.8	1.2	
	APMT1135PDER-H4	M	E	●							11.24	9	6.35	3.5	0.4	1.6	
	APMT1135PDER-H6	M	E	●							11.10	9	6.35	3.5	0.4	2.4	
BAP400 SRM2 ➲K220 SRM2ϕ40 ϕ50 ➲K228 	**APMT1604PDER-H1**	M	E	●			●				17.02	14	9.525	4.76	1.7	0.4	
	APMT1604PDER-H2	M	E	●	●		●	●		●	17.11	14	9.525	4.76	1.4	0.8	
	APMT1604PDER-H4	M	E	●							17.06	14	9.525	4.76	0.4	1.6	
	APMT1604PDER-H6	M	E	●							16.93	14	9.525	4.76	0.4	2.4	
	APMT1604PDER-H8	M	E	●							16.79	14	9.525	4.76	0.4	3.2	
BAP300 SRM2 ➲K220 	**APMT1135PDER-M0**	M	E	★							11.25	9	6.35	3.5	1.8	0.2	
	APMT1135PDER-M1	M	E	★							11.25	9	6.35	3.5	1.5	0.4	
	APMT1135PDER-M2	M	E	●	●			●			11.18	9	6.35	3.5	1.2	0.8	
BAP400 SRM2 ➲K220 SRM2ϕ40 ϕ50 ➲K228 	**APMT1604PDER-M2**	M	E	●	●			●			17.10	14	9.525	4.76	1.4	0.8	

ROTATING INSERTS

Work Material			F7030	FH7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	MP9140	VP15TF	VP30RT	UP20M	UTi20T
	P	Steel	◐	◐	◐	✤						◐	✤	◐	◐
	M	Stainless Steel	◐				◐	✤				◐	✤	◐	◐
	K	Cast Iron		◐								✤	✤		✤
	N	Non-ferrous Metal													
	S	Heat-resistant Alloy, Titanium Alloy							◐	✤	✤	◐			
	H	Hardened Materials										◐			

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

Honing:
E: Round S: Chamfer + Hone

Shape	Order Number	Class	Honing	Coated: F7030	FH7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	MP9140 (NEW)	VP15TF	VP30RT	UP20M	Carbide: UTi20T	IC	S	BS	RE	Geometry
DCCC ➲K200 	CCMX083508EN-A	M	E	●											★	★	7.94	3.5	–	0.8	
	CCMX09T308EN-A	M	E	●									●		★	★	9.525	3.97	–	0.8	
DCCC ➲K200 	CCMX09T308EN-B	M	E	●												★	9.525	3.97	–	0.8	
PMR ➲K236 	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 ➲K180 	JOMW06T215ZZSR-FT	M	S		●	●	●	●	●	●	●		●	●			6.35	2.78	1.2	1.5	
	JOMW080320ZZSR-FT	M	S		●	●	●	●	●	●	●		●	●			8	3.18	1.4	2	
	JDMW09T320ZDSR-FT	M	S		●	●	●	●	●	●	●		●	●			9.525	3.97	1.8	2	
	JDMW120420ZDSR-FT	M	S		●	●	●	●	●	●	●		●	●			12	4.76	2.5	2	
	JDMW140520ZDSR-FT	M	S		●	●	●	●	●	●	●		●	●			14	5.56	2.8	2	*JOMW... : 13°, JDMW... : 15°
AJX ➲K180 	JOMT06T216ZZER-JL	M	E					●	●	●	●	●					6.35	2.78	1.2	1.6	
	JOMT080322ZZER-JL	M	E					●	●	●	●	●					8	3.18	1.4	2.2	
	JDMT09T323ZDER-JL	M	E					●	●	●	●	●					9.525	3.97	1.8	2.3	
	JDMT120423ZDER-JL	M	E					●	●	●	●	●					12	4.76	2.5	2.3	
	JDMT140523ZDER-JL	M	E					●	●	●	●	●					14	5.56	2.8	2.3	*JOMT... : 13°, JDMT... : 15°
AJX ➲K180 	JOMT06T215ZZSR-JM	M	S		●	●	●	●	●	●	●		●	●			6.35	2.78	1.2	1.5	
	JOMT080320ZZSR-JM	M	S		●	●	●	●	●	●	●		●	●			8	3.18	1.4	2	
	JDMT09T320ZDSR-JM	M	S		●	●	●	●	●	●	●		●	●			9.525	3.97	1.8	2	
	JDMT120420ZDSR-JM	M	S		●	●	●	●	●	●	●		●	●			12	4.76	2.5	2	
	JDMT140520ZDSR-JM	M	S		●	●	●	●	●	●	●		●	●			14	5.56	2.8	2	*JOMT... : 13°, JDMT... : 15°
AJX ➲K180 	JDMT120420ZDSR-ST	M	S		●	●	●	●	●				●	●			12	4.76	2.5	2	
	JDMT140520ZDSR-ST	M	S		●	●	●	●	●				●	●			14	5.56	2.8	2	

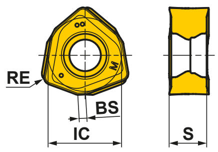
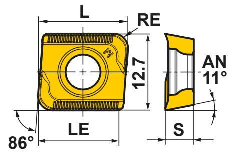
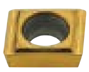
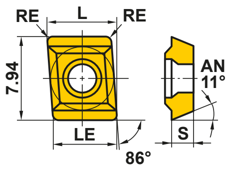
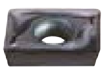
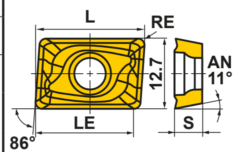
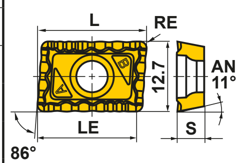
● = NEW

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

Work Material			MC7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	MP9140	VP15TF	VP20RT	VP30RT	UP20M	UTi20T
	P	Steel	●	●	✣						●	●	✣	●	●
	M	Stainless Steel	◐			◐	✣				◐	◐	✣	◐	◐
	K	Cast Iron									✣	✣			✣
	N	Non-ferrous Metal													
	S	Heat-resistant Alloy, Titanium Alloy						◐	✣	✣	◐	✣	✣		
	H	Hardened Materials									◐				

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

Honing:
E: Round S: Chamfer + Hone

Shape	Order Number	Class	Honing	Coated MC7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	MP9140 (NEW)	VP15TF	VP20RT	VP30RT	UP20M	Carbide UTi20T	Dimensions (mm) L	LE	IC	S	BS	RE	Geometry
WJX09 ➲K072 WJX14 ➲K079 	JOMU090512ZZER-L	M	E	●	●	●	●	●	●	●		●		●			–	–	9.525	4.73	0.88	1.2	 Right hand insert only.
	JOMU140715ZZER-L	M	E	●	●	●	●	●	●	●		★		★			–	–	14	6.58	1.3	1.5	
	JOMU090512ZZER-M	M	E	●	●	●	●	●	●	●		●		●			–	–	9.525	4.75	0.88	1.2	
	JOMU140715ZZER-M	M	E	●	●	●	●	●	●	●		★		★			–	–	14	6.63	1.3	1.5	
	JOMU090512ZZER-R	M	E	●	●	●						●		●			–	–	9.525	4.83	0.88	1.2	
	JOMU140715ZZER-R	M	E	●	●	●						●		●			–	–	14	6.75	1.3	1.5	
ASPX ➲K208 NEW 	JPGX1404080PPER-JM	G	E								●						15.12	13.4	–	4.8	–	0.8	
	JPGX1404120PPER-JM	G	E								●						15.06	13.3	–	4.8	–	1.2	
	JPGX1404160PPER-JM	G	E								●						15.00	13.3	–	4.8	–	1.6	
	JPGX1404240PPER-JM	G	E								●						14.88	13.2	–	4.8	–	2.4	
	JPGX1404320PPER-JM	G	E								●						14.72	13.1	–	4.8	–	3.2	
	JPGX1404400PPER-JM	G	E								●						14.64	13.0	–	4.8	–	4.0	
	JPGX1404500PPER-JM	G	E								●						14.49	13.0	–	4.8	–	5.0	
	JPGX1404635PPER-JM	G	E								●						14.29	12.9	–	4.8	–	6.35	
TAB 	JPMT060204-E	M	E									★			●	●	7.0	6.0	–	2.38	–	0.4	 Inner insert (E) shown.
SPX ➲K203 	JPMX140412-JM	M	E									●	●				15.04	12.9	–	4.79	–	1.2	
	JPMX190412-JM	M	E									●	●				19.81	17.6	–	4.83	–	1.2	
SPX ➲K203 	JPMX140412-WH	M	E									●	●				15.04	12.9	–	4.76	–	1.2	
	JPMX190412-WH	M	E									●	●				19.81	17.6	–	4.76	–	1.2	

● ★ = NEW

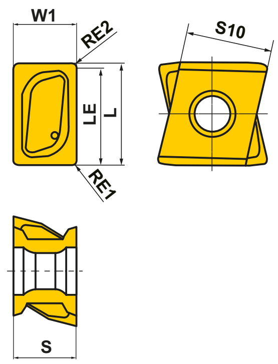
ROTATING INSERTS

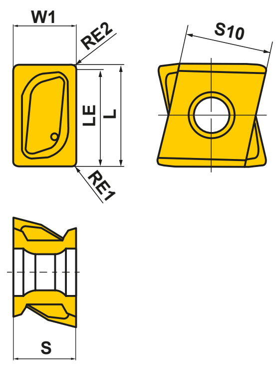
Work Material			MP6120	VP15TF
	P	Steel	◑	◑
	M	Stainless Steel		
	K	Cast Iron		✽
	N	Non-ferrous Metal		
	S	Heat-resistant Alloy, Titanium Alloy		◑
	H	Hardened Steel		

Cutting Conditions (Guide):
●:Stable Cutting ◑:General Cutting ✽:Unstable Cutting

Honing:
E:Round

Shape	Order Number	Hand	Class	Honing	Coated MP6120	Coated VP15TF	L	LE	S	S10	RE1	RE2	W1	Geometry
DCV3 Side Cutter	**LNGU090604PNER-M**	R	G	E		●	9.0	8.6	6.0	8.5	0.4	0.4	6.0	
	LNGU090604PNEL-M	L	G	E		●	9.0	8.6	6.0	8.5	0.4	0.4	6.0	
	LNGU090608PNER-M	R	G	E		●	9.0	8.6	6.0	8.5	0.8	0.4	6.0	
	LNGU090608PNEL-M	L	G	E		●	9.0	8.6	6.0	8.5	0.8	0.4	6.0	
	LNGU090612PNER-M	R	G	E		●	9.0	8.6	6.0	8.5	1.2	0.4	6.0	
	LNGU090612PNEL-M	L	G	E		●	9.0	8.6	6.0	8.5	1.2	0.4	6.0	
NEW	**LNGU090616PNER-M**	R	G	E		●	9.0	8.6	6.0	8.5	1.6	0.4	6.0	
	LNGU090616PNEL-M	L	G	E		●	9.0	8.6	6.0	8.5	1.6	0.4	6.0	
	LNGU090620PNER-M	R	G	E		●	9.0	8.6	6.0	8.5	2.0	0.4	6.0	
	LNGU090620PNEL-M	L	G	E		●	9.0	8.6	6.0	8.5	2.0	0.4	6.0	
	LNGU090624PNER-M	R	G	E		●	9.0	8.6	6.0	8.5	2.4	0.4	6.0	
	LNGU090624PNEL-M	L	G	E		●	9.0	8.6	6.0	8.5	2.4	0.4	6.0	
	LNGU090630PNER-M	R	G	E		●	9.0	8.6	6.0	8.5	3.0	0.4	6.0	
	LNGU090630PNEL-M	L	G	E		●	9.0	8.6	6.0	8.5	3.0	0.4	6.0	
	LNGU090640PNER-M	R	G	E		●	9.0	8.6	6.0	8.5	4.0	0.4	6.0	
	LNGU090640PNEL-M	L	G	E		●	9.0	8.6	6.0	8.5	4.0	0.4	6.0	Right hand insert shown.
DCV4 Side Cutter	**LNGU130804PNER-M**	R	G	E		●	13.0	12.2	8.0	11.0	0.4	0.8	8.0	
	LNGU130804PNEL-M	L	G	E		●	13.0	12.2	8.0	11.0	0.4	0.8	8.0	
	LNGU130808PNER-M	R	G	E		●	13.0	12.2	8.0	11.0	0.8	0.8	8.0	
	LNGU130808PNEL-M	L	G	E		●	13.0	12.2	8.0	11.0	0.8	0.8	8.0	
	LNGU130820PNER-M	R	G	E		●	13.0	12.2	8.0	11.0	2.0	0.8	8.0	
	LNGU130820PNEL-M	L	G	E		●	13.0	12.2	8.0	11.0	2.0	0.8	8.0	
	LNGU130830PNER-M	R	G	E		●	13.0	11.4	8.0	11.0	3.0	1.6	8.0	
	LNGU130830PNEL-M	L	G	E		●	13.0	11.4	8.0	11.0	3.0	1.6	8.0	
	LNGU130840PNER-M	R	G	E		●	13.0	11.4	8.0	11.0	4.0	1.6	8.0	
	LNGU130840PNEL-M	L	G	E		●	13.0	11.4	8.0	11.0	4.0	1.6	8.0	
	LNGU130850PNER-M	R	G	E		●	13.0	11.4	8.0	11.0	5.0	1.6	8.0	
	LNGU130850PNEL-M	L	G	E		●	13.0	11.4	8.0	11.0	5.0	1.6	8.0	
	NEW **LNGU130804PNER-R**	R	G	E	●	●	13.0	12.2	8.0	11.0	0.4	0.8	8.0	
	NEW **LNGU130804PNEL-R**	L	G	E	●	●	13.0	12.2	8.0	11.0	0.4	0.8	8.0	
	NEW **LNGU130808PNER-R**	R	G	E	●	●	13.0	12.2	8.0	11.0	0.8	0.8	8.0	
	NEW **LNGU130808PNEL-R**	L	G	E	●	●	13.0	12.2	8.0	11.0	0.8	0.8	8.0	
	NEW **LNGU130812PNER-R**	R	G	E	●	●	13.0	12.2	8.0	11.0	1.2	0.8	8.0	
	NEW **LNGU130812PNEL-R**	L	G	E	●	●	13.0	12.2	8.0	11.0	1.2	0.8	8.0	
	NEW **LNGU130816PNER-R**	R	G	E	●	●	13.0	12.2	8.0	11.0	1.6	0.8	8.0	
	NEW **LNGU130816PNEL-R**	L	G	E	●	●	13.0	12.2	8.0	11.0	1.6	0.8	8.0	
	NEW **LNGU130820PNER-R**	R	G	E	●	●	13.0	12.2	8.0	11.0	2.0	0.8	8.0	
	NEW **LNGU130820PNEL-R**	L	G	E	●	●	13.0	12.2	8.0	11.0	2.0	0.8	8.0	Right hand insert shown.





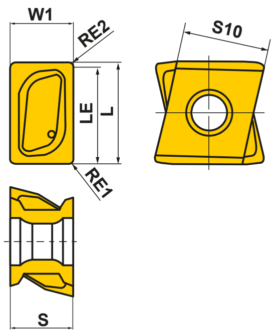
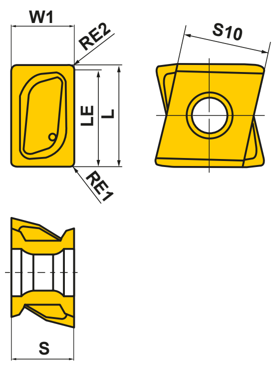
● = NEW

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

Work Material			MP6120	VP15TF
	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	Hand	Class	Honing	Coated MP6120	Coated VP15TF	L	LE	S	S10	RE1	RE2	W1	Geometry
DCV4 Side Cutter 	NEW **LNGU130824PNER-R**	R	G	E	●	●	13.0	12.2	8.0	11.0	2.4	0.8	8.0	 Right hand insert shown.
	NEW **LNGU130824PNEL-R**	L	G	E	●	●	13.0	12.2	8.0	11.0	2.4	0.8	8.0	
	NEW **LNGU130830PNER-R**	R	G	E	●	●	13.0	11.4	8.0	11.0	3.0	1.6	8.0	
	NEW **LNGU130830PNEL-R**	L	G	E	●	●	13.0	11.4	8.0	11.0	3.0	1.6	8.0	
	NEW **LNGU130840PNER-R**	R	G	E	●	●	13.0	11.4	8.0	11.0	4.0	1.6	8.0	
	NEW **LNGU130840PNEL-R**	L	G	E	●	●	13.0	11.4	8.0	11.0	4.0	1.6	8.0	
	NEW **LNGU130850PNER-R**	R	G	E	●	●	13.0	11.4	8.0	11.0	5.0	1.6	8.0	
	NEW **LNGU130850PNEL-R**	L	G	E	●	●	13.0	11.4	8.0	11.0	5.0	1.6	8.0	
DCV5 Side Cutter 	**LNGU171004PNER-R**	R	G	E	●	●	17.0	16.2	10.0	13.0	0.4	0.8	10.0	 Right hand insert shown.
	LNGU171004PNEL-R	L	G	E	●	●	17.0	16.2	10.0	13.0	0.4	0.8	10.0	
	LNGU171008PNER-R	R	G	E	●	●	17.0	16.2	10.0	13.0	0.8	0.8	10.0	
	LNGU171008PNEL-R	L	G	E	●	●	17.0	16.2	10.0	13.0	0.8	0.8	10.0	
	LNGU171012PNER-R	R	G	E	●	●	17.0	16.2	10.0	13.0	1.2	0.8	10.0	
	LNGU171012PNEL-R	L	G	E	●	●	17.0	16.2	10.0	13.0	1.2	0.8	10.0	
	LNGU171016PNER-R	R	G	E	●	●	17.0	16.2	10.0	13.0	1.6	0.8	10.0	
	LNGU171016PNEL-R	L	G	E	●	●	17.0	16.2	10.0	13.0	1.6	0.8	10.0	
	LNGU171020PNER-R	R	G	E	●	●	17.0	16.2	10.0	13.0	2.0	0.8	10.0	
	LNGU171020PNEL-R	L	G	E	●	●	17.0	16.2	10.0	13.0	2.0	0.8	10.0	
	LNGU171024PNER-R	R	G	E	●	●	17.0	16.2	10.0	13.0	2.4	0.8	10.0	
	LNGU171024PNEL-R	L	G	E	●	●	17.0	16.2	10.0	13.0	2.4	0.8	10.0	
	LNGU171030PNER-R	R	G	E	●	●	17.0	15.4	10.0	13.0	3.0	1.6	10.0	
	LNGU171030PNEL-R	L	G	E	●	●	17.0	15.4	10.0	13.0	3.0	1.6	10.0	
	LNGU171040PNER-R	R	G	E	●	●	17.0	15.4	10.0	13.0	4.0	1.6	10.0	
	LNGU171040PNEL-R	L	G	E	●	●	17.0	15.4	10.0	13.0	4.0	1.6	10.0	
	LNGU171050PNER-R	R	G	E	●	●	17.0	15.4	10.0	13.0	5.0	1.6	10.0	
	LNGU171050PNEL-R	L	G	E	●	●	17.0	15.4	10.0	13.0	5.0	1.6	10.0	
	LNGU171060PNER-R	R	G	E	●	●	17.0	15.4	10.0	13.0	6.0	1.6	10.0	
	LNGU171060PNEL-R	L	G	E	●	●	17.0	15.4	10.0	13.0	6.0	1.6	10.0	
	LNGU171070PNER-R	R	G	E	●	●	17.0	15.4	10.0	13.0	7.0	1.6	10.0	
	LNGU171070PNEL-R	L	G	E	●	●	17.0	15.4	10.0	13.0	7.0	1.6	10.0	

Dimensions (mm)

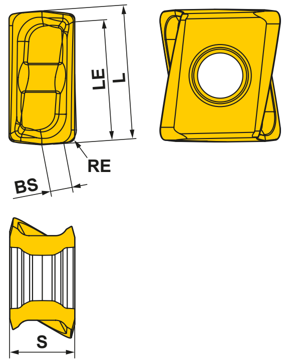
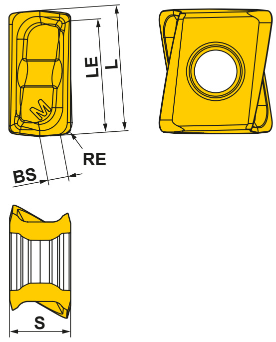
● = NEW

ROTATING INSERTS

Work Material			MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	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	MC5020 (Coated)	MP6120 (Coated)	MP6130 (Coated)	MP7130 (Coated)	MP9120 (Coated)	MP9130 (Coated)	VP15TF (Coated)	TF15 (Carbide)	L	RE	LE	S	BS	Geometry
VPX200 ➲K086 VPX200 Long Cutting Edge ➲K114	LOGU0904020PNER-L	G	E	★	★	★	★	★	★	★		8.7	0.2	7.6	4.3	1.7	
	LOGU0904040PNER-L	G	E	●	●	●	●	●	●	★		8.7	0.4	7.6	4.3	1.5	
	LOGU0904080PNER-L	G	E	●	●	●	●	●	●	★		8.7	0.8	7.6	4.3	1.2	
	LOGU0904100PNER-L	G	E	★	★	★	★	★	★	★		8.7	1.0	7.6	4.3	1.0	
	LOGU0904120PNER-L	G	E	★	★	★	★	★	★	★		8.7	1.2	7.6	4.3	0.8	
NEW 	LOGU0904160PNER-L	G	E	●	●	●	●	●	●	★		8.7	1.6	7.6	4.3	0.5	
	LOGU0904020PNFR-L	G	F								●	8.7	0.2	7.6	4.3	1.7	
	LOGU0904040PNFR-L	G	F								●	8.7	0.4	7.6	4.3	1.5	
	LOGU0904080PNFR-L	G	F								●	8.7	0.8	7.6	4.3	1.2	
	LOGU0904100PNFR-L	G	F								★	8.7	1.0	7.6	4.3	1.0	
	LOGU0904120PNFR-L	G	F								★	8.7	1.2	7.6	4.3	0.8	
	LOGU0904160PNFR-L	G	F								★	8.7	1.6	7.6	4.3	0.5	Right hand insert only.
VPX200 ➲K086 VPX200 Long Cutting Edge ➲K114	LOGU0904020PNER-M	G	E	★	★	★	★	★	★	★		8.7	0.2	7.6	4.3	1.7	
	LOGU0904040PNER-M	G	E	●	●	●	●	●	●	★		8.7	0.4	7.6	4.3	1.6	
	LOGU0904080PNER-M	G	E	●	●	●	●	●	●	★		8.7	0.8	7.6	4.3	1.2	
	LOGU0904100PNER-M	G	E	★	★	★	★	★	★	★		8.7	1.0	7.6	4.3	1.0	
	LOGU0904120PNER-M	G	E	★	★	★	★	★	★	★		8.7	1.2	7.6	4.3	0.9	
	LOGU0904160PNER-M	G	E	●	●	●	●	●	●	★		8.7	1.6	7.6	4.3	0.5	
	LOGU0904020PNFR-M	G	F								●	8.7	0.2	7.6	4.3	1.7	
	LOGU0904040PNFR-M	G	F								●	8.7	0.4	7.6	4.3	1.6	
	LOGU0904080PNFR-M	G	F								●	8.7	0.8	7.6	4.3	1.2	
	LOGU0904100PNFR-M	G	F								★	8.7	1.0	7.6	4.3	1.0	
	LOGU0904120PNFR-M	G	F								★	8.7	1.2	7.6	4.3	0.9	
	LOGU0904160PNFR-M	G	F								★	8.7	1.6	7.6	4.3	0.5	Right hand insert only.

Dimensions (mm)

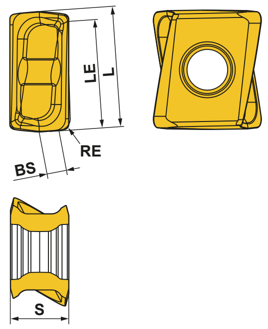
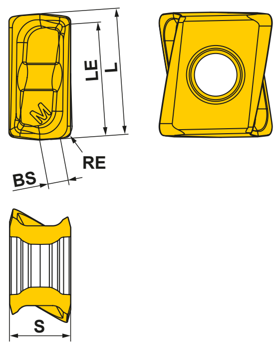
● ★ = NEW

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

Work Material		MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	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 MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	Carbide TF15	Dimensions (mm) L	RE	LE	S	BS	Geometry
VPX300 ➲K100 VPX300 Long Cutting Edge ➲K124	LOGU1207020PNER-L	G	E	★	★	★	★	★	★	★		12.4	0.2	11.3	7.0	3.0	
	LOGU1207040PNER-L	G	E	●	●	●	●	●	●	★		12.4	0.4	11.3	7.0	2.8	
	LOGU1207080PNER-L	G	E	●	●	●	●	●	●	★		12.4	0.8	11.3	7.0	2.6	
	LOGU1207100PNER-L	G	E	★	★	★	★	★	★	★		12.4	1.0	11.3	7.0	2.5	
	LOGU1207120PNER-L	G	E	●	●	●	●	●	●	★		12.4	1.2	11.3	7.0	2.4	
	LOGU1207160PNER-L	G	E	●	●	●	●	●	●	★		12.4	1.6	11.3	7.0	1.8	
	LOGU1207200PNER-L	G	E	●	●	●	●	●	●	★		12.4	2.0	11.3	7.0	1.4	
	LOGU1207240PNER-L	G	E	●	●	●	●	●	●	★		12.4	2.4	11.3	7.0	1.2	
	LOGU1207300PNER-L	G	E	★	★	★	★	★	★	★		12.4	3.0	11.3	7.0	0.6	
NEW	LOGU1207320PNER-L	G	E	●	●	●	●	●	●	★		12.4	3.2	11.3	7.0	0.4	
	LOGU1207020PNFR-L	G	F								★	12.4	0.2	11.3	7.0	3.0	
	LOGU1207040PNFR-L	G	F								●	12.4	0.4	11.3	7.0	2.8	
	LOGU1207080PNFR-L	G	F								●	12.4	0.8	11.3	7.0	2.6	
	LOGU1207100PNFR-L	G	F								★	12.4	1.0	11.3	7.0	2.5	
	LOGU1207120PNFR-L	G	F								●	12.4	1.2	11.3	7.0	2.4	
	LOGU1207160PNFR-L	G	F								●	12.4	1.6	11.3	7.0	1.8	
	LOGU1207200PNFR-L	G	F								●	12.4	2.0	11.3	7.0	1.4	
	LOGU1207240PNFR-L	G	F								●	12.4	2.4	11.3	7.0	1.2	
	LOGU1207300PNFR-L	G	F								★	12.4	3.0	11.3	7.0	0.6	
	LOGU1207320PNFR-L	G	F								●	12.4	3.2	11.3	7.0	0.4	Right hand insert only.
VPX300 ➲K100 VPX300 Long Cutting Edge ➲K124	LOGU1207020PNER-M	G	E	★	★	★	★	★	★	★		12.4	0.2	11.3	7.0	3.0	
	LOGU1207040PNER-M	G	E	●	●	●	●	●	●	★		12.4	0.4	11.3	7.0	2.8	
	LOGU1207080PNER-M	G	E	●	●	●	●	●	●	★		12.4	0.8	11.3	7.0	2.4	
	LOGU1207100PNER-M	G	E	★	★	★	★	★	★	★		12.4	1.0	11.3	7.0	2.3	
	LOGU1207120PNER-M	G	E	●	●	●	●	●	●	★		12.4	1.2	11.3	7.0	2.1	
	LOGU1207160PNER-M	G	E	●	●	●	●	●	●	★		12.4	1.6	11.3	7.0	1.7	
	LOGU1207200PNER-M	G	E	●	●	●	●	●	●	★		12.4	2.0	11.3	7.0	1.4	
	LOGU1207240PNER-M	G	E	●	●	●	●	●	●	★		12.4	2.4	11.3	7.0	1.0	
	LOGU1207300PNER-M	G	E	★	★	★	★	★	★	★		12.4	3.0	11.3	7.0	0.5	
	LOGU1207320PNER-M	G	E	●	●	●	●	●	●	★		12.4	3.2	11.3	7.0	0.3	
	LOGU1207020PNFR-M	G	F								★	12.4	0.2	11.3	7.0	3.0	
	LOGU1207040PNFR-M	G	F								●	12.4	0.4	11.3	7.0	2.8	
	LOGU1207080PNFR-M	G	F								●	12.4	0.8	11.3	7.0	2.4	
	LOGU1207100PNFR-M	G	F								★	12.4	1.0	11.3	7.0	2.3	
	LOGU1207120PNFR-M	G	F								●	12.4	1.2	11.3	7.0	2.1	
	LOGU1207160PNFR-M	G	F								●	12.4	1.6	11.3	7.0	1.7	
	LOGU1207200PNFR-M	G	F								●	12.4	2.0	11.3	7.0	1.4	
	LOGU1207240PNFR-M	G	F								●	12.4	2.4	11.3	7.0	1.0	
	LOGU1207300PNFR-M	G	F								★	12.4	3.0	11.3	7.0	0.5	
	LOGU1207320PNFR-M	G	F								●	12.4	3.2	11.3	7.0	0.3	Right hand insert only.

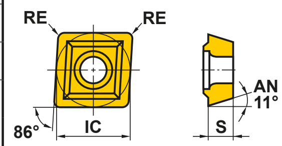
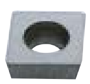
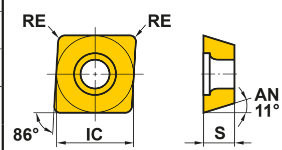
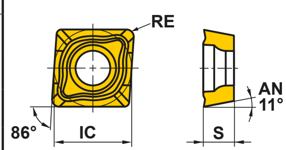
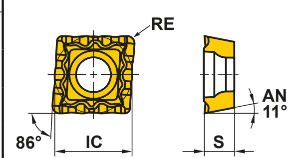
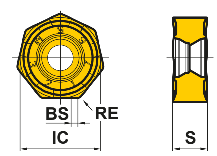
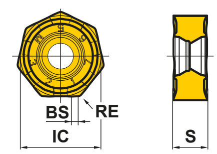
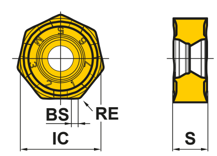
● ★ = NEW

ROTATING INSERTS

Work Material			MC5020	MP6120	MP6130	MP7130	MP7140	VP15TF	VP20RT	UP20M	UTi20T
	P	Steel		◐	✤			◐	◐	◐	◐
	M	Stainless Steel				◐	✤	◐	◐	◐	◐
	K	Cast Iron	◐					✤	✤		✤
	N	Non-ferrous Metal									
	S	Heat-resistant Alloy, Titanium Alloy						◐	✤		
	H	Hardened Materials						◐			

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

Honing:
E: Round

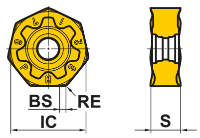
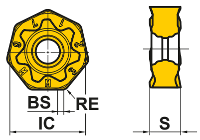
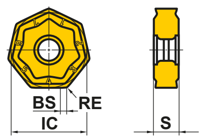
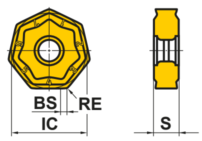
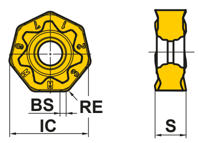
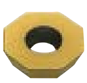
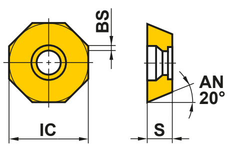
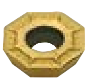
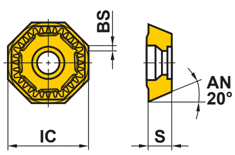
Shape	Order Number	Class	Honing	Coated MC5020	Coated MP6120	Coated MP6130	Coated MP7130	Coated MP7140	Coated VP15TF	Coated VP20RT	Coated UP20M	Carbide UTi20T	IC	S	BS	RE	Geometry
CBMP ECMP TAB 	MPMT070308	M	E								★	●	7.94	3.18	–	0.8	
	MPMT090308	M	E						★		★	●	9.525	3.18	–	0.8	
	MPMT120408	M	E								★	●	12.7	4.76	–	0.8	
TSMP ➲K232 	MPMW070308	M	E									●	7.94	3.18	–	0.8	
	MPMW090308	M	E									●	9.525	3.18	–	0.8	
	MPMW120408	M	E									●	12.7	4.76	–	0.8	
SPX ➲K203 	MPMX120412-JM	M	E						●	●			12.7	4.79	–	1.2	
SPX ➲K203 	MPMX120412-WH	M	E						●	●			12.7	4.76	–	1.2	
AHX440S ➲K034 	NNMU130508ZER-L	M	E	●	●	●	●	●	★				13.4	5.77	1	0.8	
AHX440S ➲K034 AHX475S ➲K038 	NNMU130508ZEN-M	M	E	●	●	●	●	●	★				13.4	5.57	1	0.8	
	NNMU130532ZEN-M	M	E	●	●	●	●	●	★				13.4	5.57	–	3.2	
AHX440S ➲K034 AHX475S ➲K038 	NNMU130532ZEN-R	M	E	●	●	●	●	●	★				13.4	5.47	–	3.2	

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

Work Material			MP6120	MP6130	MP9120	MP9130	F7010	F7030	MC5020	MP7030	VP15TF	VP20RT	NX4545
	P	Steel	◐	✣			●	◐			◐	◐	◐
	M	Stainless Steel					◐	◐		◐	◐	◐	◐
	K	Cast Iron							◐		✣	✣	
	N	Non-ferrous Metal											
	S	Heat-resistant Alloy, Titanium Alloy			◐	✣					◐		
	H	Hardened Materials									◐		

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

Honing:
E:Round S:Chamfer + Hone T:Chamfer

Shape	Order Number	Class	Honing	Coated: MP6120	MP6130	MP9120	MP9130	F7010	F7030	MC5020	MP7030	VP15TF	VP20RT	Cermet: NX4545	Dimensions (mm): IC	S	BS	RE	Geometry
AHX640S ➲K041	NNMU200708ZEN-M	M	E	●	●										20	8	1	0.8	
	NNMU200708ZEN-MP	M	E									●			20	8	1	0.8	
AHX640S ➲K041 	NNMU200712ZER-MM	M	E								●				20	8	1	1.2	
AHX640W ➲K048 AHX640S ➲K041 	NNMU200608ZEN-MK	M	E							●		★	★		20	6.55	1	0.8	
AHX640W ➲K048 AHX640S ➲K041 	NNMU200608ZEN-HK	M	E							●		★	★		20	6.55	1	0.8	
AHX640S ➲K041 	NNMU200712ZER-L	M	E			●	●								20	8	1	1.2	
OCTACUT	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	–	
OCTACUT	OEMX12T3EER1-JS	M	E						●						12.7	3.97	1	–	
	OEMX1705EER1-JS	M	E						●						17	5	1.4	–	
	OEMX1705ETR1-JS	M	T									★			17	5	1.4	–	

L

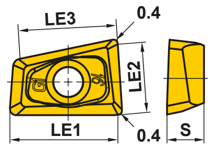
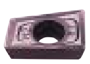
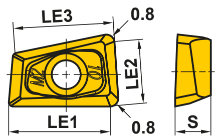
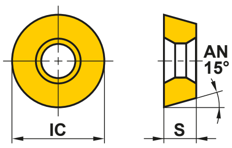
ROTATING INSERTS

ROTATING INSERTS

Work Material			F7030	MP6120	MP6130	MP7130	MP7140	MP9120	VP15TF	VP30RT	VP10H	VP05HT	MP8010	HTi10
	P	Steel	◐	◐	✤				◐	✤	●	●		
	M	Stainless Steel	◐			◐	✤		◐	✤				
	K	Cast Iron							✤	✤	◐	●	●	◐
	N	Non-ferrous Metal												◐
	S	Heat-resistant Alloy, Titanium Alloy						◐	◐	✤	●			
	H	Hardened Materials							◐		●	●	●	

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

Honing:
E: Round F: Sharp S: Chamfer + Hone

Shape	Order Number	Class	Honing	Coated F7030	Coated MP6120	Coated MP6130	Coated MP7130	Coated MP7140	Coated MP9120	Coated VP15TF	Coated VP30RT	Coated VP10H	Coated VP05HT	Coated MP8010	Carbide HTi10	LE1	LE2	LE3	IC	S	Geometry
AQX ➲K172 	QOGT0830R-G1	G	E *1		★				★	●					●	7.7	4.9	7.3	—	3	
	QOGT1035R-G1	G	E *1		★				★	●					●	9.9	6.4	9.3	—	3.5	
	QOGT1342R-G1	G	E *1		★				★	●					●	12.4	8.1	11.6	—	4.2	
	QOGT1651R-G1	G	E *1		★				★	●					●	15.8	10.4	14.6	—	5.1	
	QOGT1856R-G1	G	E *1		★				★	●					●	17.3	11.4	16	—	5.6	
	QOGT2062R-G1	G	E *1		★				★	●					●	19.8	13.1	18.1	—	6.2	
	QOGT2576R-G1	G	E *1		★				★	●					●	25.2	16.6	23.1	—	7.6	
AQX ➲K172 	QOMT0830R-M2	M	E		●	●	●	●	●	●	●					7.3	4.4	7.3	—	3	
	QOMT1035R-M2	M	E		●	●	●	●	●	●	●					9.5	5.9	9.3	—	3.5	
	QOMT1342R-M2	M	E		●	●	●	●	●	●	●					12	7.6	11.6	—	4.2	
	QOMT1651R-M2	M	E		●	●	●	●	●	●	●					15.4	9.9	14.6	—	5.1	
	QOMT1856R-M2	M	E		●	●	●	●	●	●	●					16.9	10.9	16	—	5.6	
	QOMT2062R-M2	M	E		●	●	●	●	●	●	●					19.4	12.6	18.1	—	6.2	
	QOMT2576R-M2	M	E		●	●	●	●	●	●	●					24.8	16.1	23.1	—	7.6	
RRD 	RDHX0501M0E	H	E	●						●		●	●			—	—	—	5	1.5	
	RDHX0501M0S	H	S	●						●		●				—	—	—	5	1.5	
	RDHX07T1M0E	H	E	●						●		●	●			—	—	—	7	1.98	
	RDHX07T1M0S	H	S	●						●		●	●			—	—	—	7	1.98	
	RDHX0702M0E	H	E	●						●		●	●			—	—	—	7	2.38	
	RDHX0702M0S	H	S	●						●		●				—	—	—	7	2.38	
	RDHX1003M0E	H	E	●						●		●	●			—	—	—	10	3.18	
	RDHX1003M0S	H	S	●						●		●	●			—	—	—	10	3.18	
	RDHX12T3M0E	H	E	●						●		●	●			—	—	—	12	3.97	
	RDHX12T3M0S	H	S	●						●		●				—	—	—	12	3.97	
	RDHX1604M0E	H	E	●						●		●	●			—	—	—	16	4.76	
	RDHX1604M0S	H	S	●						●		●				—	—	—	16	4.76	

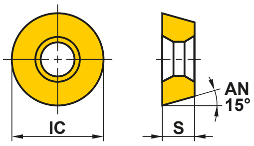
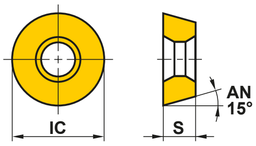
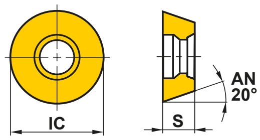
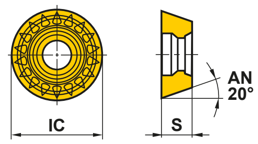
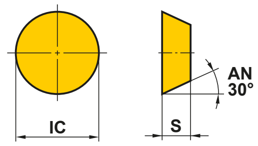
*1 Grade HTi10 is "F".

● : Inventory maintained. ★ : Inventory maintained in Japan.
☐ : Non stock, produced to order only. (10 inserts in one case)

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

Honing: E:Round S:Chamfer + Hone T:Chamfer

Work Material		F7030	VP15TF	VP20M	VP10H	VP05HT	UP20M	NX4545	UTi20T	HTi10
P	Steel	◐	◐	◐	●	●	◐	◐	◐	
M	Stainless Steel	◐	◐	◐			◐	◐	◐	
K	Cast Iron		✤		◐	●			✤	◐
N	Non-ferrous Metal									◐
S	Heat-resistant Alloy, Titanium Alloy		◐		●					
H	Hardened Materials		◐		●	●				

Shape	Order Number	Class	Honing	Coated F7030	Coated VP15TF	Coated VP20M	Coated VP10H	Coated VP05HT	Coated UP20M	Cermet NX4545	Carbide UTi20T	Carbide HTi10	Dimensions (mm) IC	Dimensions (mm) S	Geometry
RRD 	RDMX07T1M0E	M	E					●					7	1.98	
	RDMX07T1M0T	M	T	□		●	●						7	1.98	
	RDMX0702M0E	M	E					□					7	2.38	
	RDMX0702M0T	M	T	●		●	●						7	2.38	
	RDMX1003M0E	M	E					●					10	3.18	
	RDMX1003M0S	M	S		●		●						10	3.18	
	RDMX1003M0T	M	T	●		●	●			●	□		10	3.18	
	RDMX12T3M0E	M	E					●					12	3.97	
	RDMX12T3M0S	M	S		●		●						12	3.97	
	RDMX12T3M0T	M	T	●		●	●			□	□		12	3.97	
	RDMX1604M0E	M	E					●					16	4.76	
	RDMX1604M0S	M	S		●		●						16	4.76	
	RDMX1604M0T	M	T	●		●	●			□	□		16	4.76	
RRD 	RDZX0501M0E	Z	E		●								5	1.50	
	RDZX07T1M0E	Z	E		●								7	1.98	
	RDZX0702M0E	Z	E		●								7	2.38	
	RDZX1003M0E	Z	E		●								10	3.18	
	RDZX1003M0S	Z	S	●	●								10	3.18	
	RDZX12T3M0E	Z	E		●								12	3.97	
	RDZX12T3M0S	Z	S	●	●								12	3.97	
	RDZX1604M0E	Z	E		●								16	4.76	
	RDZX1604M0S	Z	S	●	●								16	4.76	
OCTACUT 	REMX1705SN	M	S	★									17.25	5.2	
OCTACUT 	REMX12T3EN-JS	M	E	★									12.95	4.17	
	REMX1705EN-JS	M	E	★									17.25	5.2	
SG20 	RGEN2004M0EN	E	E		★								20	4.76	
	RGEN2004M0SN	E	S	●					●		●	●	20	4.76	

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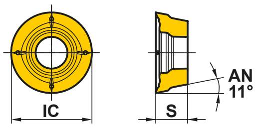
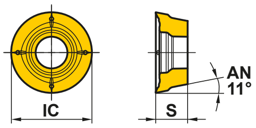
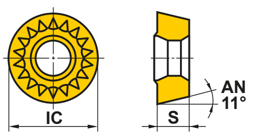
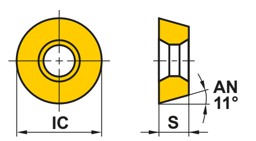
ROTATING INSERTS

ROTATING INSERTS

Work Material			F7010	F7030	MC7020	MP7130	MP9130	MP9140	VP15TF	AP20M	NX2525	NX4545	UTi20T
	P	Steel	●	◐					◐	◐	●	◐	◐
	M	Stainless Steel	◐	◐	◐	◐			◐	◐	●	◐	◐
	K	Cast Iron							✱		●		✱
	N	Non-ferrous Metal											
	S	Heat-resistant Alloy, Titanium Alloy					✱	✱	◐				
	H	Hardened Materials							◐				

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

Honing:
E: Round T: Chamfer

Shape	Order Number	Class	Honing	Coated F7010	Coated F7030	Coated MC7020	Coated MP7130	Coated MP9130	Coated MP9140 (NEW)	Coated VP15TF	Coated AP20M	Cermet NX2525	Cermet NX4545	Carbide UTi20T	IC	S	BS	Geometry
ARP5/6 ➲K238 	RPHT1040M0E4-L	H	E			●	●	●							10	3.97	–	
	RPHT1248M0E4-L	H	E			●	●	●							12	4.76	–	
	RPHT1040M0E4-M	H	E			●	●	●							10	3.97	–	
	RPHT1248M0E4-M	H	E			●	●	●							12	4.76	–	
	RPHT1040M0E4-R	H	E			●	●	●							10	3.97	–	
	RPHT1248M0E4-R	H	E			●	●	●							12	4.76	–	
ARP5/6 ➲K238 	RPMT1040M0E4-L	M	E			●	●	●							10	3.97	–	
	NEW RPMT1040M0E8-L1	M	E			●	●	●	●						10	3.97	–	
	NEW RPMT1040M0E4-L2	M	E						●						10	3.97	–	
	RPMT1248M0E4-L	M	E			●	●	●							12	4.76	–	
	NEW RPMT1248M0E8-L1	M	E			●	●	●	●						12	4.76	–	
	NEW RPMT1248M0E4-L2	M	E						●						12	4.76	–	
	RPMT1040M0E4-M	M	E			●	●	●							10	3.97	–	
	NEW RPMT1040M0E8-M1	M	E			●	●	●	●						10	3.97	–	
	NEW RPMT1040M0E4-M2	M	E						●						10	3.97	–	
	RPMT1248M0E4-M	M	E			●	●	●							12	4.76	–	
	NEW RPMT1248M0E8-M1	M	E			●	●	●	●						12	4.76	–	
	NEW RPMT1248M0E4-M2	M	E						●						12	4.76	–	
	RPMT1040M0E4-R	M	E			●	●	●							10	3.97	–	
	NEW RPMT1040M0E8-R1	M	E			●	●	●							10	3.97	–	
	RPMT1248M0E4-R	M	E			●	●	●							12	4.76	–	
	NEW RPMT1248M0E8-R1	M	E			●	●	●							12	4.76	–	
BRP ➲K190 	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	–	
BRP ➲K190 	RPMW08T2M0E	M	E											●	8	2.78	–	
	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	–	

● = NEW

●: Inventory maintained. ★: Inventory maintained in Japan.
□: Non stock, produced to order only. (10 inserts in one case)

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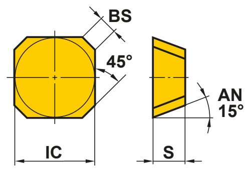
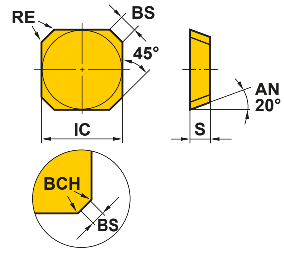
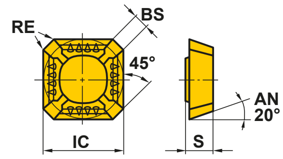
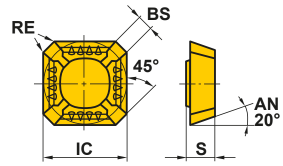
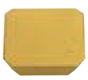
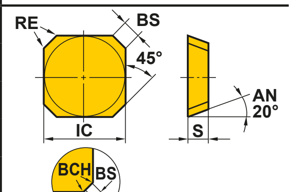
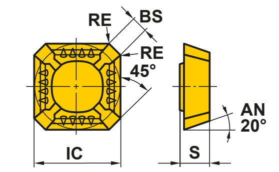
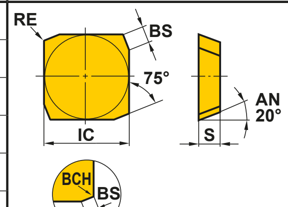
ROTATING INSERTS

Work Material			P ●	P ◐		P ◐	P ◐	P ●	P ◐	P ◐							
P: Steel			●	◐		◐	◐	●	◐	◐							
M: Stainless Steel			◐	◐		◐	◐	●	◐	◐							
K: Cast Iron					◐	✤		●		✤	◐						
N: Non-ferrous Metal											◐						
S: Heat-resistant Alloy, Titanium Alloy						◐											
H: Hardened Materials						◐											

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

Honing: E: Round F: Sharp S: Chamfer + Hone T: Chamfer Z: Strong

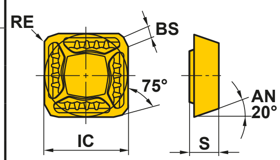
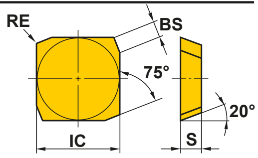
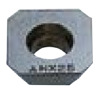
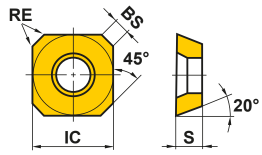
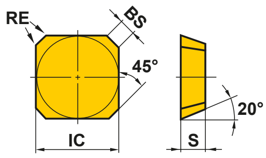
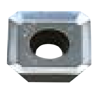
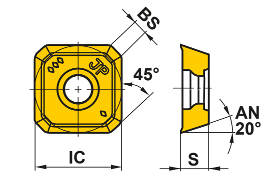
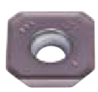
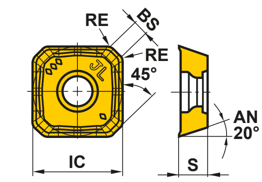
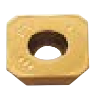
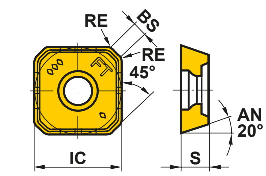
Shape	Order Number	Class	Honing	Coated F7010	Coated F7030	Coated MC5020	Coated VP15TF	Coated UP20M	Cermet NX2525	Cermet NX4545	Carbide UTi20T	Carbide HTi10	Dimensions (mm) IC	S	BS	BCH	RE	Geometry
Corner Angle 45° 	**SDEN1203AEN**	E	T							●			12.7	3.18	1.2	—	—	
LSE445 SE445 	**SEEN1203AFEN1**	E	E									●	12.7	3.18	1.4	—	1.0	
	SEEN1203AFTN1	E	T					●					12.7	3.18	1.4	—	1.0	
	*** SEEN1203AFTN3**	E	T						●				12.7	3.18	1.4	0.77	—	* SEEN1203AFTN3
LSE445 SE445 	**SEER1203AFEN-JS**	E	E	●	●	●	●						12.7	3.18	1.4	—	1.0	
Corner Angle 45° 	**SEER1204AFEN-JS**	E	E	●									12.7	4.76	1.4	—	1.0	
SE545 	**SEEN1504AFEN1**	E	E				★						15.875	4.76	1.4	—	1.0	
	SEEN1504AFTN1	E	T	□				●	★	●	●		15.875	4.76	1.4	—	1.0	
	*** SEEN1504AFTN3**	E	T	●									15.875	4.76	1.4	0.77	—	
	SEEN1504AFSN1	E	S		●	●							15.875	4.76	1.4	—	1.0	* SEEN1504AFTN3
SE545 	**SEER1504AFEN-JS**	E	E	●	●	★							15.875	4.76	1.4	—	1.0	
SE415 	**SEEN1203EFFR1**	E	F									●	12.7	3.18	1.4	—	1.0	
	SEEN1203EFER1	E	E				★						12.7	3.18	1.4	—	1.0	
	SEEN1203EFTR1	E	T						★	●			12.7	3.18	1.4	—	1.0	
	*** SEEN1203EFTR3**	E	T						●				12.7	3.18	1.4	—	—	
	SEEN1203EFSR1	E	S		●	●							12.7	3.18	1.4	—	1.0	* SEEN1203EFTR3 Right hand insert shown.

ROTATING INSERTS

Work Material			F7030	MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	UP20M	NX2525	NX4545	UTi20T	HTi10
	P	Steel	◐		◐	✣					◐	✣	◐	◐	◐	◐	
	M	Stainless Steel	◐				◐	✣			◐	✣	◐	◐	◐	◐	
	K	Cast Iron		◐							✣	✣		●		✣	◐
	N	Non-ferrous Metal															◐
	S	Heat-resistant Alloy, Titanium Alloy							◐	✣	◐	✣					
	H	Hardened Materials									◐						

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

Honing:
E: Round F: Sharp S: Chamfer + Hone T: Chamfer

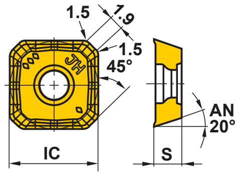
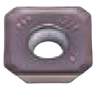
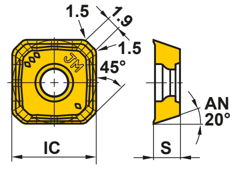
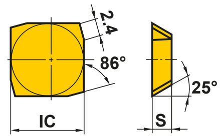
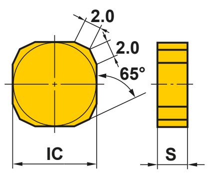
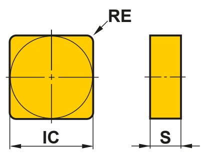
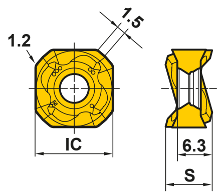
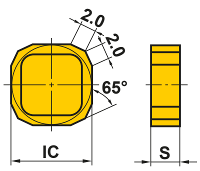
Shape	Order Number	Class	Honing	Coated: F7030	MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	UP20M	Cermet: NX2525	NX4545	Carbide: UTi20T	HTi10	Dimensions (mm): IC	S	BS	RE	Geometry
SE415 	SEER1203EFER-JS	E	E	●	★														12.7	3.18	1.4	1.0	
SE515 	SECN1504EFTR1	C	T													★			15.875	4.76	1.4	1.0	 Right hand insert shown.
	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	
Corner Angle 45° 	SEEW1204AFTN	E	T												●	●	●		12.7	4.76	2.6	1.0	
Corner Angle 45° 	SEMN1204AZTN	M	T											●			●		12.7	4.76	2.0	0.2	
ASX445 ➲K026 	SEGT13T3AGFN-JP	G	F															●	13.4	3.97	2.2	–	
ASX445 ➲K026 	SEET13T3AGEN-JL	E	E	●		●	●	●	●	●	●	●	●			●			13.4	3.97	1.9	1.5	
ASX445 ➲K026 	SEMT13T3AGSN-FT	M	S		●														13.4	3.97	1.9	1.5	

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

Work Material			F7030	MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP20RT	VP30RT	UP20M	MX3030	NX4545	VP45N	UTi20T	HTi10	TF15
	P	Steel	◐		◐	✣					◐	◐	✣	◐	◐	◐	◐	◐		
	M	Stainless Steel	◐				◐	✣			◐	◐	✣	◐	◐	◐	◐	◐		
	K	Cast Iron		◐							✣	✣	✣	✣	◐			✣	◐	
	N	Non-ferrous Metal																	◐	✣
	S	Heat-resistant Alloy, Titanium Alloy							◐	✣	◐	✣	✣							
	H	Hardened Materials									◐									

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

Honing:
E: Round F: Sharp
S: Chamfer + Hone T: Chamfer

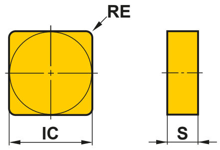
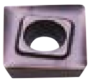
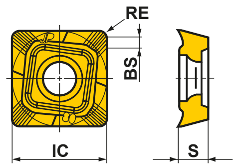
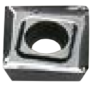
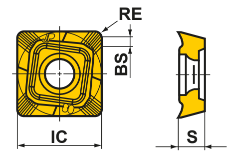
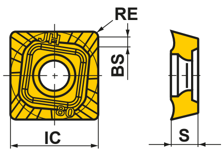
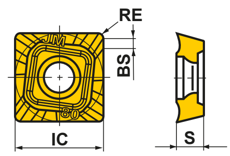
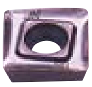
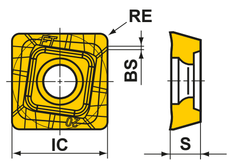
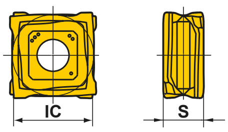
Shape	Order Number	Class	Honing	Coated F7030	Coated MC5020	Coated MP6120	Coated MP6130	Coated MP7130	Coated MP7140	Coated MP9120	Coated MP9130	Coated VP15TF	Coated VP20RT	Coated VP30RT	Coated UP20M	Cermet MX3030	Cermet NX4545	Cermet VP45N	Carbide UTi20T	Carbide HTi10	Carbide TF15	Dimensions (mm) IC	Dimensions (mm) S	Geometry
ASX445 ➲**K026** 	**SEMT13T3AGSN-JH**	M	S	●	●	●	●	●	●	●	●	●		●								13.4	3.97	
ASX445 ➲**K026** 	**SEMT13T3AGSN-JM**	M	S	●	●	●	●	●	●	●	●	●		●			●	●				13.4	3.97	
BF407 	**SFAN1203ZFFR2**	A	F																	●		12.7	3.175	 Right hand insert shown.
	SFAN1203ZFFL2	A	F																	★		12.7	3.175	
	SFCN1203ZFFR2	C	F																	●		12.7	3.175	
BN425 DN 	**SNC43B2S**	C	T														★					12.7	4.8	
	**SNEN1204EN**	E	E												●				●			12.7	4.76	
	SNEN1504EN	E	E																★			15.88	4.76	
WSX445 ➲**K016** 	**SNGU140812ANFR-L**	G	F																		●	14	8.4	 Right hand insert shown.
	SNGU140812ANFL-L	G	F																		★	14	8.4	
	SNGU140812ANER-L	G	E		●	●	●	●	●	●	●	★	★			●						14	8.4	
	SNGU140812ANEL-L	G	E		★	★	★					★				★						14	8.4	
	SNGU140812ANER-M	G	E		●	●	●	●	●	●	●	★	★			●						14	8.4	
	SNGU140812ANEL-M	G	E		★	★	★					★				★						14	8.4	
	SNMU140812ANER-M	M	E		●	●	●	●	●	●	●	★	★			●						14	8.4	
	SNMU140812ANEL-M	M	E		★	★	★					★				★						14	8.4	
	SNMU140812ANER-R	M	E		●	●	●					★	★									14	8.4	
	SNMU140812ANEL-R	M	E		★	★	★					★										14	8.4	
	SNMU140812ANER-H	M	E		●	●	●					★	★									14	8.4	
BN425 DN 	**SNMF43B2G**	M	E		★																	12.7	4.8	

ROTATING INSERTS

Work Material			F7030	MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	NX2525	NX4545	UTi20T	HTi10
	P	Steel	◐		◐	✤					◐	✤	◐	◐	◐	
	M	Stainless Steel	◐				◐	✤			◐	✤	◐	◐	◐	
	K	Cast Iron		◐							✤	✤	●		✤	◐
	N	Non-ferrous Metal														◐
	S	Heat-resistant Alloy, Titanium Alloy							◐	✤	◐	✤				
	H	Hardened Materials									◐					

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

Honing:
E: Round F: Sharp

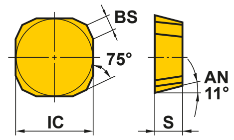
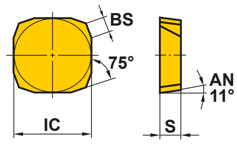
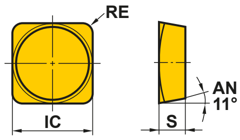
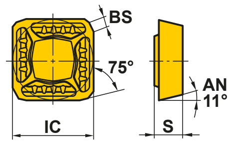
Shape	Order Number	Class	Honing	Coated F7030	Coated MC5020	Coated MP6120	Coated MP6130	Coated MP7130	Coated MP7140	Coated MP9120	Coated MP9130	Coated VP15TF	Coated VP30RT	Cermet NX2525	Cermet NX4545	Carbide UTi20T	Carbide HTi10	Dimensions (mm) IC	S	BS	RE	Geometry
	SNMN120408	M	E		★									★		●	★	12.7	4.76	–	0.8	
	SNMN120412	M	E		●									★		●		12.7	4.76	–	1.2	
ASX400 ➲K068 	SOET12T308PEER-JL	E	E	●		●	●	●	●	●	●	●	●		●			12.7	3.97	1.4	0.8	
ASX400 ➲K068 	SOGT12T308PEFR-JP	G	F														●	12.7	3.97	1.4	0.8	
ASX400 ➲K068 	SOMT12T308PEER-JH	M	E	●	●	●	●	●	●	●	●	●	●					12.7	3.97	1.4	0.8	
ASX400 ➲K068	SOMT12T308PEER-JM	M	E	●	●	●	●	●	●	●	●	●	●		●			12.7	3.97	1.4	0.8	
ASX400 Side Cutter 	SOMT12T308PEEL-JM	M	E									●						12.7	3.97	1.4	0.8	Right hand insert shown.
ASX400 ➲K068 	SOMT12T320PEER-FT	M	E		●	●				★	★	●						12.7	3.97	0.5	2.0	
VOX400 ➲K065 	SONX1206PER	N	E		●							●						12.7	6.3	–	–	
	SONX1206PEL	N	E									★						12.7	6.3	–	–	Right hand insert shown.

●: Inventory maintained. ★: Inventory maintained in Japan.
□: Non stock, produced to order only. (10 inserts in one case)

Work Material			F7030	MC5020	UP20M	NX2525	NX4545	UTi20T	HTi10
	P	Steel	◐		◐	●	◐	◐	
	M	Stainless Steel	◐		◐	●	◐	◐	
	K	Cast Iron		◐		●		✤	◐
	N	Non-ferrous Metal							◐
	S	Heat-resistant Alloy, Titanium Alloy							
	H	Hardened Materials							

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

Honing:
E:Round F:Sharp T:Chamfer

Shape	Order Number	Class	Honing	Coated F7030	Coated MC5020	Coated UP20M	Cermet NX2525	Cermet NX4545	Carbide UTi20T	Carbide HTi10	Dimensions (mm) IC	S	BS	RE	Geometry
Corner Angle 15° 	SPEN1203EDR	E	T	●			●	●			12.7	3.18	1.4	—	 Right hand insert shown.
	SPEN1203EDL	E	T *1				□		★	□	12.7	3.18	1.4	—	
	SPEN1504EDR	E	T *1			●	□	●		□	15.875	4.76	1.4	—	
	SPEN1504EDL	E	T						●		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	—	
FP490 	SPEN424A	E	F							★	12.7	3.18	—	1.6	
FBP415 	SPER1203EEER-JS	E	E		●						12.7	3.18	1.4	—	

*1 Grade HTi10 is "F".

ROTATING INSERTS

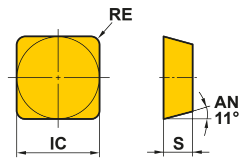
Work Material		F7030	MC5020	MP9140	VP15TF	UP20M	NX2525	NX4545	UTi20T	HTi10
P	Steel	◐			◐	◐	●	◐	◐	
M	Stainless Steel	◐			◐	◐	●	◐	◐	
K	Cast Iron		◐		✣		●		✣	◐
N	Non-ferrous Metal									◐
S	Heat-resistant Alloy, Titanium Alloy			✣	◐					
H	Hardened Materials				◐					

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

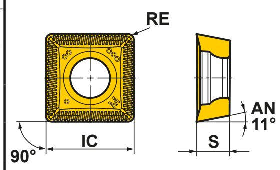
Honing:
E:Round F:Sharp T:Chamfer

Shape	Order Number	Class	Honing	Coated F7030	Coated MC5020	Coated MP9140 (NEW)	Coated VP15TF	Coated UP20M	Cermet NX2525	Cermet NX4545	Carbide UTi20T	Carbide HTi10	IC	S	BS	RE
11° Positive	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
	SPGN150404	G	E								★		15.875	4.76	–	0.4
	SPGN150408	G	E *1									★	15.875	4.76	–	0.8
	SPMN120304	M	E *1				★				●	●	12.7	3.18	–	0.4
	SPMN120304T	M	T						●				12.7	3.18	–	0.4
	SPMN120308	M	E *1	★			★	★			●	●	12.7	3.18	–	0.8
	SPMN120312	M	E *1	★			★				●	●	12.7	3.18	–	1.2
	SPMN120408	M	E *1		★						●	★	12.7	4.76	–	0.8
	SPMN120412	M	E		★						★		12.7	4.76	–	1.2
	SPMN150408	M	E								●		15.875	4.76	–	0.8
	SPMN150412	M	E								●		15.875	4.76	–	1.2
ASPX ➲K208 NEW	SPGX1204100PPER-JM	G	E			●							12.7	4.8	–	1.0
BSP	SPMB1204APT	M	T					●			●		12.7	4.76	1.4	–
TBE1	SPMT120408-A	M	E					●			●		12.7	4.76	–	0.8
CESP CFSP CGSP ➲K230	SPMW090304	M	E *2				★	●	●	●	●	●	9.525	3.18	–	0.4
	SPMW090308	M	E *2				★	●	★	★	●	●	9.525	3.18	–	0.8
	SPMW120304	M	E *2				★	●	●	●	●	●	12.7	3.18	–	0.4
	SPMW120308	M	E *2				★	●	●	●	●	●	12.7	3.18	–	0.8

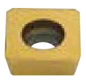
Shape / Geometry (11° Positive):

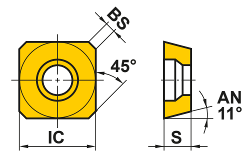


Shape / Geometry (ASPX):

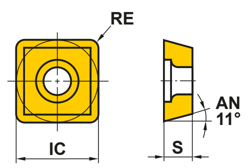


Shape / Geometry (BSP):

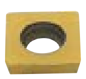


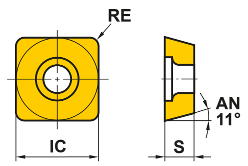


Shape / Geometry (TBE1):



Shape / Geometry (CESP, CFSP, CGSP):





*1 Grade HTi10 is "F".
*2 Grade HTi10 is "T".

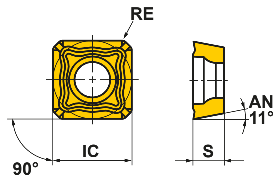
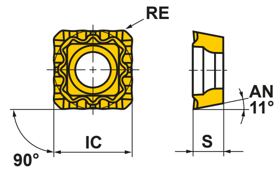
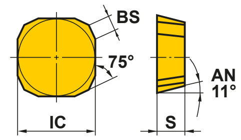
● = NEW

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

Work Material			VP15TF	VP20RT	UTi20T
	P	Steel	◐	◐	◐
	M	Stainless Steel	◐	◐	◐
	K	Cast Iron	✤	✤	✤
	N	Non-ferrous Metal			
	S	Heat-resistant Alloy, Titanium Alloy	◐	✤	
	H	Hardened Materials	◐		

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

Honing:
E: Round

Shape	Order Number	Class	Honing	Coated VP15TF	Coated VP20RT	Carbide UTi20T	Dimensions (mm) IC	S	BS	RE	Geometry
SPX ➲**K203** 	**SPMX120408-JM**	M	E	●	●		12.7	4.80	—	0.8	
SPX ➲**K203** 	**SPMX120408-WH**	M	E	●	●		12.7	4.76	—	0.8	
Corner Angle 15° 	**SPNN1203EDR**	N	E			●	12.7	3.18	1.4	—	 Right hand insert shown.

L

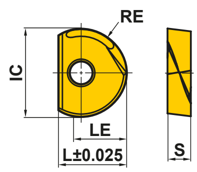
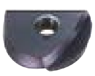
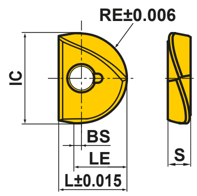
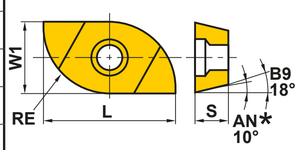
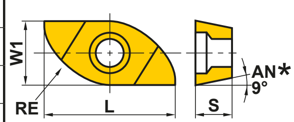
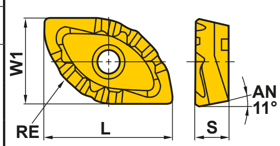
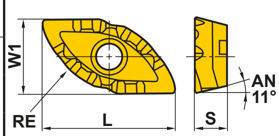
ROTATING INSERTS

ROTATING INSERTS

Work Material			EP6120	MP6120	MP9120	VP15TF	VP20RT	VP30RT	MP8010
Work Material	P	Steel	◐	◐		◐	◐	✤	
	M	Stainless Steel				◐	◐	✤	
	K	Cast Iron				✤	✤	✤	
	N	Non-ferrous Metal	◐						
	S	Heat-resistant Alloy, Titanium Alloy			◐	◐	✤	✤	
	H	Hardened Materials	◐			◐			●

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

Honing:
E: Round F: Sharp

Shape		Order Number	Class	Honing	Coated EP6120	MP6120	MP9120	VP15TF	VP20RT	VP30RT	MP8010	Dimensions (mm) RE	L	LE	W1	IC	S	BS	Geometry
SRB ➲K212 	*	SRBT10	—	F				●				5	8.5	5	—	10	2.6	—	
	*	SRBT12	—	F				●				6	10	6	—	12	3	—	
	*	SRBT16	—	F				●				8	12	8	—	16	4	—	
	*	SRBT20	—	F				●				10	15	10	—	20	5	—	
	*	SRBT25	—	F				●				12.5	18.5	12.5	—	25	6	—	
	*	SRBT30	—	F				●				15	22.5	15	—	30	7	—	
	*	SRBT32	—	F				●				16	23.5	16	—	32	7	—	
SRF ➲K212 	*	SRFT10	—	F	●			●			●	5	8.5	5.5	—	10	2.6	0.5	
	*	SRFT12	—	F	●			●			●	6	10	6.5	—	12	3	0.5	
	*	SRFT16	—	F	●			●			●	8	12	9	—	16	4	1	
	*	SRFT20	—	F	●			●			●	10	15	11	—	20	5	1	
	*	SRFT25	—	F	●			●			●	12.5	18.5	13.5	—	25	6	1	
	*	SRFT30	—	F	●			●			●	15	22.5	16	—	30	7	1	
	*	SRFT32	—	F	●			●			●	16	23.5	17	—	32	7	1	
SRM2 ➲K220 		SRG16C	G	E		●	★	●				8	16	—	8.2	—	3.5	—	
		SRG20C	G	E		●	★	●				10	19	—	10.2	—	4.6	—	
		SRG25C	G	E		●	★	●				12.5	24	—	12.8	—	5.5	—	
		SRG30C	G	E		●	★	●				15	28	—	15.3	—	7	—	
		SRG32C	G	E		●	★	●				16	28	—	16.3	—	7	—	* SRG16C : 11°
SRM2 ➲K220 		SRG16E	G	E		●	★	●				8	13.5	—	6.7	—	3.5	—	
		SRG20E	G	E		●	★	●				10	15.5	—	8.5	—	4.6	—	
		SRG25E	G	E		●	★	●				12.5	20.5	—	10.2	—	5.5	—	
		SRG30E	G	E		●	★	●				15	25.2	—	12.2	—	7	—	
		SRG32E	G	E		●	★	●				16	26.1	—	13.1	—	7	—	* SRG16E : 11°
SRM2ϕ40 ϕ50 ➲K228 	*	SRG40C	G	E				●	●	●		20	36	—	20.5	—	8	—	
	*	SRG50C	G	E				●	●	●		25	40	—	26	—	8.5	—	
SRM2ϕ40 ϕ50 ➲K228 	*	SRG40E	G	E				●	●	●		20	32	—	16.6	—	8	—	
	*	SRG50E	G	E				●	●	●		25	35.8	—	20	—	8.5	—	

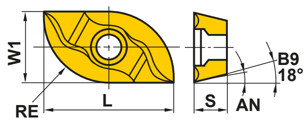
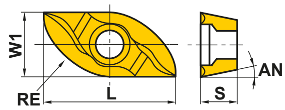
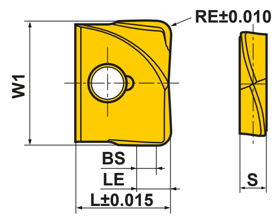
*2 inserts in one case.

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

Work Material			MP6120	MP9120	VP15TF	MP8010
	P	Steel	◐		◐	
	M	Stainless Steel			◐	
	K	Cast Iron			✤	●
	N	Non-ferrous Metal				
	S	Heat-resistant Alloy, Titanium Alloy		◐	◐	
	H	Hardened Materials			◐	●

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

Honing:
E:Round F:Sharp

Shape	Order Number	Class	Honing	Coated				Dimensions (mm)							Geometry
				MP6120	MP9120	VP15TF	MP8010	RE	L	LE	W1	S	BS	AN	
SRM2 ➔K220 	SRM16C-M	M	E	●	★	●		8	16	—	8.2	3.5	—	11°	
	SRM20C-M	M	E	●	★	●		10	19	—	10.2	4.6	—	10°	
	SRM25C-M	M	E	●	★	●		12.5	24	—	12.8	5.5	—	10°	
	SRM30C-M	M	E	●	★	●		15	28	—	15.3	7	—	10°	
	SRM32C-M	M	E	●	★	●		16	28	—	16.3	7	—	10°	
SRM2 ➔K220 	SRM16E-M	M	E	●	★	●		8	13.5	—	6.7	3.5	—	11°	
	SRM20E-M	M	E	●	★	●		10	15.5	—	8.5	4.6	—	9°	
	SRM25E-M	M	E	●	★	●		12.5	20.5	—	10.2	5.5	—	9°	
	SRM30E-M	M	E	●	★	●		15	25.2	—	12.2	7	—	9°	
	SRM32E-M	M	E	●	★	●		16	26.1	—	13.1	7	—	9°	
SUF ➔K216 	* SUFT10R05	—	F			●	●	0.5	8.5	1.5	10	2.6	1	—	
	* SUFT10R10	—	F			●	●	1	8.5	2	10	2.6	1	—	
	* SUFT10R20	—	F			★	●	2	8.5	3	10	2.6	1	—	
	* SUFT12R05	—	F			●	●	0.5	10	1.7	12	3	1.2	—	
	* SUFT12R10	—	F			●	●	1	10	2.2	12	3	1.2	—	
	* SUFT12R20	—	F			●	●	2	10	3.2	12	3	1.2	—	
	* SUFT12R30	—	F			●	★	3	10	4.2	12	3	1.2	—	
	* SUFT16R05	—	F			●	●	0.5	12	2.1	16	4	1.6	—	
	* SUFT16R10	—	F			●	●	1	12	2.6	16	4	1.6	—	
	* SUFT16R15	—	F			●	★	1.5	12	3.1	16	4	1.6	—	
	* SUFT16R20	—	F			●	●	2	12	3.6	16	4	1.6	—	
	* SUFT16R30	—	F			●	★	3	12	4.6	16	4	1.6	—	
	* SUFT20R05	—	F			●	●	0.5	15	2.5	20	5	2	—	
	* SUFT20R10	—	F			●	●	1	15	3	20	5	2	—	
	* SUFT20R15	—	F			●	★	1.5	15	3.5	20	5	2	—	
	* SUFT20R20	—	F			●	●	2	15	4	20	5	2	—	
	* SUFT20R30	—	F			●	●	3	15	5	20	5	2	—	
	* SUFT25R05	—	F			●	★	0.5	18.5	3	25	6	2.5	—	
	* SUFT25R10	—	F			★	●	1	18.5	3.5	25	6	2.5	—	
	* SUFT25R20	—	F			●	★	2	18.5	4.5	25	6	2.5	—	
	* SUFT25R30	—	F			●	★	3	18.5	5.5	25	6	2.5	—	
	* SUFT30R05	—	F			★	★	0.5	22.5	3.5	30	7	3	—	
	* SUFT30R10	—	F			★	★	1	22.5	4	30	7	3	—	
	* SUFT30R20	—	F			★	★	2	22.5	5	30	7	3	—	
	* SUFT30R30	—	F			★	★	3	22.5	6	30	7	3	—	
	* SUFT32R05	—	F			★	★	0.5	23.5	3.7	32	7	3.2	—	
	* SUFT32R10	—	F			★	★	1	23.5	4.2	32	7	3.2	—	
	* SUFT32R20	—	F			★	★	2	23.5	5.2	32	7	3.2	—	

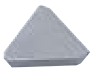
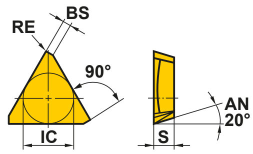
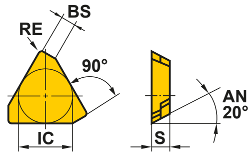
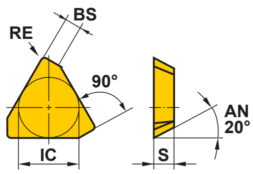
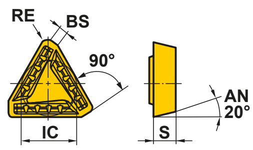
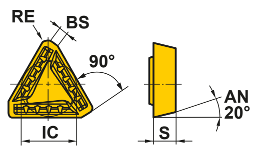
*2 inserts in one case.

ROTATING INSERTS

Work Material			F7030	MC5020	VP15TF	UP20M	NX2525	NX4545	UTi20T	HTi10
	P	Steel	◐		◐	◐	●	◐	◐	
	M	Stainless Steel	◐		◐	◐	●	◐	◐	
	K	Cast Iron		◐	✤		●		✤	◐
	N	Non-ferrous Metal								◐
	S	Heat-resistant Alloy, Titanium Alloy			◐					
	H	Hardened Materials			◐					

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

Honing:
E:Round F:Sharp S:Chamfer + Hone
T:Chamfer Z:Strong

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
NSE300 SE300 	TECN1603PEFR1W	C	F								★	9.525	3.175	1.4	0.4	Wall face finishing. 
	TECN1603PEER1W	C	E								★	9.525	3.175	1.4	0.4	
	TECN1603PETR1W	C	T					★	★	★		9.525	3.175	1.4	0.4	
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	
	TEEN1603PEZR1	E	Z					●				9.525	3.175	1.4	0.4	
NSE400 SE400 	TECN2204PEFR1	C	F								★	12.7	4.76	1.4	1.0	 Right hand insert shown.
	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	
NSE300 	TEER1603PEER-JS	E	E	●						●		9.525	3.175	1.4	0.4	
NSE400 	TEER2204PEER-JS	E	E	●						★		12.7	4.76	1.4	1.0	

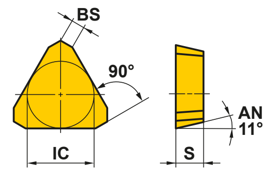
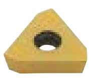
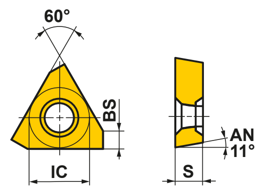
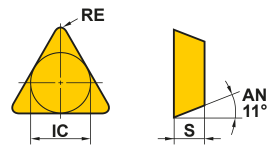
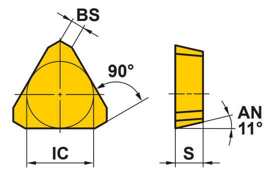
Dimensions (mm): IC, S, BS, RE.

●: Inventory maintained. ★: Inventory maintained in Japan.
□: Non stock, produced to order only. (10 inserts in one case)

Work Material			F7030	VP15TF	UP20M	AP10H	NX2525	NX4545	UTi20T	HTi10
	P	Steel	◐	◐	◐		●	◐	◐	
	M	Stainless Steel	◐	◐	◐		●	◐	◐	
	K	Cast Iron		❋		◐	●		❋	◐
	N	Non-ferrous Metal								◐
	S	Heat-resistant Alloy, Titanium Alloy		◐						
	H	Hardened Materials		◐						

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

Honing:
E: Round T: Chamfer

Shape	Order Number	Class	Honing	Coated F7030	Coated VP15TF	Coated UP20M	Coated AP10H	Cermet NX2525	Cermet NX4545	Carbide UTi20T	Carbide HTi10	IC	S	BS	RE	Geometry
Corner Angle 0° 	**TPEN1603PPR**	E	T	●				●				9.525	3.18	1.2	—	
	TPEN1603PPN	E	T *1							●		9.525	3.18	1.2	—	
	TPEN2204PDR	E	T *1	●				●	●		●	12.7	4.76	1.4	—	
	TPEN2204PDL	E	T *1							□		12.7	4.76	1.4	—	
PMF ➲K234 	**TPEW1303ZPER2**	E	E		●		●					7.94	3.18	2	—	
11° Positive 	**TPMN160304**	M	E *1	●	★	★		●		●	●	9.525	3.18	—	0.4	
	TPMN160308	M	E *2	●	★	●		●		●	●	9.525	3.18	—	0.8	
	TPMN160312	M	E *1			●					★	9.525	3.18	—	1.2	
	TPMN220404	M	E							●		12.7	4.76	—	0.4	
	TPMN220408	M	E *1	●	★	●				●	●	12.7	4.76	—	0.8	
	TPMN220408T	M	T					●				12.7	4.76	—	0.8	
	TPMN220412	M	E *1	★	★					●	●	12.7	4.76	—	1.2	
Corner Angle 0° 	**TPNN2204PDR**	N	E							●		12.7	4.76	1.4	—	

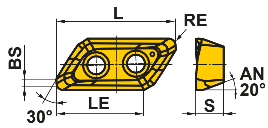
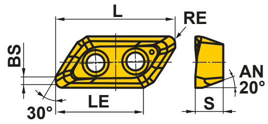
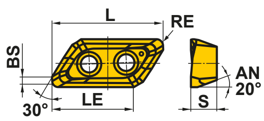
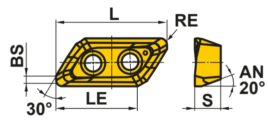
*1 Grade HTi10 is "F".
*2 Grade HTi10 is "F", Grade NX2525 is "T".

ROTATING INSERTS

Work Material			MP9120	LC15TF	MT2010	TF15
	P	Steel				
	M	Stainless Steel				
	K	Cast Iron				
	N	Non-ferrous Metal	✤	✤	◐	◐
	S	Heat-resistant Alloy, Titanium Alloy	◐			
	H	Hardened Materials				

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

Honing:
E: Round F: Sharp

Shape	Order Number	Class	Honing	Coated MP9120	Coated LC15TF	Carbide MT2010 (NEW)	Carbide TF15	L	LE	S	BS	RE	Geometry
AXD4000 ➲K155 AXD4000A ➲K162	XDGX175004PDFR-GL	G	F		★		●	23.0	16.9	5	1.7	0.4	
	XDGX175008PDFR-GL	G	F		★		●	23.0	17.0	5	1.3	0.8	
	XDGX175012PDFR-GL	G	F		★		●	23.0	17.0	5	0.9	1.2	
	XDGX175016PDFR-GL	G	F		★		●	22.0	16.4	5	1.4	1.6	
	XDGX175020PDFR-GL	G	F		★		●	22.0	16.4	5	1.0	2.0	
	XDGX175024PDFR-GL	G	F		★		●	22.0	16.4	5	0.6	2.4	
	XDGX175030PDFR-GL	G	F		★		●	21.1	16.1	5	0.8	3.0	
	XDGX175032PDFR-GL	G	F		★		●	21.1	16.1	5	0.6	3.2	
	XDGX175040PDFR-GL	G	F		★		●	20.0	15.6	5	0.8	4.0	
	XDGX175050PDFR-GL	G	F		★		●	19.4	15.3	5	0.4	5.0	
AXD4000 ➲K155 AXD4000A ➲K162	XDGX175004PDER-GM	G	E	●				23.0	17.0	5	1.7	0.4	
	XDGX175008PDER-GM	G	E	●				23.0	17.0	5	1.2	0.8	
	XDGX175012PDER-GM	G	E	●				23.0	17.0	5	0.9	1.2	
	XDGX175016PDER-GM	G	E	●				22.0	15.9	5	1.3	1.6	
	XDGX175020PDER-GM	G	E	●				22.0	15.9	5	0.8	2.0	
	XDGX175024PDER-GM	G	E	●				22.0	15.9	5	0.4	2.4	
	XDGX175030PDER-GM	G	E	●				21.1	16.0	5	0.6	3.0	
	XDGX175032PDER-GM	G	E	●				21.1	16.0	5	0.4	3.2	
	XDGX175040PDER-GM	G	E	●				20.0	14.8	5	0.5	4.0	
	XDGX175050PDER-GM	G	E	●				19.4	15.0	5	0.3	5.0	
AXD4000 ➲K155 AXD4000A ➲K162	XDGX175004PDFR-GM	G	F			●	●	23.0	17.0	5	1.7	0.4	
	XDGX175008PDFR-GM	G	F			●	●	23.0	17.0	5	1.2	0.8	
	XDGX175012PDFR-GM	G	F			★	●	23.0	17.0	5	0.9	1.2	
	XDGX175016PDFR-GM	G	F			●	●	22.0	15.9	5	1.3	1.6	
	XDGX175020PDFR-GM	G	F			●	●	22.0	15.9	5	0.8	2.0	
	XDGX175024PDFR-GM	G	F			★	●	22.0	15.9	5	0.4	2.4	
	XDGX175030PDFR-GM	G	F			●	●	21.1	16.0	5	0.6	3.0	
	XDGX175032PDFR-GM	G	F			●	●	21.1	16.0	5	0.4	3.2	
	XDGX175040PDFR-GM	G	F			●	●	20.0	14.8	5	0.5	4.0	
	XDGX175050PDFR-GM	G	F			★	●	19.4	15.0	5	0.3	5.0	
AXD7000 ➲K166	XDGX227008PDFR-GL	G	F		★		●	30.0	21.6	7	2.0	0.8	
	XDGX227016PDFR-GL	G	F		★		●	30.0	21.7	7	1.2	1.6	
	XDGX227020PDFR-GL	G	F		★		●	30.0	21.7	7	0.8	2.0	
	XDGX227030PDFR-GL	G	F		★		●	28.8	21.2	7	0.8	3.0	
	XDGX227032PDFR-GL	G	F		★		●	28.8	21.2	7	0.6	3.2	
	XDGX227040PDFR-GL	G	F		★		●	27.5	20.6	7	0.9	4.0	
	XDGX227050PDFR-GL	G	F		★		●	27.0	20.3	7	0.4	5.0	

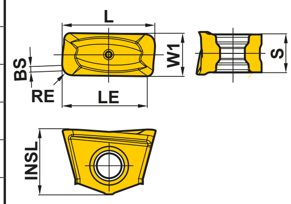
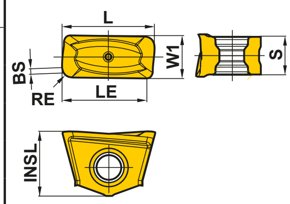
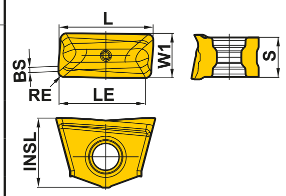
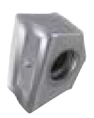
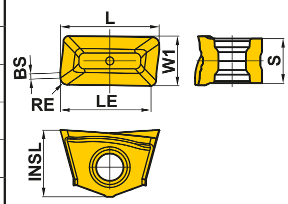
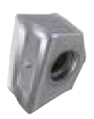
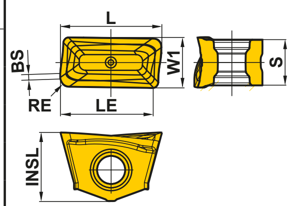
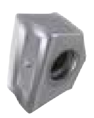
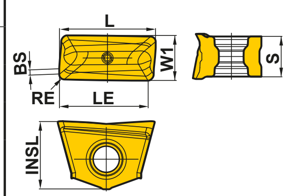
● ★ = NEW

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

Work Material			MP9130
	P	Steel	
	M	Stainless Steel	
	K	Cast Iron	
	N	Non-ferrous Metal	
	S	Heat-resistant Alloy, Titanium Alloy	✤
	H	Hardened Materials	

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

Honing:
E:Round

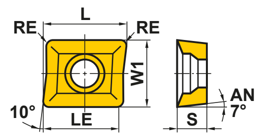
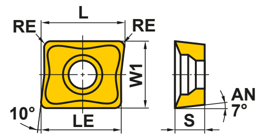
Shape	Order Number	Class	Honing	Coated MP9130	L	LE	W1	INSL	S	BS	RE	Geometry
VFX5 ➲K192 	XNMU160708R-MS	M	E	●	16.0	13.4	7.0	11.1	6.5	1.0	0.8	
	XNMU160712R-MS	M	E	●	16.0	13.8	7.0	11.1	6.5	1.0	1.2	
	XNMU160716R-MS	M	E	●	16.0	13.8	7.0	11.1	6.5	1.0	1.6	
	XNMU160724R-MS	M	E	●	16.0	13.8	7.0	11.1	6.5	1.0	2.4	
	XNMU160732R-MS	M	E	●	17.3	14.4	7.0	11.1	6.5	—	3.2	
	XNMU160740R-MS	M	E	●	18.9	15.2	7.0	11.1	6.5	—	4.0	
VFX5 ➲K192 	XNMU160708R-HS	M	E	●	16.0	13.4	7.0	11.1	6.5	1.0	0.8	
VFX5 ➲K192 	XNMU160708R-LS	M	E	●	16.0	13.4	7.0	11.1	6.5	1.0	0.8	
VFX6 ➲K196 	XNMU190912R-MS	M	E	●	19.1	16.5	9.5	12.7	8.5	1.0	1.2	
	XNMU190916R-MS	M	E	●	19.1	16.5	9.5	12.7	8.5	1.0	1.6	
	XNMU190924R-MS	M	E	●	19.1	16.6	9.5	12.7	8.5	1.0	2.4	
	XNMU190932R-MS	M	E	●	20.2	17.1	9.5	12.7	8.5	—	3.2	
	XNMU190940R-MS	M	E	●	21.8	17.8	9.5	12.7	8.5	—	4.0	
	XNMU190950R-MS	M	E	●	21.8	17.8	9.5	12.7	8.5	—	5.0	
VFX6 ➲K196 	XNMU190912R-HS	M	E	●	19.1	16.5	9.5	12.7	8.5	1.0	1.2	
VFX6 ➲K196 	XNMU190912R-LS	M	E	●	19.1	16.5	9.5	12.7	8.5	1.0	1.2	

ROTATING INSERTS

Work Material			F7030	VP15TF	UP20M	UTi20T
	P	Steel	◐	◐	◐	◐
	M	Stainless Steel	◐	◐	◐	◐
	K	Cast Iron		✱		✱
	N	Non-ferrous Metal				
	S	Heat-resistant Alloy, Titanium Alloy		◐		
	H	Hardened Materials		◐		

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

Honing:
E: Round

Shape	Order Number	Class	Honing	Coated: F7030	Coated: VP15TF	Coated: UP20M	Carbide: UTi20T	Dimensions (mm): L	LE	W1	S	RE	Geometry
DCCC ➲K200 	ZCMX083508ER-A	M	E	●			★	11	8.5	7.94	3.5	0.8	
	ZCMX09T308ER-A	M	E	●	●	●	★	12.7	11	9.525	3.97	0.8	
DCCC ➲K200 	ZCMX09T308ER-B	M	E	●		★		12.7	11	9.525	3.97	0.8	

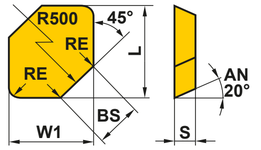
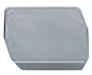
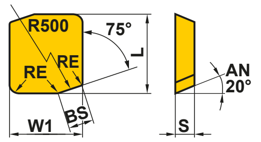
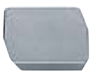
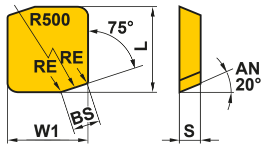
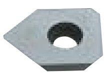
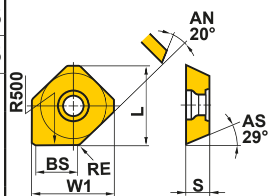
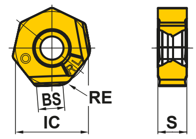
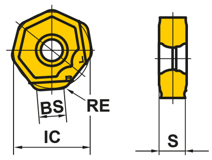
● : Inventory maintained. ★ : Inventory maintained in Japan.
(10 inserts in one case)

WIPER INSERTS

Work Material		MP6120	MC5020	VP15TF	NX2525	VP25N	HTi05T
P	Steel	◐		◐	●	◐	
M	Stainless Steel			◐	●	◐	
K	Cast Iron		◐	✤	●	◐	◐
N	Non-ferrous Metal						◐
S	Heat-resistant Alloy, Titanium Alloy			◐			
H	Hardened Materials			◐			

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

Honing:
E:Round T:Chamfer

Shape	Order Number	Class	Honing	MP6120 (Coated)	MC5020 (Coated)	VP15TF (Coated)	NX2525 (Cermet)	VP25N (Coated Cermet)	HTi05T (Carbide)	L	W1	IC	S	BS	RE	Geometry
SE545 	**WEC53AFTR5C**	C	T				★			18.505	15.875	—	4.76	5	1.0	
SE415 	**WEC42EFTR5C**	C	T				★			13.728	12.7	—	3.18	5	1.0	
SE515 	**WEC53EFTR5C**	C	T				★			16.903	15.875	—	4.76	5	1.0	
ASX445 ➔K026 	**WEEW13T3AGER8C**	E	E		●	●			●	16.6	16.48	—	3.97	7.5	1.5	
	WEEW13T3AGTR8C	E	T				●	●		16.6	16.48	—	3.97	7.5	1.5	
AHX440S ➔K034 	**WNEU1305ZEN4C-M**	E	E	●	●	★				—	—	13.4	5.1	4	2.7	
AHX640S ➔K041 	**WNEU2007ZEN7C-M**	E	E	●						—	—	20	6.9	7.2	0.8	

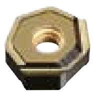
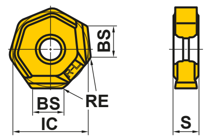
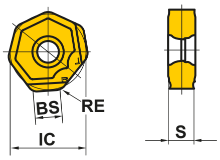
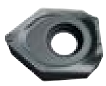
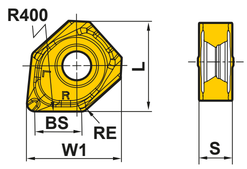
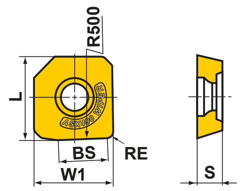
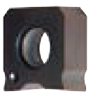
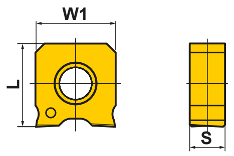
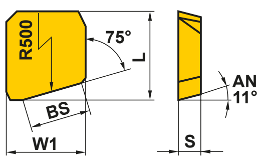
Dimensions (mm)

WIPER INSERTS

Work Material			MC5020	MP6120	VP15TF	NX2525	MX3020	HTi05T
	P	Steel		◐	◐	●	◐	
	M	Stainless Steel			◐	●	◐	
	K	Cast Iron	◐		✤	●	◐	●
	N	Non-ferrous Metal						●
	S	Heat-resistant Alloy, Titanium Alloy			◐			
	H	Hardened Materials			◐			

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

Honing:
E:Round T:Chamfer

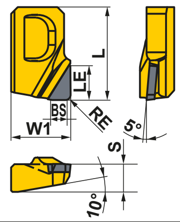
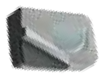
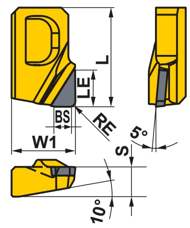
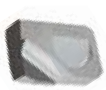
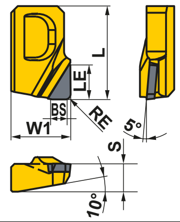
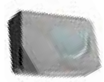
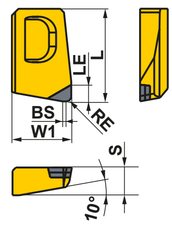
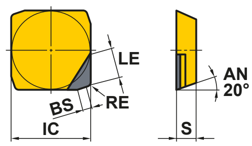
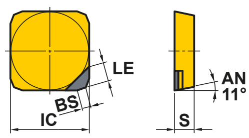
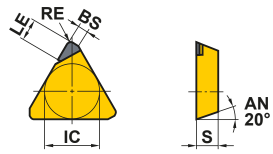
Shape	Order Number	Class	Honing	Coated MC5020	Coated MP6120	Coated VP15TF	Cermet NX2525	Cermet MX3020	Carbide HTi05T	L	W1	IC	S	BS	RE	Geometry
AHX640S ➲K041 AHX640W ➲K048 	WNEU2006ZEN7C-WK	E	E	●						—	—	20	6.55	7.4	0.8	
AHX640S ➲K041 	WNEU2007ZEN7C-WP	E	E			●				—	—	20	6.9	7.1	0.8	
WSX445 ➲K016 	WNGU1406ANEN8C-M	G	E	●	●	●		●		16.87	16.87	—	6	8	1.0	
ASX400 ➲K068 	WOEW12T308PEER8C	E	E						●	13.2	12.5	—	3.97	8	0.8	
	WOEW12T308PETR8C	E	T				●			13.2	12.5	—	3.97	8	0.8	
VOX400 ➲K065 	WOEX1206PER5C	E	E			●				13.025	12.5	—	5.5	—	—	
FBP415 	WPC42EEER10C	C	E						●	15.163	12.5	—	3.175	10	—	 Right hand insert shown.

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

CBN AND PCD

Work Material		
K	Cast Iron	CBN: ◐ ◐
N	Non-ferrous Metal	PCD: ◐ ◐

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

Shape	Order Number	Class	CBN MB4120 (NEW)	CBN MB710	PCD MD2030	PCD MD220	L	LE	W1	IC	S	BS	RE	Geometry
FMAX ➔K051 	GOER1404PXFR2	E			●	●	14.0	5.0	9.0	–	4.2	2.0	0.4	
	GOER1408PXFR2	E			●	●	14.0	5.0	9.0	–	4.2	2.0	0.8	
FMAX ➔K051 NEW 	GOER1408PXFR2-8	E				★	14.0	8.0	9.0	–	4.2	2.0	0.8	
FMAX ➔K051 	GOER1401ZXFR2	E				●	14.0	5.0	9.0	–	4.2	2.0	0.1	
FMAX ➔K051 NEW 	NP-GOEN1404PXSR05	E	●				14.0	2.5	9.0	–	4.2	0.5	0.4	
	NP-GOEN1408PXSR05	E	●				14.0	2.5	9.0	–	4.2	0.5	0.8	
SE415 	SECN1203EFFR1	C				★	–	5.0	–	12.7	3.18	1.4	1.0	
FBP415 	SPEN1203EETR1	E		★			–	3.0	–	12.7	3.175	1.4	–	
SE300 NSE300 	TECN1603PEFR1	C				★	–	5.0	–	9.525	3.175	1.4	0.4	

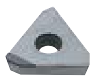
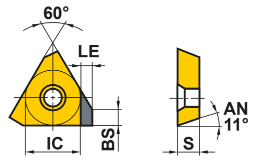
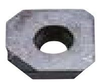
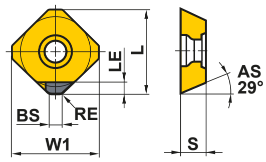
● ★ = NEW

●: Inventory maintained. ★: Inventory maintained in Japan.
(1 insert in one case)

CBN AND PCD WITH WIPER

Work Material			CBN	PCD
	K	Cast Iron	●	
	N	Non-ferrous Metal		●

Cutting Conditions (Guide): ●:Stable Cutting ●:General Cutting ✤:Unstable Cutting

Shape	Order Number	Class	CBN MB710	PCD MD220	L	LE	W1	IC	S	BS	RE	Geometry
PMF ➲K234 	TPEW1303ZPTR2	E	●		—	1.5	—	7.94	3.18	2	—	
ASX445 ➲K026 	WEEW13T3AGFR3C	E		●	16.6	1.8	16.48	—	3.97	3.0	1.5	
	WEEW13T3AGTR3C	E	●		16.6	1.8	16.48	—	3.97	3.0	1.5	

● : Inventory maintained. ★ : Inventory maintained in Japan.
(1 insert in one case)

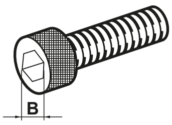
Memo

Memo

SPARE PARTS

IDENTIFICATION

IDENTIFICATION OF CLAMP SCREW (Metric coarse right hand screw thread)



H SC 060 05

- H: Hexagonal Hole Dimensions / With Slot / With Cross Hole
- SC: Screw Head
- 060: Screw Diameter
- 05: Length

Length

Example	
Symbol	L
05	5
10	10
20	20
30	30

Screw Diameter

Example	
Symbol	d
050	M5
060	M6

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

Screw Head

BH	CHUUBURASHI CO.	Button Head
BHA	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)

(d, L)

Name	Symbol	Geometry
Hexagonal Hole Dimensions	H	⬡
With Slot	S	⊖
With Cross Hole	C	✚

IDENTIFICATION OF WRENCH

HKY 15 R

Symbol	Wrench
HKY	Hexagonal Wrench
TKY	Torx Wrench
RKY	R 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	B	Size
06	1.8	6IP
07	2.1	7IP
08	2.4	8IP
10	2.8	10IP
15	3.4	15IP

R	Standard L Wrench
L	Long L Wrench
T	T Wrench
F, FS	Flag Wrench
W	Flag Wrench
D, DS	Driver
S	Wrench

IMX 10 - WR

Symbol	Wrench
iMX	Wrench for iMX Series

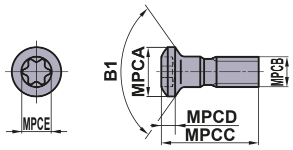
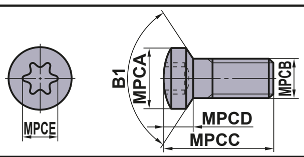
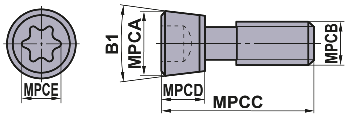
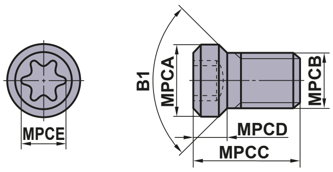
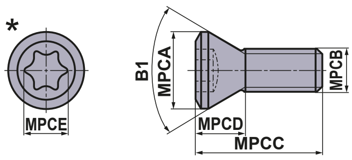
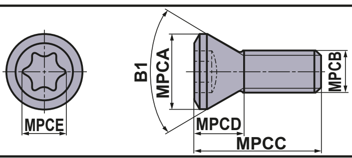
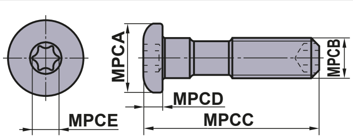
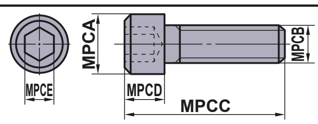
Hexagonal Wrench

Symbol	B
10	8
12	10
16	13
20	16
25	20

WR

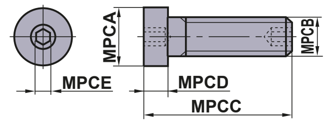
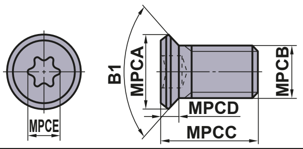
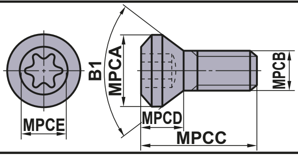
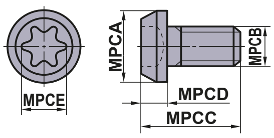
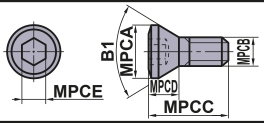
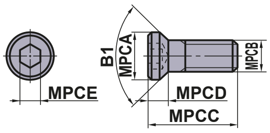
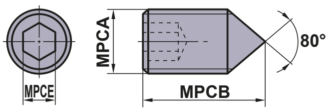
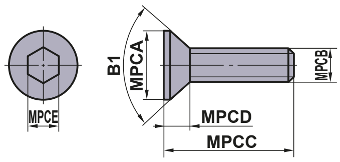
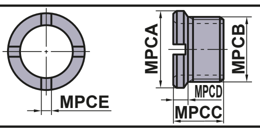
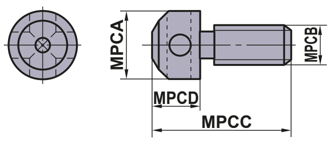
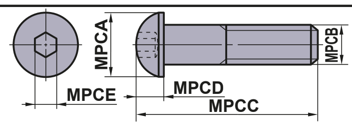
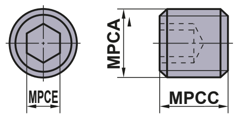
SPARE PARTS

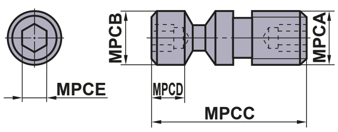
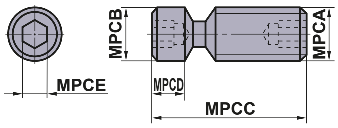
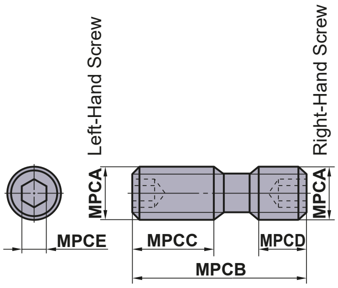
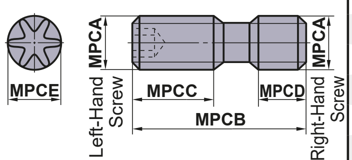
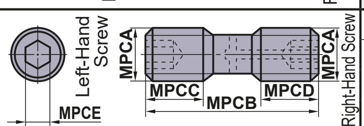
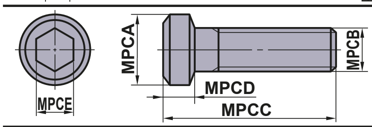
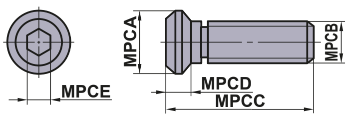
CLAMP SCREW

Geometry	Order Number	Dimensions (mm)					Angle	MPCDS	TQ (N•m)	Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE	B1			
	**AJS3010T10**	5	M3×0.5	10	1.5	2.8	120°	T10	2.5	**Profile** Holder (➲C032) **AJX** (➲K180)
	AJS4012T15	7	M4×0.7	12	2.2	3.4	120°	T15	3.5	**AJX** (➲K180)
	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	
	BRS105	8	M5×0.8	13.8	3.8	4.5	120°	T25	7.5	
	**CAS51T**	7.9	M5×0.8	19	5	4.5	10°	T25	8.5	
	**CS200T**	3.2	M2×0.4	5	1.6	1.8	90°	T6	0.6	**F** Type Boring Bar (➲E027)
	CS250T	3.7	M2.5×0.45	6	1.8	2.4	90°	T8	1.0	**Milling Tools** Series (➲K001)
	* **CS250560T**	3.9	M2.5×0.45	5.2	2.5	2.4	60°	T8	1.0	**BRP** (➲K190)
	CS300590T	4.1	M3×0.5	5.5	2.1	2.4	90°	T8	1.0	
	CS300790TS	4.7	M3×0.5	7	2.3	2.8	90°	T10	2.0	
	CS300890T	4.1	M3×0.5	8	2.1	2.4	90°	T8	1.0	**DCCC** (➲K200)
	CS350690T	4.8	M3.5×0.6	6.5	2.4	2.8	90°	T10	2.5	
	* **CS350760T**	5.5	M3.5×0.6	7	4.0	3.4	60°	T15	3.5	
	CS350790T	4.8	M3.5×0.6	7	2.4	2.8	90°	T10	3.5	
	* **CS350860T**	5.5	M3.5×0.6	8.4	4.0	3.4	60°	T15	3.5	**MMTI** Type Boring Bar (➲G026) **BRP** (➲K190)
	CS350990T	4.8	M3.5×0.6	9	2.4	2.8	90°	T10	2.5	**DCCC** (➲K200)
	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	**AL** Type Holder (➲C034)
	* **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	**AHX640S** (➲K041)
	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** (➲K236)
	**DC0520T**	8.5	M5×0.8	22.5	2.5	3.4	—	T15	3.5	**DOUBLE CLAMP** Holder (➲C008)
	DC0621T	10.5	M6×1.0	25	4	3.9	—	T20	5.0	**DOUBLE CLAMP DIMPLE BAR** (➲E015)
										HSK Tool Holder (➲H001)
	**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

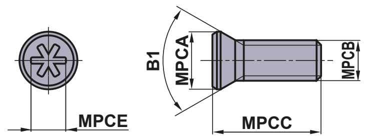
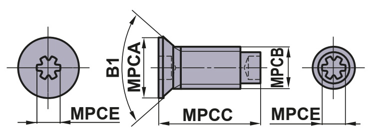
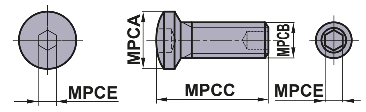
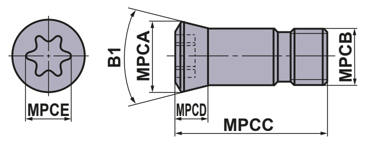
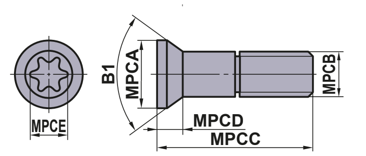
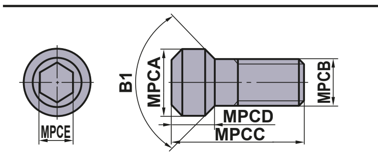
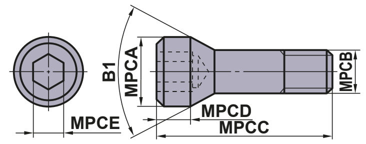
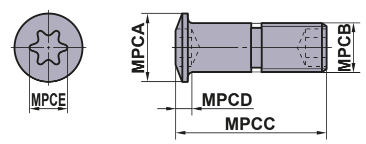
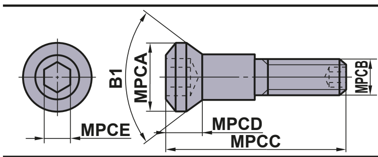
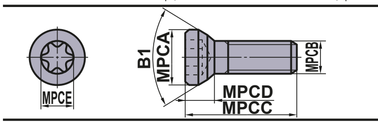
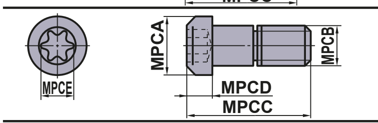
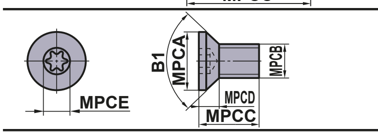
CLAMP SCREW

Geometry	Order Number	Dimensions (mm) MPCA	MPCB	MPCC	MPCD	MPCE	Angle B1	MPCDS	TQ (N•m)	Tool Holder
	**EGS06019**	9	M6×1	22.5	3.5	3	—	—	3.3	
	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 (➲C035) **AL** Type Boring Bar (➲E041)
	**GY05016S**	8.7	M5×0.8	16	3.5	3.9	90°	T20	5.0	**GY** Series (➲F004)
	**GY06013M**	12	M6×1	18	5	5.6	—	T30	6.0	**GY** Series (➲F004)
	**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 (➲C019)
	**HY-A1**	4.4	M3×0.5	7	2.1	2	82°	—	1.5	
	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	—	—	—	—	
	KS2	10	M6×1	18	7	—	—	—	—	
	KS2S	10	M6×1	18	7	—	—	—	—	
	**KS12**	10	M6×1	26	4	4	—	—	7.0	
	**LLR1**	M5×0.8	—	3.5	—	2.5	—	—	—	
	LLR2	M6×1	—	5	—	3	—	—	—	

Geometry	Order Number	Dimensions (mm)					Angle	MPCDS	TQ (N•m)	Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE	B1			
	☆LLCS103	M3×0.5	4	11	4.6	2	—	—	1.5	
	* LLCS105	M5×0.8	M5×0.8	10	1.5	2	—	—	1.5	**P** Type Boring Bar (➲E037)
	LLCS106	M6×1	6	16.5	3.5	2.5	—	—	2.2	**HSK** Tool Holder (➲H001)
	* LLCS106S	M6×1	6	13.4	0.7	2.5	—	—	2.2	
	LLCS108	M8×1.25	8	21	6.5	3	—	—	3.3	
	* LLCS108S	M8×1.25	8	16.5	2	3	—	—	3.3	
	LLCS110	M10×1.5	10	29	8	4	—	—	7.0	
	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	
LLCS103, LLCS105 LLCS112, LLCS125 LLCS205	LLCS208	M8×1.25	8	24	6.5	3	—	—	3.3	
	LLCS306	M6×1	6	21	4	2.5	—	—	2.2	
The products with "*" do not have a hexagonal hole at the end marked **MPCB**.	LLCS308	M8×1.25	8	42	27.5	3	—	—	3.3	
	LLCS310	M10×1	10	29	8	4	—	—	7.0	
The products with "☆" do not have a hexagonal hole at the end marked **MPCA**.	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	
	LS1	M6×1	22	8	8	3	—	—	5.0	
	LS2	M8×1	29	13	10	4	—	—	8.2	
	LS3	M8×1	32	13	13	4	—	—	8.2	
	* LS4	M6×1	15	8	4	3	—	—	5.0	**Milling Tools** Series (➲K001)
	* 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	—	—	7.8	
	* LS12	M8×1	24	7	7	4	—	—	7.8	
*Without Hexagonal Hole on Right-Hand Screw	* LS13	M8×1	34	12	12	4	—	—	7.8	
	* LS14	M7×0.75	24	10	10	4	—	—	7.8	
	* LS16	M7×0.75	23	11	8	4	—	—	7.8	
	* LS18	M7×0.75	14	6	4	4	—	—	7.8	
	* 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	—	—	7.8	
	LS25	M8×1	28.5	12.0	10.5	4	—	—	8.2	**DOUBLE CLAMP** Holder (➲C009)
	LS10T	M7×0.75	14	6	5	4.5	—	T25	8.0	
	LS14T	M7×0.75	24	10	10	4.5	—	T25	8.0	
	LS15T	M7×0.75	18	7	7	4.5	—	T25	8.0	
	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	**AHX640W** (➲K048)
	LS24H	M8×1.25	24	8.5	8.5	4	—	—	8.2	
	MGS6	10	M6×1	26	4	5	—	—	9.0	**APX3000** (➲K133)
	MHT1	11	M8×1	18.5	3.5	4	—	—	8.7	

SPARE PARTS

CLAMP SCREW

Geometry	Order Number	Dimensions (mm) MPCA	MPCB	MPCC	MPCD	MPCE	Angle B1	MPCDS	TQ (N•m)	Tool Holder
	**NS251**	3.6	M2.5×0.45	7	—	2.2	60°	—	0.7	**BTVH** (➲D016) **CSVH** (➲D027)
	NS401	5.8	M4×0.7	6	—	3.6	60°	—	3.5	**CTAH-S** (➲D020)
	**NS402W**	5.85	M4×0.7	10	—	2.2	60°	—	0.7	**CTAH** (➲D020) **CTBH** (➲D022)
	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** (➲D001)
	NS502W	8	M5×0.8	20	—	2.5	120°	—	2.2	
	**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** (➲K212) **SUF** (➲K216)
	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°	—	0.6	
	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	
	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 (➲G019)
	SETS61	8	M6×1	20	1.8	3.9	—	T20	5.0	**MMTI** Type Boring Bar (➲G026)
										HSK Tool Holder (➲H001)
	**SLCS105**	10	M5×0.8	25	6.3	4	90°	—	7.0	**WP** Type Holder (➲C017)
	SLCS106	12	M6×1	32	6.2	4	90°	—	7.0	
	**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	
	**STS1**	6.8	M3×0.5	7	2.2	2.8	90°	T10	2.5	

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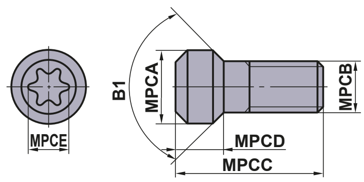
SPARE PARTS



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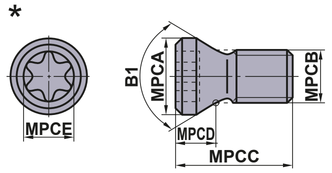

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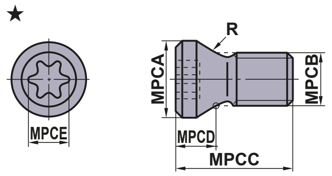

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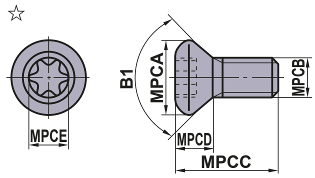
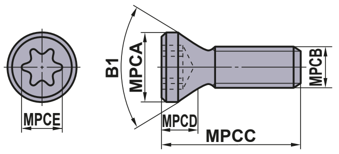
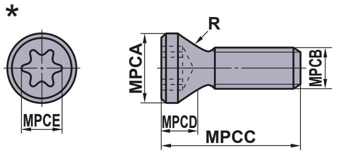
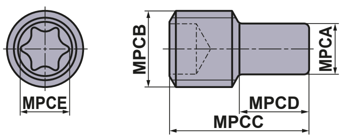
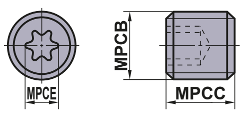
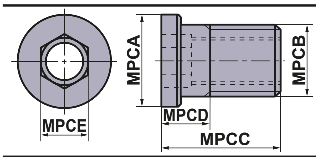
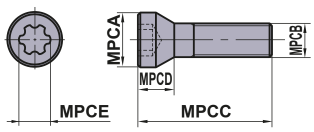
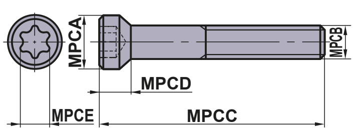


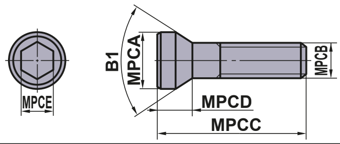
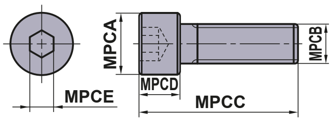
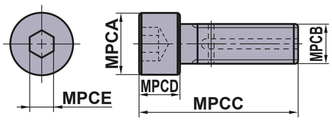
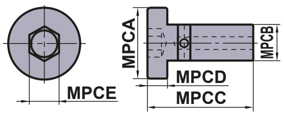
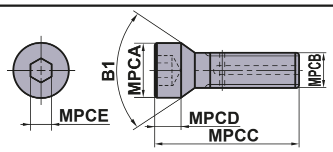
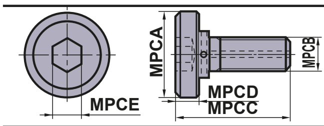
Order Number	Dimensions (mm)					Angle	MPCDS	TQ (N•m)	Tool Holder
	MPCA	MPCB	MPCC	MPCD	MPCE	B1			
* TS16	2.5	M1.6×0.35	3.2	1.6	1.8	60°	T6	0.6	**MICRO-DEX** (➲E018)
TS2	2.7	M2×0.4	4.6	1.4	1.8	60°	T6	0.6	
* TS2A	2.7	M2×0.4	4.5	1.2	1.8	60°	T6	0.6	**AQX** (➲K172)
TS2C	2.7	M2×0.4	3.8	1.4	1.8	60°	T6	0.6	
☆ TS2D	3.8	M2×0.4	5.3	1.9	1.8	82°	T6	0.6	**DIMPLE BAR** (➲E007)
TS21	2.7	M2×0.4	3.4	1.4	1.8	60°	T6	0.6	**F** Type Boring Bar (➲E029)
* TS22	3.0	M2.2×0.45	5	1.2	1.8	60°	T6	0.6	**S** Type Boring Bar (➲E030)
* TS25	3.3	M2.5×0.45	5.5	1.7	2.4	60°	T8	1.0	**AQX** (➲K172) **AJX** (➲K180)
☆ TS25D	4.4	M2.5×0.45	6.2	2.2	2.4	82°	T8	1.0	**MMTI** Type Boring Bar (➲G026)
* TS25H	3.6	M2.5×0.45	5.5	2	2.4	60°	T8	1.0	**SRM2** (➲K220)
TS202	2.7	M2×0.4	5.5	1.8	1.8	60°	T6	0.6	
TS253	3.3	M2.5×0.45	4.5	1.7	2.4	60°	T8	1.0	**Milling Tools** Series (➲K001)
TS254	3.3	M2.5×0.45	7	1.7	2.4	60°	T8	1.0	**SMALL TOOLS** (➲D001) **PMF** (➲K234)
* TS255	3.5	M2.5×0.45	7.5	1.6	2.4	60°	T8	1.0	**Profile Holder** (➲C032)
TS3	3.9	M3×0.5	6	2	2.4	60°	T8	1.0	**TSMP** (➲K232)
TS304	3.9	M3×0.5	10.5	2.0	2.4	60°	T8	1.5	
TS3D	5.0	M3×0.5	6	2.3	2.8	82°	T10	2.5	**DIMPLE BAR** (➲E007)
* TS3SB	4.4	M3×0.5	8	2	2.4	80°	T8	1.5	**AXD4000** (➲K155)
TS3SBS	4.4	M3×0.5	6.5	2	2.4	80°	T8	1.5	**AXD4000** (➲K155)
☆ TS31D	4.8	M3×0.5	7.2	2.2	2.8	82°	T10	2.5	**DIMPLE BAR** (➲E007)
* TS32	3.9	M3×0.5	7.5	2	2.4	60°	T8	2.0	**SRM2** (➲K220)
* TS33	3.9	M3×0.5	6.7	2	2.4	60°	T8	1.5	**AQX** (➲K172) **AJX** (➲K180)
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	**HSK** Tool Holder (➲H001)
★ TS35R	5.7	M3.5×0.6	10	2.1	3.4	—	T15	3.5	**AHX440S** (➲K034) **AHX475S** (➲K038)
TS351	4.8	M3.5×0.6	7.2	2.4	2.8	60°	T10	2.5	**AJX** (➲K180) **SRM2** (➲K220)
TS352	4.8	M3.5×0.6	10	3	2.8	60°	T10	2.5	**VFX5** (➲K192)
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	**AXD7000** (➲K166)
* TS4SBL	5.8	M4×0.7	10.5	2.7	3.4	80°	T15	3.5	**GY** SERIES (➲F004) **AXD7000** (➲K166)
TS4	5.4	M4×0.7	8	2.6	3.4	60°	T15	3.5	**CE/CF/CGSP** (➲K230) **TSMP** (➲K232)
TS4D	5.6	M4×0.7	7.7	2.5	3.4	82°	T15	3.5	**DIMPLE BAR** (➲E007)
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	**AJX** (➲K180) **BRP** (➲K190) **SRM2** (➲K220)
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	**AQX** (➲K172) **AJX** (➲K180)
TS450	5.9	M4.5×0.75	13	3.6	3.9	60°	T20	5.0	**VFX6** (➲K196)
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	**SP** Holder (➲C024) **CE/CF/CGSP** (➲K230) **TSMP** (➲K232)
TS5L	6.8	M5×0.8	15	2.9	4.5	80°	T25	7.5	
★ TS5R	6.9	M5×0.8	12	3.5	3.9	—	T20	5.0	**WWX400** (➲K056) **WJX** (➲K072)
TS52	6.8	M5×0.8	8	3.2	4.5	60°	T25	7.5	**CE/CF/CGSP** (➲K230)
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	**AJX** (➲K180)
TS55	6.8	M5×0.8	10.5	3.2	4.5	60°	T25	7.5	**GY** SERIES (➲F004) **AQX** (➲K172) **SPX** (➲K203) **SRM2** (➲K220)
* TS6S	8.5	M6×1.0	13	4.4	5.6	60°	T30	10.0	**AQX** (➲K172) **SRM2** (➲K220)
* TS6	8.5	M6×1.0	16	4.4	5.6	60°	T30	10.0	**SRM2** (➲K220)

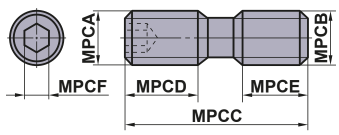
SPARE PARTS

CLAMP SCREW

Geometry	Order Number	Dimensions (mm)					Angle	MPCDS	TQ (N•m)	Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE	B1			
	TPS20	2.7	M2×0.4	3.5	1.3	1.8	60°	6IP	0.5	
	TPS20-1	2.65	M2×0.4	4.7	2.4	1.8	60°	6IP	0.6	MVX (➲M160)
	TPS22	3.0	M2.2×0.45	4.7	1.6	2.1	60°	7IP	0.5	
	TPS22S	3.0	M2.2×0.45	4.2	1.6	2.1	60°	7IP	0.5	
	TPS25	3.3	M2.5×0.45	5.5	1.7	2.1	60°	7IP	1.0	APX3000 (➲K133) MVX (➲M160)
	TPS25-1	3.3	M2.5×0.45	6.5	1.7	2.1	60°	7IP	1.0	APX3000 (➲K133)
	TPS27F1	3.7	M2.7×0.35	6.5	1.8	2.1	60°	7IP	1.0	VPX200 (➲K086)
	TPS27F2	3.7	M2.7×0.35	8.0	1.8	2.1	60°	7IP	1.0	VPX300 (➲K100)
	TPS3	3.9	M3×0.5	6.7	1.4	2.82	60°	10IP	1.0	MVX (➲M160)
	* TPS3R	4.6	M3×0.5	8.5	1.4	2.82	—	10IP	2.0	WJX09 (➲K072)
* 	TPS3SB	4.4	M3×0.5	8	2.0	2.82	80°	10IP	3.0	AXD4000A (➲K162)
	TPS35	5.3	M3.5×0.6	11.5	2.8	3.4	60°	15IP	3.5	ASX445 (➲K026) ASX400 (➲K068) PMR (➲K236)
	TPS351	4.8	M3.5×0.6	7.2	1.4	2.82	60°	10IP	2.5	MVX (➲M160)
	TPS351B	5.1	M3.5×0.6	7.2	1.4	2.82	60°	10IP	2.5	ARP (➲K238)
	TPS4	5.3	M4×0.7	8	2.6	3.4	60°	15IP	3.5	APX4000 (➲K140) ARP (➲K238) MVX (➲M160)
	TPS40F1	5.3	M4×0.5	10.5	2.8	3.4	60°	15IP	3.0	VPX300 (➲K100)
	TPS43	5.3	M4×0.7	10	2.6	3.4	60°	15IP	4.0	APX4000 (➲K140) MVX (➲M160)
	* TPS4R	6.4	M4×0.7	10.6	2.9	3.4	—	15IP	3.5	WSX445 (➲K016)
	TPS54	6.8	M5×0.8	12	3.2	4.5	60°	25IP	7.5	MVX (➲M160)
	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 (➲K234)
	TSS04505S	—	M4.5×0.7	5	—	3.5	—	T10	3.5	FMAX (➲K051)
	TSS05006	—	M5×0.8	6	—	2.8	—	T10	—	
	TSS06010	—	M6×1	10	—	3.9	—	T20	—	
	WCS503507H	6.3	M5×0.5	7	3.3	3.5	—	—	5.0	ASX445 (➲K026) ASX400 (➲K068) PMR (➲K236)
	WCS604010H	7.8	M6×0.75	10	4.1	4.0	—	—	7.0	PMR (➲K236)
	WS203107TPS	3.1	M2×0.25	7.3	1.7	1.8	60°	6IP	1.0	STAW (➲M141)
	WS203108TPS	3.1	M2×0.25	8.3	1.9	1.8	60°	6IP	1.0	
	WS253909TPS	3.9	M2.5×0.35	9.5	2.4	2.4	60°	8IP	2.0	
	WS304912TPS	4.9	M3×0.35	12	3.25	2.82	60°	10IP	2.5	
	WS254012T	4	M2.5×0.45	11.5	2.2	2.4	80°	T8	2.0	TAW (➲M150)
	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	

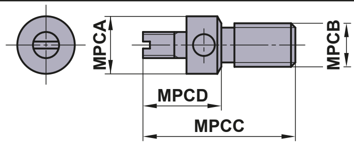
SET BOLT

Geometry	Order Number	Dimensions (mm)					Angle	MPCDS	TQ (N•m)	Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE	B1			
	**BOES101**	15	M10×1.5	45	10	8	60°	—	10.0	
  * With coolant hole.	* **HSC08025H**	13	M8×1.25	33	8	5	—	—	24	**VPX200/300** (➲K086,K100) **ARP** (➲K238)
	HSC05030	8.5	M5×0.8	35	5	4	—	—	10	**APX3000/4000** (➲K133,K140)
	* **HSC08030H**	13	M8×1.25	38	8	5	—	—	24	**WSX445** (➲K016)
	HSC08045	13	M8×1.25	53	8	5	—	—	24	**VPX200/300** (➲K086,K100)
	HSC08040	13	M8×1.25	48	8	5	—	—	24	**WSX445** (➲K016)
	HSC08050	13	M8×1.25	58	8	5	—	—	24	**VPX200/300** (➲K086,K100)
	* **HSC10030H**	16	M10×1.5	40	10	6	—	—	40	**APX3000/4000** (➲K133,K140) **AJX** (➲K180) **WSX445** (➲K016)
	HSC10035	16	M10×1.5	45	10	6	—	—	44	**VFX5** (➲K192) **VFX6** (➲K196)
	HSC10050	16	M10×1.5	60	10	8	—	—	44	**APX3000/4000** (➲K133,K140) **VPX200/300** (➲K086,K100)
	HSC10055	16	M10×1.5	65	10	8	—	—	44	**VFX5** (➲K192)
	HSC10060	16	M10×1.5	70	10	8	—	—	44	**VPX200/300** (➲K086,K100)
	HSC10070	16	M10×1.5	80	10	8	—	—	44	**VPX200/300** (➲K086,K100) **ASPX** (➲K028)
	HSC12035	18	M12×1.75	47	12	10	—	—	80	**WSX445** (➲K016)
	* **HSC12035H**	18	M12×1.75	47	12	10	—	—	80	**APX3000/4000** (➲K133,K140) **AJX** (➲K180)
	HSC12040	18	M12×1.75	52	12	10	—	—	80	
	HSC12045	18	M12×1.75	57	12	10	—	—	80	**WSX445** (➲K016)
	HSC12060	18	M12×1.75	72	12	10	—	—	80	**VPX200/300** (➲K086,K100)
	HSC12070	18	M12×1.75	82	12	10	—	—	80	**APX3000/4000** (➲K133,K140) **AJX** (➲K180) **WSX445** (➲K016)
	HSC16040	24	M16×2	56	16	14	—	—	150	**WSX445** (➲K016)
	* **HSC16040H**	24	M16×2	56	16	14	—	—	150	**APX3000/4000** (➲K133,K140) **AJX** (➲K180)
	HSC16055	24	M16×2	71	16	14	—	—	150	**VPX200/300** (➲K086,K100)
	HSC16065	24	M16×2	81	16	14	—	—	150	**VPX200/300** (➲K086,K100)
	HSC16080	24	M16×2	96	16	14	—	—	150	
	HSC20040	30	M20×2.5	60	20	17	—	—	320	
	HSC20090	30	M20×2.5	110	20	17	—	—	320	
	**HSCX12030H**	24	M12×1.75	37	7	8	—	—	40	**FMAX** (➲K051)
	HSCX16035H	30	M16×2	44	9	12	—	—	100	
	HSCX20035H	36	M20×2.5	46	11	14	—	—	180	
	**HFF08033H**	11	M8×1.25	33	5	5	90°	—	8.2	**WJX09** (➲K072)
	HFF08043H	11	M8×1.25	43	5	5	90°	—	8.2	**AXD4000** (➲K155)
	**MBA16033H**	40	M16×2	43	10	14	—	—	150	**AHX640** (For ϕ100) (➲K041) **WSX445** (➲K016) **APX4000** (➲K140) **AHX475S** (➲K038) **AHX640S** (➲K041) **AXD4000** (➲K155) **AXD7000** (➲K166) **AJX** (➲K180)
	MBA20040H	50	M20×2.5	54	14	17	—	—	320	

Geometry	Order Number	Dimensions (mm)						TQ (N•m)	Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE	MPCF		
	**HDS08030**	M8×0.75	M8×1.25	30	13.5	11.5	4	8.2	**BRP** (➲K190)
	HDS10031	M10×1.0	M10×1.5	31	14	12	5	9.0	**PMF** (➲K234)

SPARE PARTS

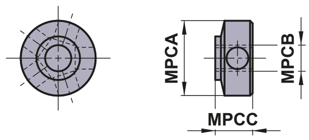
LARGE ADJUSTMENT SCREW

Geometry	Order Number	Dimensions (mm)					Angle	MPCDS	TQ (N•m)	Tool Holder
		MPCA	**MPCB**	**MPCC**	**MPCD**	**MPCE**	**B1**			
	**KSS2**	6.6	M5×0.8	17.5	9	—	—	—	—	**FMAX** (➲K051)

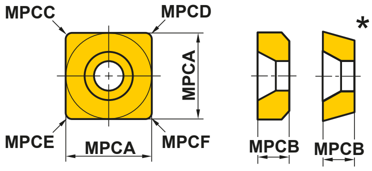
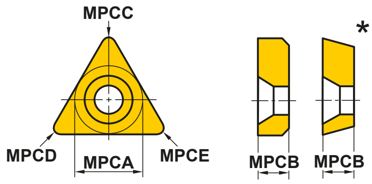
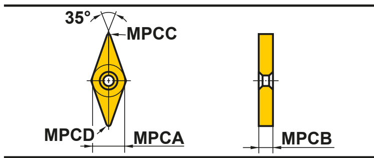
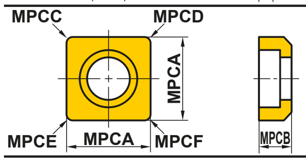
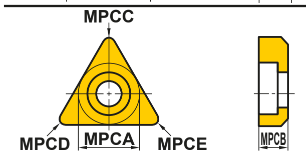
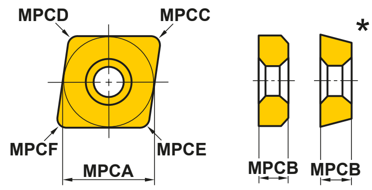
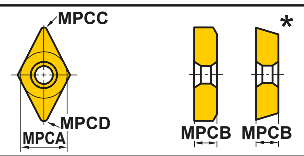
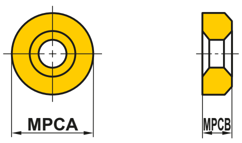
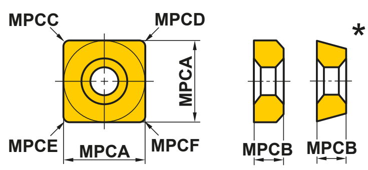
N

SPARE PARTS

MICRO ADJUSTMENT NUT

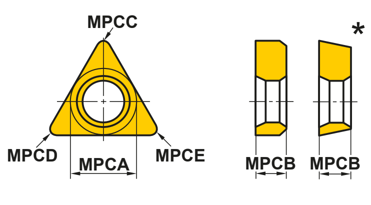
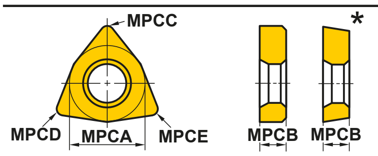
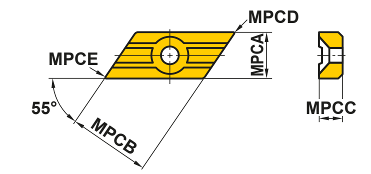
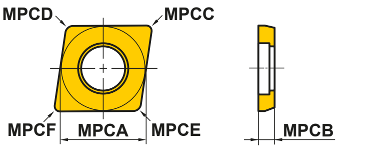
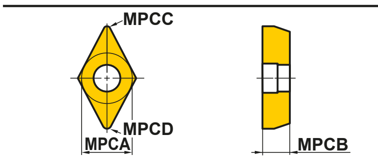
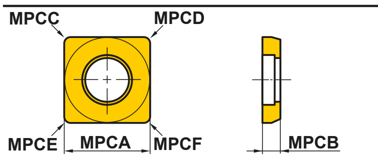
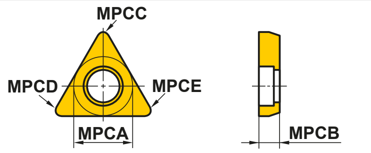
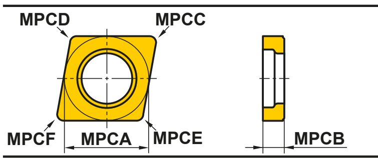
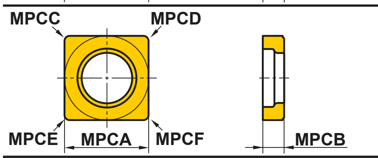
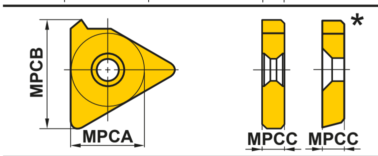
Geometry	Order Number	Dimensions (mm)					Angle	MPCDS	TQ (N•m)	Tool Holder
		MPCA	**MPCB**	**MPCC**	**MPCD**	**MPCE**	**B1**			
	**KSN3**	8.6	M3×0.35	4.3	—	—	—	—	—	**FMAX** (➲K051)

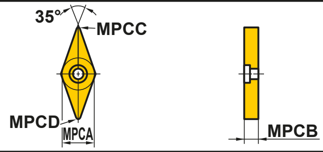
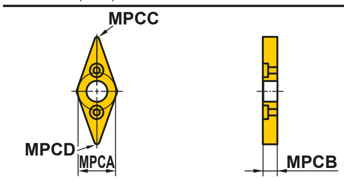
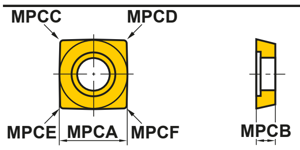
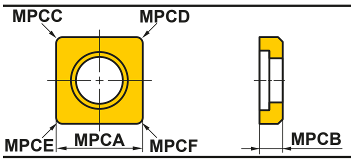
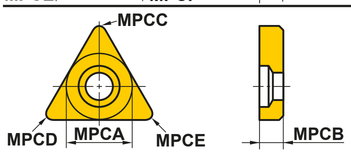
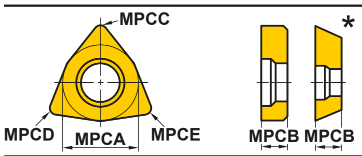
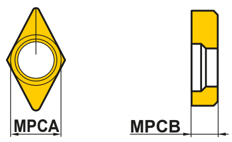
SHIM

Geometry	Order Number	Dimensions (mm)						Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE	MPCF	
	CS32	9.52	3.18	0.8	0.8	1.2	1.2	
	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	
	* PS31	8.28	2.38	0.2	0.2	0.6	0.6	
	* PS42	11.46	3.18	0.2	0.2	0.6	1.0	
	CT22	6.35	3.18	0.4	0.8	1.2	–	
	CT32	9.52	3.18	0.4	0.8	1.2	–	
	* PT21	5.11	2.38	0.2	0.2	0.6	–	
	* PT32	8.28	3.18	0.2	0.2	0.6	–	**F** Type Boring Bar (➲E028)
	* PT42	10.85	3.18	0.3	0.3	0.7	–	
	BPT322	7.8	3.18	–	–	–	–	
	DCSVN32	9.52	3.18	0.8	1.2	–	–	**DOUBLE CLAMP** Holder (➲C019) **DOUBLE CLAMP DIMPLE BAR** (➲E017)
	ESS42	12.70	3.18	0.8	0.8	1.2	1.6	
	EST32	9.52	3.18	0.4	0.8	1.2	–	
	EST43	12.70	4.76	0.4	0.8	1.2	–	
	LLSCN3T3	9.52	3.97	0.4	0.4	0.8	0.8	**LL** Type Holder (➲C008)
	LLSCN33	9.52	4.76	0.4	0.4	0.8	0.8	**LL** Type Holder (➲C008)
	LLSCN42	12.70	3.18	0.8	0.8	1.2	1.2	**DOUBLE CLAMP DIMPLE BAR** (➲E015)
	LLSCN53	15.87	4.76	1.2	1.2	1.6	1.6	**P** Type Boring Bar (➲E038)
	LLSCN63	19.05	4.76	1.2	1.2	1.6	1.6	**HSK** Tool Holder (➲H001)
	* LLSCP42	12.70	3.18	0.8	0.8	1.2	1.2	**DOUBLE CLAMP DIMPLE BAR** (➲E015)
	* LLSCP63	19.05	4.76	1.2	1.2	1.6	1.6	**P** Type Boring Bar (➲E038) **HSK** Tool Holder (➲H001)
	LLSDN32	9.52	3.18	0.8	1.2	–	–	**DOUBLE CLAMP** Holder (➲C010) **LL** Type Holder (➲C010) **DOUBLE CLAMP DIMPLE BAR** (➲E015) **P** Type Boring Bar (➲E038) **HSK** Tool Holder (➲H001)
	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** (➲E015)
	LLSRN103	8.3	3.18	–	–	–	–	**LL** Type Holder (➲C026)
	LLSRN123	9.8	3.18	–	–	–	–	**HSK** Tool Holder (➲H001)
	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	
	LLSSN33	9.52	4.76	0.8	0.8	1.2	1.2	**DOUBLE CLAMP DIMPLE BAR** (➲E016)
	LLSSN42	12.70	3.18	0.8	0.8	1.2	1.6	**P** Type Boring Bar (➲E037)
	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	**DOUBLE CLAMP DIMPLE BAR** (➲E016)

SPARE PARTS

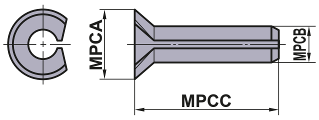
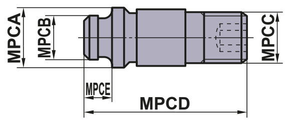
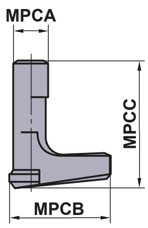
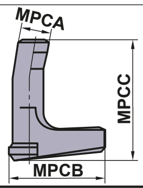
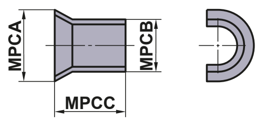
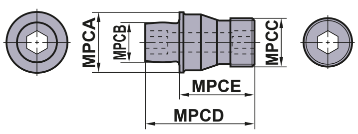
SHIM

Geometry	Order Number	Dimensions (mm) MPCA	MPCB	MPCC	MPCD	MPCE	MPCF	Tool Holder
	LLSTE32	7.6	3.18	0.4	0.4	0.4	—	
	LLSTN32	9.52	3.18	0.4	0.8	1.2	—	**LL** Type Holder (C016)
	LLSTN33	9.52	4.76	0.4	0.8	1.2	—	**DOUBLE CLAMP DIMPLE BAR** (E016)
	LLSTN42	12.70	3.18	0.4	0.8	1.2	—	**P** Type Boring Bar (E037)
	LLSTN53	15.87	4.76	0.8	1.2	1.6	—	
	* LLSTP32	9.52	3.18	0.4	0.8	1.2	—	
	* LLSTP42	12.70	3.18	0.4	0.8	1.2	—	
	LLSWN32	9.52	3.18	0.4	0.8	1.2	—	**LL** Type Holder (C022)
	LLSWN3T3	9.52	3.97	0.4	0.8	1.2	—	**DOUBLE CLAMP** Holder (C022)
	LLSWN42	12.70	3.18	0.4	0.8	1.2	—	**DOUBLE CLAMP DIMPLE BAR** (E017)
	* 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	—	
	MHS543R/L	9.4	15.7	6.5	1.2	1.2	—	
 Hole position of this item is offset from centre.	MLCP42	12.58	3.18	1.2	1.2	1.2	1.2	**P** Type Boring Bar (E038)
 Hole position of this item is offset from centre.	MLDP42	12.56	3.18	1.2	1.2	—	—	**P** Type Boring Bar (E038)
 Hole position of this item is offset from centre.	MLSP42	12.63	3.18	1.2	1.2	1.2	1.2	**P** Type Boring Bar (E037)
 Hole position of this item is offset from centre.	MLTP32	9.50	3.18	1.2	1.2	1.2	—	**P** Type Boring Bar (E037)
	MSCN63	18.8	4.76	1.6	1.6	1.6	1.6	**DOUBLE CLAMP** Holder (C009) (For Heavy Cutting)
	MSSN63	18.8	4.76	1.6	1.6	1.6	1.6	**DOUBLE CLAMP** Holder (C012) (For Heavy Cutting)
	CT32T1	9.525	15.03	3.18	—	—	—	
	* PT32T1R	8.28	13.34	3.18	—	—	—	
	* PT32T2R	8.28	13.19	3.18	—	—	—	

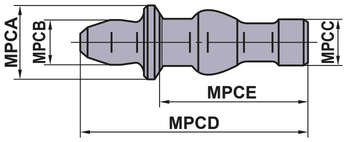
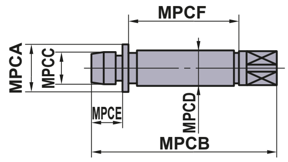
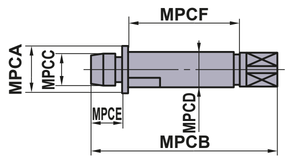
Geometry	Order Number	Dimensions (mm)						Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE	MPCF	
	**PV321**	9.52	3.18	0.4	0.4	–	–	
	PV322	9.52	3.18	0.8	0.8	–	–	**MP** Type Holder (➲C019)
	PV323	9.52	3.18	1.2	1.2	–	–	
	**SPSVN32**	8.06	3.18	0.3	0.3	–	–	**SP** Type Holder (➲C030) **HSK** Tool Holder (➲H001)
	**STASX400N**	11.00	3.00	0.4	0.4	0.4	0.4	**ASX400** (➲K068)
	**STASX445N**	10.76	3.00	–	–	–	–	**ASX445** (➲K026)
	**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 (➲C017)
	WPSTN43	12.50	4.76	0.8	0.4	1.2	–	
	* **WPSWC43**	12.50	4.76	0.4	0.8	1.2	–	
	WPSWN43	12.50	4.76	0.4	0.8	1.2	–	**WP** Type Holder (➲C023)
	**SPSDN32**	8.687	3.175	–	–	–	–	

SPARE PARTS

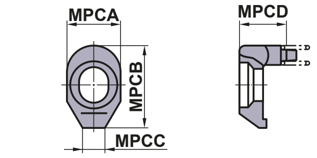
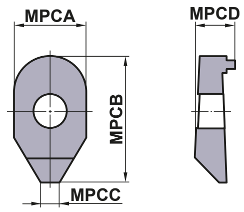
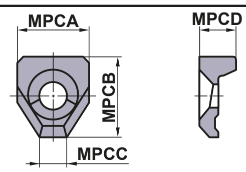
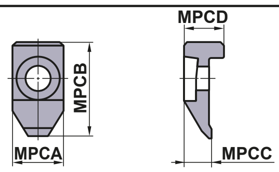
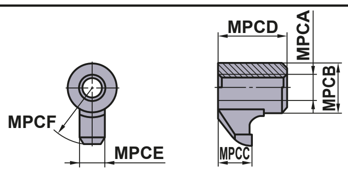
SHIM PIN AND CLAMP LEVER

Geometry	Order Number	Dimensions (mm)					Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE	
	BCP141	3.0	1.4	5.6	–	–	**SP** Type Holder (➲C030)
	BCP201	4.3	2	7.4	–	–	**F** Type Boring Bar (➲E028)
	BCP202	4.3	2	6.4	–	–	**HSK** Tool Holder (➲H013)
	BCP251	4.8	2.5	7.4	–	–	
	BCP252	4.8	2.5	6.4	–	–	
	BCP301	5.3	3	7.4	–	–	
	CCP33	6.5	3.66	M5×0.8	18.5	3	**WP** Holder (➲C017)
	CCP34	7.5	5.0	M6×1.0	18.5	3	
	CCP44	7.5	5.0	M5×0.8	14.2	3	
	LLCL12S	2.1	9.3	5.6	–	–	**LL** Type Holder (➲C016)
	LLCL13	3.6	10	12.5	–	–	**P** Type Boring Bar (➲E037)
	LLCL13S	3.6	10	7.8	–	–	**HSK** Tool Holder (➲H001)
	LLCL14	4.7	13.4	13.2	–	–	
	LLCL14S	4.7	13.6	12.2	–	–	
	LLCL15	6.0	19	17	–	–	
	LLCL16	7.5	20.8	21	–	–	
	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 (➲C008)
	LLP14	7.25	6.55	5.8	–	–	**DOUBLE CLAMP** Holder (➲C008)
	LLP15	8.8	8.05	8.6	–	–	**DOUBLE CLAMP DIMPLE BAR** (➲E015)
	LLP16	10.85	9.85	11.1	–	–	**P** Type Boring Bar (➲E037)
	LLP18	15.35	13.05	12.0	–	–	**HSK** Tool Holder (➲H001)
	LLP23	5.55	4.85	6.8	–	–	
	LLP24	7.25	6.55	9.1	–	–	
	MP6	11.9	7.8	M10×1	22.1	15	**DOUBLE CLAMP** Holder (➲C009) (For Heavy Cutting)

LOCK PIN

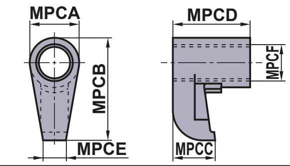
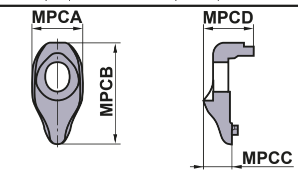
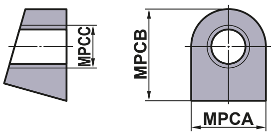
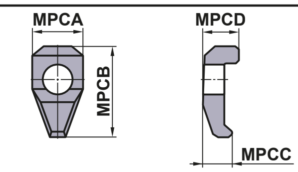
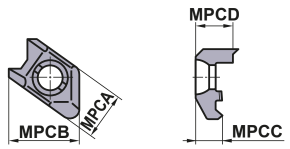
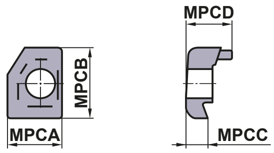
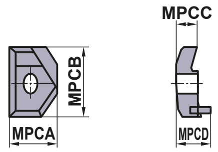
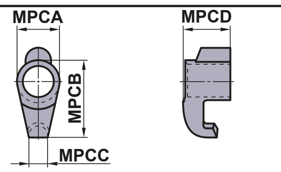
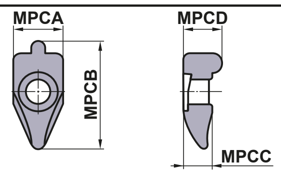
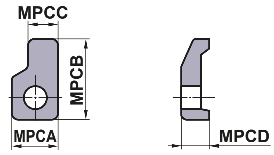
Geometry	Order Number	Dimensions (mm)						Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE	MPCF	
	**P11S**	6	3.7	4	17	11.1	–	**MP** Type Holder (➲C019)
	P21S	7.5	4.9	4.5	17.2	11.5	–	
	**P221US**	4	18	2.11	3.5	3.3	7.7	
	**P333WS**	5.75	24	3.64	5.0	4.9	11.3	
	P434W	7.75	30	5.03	7.0	4.9	16.8	

CLAMP BRIDGE

Geometry	Order Number	Dimensions (mm)						Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE	MPCF	
	**AMS3**	7	12	3	3.3	–	–	**Profile** Holder (➲C032) **AJX** (➲K180)
	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 (➲C017)
	CCK14	19	22	8	9.5	–	–	
	**CCTC1**	13	25	7	10.2	–	–	
	**CK231**	M6×1	8	4	7.5	4.5	9.5	
	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	

SPARE PARTS

CLAMP BRIDGE

Geometry	Order Number	Dimensions (mm)						Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE	MPCF	
	**CKW6**	10.9	22.5	9.2	16.8	5	M8×1	**DOUBLE CLAMP** Holder (➲C009) (For Heavy Cutting)
	**DCK2211**	11	22	6.57	11.1	–	–	**DOUBLE CLAMP** Holder (➲C008) **DOUBLE CLAMP DIMPLE BAR** (➲E015) **HSK** Tool Holder (➲H001)
	DCK2613	13	26.5	7.35	12.9	–	–	
	DCK3113	13	31	9	14.5	–	–	
	**KGC1**	12.0	15.0	M7×0.75	–	–	–	
	**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 (➲F124) **MT** Type Holder (➲G024) **HSK** Tool Holder (➲H001)
	**MTK2R/L**	18	28	7	14	–	–	
	**SETK51**	6.8	14.5	2.9	8	–	–	**MMTE** Type Holder (➲G019) **MMTI** Type Holder (➲G026) **HSK** Tool Holder (➲H001)
	SETK61	8.9	18.1	4.1	8.6	–	–	
	**SRK1R**	9.4	21	5.5	7.5	–	–	
	**UCR**	12	24	8	7	–	–	

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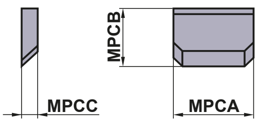
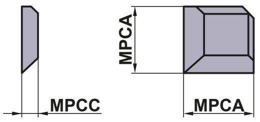
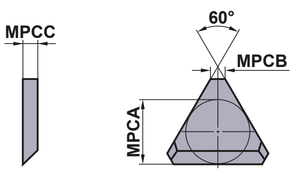
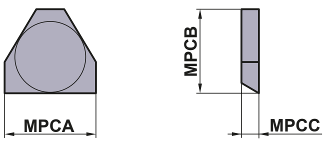
SPARE PARTS

BREAKER PIECE

Geometry	Order Number	Dimensions (mm)					Tool Holder
		MPCA	MPCB	MPCC	IC	LBB	
	**CBS3**	9.4	8.0	1.5	9.525	1.5	
	CBS4	12.6	9.2	2.5	12.70	3.5	
	CBS4N	12.6	10.2	2.5	12.70	2.5	
	CBS4F	12.6	11.2	2.5	12.70	1.5	
	CBS6	18.9	14.6	2.5	19.05	4.5	
	CBS6F	18.9	17.6	2.5	19.05	1.5	
	**CBS3D**	8.0	–	1.5	9.525	1.5	
	CBS4D	10.2	–	2.5	12.70	2.5	
	**CBT2N**	5.67	1.4	1.5	6.35	1.0	**F** Type Boring Bar (➲E028) *For positive inserts, the breaker width is 0.5mm larger than the figures in the list.
	CBT3	7.20	1.4	2.5	9.525	3.5	
	CBT3N	7.87	1.4	2.5	9.525	2.5	
	CBT3F	8.53	1.4	2.5	9.525	1.5	
	CBT4N	11.07	1.4	2.5	12.70	2.5	
	CBT4F	11.73	1.4	2.5	12.70	1.5	

Geometry	Order Number	Dimensions (mm)			**MPCD** (mm)	Tool Holder
		MPCA	MPCB	MPCC		
	**CBT3106**	11.5	10.6	2.0	2.5–3.0	
	CBT3113	11.5	11.3	2.0	1.5–2.0	
	CBT3120	11.5	12	2.0	0.75–1.25	

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SPARE PARTS

ANTI SEIZE LUBRICANT

ANTI SEIZE LUBRICANT

Shape	Order Number	Stock	Volume (g)
	**MK1K**	★	20
	**MK1KS**	★	3

★ : Inventory maintained in Japan.

TECHNICAL DATA

ISO13399 COMPLIANCE

List of Property Symbols Complying with ISO13399

Alphabetical

Source: ISO13399 standard
URL : https://www.iso.org/search/x/query/13399

ISO13399 Property Symbols	Content
ADJLX	Adjustment limit maximum
ADJRG	Adjustment range
ALF	Clearance angle radial
ALP	Clearance angle axial
AN	Clearance angle major
ANN	Clearance angle minor
APMX	Depth of cut maximum
AS	Clearance angle wiper edge
ASP	Adjusting screw protrusion
AZ	Plunge depth maximum
B	Shank width
BBD	Balanced by design
BCH	Corner chamfer length
BD	Body diameter
BDX	Body diameter maximum
BHCC	Bolt hole circle count
BHTA	Body half taper angle
BMC	Body material code
BS	Wiper edge length
BSR	Wiper edge radius
CASC	Cartridge size code
CB	Chipbreaker face count
CBDP	Connection bore depth
CBMD	Chipbreaker manufacturers designation
CBP	Chipbreaker property
CCMS	Connection code machine side
CCWS	Connection code workpiece side
CCP	Chamfer corner property
CDI	Insert cutting diameter
CDX	Cutting depth maximum
CEATC	Tool cutting edge angle type code
CECC	Cutting edge condition code
CEDC	Cutting edge count
CF	Spot chamfer
CHW	Corner chamfer width
CICT	Cutting item count
CNC	Corner count
CND	Coolant entry diameter
CNSC	Coolant entry style code
CNT	Coolant entry thread size
CP	Coolant pressure
CRE	Spot radius
CRKS	Connection retention knob thread size
CSP	Coolant supply property
CTP	Coating property
CTX	Cutting point translation X-direction
CTY	Cutting point translation Y-direction
CUTDIA	Work piece parting diameter maximum
CUB	Connection unit basis
CW	Cutting width
CWX	Cutting width maximum
CXD	Coolant exit diameter

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TECHNICAL DATA

ISO13399 Property Symbols	Content
CXSC	Coolant exit style code
CZC	Connection size code
D1	Fixing hole diameter
DAH	Diameter access hole
DAXN	Axial groove outside diameter minimum
DAXX	Axial groove outside diameter maximum
DBC	Diameter bolt circle
DC	Cutting diameter
DCB	Connection bore diameter
DCBN	Connection bore diameter minimum
DCBX	Connection bore diameter maximum
DCC	Design configuration style code
DCCB	Counterbore diameter connection bore
DCIN	Cutting diameter internal
DCINN	Cutting diameter internal minimum
DCINX	Cutting diameter internal maximum
DCN	Cutting diameter minimum
DCON	Connection diameter
DCONMS	Connection diameter machine side
DCONWS	Connection diameter workpiece side
DCSC	Cutting diameter size code
DCSFMS	Contact surface diameter machine side
DCX	Cutting diameter maximum
DF	Flange diameter
DHUB	Hub diameter
DMIN	Minimum bore diameter
DMM	Shank diameter
DN	Neck diameter
DRVA	Drive angle
EPSR	Insert included angle
FHA	Flute helix angle
FHCSA	Fixing hole countersunk angle
FHCSD	Fixing hole countersunk diameter
FLGT	Flange thickness
FMT	Form type
FXHLP	Fixing hole property
GAMF	Rake angle radial
GAMN	Rake angle normal
GAMO	Rake angle orthogonal
GAMP	Rake angle axial
GAN	Insert rake angle
H	Shank height
HA	Thread height theoretical
HAND	Hand
HBH	Head bottom offset height
HBKL	Head back offset length
HBKW	Head back offset width
HBL	Head bottom offset length
HC	Thread height actual
HF	Functional height
HHUB	Hub height
HTB	Body height
IC	Inscribed circle diameter
IFS	Insert mounting style code
IIC	Insert interface code
INSL	Insert length
KAPR	Tool cutting edge angle
KCH	Corner chamfer angle

ISO13399 Property Symbols	Content
KRINS	Cutting edge angle major
KWW	Keyway width
KYP	Keyway property
L	Cutting edge length
LAMS	Inclination angle
LB	Body length
LBB	Chipbreaker width
LBX	Body length maximum
LCCB	Counterbore depth connection bore
LCF	Length chip flute
LDRED	Reduced body diameter length
LE	Cutting edge effective length
LF	Functional length
LFA	a dimension on lf
LH	Head length
LPR	Protruding length
LS	Shank length
LSC	Clamping length
LSCN	Clamping length minimum
LSCX	Clamping length maximum
LTA	LTA length (length from MCS to CRP)
LU	Usable length
LUX	Usable length maximum
M	m-dimension
M2	Distance between the nominal inscribed circle and the corner of an insert that has the secondary included angle
MHA	Mounting hole angle
MHD	Mounting hole distance
MHH	Mounting hole height
MIID	Master insert identification
MTP	Clamping type code
NCE	Cutting end count
NOF	Flute count
NOI	Insert index count
NT	Tooth count
OAH	Overall height
OAL	Overall length
OAW	Overall width
PDPT	Profile depth insert
PDX	Profile distance ex
PDY	Profile distance ey
PFS	Profile style code
PL	Point length
PNA	Profile included angle
PRFRAD	Profile radius
PSIR	Tool lead 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
RCP	Rounded corner property
RE	Corner radius
REL	Corner radius left hand
RER	Corner radius right hand
RMPX	Ramping angle maximum
RPMX	Rotational speed maximum
S	Insert thickness
S1	Insert thickness total
SC	Insert shape code
SDL	Step diameter length
SIG	Point angle

ISO13399 Property Symbols	Content
SSC	Insert seat size code
SX	Shank cross section shape code
TC	Tolerance class insert
TCE	Tipped cutting edge code
TCTR	Thread tolerance class
TD	Thread diameter
THFT	Thread form type
THL	Threading length
THLGTH	Thread length
THSC	Tool holder shape code
THUB	Hub thickness
TP	Thread pitch
TPI	Threads per inch
TPIN	Threads per inch minimum
TPIX	Threads per inch maximum
TPN	Thread pitch minimum
TPT	Thread profile type
TPX	Thread pitch maximum
TQ	Torque
TSYC	Tool style code
TTP	Thread type
ULDR	Usable length diameter ratio
UST	Unit system
W1	Insert width
WEP	Wiper edge property
WF	Functional width
WF2	Distance between the cutting reference point and the front seating surface of a turning tool
WFS	Functional width secondary
WT	Weight of item
ZEFF	Face effective cutting edge count
ZEFP	Peripheral effective cutting edge count
ZNC	Cutting edge center count
ZNF	Face mounted insert count
ZNP	Peripheral mounted insert count

List of Reference Symbols Complying with ISO13399

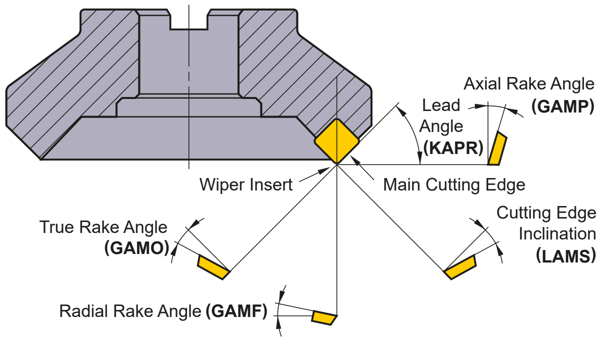
ISO13399 Reference Symbols	Content
CIP	Coordinate system In Process
CRP	Cutting Reference Point
CSW	Coordinate System Workpiece side
MCS	Mounting Coordinate System
PCS	Primary Coordinate System

TROUBLE SHOOTING FOR FACE MILLING

Trouble		Factors \ Solution	Insert Grade Selection				Cutting Conditions						Style and Design of the Tool									Machine, Installation of Tool		
			Select a harder grade	Select a tougher grade	Select a grade with better thermal shock resistance	Select a grade with better adhesion resistance	Cutting speed	Feed	Depth of cut	Engage angle	Coolant: Do not use water-soluble cutting fluid	Coolant: Determine dry or wet cutting	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	Increase clamping rigidity of the tool and workpiece	Decrease overhang	Decrease power and machine backlash
							Up ↗ / Down ↘	Up ↗ / Down ↘	Up ↗ / Down ↘	↗ Up			Up ↗ / Down ↘	Up ↗ / Down ↘	Up ↗ / Down ↘	Up ↗ / Down ↘	Larger ↗ / Smaller ↘							
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

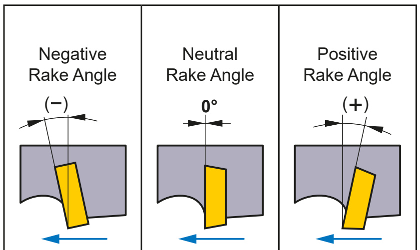


Each Cutting Edge Angle in Face Milling

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	GAMO	Determines actual sharpness.	**Positive (large)** : Excellent machinability. Minimal welding. **Negative (large)** : Poor machinability. Strong cutting edge.
Cutting Edge Inclination	LAMS	Determines chip disposal direction.	**Positive (large)** : Excellent chip disposal. Low cutting edge strength.

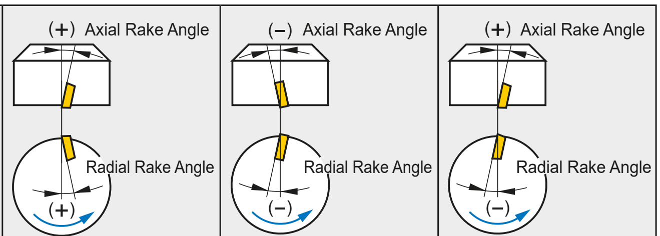
STANDARD INSERTS

● Positive and Negative Rake Angle



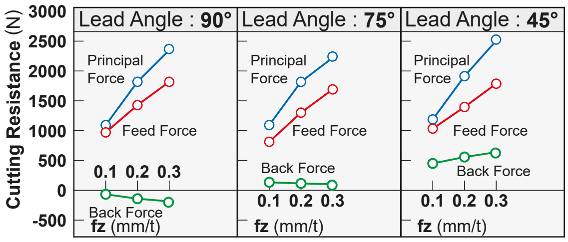
- Insert shape whose cutting edge precedes is a positive rake angle.
- Insert shape whose cutting edge follows is a negative rake angle.

● Standard Cutting Edge Shape



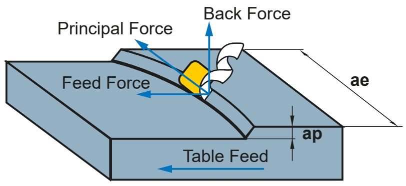
Standard Cutting Edge Combinations		Double Positive (DP Edge Type)	Double Negative (DN Edge Type)	Negative/Positive (NP Edge Type)
Axial Rake Angle (GAMP)		Positive (+)	Negative (−)	Positive (+)
Radial Rake Angle (GAMF)		Positive (+)	Negative (−)	Negative (−)
Insert Used		Positive Insert (One Sided Use)	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



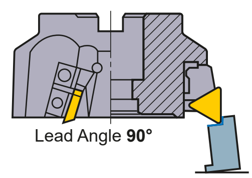
Workpiece : **DIN 41CrMo4 (281HB)**
Tool : **ø125mm** Single Insert
Cutting Conditions : **Vc=125.6 m/min ap=4 mm ae=110mm**

Cutting Resistance Comparison between Different Insert Shapes

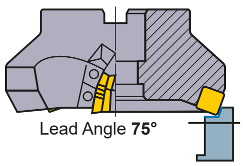


Three Cutting Resistance Forces in Milling

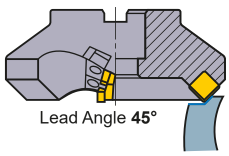
Lead Angle 90° Back force is in the minus direction. Lifts the workpiece when workpiece clamp rigidity is low.



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.

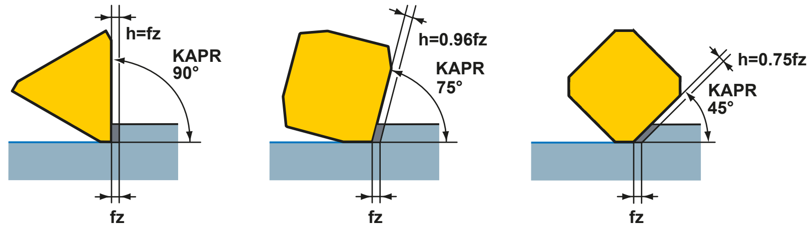
P
TECHNICAL DATA

FUNCTION OF TOOL FEATURES FOR FACE MILLING

■LEAD ANGLE AND TOOL LIFE

●Lead angle and chip thickness

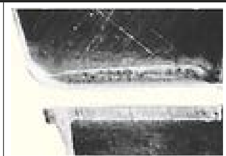
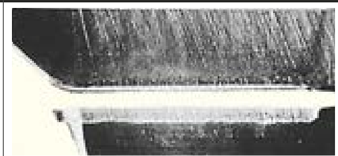
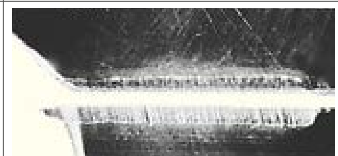
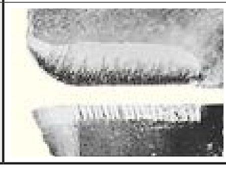
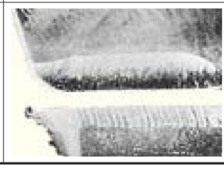
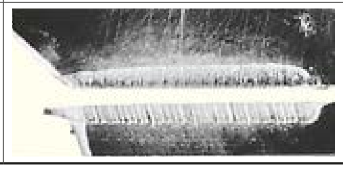
When the depth of cut and feed per tooth, fz, are fixed, the smaller the lead angle (KAPR) is, then the thinner the chip thickness (h) becomes (for a 45° KAPR, it is approx. 75% that of a 90° KAPR). Therefore as the KAPR increases, the cutting resistance decreases resulting in longer tool life. Note 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

●Lead angle and crater wear

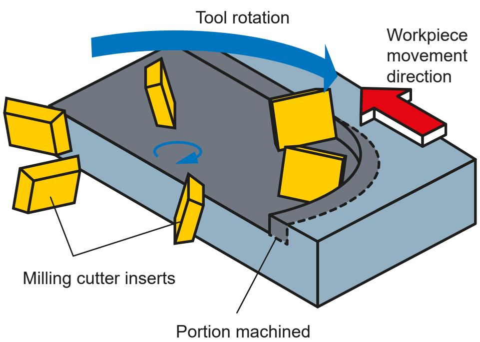
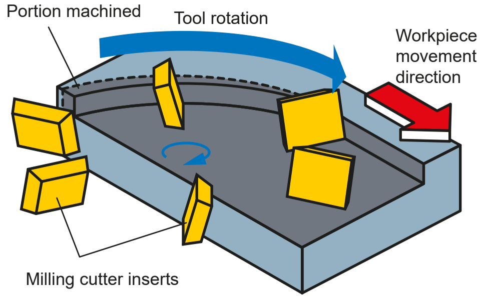
The table below shows wear patterns for different lead angles. When comparing crater wear for 90° and 45° lead angles, it can be clearly seen that the crater wear for 90° lead angle is larger. This is because if the chip thickness is relatively large, the cutting resistance increases and so promotes crater wear. As the crater develops then cutting edge strength will reduce and lead to fracturing.

	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 : **Alloy steel (287HB)**
Tools : **DC=125 mm**
Insert : **M20**Cemented Carbide
Cutting Conditions : **ap=3.0 mm**
ae=110 m
fz=0.2 mm/t
Dry Cutting

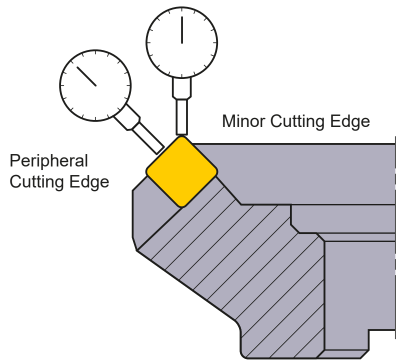
■UP AND DOWN CUT (CLIMB) MILLING

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
	

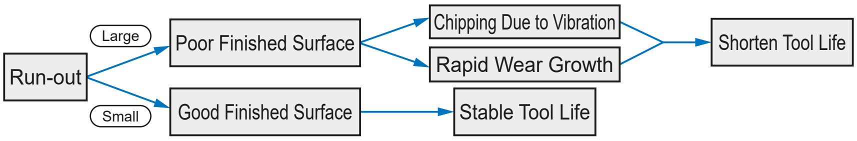
FINISHED SURFACE

Cutting Edge Run-out Accuracy

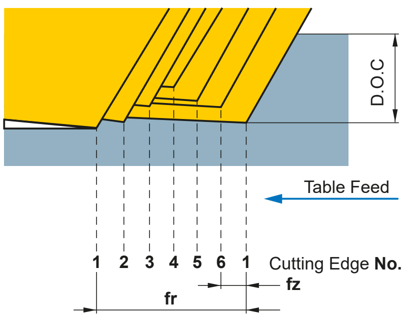


Cutting Edge Run-out and Accuracy in Face Milling

Cutting edge run-out accuracy of indexable inserts on the cutter body greatly affects the surface finish and tool life.



Improve Finished Surface Roughness



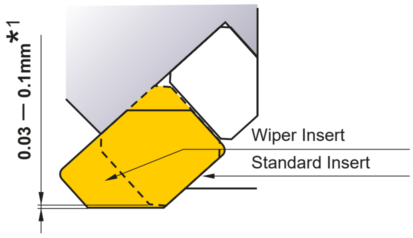
fz : Feed per Tooth
fr : Feed per Revolution

Sub Cutting Edge Run-out and Finished Surface

Since Mitsubishi Materials' normal sub cutting edge width is 1.4 mm, 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

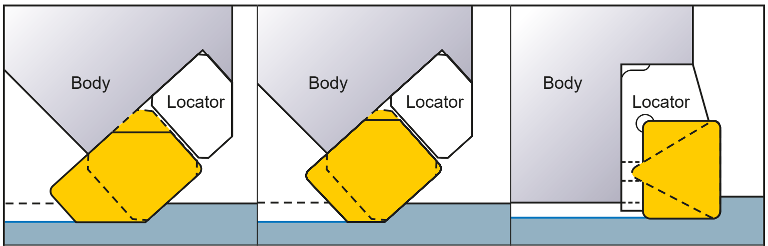
* Machine a surface that has already been machined with normal inserts in order to produce a smooth finished surface.



· Replace one or two normal inserts with wiper inserts.
· Wiper inserts are set to protrude by 0.03−0.1 mm 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.

* A sub cutting edge that is too long causes chatter.

- 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 insert, run-out needs to be eliminated.
- Use a high hardness grade (high wear resistance) for wiper inserts.

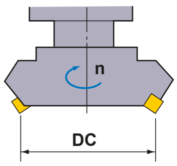
FORMULAE FOR FACE MILLING

■CUTTING SPEED (Vc)

$$Vc = \frac{\pi \cdot DC \cdot n}{1000} \text{ (m/min)}$$

*Divide by 1000 to change to m from mm.

Vc (m/min) : Cutting Speed
π (3.14) : Pi
DC(mm) : Cutter Diameter
n (min^{-1}) : Main Axis Spindle Speed



(Example) What is the cutting speed when the 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.

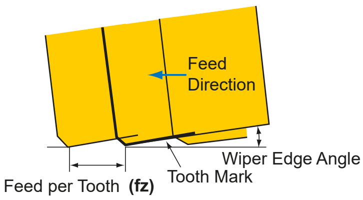
$$Vc = \frac{\pi \cdot DC \cdot n}{1000} = \frac{3.14 \times 125 \times 350}{1000} = 137.4 \text{ m/min}$$

The cutting speed is 137.4 m/min.

■FEED PER TOOTH (fz)

$$fz = \frac{Vf}{z \cdot n} \text{ (mm/t.)}$$

fz (mm/t.) : 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**)



(Example) What is the feed per tooth when the main axis spindle speed is 500min^{-1}, insert number is 10, and the table feed is 500mm/min ?

(Answer) Substitute the above figures into the formula.

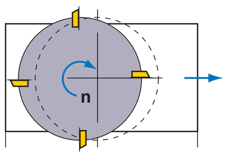
$$fz = \frac{Vf}{z \times n} = \frac{500}{10 \times 500} = 0.1 \text{ mm/t.}$$

The answer is 0.1mm/t.

■TABLE FEED (Vf)

$$Vf = fz \cdot z \cdot n \text{ (mm/min)}$$

Vf (mm/min) : Table Feed per Min.
z : Insert Number
fz (mm/t.) : Feed per Tooth
n (min^{-1}) : Main Axis Spindle Speed



(Example) What is the table feed when feed per tooth is 0.1 mm/t., insert number is 10, and the main axis spindle speed is 500 min^{-1}?

(Answer) Substitute the above figures into the formula.

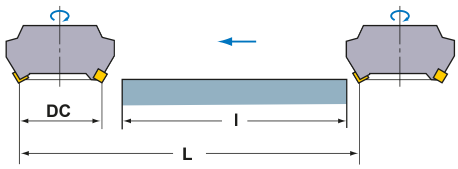
Vf = fz×z×n = 0.1×10×500 = 500 mm/min

The table feed is 500 mm/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**)



(Example) What is the cutting time required for finishing 100mm width and 300mm length surface of a cast iron (GG20) block when the cutter diameter is ϕ200, the number of inserts is 16, the cutting speed is 125 m/min, and feed per tooth is 0.25 mm/t.. (spindle speed is 200 min^{-1})

(Answer) Calculate table feed per min Vf=0.25×16×200=800 mm/min
Calculate total table feed length. L=300+200=500 mm
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)

(Example) 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 the 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/t

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/t	0.2mm/t	0.3mm/t	0.4mm/t	0.6mm/t
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	Cutting Conditions									Style and Design of the Tool						Machine, Installation of Tool					
			Coated tool	Cutting speed	Feed	Depth of cut	Pick feed	Down cut	Use air blow	Coolant: Increase coolant quantity	Coolant: Do not use water-soluble cutting fluid	Coolant: Determine dry or wet cutting	Helix angle	Insert number	Concavity angle of end cutting edge	Tool diameter	Cutter rigidity	Wider chip pocket	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
				Up ↗ Down ↘			↘ Down						Up ↗ Larger Down ↘ Smaller											
Deterioration of Tool Life	Large peripheral cutting edge wear	Non-coated end mill is used	●																					
		A small number of cutting edges												●↗										
		Improper cutting conditions		●↘							●													
		Up cut milling is used						Down Cut																
	Severe chipping	Improper cutting conditions																						
		Fragile cutting edge															●							
		Insufficient clamping force																				●	●	
		Low clamping rigidity																	●	●	●	●	●	●
	Breakage during cutting	Improper cutting conditions				●↘																		
		Low end mill rigidity														●↗	●							
		Overhang longer than necessary				●↘													●					
		Chip jamming								●								●						
Deterioration of Surface Finish	Vibration during cutting	Improper cutting conditions		●↘	●↘																			
		Low end mill rigidity											●↗	●↗		●↗	●							
		Low clamping rigidity																	●	●	●	●	●	●
	Poor surface finish on walls	Large cutting edge wear	●																					
		Improper cutting conditions		●↘		●↘																		
		Chip packing							●	●		● Wet												
	Poor surface finish on faces	The end cutting edge does not have a concave angle			●↘	●↘									●↗									
		Large pick feed					●↘																	
	Out of vertical	Large cutting edge wear	●																					
		Improper cutting conditions			●↘	●↘																		
		Lack of end mill rigidty											●↗	●↗		●↗	●							
	Poor dimensional accuracy	Improper cutting conditions		●↘	●↘	●↘																		
		Low clamping rigidity																	●	●	●	●	●	●
Burrs, Chipping, etc.	Burr or chipping occurs	Improper cutting conditions			●↘	●↘																		
		Large helix angle											●↘											
	Quick bur formation	Notch wear	●																					
		Improper cutting conditions		●↘	●↗																			
Poor Chip Dispersal	Chip packing	Metal removal too large			●↘	●↘																		
		Lack of chip pocket												●↘				●						

Memo

METALLIC MATERIALS CROSS REFERENCE LIST

CARBON STEEL

Germany		U.K.		France	Italy	Spain	Sweden	Japan	USA	China
W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	JIS	AISI/SAE	GB
1.0038	RSt.37-2	4360 40 C	–	E 24-2 Ne	–	–	1311	STKM 12A STKM 12C	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
1.0715	9SMn28	230M07	1A	S250	CF9SMn28	F.2111 11SMn28	1912	SUM22	1213	Y15
1.0718	9SMnPb28	–	–	S250Pb	CF9SMnPb28	11SMnPb28	1914	SUM22L	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	–
1.1141	Ck15	080M15	32C	XC12	C16	C15K	1370	S15C	1015	15
1.1158	Ck25	–	–	–	–	–	–	S25C	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
1.1167	36Mn5	–	–	40M5	–	36Mn5	2120	SMn438(H)	1335	35Mn2
1.1170	28Mn6	150M28	14A	20M5	C28Mn	–	–	SCMn1	1330	30Mn
1.1183	Cf35	060A35	–	XC38TS	C36	–	1572	S35C	1035	35Mn
1.1191	Ck45	080M46	–	XC42	C45	C45K	1672	S45C	1045	Ck45
1.1213	Cf53	060A52	–	XC48TS	C53	–	1674	S50C	1050	50
1.0535	C55	070M55	9	–	C55	–	1655	–	1055	55
1.0601	C60	080A62	43D	CC55	C60	–	–	–	1060	60
1.1203	Ck55	070M55	–	XC55	C50	C55K	–	S55C	1055	55
1.1221	Ck60	080A62	43D	XC60	C60	–	1678	S58C	1060	60Mn
1.1274	Ck101	060A96	–	XC100	–	F.5117	1870	–	1095	–
1.1545	C105W1	BW1A	–	Y105	C36KU	F.5118	1880	SK3	W1	–
1.1545	C105W1	BW2	–	Y120	C120KU	F.515	2900	SUP4	W210	–

ALLOY STEEL

Germany		U.K.		France	Italy	Spain	Sweden	Japan	USA	China
W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	JIS	AISI/SAE	GB
1.0144	St.44.2	4360 43 C	–	E28-3	–	–	1412	SM400A, SM400B SM400C	A573-81	–
1.0570	St52-3	4360 50 B	–	E36-3	Fe52BFN Fe52CFN	–	2132	SM490A, SM490B SM490C	–	–
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	–
1.3505	100Cr6	534A99	31	100C6	100Cr6	F.131	2258	SUJ2	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	–
1.5710	36NiCr6	640A35	111A	35NC6	–	–	–	SNC236	3135	–
1.5732	14NiCr10	–	–	14NC11	16NiCr11	15NiCr11	–	SNC415(H)	3415	–
1.5752	14NiCr14	655M13	36A	12NC15	–	–	–	SNC815(H)	3415, 3310	–
1.6523	21NiCrMo2	805M20	362	20NCD2	20NiCrMo2	20NiCrMo2	2506	SNCM220(H)	8620	–
1.6546	40NiCrMo22	311-Type 7	–	–	40NiCrMo2(KB)	40NiCrMo2	–	SNCM240	8740	–
1.6587	17CrNiMo6	820A16	–	18NCD6	–	14NiCrMo13	–	–	–	–
1.7015	15Cr3	523M15	–	12C3	–	–	–	SCr415(H)	5015	15Cr

Germany		U.K.		France	Italy	Spain	Sweden	Japan	USA	China
W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	JIS	AISI/SAE	GB
1.7045	42Cr4	–	–	–	–	42Cr4	2245	SCr440	5140	40Cr
1.7176	55Cr3	527A60	48	55C3	–	–	–	SUP9(A)	5155	20CrMn
1.7262	15CrMo5	–	–	12CD4	–	12CrMo4	2216	SCM415(H)	–	–
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
1.7033	34Cr4	530A32	18B	32C4	34Cr4(KB)	35Cr4	–	SCr430(H)	5132	35Cr
1.7035	41Cr4	530M40	18	42C4	41Cr4	42Cr4	–	SCr440(H)	5140	40Cr
1.7131	16MnCr5	(527M20)	–	16MC5	16MnCr5	16MnCr5	2511	–	5115	18CrMn
1.7218	25CrMo4	1717CDS110 708M20	–	25CD4	25CrMo4(KB)	55Cr3	2225	SCM420 SCM430	4130	30CrMn
1.7220	34CrMo4	708A37	19B	35CD4	35CrMo4	34CrMo4	2234	SCM432 SCCRM3	4137 4135	35CrMo
1.7223	41CrMo4	708M40	19A	42CD4TS	41CrMo4	42CrMo4	2244	SCM 440	4140 4142	40CrMoA
1.7225	42CrMo4	708M40	19A	42CD4	42CrMo4	42CrMo4	2244	SCM440(H)	4140	42CrMo 42CrMnMo
1.7361	32CrMo12	722M24	40B	30CD12	32CrMo12	F.124.A	2240	–	–	–
1.8159	50CrV4	735A50	47	50CV4	50CrV4	51CrV4	2230	SUP10	6150	50CrVA
1.8509	41CrAlMo7	905M39	41B	40CAD6 40CAD2	41CrAlMo7	41CrAlMo7	2940	–	–	–
1.2067	100Cr6	BL3	–	Y100C6	–	100Cr6	–	–	L3	CrV, 9SiCr
1.2419	105WCr6	–	–	105WC13	100WCr6 107WCr5KU	105WCr5	2140	SKS31 SKS2, SKS3	–	CrWMo
1.2713	55NiCrMoV6	BH224/5	–	55NCDV7	–	F.520.S	–	SKT4	L6	5CrNiMo
1.5662	X8Ni9	1501-509	–	–	X10Ni9	XBNi09	–	–	ASTM A353	–
1.5680	12Ni19	–	–	Z18N5	–	–	–	–	2515	–
1.6657	14NiCrMo134	832M13	36C	–	15NiCrMo13	14NiCrMo131	–	–	–	–
1.2080	X210Cr12	BD3	–	Z200C12	X210Cr13KU X250Cr12KU	X210Cr12	–	SKD1	D3 ASTM D3	Cr12
1.2601	X153CrMoV12	BD2	–	–	X160CrMoV12	–	–	SKD11	D2	Cr12MoV
1.2363	X100CrMoV5	BA2	–	Z100CDV5	X100CrMoV5	F.5227	2260	SKD12	A2	Cr5Mo1V
1.2344	X40CrMoV51 X40CrMoV51	BH13	–	Z40CDV5	X35CrMoV05KU X40CrMoV51KU	X40CrMoV5	2242	SKD61	H13 ASTM H13	40CrMoV5
1.2436	X210CrW12	–	–	–	X215CrW121KU	X210CrW12	2312	SKD2	–	–
1.2542	45WCrV7	BS1	–	–	45WCrV8KU	45WCrSi8	2710	–	S1	–
1.2581	X30WCrV93	BH21	–	Z30WCV9	X28W09KU	X30WCrV9	–	SKD5	H21	30WCrV9
1.2601	X165CrMoV12	–	–	–	X165CrMoW12KU	X160CrMoV12	2310	–	–	–
1.2833	100V1	BW2	–	Y1105V	–	–	–	SKS43	W210	V
1.3255	S 18-1-2-5	BT4	–	Z80WKCV	X78WCo1805KU	HS18-1-1-5	–	SKH3	T4	W18Cr4VCo5
1.3355	S 18-0-1	BT1	–	Z80WCV	X75W18KU	HS18-0-1	–	SKH2	T1	–
1.3401	G-X120Mn12	Z120M12	–	Z120M12	XG120Mn12	X120MN12	–	SCMnH/1	–	–
1.4718	X45CrSi93	401S45	52	Z45CS9	X45CrSi8	F.322	–	SUH1	HW3	X45CrSi93
1.3343	S6-5-2	4959BA2	–	Z40CSD10	15NiCrMo13	–	2715	SUH3	D3	–
1.3343	S6/5/2	BM2	–	Z85WDCV	HS6-5-2-2	F.5603	2722	SKH9, SKH51	M2	–
1.3348	S 2-9-2	–	–	–	HS2-9-2	HS2-9-2	2782	–	M7	–
1.3243	S6/5/2/5	BM35	–	6-5-2-5	HS6-5-2-5	F.5613	2723	SKH55	M35	–

METALLIC MATERIALS CROSS REFERENCE LIST

■STAINLESS STEEL (FERRITIC,MARTENSITIC)

Germany		U.K.		France	Italy	Spain	Sweden	Japan	USA	China
W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	JIS	AISI/SAE	GB
1.4000	X7Cr13	403S17	–	Z6C13	X6Cr13	F.3110	2301	SUS403	403	OCr13 1Cr12
1.4001	X7Cr14	–	–	–	–	F.8401	–	–	–	–
1.4005	X12CrS13	416S21	–	Z11CF13	X12CrS13	F.3411	2380	SUS416	416	–
1.4006	X10Cr13	410S21	56A	Z10C14	X12Cr13	F.3401	2302	SUS410	410	1Cr13
1.4016	X8Cr17	430S15	60	Z8C17	X8Cr17	F.3113	2320	SUS430	430	1Cr17
1.4027	G-X20Cr14	420C29	56B	Z20C13M	–	–	–	SCS2	–	–
1.4034	X46Cr13	420S45	56D	Z40CM Z38C13M	X40Cr14	F.3405	2304	SUS420J2	–	4Cr13
1.4003	–	405S17	–	Z8CA12	X6CrAl13	–	–	–	405	–
1.4021	–	420S37	–	Z8CA12	X20Cr13	–	2303	–	420	–
1.4057	X22CrNi17	431S29	57	Z15CNi6.02	X16CrNi16	F.3427	2321	SUS431	431	1Cr17Ni2
1.4104	X12CrMoS17	–	–	Z10CF17	X10CrS17	F.3117	2383	SUS430F	430F	Y1Cr17
1.4113	X6CrMo17	434S17	–	Z8CD17.01	X8CrMo17	–	2325	SUS434	434	1Cr17Mo
1.4313	X5CrNi134	425C11	–	Z4CND13.4M	(G)X6CrNi304	–	2385	SCS5	CA6-NM	–
1.4724	X10CrA113	403S17	–	Z10C13	X10CrA112	F.311	–	SUS405	405	OCr13Al
1.4742	X10CrA118	430S15	60	Z10CAS18	X8Cr17	F.3113	–	SUS430	430	Cr17
1.4747	X80CrNiSi20	443S65	59	Z80CSN20.02	X80CrSiNi20	F.320B	–	SUH4	HNV6	–
1.4762	X10CrA124	–	–	Z10CAS24	X16Cr26	–	2322	SUH446	446	2Cr25N
1.4871	X53CrMnNiN219	349S54	–	Z52CMN21.09	X53CrMnNiN219	–	–	SUH35	EV8	5Cr2Mn9Ni4N
1.4521	X1CrMoTi182	–	–	–	–	–	2326	–	S44400	–
1.4922	X20CrMoV12-1	–	–	–	X20CrMoNi1201	–	2317	–	–	–
1.4542	–	–	–	Z7CNU17-04	–	–	–	–	630	–

■STAINLESS STEEL (AUSTENITIC)

Germany		U.K.		France	Italy	Spain	Sweden	Japan	USA	China
W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	JIS	AISI/SAE	GB
1.4306	X2CrNi1911	304S11	–	Z2CN18.10	X2CrNi18.11	–	2352	SUS304L	304L	OCr19Ni10
1.4350	X5CrNi189	304S11	58E	Z6CN18.09	X5CrNi1810	F.3551 F.3541 F.3504	2332	SUS304	304	OCr18Ni9
1.4305	X12CrNiS188	303S21	58M	Z10CNF18.09	X10CrNiS18.09	F.3508	2346	SUS303	303	1Cr18Ni9MoZr
–	–	304C12	–	Z3CN19.10	–	–	2333	SUS304L	–	–
1.4306	X2CrNi189	304S12	–	Z2CrNi1810	X2CrNi18.11	F.3503	2352	SCS19	304L	–
1.4310	X12CrNi177	–	–	Z12CN17.07	X12CrNi1707	F.3517	2331	SUS301	301	Cr17Ni7
1.4311	X2CrNiN1810	304S62	–	Z2CN18.10	–	–	2371	SUS304LN	304LN	–
1.4401	X5CrNiMo1810	316S16	58J	Z6CND17.11	X5CrNiMo1712	F.3543	2347	SUS316	316	0Cr17Ni11Mo2
1.4308	G-X6CrNi189	304C15	–	Z6CN18.10M	–	–	–	SCS13	–	–
1.4408	G-X6CrNiMo1810	316C16	–	–	–	F.8414	–	SCS14	–	–
1.4581	G-X5CrNiMoNb1810	318C17	–	Z4CNDNb1812M	XG8CrNiMo1811	–	–	SCS22	–	–
1.4429	X2CrNiMoN1813	–	–	Z2CND17.13	–	–	2375	SUS316LN	316LN	OCr17Ni13Mo
1.4404	–	316S13	–	Z2CND17.12	X2CrNiMo1712	–	2348	–	316L	–
1.4435	X2CrNiMo1812	316S13	–	Z2CND17.12	X2CrNiMo1712	–	2353	SCS16 SUS316L	316L	OCr27Ni12Mo3
1.4436	–	316S13	–	Z6CND18-12-03	X8CrNiMo1713	–	2343, 2347	–	316	–
1.4438	X2CrNiMo1816	317S12	–	Z2CND19.15	X2CrNiMo1816	–	2367	SUS317L	317L	00Cr19Ni13Mo
1.4539	X1NiCrMo	–	–	Z6CNT18.10	–	–	2562	–	UNS V 0890A	–
1.4541	X10CrNiTi189	321S12	58B	Z6CNT18.10	X6CrNiTi1811	F.3553 F.3523	2337	SUS321	321	1Cr18NI9Ti
1.4550	X10CrNiNb189	347S17	58F	Z6CNNb18.10	X6CrNiNb1811	F.3552 F.3524	2338	SUS347	347	1Cr18Ni11Nb
1.4571	X10CrNiMoTi1810	320S17	58J	Z6CNDT17.12	X6CrNiMoTi1712	F.3535	2350	–	316Ti	Cr18Ni12Mo2T
1.4583	X10CrNiMoNb1812	–	–	Z6CNDNb1713B	X6CrNiMoNb1713	–	–	–	318	Cr17Ni12Mo3Mb

Germany		U.K.		France	Italy	Spain	Sweden	Japan	USA	China
W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	JIS	AISI/SAE	GB
1.4828	X15CrNiSi2012	309S24	–	Z15CNS20.12	X6CrNi2520	–	–	SUH309	309	1Cr23Ni13
1.4845	X12CrNi2521	310S24	–	Z12CN2520	X6CrNi2520	F.331	2361	SUH310	310S	OCr25Ni20
1.4406	X10CrNi18.08	–	58C	Z1NCDU25.20	–	F.8414	2370	SCS17	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	–
1.4878	X12CrNiTi189	321S32	58B, 58C	Z6CNT18.12B	X6CrNiTi18 11	F.3523	–	SUS321	321	1Cr18Ni9Ti

HEAT RESISTANT STEELS

Germany		U.K.		France	Italy	Spain	Sweden	Japan	USA	China
W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	JIS	AISI/SAE	GB
1.4864	X12NiCrSi3616	–	–	Z12NCS35.16	–	–	–	SUH330	330	–
1.4865	G-X40NiCrSi3818	330C11	–	–	XG50NiCr3919	–	–	SCH15	HT, HT 50	–

GRAY CAST IRON

Germany		U.K.		France	Italy	Spain	Sweden	Japan	USA	China
W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	JIS	AISI/SAE	GB
–	–	–	–	–	–	–	0100	–	–	–
–	GG 10	–	–	Ft 10 D	–	–	0110	FC100	No 20 B	–
0.6015	GG 15	Grade 150	–	Ft 15 D	G15	FG15	0115	FC150	No 25 B	HT150
0.6020	GG 20	Grade 220	–	Ft 20 D	G20	–	0120	FC200	No 30 B	HT200
0.6025	GG 25	Grade 260	–	Ft 25 D	G25	FG25	0125	FC250	No 35 B	HT250
–	–	–	–	–	–	–	–	–	No 40 B	–
0.6030	GG 30	Grade 300	–	Ft 30 D	G30	FG30	0130	FC300	No 45 B	HT300
0.6035	GG 35	Grade 350	–	Ft 35 D	G35	FG35	0135	FC350	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

Germany		U.K.		France	Italy	Spain	Sweden	Japan	USA	China
W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	JIS	AISI/SAE	GB
0.7040	GGG 40	SNG 420/12	–	FCS 400-12	GS 370-17	FGE 38-17	07 17-02	FCD400	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	–	–	–
0.7050	GGG 50	SNG 500/7	–	FGS 500-7	GS 500	FGE 50-7	07 27-02	FCD500	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	–	–	–
–	GGG 60	SNG 600/3	–	FGS 600-3	–	–	07 32-03	FCD600	–	QT600-3
0.7070	GGG 70	SNG 700/2	–	FGS 700-2	GS 700-2	FGS 70-2	07 37-01	FCD700	100-70-03	QT700-18

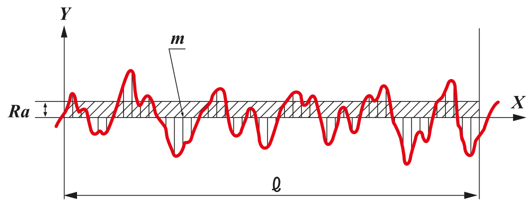
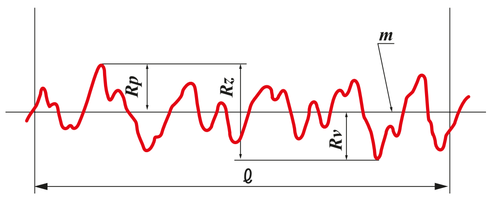
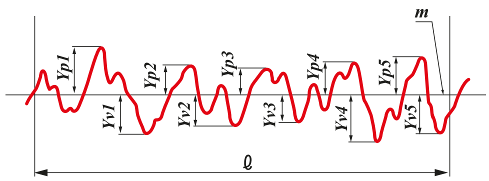
MALLEABLE CAST IRON

Germany		U.K.		France	Italy	Spain	Sweden	Japan	USA	China
W-nr.	DIN	BS	EN	AFNOR	UNI	UNE	SS	JIS	AISI/SAE	GB
–	–	8 290/6	–	MN 32-8	–	–	08 14	FCMB310	–	–
–	GTS-35	B 340/12	–	MN 35-10	–	–	08 15	FCMW330	32510	–
0.8145	GTS-45	P 440/7	–	Mn 450	GMN45	–	08 52	FCMW370	40010	–
0.8155	GTS-55	P 510/4	–	MP 50-5	GMN55	–	08 54	FCMP490	50005	–
–	GTS-65	P 570/3	–	MP 60-3	–	–	08 58	FCMP540	70003	–
0.8165	GTS-65-02	P 570/3	–	Mn 650-3	GMN 65	–	08 56	FCMP590	A220-70003	–
–	GTS-70-02	P 690/2	–	Mn 700-2	GMN 70	–	08 62	FCMP690	A220-80002	–

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):** $$Ra=\frac{1}{\ell}\int_{0}^{\ell}\lvert f(x)\rvert\,dx$$	
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.** $$Rz=R_p+R_v$$	
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.

P

TECHNICAL DATA

HARDNESS COMPARISON TABLE

HARDNESS CONVERSION NUMBERS OF STEEL

Brinell Hardness (HB), 10mm Ball, Load: 3000kgf		Vickers Hardness	Rockwell Hardness				Shore Hardness	Tensile Strength (Approx.)
Standard Ball	Tungsten Carbide Ball	(HV)	A Scale, Load: 60kgf, Diamond Point (HRA)	B Scale, Load: 100kgf, 1/16" Ball (HRB)	C Scale, Load: 150kgf, Diamond Point (HRC)	D Scale, Load: 100kgf, Diamond Point (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: 3000kgf		Vickers Hardness	Rockwell Hardness				Shore Hardness	Tensile Strength (Approx.)
Standard Ball	Tungsten Carbide Ball	(HV)	A Scale, Load: 60kgf, Diamond Point (HRA)	B Scale, Load: 100kgf, 1/16" Ball (HRB)	C Scale, Load: 150kgf, Diamond Point (HRC)	D Scale, Load: 100kgf, Diamond Point (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) The above list is the same as that of 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 +80	+142 +80	+180 +80	+75 +50	+89 +50	+112 +50	+41 +25	+50 +25	+64 +25	+25 +9	+34 +9	+16 0	+25 0
40	50	+280 +180	+192 +130	+230 +130													
50	65	+310 +190	+214 +140	+260 +140	+146 +100	+174 +100	+220 +100	+90 +60	+106 +60	+134 +60	+49 +30	+60 +30	+76 +30	+29 +10	+40 +10	+19 0	+30 0
65	80	+320 +200	+224 +150	+270 +150													
80	100	+360 +220	+257 +170	+310 +170	+174 +120	+207 +120	+260 +120	+107 +72	+126 +72	+159 +72	+58 +36	+71 +36	+90 +36	+34 +12	+47 +12	+22 0	+35 0
100	120	+380 +240	+267 +180	+320 +180													
120	140	+420 +260	+300 +200	+360 +200	+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
140	160	+440 +280	+310 +210	+370 +210													
160	180	+470 +310	+330 +230	+390 +230													
180	200	+525 +340	+355 +240	+425 +240	+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
200	225	+565 +380	+375 +260	+445 +260													
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 1) Values shown in the upper portion of the respective boxes are the upper dimensional tolerance, while values shown in the lower portion are the lower dimensional tolerance.

P

TECHNICAL DATA

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	–	–	–	–

FIT TOLERANCE TABLE(SHAFT)

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 1) Values shown in the upper portion of the respective boxes are the upper dimensional tolerance, while values shown in the lower portion are the 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	—	—	—	—

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	mmH2O	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 1) 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 1) 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}
$3.600\ \ \times10^{6}$	1	3.67098×10^{5}	$8.6000\ \ \times10^{2}$
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 1) 1J=1W•s, 1J=1N•m
1cal=4.18605J
(By the law of weights and measures)

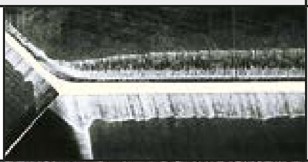
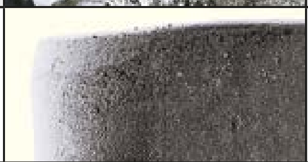
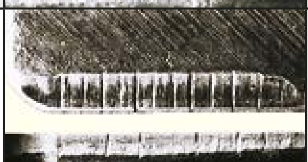
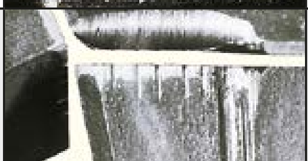
●Power (Rate of Production / Motive Power) /Heat Flow Rate

W	kgf•m/s	PS	kcal/h
1	1.01972×10^{-1}	1.35962×10^{-3}	$8.6000\ \ \times10^{-1}$
9.80665	1	1.33333×10^{-2}	8.43371
$7.355\ \ \times10^{2}$	$7.5\ \ \times10$	1	6.32529×10^{2}
1.16279	1.18572×10^{-1}	1.58095×10^{-3}	1

Note 1) 1W=1J/s, PS:French horse power
1PS=0.7355kW
1cal=4.18605J
(By the law of weights and measures)

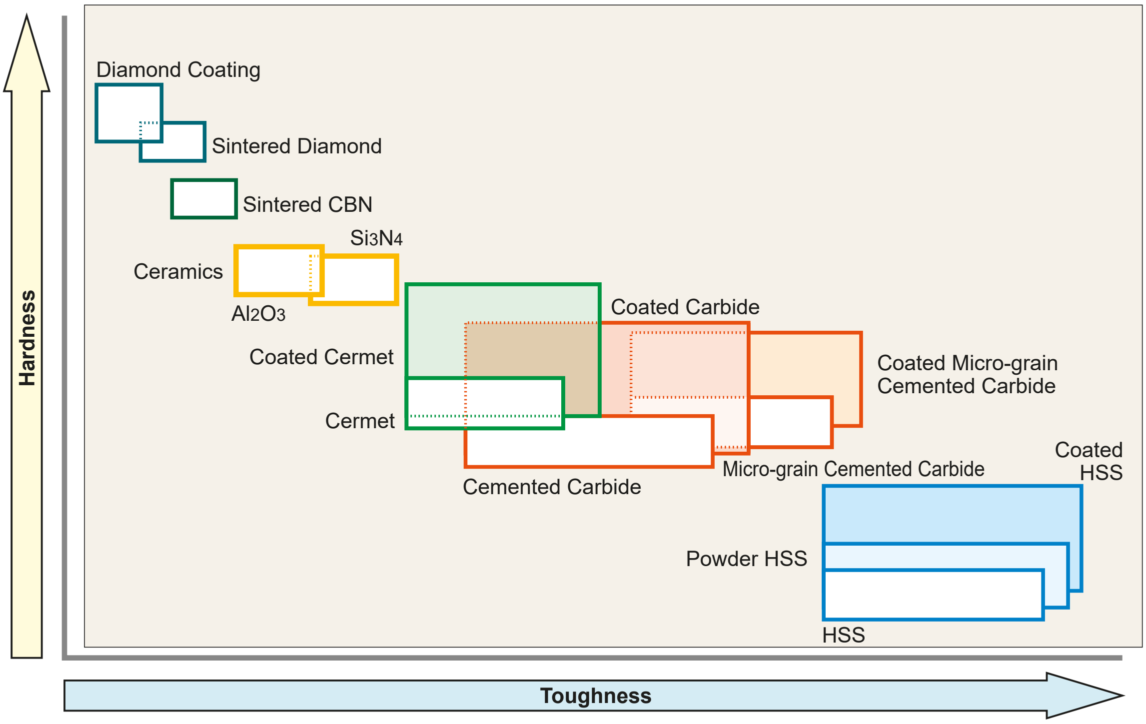
TOOL WEAR AND DAMAGE

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 DIN Ck45, 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 layers. • 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

Cemented carbide (WC-Co) was developed in 1923 and was later improved by adding TiC and TaC. In 1969, CVD coating technology was developed, and coated carbide has since been used widely. TiC-TiN based cermet was developed in 1974. Today, "Coated Carbide grades for roughing and cermet for finishing" is a well established trend.



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•℃

P

TECHNICAL DATA

GRADE CHAIN

Application	Grade type	Work material	Grades
For Cutting Tools	Cemented Carbide	P Steel	UTi20T
		M Stainless Steel General	UTi20T
		K Cast Iron	HTi05T, HTi10, UTi20T
		N Non-Ferrous	HTi10, TF15
		S Heat Resistant Alloy Ti Alloy	MT9005, RT9010, MT9015, TF15
	Coated Carbide	P Steel	UE6105, UE6110, MC6015, MC6115 (NEW), MS6015 (PVD), UE6020, MP6120 (PVD), MC6025, MC6125 (NEW), MC6035, UH6400
			FH7020, VP15TF (PVD), MP6130 (PVD), VP10RT (PVD), VP20RT (PVD), VP30RT (PVD), VP20MF (PVD), UP20M (PVD)
		M Stainless Steel General	MC7015, US7020, MC7020, MC7025, F7030, VP15TF (PVD), VP20RT (PVD), MP7030 (PVD)
			MP7130 (PVD), MP7035 (PVD), US735, MP7140 (PVD), VP10RT (PVD), VP30RT (PVD), VP20MF (PVD), UP20M (PVD)
		K Cast Iron	UC5105, MC5005, UC5115, MH515 (NEW), MC5015, MY5015, MC5020, VP15TF (PVD), VP10RT (PVD), VP20RT (PVD)
		N Non-Ferrous	LC15TF
		S Heat Resistant Alloy Ti Alloy	US905, MP9005 (PVD), VP05RT (PVD), VP10RT (PVD), VP20RT (PVD), MP9015 (PVD), VP15TF (PVD), MP9120 (PVD), MP9025 (PVD), MS9025 (NEW) (PVD), MP9130 (PVD), MP9140 (NEW) (PVD)
		H Hardened Materials	MP8010 (PVD), VP15TF (PVD)
	Cermet	P Steel	NX2525, NX3035, MX3020, MX3030, NX4545
		M Stainless Steel General	NX2525, MX3020, MX3030, NX4545
		K Cast Iron	NX2525, MX3020, MX3030
	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), VP25N (PVD)
	Polycrystallines	N Non-Ferrous Non-Metal (Sintered Diamond)	MD205 (Produced to order), MD220, MD230 (Produced to order), MD2030 (NEW)
		Sintered Alloy	MB4020, MB4120 (NEW)
		K Cast Iron (Sintered CBN)	MB710, BC5110 (NEW) (PVD), MB4020, MB4120 (NEW), MB730, MBS140
		H Hardened Materials (Sintered CBN)	BC8105 (Coated), MB8110 (NEW), BC8110 (Coated), BC8210 (NEW) (Coated), MB8120 (NEW), BC8120 (Coated), BC8220 (NEW) (Coated), MB8025, MB8130 (NEW), BC8130 (Coated)
	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, GTi50
		Corrosion Resistance	GC15, GC20, GC30
	Micro-grain Cemented Carbide	Special Wear Resistance	MF10, TF15, MF20S, GM30
For Construction Tools	Cemented Carbide	General Use	MG10, MG20, MG25, MG30, MG40, MG50, MG60

GRADES COMPARISON TABLE

CEMENTED CARBIDE

	ISO Classifi-cation	ISO Symbol	Mitsubishi Materials	Sandvik	Kennametal	Seco Tools	Iscar	Sumitomo Electric	Tungaloy	Kyocera	Dijet	MOLDINO
Turning	P	P01										
		P10					IC70	ST10P	TH10			WS10
		P20	UTi20T				IC70 IC50M	ST20E	KS20			EX35
		P30	UTi20T				IC50M IC54	A30 A30N	UX30 KS15F			EX35
		P40					IC54	ST40E	TX40			EX35
	M	M10			KU10 K313 K68	890	IC07	EH510	TH10			WA10B
		M20	UTi20T		KU10 K313 K68	HX 883	IC07 IC08 IC20	EH520	KS20			EX35
		M30	UTi20T				IC08 IC20 IC28	A30 A30N	UX30			EX35
		M40					IC28		TU40			
	K	K01	HTi05T		KU10 K313 K68			H1 H2	KS05F			WH01 WH05
		K10	HTi10		KU10 K313 K68	890	IC20	EH510	TH10	KW10 GW15	KT9	WH10
		K20	UTi20T	H13A	KU10 K313 K68	HX	IC20	G10E H10E EH520	KS15F KS20	GW25	KT9	WH20
		K30	UTi20T			883		G10E H10E				
	N	N01		H10				H1 H2	KS05F	GW05 KW10		
		N10	HTi10	H10 HBA	KU10 K313 K68	890	IC08 IC20	EH510	TH10	KW10 GW15	KT9	WH10
		N20		H10 HBA	KU10 K313 K68	HX KX	IC08 IC20	G10E EH520	KS15F		KT9	WH20
		N30				883						
	S	S01	MT9005							SW05		
		S10	MT9005 RT9010 MT9015	H10A H10F H13A	KU10 K313 K68	HX 883	IC07 IC08	EH510	KS05F TH10	SW10		WH13S
		S20	RT9010 TF15		KU10 K313 K68	883	IC07 IC08	EH520	KS15F KS20	SW25		
		S30	TF15									
Milling	P	P10										
		P20	UTi20T		K125M		IC50M IC28	A30N				EX35
		P30	UTi20T	SM30	GX		IC50M IC28	A30N	UX30			EX35
		P40					IC28					EX35
	M	M10										
		M20	UTi20T				IC08 IC20	A30N				EX35
		M30	UTi20T	SM30			IC08 IC28	A30N				EX35
		M40					IC28					
	K	K01	HTi05T		K115M,K313							
		K10	HTi10		K115M K313		IC20	G10E	TH10	KW10 GW25	KT9	WH10
		K20	UTi20T	H13A		HX	IC20	G10E		GW25	FZ15	WH20
		K30	UTi20T									

Note 1) The tables above are based on published data and not authorized by each manufacturer.

MICRO GRAIN

	ISO Classification	ISO Symbol	Mitsubishi Materials	Sandvik	Kennametal	Seco Tools	Sumitomo Electric	Tungaloy	Kyocera	Dijet	MOLDINO
Cutting Tools	Z	Z01	**SF10 MF07 MF10**	PN90 6UF,H3F 8UF,H6F			F0	F MD05F MD1508		FZ05 FB05 FB10	NM08
		Z10	**HTi10 MF20**	H10F		890	XF1 F1 AFU	MD10 MD0508 MD07F	FW30	FZ10 FZ15 FB15	NM10 NM12 NM15
		Z20	**TF15 MF30**	H15F		890 883	AF0 SF2 AF1	EM10 MD20 G1F		FZ15 FB15 FB20	BRM20 EF20N
		Z30				883	A1 CC			FZ20 FB20	NM25 NM40

CERMET

	ISO Classification	ISO Symbol	Mitsubishi Materials	Sandvik	Kennametal	Seco Tools	Iscar	Sumitomo Electric	Tungaloy	Kyocera	Dijet	MOLDINO
Turning	P	P01	**AP25N* VP25N***				IC20N IC520N*	T1000A	NS520 GT720*	CCX* TN610 PV710* PV30*		
		P10	**NX2525 AP25N* VP25N***	CT5015 GC1525*	KT315 KT125	TP1020 TP1030* CM CMP*	IC20N IC520N* IC530N*	T1500A T1500Z*	NS520 NS9530 GT9530* AT9530*	CCX* TN60 TN610 PV710* TN620 PV720*	CX75	CZ25*
		P20	**NX2525 AP25N* VP25N* NX3035 MP3025***	GC1525*	KT325 KT1120 KT5020*	TP1020 TP1030*	IC20N IC520N* IC30N IC530N* IC75T	T1500A T1500Z* T2500A T2500Z* T3000Z*	NS9530 GT9530* AT9530*	TN60 TN620 PV720* TN6020	CX75 PX90*	CH550
		P30	**MP3025* VP45N***				IC75T	T3000Z*		PV730* PV90*	PX90*	
	M	M10	**NX2525 AP25N* VP25N***	GC1525*	KT125	TP1020 TP1030* CM CMP*		T1000A T1500Z*		TN60 TN620 PV720* TN6020		CZ25*
		M20	**NX2525 AP25N* VP25N***					T1500A T1500Z*		TN90 TN6020 TN620 PV720* PV90*		CH550
		M30								PV730*		
	K	K01	**NX2525 AP25N***					T1000A	NS520 GT720*	CCX* PV7005*		
		K10	**NX2525 AP25N***	CT5015	KT325 KT125				NS520 NS9530 GT9530*	CCX* PV7005* TN60		CZ25*
		K20	**NX2525 AP25N***									CH550
Milling	P	P10	**NX2525**			C15M	IC30N			TN620M TN60	CX75	MZ1000*
		P20	**MX3020 NX2525**	CT530	KT530M HT7 KT605M	C15M MP1020	IC30N	T250A T2500A		TN100M TN620M TN60	CX75 CX90	CH550 CH7030 MZ1000*
		P30	**MX3030 NX4545**				IC30N	T4500A	NS740		CX90	CH7035
	M	M10	**NX2525**				IC30N			TN60		
		M20	**MX3020 NX2525**	CT530	KT530M HT7 KT605M	C15M	IC30N	T250A T2500A		TN100M	CX75	
		M30	**MX3030 NX4545**					T4500A				
	K	K01										
		K10	**NX2525**							TN60	CX75	
		K20	**NX2525**		KT530M HT7						CX75	

*Coated Cermet
Note 1) The tables above are based on published data and not authorized by each manufacturer.

GRADES COMPARISON TABLE

CVD COATED GRADE

	ISO Classification	ISO Symbol	Mitsubishi Materials	Sandvik	Kennametal	Seco Tools	Iscar	Sumitomo Electric	Tungaloy	Kyocera	Dijet	MOLDINO
Turning	P	P01	**MC6115** **UE6105**	GC4305 GC4205 GC4415	KCP05B KCP05 KC9105	TP0501 TP0500 TP1501 TP1500	IC9150 IC8150 IC428	AC810P AC700G	T9105 T9025	CA510 CA5505	JC110V	HG8010
		P10	**MC6115** **UE6105** **MC6015** **UE6110** **MY5015**	GC4315 GC4215 GC4325 GC4415	KCP10B KCP10 KCP25 KC9110	TP1501 TP1500 TP2501 TP2500	IC9150 IC8150 IC8250	AC810P AC700G AC820P AC2000 AC8015P	T9105 T9115 T9215	CA510 CA5505 CA515 CA5515	JC110V JC215V	HG8010 HG8025 GM8020
		P20	**MC6115** **MC6015** **UE6110** **MC6125** **MC6025** **UE6020** **MY5015**	GC4315 GC4215 GC4325 GC4225 GC4425	KCP25B KCP30B KCP25 KC9125	TP2501 TP2500	IC8250 IC9250 IC8350	AC820P AC2000 AC8025P AC830P	T9115 T9125 T9215 T9225	CA025P CA515 CA5515 CA525 CA5525 CR9025	JC110V JC215V	HG8025 GM8020 GM25
		P30	**MC6125** **MC6025** **UE6020** **MC6035** **UH6400**	GC4325 GC4335 GC4225 GC4235 GC4425	KCP30B KCP30	TP3501 TP3500 TP3000	IC8350 IC9250 IC9350	AC8035P AC830P AC630M	T9125 T9135 T9225 T9235	CA025P CA525 CA5525 CA530 CA5535 CR9025	JC215V JC325V	GM25 GM8035
		P40	**MC6035** **UH6400**	GC4235 GC4335	KCP40 KCP40B KC9140 KC9240	TP3501 TP3500 TP3000	IC9350	AC8035P AC630M	T9135 T9035 T9235	CA530 CA5535	JC325V	GM8035 GX30
	M	M10	**MC7015** **US7020**	GC2015 GC2220	KCM15B KCM15	TM1501 TM2000	IC6015 IC8250	AC610M AC6020M	T6120 T9215	CA6515	JX605X JC110V	
		M20	**MC7015** **US7020** **MC7025**	GC2015 GC2220	KCM15 KCM25B KCP40B	TM2000 TM2501	IC6015	AC6020M AC610M AC6030M AC630M	T6120 T9215	CA6515 CA6525	JC110V	HG8025 GM25
		M30	**MC7025** **US735**	GC2025	KCM25 KCM35B KCP40	TM4000 TM3501	IC6025	AC6030M AC630M	T6130	CA6525	JX525X	GM8035 GX30
		M40	**US735**	GC2025	KCM35B KCM35	TM4000 TM3501	IC6025	AC6030M AC630M			JX525X	GX30
	K	K01	**MC5005** **UC5105**	GC3205 GC3210	KCK05B KCK05	TK0501 TH1500	IC5005	AC405K AC410K AC4010K	T505 T515 T5105	CA4505 CA4010 CA310	JC050W JC105V	HX3505
		K10	**MC5015** **MH515** **UC5115** **MY5015**	GC3205 GC3210	KCK15B KCK15 KCK20 KC9315 KCK20B	TK0501 TK1501	IC5005 IC5010 IC428	AC405K AC4010K AC410K AC4015K AC415K	T515 T5115	CA315 CA4515 CA4010 CA4115	JC108W JC050W JC105V JC110V	HX3515 HG8010
		K20	**MC5015** **MH515** **UC5115** **UE6110** **MY5015**	GC3225	KCK20B KCK20 KCPK05	TK1501	IC5010 IC8150	AC4015K AC415K AC420K AC8025P	T5115 T5125	CA320 CA4515 CA4115 CA4120	JC108W JC110V JC215V	HG8025 GM8020
		K30	**UE6110**	GC3225	KCPK05			AC8025P	T5125		JC215	HG8025 GM8020
	S	S01	**US905**	S05F S205						CA6515 CA6525 CA6535		HS9105 HS9115
Milling	P	P10				MP1501	IC5400	ACP2000 XCU2500 ACP100			JC730U	
		P20	**F7030** **MC7020**	GC4220		MP1501 MP2501 T25M	IC5500	ACP2000 ACP3000 XCU2500 ACP100	T3130 T3225		JC730U JC835S	GX2140 GF30
		P30	**F7030** **MC7020**	GC4330 GC4230	KCPK30 KC930M	MP1501 MP2501 TM25 T350	IC5500	ACP3000 XCU2500 ACP100	T3130 T3225		JC835S JC730U	GX2140 GX2160 GF30
		P40		GC4340 GC4240	KC935M KC530M	MM4500 T350M						GX2030 GX2160
	M	M10						XCU2500			JC730U	
		M20	**F7030** **MC7020**		KC925M	MP2501 MS2500 T25M T350M		ACP100 ACM200 XCU2500	T3130 T3225	CA6535	JC730U JC835S	AX2040 GX2140
		M30	**F7030** **FC7020** **MC7020**	GC2040	KC930M	MP2501 T25M T350M		ACP100 XCU2500 ACM200	T3130 T3225	CA6535	JC730U JC835S	AX2040 GX2140 GX2160 GX30
		M40			KC930M KC935M	MM4500 T350M						GX2160
	K	K01										
		K10	**MC5020**					XCK2000 ACK200	T1215 T1115	CA420M	JC605W	GX2120
		K20	**MC5020**	GC3220 GC3330 K20W	KC915M	MP1501	IC5100	ACK200 XCK2500 XCK2000 ACK200	T1115		JC610 JC605W JC608X	GX2120
		K30		GC3330 GC3040	KC920M KC925M KCPK30 KC930M KC935M	MP1501	IC5100 DT7150				JC610	

Note 1) The tables above are based on published data and not authorized by each manufacturer.

PVD COATED GRADE

	ISO Classification	ISO Symbol	Mitsubishi Materials	Sandvik	Kennametal	Seco Tools	Iscar	Sumitomo Electric	Tungaloy	Kyocera	Dijet	MOLDINO
Turning	P	P01								PR1005		
		P10	VP10MF MS6015	GC1125	KCU10 KC5010 KC5510 KU10T	CP200 TS2000	IC250 IC507 IC570 IC807 IC907 IC908		AH710 SH725	PR1005 PR1705 PR930 PR1025 PR1115 PR1225 PR1425 PR1725		
		P20	VP10RT VP20RT VP15TF VP20MF MS6015	GC1125 GC15	KCU10 KC5025 KC5525 KU25T	TS2500	IC1007 IC250 IC308 IC507 IC807 IC808 IC907 IC908 IC1008 IC1028 IC3028	AC520U	AH710 AH725 AH120 SH730 GH730 GH130 SH725	PR930 PR1025 PR1725 PR1115 PR1225 PR1425 PR1535		IP2000
		P30	VP10RT VP20RT VP15TF VP20MF	GC1125	KCU25 KC5525 KU25T	CP500	IC228 IC250 IC328 IC330 IC354 IC528 IC1008 IC1028 IC3028	AC1030U AC530U	AH725 AH120 SH730 GH730 GH130 AH740 J740 SH725 AH7025	PR1025 PR1725 PR1225 PR1425 PR1535 PR1625		IP3000
		P40				CP500 CP600	IC228 IC328 IC528 IC928 IC1008 IC1028 IC3028		AH740 J740	PR1535		
	M	M01										
		M10	VP10MF MS6015	GC1115 GC15 GC1105	KCU10 KC5010 KC5510	CP200 TS2000	IC354 IC507 IC520 IC807 IC907 IC1007 IC5080T		AC8005 AH710 SH725	PR1025 PR1225 PR1425 PR1725	JC5003 JC8015	IP050S
		M20	VP10RT VP20RT VP15TF VP20MF MS9025	GC1115 GC15 GC1125	KCU10 KC5010 KC5510	TS2500 CP500	IC354 IC808 IC908 IC1008 IC1028 IC3028 IC5080T	AC520U AC5015S	AH710 AH725 AH120 SH730 GH730 GH130 GH330 AH630 SH725 AH8015 AH7025	PR1025 PR1125 PR1225 PR1425 PR915 PR930 PR1535 PR1725	JC5003 JC5015 JC8015 JC5118	IP100S
		M30	VP10RT VP20RT VP15TF VP20MF MP7035	GC1125 GC2035	KCU25 KC5525	CP500 CP600 TTP2050	IC228 IC250 IC328 IC330 IC1008 IC1028 IC9080T	AC520U AC530U AC1030U AC6040M AC5025S	GH330 AH725 AH120 SH730 GH730 GH130 J740 AH645 SH725	PR1125 PR1725 PR1425 PR1535	JC5015 JC8015 JC5118	
		M40	MP7035	GC2035			IC328 IC928 IC1008 IC1028 IC3028 IC9080T	AC530U AC6040M	J740	PR1535	JC5118	
	K	K01										
		K10		GC15	KCU10 KC5010 KC5510	CP200 TS2000	IC350 IC910 IC1008	AC510U	GH110 AH110 AH710			
		K20	VP10RT VP20RT VP15TF		KCU15 KCU25	CP200 TS2000 TS2500	IC228 IC350 IC808 IC830 IC908 IC1007 IC1008		GH110 AH7025 AH110 AH710 AH725 AH120 GH730 GH130			
		K30	VP10RT VP20RT VP15TF		KCU25 KC5525	CP500	IC228 IC350 IC808 IC830 IC908 IC928 IC1007 IC1008		AH725 AH120 GH730 GH130			
	S	S01	MP9005 VP05RT			TH1000	IC507 IC804 IC807 IC907 IC5080T	AC5005S	AH905 AH8005	PR005S PR1305	JC5003 JC8015	JP9105
		S10	MP9005 MP9015 VP10RT	GC1105 GC15	KCU10 KC5010 KC5410 KC5510	CP200 CP250 TS2000 TS2050 TS2500 TH1000	IC507 IC806 IC807 IC903 IC5080T	AC510U AC5015S	AH905 SH730 AH110 AH8005 AH120	PR005S PR015S PR1310	JC5003 JC5015 JC8015	JP9115
		S20	MP9015 MT9015	GC1125	KCU10 KCU25 KC5025 KC5525	TS2500 CP500	IC228 IC300 IC328 IC808 IC908 IC928 IC3028 IC806 IC9080T	AC510U AC520U AC5025S	AH120 AH725 AH8015	PR015S PR1125 PR1325	JC5015 JC8015 JC5118	
		S30	MS9025 MP9025 VP15TF VP20RT	GC1125	KC5525	CP600	IC928 IC830	AC1030U	AH725 AH7025	PR1125 PR1535	JC5118	
Milling	P	P01					IC903				JC8003	ATH80D ATH08M TH308 PN208 JP4105 PN15M
		P10		GC1010 GC1130	KC505M KC715M KC510M KC515M		IC250 IC350 IC808 IC810 IC900 IC903 IC908 IC910 IC950	ACU2500 ACP200		PR830 PR1225	JC8003 JC8015 JC5015 JC5118	PN15M PN215 PCA12M JP4115
		P20	MP6120 VP15TF	GC1010 GC1030 GC1130 GC2030	KC522M KC525M KC527M KC610M KC620M KC635M KC715M KC720M KC730M KTPK20	F25M MP3000	IC250 IC300 IC328 IC330 IC350 IC808 IC810 IC830 IC900 IC908 IC910 IC928 IC950 IC1008	ACU2500 ACP200	AH3225 AH725 AH120 GH330 AH330 AH9130 AH6030	PR830 PR1225 PR1230 PR1525	JC5015 JC5040 JC6235 JC8015 JC5118 JC6235 JC7560P JC8118P	CY9020 JP4120 CY150

Note 1) The tables above are based on published data and not authorized by each manufacturer.

GRADES COMPARISON TABLE

PVD COATED GRADE

	ISO Classification	ISO Symbol	Mitsubishi Materials	Sandvik	Kennametal	Seco Tools	Iscar	Sumitomo Electric	Tungaloy	Kyocera	Dijet	MOLDINO
Milling	P	P30	MP6120 VP15TF MP6130 VP30RT	GC1010 GC1030 GC2030 GC1130	KC735M KC725M KC530M KC537M KCPM40	F25M MP3000 F30M MP2050	IC250 IC300 IC328 IC330 IC350 IC830 IC845 IC900 IC928 IC950 IC1008	ACU2500 ACP200 ACP300	AH725 AH120 AH130 AH140 GH130 AH730 AH3035 AH6030 AH3225 AH9130	PR1230 PR1525	JC6235 JC7560 JC8050 JC7560P JC5015 JC8118 JC5040 JC8118P JC8015 JC5118	JS4045 CY250 CY250V CY25 HC844
		P40	VP30RT	GC2030 GC1030 GC1130	KC735M KC537M KCPM40	F40M T60M	IC300 IC328 IC330 IC830 IC928 IC1008	ACP300	AH140 AH3035	PR1525	JC6235 JC7560 JC8050 JC7560P JC5040 JC8118 JC5118 JC8118P JC5118	JS4060 PTH30E PTH40H JX1060 JS4060
	M	M01					IC907					PN08M PN208
		M10		GC1025 GC1030 GC1010 GC1130	KC715M KC515M		IC903	ACU2500 ACM100		PR1225		PN15M PN215
		M20	VP15TF MP7130 MP7030 VP20RT	GC1025 GC1030 GC1040 GC2030 S30T	KC610M KC635M KC730M KC720M KC522M KC525M KCPM40 KTPK20	F25M MP3000	IC250 IC300 IC808 IC830 IC900 IC908 IC928 IC1008	ACU2500 ACP200	AH725 AH120 GH330 AH330 GH110 AH6030 AH9130	PR1025 PR1225	JC5015 JC5118 JC8015	JP4120
		M30	VP15TF MP7130 MP7030 VP20RT MP7140 VP30RT	S30T GC1040 GC2030	KC537M KC725M KC735M KCPM40 KC530M	F30M F40M MP3000 MP2050	IC250 IC300 IC328 IC330 IC380 IC830 IC882 IC928 IC1008	ACP200 ACP300 ACM300	AH120 AH725 AH130 AH140 GH130 AH730 GH340 AH9130 AH3135 AH4035	PR830 PR1225 PR1525 PR1535	JC5015 JC7560 JC8015 JC7560P JC8050 JC8118 JC5118 JC8118P	JS4045 CY250 HC844
		M40	MP7140 VP30RT			F40M MP2050	IC250 IC300 IC328 IC330 IC882 IC1008	ACP300 ACM300	AH140 AH3135 AH4035	PR1525 PR1535	JC5015 JC7560 JC5118 JC7560P JC8050 JC8118 JC8118P	PTH30E PTH40H JM4160
	K	K01	MP8010						AH110 GH110 AH330		JC8003	ATH80D ATH08M TH308
		K10	MP8010	GC1010	KC514M KC515M KC527M KC635M	MK2050	IC350 IC810 IC830 IC900 IC910 IC928 IC950 IC380 IC1008	ACU2500 ACK3000	AH110 GH110 AH725 AH120 GH130 AH330	PR1210 PR1510	JC8015	ATH10E TH315 CY100H
		K20	VP15TF VP20RT	GC1010 GC1020	KTPK20 KC514M KC610M KC520M KC620M KC524M	MK2000 MK2050	IC350 IC808 IC810 IC830 IC900 IC908 IC910 IC928 IC950 IC1008	ACU2500 ACK300 ACK3000	GH130 AH9130 AH9030	PR1210 PR1510	JC5015 JC8015 JC6235	CY150 JP4120 CY9020 PTH13S
		K30	VP15TF VP20RT	GC1020	KC522M KC725M KC524M KC735M KC537M	MK2050	IC350 IC808 IC830 IC908 IC928 IC950 IC1008	ACK300 ACK3000			JC6235 JC5015 JC8015 JC8118 JC8118P	CY250 JS4045
	S	S01					IC907 IC908 IC808 IC903		AH110 AH710	PR1210	JC8003 JC8015 JC5118	PN08M PN208
		S10	MP9120 VP15TF	GC1130 GC1010 GC1030 GC2030	KC510M	MS2050	IC903 IC907 IC908 IC840 IC910 IC808	EH520Z EH20Z ACM100	AH120 AH725	PR1210	JC8003 JC5015 JC8015 JC5118	JS1025 JP4120
		S20	MP9120 VP15TF MP9130 MP9030	S30T GC2030 GC1030 GC1130	KC522M KC525M KCSM30 KCPM40	MS2050 MP2050	IC300 IC908 IC808 IC900 IC830 IC928 IC328 IC330 IC840 IC882 IC380	EH520Z EH20Z ACK300 ACP300	AH725 AH6030 AH130	PR1535	JC8015 JC5015 JC8050 JC5118	PTH30H
		S30		GC2030 GC1040	KC725M KCPM40	MS2050 F40M KCSM40	IC830 IC882 IC928	ACP300 ACM300	AH3135	PR1535	JC8050 JC7560 JC5118	JM4160
	H	H01	MP8010 VP05HT				IC903				JC8003 DH103 JC8008 DH102	
		H10	VP15TF VP10H	GC1130 GC1010 GC1030	KC505M KC510M	MH1000 F15M	IC900 IC808 IC907 IC905				JC8003 JC8008 JC8015 JC5118 JC8118P	JP4105 TH303 TH308 PTH08M ATH08M ATH80D
		H20	VP15TF	GC1030 GC1130		F15M	IC900 IC808 IC908 IC380 IC1008		AH3135		JC8015 JC5118 JC8118P	JP4115 TH315
		H30				MP3000 F30M	IC380 IC900 IC1008		AH3135			JP4120

Note 1) The tables above are based on published data and not authorized by each manufacturer.

CBN

	ISO Classification	ISO Symbol	Mitsubishi Materials	Sandvik	Seco Tools	Sumitomo Electric	Tungaloy	Kyocera	Dijet
Turning	H	H01	**BC8105** **BC8110** **MB8110**	CB7105	CBN060K	BNC100 BNX10 BN1000 BNC2010	BXM10 BX310	KBN05M KBN10M KBN510	
		H10	**BC8110** **MBC020** **BC8120** **BC8220** **MB8025** **MB8110** **MB8120**	CB7115 CB7015	CBN010	BNC160 BNX20 BN2000 BNC2020	BXM10 BX330 BX530	KBN05M KBN25M KBN525	JBN300
		H20	**MBC020** **BC8120** **BC8220** **MB8025** **MB8120**	CB7125 CB7025 CB20	CBN150 CBN160C	BNC200 BNX25 BN250 BNC2020	BXM20 BXA20 BX360	KBN525 KBN05M KBN25M	JBN245
		H30	**BC8130** **MB8130**	CB7135 CB7525	CBN150 CBN160C	BNC300 BN350	BXC50 BX380	KBN35M	
	S	S01	**MB730** **MB8025**		CBN170	BN700 BN7000	M714B		
		S10				BNS8125	BX470, BX480		
		S20							
		S30							
	K	K01	**MB710** **BC5110** **MB5015**			BN500 BNC500	BX870 BX930 BX910		
		K10	**MB730** **MB4020** **MB4120**	CB7525		BN700 BN7500 BN7000	BX470 BX480	KBN60M	JBN795
		K20	**MB730** **MB4020** **MB4120**		CBN200	BN700 BN7000	BX480	KBN60M	JBN500
		K30	**BC5030**	CB7925	CBN300 CBN400C CBN500	BNS800 BNC8115, BNC8125	BX90S BXC90	KBN900	
	Sintered Alloy		**MB4020** **MB4120**		CBN200	BN7500 BN7000 BNC7115	BX470 BX480	KBN570 KBN70M	

PCD

	ISO Classification	ISO Symbol	Mitsubishi Materials	Sandvik	Seco Tools	Sumitomo Electric	Tungaloy	Kyocera	Dijet
Turning	N	N01	**MD205**	CD05	PCD05	DA90	DX180 DX160	KPD001	JDA30 JDA735
		N10	**MD220**	CD10	PCD10	DA150	DX140	KPD010	
		N20	**MD220**		PCD20	DA2200	DX120		JDA715
		N30	**MD230** **MD2030**		PCD30 PCD30M	DA1000	DX110	KPD230	JDA10

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