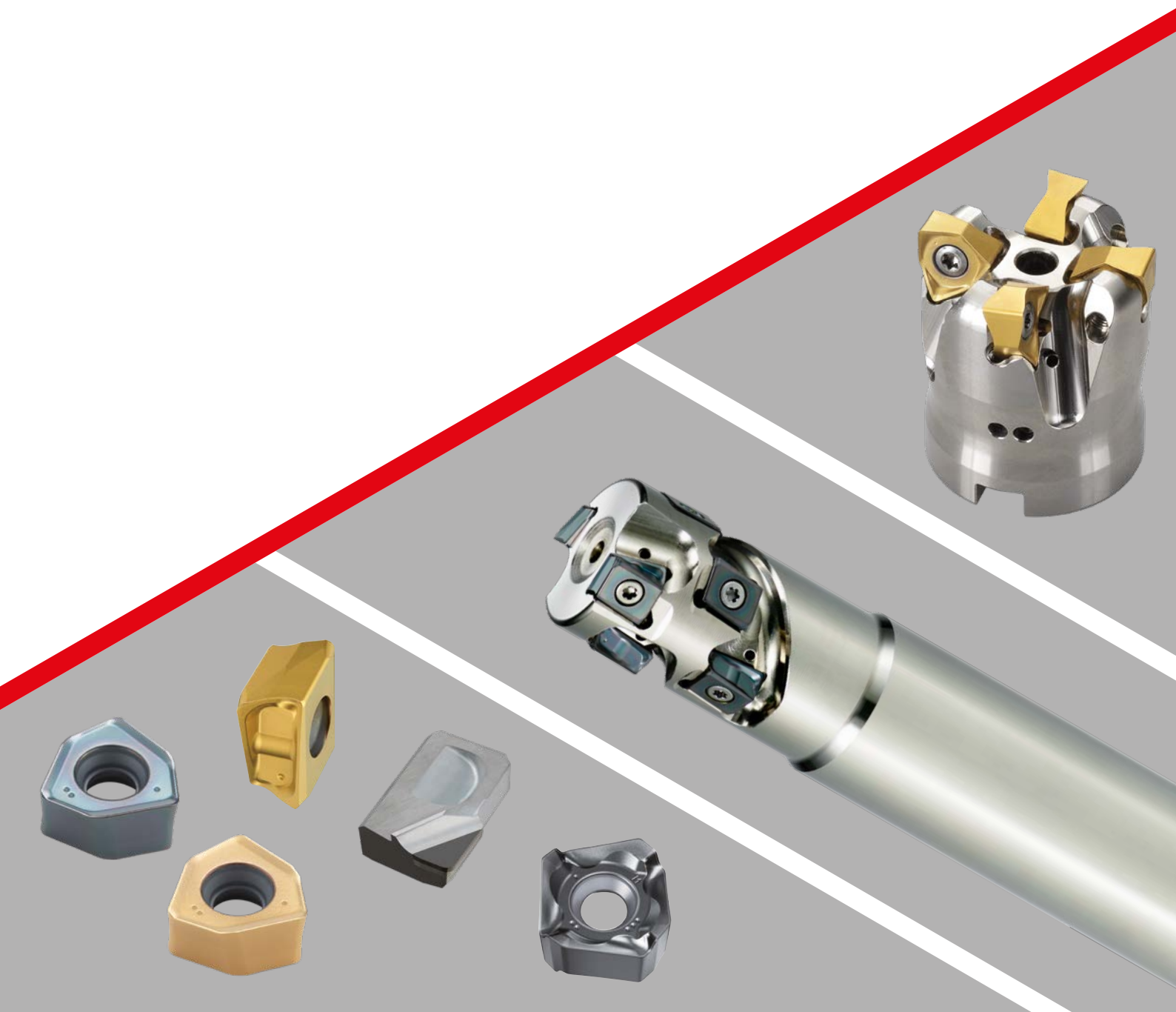


INDEXABLE MILLING TOOLS



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 the highest quality milling tools.



INDEX

INDEXABLE MILLING TOOLS

ROTATING TOOLS	K001
ROTATING TOOL INSERTS	L001
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GENERAL INFORMATION	



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 MATERIAL COVERED BY THE TOOL provides a graph depicting the scope of the 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

ROTATING TOOLS
FACE MILLING
"GENERAL CUTTING"
WSX445

Material: P, M, K, S, H

Fig.1
Fig.2

ARBOR TYPE RIGHT HAND TOOL HOLDER

DC (mm) Order Number Stock Color Note of Part Type Dimensions (mm) DCX LF DCONIMS WT (kg) APXK (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	WSX445-080A05AR	●	5	Fine Pitch	92.9	50	27	1.2	5	1
80	WSX445-080A06AR	●	6	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	172.9	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	212.9	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 (Inventory) type on the outer body from 40 to 100 in diameter (DC).
Note 3) Please use a set bolt of the FMB type on the outer 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

K016

INSERTS WITH CHIPBREAKER

Material: P, M, K, S, H

Shape: Order Number

Dimensions (mm): IC, S, BS, RE1

Geometry

WIPER INSERTS

Material: P, M, K, S, H

Shape: Order Number

Dimensions (mm): INSL, W1, S, BS, RE1

Geometry

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 TECHNICAL DATA

K019

LEGEND FOR STOCK STATUS MARK
is shown on the left hand page of
each double-page spread.

SPARE PARTS
FOR MILLING 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

SYMBOL DESCRIPTIONS K002
CLASSIFICATION..... K004

STANDARD OF MILLING

FACE MILLING

WSX445..... K016
ASX445..... K026
AHX440S..... K034
AHX475S..... K038
AHX640S..... K042
AHX640W..... K049
NEW WSF406W..... K052

FACE MILLING (HIGH FEED)

FMAX..... K056

SHOULDER MILLING

NEW WWX200..... K062
WWX400..... K067
VOX400..... K077
ASX400..... K080

MULTI FUNCTIONAL MILLING

WJX..... K085
VPX200..... K099
VPX300..... K113
APX3000..... K146
APX4000..... K153
NEW AXD4000..... K168
AXD4000A..... K176
AXD7000..... K180
AQX..... K186
AJX..... K194
ARP..... K254
BRP..... K206

DEEP SHOULDER MILLING

VPX200 LONG CUTTING EDGE TYPE ... K127
VPX300 LONG CUTTING EDGE TYPE ... K137
APX3000 LONG CUTTING EDGE TYPE ... K160
APX4000 LONG CUTTING EDGE TYPE ... K164
VFX5..... K208
VFX6..... K212
DCCC..... K216
SPX..... K219
ASPX..... K224

BALL NOSE END MILLING

SRF,SRB..... K228
SRM2..... K236
SRM2Ø40,Ø50..... K244

RADIUS END MILLING

SUF..... K232

CHAMFER MILLING

CESP,CFSP,CGSP K246

T-SLOT MILLING

TSMP..... K248

VERTICAL FEED MILLING

PMF..... K250
PMR..... K252

ARBORS

ARBORS FOR SCREW-IN TOOLS ... K260
MAXIMUM ALLOWABLE
REVOLUTIONS FOR CUTTERS ... K262
LIST OF CUTTING
EDGE DIAMETER TOLERANCES ... K263

*Alphabetical Order Index

K034 AHX440S
K038 AHX475S
K042 AHX640S
K049 AHX640W
K194 AJX
K146 APX3000
K160 APX3000 LONG CUTTING EDGE TYPE
K153 APX4000
K164 APX4000 LONG CUTTING EDGE TYPE
K186 AQX
K254 ARP
K224 ASPX
K080 ASX400
K026 ASX445
K168 AXD4000

K176 AXD4000A
K180 AXD7000
K206 BRP
K246 CESP/CFSP/CGSP
K216 DCCC
K056 FMAX
K250 PMF
K252 PMR
K219 SPX
K228 SRF/SRB
K232 SUF
K236 SRM2
K244 SRM2Ø40,Ø50
K248 TSMP
K208 VFX5

K212 VFX6
K077 VOX400
K099 VPX200
K127 VPX200 LONG CUTTING EDGE TYPE
K113 VPX300
K137 VPX300 LONG CUTTING EDGE TYPE
K085 WJX09
K092 WJX14
K052 WSF406W
K016 WSX445
K062 WWX200
K067 WWX400
K260 ARBORS FOR SCREW-IN TOOLS



SYMBOL DESCRIPTIONS

KAPR (Cutting Edge Angle) List

15°
KAPR

30°
KAPR

45°
KAPR

50°
KAPR

60°
KAPR

84°
KAPR

90°
KAPR

R
KAPR

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



Finish Cutting



Medium Cutting



Rough Cutting

Material Range

1st Recommendation



2nd Recommendation



CLASSIFICATION (ARBOR type)

Product Name · Shape	APMX (mm)	Features	Cutter Dia. (mm)	Material	Page
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
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
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
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
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	K042
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	K049
High Efficiency Cutting for Cast Iron NEW WSF406W  84° KAPR	7	● Uniquely designed double-sided insert. ● Adjustable cutting edge run-out system. ● Improved surface finish. ● Suppression of edge chipping.	Ø80 — Ø250	K	K052
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	K056
Multi Functional Milling 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	K085

K

ROTATING TOOLS

Product Name · Shape	APMX (mm)	Features	Cutter Dia. (mm)	Material	Page
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	K092
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	K194
Multi Functional Milling of Difficult-to-cut Materials ARP 	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	K254
Multi Functional Cutting BRP 	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	K206
General Cutting NEW WWX200 	5	● High-stability clamping and high-quality machining. ● The optimised “X-type” insert meets the demand for greater strength. ● Economical double-sided 6 corners.	Ø40 — Ø160	P M K N S H	K062
General Cutting WWX400 	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	K067
Cast Iron VOX400 	10	● Tangential inserts with high strength cutting edge. ● Economical 8 cutting edge inserts. ● Screw-on type.	Ø50 — Ø250	K	K077
General Cutting ASX400 	10	● High accuracy, high quality vertical wall. ● Low cutting force insert. ● With through air & coolant holes.	Ø50 — Ø250	P M K N S H	K080
Multi Functional Cutting for High Efficiency Machining VPX200 	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	K099

K

ROTATING TOOLS

CLASSIFICATION (ARBOR type)

Product Name · Shape	APMX (mm)	Features	Cutter Dia. (mm)	Material	Page
Shell Type VPX200  	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	K129
Multi Functional Cutting for High Efficiency Machining VPX300  	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	K113
Shell Type VPX300 	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	K138
Multi Functional Cutting APX3000  	10	● Low cutting force insert. ● High accuracy, high quality vertical wall. ● With through air & coolant holes.	Ø32 — Ø100	P M K N S H	K146
Shell Type APX3000 	37 46	● High accuracy, high quality vertical wall machining. ● Low cutting force insert. ● With through coolant holes.	Ø40 Ø50	P M K N S	K161
Multi Functional Cutting APX4000  	15	● Low cutting force insert. ● High accuracy, high quality vertical wall. ● With through air & coolant holes.	Ø40 — Ø160	P M K S H	K153
Shell Type APX4000 	42 56	● High accuracy, high quality vertical wall machining. ● Low cutting force insert. ● With through coolant holes.	Ø50 Ø63	P M K S	K165
Aluminium Alloy to Difficult-to-cut Material Cutting AXD4000  	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	K168
Ultra-high Speed, Efficient Machining of Aluminium Alloys AXD4000A  	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	K176

K

ROTATING TOOLS

Product Name · Shape	APMX (mm)	Features	Cutter Dia. (mm)	Material	Page
Aluminium Alloy to Difficult-to-cut Material Cutting AXD7000  	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	K180
Shell Type SPX  	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	K220
Shell Type ASPX  	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	K224
ASPX  	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	K225
VFX5  	26 — 75	● High performance titanium alloy milling. ● High rigidity design. ● Highly reliable clamping mechanism. ● With through coolant holes.	Ø40 — Ø80	S	K208
VFX6  	31 — 90	● High performance titanium alloy milling. ● High rigidity design. ● Highly reliable clamping mechanism. ● With through coolant holes.	Ø63 — Ø100	S	K212

K

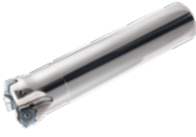
ROTATING TOOLS

CLASSIFICATION (SHANK type)

Product Name · Shape	APMX (mm)	Features	Cutter Dia. (mm)	Material	Page
WSX445  	5	● Unique design double sided insert. ● Sudden fracture & welding prevention function. ● Highly efficient chip discharge. ● With through coolant holes.	Ø40 — Ø63		K016
ASX445  	6	● Precision inexpensive moulded type 20° positive insert. ● Screw-on type. ● A wide range of chipbreakers. ● High rigidity due to carbide shim.	Ø50 Ø63		K026
WWX200  	5	● High-stability clamping and high-quality machining. ● The optimised "X-type" insert meets the demand for greater strength. ● Economical double-sided 6 corners.	Ø25 — Ø50		K062
WWX400  	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		K067
ASX400  	10	● High tolerance M-class inserts. ● Economical 4 cutting edge inserts. ● Curved cutting edge and high rigidity holder. ● Screw-on type.	Ø40 — Ø63		K080
VPX200  	8	● Special insert design with 4 cutting edges. ● High precision, high quality insert cutting edge with finishing blade. ● With through coolant holes.	Ø16 — Ø50		K099
VPX300  	11	● Special insert design with 4 cutting edges. ● High precision, high quality insert cutting edge with finishing blade. ● With through coolant holes.	Ø25 — Ø50		K113
APX3000  	10	● High accuracy, high quality vertical wall. ● Low cutting force insert. ● With through air & coolant holes.	Ø12 — Ø63		K146
APX4000  	15	● High accuracy, high quality vertical wall. ● Low cutting force insert. ● With through air & coolant holes.	Ø25 — Ø63		K153

K

ROTATING TOOLS

Product Name · Shape	APMX (mm)	Features	Cutter Dia. (mm)	Material	Page
AXD4000  	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		K168
AXD7000  	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		K180
AQX  	7.4 — 55	● The centre bottom cutting edge enables drilling without previously formed hole. ● With through coolant holes.	Ø16 — Ø50		K186
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		K194
WJX09 	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		K085
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		K092
ARP  	5 — 6	● Accurate insert run out. ● Solid clamping system. ● Standard stock item of extra fine pitch. ● With through coolant holes.	Ø25 — Ø50		K254
VPX200 Long Cutting Edge  	14 — 42	● Special insert design with 4 cutting edges. ● High precision, high quality insert cutting edge. ● With through coolant holes.	Ø20 — Ø40		K127
VPX300 Long Cutting Edge  	21 — 42	● Special insert design with 4 cutting edges. ● High precision, high quality insert cutting edge. ● With through coolant holes.	Ø40		K137

K

ROTATING TOOLS

CLASSIFICATION (SHANK type)

Product Name · Shape	APMX (mm)	Features	Cutter Dia. (mm)	Material	Page
APX3000 Long Cutting Edge  	28 — 55	● High accuracy, high quality vertical wall machining. ● Low cutting force insert.	Ø20 — Ø40		K160
APX4000 Long Cutting Edge  	56 84	● High accuracy, high quality vertical wall machining. ● Low cutting force insert. ● With through air & coolant holes.	Ø40 Ø50		K164
DCCC  	27 — 83	● Different helical flute angles prevents chattering.	Ø25 — Ø40		K216
SPX  	110 — 261	● Low cutting resistance due to the use of wavy inserts. ● Suitable for heavy cutting due to holder rigidity.	Ø63		K219
SRF/SRB  	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		K228
SUF  	1.5 — 5.2	● Highly accurate corner radius tolerance allows for high precision finishing. ● Seamless gash.	Ø10 — Ø32		K232
SRM2  	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		K236
SRM2 Ø40/Ø50  	54 63	● Best for roughing of moulds. ● Low resistance chipbreaker. ● Highly rigid body.	Ø40 Ø50		K244
CESP·CFSP·CGSP    	5.9 — 10.2	● Covers 5 cutting modes. ● Excellent sharpness with 11° positive inserts. ● 30°, 45° and 60° chamfer series.	Ø8 — Ø32		K246

K

ROTATING TOOLS

Product Name · Shape	APMX (mm)	Features	Cutter Dia. (mm)	Material	Page
TSMF  	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	K248
PMF 	0.1	● 2 directional cutting with large overhang. ● Excellent straightness. ● Excellent wall accuracy.	Ø50 — Ø80	P K	K250
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	K252

K

ROTATING TOOLS

CLASSIFICATION (SCREW-IN type)

Product Name · Shape	APMX (mm)	Features	Cutter Dia. (mm)	Material	Page
ASX400  	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	K080
APX3000  	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	K146
APX4000  	15	● High accuracy, high quality vertical wall machining. ● Low cutting force insert. ● With through air & coolant holes.	Ø25 — Ø40	P M K S H	K153
AXD4000  	14.8 15	● Air / coolant through. ● Low resistance insert. ● High balance quality. ● Excellent wall accuracy. ● Multi functional milling.	Ø25 — Ø40	P N S	K168
AQX  	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	K186
VPX200  	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	K099
VPX300  	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	K113
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	K194
WJX09 	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	K085

K

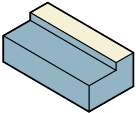
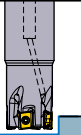
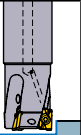
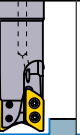
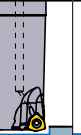
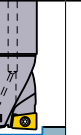
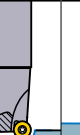
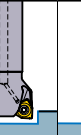
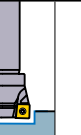
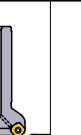
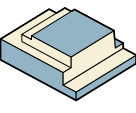
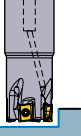
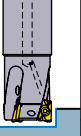
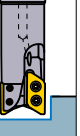
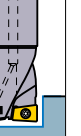
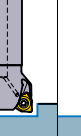
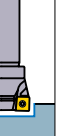
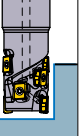
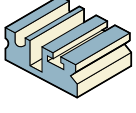
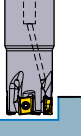
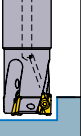
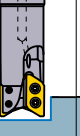
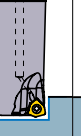
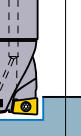
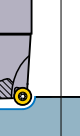
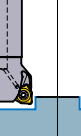
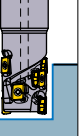
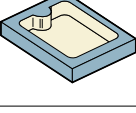
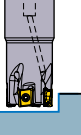
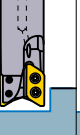
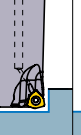
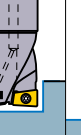
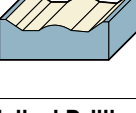
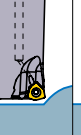
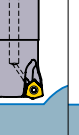
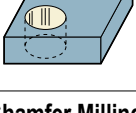
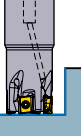
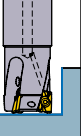
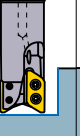
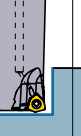
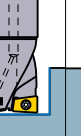
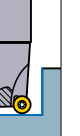
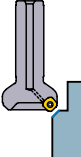
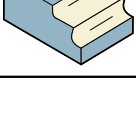
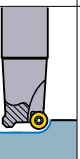
ROTATING TOOLS

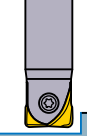
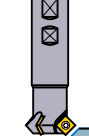
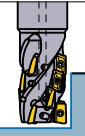
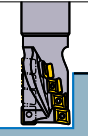
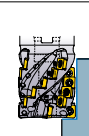
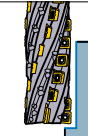
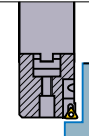
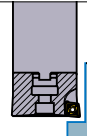
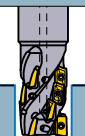
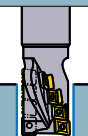
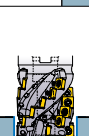
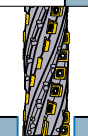
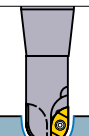
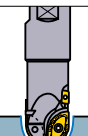
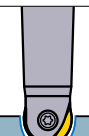
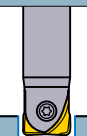
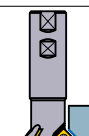
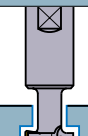
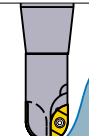
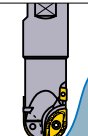
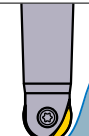
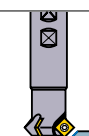
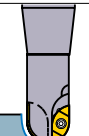
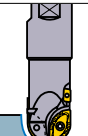
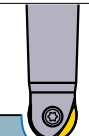
Product Name · Shape	APMX (mm)	Features	Cutter Dia. (mm)	Material	Page
ARP  	5 — 6	● Run-out does not occur easily when changing sections. ● Solid clamping system. ● With through coolant holes.	Ø25 — Ø40		K254
BRP  	4 — 6	● 11° positive insert. ● Round shape insert with a strong cutting edge. ● Wide range of tools available. ● Suitable for mould machining.	Ø16 — Ø42		K206
SRF/SRB  	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		K228
SUF  	2.1 — 5.2	● Highly accurate corner radius tolerance allows for high precision finishing. ● Seamless gash. ● With through coolant holes.	Ø16 — Ø32		K232
SRM2  	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		K236

CLASSIFICATION

K

ROTATING TOOLS

	Multi Functional Type							General Type			Long Cutting Edge Type	
Product Name	VPX200 VPX300	APX3000 APX4000	AXD4000 AXD7000	WJX09 WJX14	AJX	AQX	ARP	WWX200 WWX400	ASX400	ASX445 WSX445	VPX200 VPX300 Long Cutting Edge Type	
Cutting Mode	➡ K099 ➡ K113	➡ K146 ➡ K153	➡ K168 ➡ K180	➡ K085 ➡ K092	➡ K194	➡ K186	➡ K254	➡ K062 ➡ K067	➡ K080	➡ K026 ➡ K016	➡ K127 ➡ K137	
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	ASPX	SPX	SRM2	SRM2 Ø40/Ø50	SRF/SRB For Finishing	SUF For Finishing	CESP CFSP CGSP	TSMP	PMF	PMR
	 ➔ K160 ➔ K164	 ➔ K216	 ➔ K208 ➔ K212	 ➔ K224	 ➔ K219	 ➔ K236	 ➔ K244	 ➔ K228	 ➔ K232	 ➔ K246	 ➔ K248	 ➔ K250	 ➔ K252
													
													
										 *1	 *2	 *3	
													
													
													

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

K

ROTATING TOOLS

ROTATING TOOLS

FACE MILLING <GENERAL CUTTING>



WSX445

P

M

K

N

S

H

K

ROTATING TOOLS



Fig.1

ø40
ø50
ø63
ø80

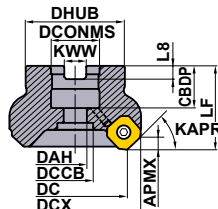
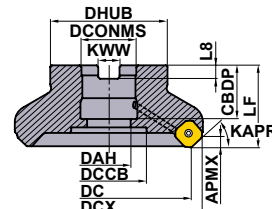


Fig.2

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		Number of Teeth	Type	Dimensions (mm)			WT [*] (kg)	APMX (mm)	Fig.
						DCX	LF	DCONMS			
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).

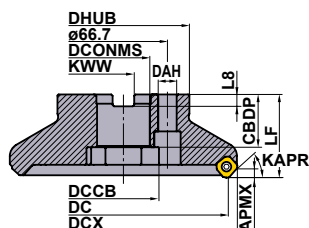
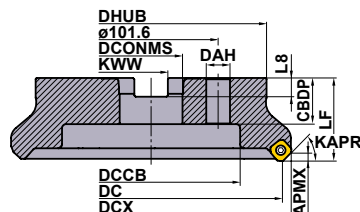
★ WT : Tool Weight

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
ø160Fig.4
ø200

Right hand tool holder shown.

ARBOR TYPE LEFT HAND TOOL HOLDER

DC (mm)	Order Number	Stock		Number of Teeth	Type	Dimensions (mm)			WT (kg)	APMX (mm)	Fig.
						DCX	LF	DCONMS			
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

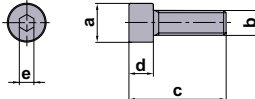
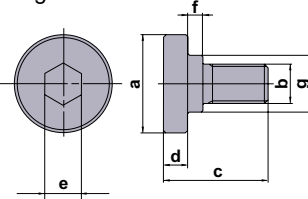
Note 1) A set bolt to the arbor is not supplied with the body.

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)

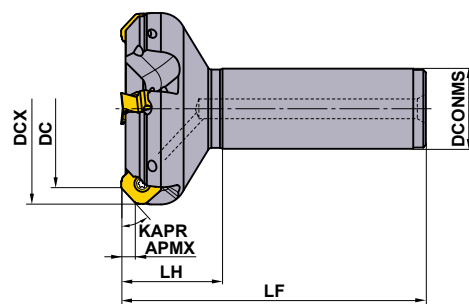
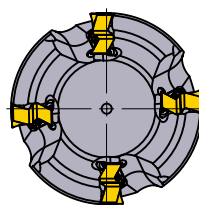
Arbor Type	Set Bolt		Fig.	Reference Dimensions (mm)							Geometry
	With Coolant Hole	Without Coolant Hole		a	b	c	d	e	f	g	
	Order Number	Order Number									
WSX445-040A○○AR	HSC08025H	HSC08040	1	13	M8×1.25	33	8	5	—	—	Fig.1 
WSX445-050A○○AR	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	—	—	
WSX445-063A○○AR	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.

ROTATING TOOLS

ROTATING TOOLS

K



Right hand tool holder only.

SHANK TYPE

DC (mm)	Order Number	Stock		Number of Teeth	Type	Dimensions (mm)				WT [*] (kg)	APMX (mm)
						DCX	LF	DCONMS	LH		
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

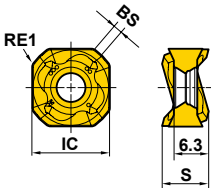
* WT : Tool Weight

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)

Material	P	Steel																	Cutting Conditions (Guide) : ● : Stable Cutting ●● : General Cutting ✳ : Unstable Cutting	Honing : E : Round F : Sharp				
	M	Stainless Steel																						
	K	Cast Iron																						
	N	Non-ferrous Metal																						
	S	Heat-resistant Alloy, Titanium Alloy																						
	H	Hardened Steel																						
Shape	Order Number	Class	Hand	Honing	Coated												Cermet	Carbide	Dimensions (mm)				Geometry	
					NEW MV1020	NEW MV1030	MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP20RT	NEW MX3030			TF15	IC	S	BS		RE1
	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	

 =  NEW

[illegible]

■ INSTRUCTIONS FOR USE OF WIPER INSERTS



Fig.1

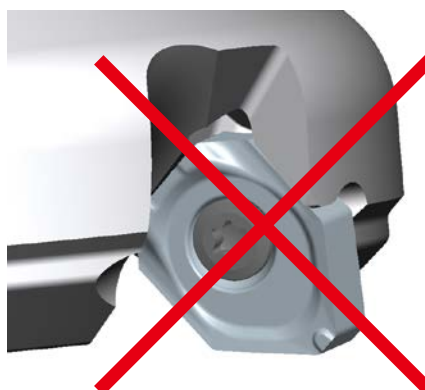


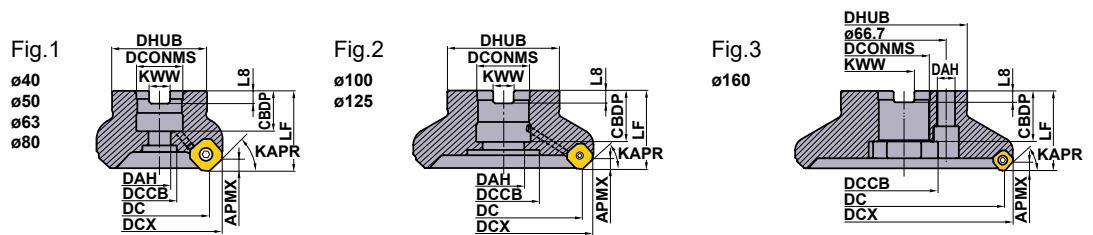
Fig.2

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.

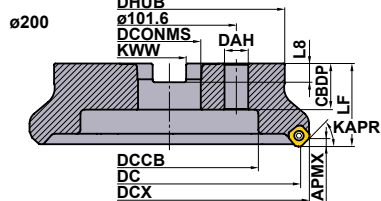
ARBOR TYPE MOUNTING DIMENSIONS



Right hand tool holder shown.

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

Fig.4



Right hand tool holder shown.

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

■ WSX445 Cutting Speed Dry and Wet Cutting

(mm)

	Material	Properties	MV1020		MV1030	
			Cutting Speed V_c (m/min)		Cutting Speed V_c (m/min)	
			Dry Cutting	Wet Cutting	Dry Cutting	Wet Cutting
P	Mild Steel	Hardness ≤180HB	300 (200—400)	220 (120—320)	250 (200—300)	150 (100—200)
	Carbon Steel Alloy Steel	Hardness 180—350HB	260 (170—350)	200 (100—300)	220 (170—270)	120 (80—160)
		Hardness 280—350HB	180 (100—250)	150 (100—200)	180 (100—250)	120 (80—160)
M	Stainless Steel	—	—	—	200 (150—250)	—
K	Ductile Cast Iron	Tensile Strength ≤450MPa	240 (130—350)	200 (130—250)	160 (110—240)	150 (100—200)
		Tensile Strength ≤800MPa	220 (80—350)	180 (80—230)	180 (110—250)	140 (80—200)

ROTATING TOOLS

RECOMMENDED CUTTING CONDITIONS

■ Dry cutting

Material		Hardness	1st Recommendation	2nd Recommendation	Vc (m/min)			
						Finish Cutting		
						fz (mm/t.)	ap	
P						L Chipbreaker		
Mild Steel	≤ 180HB	MV1020	—	300 (200—400)	0.15 (0.1—0.2)	≤ 1.0		
		MV1030	—	250 (200—300)	0.15 (0.1—0.2)	≤ 1.0		
		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	MV1020	—	260 (170—350)	0.15 (0.1—0.2)	≤ 1.0		
		MV1030	—	220 (170—270)	0.15 (0.1—0.2)	≤ 1.0		
		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 Chipbreaker		
Austenitic Stainless Steel	≤ 200HB	MV1030	—	200 (150—250)	0.15 (0.1—0.2)	≤ 1.0		
		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 Chipbreaker		
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	MV1020	—	240 (130—350)	0.15 (0.1—0.2)	≤ 1.0		
		MV1030	—	160 (110—240)	0.15 (0.1—0.2)	≤ 1.0		
		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	MV1020	—	220 (80—350)	0.15 (0.1—0.2)	≤ 1.0		
		MV1030	—	180 (110—250)	0.15 (0.1—0.2)	≤ 1.0		
		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 Chipbreaker		
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.)

ROTATING TOOLS

K023

ROTATING TOOLS

RECOMMENDED CUTTING CONDITIONS

Wet Cutting

Material		Hardness	1st Recommendation	2nd Recommendation	Vc (m/min)														
						Finish Cutting													
						fz (mm/t.)	ap												
P						L Chipbreaker													
						Mild Steel	≤ 180HB	MV1020	—	220 (120—320)	0.15 (0.1—0.2)	≤ 1.0							
								MV1030	—	150 (100—200)	0.15 (0.1—0.2)	≤ 1.0							
								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	MV1020	—	200 (100—300)	0.15 (0.1—0.2)	≤ 1.0							
								MV1030	—	120 (80—160)	0.15 (0.1—0.2)	≤ 1.0							
								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 Chipbreaker													
						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 Chipbreaker							
												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	MV1020	—	200 (130—250)	0.15 (0.1—0.2)							≤ 1.0							
		MV1030	—	150 (100—200)	0.15 (0.1—0.2)							≤ 1.0							
		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	MV1020	—	180 (80—230)	0.15 (0.1—0.2)							≤ 1.0							
		MV1030	—	140 (80—200)	0.15 (0.1—0.2)							≤ 1.0							
		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 Chipbreaker							
						Aluminium Alloy	—	TF15	—	≥ 300	0.15 (0.1—0.2)	≤ 1.0							
S						L Chipbreaker													
						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.)

K ROTATING TOOLS

K025

ROTATING TOOLS

FACE MILLING

<GENERAL CUTTING>

ASX445

P

M

K

N

S

H



K

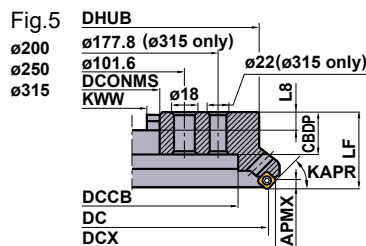
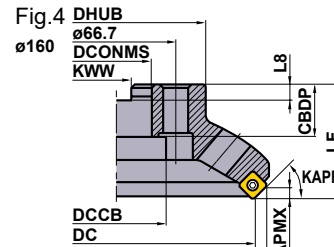
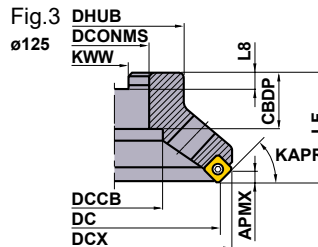
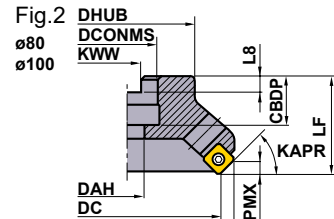
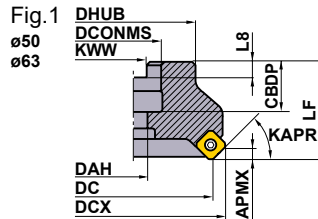
ROTATING TOOLS



ø50, ø63



Over ø80



ARBOR TYPE

KAPR : 45°

GAMP: +20°—+23° GAMF: -13°—-10°

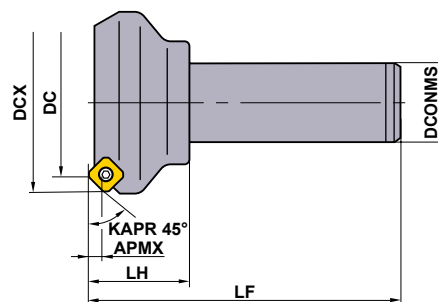
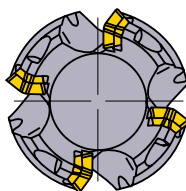
Right hand tool holder shown.

Type	Order Number	Stock		Number of Teeth	Dimensions (mm)										WT * (kg)	APMX (mm)	Fig.
		R	L		DC	DCX	LF	DCONMS	CBDP	DAH	DCCB	DHUB	KWW	L8			
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.

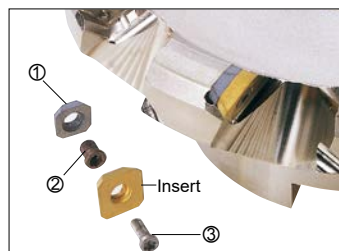
□ : Non stock, produced to order only.



Right hand tool holder only.

SHANK TYPE

Order Number	Stock		Number of Teeth	Dimensions (mm)					APMX (mm)
	R			DC	DCX	LF	DCONMS	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	②	③		
	Shim	Shim Screw	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.	

ROTATING TOOLS

INSERTS

Material		P	Steel	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
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● = NEW

Instructions for use of the JP Chipbreaker

Note 1) The JP Chipbreaker 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)

Material	P	Steel								Cutting Conditions (Guide) :									
	M	Stainless Steel								● : Stable Cutting ● : General Cutting ✖ : Unstable Cutting									
Material	K	Cast Iron	●	✖	●	●										Honing : E : Round F : Sharp S : Chamfer + Hone T : Chamfer			
	N	Non-ferrous Metal																	
	S	Heat-resistant Alloy, Titanium Alloy	●																
	H	Hardened Steel	●																
Shape	Order Number	Class	Honing	Coated	Cermet	Coated Cermet	Carbide	CBN	PCD	Dimensions (mm)						Geometry			
				MC5020	VP15TF	NX2525	VP25N	HT105T	MB710	MD220	INSL	LE	W1	S	BS		RE1		
	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 3) PCD grade MD220 is for aluminium alloy.

A close-up photograph of a metallic, possibly aluminum, component. A red circle is drawn around a specific feature on the part, which appears to be a small, circular hole or a recessed area. The part has a brushed metal finish and some visible machining marks. The background is a plain, light-colored surface.

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.

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)

K029

ROTATING TOOLS

RECOMMENDED CUTTING CONDITIONS

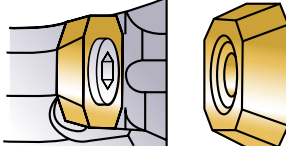
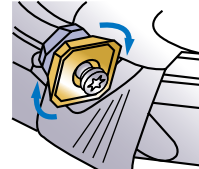
	Material	Hardness	Grade	Cutting Speed (m/min)	Finish—Light Cutting		Light—Rough Cutting		Medium—Heavy Cutting	
					Feed per Tooth (mm/t.)	Chipbreaker	Feed per Tooth (mm/t.)	Chipbreaker	Feed per Tooth (mm/t.)	Chipbreaker
P	Mild Steel	≤180HB	MV1020	300 (200—400)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			MV1030	275 (200—350)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			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
			MX3030	180 (130—230)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	—	—
			NX4545	180 (130—230)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	—	—
	Carbon Steel Alloy Steel	180—280HB	MV1020	260 (170—350)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			MV1030	235 (170—300)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			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
			MX3030	150 (120—180)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	—	—
			NX4545	150 (120—180)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	—	—
		280—350HB	MV1020	180 (100—250)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			MV1030	165 (100—230)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			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
			MX3030	100 (80—160)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	—	—
			NX4545	100 (80—160)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	—	—
M	Stainless Steel	≤270HB	MV1030	220 (170—270)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH
			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
			MX3030	150 (120—180)	0.15 (0.1—0.2)	JL	0.2 (0.1—0.3)	JM	—	—
			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	MV1020	240 (130—350)	—	—	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH FT
			MV1030	190 (130—250)	—	—	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH FT
			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	MV1020	220 (80—350)	—	—	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH FT
			MV1030	110 (80—150)	—	—	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH FT
			MC5020	110 (80—150)	—	—	0.2 (0.1—0.3)	JM	0.3 (0.2—0.4)	JH FT
N	Aluminium Alloy	—	HT10	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 (Inconel®718 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)

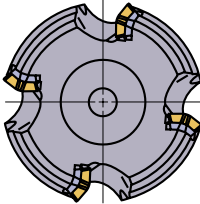
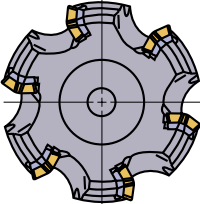
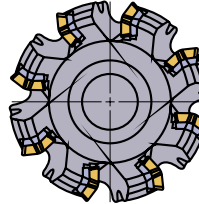
● Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

FEATURES

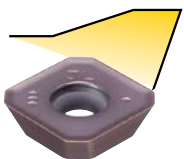
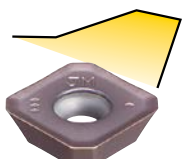
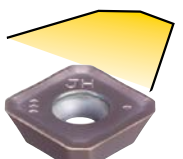
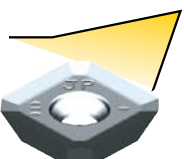
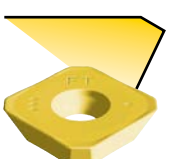
■ STABLE, LONG TOOL LIFE, HIGH ACCURACY BODY

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. 
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■ EFFECTIVE FOR VARIOUS MACHINING APPLICATIONS

● Coarse Pitch Type 1st recommendation for cutting steels and stainless steels. - For deep cutting and high feed rates with large-volume chip discharge. - Smooth cutting allows longer overhang applications. 	● Fine Pitch Type 1st recommendation for cast iron, hardened steel and heat-resistant alloys. - For shallow cutting with low feed rates and low-volume chip discharge. 	● Extra Fine Pitch Type 1st recommendation for cast iron. - For cutting operations where chip discharge volume is small and high table feed is desired. 
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■ CHIPBREAKERS FOR A WIDE RANGE OF APPLICATIONS

JL Finish to Light Cutting Chipbreaker	JM Light to Semi-Heavy Cutting Chipbreaker	JH Medium to Heavy Cutting Chipbreaker	JP Aluminium Alloy Cutting Chipbreaker	FT Rough Cutting for Cast Iron Chipbreaker
				
High accuracy insert with ground finished periphery. Large rake angle leading to low cutting resistance. ①Workpiece rigidity is low.	High accuracy M class insert. For a wide range of workpieces and cutting conditions. ①General cutting.	High accuracy M class insert. Strong cutting edge for high fracture resistance. ①Interrupted cutting. ②Scaling.	High accuracy insert with ground finished periphery. Large rake angle and mirror finished rake face for sharp cutting performance and high welding resistance. ①General machining of aluminium and non ferrous metal.	High M class inserts. Higher fracture-resistant flat-top inserts. ①For rough accuracy machining of scaled cast iron.

■ INSERT GRADES FOR A WIDE RANGE OF MATERIALS

P Carbon Steel · Alloy Steel	M Stainless Steel	K Cast Iron · Ductile Cast Iron	N Aluminium Alloy	S Heat Resistant Alloy Titanium Alloy	H Heat Treated Steel
High Cutting Speed Low Cutting Speed Stable Cutting Conditions Unstable F7030 MP6120 VP15TF MP6130 VP30RT	Stable Cutting Conditions Unstable F7030 MP7130 VP15TF MP7140 VP30RT	Stable Cutting Conditions Unstable MC5020 VP15TF	Stable Cutting Conditions Unstable HTi10	Stable Cutting Conditions Unstable MP9120 VP15TF MP9130	Stable Cutting Conditions Unstable VP15TF

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.

ROTATING TOOLS

FACE MILLING

<GENERAL CUTTING>

AHX440S/475S/640S

Selection Reference Table (Cutting Edge Count and Cutting Conditions)

DC	Type	Number of Teeth	AHX440S			AHX475S			AHX640S		
			General Cutting			High Feed Machining			General Cutting		
			Stock	fr (mm/rev)	APMX	Stock	fr (mm/rev)	APMX	Stock	fr (mm/rev)	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.)

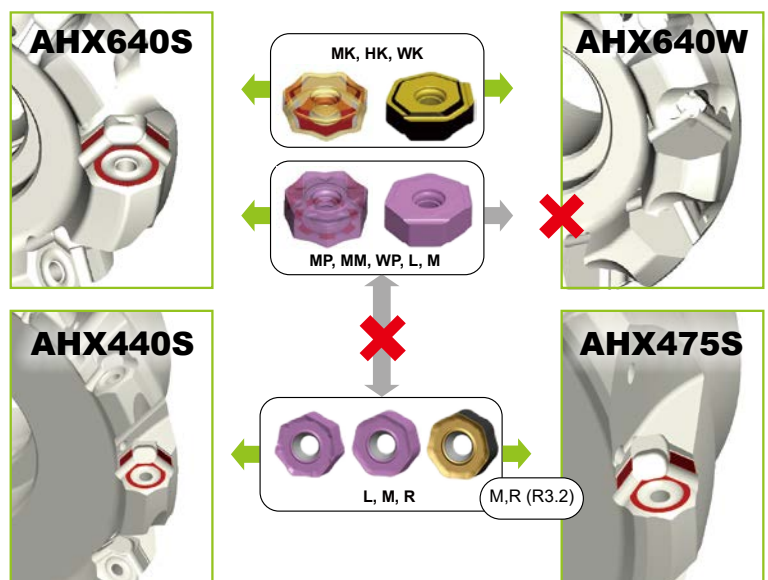
Note 2) APMX : Maximum depths of cut (AHX440S : the maximum depths of cut will vary depending on the chipbreaker)

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

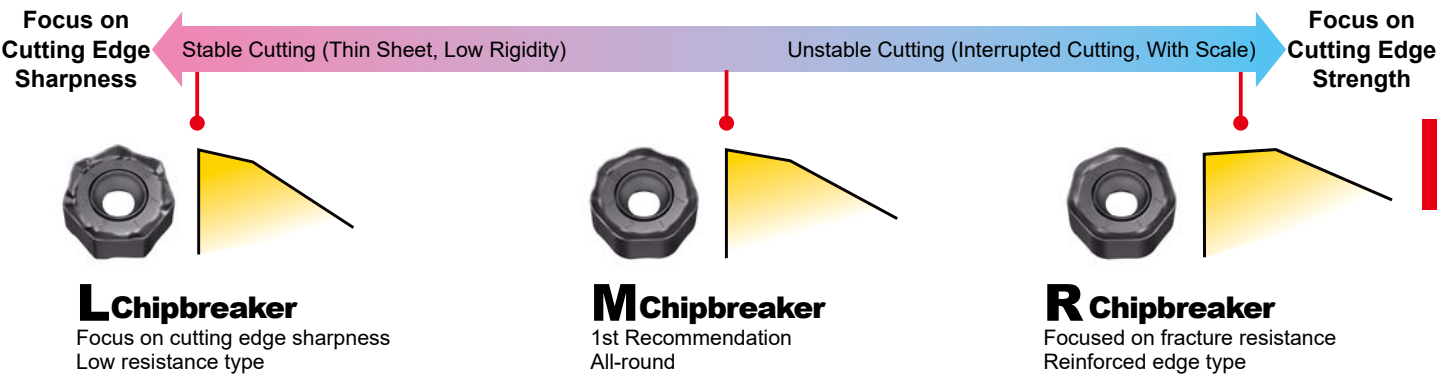
The RE = 3.2 mm insert for use with AHX440S can be mounted on AHX475S.

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 chipbreaker.



Chipbreaker System

Chipbreaker Series for Varied Cutting Conditions



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

ROTATING TOOLS

FACE MILLING

<GENERAL CUTTING>

AHX440S



P

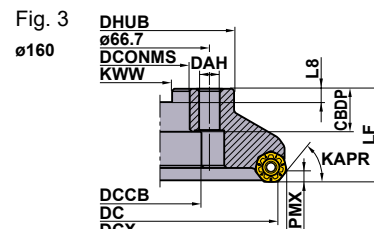
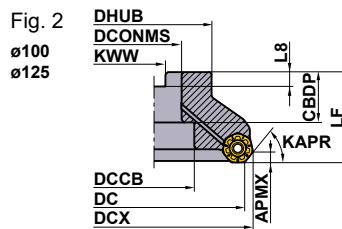
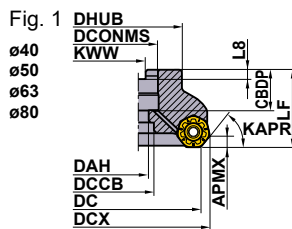
M

K

N

S

H



KAPR : 50°
GAMP : -6° GAMF : -7°

Right hand tool holder only.

DC (mm)	Order Number	Stock		Number of Teeth	Dimensions (mm)			Fig.	WT [*] (kg)	APMX (mm)
					LF	DCX	DCONMS			
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 chipbreaker insert.

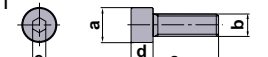
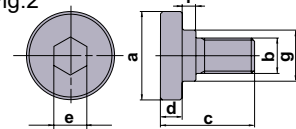
* WT : Tool Weight

SPARE PARTS

Tool Holder Number		*	
AHX440S	TS35R		TKY15T

* Clamp Torque (N · m) : TS35R=3.5

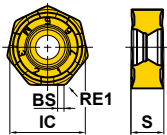
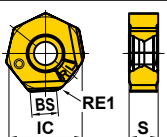
SET BOLT (SOLD SEPARATELY)

Tool Holder Number	Set Bolt		Fig.	Reference Dimensions (mm)								Geometry
	With Coolant Hole	Without Coolant Hole		a	b	c	d	e	f	g		
	Order Number	Order Number										
AHX440S-040A	HSC08025H	HSC08040	1	13	M8×1.25	33	8	5	—	—	Fig.1 	
AHX440S-050A	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	—	—		
AHX440S-063A	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	—	—		
AHX440S-080A	HSC12035H	HSC12035 (HSC12045)	1	18	M12×1.75	47 57	12	10	—	—	Fig.2 	
AHX440S-100B	MBA16033H	—	2	40	M16×2	43	10	14	6	23		
AHX440S-125B	MBA20040H	—	2	50	M20×2.5	54	14	17	6	27		
AHX440S-160C	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.

INSERTS

Material		P	Steel	●	●	●	✱			●	●	●	●	●	●	Cutting Conditions (Guide) : ● : Stable Cutting ● : General Cutting ✱ : Unstable Cutting Honing : E : Round					
		M	Stainless Steel	●	●			●	✱		●	●									
		K	Cast Iron	●	●						●										
		H	Hardened Steel								●										
Application	Shape	Order Number	Class	Honing	Coated								Dimensions (mm)					Geometry			
					NEW MV1020	NEW MV1030	MP6120	MP6130	MP7130	MP7140	MC5020	VP15TF	IC	RE1	BS	S	APMX				
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

● = NEW



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

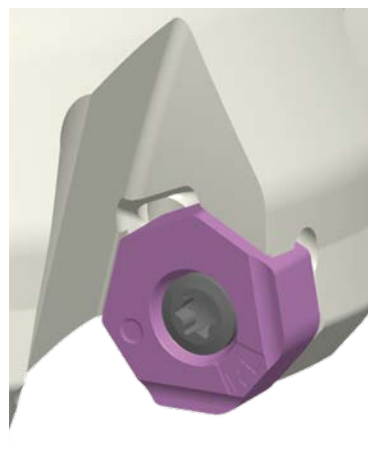


Fig.1



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 surface finish 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 cutter body.

MOUNTING DIMENSION	> K047
SPARE PARTS	> N001
TECHNICAL DATA	> P001

K035

K

ROTATING TOOLS

RECOMMENDED CUTTING CONDITIONS

■ Dry Cutting

	Material	Hardness	Grade	Vc (m/min)	fz (mm/t.)	ap (mm)
P	Mild Steel	≤180HB	MV1020	300 (200—400)	0.3 (0.2—0.4)	≤3
			MV1030	245 (190—300)	0.3 (0.2—0.4)	≤3
			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	MV1020	260 (170—350)	0.3 (0.2—0.4)	≤3
			MV1030	210 (150—270)	0.3 (0.2—0.4)	≤3
			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	MV1020	180 (100—250)	0.3 (0.2—0.4)	≤3
			MV1030	135 (90—180)	0.3 (0.2—0.4)	≤3
			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	MV1030	185 (120—250)	0.2 (0.1—0.3)	≤3
			MP7130,VP15TF	200 (150—250)	0.2 (0.1—0.3)	≤3
			MP7140	180 (120—230)	0.2 (0.1—0.3)	≤3
		> 200HB	MV1030	140 (80—200)	0.2 (0.1—0.3)	≤3
			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 Martensitic 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	MV1020	240 (130—350)	0.2 (0.1—0.3)	≤3
			MV1030	185 (120—250)	0.2 (0.1—0.3)	≤3
			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	MV1020	220 (80—350)	0.2 (0.1—0.3)	≤3
			MV1030	150 (100—200)	0.2 (0.1—0.3)	≤3
			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

	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 Martensitic 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

	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 Martensitic 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.)

ROTATING TOOLS

FACE MILLING

<GENERAL HIGH FEED CUTTING>

AHX475S

P M **K** N S H



ROTATING TOOLS

K

15°
KAPR



Fig.1

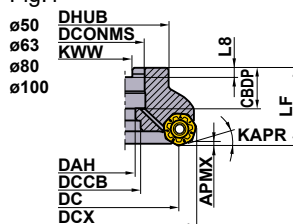
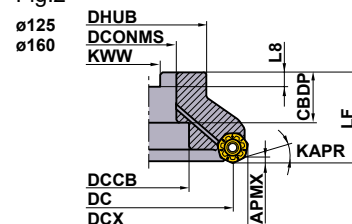


Fig.2



Right hand tool holder only.

KAPR : 15°

GAMP : -6° GAMF : -10°

DC (mm)	Order Number	Stock		Number of Teeth	Dimensions (mm)			Fig.	WT [*] (kg)	APMX (mm)
					LF	DCX	DCONMS			
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

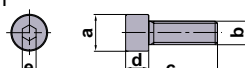
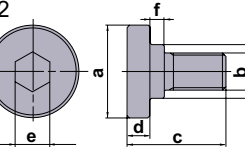
Tool Holder Number		
	Clamp Screw	Wrench (Insert)
AHX475S	TS35R	TKY15T

* Clamp Torque (N · m) : TS35R=3.5

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

(10 inserts in one case)

SET BOLT (SOLD SEPARATELY)

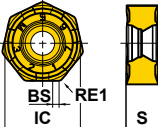
Tool Holder Number	Set Bolt		Fig.	Reference Dimensions (mm)								Geometry
	With Coolant Hole	Without Coolant Hole		a	b	c	d	e	f	g		
	Order Number	Order Number										
AHX475S-050A ^{NEW} AR	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	—	—	Fig.1  Fig.2 	
AHX475S-063A ^{NEW} AR	HSC10030H	HSC10035	1	16	M10×1.5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

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

K

ROTATING TOOLS

INSERTS

Material		P	Steel	●	●	●	✱	●	Cutting Conditions (Guide) :							
		K	Cast Iron	●	●			●	● : Stable Cutting	● : General Cutting	✱ : Unstable Cutting	Honing : E : Round				
		H	Hardened Steel					●								
Application	Shape	Order Number	Class	Honing	Coated						Dimensions (mm)					Geometry
					NEW MV1020	NEW MV1030	MP6120	MP6130	MC5020	VP15TF	IC	RE1	BS	S	APMX	
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	

● = NEW

MOUNTING DIMENSION > K047
 SPARE PARTS > N001
 TECHNICAL DATA > P001

K039

RECOMMENDED CUTTING CONDITIONS

■ Dry Cutting

Material	Hardness	Grade	Chipbreaker	Vc (m/min)	fz (mm/t.)	ap (mm)	ae (mm)
P	Mild Steel	MV1020	R	220(170—270)	0.6	≤1.6	≤0.5DC
		MV1020	R	220(170—270)	0.8	≤1.6	0.5—0.8DC
		MV1020	M	220(170—270)	1	≤1.6	0.8—1DC
		MV1030	R	140(80—200)	0.6	≤1.6	≤0.5DC
		MV1030	R	140(80—200)	0.8	≤1.6	0.5—0.8DC
		MV1030	M	140(80—200)	1	≤1.6	0.8—1DC
		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	MV1020	R	200(150—250)	0.6	≤1.6	≤0.5DC
		MV1020	R	200(150—250)	0.8	≤1.6	0.5—0.8DC
		MV1020	M	200(150—250)	1	≤1.6	0.8—1DC
		MV1030	R	120(60—180)	0.6	≤1.6	≤0.5DC
		MV1030	R	120(60—180)	0.8	≤1.6	0.5—0.8DC
		MV1030	M	120(60—180)	1	≤1.6	0.8—1DC
		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	MV1020	R	150(100—200)	0.5	≤1.6	≤0.5DC
		MV1020	R	150(100—200)	0.6	≤1.6	0.5—0.8DC
		MV1020	M	150(100—200)	0.7	≤1.6	0.8—1DC
		MV1030	R	90(30—150)	0.5	≤1.6	≤0.5DC
		MV1030	R	90(30—150)	0.6	≤1.6	0.5—0.8DC
		MV1030	M	90(30—150)	0.7	≤1.6	0.8—1DC
		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	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	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

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%.

	Material	Hardness	Grade	Chipbreaker	Vc (m/min)	fz (mm/t.)	ap (mm)	ae (mm)
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	MV1020	R	200(150—250)	0.6	≤1.6	≤0.5DC
			MV1020	R	200(150—250)	0.8	≤1.6	0.5—0.8DC
			MV1020	M	200(150—250)	1	≤1.6	0.8—1DC
			MV1030	R	140(80—200)	0.6	≤1.6	≤0.5DC
			MV1030	R	140(80—200)	0.8	≤1.6	0.5—0.8DC
			MV1030	M	140(80—200)	1	≤1.6	0.8—1DC
			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	MV1020	R	180(130—230)	0.5	≤1.6	≤0.5DC
			MV1020	R	180(130—230)	0.6	≤1.6	0.5—0.8DC
			MV1020	R	180(130—230)	0.7	≤1.6	0.8—1DC
			MV1030	R	140(80—200)	0.5	≤1.6	≤0.5DC
			MV1030	R	140(80—200)	0.6	≤1.6	0.5—0.8DC
			MV1030	R	140(80—200)	0.7	≤1.6	0.8—1DC
			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

K

ROTATING TOOLS

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%.

ROTATING TOOLS

FACE MILLING

<GENERAL CUTTING>

AHX640S

P

M

K

N

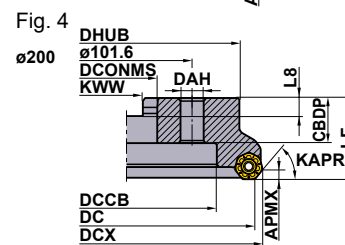
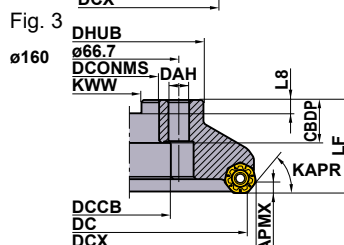
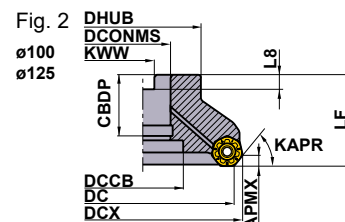
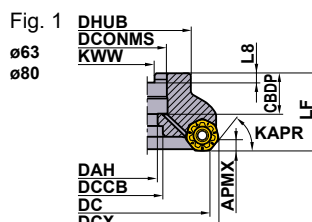
S

H



K

ROTATING TOOLS



Right hand tool holder only.

DC	Set Bolt	Geometry
Ø63	HSC10030H	
Ø80	HSC12035H	
Ø100	MBA16033H	
Ø125	MBA20040H	
Ø160	—	
Ø200	—	

KAPR : 50°
GAMP : -6° GAMF : -5°

DC (mm)	Order Number	Stock		Number of Teeth	Dimensions (mm)			Fig.	WT [*] (kg)	APMX (mm)
					LF	DCX	DCONMS			
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		*	
AHX640S	CS5015060T		TKY20T

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

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

INSERTS

Material		P	Steel	
----------	--	---	-------	---

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

● = NEW

MOUNTING DIMENSION > K047
 SPARE PARTS > N001
 TECHNICAL DATA > P001

K043

K

ROTATING TOOLS

INSTRUCTIONS FOR USE OF WIPER INSERTS

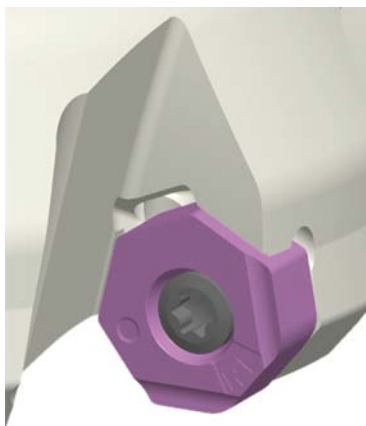


Fig.1



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 surface finish 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 cutter body.

RECOMMENDED CUTTING CONDITIONS

■ Dry Cutting

	Material	Hardness	Grade	Chipbreaker	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 Martensitic Stainless Steel	≤200HB	MP7030	MM	200 (150—250)	0.2 (0.1—0.3)	≤5	≤0.8DC
	Ferritic and Martensitic 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	XC5010	MK, FT	800 (500—1000)	0.1 (0.1—0.3)	≤3	≤0.8DC
			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	XC5010	MK, FT	800 (500—1000)	0.1 (0.1—0.3)	≤3	≤0.8DC
			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	XC5010	MK, FT	800 (500—1000)	0.1 (0.1—0.3)	≤3	≤0.8DC
			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%.

K

ROTATING TOOLS

RECOMMENDED CUTTING CONDITIONS

Wet Cutting

	Material	Hardness	Chipbreaker	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 Martensitic Stainless Steel	≤200HB	MP7030	MM	125 (100—150)	0.15 (0.1—0.2)	≤5	≤0.8DC
	Ferritic and Martensitic 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

	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

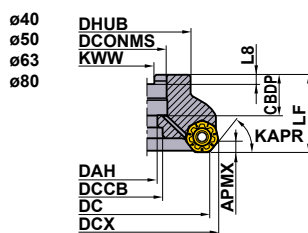


Fig. 2

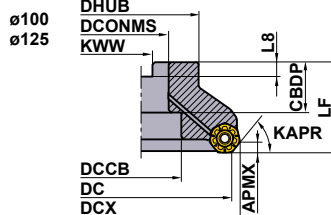
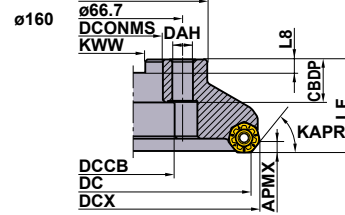


Fig. 3



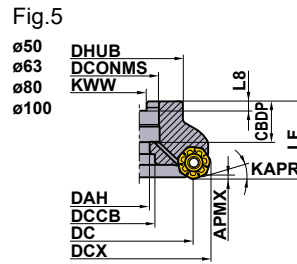
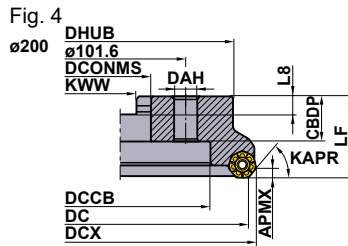
Right hand tool holder only.

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

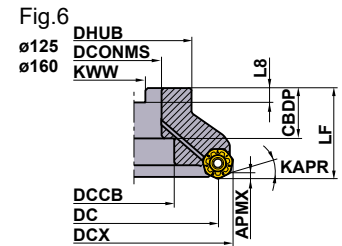
K

ROTATING TOOLS

ROTATING TOOLS



Right hand tool holder only.



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

FACE MILLING

<HIGH FEED CUTTING FOR CAST IRON>

AHX640W

P

M

K

N

S

H



Fig.1
ø80

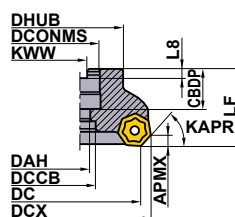


Fig.2
ø100
ø125

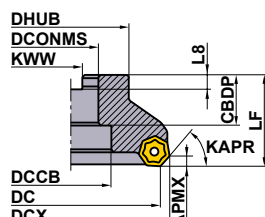


Fig.3
ø160

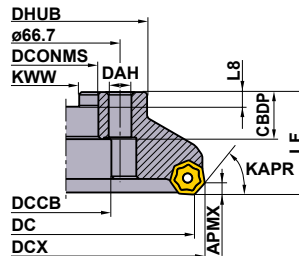


Fig.4
ø200
ø250

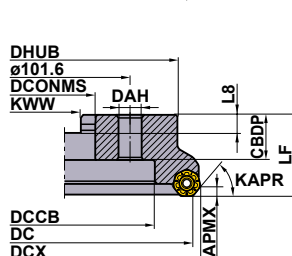
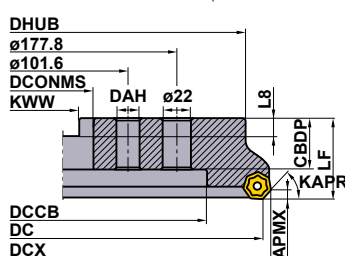


Fig.5
ø315



Right hand tool holder shown.

KAPR : 50°
GAMP : -6° GAMF : -4°

RIGHT HAND TOOL HOLDER

DC (mm)	Order Number	Stock		Number of Teeth	Dimensions (mm)			Fig.	WT (kg)	APMX (mm)
					LF	DCX	DCONMS			
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		Number of Teeth	Dimensions (mm)			Fig.	WT (kg)	APMX (mm)
					LF	DCX	DCONMS			
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.

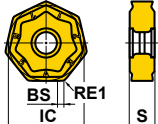
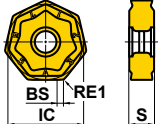
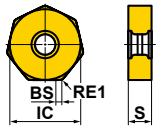
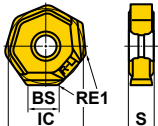
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SPARE PARTS > N001
TECHNICAL DATA > P001

K049

ROTATING TOOLS

ROTATING TOOLS

INSERTS

Material	K	Cast Iron		●	●	●	✱	Cutting Conditions (Guide) : ● : Stable Cutting ● : General Cutting ✱ : Unstable Cutting Honing : E : Round					
Shape	Order Number	Class	Honing	Coated				Dimensions(mm)					Geometry
				XC5010	MC5020	VP15TF	VP20RT	IC	RE1	BS	S	APMX	
 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	
 Unstable Cutting	NNMQ200708ZEN-FT	M	E	●				20	0.8	1.0	6.55	6	
 Wiper	WNEU2006ZEN7C-WK	E	E		●			20	0.8	7.4	6.55	0.5	

● = NEW

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

Material	Tensile Strength	Grade	Vc (m/min)	fz (mm/t.)
K	Gray Cast Iron	XC5010	800 (500—1000)	0.1 (0.1—0.3)
		MC5020	220 (150—300)	0.3 (0.2—0.4)
		VP15TF VP20RT	180 (130—250)	0.3 (0.2—0.4)
	Ductile Cast Iron	XC5010	800 (500—1000)	0.1 (0.1—0.3)
		MC5020	200 (150—250)	0.2 (0.1—0.3)
		VP15TF VP20RT	170 (120—220)	0.2 (0.1—0.3)
	≤800MPa	XC5010	800 (500—1000)	0.1 (0.1—0.3)
		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)

Material	Grade	ap (mm)	Vc (m/min)	fz (mm/t.)
K	Gray Cast Iron	<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.

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

AHX640W MOUNTING DIMENSIONS

Fig.1
ø80

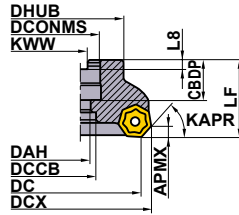


Fig.2
ø100
ø125

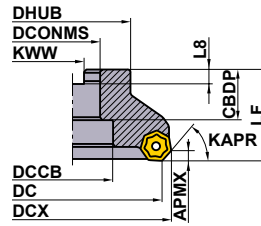


Fig.3
ø160

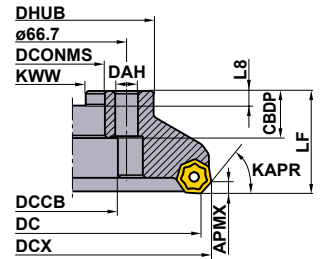


Fig.4
ø200
ø250

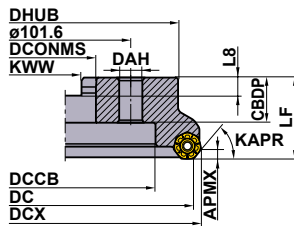
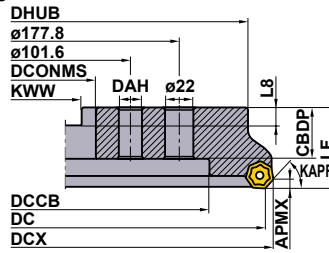


Fig.5
ø315



Right hand tool holder shown.

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

ROTATING TOOLS

FACE MILLING

<HIGH EFFICIENCY CUTTING FOR CAST IRON>



WSF406W

NEW

P

M

K

N

S

H

K

ROTATING TOOLS



Fig.1
ø80

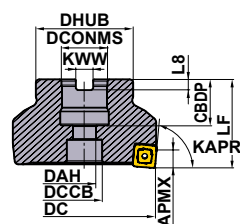


Fig.2
ø100
ø125
ø160

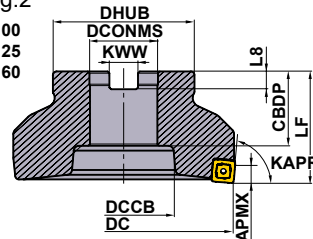
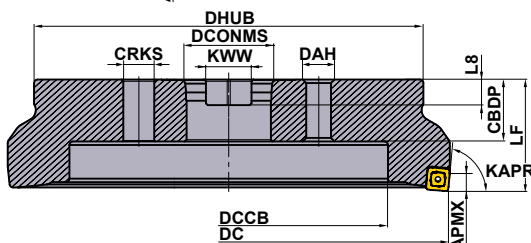


Fig.3
ø200
ø250



ARBOR TYPE

KAPR : 84°

DCONMS = inch size

Right hand tool holder only.

DC (mm)	Order Number	Stock R		Number of Teeth	Dimensions (mm)		WT [*] (kg)	APMX (mm)	RPMX (min ⁻¹)	Fig.
					LF	DCONMS				
80	WSF406WR08006CN	★	—	6	50	25.4	1.2	7.0	7,800	1
80	WSF406WR08009CN	★	—	9	50	25.4	1.2	7.0	7,800	1
100	WSF406WR10008DN	★	—	8	50	31.75	1.7	7.0	7,000	2
100	WSF406WR10012DN	★	—	12	50	31.75	1.7	7.0	7,000	2
125	WSF406WR12510EN	★	—	10	63	38.1	3.3	7.0	6,250	2
125	WSF406WR12516EN	★	—	16	63	38.1	3.2	7.0	6,250	2
160	WSF406WR16014FN	★	—	14	63	50.8	5	7.0	5,500	2
160	WSF406WR16020FN	★	—	20	63	50.8	4.9	7.0	5,500	2
200	WSF406WR20016KN	★	—	16	63	47.625	8.6	7.0	4,900	3
200	WSF406WR20024KN	★	—	24	63	47.625	8.5	7.0	4,900	3
250	WSF406WR25022KN	★	—	22	63	47.625	14	7.0	4,400	3
250	WSF406WR25032KN	★	—	32	63	47.625	13.9	7.0	4,400	3

Note 1) A set bolt for the arbor is not supplied with the body. Please refer to page K053 to find the correct type of set bolt to order.

★ WT : Tool Weight

MOUNTING DIMENSIONS

DC (mm)	Order Number	Dimensions (mm)								Fig.
		DCONMS	CBDP	DAH	DCCB	CRKS	DHUB	KWW	L8	
80	WSF406WR080	25.4	34	13	20	—	55	9.5	6	1
100	WSF406WR100	31.75	32	—	46	—	70	12.7	8	2
125	WSF406WR125	38.1	42	—	56	—	80	15.9	10	2
160	WSF406WR160	50.8	45	—	80	—	100	19.1	11	2
200	WSF406WR200	47.625	35	18	140	M16	175	25.4	14.22	3
250	WSF406WR250	47.625	35	18	180	M16	220	25.4	14.22	3

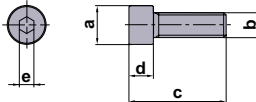
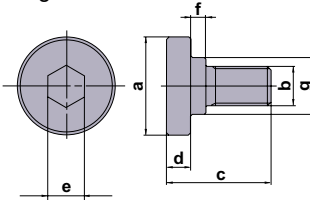
★ : Inventory maintained in Japan.

SPARE PARTS

Tool Holder Type		 *		
	Wedge	Clamp Screw	Wrench	Adjustable Run-Out System
WSF406W	CWSF406N	LS0622T	TKY15T	ADW04

* Clamp Torque (N • m) : LS0622T = 6.0

Parts Sold Separately Set Bolt

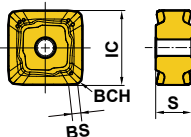
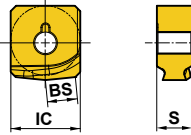
Tool Holder Type	Set Bolt	Fig.	Reference Dimensions (mm)							Geometry
	Order Number		a	b	c	d	e	f	g	
WSF406WR080	HSC12035	1	18	M12x1.75	47	12	10	—	—	Fig.1 
WSF406WR100	—	2	40	M16x2	43	10	14	6	23	
WSF406WR125	—	2	50	M20x2.5	54	14	17	6	27	
WSF406WR160	—	2	65	M24x3	59	14	17	10	37	
WSF406WR200	—	1	24	M16x2	61-	16	14	—	—	
WSF406WR250	—	1	24	M16x2	61-	16	14	—	—	
										Fig.2 

Note 1) Please purchase the appropriate set bolt after confirming the reference dimensions. The items with an order number listed under the Set Bolt columns are also sold by MITSUBISHI MATERIALS.

K

ROTATING TOOLS

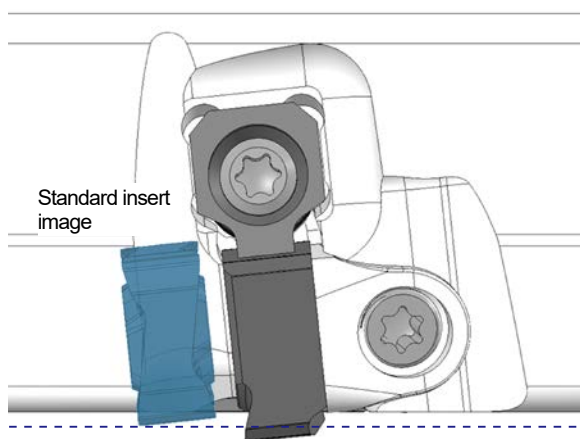
INSERTS

Material	K	Cast Irons				Cutting Conditions (Guide) :				Honing : E : Round
						● : Stable Cutting	● : General Cutting	✱ : Unstable Cutting		
Shape	Order Number	Class	Honing	Coated		IC	S	BS	BCH	Geometry
				MV1020 NEW MV1030 NEW MC520						
NEW	SNMU1206C05ZNER-M	M	E	● ● ★		12.7	6.2	1.6	0.5	
										
NEW	WNGU1206ZNER5C-M	G	E	★		12.3	6.2	5.2	—	
										
Wiper										

● ★ = NEW

How to Use Wiper Insert for Best Results

- The WSF406W can obtain a good surface finish when using a standard insert due to the adjustable run-out system, but by using a wiper insert an excellent surface finish can be achieved without having to set a high accuracy face run out. When a wiper insert is mounted, aim to set the standard insert run out accuracy to within 0.04mm.
- Just one wiper insert is enough to achieve excellent finished surfaces. However, if the feed per revolution is greater than 5.0mm/rev, attach two or more wiper inserts so that they are evenly spaced in the cutter body and set the run out accuracy between multiple wiper inserts to within 0.003mm before use.



By figure image

Please set the wiper insert to protrude by up to 0.07 mm.

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

Cutting Conditions (Guide) :

● : Stable Cutting ● : General Cutting ✖ : Unstable Cutting

RECOMMENDED CUTTING CONDITIONS

■ Dry cutting

(mm)								
Material	Properties	Cutting Conditions	Depth of Cut ap	Insert		Cutting Speed Vc (m/min)	Feed per Tooth fz (mm/t.)	Width of Cut ae
				1st Recommended	2nd Recommended			
K	Gray Cast Irons	●	ap ≤ 0.5mm	MC520	MV1020	300 (250—300)	0.13 (0.08—0.20)	≤ 0.8DC
			ap ≤ 2.0mm	MC520	MV1020	250 (210—300)	0.15 (0.10—0.25)	≤ 0.8DC
			2.0mm < ap ≤ 4.0mm	MC520	MV1020	220 (190—260)	0.13 (0.10—0.20)	≤ 0.8DC
			4.0mm < ap ≤ 7.5mm	MC520	MV1020	200 (180—230)	0.10 (0.08—0.15)	≤ 0.8DC
		●	ap ≤ 0.5mm	MC520	MV1020	250 (210—300)	0.13 (0.08—0.20)	≤ 0.8DC
			ap ≤ 2.0mm	MC520	MV1020	220 (190—260)	0.15 (0.10—0.25)	≤ 0.8DC
			2.0mm < ap ≤ 4.0mm	MC520	MV1020	200 (180—230)	0.13 (0.10—0.20)	≤ 0.8DC
			4.0mm < ap ≤ 7.5mm	MC520	MV1020	180 (160—210)	0.10 (0.08—0.15)	≤ 0.8DC
		✖	ap ≤ 0.5mm	MC520	MV1020	220 (190—260)	0.13 (0.08—0.20)	≤ 0.8DC
			ap ≤ 2.0mm	MC520	MV1020	200 (180—230)	0.15 (0.10—0.25)	≤ 0.8DC
			2.0mm < ap ≤ 4.0mm	MC520	MV1020	180 (160—210)	0.13 (0.10—0.20)	≤ 0.8DC
			4.0mm < ap ≤ 7.5mm	MC520	MV1020	150 (100—180)	0.10 (0.08—0.15)	≤ 0.8DC
	Ductile Cast Irons	●	ap ≤ 0.5mm	MV1020	MC520	230 (200—250)	0.13 (0.08—0.20)	≤ 0.8DC
			ap ≤ 2.0mm	MV1020	MC520	200 (170—230)	0.15 (0.10—0.25)	≤ 0.8DC
			2.0mm < ap ≤ 4.0mm	MV1020	MC520	180 (150—210)	0.13 (0.10—0.20)	≤ 0.8DC
			4.0mm < ap ≤ 7.5mm	MV1020	MC520	160 (130—190)	0.10 (0.08—0.15)	≤ 0.8DC
		●	ap ≤ 0.5mm	MV1020	MC520	200 (170—230)	0.13 (0.08—0.20)	≤ 0.8DC
			ap ≤ 2.0mm	MV1020	MC520	180 (150—210)	0.15 (0.10—0.25)	≤ 0.8DC
			2.0mm < ap ≤ 4.0mm	MV1020	MC520	160 (130—190)	0.13 (0.10—0.20)	≤ 0.8DC
			4.0mm < ap ≤ 7.5mm	MV1020	MC520	140 (110—170)	0.10 (0.08—0.15)	≤ 0.8DC
		✖	ap ≤ 0.5mm	MV1020	MC520	180 (150—200)	0.13 (0.08—0.20)	≤ 0.8DC
			ap ≤ 2.0mm	MV1020	MC520	160 (130—190)	0.15 (0.10—0.25)	≤ 0.8DC
			2.0mm < ap ≤ 4.0mm	MV1020	MC520	140 (110—170)	0.13 (0.10—0.20)	≤ 0.8DC
			4.0mm < ap ≤ 7.5mm	MV1020	MC520	120 (90—150)	0.10 (0.08—0.15)	≤ 0.8DC
	Ductile Cast Irons	●	ap ≤ 0.5mm	MV1020	MC520	230 (200—250)	0.13 (0.08—0.20)	≤ 0.8DC
			ap ≤ 2.0mm	MV1020	MC520	200 (170—230)	0.15 (0.10—0.25)	≤ 0.8DC
			2.0mm < ap ≤ 4.0mm	MV1020	MC520	180 (150—210)	0.13 (0.10—0.20)	≤ 0.8DC
			4.0mm < ap ≤ 7.5mm	MV1020	MC520	160 (130—190)	0.10 (0.08—0.15)	≤ 0.8DC
		●	ap ≤ 0.5mm	MV1020	MC520	200 (170—230)	0.13 (0.08—0.20)	≤ 0.8DC
			ap ≤ 2.0mm	MV1020	MC520	180 (150—210)	0.15 (0.10—0.25)	≤ 0.8DC
			2.0mm < ap ≤ 4.0mm	MV1020	MC520	160 (130—190)	0.13 (0.10—0.20)	≤ 0.8DC
			4.0mm < ap ≤ 7.5mm	MV1020	MC520	140 (110—170)	0.10 (0.08—0.15)	≤ 0.8DC
		✖	ap ≤ 0.5mm	MV1020	MC520	180 (150—210)	0.13 (0.08—0.20)	≤ 0.8DC
			ap ≤ 2.0mm	MV1020	MC520	160 (130—190)	0.15 (0.10—0.25)	≤ 0.8DC
			2.0mm < ap ≤ 4.0mm	MV1020	MC520	140 (110—170)	0.13 (0.10—0.20)	≤ 0.8DC
			4.0mm < ap ≤ 7.5mm	MV1020	MC520	120 (90—150)	0.10 (0.08—0.15)	≤ 0.8DC

Note 1) Refer to the table above for more details on how to set the cutting conditions according the usage.

Note 2) When using a wiper insert, the cutting conditions for finishing are ap ≤ 0.5mm.

K

ROTATING TOOLS

ROTATING TOOLS

FACE MILLING

<HIGH FEED FINISHING>



FMAX

P

M

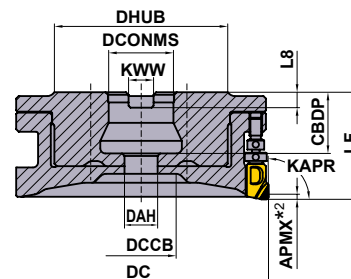
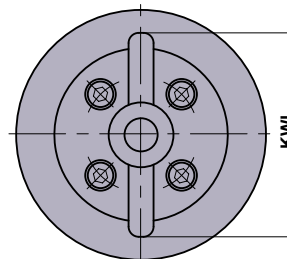
K

N

S

H

Fig.1
ø100
ø125



For Compact and Smaller Machining Centre



ROTATING TOOLS

K

ARBOR TYPE

KAPR: 90°

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

Right hand tool holder only.

DC (mm)	Order Number	Stock		Number of Teeth	Dimensions (mm)		WT ^{*1} (kg)	RPMX (min-1)	Fig.
					LF	DCONMS			
100	FMAXR10010CLW	★	●	10	42	25.4	1.06	22000	1
100	FMAXR10016CLW	★	●	16	42	25.4	1.11	22000	1
125	FMAXR12514CLW	★	●	14	42	25.4	1.44	19600	1
125	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

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

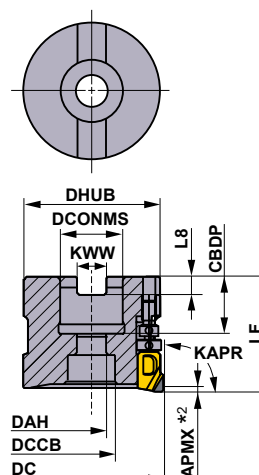
● : Inventory maintained. ★ : Inventory maintained in Japan.

FMAX- 40/50/63



Fig.1

ø40
ø50
ø63



K

ROTATING TOOLS

ARBOR TYPE

KAPR: 90°

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

Right hand tool holder only.

DC (mm)	Order Number	Stock		Number of Teeth	Dimensions (mm)		WT ^{*1} (kg)	RPMX (min-1)	Fig.
					LF	DCONMS			
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

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

FMAX

ROTATING TOOLS

K



Fig.1
ø80

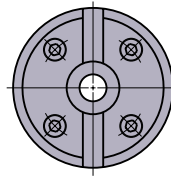
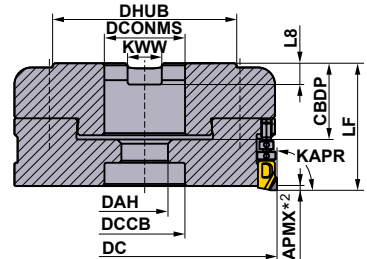
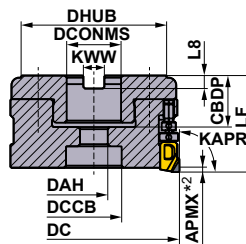
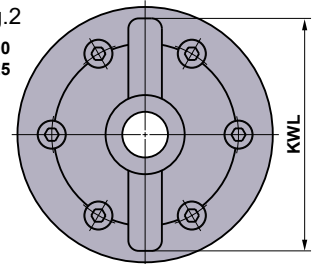


Fig.2
ø100
ø125



Right hand tool holder only.

ARBOR TYPE

KAPR: 90°

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

DC (mm)	Order Number	Stock		Number of Teeth	Dimensions (mm)		WT ^{*1} (kg)	RPMX (min-1)	Fig.
					LF	DCONMS			
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 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

DCONMS (mm)	DC (mm)	Order Number	Dimensions (mm)							Fig.
			CBDP	DAH	DCCB	DHUB	KWW	L8	KWL	
27	80	FMAX-080B14R	24	13	26	68	12.4	7	—	1
32	100	FMAX-100B18R	32	17	32	79	14.4	8	90	2
40	125	FMAX-125B24R	36	22	38	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.

● : Inventory maintained.

FACE MILLING

<FOR LOW RIGIDITY CONDITIONS>



FMAX-MB Coarse Pitch Type

NEW

P M **K** N S H



Fig.1
ø50
ø63

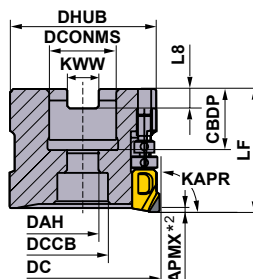
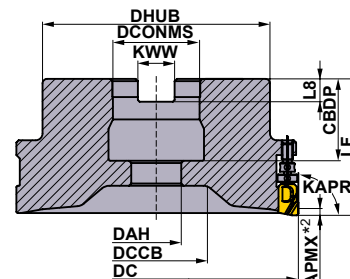


Fig.2
ø80
ø100
ø125



Right hand tool holder only.

K

ROTATING TOOLS

ARBOR TYPE

DCONMS = mm size

DC (mm)	Order Number	Stock		Number of Teeth	Dimensions (mm)		WT ^{*1} (kg)	RPMX (min ⁻¹)	Fig.
					LF	DCONMS			
50	FMAX-050A04R	●	●	4	40	22	0.38	30000	1
63	FMAX-063A04R	●	●	4	40	22	0.70	30000	1
80	FMAX-080B04RMB	●	●	4	45	27	1.12	24500	2
100	FMAX-100B04RMB	●	●	4	50	32	2.00	22000	2
125	FMAX-125B06RMB	●	●	6	60	40	3.81	19600	2

*1 WT : Tool Weight

*2 For the maximum depth of cut (APMX), please refer to the recommended cutting conditions (ap).

MOUNTING DIMENSIONS

DCONMS (mm)	DC (mm)	Order Number	Dimensions (mm)						Fig.
			CBDP	DAH	DCCB	DHUB	KWW	L8	
22	50	FMAX-050A04R	20	11	17	47	10.4	6.3	1
22	63	FMAX-063A04R	20	11	17	60	10.4	6.3	1
27	80	FMAX-080B04RMB	24	13	30	55	12.4	7	2
32	100	FMAX-100B04RMB	32	17	39	75	14.4	8	2
40	125	FMAX-125B06RMB	36	22	45	100	16.4	9	2

SPARE PARTS

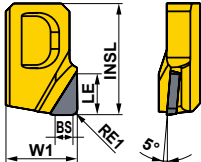
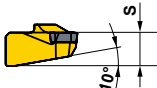
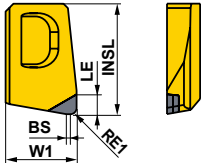
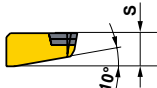
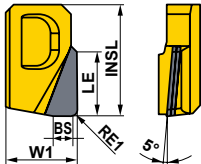
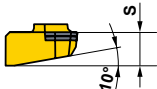
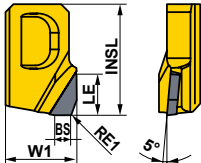
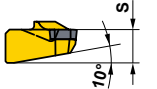
DC	Tool Holder Type	Insert Clamp Screw [*]	Micro Adjustment Screw	Large Adjustment Screw	Cuter Clamp Bolt	Wrench T10	Wrench 2.5
50	FMAX-050	TSS04505S	KSN3	KSS2	HSC10030H	TKY10T	RKY25S
63	FMAX-063	TSS04505S	KSN3	KSS2	HSC10030H	TKY10T	RKY25S
80	FMAX-080	TSS04505S	KSN3	KSS2	HSCX12030H	TKY10T	RKY25S
100	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.

ROTATING TOOLS

INSERTS

Material	K	Cast Iron	●	●	●	Cutting Conditions (Guide) :					
	N	Non-ferrous Metal				●	Stable Cutting	●	General Cutting	✱	
Shape	Order Number	MD220	MD2030	MB4120	Dimensions (mm)					Geometry	
					INSL	LE	W1	S	BS	RE1	
For Aluminium Alloys	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	
 General Purpose											
For Gray Cast Irons	NP-GOEN1404PXSR05			★	14.0	2.5	9.0	4.2	0.5	0.4	
	NP-GOEN1408PXSR05			★	14.0	2.5	9.0	4.2	0.5	0.8	
 General Purpose											
For Aluminium Alloys	GOER1408PXFR2-8	★			14.0	8.0	9.0	4.2	2.0	0.8	
 Long Edge											
For Aluminium Alloys	GOER1401ZXFR2	●			14.0	5.0	9.0	4.2	2.0	0.1	
 Burr Prevention											

For Aluminium Alloys: Sharp Edge

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

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.

RECOMMENDED CUTTING CONDITIONS

	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.

K

ROTATING TOOLS

ROTATING TOOLS

SHOULDER MILLING

<GENERAL CUTTING>



WWX200

NEW

P

M

K

N

S

H

K

ROTATING TOOLS



Fig.1

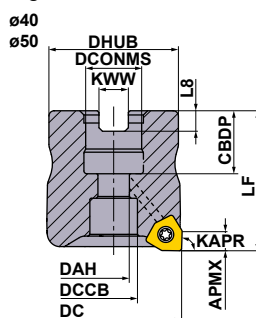
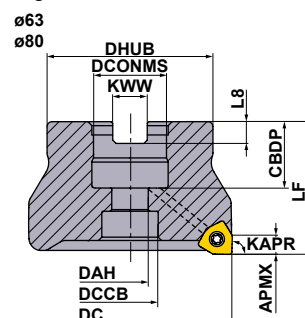


Fig.2



Right hand tool holder only.

ARBOR TYPE

DCONMS = mm size

DC (mm)	Order Number	Stock R		Number of Teeth	Dimensions (mm)		WT [*] (kg)	APMX (mm)	RPMX (min ⁻¹)	Fig.
					LF	DCONMS				
40	WWX200-040A03AR	●	●	3	40	16	0.2	5.0	21600	1
40	WWX200-040A04AR	●	●	4	40	16	0.2	5.0	21600	1
50	WWX200-050A04AR	●	●	4	40	22	0.4	5.0	18600	1
50	WWX200-050A05AR	●	●	5	40	22	0.4	5.0	18600	1
50	WWX200-050A06AR	●	●	6	40	22	0.3	5.0	18600	1
63	WWX200-063A05AR	●	●	5	40	22	0.5	5.0	16000	2
63	WWX200-063A06AR	●	●	6	40	22	0.5	5.0	16000	2
63	WWX200-063A07AR	●	●	7	40	22	0.5	5.0	16000	2
80	WWX200-080A05AR	●	●	5	50	27	1.1	5.0	13600	2
80	WWX200-080A07AR	●	●	7	50	27	1.0	5.0	13600	2
80	WWX200-080A09AR	●	●	9	50	27	1.0	5.0	13600	2
100	WWX200-100B06AR	●	●	6	50	32	1.7	5.0	11700	3
100	WWX200-100B08AR	●	●	8	50	32	1.7	5.0	11700	3
100	WWX200-100B11AR	●	●	11	50	32	1.7	5.0	11700	3
125	WWX200-125B07AR	●	●	7	63	40	3.1	5.0	10100	3
125	WWX200-125B11AR	●	●	11	63	40	3.0	5.0	10100	3
125	WWX200-125B14AR	●	●	14	63	40	3.0	5.0	10100	3
160	WWX200-160C09NR	●	—	9	63	40	4.6	5.0	8600	4
160	WWX200-160C12NR	●	—	12	63	40	4.6	5.0	8600	4
160	WWX200-160C16NR	●	—	16	63	40	4.6	5.0	8600	4

Note 1) A set bolt to the arbor is not supplied with the body. Please refer to page K064, when ordering.

Note 2) Please use a set bolt of the FMC type on the cutter body from 40 to 100 in diameter (DC).

Note 3) Please use a set bolt of the FMA type on the cutter body from 125 to 160 in diameter (DC).

* WT : Tool Weight

SPARE PARTS

Tool Holder Type			
	Clamp Screw	Wrench (Insert)	Anti-seize Lubricant
WWX200	TPS3R	TIP10D	MK1KS

* Clamp Torque (N · m) : TPS3R = 2.0

● : Inventory maintained.

Fig.3

ø100
ø125
ø160

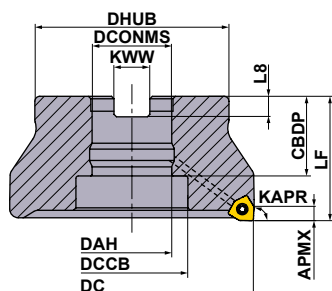
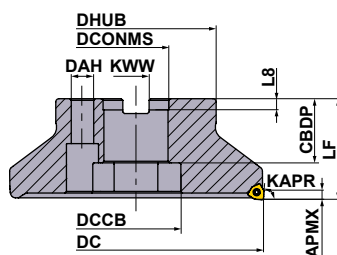


Fig.4

ø160



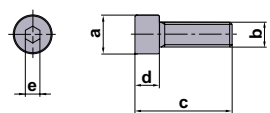
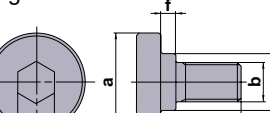
Right hand tool holder only.

MOUNTING DIMENSIONS

DC (mm)	Order Number	Dimensions (mm)							Fig.
		DCONMS	CBDP	DAH	DCCB	DHUB	KWW	L8	
40	WWX200-040A03AR	16	18	9	13.6	37	8.4	5.6	1
40	WWX200-040A04AR	16	18	9	13.6	37	8.4	5.6	1
50	WWX200-050A04AR	22	20	11	17	47	10.4	6.3	1
50	WWX200-050A05AR	22	20	11	17	47	10.4	6.3	1
50	WWX200-050A06AR	22	20	11	17	47	10.4	6.3	1
63	WWX200-063A05AR	22	20	11	17	50	10.4	6.3	2
63	WWX200-063A06AR	22	20	11	17	50	10.4	6.3	2
63	WWX200-063A07AR	22	20	11	17	50	10.4	6.3	2
80	WWX200-080A05AR	27	23	13	20	56	12.4	7	2
80	WWX200-080A07AR	27	23	13	20	56	12.4	7	2
80	WWX200-080A09AR	27	23	13	20	56	12.4	7	2
100	WWX200-100B06AR	32	26	32	45	78	14.4	8	3
100	WWX200-100B08AR	32	26	32	45	78	14.4	8	3
100	WWX200-100B11AR	32	26	32	45	78	14.4	8	3
125	WWX200-125B07AR	40	35	42	56	89	16.4	9	3
125	WWX200-125B11AR	40	35	42	56	89	16.4	9	3
125	WWX200-125B14AR	40	35	42	56	89	16.4	9	3
160	WWX200-160C09NR	40	40	—	56	100	16.4	9	4
160	WWX200-160C12NR	40	40	—	56	100	16.4	9	4
160	WWX200-160C16NR	40	40	—	56	100	16.4	9	4

ROTATING TOOLS

Parts Sold Separately Set Bolt

Tool Holder Type	Set Bolt		Fig.	Reference Dimensions (mm)								Geometry
	With Coolant Hole	Without Coolant Hole		a	b	c	d	e	f	g		
	Order Number	Order Number										
WWX200-040A [○] [○] AR	HSC08025H	—	1	13	M8x1.25	33	8	5	—	—	Fig.1 	
WWX200-050A [○] [○] AR	HSC10030H	HSC10035	1	16	M10x1.5	40(45)	10	6	—	—		
WWX200-063A [○] [○] AR	HSC10030H	HSC10035	1	16	M10x1.5	40(45)	10	6	—	—		
WWX200-080A [○] [○] AR	HSC12035H	HSC12035	1	18	M12x1.75	47	12	10	—	—		
WWX200-100B [○] [○] AR	MBA16033H	—	2	40	M16x2	43	10	14	6	23	Fig.2 	
WWX200-125B [○] [○] AR	MBA20040H	—	2	50	M20x2.5	54	14	17	6	27		
WWX200-160C [○] [○] NR	No Coolant Hole	—	2	50	M20x2.5	54	14	17	6	27		

Note 1) Please purchase the appropriate set bolt after confirming the reference dimensions. The items with an order number listed under the Set Bolt columns are also sold by MITSUBISHI MATERIALS.

Note 2) Internal coolant is necessary with the set bolt.



Fig.1

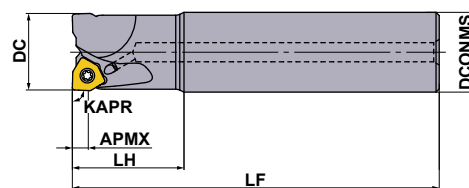
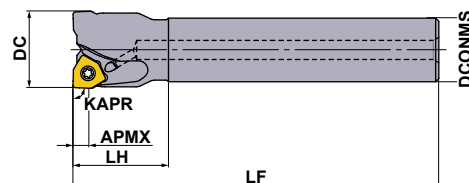


Fig.2



Right hand tool holder only.

SHANK TYPE

DC (mm)	Order Number	Stock R		Number of Teeth	Dimensions (mm)			WT [*] (kg)	APMX (mm)	RPMX (min ⁻¹)	Fig.
					LF	DCONMS	LH				
25	WWX200R2502SA20S	●	●	2	115	20	30	0.3	5	29600	2
25	WWX200R2502SA25S	●	●	2	115	25	35	0.4	5	29600	1
25	WWX200R2502SA25L	●	●	2	170	25	70	0.6	5	29600	1
28	WWX200R2802SA25S	●	●	2	115	25	35	0.4	5	27400	2
28	WWX200R2802SA25L	●	●	2	170	25	35	0.6	5	27400	2
30	WWX200R3002SA25S	●	●	2	125	25	35	0.5	5	26200	2
32	WWX200R3202SA32S	●	●	2	125	32	45	0.7	5	26200	1
32	WWX200R3203SA32S	●	●	3	125	32	45	0.7	5	26200	1
32	WWX200R3203SA32L	●	●	3	190	32	90	1.0	5	26200	1
35	WWX200R3503SA32L	●	●	3	190	32	45	1.1	5	25100	2
40	WWX200R4003SA32S	★	●	3	125	32	45	0.8	5	21600	2
40	WWX200R4004SA32S	★	●	4	125	32	45	0.8	5	21600	2
50	WWX200R5004SA32S	★	●	4	125	32	45	0.9	5	18600	2
50	WWX200R5005SA32S	★	●	5	125	32	45	0.9	5	18600	2
50	WWX200R5006SA32S	★	●	6	125	32	45	0.9	5	18600	2

★ WT : Tool Weight

SPARE PARTS

Tool Holder Type	★		
			
WWX200	TPS3R	TIP10D	MK1KS

★ Clamp Torque (N · m) : TPS3R = 2.0

ROTATING TOOLS

INSERTS

ROTATING TOOLS

K

Material	P	Steel	                                                           
----------	---	-------	--

● = NEW

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

SHOULDER MILLING

<GENERAL CUTTING>



WWX400

P M K N S H

ø50



Fig.1
ø50

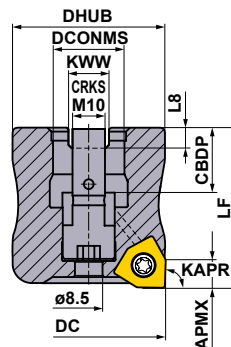
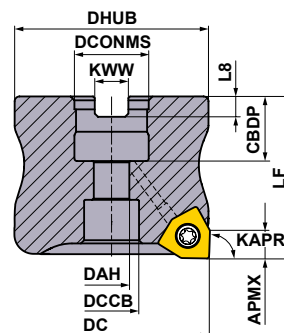


Fig.2



Right hand tool holder only.

K

ROTATING TOOLS

ARBOR TYPE

KAPR : 90°

GAMP : -6° GAMF : -7.2° ~ -12.8°

DC (mm)	Order Number	Stock		Number of Teeth	Dimensions (mm)		APMX (mm)	WT* (kg)	RMPX	RPMX (min ⁻¹)	Fig.
		R			LF	DCONMS					
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 K068, 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	*		
WWX400	TS5R	TKY20T	MK1KS

* Clamp Torque (N · m) : TS5R = 5.0

SPARE PARTS > N001
TECHNICAL DATA > P001

K067

ROTATING TOOLS

Fig.3

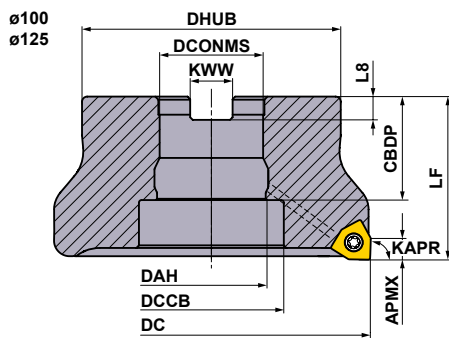


Fig.4

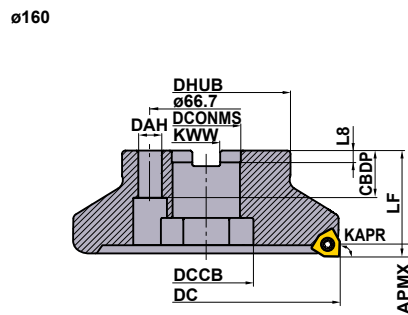
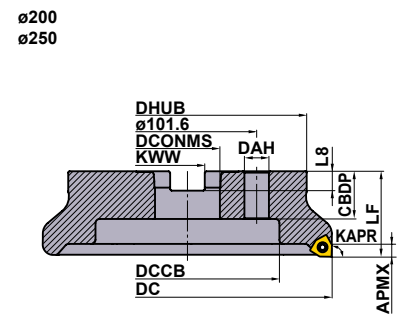


Fig.5



Right hand tool holder only.

MOUNTING DIMENSIONS

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

SET BOLT (SOLD SEPARATELY)

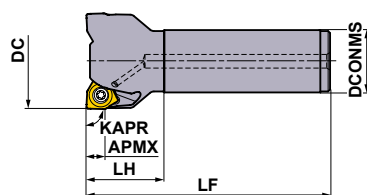
Tool Holder Type	Set Bolt		Fig.	Reference Dimensions (mm)								Geometry
	With Coolant Hole	Without Coolant Hole		a	b	c	d	e	f	g		
	Order Number	Order Number										
WWX400-063A $\odot$ AR	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	—	—	Fig.1 Fig.2	
WWX400-080A $\odot$ AR	HSC12035H	HSC12035 HSC12045	1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

★ : Inventory maintained in Japan.



Right hand tool holder only.

SHANK TYPE

DC (mm)	Order Number	Stock R		Number of Teeth	Dimensions (mm)			APMX (mm)	WT [*] (kg)	RMPX	RPMX (min ⁻¹)
					LF	DCONMS	LH				
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

ROTATING TOOLS

INSERTS

[illegible]

● = NEW

WWX200/400

Cutting Conditions (Guide) :

● : Stable Cutting ● : General Cutting ✖ : Unstable Cutting

RECOMMENDED CUTTING CONDITIONS

■ Dry Cutting Cutting Speed

	Material	Properties	Cutting Conditions	Grade	ae (mm)		
					0.5DC≥	0.8DC≥	DC(Slot)
					Vc (m/min)		
P	Mild Steel	Hardness ≤180HB	●	MV1020	300(250—350)	280(230—330)	250(200—300)
			●	MP6120	240(200—280)	220(180—260)	200(160—240)
			●	MV1030	230(190—270)	210(170—250)	190(150—230)
			●	MV1020	290(240—340)	260(210—320)	240(190—290)
			●	MV1030,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	●	MV1020	260(210—310)	240(190—280)	210(160—260)
			●	MP6120	210(170—250)	190(150—230)	170(130—210)
			●	MV1030	200(160—240)	180(140—220)	160(120—200)
			●	MV1020	250(200—300)	230(180—270)	200(150—250)
			●	MV1030,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)	●	MV1020	260(210—310)	240(190—280)	210(160—260)
			●	MP6120	200(160—240)	180(140—220)	160(120—200)
			●	MV1030	200(160—240)	180(140—220)	160(120—200)
			●	MV1020	250(200—300)	230(180—270)	200(150—250)
			●	MV1030,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	●	MV1030,MP7130	180(160—200)	160(140—180)	—
			●	MV1030,MP7130,VP15TF	170(150—190)	150(130—170)	—
			✖	MP7130,VP15TF	150(130—170)	130(110—150)	—
	Austenitic Stainless Steel	Hardness >200HB	●	MV1030,MP7130	170(150—190)	150(130—170)	—
			●	MV1030,MP7130,VP15TF	160(140—180)	140(120—160)	—
			✖	MP7130,VP15TF	140(120—160)	120(100—140)	—
	Ferritic and Martensitic Stainless Steel	Hardness ≤200HB	●	MV1030,MP7130	180(160—200)	160(140—180)	—
			●	MV1030,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	●	MV1020	240(200—310)	220(170—280)	200(150—260)
			●	MC5020	220(180—260)	200(160—240)	180(140—220)
			●	MV1030	210(170—250)	190(150—230)	170(130—210)
			●	MV1020	230(190—300)	210(160—270)	190(140—250)
			●	MV1030,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	●	MV1020	210(160—280)	190(140—250)	160(120—210)
			●	MC5020	180(140—220)	160(120—200)	140(100—180)
			●	MV1030	170(130—210)	150(110—190)	130(90—170)
			●	MV1020	200(150—270)	180(130—240)	150(110—210)
			●	MV1030,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)	—	—
			●	MP6120	40(30—70)	—	—

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

K

ROTATING TOOLS

ROTATING TOOLS

Wet Cutting Cutting Speed

(mm)

K

ROTATING TOOLS

	Material	Properties	Cutting Conditions	Grade	ae		
					0.5DC≥	0.8DC≥	DC(Slot)
					Vc (m/min)		
P	Mild Steel	Hardness ≤180HB	●	MV1020	220(210—230)	190(180—210)	180(160—190)
			●	MP6120	150(140—160)	130(120—140)	120(110—130)
			●	MV1030	140(130—150)	120(110—130)	110(100—120)
			●	MV1020	210(200—220)	180(170—200)	170(150—180)
			●	MV1030,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	●	MV1020	200(190—210)	170(160—190)	160(150—170)
			●	MP6120	150(140—160)	130(120—140)	120(110—130)
			●	MV1030	140(130—150)	120(110—130)	110(100—120)
			●	MV1020	190(180—200)	160(150—180)	150(140—160)
			●	MV1030,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)	●	MV1020	200(190—210)	170(160—190)	160(150—170)
			●	MP6120, MV1030	140(130—150)	120(110—130)	110(100—120)
			●	MV1020	190(180—200)	160(150—180)	150(140—160)
			●	MV1030	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	●	MV1020	200(180—240)	180(150—220)	150(130—200)
			●	MC5020	170(150—190)	150(130—170)	130(110—150)
			●	MV1030	160(140—180)	140(120—160)	120(100—140)
			●	MV1020	190(170—230)	170(140—210)	140(120—190)
			●	MV1030,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	●	MV1020	180(170—210)	160(150—190)	140(120—160)
			●	MC5020	160(150—170)	140(130—150)	120(110—130)
			●	MV1030	150(140—160)	130(120—140)	110(100—120)
			●	MV1020	170(160—200)	150(140—180)	120(110—150)
			●	MV1030,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)

Note 1) The recommended cutting speed has been calculated for a depth of cut 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

							(mm)
	Material	Properties	Cutting Conditions	Grade	ae		
					0.5DC≥	0.8DC≥	DC(Slot)
					Vc (m/min)		
N	Aluminium Alloys	Content 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 Alloys	—	●	MP9120	80 (60—100)	—	—
			●	MP9120	70 (50—90)	—	—
			✖	MP9130	60 (40—80)	—	—
	Heat Resistant Alloys	—	●	MP9120	60 (50—70)	—	—
			●	MP9120	50 (30—60)	—	—
			✖	MP9130	40 (20—40)	—	—
H	Hardened Steel	Hardness 40—55HRC	● ●	VP15TF	50 (30—70)	—	—
			●	MP6120	40 (30—70)	—	—

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

K

ROTATING TOOLS

RECOMMENDED CUTTING CONDITIONS

Depth of Cut / Feed per Tooth

	Material	Properties	Cutting Conditions	Schnittmodus	Grade	ae		
						0.5DC≥		
						Chipbreaker	ap	fz (mm/t.)
K	Mild Steel	Hardness ≤180HB	●	Dry, Wet	MV1020,MP6120	M	≤3.0	0.13(0.10—0.15)
			●	Dry, Wet	MV1020,MP6130	M	≤3.0	0.13(0.10—0.15)
			●	Dry, Wet		M,R	≤3.0	0.16(0.10—0.20)
			✱	Dry, Wet	MP6130,VP15TF	R	≤3.0	0.13(0.10—0.15)
	Carbon Steel Alloy Steel	Hardness 180—280HB	●	Dry, Wet	MV1020,MP6120	M	≤3.0	0.13(0.10—0.15)
			●	Dry, Wet	MV1020,MP6130	M	≤3.0	0.13(0.10—0.15)
			●	Dry, Wet		R	≤3.0	0.16(0.10—0.20)
			✱	Dry, Wet	MP6130,VP15TF	R	≤3.0	0.13(0.10—0.15)
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 280—350HB ≤350HB (Annealing)	●	Dry, Wet	MV1020,MP6120	M	≤3.0	0.13(0.10—0.15)
			●	Dry, Wet	MV1020,MP6130	M	≤3.0	0.13(0.10—0.15)
			●	Dry, Wet		R	≤3.0	0.16(0.10—0.20)
			✱	Dry, Wet	MP6130,VP15TF	R	≤3.0	0.13(0.10—0.15)
	Pre-hardened Steel	Hardness 35—45HRC	●	Dry, Wet	MP6120	M	≤2.0	0.13(0.10—0.15)
			●	Dry, Wet	MP6130	M	≤2.0	0.13(0.10—0.15)
			●	Dry, Wet		R	≤2.0	0.16(0.10—0.20)
			✱	Dry, Wet	MP6130,VP15TF	R	≤2.0	0.13(0.10—0.15)
M	Austenitic Stainless Steel	Hardness ≤200HB	● ●	Dry, Wet	MP7130	M	≤3.0	0.13(0.10—0.15)
			●	Dry, Wet	VP15TF	M	≤3.0	0.16(0.10—0.20)
			✱	Dry, Wet	MP7130,VP15TF	M	≤3.0	0.13(0.10—0.15)
	Austenitic Stainless Steel	Hardness >200HB	●	Dry	MP7130	M	≤2.0	0.13(0.10—0.15)
			●	Wet		M	≤3.0	0.13(0.10—0.15)
			●	Dry		M	≤2.0	0.13(0.10—0.15)
			●	Wet		M	≤3.0	0.13(0.10—0.15)
			●	Dry	VP15TF	M	≤2.0	0.16(0.10—0.20)
			●	Wet		M	≤3.0	0.16(0.10—0.20)
			✱	Dry	MP7130,VP15TF	M	≤2.0	0.13(0.10—0.15)
			✱	Wet		M	≤3.0	0.13(0.10—0.15)
	Ferritic and Martensitic Stainless Steel	Hardness ≤200HB	● ●	Dry, Wet	MP7130	M	≤3.0	0.13(0.10—0.15)
			●	Dry, Wet	VP15TF	M	≤3.0	0.16(0.10—0.20)
			✱	Dry, Wet	MP7130,VP15TF	M	≤3.0	0.13(0.10—0.15)
	Duplex Stainless Steel	Hardness ≤280HB	● ●	Dry	MP7130	M	≤2.0	0.13(0.10—0.15)
			● ●	Wet		M	≤3.0	0.13(0.10—0.15)
			●	Dry	VP15TF	M	≤2.0	0.16(0.10—0.20)
			●	Wet		M	≤3.0	0.16(0.10—0.20)
			✱	Dry	MP7130,VP15TF	M	≤2.0	0.13(0.10—0.15)
			✱	Wet		M	≤3.0	0.13(0.10—0.15)
	Precipitation Hardening Stainless Steel	Hardness <450HB	● ●	Dry, Wet	MP7130	M	≤2.0	0.13(0.10—0.15)
			●	Dry, Wet	VP15TF	M	≤2.0	0.16(0.10—0.20)
			✱	Dry, Wet	MP7130,VP15TF	M	≤2.0	0.13(0.10—0.15)
K	Gray Cast Iron	Tensile Strength ≤350MPa	● ●	Dry, Wet	MC5020	M	≤3.0	0.13(0.10—0.15)
			●	Dry, Wet	VP15TF	R	≤3.0	0.16(0.10—0.20)
			✱	Dry, Wet	MC5020,VP15TF	R	≤3.0	0.13(0.10—0.15)
	Ductile Cast Iron	Tensile Strength ≤800MPa	● ●	Dry, Wet	MV1020,MC5020	M	≤3.0	0.13(0.10—0.15)
			●	Dry, Wet	MV1020,VP15TF	R	≤3.0	0.16(0.10—0.20)
N	Aluminium Alloys	Content Si<5%	● ● ✱	Wet	TF15	L	≤3.0	0.13(0.10—0.15)
S	Titanium Alloys	—	● ●	Wet	MP9120	M	≤2.0	0.10(0.05—0.13)
			✱	Wet	MP9130	M	≤2.0	0.10(0.05—0.13)
	Heat Resistant Alloys	—	● ●	Wet	MP9120	M	≤2.0	0.10(0.05—0.13)
			✱	Wet	MP9130	M	≤2.0	0.10(0.05—0.13)
H	Hardened Steel	Hardness 40—55HRC	●	Dry, Wet	VP15TF	M	≤2.0	0.05(0.05—0.10)
			●	Dry, Wet	VP15TF,MP6120	R	≤2.0	0.05(0.05—0.10)

Note 1) Refer to the above table and apply the cutting conditions according to the application.

Cutting Conditions (Guide) :

● : Stable Cutting ● : General Cutting ✖ : Unstable Cutting

(mm)

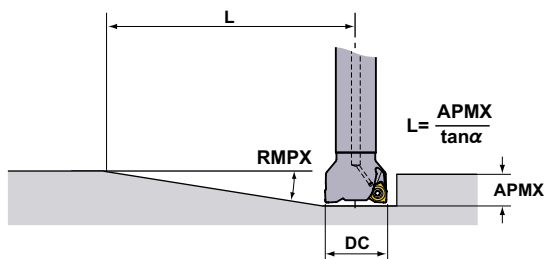
	ae			ae		
	0.8DC≥			DC(Slot)		
	Chipbreaker	ap	fz (mm/t.)	Chipbreaker	ap	fz (mm/t.)
	M	≤3.0	0.13(0.10—0.15)	M	≤2.0	0.13(0.10—0.15)
	M	≤3.0	0.13(0.10—0.15)	M	≤2.0	0.13(0.10—0.15)
	R	≤3.0	0.16(0.10—0.20)	—	—	—
	R	≤3.0	0.13(0.10—0.15)	M	≤2.0	0.13(0.10—0.15)
	M	≤3.0	0.13(0.10—0.15)	M	≤2.0	0.13(0.10—0.15)
	M	≤3.0	0.13(0.10—0.15)	M	≤2.0	0.13(0.10—0.15)
	R	≤3.0	0.16(0.10—0.20)	—	—	—
	R	≤3.0	0.13(0.10—0.15)	M	≤2.0	0.13(0.10—0.15)
	M	≤3.0	0.13(0.10—0.15)	M	≤2.0	0.13(0.10—0.15)
	M	≤3.0	0.13(0.10—0.15)	M	≤2.0	0.13(0.10—0.15)
	R	≤3.0	0.16(0.10—0.20)	—	—	—
	R	≤3.0	0.13(0.10—0.15)	M	≤2.0	0.13(0.10—0.15)
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	M	≤3.0	0.13(0.10—0.15)	—	—	—
	M	≤3.0	0.16(0.10—0.20)	—	—	—
	M	≤3.0	0.13(0.10—0.15)	—	—	—
	M	≤3.0	0.13(0.10—0.15)	—	—	—
	M	≤3.0	0.13(0.10—0.15)	—	—	—
	M	≤3.0	0.13(0.10—0.15)	—	—	—
	M	≤3.0	0.16(0.10—0.20)	—	—	—
	M	≤3.0	0.16(0.10—0.20)	—	—	—
	M	≤3.0	0.13(0.10—0.15)	—	—	—
	M	≤3.0	0.13(0.10—0.15)	—	—	—
	M	≤3.0	0.13(0.10—0.15)	—	—	—
	M	≤3.0	0.16(0.10—0.20)	—	—	—
	M	≤3.0	0.16(0.10—0.20)	—	—	—
	M	≤3.0	0.16(0.10—0.20)	—	—	—
	M	≤3.0	0.13(0.10—0.15)	—	—	—
	M	≤3.0	0.13(0.10—0.15)	—	—	—
	M	≤3.0	0.16(0.10—0.20)	—	—	—
	M	≤3.0	0.16(0.10—0.20)	—	—	—
	M	≤3.0	0.13(0.10—0.15)	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	M	≤3.0	0.13(0.10—0.15)	M	≤2.0	0.13(0.10—0.15)
	R	≤3.0	0.16(0.10—0.20)	—	—	—
	R	≤3.0	0.13(0.10—0.15)	R	≤2.0	0.13(0.10—0.15)
	M	≤3.0	0.13(0.10—0.15)	M	≤2.0	0.13(0.10—0.15)
	R	≤3.0	0.16(0.10—0.20)	—	—	—
	R	≤3.0	0.13(0.10—0.15)	R	≤2.0	0.13(0.10—0.15)
	L	≤3.0	0.13(0.10—0.15)	L	≤2.0	0.13(0.10—0.15)
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—

K

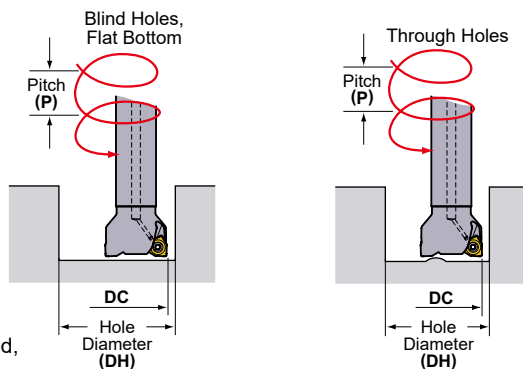
ROTATING TOOLS

■ 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.

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.

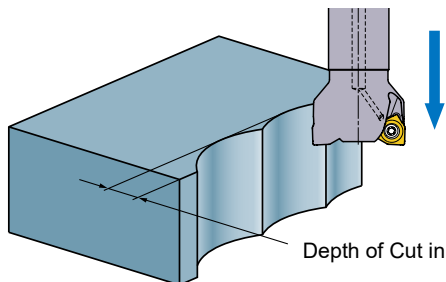
Note 2) When ramping and helical milling, long continuous chips may be dispersed, take cautionary measures.

Note 3) WWX200 cannot be used for ramping or helical machining.

<Helical Milling>

To obtain a flat bottom surface when helical milling, it is required to remove "the uncut part" in the centre of the workpiece 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



Depth of Cut in the Radial Direction : ae = WWX200 5mm
WWX400 8mm

SHOULDER MILLING

<STRONG EDGE TYPE FOR CAST IRON>



VOX400

P M **K** N S H



Fig.1

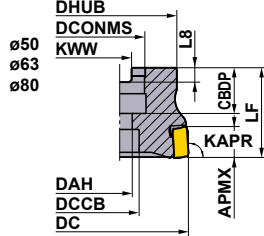


Fig.2

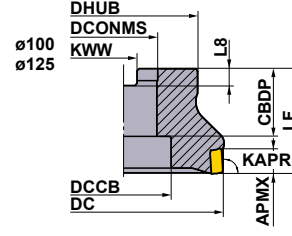
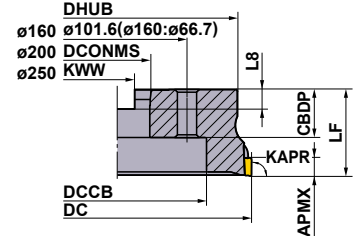


Fig.3



Right hand tool holder only.

ARBOR TYPE

KAPR : 90°

GAMP : -6° GAMF : -18°

Type	Order Number	Stock	Number of Teeth	Dimensions(mm)									WT (kg)	APMX (mm)	Fig.	Clamp Screw	Wrench
				DC	LF	DCONMS	CBDP	DAH	DCCB	DHUB	KWW	L8					
Coarse Pitch	VOX400-050A03R	●	—	3	50	40	22	20	11	17	10.4	6.3	0.3	10	1	CS401160T	TKY15T
	VOX400-063A04R	●	—	4	63	40	22	20	11	17	10.4	6.3	0.6	10	1	CS401160T	TKY15T
	VOX400-080A04R	●	—	4	80	50	27	23	13	20	12.4	7	1	10	1	CS401160T	TKY15T
	VOX400-100B06R	●	—	6	100	50	32	32	—	45	14.4	8	1.7	10	2	CS401160T	TKY15T
	VOX400-125B08R	●	—	8	125	63	40	32	—	56	16.4	9	3	10	2	CS401160T	TKY15T
	VOX400-160C10R	●	—	10	160	63	40	29	—	56	16.4	9	5.4	10	3	CS401160T	TKY15T
	VOX400-200C12R	●	—	12	200	63	60	32	—	130	25.7	14.22	8.1	10	3	CS401160T	TKY15T
	VOX400-250C16R	●	—	16	250	63	60	32	—	180	25.7	14.22	11.8	10	3	CS401160T	TKY15T
Fine Pitch	VOX400-050A05R	●	—	5	50	40	22	20	11	17	10.4	6.3	0.3	10	1	CS401160T	TKY15T
	VOX400-063A06R	●	—	6	63	40	22	20	11	17	10.4	6.3	0.6	10	1	CS401160T	TKY15T
	VOX400-080A08R	●	—	8	80	50	27	23	13	20	12.4	7	1	10	1	CS401160T	TKY15T
	VOX400-100B10R	●	—	10	100	50	32	32	—	45	14.4	8	1.7	10	2	CS401160T	TKY15T
	VOX400-125B12R	●	—	12	125	63	40	32	—	56	16.4	9	3	10	2	CS401160T	TKY15T
	VOX400-160C16R	●	—	16	160	63	40	29	—	56	16.4	9	5.4	10	3	CS401160T	TKY15T
	VOX400-200C20R	●	—	20	200	63	60	32	—	130	25.7	14.22	8.1	10	3	CS401160T	TKY15T
	VOX400-250C24R	●	—	24	250	63	60	32	—	180	25.7	14.22	11.8	10	3	CS401160T	TKY15T
Extra Fine Pitch	VOX400-063A08R	●	—	8	63	40	22	20	11	17	10.4	6.3	0.5	10	1	CS401160T	TKY15T
	VOX400-080A10R	●	—	10	80	50	27	23	13	20	12.4	7	1.0	10	1	CS401160T	TKY15T
	VOX400-100B12R	●	—	12	100	50	32	32	—	45	14.4	8	1.6	10	2	CS401160T	TKY15T
	VOX400-125B16R	●	—	16	125	63	40	32	—	56	16.4	9	2.8	10	2	CS401160T	TKY15T
	VOX400-160C20R	●	—	20	160	63	40	29	—	56	16.4	9	5.2	10	3	CS401160T	TKY15T
	VOX400-200C26R	★	—	26	200	63	60	32	—	130	25.7	14.22	7.9	10	3	CS401160T	TKY15T
	VOX400-250C34R	★	—	34	250	63	60	32	—	180	25.7	14.22	11.5	10	3	CS401160T	TKY15T

*1 Clamp Torque (N・m) : CS401160T=3.5

*2 WT : Tool Weight

K

ROTATING TOOLS

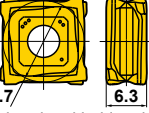
● : Inventory maintained. ★ : Inventory maintained in Japan.

SPARE PARTS > N001
TECHNICAL DATA > P001

K077

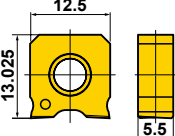
ROTATING TOOLS

INSERTS

Material	K	Cast Iron			Cutting Conditions (Guide) :
					● : Stable Cutting ● : General Cutting ✱ : Unstable Cutting
Shape	Order Number	Class	Honing	Coated	Geometry
				MC5020 VP15TF	
	SONX1206PER SONX1206PEL	N N	E E	● ★	 ø12.7 / 6.3 Right hand tool holder shown.

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

WIPER INSERTS

Material	K	Cast Iron			Cutting Conditions (Guide) :
					● : Stable Cutting ● : General Cutting ✱ : Unstable Cutting
Shape	Order Number	Class	Honing	Coated	Geometry
				VP15TF	
	WOEX1206PER5C	E E	E E	● ●	 12.5 13.025 5.5

RECOMMENDED CUTTING CONDITIONS

■ VOX400 (Standard Pitch)

Material	Tensile Strength	Insert Grade	Cutting Speed (m/min)	Ø50 - Ø250		
				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)

Material	Tensile Strength	Insert Grade	Cutting Speed (m/min)	Ø50, Ø63			Ø80		
				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)

Material	Tensile Strength	Insert Grade	Cutting Speed (m/min)	Ø100			Ø125		
				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)

Material		Tensile Strength	Insert Grade	Cutting Speed (m/min)	Ø160			Ø200—Ø250		
					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)

Material	Tensile Strength	Insert Grade	Cutting Speed (m/min)	Ø63			Ø80			
				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)

Material	Tensile Strength	Insert Grade	Cutting Speed (m/min)	Ø100			Ø125			
				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)

Material		Tensile Strength	Insert Grade	Cutting Speed (m/min)	Ø160			Ø200—Ø250		
					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.

ROTATING TOOLS

SHOULDER MILLING

<GENERAL CUTTING>

ASX400

P

M

K

N

S

H

K

ROTATING TOOLS



ARBOR TYPE

KAPR : 90°

GAMP : +11°

GAMF : -9° ~ -11°



Fig.1

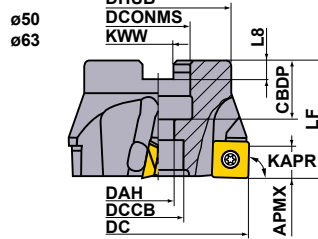


Fig.2

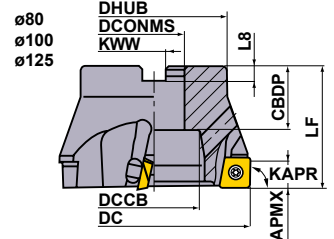


Fig.3

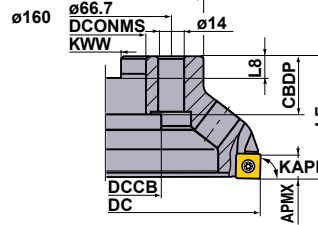
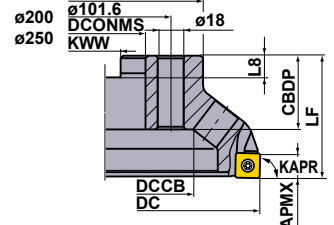


Fig.4

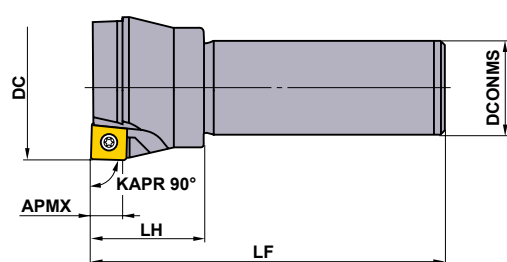
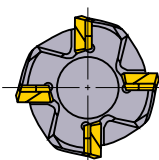


Right hand tool holder only.

Type	Order Number	Stock		Number of Teeth	Dimensions(mm)								WT [*] (kg)	APMX (mm)	Fig.	
		R			DC	LF	DCONMS	CBDP	DAH	DCCB	DHUB	KWW				L8
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

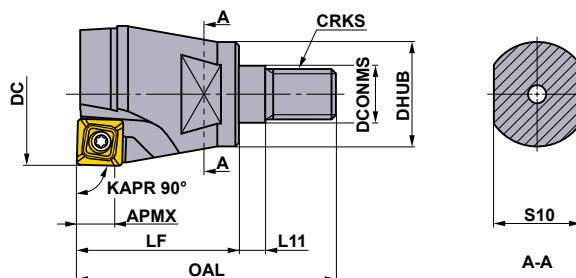
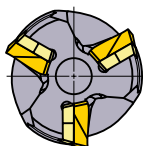
Right hand tool holder only.

Type	Order Number	Stock	Number of Teeth	Dimensions(mm)				
		R		DC	LF	DCONMS	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



SCREW-IN TYPE

Right hand tool holder only.

Order Number	Stock	Teeth	Dimensions (mm)									*2 WT (kg)		 *1	 *1		
			DC	DCONMS	DHUB	OAL	LF	L11	S10	CRKS	APMX		Shim	Shim Screw	Clamp Screw	Wrench (Insert)	Wrench (Shim)
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 K260.

ROTATING TOOLS

INSERTS

[illegible]

● = NEW

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

RECOMMENDED CUTTING CONDITIONS

	Material	Hardness	Grade	Cutting Speed (m/min)	Finish—Light Cutting		Light—Rough Cutting		Medium—Heavy Cutting	
					Feed per Tooth (mm/t.)	Chipbreaker	Feed per Tooth (mm/t.)	Chipbreaker	Feed per Tooth (mm/t.)	Chipbreaker
P	Mild Steel	≤180HB	MV1020	300 (200—400)	0.18 (0.08—0.28)	JL	0.20 (0.10—0.30)	JM	0.25 (0.10—0.35)	JH
			MV1030	275 (200—350)	0.18 (0.08—0.28)	JL	0.20 (0.10—0.30)	JM	0.25 (0.10—0.35)	JH
			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
			MX3030	180 (130—250)	0.15 (0.07—0.23)	JL	0.18 (0.10—0.28)	JM	—	—
			NX4545	180 (130—230)	0.15 (0.07—0.23)	JL	0.18 (0.10—0.28)	JM	—	—
	Carbon Steel Alloy Steel	180—280HB	MV1020	260 (170—350)	0.15 (0.07—0.23)	JL	0.18 (0.10—0.28)	JM	0.20 (0.10—0.30)	JH
			MV1030	235 (170—300)	0.15 (0.07—0.23)	JL	0.18 (0.10—0.28)	JM	0.20 (0.10—0.30)	JH
			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
			MX3030	150 (120—180)	0.13 (0.06—0.20)	JL	0.15 (0.10—0.25)	JM	—	—
			NX4545	150 (120—180)	0.13 (0.06—0.20)	JL	0.15 (0.10—0.25)	JM	—	—
		280—350HB	MV1020	180 (100—250)	0.13 (0.06—0.20)	JL	0.15 (0.10—0.25)	JM	0.18 (0.10—0.28)	JH
			MV1030	165 (100—230)	0.13 (0.06—0.20)	JL	0.15 (0.10—0.25)	JM	0.18 (0.10—0.28)	JH
			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	—	—
	Stainless Steel	≤270HB	MV1030	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
			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
			MX3030	100 (80—160)	0.15 (0.07—0.23)	JL	0.18 (0.10—0.28)	JM	—	—
			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	MV1020	240 (130—350)	0.18 (0.10—0.28)	JL	0.20 (0.10—0.30)	JM	0.25 (0.10—0.35)	JH FT
			MV1030	190 (130—250)	0.18 (0.10—0.28)	JL	0.20 (0.10—0.30)	JM	0.25 (0.10—0.35)	JH FT
			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
		Tensile Strength >450MPa	MV1020	220 (80—350)	0.18 (0.10—0.28)	JL	0.20 (0.10—0.30)	JM	0.25 (0.10—0.35)	JH FT
			MV1030	110 (80—150)	0.18 (0.10—0.28)	JL	0.20 (0.10—0.30)	JM	0.25 (0.10—0.35)	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

K

ROTATING TOOLS

RECOMMENDED CUTTING CONDITIONS

	Material	Hardness	Grade	Cutting Speed (m/min)	Finish—Light Cutting		Light—Rough Cutting		Medium—Heavy Cutting	
					Feed per Tooth (mm/t.)	Chipbreaker	Feed per Tooth (mm/t.)	Chipbreaker	Feed per Tooth (mm/t.)	Chipbreaker
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}) = $(1000 \times \text{Cutting Speed}) \div (3.14 \times \text{DC})$
- Table Feed (mm/min) = Feed per Tooth x Number of Teeth x Cutter Revolution

INSTRUCTIONS FOR USING INSERTS

■ Instructions for use of the JP chipbreaker ■ Instructions for use of wiper inserts

- The JP chipbreaker has sharp cutting edges. Wear gloves when handling.
- When machining aluminium alloy, welding to the cutting edge tends to occur, often leading to insert failure. To prevent this, wet cutting is recommended.



- Wiper inserts 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 (a_p) ≤ 0.5 mm, Feed per Tooth (f_z) ≤ 0.2 mm/t.

MULTI-FUNCTIONAL MILLING



WJX09

P

M

K

N

S

H



Fig.1
ø40

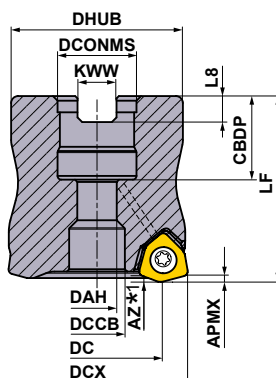
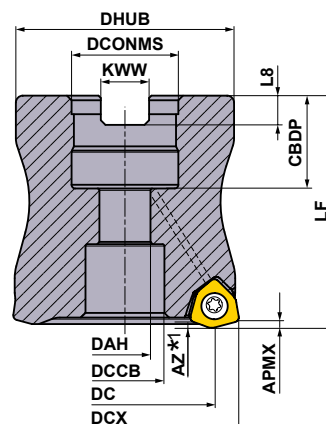
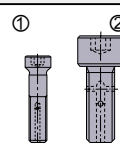


Fig.2
ø50
ø52
ø63
ø66



Right hand tool holder only.

DCONMS (mm)	Set Bolt	Geometry
Ø16	HFF08033H	①
Ø22	HSC10030H	②
Ø27	HSC12035H	②



ARBOR TYPE

GAMP: -6° GAMF: -11° - -10°

DCX (mm)	Order Number	Stock	R	Number of Teeth	Dimensions (mm)			WT*2 (kg)	APMX (mm)	RPMX (min ⁻¹)	Fig.	Insert Type
					DC	LF	DCONMS					
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 K090, 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)							Fig.
		DCONMS	CBDF	DAH	DCCB	DHUB	KWW	L8	
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	47	10.4	6.3	2
50	WJX09-050A06AR	22	20	11	17	47	10.4	6.3	2
52	WJX09-052A06AR	22	20	11	17	47	10.4	6.3	2
63	WJX09-063A05AR	22	20	11	17	60	10.4	6.3	2
63	WJX09-063A07AR	22	20	11	17	60	10.4	6.3	2
63	WJX09-063X07AR	27	23	13	20	60	12.4	7	2
66	WJX09-066X07AR	27	23	13	20	60	12.4	7	2

● : Inventory maintained.

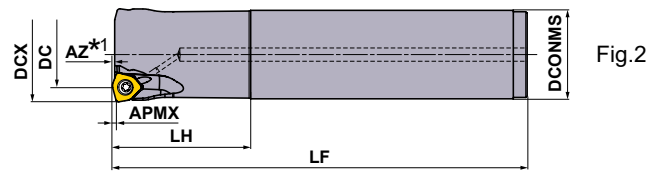
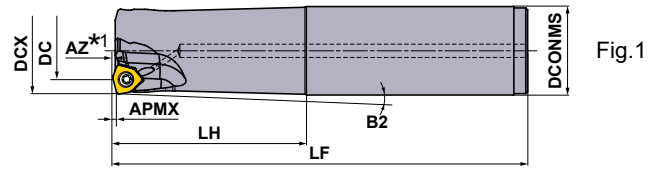
SPARE PARTS > N001
TECHNICAL DATA > P001

K085

K

ROTATING TOOLS

ROTATING TOOLS

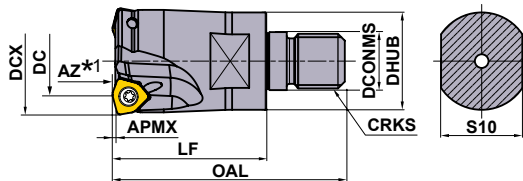


SHANK TYPE

Right hand tool holder only.

DCX (mm)	Order Number	Stock R	Number of Teeth	Dimensions (mm)					APMX (mm)	RPMX (min ⁻¹)	Fig.	Insert Type
				DC	LF	LH	DCONMS	B2				
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 K090, for the maximum drilling depth (AZ).



SCREW-IN TYPE

Right hand tool holder only.

DCX (mm)	Order Number	Stock R	Number of Teeth	Dimensions (mm)							WT (kg)	APMX (mm)	RPMX (min ⁻¹)	Insert Type
				DC	LF	OAL	DCONMS	DHUB	S10	CRKS				
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 K090, for the maximum drilling depth (AZ).

*2 WT : Tool Weight

Note 1) For screw-in type arbors, refer to page K260.

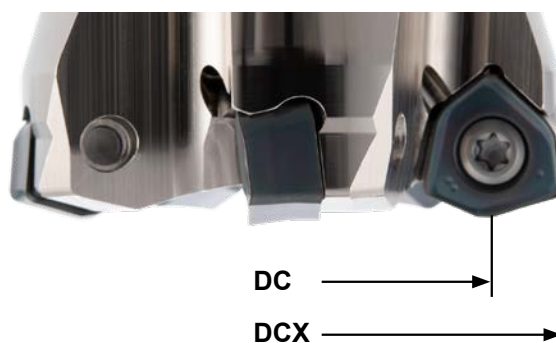
Tool Holder Type	*		
	Clamp Screw	Wrench (Insert)	Anti-seize Lubricant
WJX09	TPS3R	TIP10D	MK1KS

K

[illegible]

● = NEW

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



ARBORS	➤ K260
SPARE PARTS	➤ N001
TECHNICAL DATA	➤ P001

K087

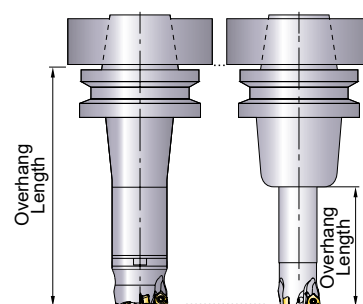
ROTATING TOOLS

RECOMMENDED CUTTING CONDITIONS

■ Correction Value According to Overhang Length

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

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 × DCONMS	100%	100%	100%
		3.0 × DCONMS	90%	100%	90%
		4.0 × DCONMS	85%	90%	85%
		5.0 × DCONMS	80%	85%	80%
		7.5 × DCONMS	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%



DCONMS=Connection Dia.

■ Cutting Speed (Dry Cutting)

Material		Properties		Cutting Speed Vc (m/min)				
P				MV1020	MV1030	MP6130	MP6120	VP15TF
Mild Steel	≤ 180HB	230 (180—280)	160 (100—220)	160 (110—200)	170 (120—220)	170 (120—220)	230 (180—280)	140 (100—180)
Carbon Steel Alloy Steel	180—280HB	220 (170—270)	150 (80—220)	140 (90—200)	160 (100—220)	160 (100—220)	220 (170—270)	120 (80—170)
Carbon Steel Alloy Steel	280—350HB	220 (170—270)	150 (80—220)	140 (90—200)	160 (100—220)	160 (100—220)	220 (170—270)	120 (80—170)
Alloy Tool Steel	≤ 350HB (Annealing)	220 (170—270)	150 (80—220)	140 (90—200)	160 (100—220)	160 (100—220)	220 (170—270)	120 (80—170)
Pre-hardened Steel	35—45HRC	150 (120—190)	110 (60—150)	100 (60—140)	120 (80—160)	120 (80—160)	—	90 (50—130)
M				MV1030	MP7130	MP7140	MC7020	VP30RT
Austenitic Stainless Steel	≤ 200HB	160 (130—200)	160 (130—200)	150 (120—180)	220 (170—270)	150 (120—180)		
Austenitic Stainless Steel	> 200HB	140 (80—200)	140 (100—200)	130 (80—180)	190 (140—240)	130 (80—180)		
Ferritic and Martensitic Stainless Steel	≤ 200HB	150 (80—200)	150 (100—200)	130 (80—180)	220 (170—270)	130 (80—180)		
Duplex Stainless Steel	≤ 280HB	130 (80—180)	130 (80—180)	110 (60—160)	180 (130—230)	110 (60—160)		
Precipitation Hardening Stainless Steel	< 450HB	110 (60—160)	110 (60—160)	90 (50—130)	170 (120—220)	90 (50—130)		
K				MV1020	MV1030	VP15TF		
Gray Cast Iron	≤ 350MPa	230 (180—280)	180 (140—220)	180 (140—220)				
Ductile Cast Iron	≤ 450MPa	210 (160—260)	160 (120—210)	160 (120—210)				
Ductile Cast Iron	≤ 800MPa	190 (140—240)	130 (90—170)	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%.

■ Depth of Cut / Feed per Tooth

(mm)

	Material	Properties	Depth of Cut ap	Chipbreaker	Cutting Dia. Max. DCX=25,28(Z=2)	Cutting Dia. Max. DCX=25,28(Z=3)	Cutting Dia. Max. DCX=32-	Cutting Mode
					Feed fz(mm/t.)	Feed fz(mm/t.)	Feed fz(mm/t.)	
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%.

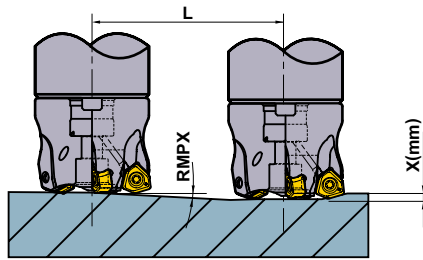
Note 4) If ap is set at 2mm or more, avoid machining on the walls or ramping.

K

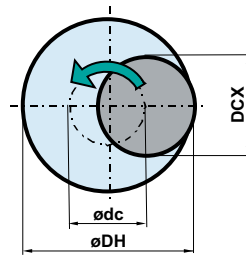
ROTATING TOOLS

MAXIMUM CAPACITIES BY MODE

■ Ramping



■ Helical Milling



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

$$\phi_{dc} = \phi_{DH} - DCX$$

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 workpiece 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>

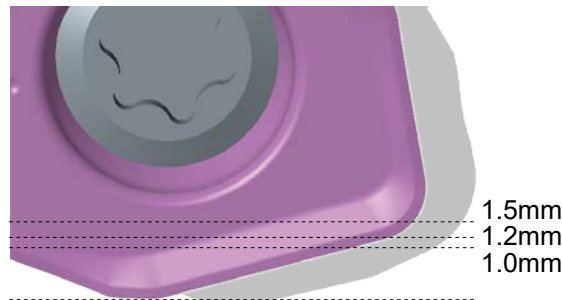
When drilling, set the axial feed per revolution at 0.2mm/rev or less.

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 K089.

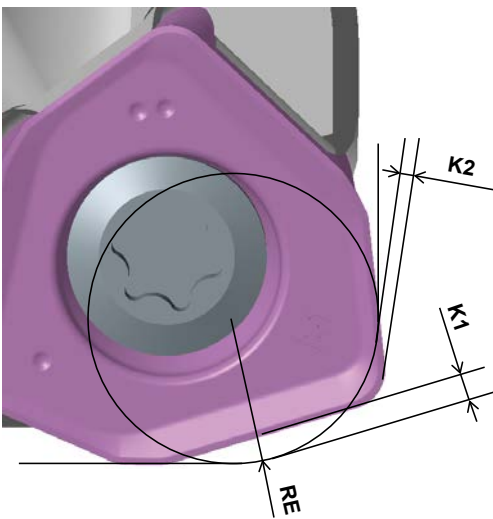
	WJX09
High feed and multi-function machining (APMX)	ap=1.2mm
Low feed and Face machining	ap=1.5mm



WJX09 Conventional Size 09

■ Remaining Stock

For CAM, use CAD data (from online catalogs), or define it 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	-

ROTATING TOOLS

MULTI-FUNCTIONAL MILLING



WJX14

P

M

K

N

S

H

ROTATING TOOLS

K



Fig.1
ø50
ø52

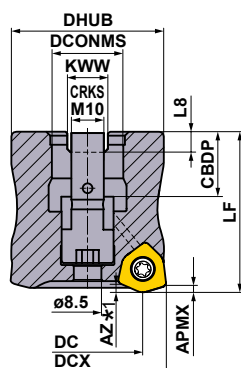


Fig.2
ø63
ø66
ø80
ø100

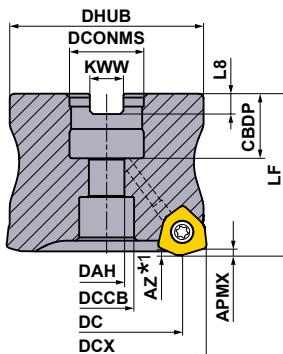
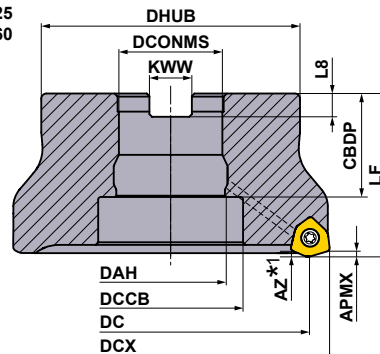


Fig.3
ø125
ø160



Right hand tool holder only.

DCONMS (mm)	Set Bolt	Geometry	
Ø22	HSC10030H	①	
Ø27	HSC12035H		
Ø32	HSC16040H		
Ø40	MBA20040H	②	
	MBA24045H		

ARBOR TYPE

GAMP: -7°, -10° GAMP: -10°

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.

DCX (mm)	Order Number	Stock		Number of Teeth	Dimensions (mm)			WT*2 (kg)	APMX (mm)	RPMX (min ⁻¹)	Fig.	Insert Type
		R			DC	LF	DCONMS					
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 K097, 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

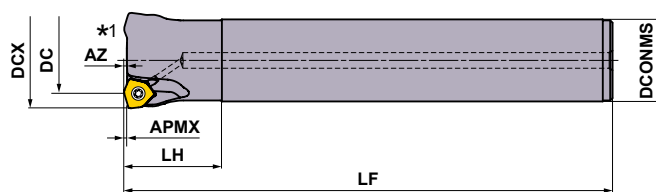
● : Inventory maintained. ★ : Inventory maintained in Japan.

MOUNTING DIMENSIONS

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

K

ROTATING TOOLS



Right hand tool holder only.

SHANK TYPE

DCX (mm)	Order Number	Stock		Number of Teeth	Dimensions (mm)				APMX (mm)	RPMX (min ⁻¹)	Insert Type
		R			DC	LF	LH	DCONMS			
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 K097, 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

ROTATING TOOLS

INSERTS

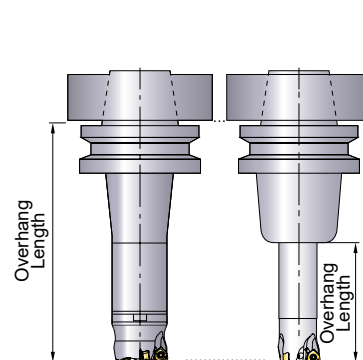
Material	P	Steels	● ●
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RECOMMENDED CUTTING CONDITIONS

■ Correction Value According to Overhang Length

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

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 × DCONMS	100%	100%	100%
		3.0 × DCONMS	90%	100%	90%
		4.0 × DCONMS	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%
		200	100%	100%	100%
	≥ 100	300	85%	100%	90%
		400	80%	80%	80%



K

ROTATING TOOLS

DCONMS=Connection Dia.

■ Cutting Speed (Dry Cutting)

Material		Properties		Cutting Speed Vc (m/min)				
				MV1020	MV1030	MP6130	MP6120	MC7020
P								
Mild Steel	≤ 180HB	220 (170—270)	130 (80—180)	140 (90—180)	150 (100—200)	220 (170—270)	150 (100—200)	120 (80—160)
Carbon Steel Alloy Steel	180—280HB	200 (150—250)	120 (60—180)	120 (70—180)	140 (80—200)	200 (150—250)	140 (80—200)	100 (60—150)
Carbon Steel Alloy Steel	280—350HB	200 (150—250)	120 (60—180)	120 (70—180)	140 (80—200)	200 (150—250)	140 (80—200)	100 (60—150)
Alloy Tool Steel	≤ 350HB (Annealing)	200 (150—250)	120 (60—180)	120 (70—180)	140 (80—200)	200 (150—250)	140 (80—200)	100 (60—150)
Pre-hardened Steel	35—45HRC	140 (100—180)	90 (50—130)	90 (50—130)	110 (70—150)	—	110 (70—150)	80 (40—120)
M								
Austenitic Stainless Steel	≤ 200HB	160 (130—200)	160 (130—200)	150 (120—180)	220 (170—270)	150 (120—180)		
Austenitic Stainless Steel	> 200HB	140 (100—200)	140 (100—200)	130 (80—180)	190 (140—240)	130 (80—180)		
Ferritic and Martensitic Stainless Steel	≤ 200HB	150 (100—200)	150 (100—200)	130 (80—180)	220 (170—270)	130 (80—180)		
Duplex Stainless Steel	≤ 280HB	130 (80—180)	130 (80—180)	110 (60—160)	180 (130—230)	110 (60—160)		
Precipitation Hardening Stainless Steel	< 450HB	110 (60—160)	110 (60—160)	90 (50—130)	170 (120—220)	90 (50—130)		
K								
Gray Cast Iron	≤ 350MPa	210 (160—260)	160 (120—200)	160 (120—200)				
Ductile Cast Iron	≤ 450MPa	200 (150—250)	150 (100—200)	150 (100—200)				
Ductile Cast Iron	≤ 800MPa	180 (130—230)	120 (80—160)	120 (80—160)				
S								
Titanium Alloy	—	40 (30—60)	50 (30—65)	50 (30—65)				
Heat Resistant Alloy	—	30 (20—40)	40 (20—50)	40 (20—50)				
H								
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%.

SPARE PARTS > N001
TECHNICAL DATA > P001

K095

ROTATING TOOLS

Depth of Cut / Feed per Tooth

(mm)

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

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.

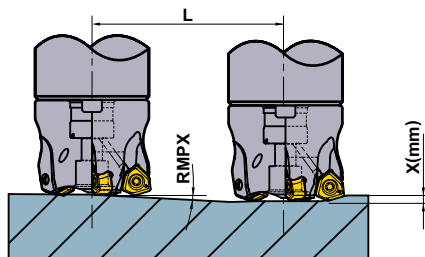
Note 2) When large vibration occurs, reduce the cutting conditions.

Note 3) For interrupted cutting, reduce the cutting speed and feed rate by 20%.

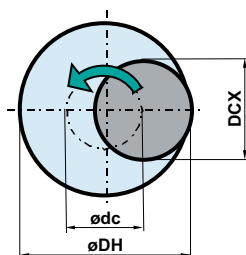
Note 4) If ap is set at 2mm or more, avoid machining on the walls or ramping.

MAXIMUM CAPACITIES BY MODE

■ Ramping



■ Helical Milling



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

$$\phi_{dc} = \phi_{DH} - DCX$$

Locus of the Centre of the Tool

Desired Hole Diameter

Cutting Diameter Maximum

Tool Holder Type	DCX	DC	APMX	RMPX	Ramping		Helical Milling (Blind Hole, Flat Bottom)		Helical Milling (Through Hole)	AZ
					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.

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 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 workpiece 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 0.2mm/rev or less.

K

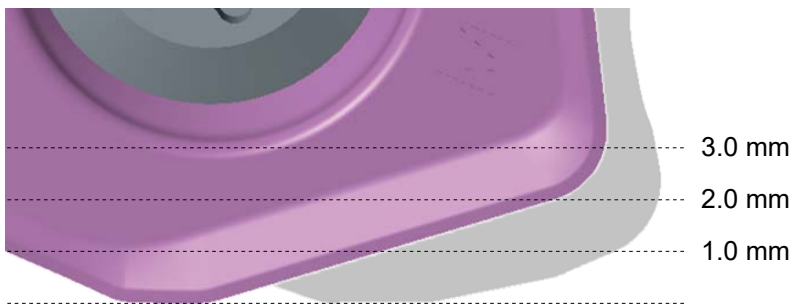
ROTATING TOOLS

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 K096.

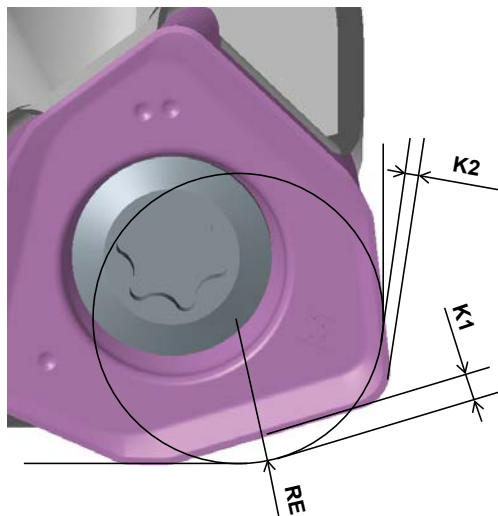
	WJX14
High feed and multi-function machining (APMX)	ap=2.0 mm
Low feed and Face machining	ap=3.0 mm



WJX14 Conventional Size 14

■ Remaining Stock

For CAM, use CAD data (from online catalogues), or define it 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

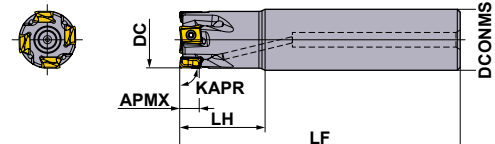
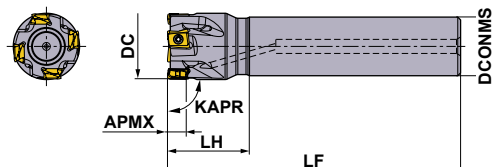


Fig.2



Right hand tool holder only.

K

ROTATING TOOLS

■ CYLINDRICAL SHANK

DC (mm)	Order Number	Stock		Number of Teeth	Dimensions (mm)			APMX (mm)	RMPX	RPMX (min ⁻¹)	WT* (kg)	Fig.	Insert Type
					DCONMS	LF	LH						
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.

SPARE PARTS > N001
TECHNICAL DATA > P001

K099



Fig.1

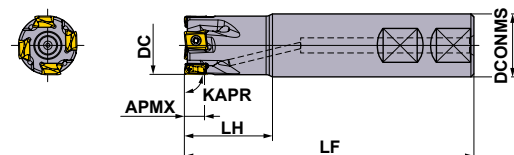
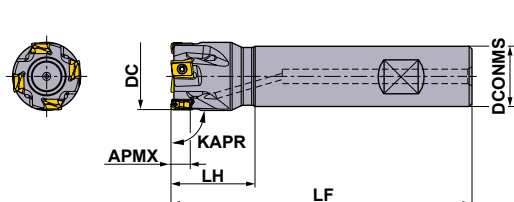


Fig.2



WELDON SHANK TYPE

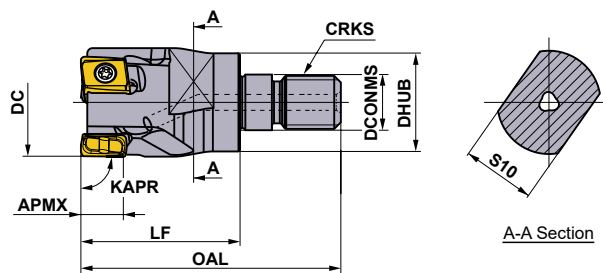
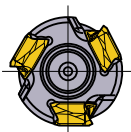
Right hand tool holder only.

DC (mm)	Order Number	Stock		Number of Teeth	Dimensions (mm)			APMX (mm)	RMPX	RPMX (min ⁻¹)	WT* (kg)	Fig.	Insert Type
		R			DCONMS	LF	LH						
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



Right hand tool holder only.

K

ROTATING TOOLS

SCREW-IN TYPE

DC (mm)	Order Number	Stock		Number of Teeth	Dimensions (mm)						WT* (kg)	APMX (mm)	RMPX	Insert Type
		R			DCONMS	DHUB	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 K260.

* WT : Tool Weight

SPARE PARTS

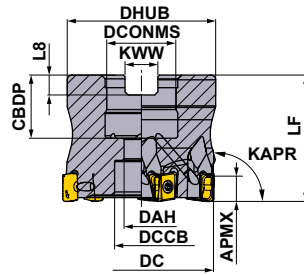
DC (mm)	Tool Holder Type	*		
		Clamp Screw	Wrench	Anti-seize Lubricant
16	VPX200R16	TPS27F1	TIP07F	MK1KS
18	VPX200R18	TPS27F1	TIP07F	MK1KS
20	VPX200R20	TPS27F1	TIP07F	MK1KS
22	VPX200R22	TPS27F2	TIP07F	MK1KS
25	VPX200R25	TPS27F2	TIP07F	MK1KS
28	VPX200R28	TPS27F2	TIP07F	MK1KS
30	VPX200R30	TPS27F2	TIP07F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

ROTATING TOOLS

K

ROTATING TOOLS



Right hand tool holder only.

DC	Set Bolt	Geometry
Ø32, Ø40	HSC08025H	
Ø50, Ø63	HSC10030H	

ARBOR TYPE

KAPR: 90°

GAMP: -6° GAMF: -25°

DC (mm)	Order Number	Stock R		Number of Teeth	Dimensions (mm)		WT* (kg)	APMX (mm)	RMPX	RPMX (min ⁻¹)	Insert Type
					LF	DCONMS					
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)						
		DCONMS	CBDP	DAH	DCCB	DHUB	KWW	L8
32	VPX200-032A03AR	16	18	9	14	30	8.4	5.6
32	VPX200-032A05AR	16	18	9	14	30	8.4	5.6
40	VPX200-040A04AR	16	18	9	14	37	8.4	5.6
40	VPX200-040A06AR	16	18	9	14	37	8.4	5.6
50	VPX200-050A05AR	22	20	11	17	47	10.4	6.3
50	VPX200-050A07AR	22	20	11	17	47	10.4	6.3
63	VPX200-063A06AR	22	20	11	17	60	10.4	6.3
63	VPX200-063A09AR	22	20	11	17	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

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

CHIPBREAKER RECOMMENDATION

■ Chipbreaker Selection Table

	Material	Properties	Cutting Conditions	Chipbreaker		Grade	
				1st Recommendation	2nd Recommendation	1st Recommendation	2nd Recommendation
P	Mild Steel	Hardness ≤180HB	 	L	M	MV1020	—
			 	L	M	MV1030	—
			 	L	M	MP6120	VP15TF
			 	M	L	MP6130	—
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 180-350HB ≤350HB (Annealing)	 	L	M	MV1020	—
			 	L	M	MV1030	—
			 	L	M	MP6120	VP15TF
			 	M	L	MP6120	VP15TF
	Pre-hardened Steel	Hardness 35—45HRC	 	M	L	MP6120	VP15TF
			 	M	L	MP6130	—
M	Austenitic Stainless Steel	Hardness ≤280HB	 	L	M	MV1030	—
			 	L	M	MP7130	VP15TF
		Hardness >200HB	 	M	L	MP7130	—
			 	L	M	MV1030	—
	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	MV1020	—
			 	M	L	MV1030	—
			 	M	L	MC5020	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	—
H	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

■ Dry Cutting Cutting Speed

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	MV1020	280 (220—330)	270 (210—320)	220 (170—260)	220 (170—260)
			MV1030	230 (180—270)	220 (170—260)	180 (140—210)	180 (140—210)
			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)	MV1020	220 (170—260)	210 (160—240)	170 (130—200)	170 (130—200)
			MV1030	180 (140—210)	170 (130—200)	140 (110—160)	140 (110—160)
			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)
M	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)
	Austenitic Stainless Steel	Hardness ≤200HB Hardness >200HB	MV1030	180 (140—210)	170 (130—200)	140 (110—160)	140 (110—160)
			MP7130,VP15TF	180 (140—210)	170 (130—200)	140 (110—160)	140 (110—160)
			MV1030	150 (110—180)	140 (100—160)	110 (80—130)	110 (80—130)
			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)
K	Precipitation Hardening Stainless Steel	Hardness <450HB	MP7130,VP15TF	130 (100—160)	120 (80—140)	90 (60—110)	90 (60—110)
	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)
			MV1020	180 (140—250)	170 (130—240)	150 (120—210)	150 (120—210)
			MV1030	150 (100—200)	140 (90—190)	125 (80—170)	125 (80—170)
	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)
	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, workpiece or attachment of workpiece 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

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	0.05—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

K

ROTATING TOOLS

ROTATING TOOLS

RECOMMENDED CUTTING CONDITIONS

■ Dry Cutting

Depth of Cut / Feed per Tooth

	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.)
K	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
	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
	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
	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
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
	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	0.06—0.10	≤6	0.06—0.10
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, workpiece or attachment of workpiece 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.

Wet Cutting Cutting Speed

Cutting Conditions (Guide) :

● : Stable Cutting ● : General Cutting ✖ : Unstable Cutting

	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	● ●	MV1020	210 (150—290)	200 (140—270)	150 (110—180)	150 (110—180)
			● ●	MV1030	140 (100—190)	130 (90—180)	100 (70—120)	100 (70—120)
			● ● ✖	MP6120 MP6130 VP15TF	140 (100—190)	130 (90—180)	100 (70—120)	100 (70—120)
			● ●	MV1020	180 (140—210)	170 (120—200)	150 (110—180)	150 (110—180)
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 180—350HB ≤350HB (Annealing)	● ●	MV1030	120 (90—140)	110 (80—130)	100 (70—120)	100 (70—120)
			● ● ✖	MP6120 MP6130 VP15TF	120 (90—140)	110 (80—130)	100 (70—120)	100 (70—120)
			● ● ✖	MP6120 MP6130 VP15TF	100 (80—120)	90 (70—110)	80 (60—100)	80 (60—100)
	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)
		Hardness >200HB	● ● ✖	MP7130 VP15TF	100 (80—130)	90 (70—110)	70 (50—100)	70 (50—100)
	Duplex Stainless Steel	Hardness ≤280HB	● ● ✖	MP7130 VP15TF	100 (80—130)	90 (70—120)	70 (50—100)	70 (50—100)
	Ferritic and Martensitic Stainless Steel	—	● ● ✖	MP7130 VP15TF	120 (100—150)	110 (90—140)	90 (70—120)	90 (70—120)
	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)
			● ● ✖	VP15TF	130 (100—150)	120 (90—140)	100 (80—120)	100 (80—120)
	Ductile Cast Iron	Tensile Strength ≤800MPa	● ●	MV1020	160 (130—210)	150 (120—200)	130 (110—170)	130 (110—170)
			● ●	MV1030	130 (80—180)	120 (70—170)	105 (60—150)	105 (60—150)
			● ●	MC5020	160 (140—180)	150 (130—170)	130 (110—150)	130 (110—150)
			● ● ✖	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)
			● ● ✖	MP9130	40 (30—60)	40 (30—60)	40 (30—60)	40 (30—60)
	Titanium Alloy (Ti-5Al-5V-5Mo-3Cr, etc.)	—	● ● ✖	MP9120 MP9130 VP15TF	30 (20—40)	30 (20—40)	30 (20—40)	30 (20—40)
			● ●	MP9120, VP15TF	40 (30—60)	40 (30—60)	40 (30—60)	40 (30—60)
	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, workpiece or attachment of workpiece 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.

K

ROTATING TOOLS

ROTATING TOOLS

RECOMMENDED CUTTING CONDITIONS

Wet Cutting

Depth of Cut / Feed per Tooth

	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.)
K	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 (Annealing)	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
	Duplex Stainless Steel	Hardness ≤280HB		● ● ● *	≤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
			≤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
	Ferritic and Martensitic Stainless Steel	—	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
	Precipitation Hardening Stainless Steel	Hardness <450HB		● ● ● *	≤2	0.06-0.08	≤4	0.06-0.08	≤4	0.05-0.08
			≤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
K	Gray Cast Iron	Tensile Strength ≤350MPa	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
			≤0.25DC	● ● ● *	≤6	0.10-0.15	≤8	0.10-0.20	≤8	0.10-0.25
	Ductile Cast Iron	Tensile Strength ≤800MPa		● ● ● *	≤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	0.08-0.12	≤8	0.10-0.15
				● ● ● *	≤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	0.08-0.12
				● ● ● *	≤4	0.08-0.12	≤6	0.08-0.12	≤6	0.08-0.12
			DC(Slot)	● ● ● *	≤2	0.08-0.12	≤6	0.08-0.12	≤6	0.06-0.10
				● ● ● *	≤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
			≤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

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, workpiece or attachment of workpiece 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

	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.)
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
S	Titanium Alloy (Ti-6Al-4V, etc.)	—	≤0.25DC	● ● ✖	≤6	0.08—0.15	≤8	0.08—0.15	≤8	0.08—0.15
				● ● ✖	≤5	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
				● ● ✖	≤4	0.06—0.10	≤6	0.06—0.10	≤6	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
				● ● ✖	≤5	0.08—0.12	≤8	0.08—0.12	≤8	0.08—0.12
			0.25—0.5DC	● ● ✖	≤4	0.06—0.10	≤6	0.06—0.10	≤6	0.06—0.10
				● ● ✖	≤4	0.06—0.10	≤6	0.06—0.10	≤6	0.06—0.10
	Heat Resistant Alloy	—	≤0.25DC	● ● ✖	≤6	0.08—0.12	≤8	0.08—0.12	≤8	0.08—0.12
				● ● ✖	≤5	0.08—0.12	≤8	0.08—0.12	≤8	0.08—0.12
			0.25—0.5DC	● ● ✖	≤4	0.06—0.10	≤6	0.06—0.10	≤6	0.06—0.10
				● ● ✖	≤4	0.06—0.10	≤6	0.06—0.10	≤6	0.06—0.10
	Heat Resistant Alloy	—	0.5—0.75DC	● ● ✖	≤4	0.06—0.10	≤6	0.06—0.10	≤6	0.06—0.10
				● ● ✖	≤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, workpiece or attachment of workpiece 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.)

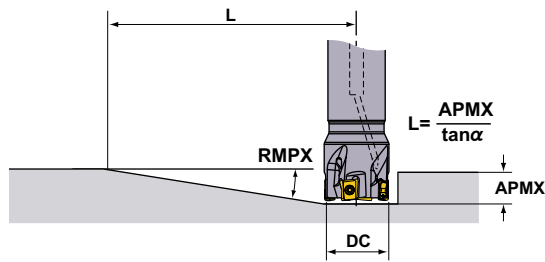
Note 5) When using higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

K

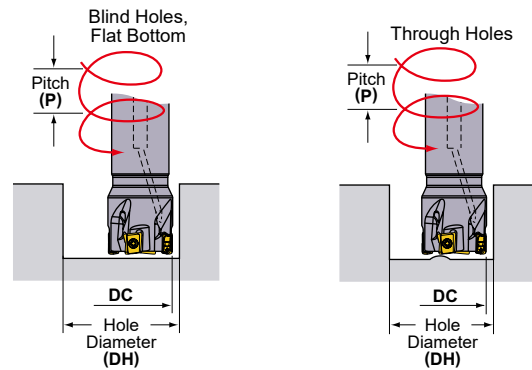
ROTATING TOOLS

■ 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.

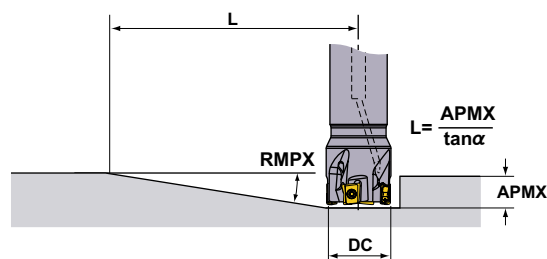
DC (mm)	RE (mm)	Ramping		Helical Cutting (Blind Hole, Flat Bottom)				Helical Cutting (Through Hole)	
		RMPX	L (mm) *	DH max. (mm)	P max. (mm)	DH min. (mm)	P max. (mm)	DH min. (mm)	P max. (mm)
16	0.2	1.85°	248	31.0	1.5	27.5	1.2	24.2	0.8
	0.4	1.85°	248	30.6	1.5	27.5	1.2	24.2	0.8
	0.8	1.85°	248	29.8	1.4	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 workpiece with the ramping angles in the table above, chips may be elongated.

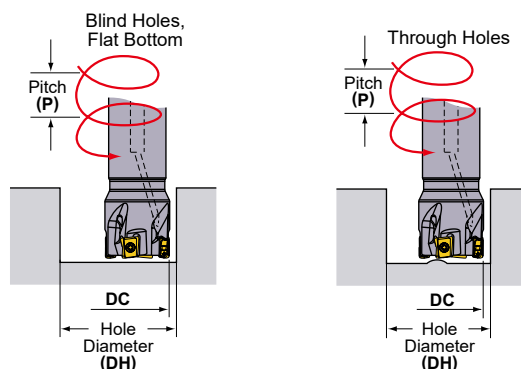
* Shows the distance until a maximum depth of cut of 8 mm is achieved at the maximum ramping angle $L (= 8 / \tan \alpha)$.

■ 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 workpiece 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 $L (= 8/\tan \alpha)$.

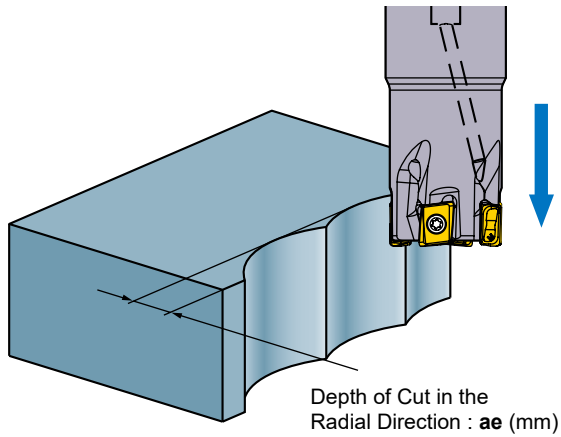
■ For Plunging and Drilling

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

● Plunging

ROTATING TOOLS

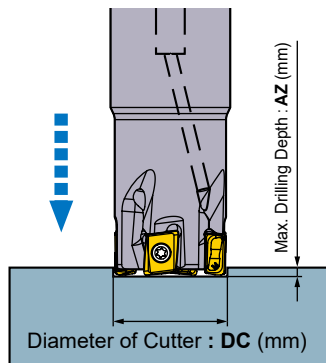
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DC (mm)	ae max. (mm)
16	3.9
18	3.9
20	3.9
22	4.0
25	4.0
28	4.0
30	4.0
32	4.0
35	4.0
40	4.0
50	4.0
63	4.0

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



VPX300

P

M

K

N

S

H



Fig.1

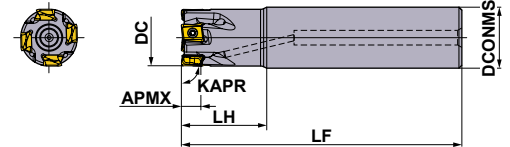
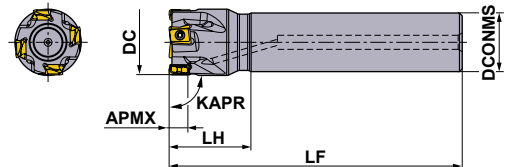


Fig.2



Right hand tool holder only.

K

ROTATING TOOLS

■ CYLINDRICAL SHANK

DC (mm)	Order Number	Stock		Number of Teeth	Dimensions (mm)			APMX (mm)	RMPX	RPMX (min ⁻¹)	WT* (kg)	Fig.	Insert Type
		R			DCONMS	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.

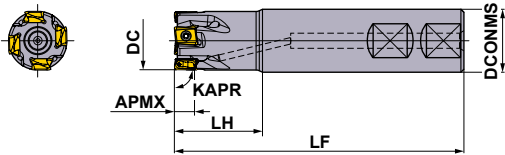
SPARE PARTS > N001
TECHNICAL DATA > P001

K113

ROTATING TOOLS



Fig.1

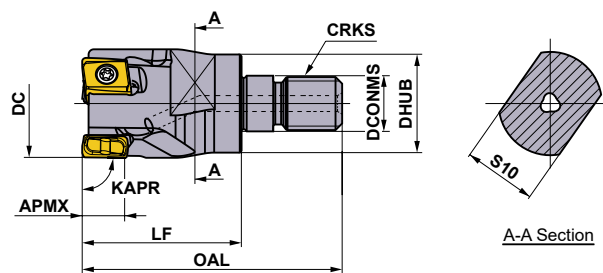
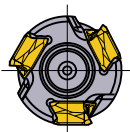


Right hand tool holder only.

WELDON SHANK TYPE

DC (mm)	Order Number	Stock		Number of Teeth	Dimensions (mm)			APMX (mm)	RMPX	RPMX (min ⁻¹)	WT* (kg)	Fig.	Insert Type
		R			DCONMS	LF	LH						
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



Right hand tool holder only.

K

ROTATING TOOLS

SCREW-IN TYPE

DC (mm)	Order Number	Stock		Number of Teeth	Dimensions (mm)						WT* (kg)	APMX (mm)	RMPX	Insert Type
		R			DCONMS	DHUB	OAL	LF	S10	CRKS				
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 K260.

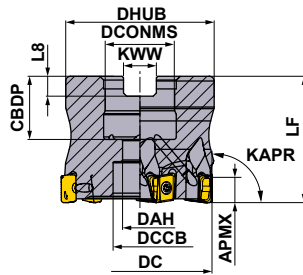
★ WT : Tool Weight

SPARE PARTS

DC (mm)	Tool Holder Type	*		
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

ROTATING TOOLS



DC (mm)	Set Bolt	Geometry
Ø40	HSC08025H	
Ø50, Ø63	HSC10030H	
Ø80	HSC12035H	

ARBOR TYPE

KAPR: 90°
GAMP: -6° GAMF: -22.5°

Right hand tool holder only.

DC (mm)	Order Number	Stock		Number of Teeth	Dimensions (mm)		WT* (kg)	APMX (mm)	RMPX	RPMX (min ⁻¹)	Insert Type
					LF	DCONMS					
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)						
		DCONMS	CBDP	DAH	DCCB	DHUB	KWW	L8
40	VPX300-040A03AR	16	18	9	14	37	8.4	5.6
40	VPX300-040A04AR	16	18	9	14	37	8.4	5.6
50	VPX300-050A04AR	22	20	11	17	47	10.4	6.3
50	VPX300-050A06AR	22	20	11	17	47	10.4	6.3
63	VPX300-063A06AR	22	20	11	17	60	10.4	6.3
63	VPX300-063A08AR	22	20	11	17	60	10.4	6.3
80	VPX300-080A07AR	27	23	13	20	56	12.4	7.0
80	VPX300-080A10AR	27	23	13	20	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

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

CHIPBREAKER RECOMMENDATION

■ Chipbreaker Selection Table

	Material	Properties	Cutting Conditions	Chipbreaker		Grade	
				1st Recommendation	2nd Recommendation	1st Recommendation	2nd Recommendation
P	Mild Steel	Hardness ≤180HB	 	L	M	MV1020	—
			 	L	M	MV1030	—
			 	L	M	MP6120	VP15TF
			 	M	L	MP6130	—
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 180-350HB ≤350HB (Annealing)	 	L	M	MV1020	—
			 	L	M	MV1030	—
			 	L	M	MP6120	VP15TF
			 	M	L	MP6120	VP15TF
	Pre-hardened Steel	Hardness 35—45HRC	 	M	L	MP6120	VP15TF
			 	M	L	MP6130	—
M	Austenitic Stainless Steel	Hardness ≤280HB	 	L	M	MV1030	—
			 	L	M	MP7130	VP15TF
		Hardness >200HB	 	M	L	MP7130	—
			 	L	M	MV1030	—
	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	MV1020	—
			 	M	L	MV1030	—
			 	M	L	MC5020	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	—
H	Heat Resistant Alloy	—	 	M	L	MP9120	VP15TF
			 	M	L	MP9130	—
H	Hardened Steel	Hardness 40—55HRC	 	M	—	VP15TF	—

RECOMMENDED CUTTING CONDITIONS

Cutting Conditions (Guide) :

● : Stable Cutting ● : General Cutting ✖ : Unstable Cutting

■ Dry Cutting Cutting Speed

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	MV1020	280 (220—330)	270 (210—320)	220 (170—260)	220 (170—260)
			MV1030	230 (180—270)	220 (170—260)	180 (140—210)	180 (140—210)
			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)	MV1020	220 (170—260)	210 (160—240)	170 (130—200)	170 (130—200)
			MV1030	180 (140—210)	170 (130—200)	140 (110—160)	140 (110—160)
			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	MV1030	180 (140—210)	170 (130—200)	140 (110—160)	140 (110—160)
			MP7130, VP15TF	180 (140—210)	170 (130—200)	140 (110—160)	140 (110—160)
		Hardness >200HB	MV1030	150 (110—180)	140 (100—160)	110 (80—130)	110 (80—130)
			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)
K	Precipitation Hardening Stainless Steel	Hardness <450HB	MP7130, VP15TF	130 (100—160)	120 (80—140)	90 (60—110)	90 (60—110)
	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	MV1020	180 (140—250)	170 (130—240)	150 (120—210)	150 (120—210)
			MV1030	150 (100—200)	140 (90—190)	125 (80—170)	150 (120—210)
			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, workpiece or attachment of workpiece 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 the clamp screw periodically.

Depth of Cut / Feed per Tooth

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

K

ROTATING TOOLS

ROTATING TOOLS

RECOMMENDED CUTTING CONDITIONS

■ Dry Cutting

Depth of Cut / Feed per Tooth

	Material	Properties	ae (mm)	Cutting Conditions	DC (mm)			
					ø25		ø28-ø80	
					ap (mm)	fz (mm/t.)	ap (mm)	fz (mm/t.)
K	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, workpiece or attachment of workpiece 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 the clamp screw periodically.

Wet Cutting Cutting Speed

Cutting Conditions (Guide) :

● : Stable Cutting ● : General Cutting ✖ : Unstable Cutting

	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	● ●	MV1020	210 (150—290)	200 (140—270)	150 (110—180)	150 (110—180)
			● ●	MV1030	140 (100—190)	130 (90—180)	100 (70—120)	100 (70—120)
			● ● ✖	MP6120 MP6130 VP15TF	140 (100—190)	130 (90—180)	100 (70—120)	100 (70—120)
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 180—350HB ≤350HB (Annealing)	● ●	MV1020	180 (140—210)	170 (120—200)	150 (110—180)	150 (110—180)
			● ●	MV1030	120 (90—140)	110 (80—130)	100 (70—120)	100 (70—120)
			● ● ✖	MP6120 MP6130 VP15TF	120 (90—140)	110 (80—130)	100 (70—120)	100 (70—120)
	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)
		Hardness >200HB	● ● ✖	MP7130, VP15TF	100 (80—130)	90 (70—120)	70 (50—100)	70 (50—100)
	Duplex Stainless Steel	Hardness ≤280HB	● ● ✖	MP7130, VP15TF	100 (80—130)	90 (70—120)	70 (50—100)	70 (50—100)
	Ferritic and Martensitic Stainless Steel	—	● ● ✖	MP7130, VP15TF	120 (100—150)	110 (90—140)	90 (70—120)	90 (70—120)
	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)
			● ● ✖	VP15TF	130 (100—150)	120 (90—140)	100 (80—120)	100 (80—120)
	Ductile Cast Iron	Tensile Strength ≤800MPa	● ●	MV1020	160 (130—210)	150 (120—200)	130 (110—170)	130 (110—170)
			● ●	MV1030	130 (80—180)	120 (70—170)	105 (60—150)	105 (60—150)
			● ●	MC5020	160 (140—180)	150 (130—170)	130 (110—150)	130 (110—150)
			● ● ✖	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)
			✖	MP9130	40 (30—60)	40 (30—60)	40 (30—60)	40 (30—60)
	Titanium Alloy (Ti-5Al-5V-5Mo-3Cr, etc.)	—	● ●	MP9120, VP15TF	30 (20—40)	30 (20—40)	30 (20—40)	30 (20—40)
			✖	MP9130	30 (20—40)	30 (20—40)	30 (20—40)	30 (20—40)
	Heat Resistant Alloy	—	● ●	MP9120, VP15TF	40 (30—60)	40 (30—60)	40 (30—60)	40 (30—60)
			✖	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, workpiece or attachment of workpiece 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 the clamp screw periodically.

K

ROTATING TOOLS

ROTATING TOOLS

RECOMMENDED CUTTING CONDITIONS

Wet Cutting

Depth of Cut / Feed per Tooth

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, workpiece or attachment of workpiece 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 the clamp screw periodically.

Cutting Conditions (Guide) :

● : Stable Cutting ● : General Cutting ✖ : Unstable Cutting

	Material	Properties	ae (mm)	Cutting Conditions	DC (mm)			
					ø25		ø28—ø80	
					ap (mm)	fz (mm/t.)	ap (mm)	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
	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
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—0.15
			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
			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.

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- Rigidity of machine, workpiece or attachment of workpiece 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 the clamp screw periodically.

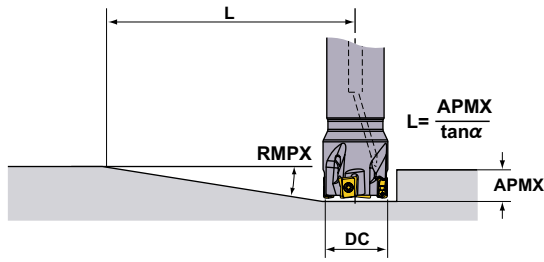
K

ROTATING TOOLS

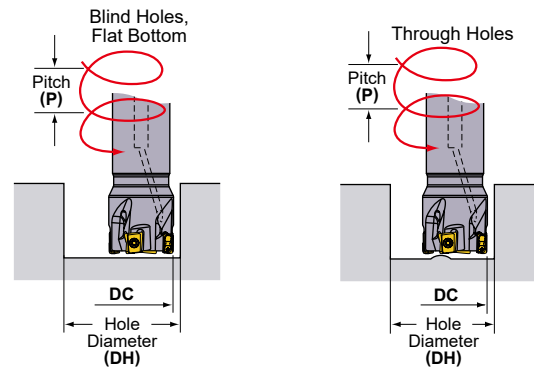
ROTATING TOOLS

■ 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.

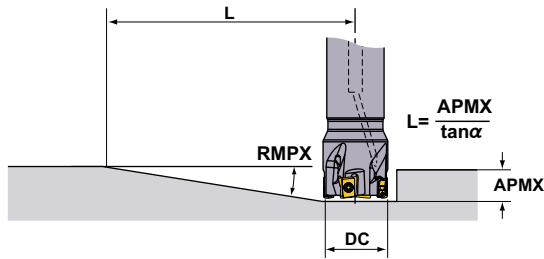
DC (mm)	RE (mm)	Ramping		Helical Cutting (Blind Hole, Flat Bottom)				Helical Cutting (Through Hole)	
		RMPX	L (mm) *	DH max. (mm)	P max. (mm)	DH min. (mm)	P max. (mm)	DH min. (mm)	P max. (mm)
25	0.2	2.13°	296	49.0	2.8	42.7	2.1	36.9	1.4
	0.4	2.13°	296	48.6	2.8	42.7	2.1	36.9	1.4
	0.8	2.13°	296	47.8	2.7	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
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
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
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
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

Note 1) When machining a highly ductile workpiece with the ramping angles in the table above, chips may be elongated.

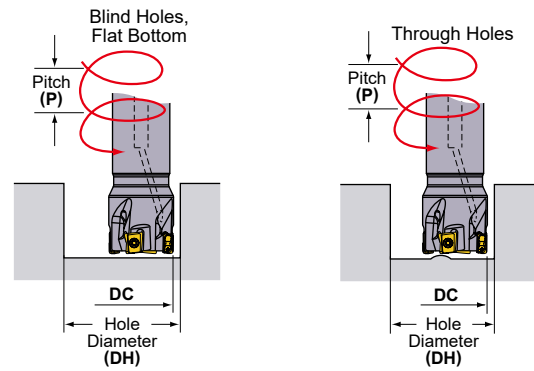
* Shows the distance until a maximum depth of cut of 11 mm is achieved at the maximum ramping angle $L (= 11/\tan \alpha)$.

■ 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 workpiece 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 $L (= 11/\tan \alpha)$.

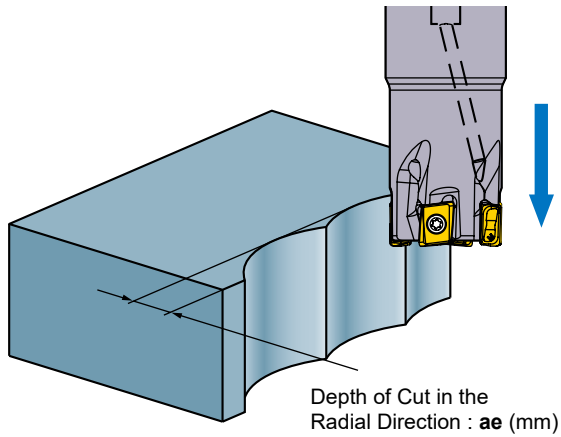
■ For Plunging and Drilling

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

● Plunging

ROTATING TOOLS

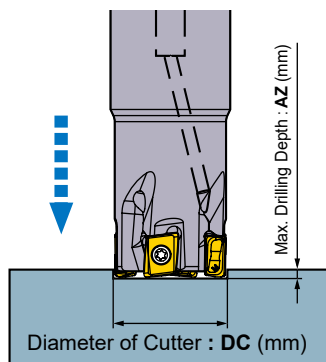
K



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

VPX200



LONG CUTTING EDGE

P M K N S H



Fig.1

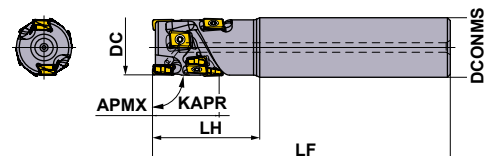
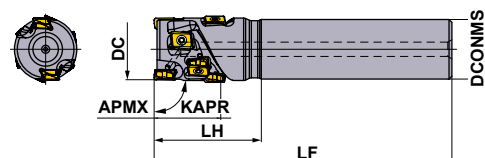


Fig.2



Right hand tool holder only.

■ CYLINDRICAL SHANK

DC (mm)	Order Number	Stock R		Number of Flutes	Total	Dimensions (mm)			APMX (mm)	RMPX	WT ^{*2} (kg)	Fig.	Insert Type ^{*1}
						DCONMS	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	★		
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

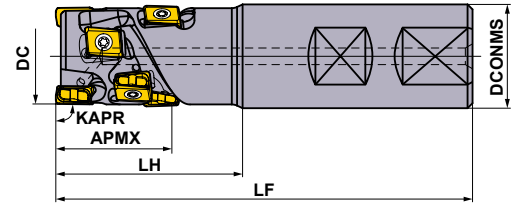
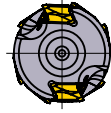
● : Inventory maintained. ★ : Inventory maintained in Japan.

SPARE PARTS > N001
TECHNICAL DATA > P001

K127



Fig.1



Right hand tool holder only.

WELDON SHANK TYPE

DC (mm)	Order Number	Stock		Number of Flutes	Total	Dimensions (mm)			APMX (mm)	RMPX	WT ^{*2} (kg)	Fig.	Insert Type ^{*1}
		R				DCONMS	LF	LH					
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 0.2 mm and 0.4 mm can also be used for the peripheral cutting edges.

*2 WT : Tool Weight

SPARE PARTS

DC (mm)	Tool Holder Type	★		
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

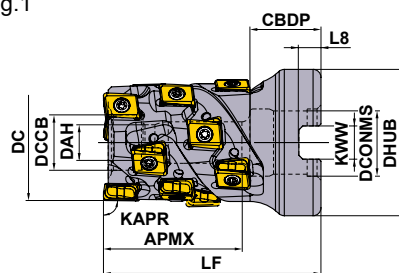
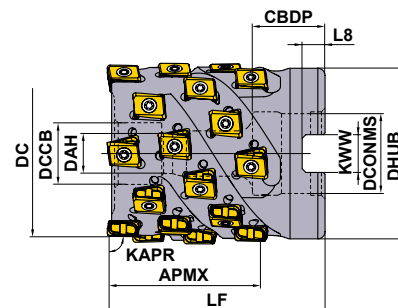


Fig.2



Right hand tool holder only.

SHELL TYPE

KAPR: 90°

GAMP: -6° GAMF: -25°

DC (mm)	APMX	Set Bolt	Geometry
Ø32	35	HSC08045	
Ø40	42	HSC08050	
Ø50	42	HSC10045	

DC (mm)	Order Number	Stock		Number of Flutes	Total	Dimensions (mm)		WT*2 (kg)	APMX (mm)	RMPX	Fig.	Insert Type*1
						LF	DCONMS					
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 0.8 mm is recommended for the peripheral cutting edges except the bottom cutting edge (end cutting).

Insert RE 0.2 mm 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)						
		DCONMS	CBDP	DAH	DCCB	DHUB	KWW	L8
32	VPX200-032A02A035R10	16	18	9	14	37	8.4	5.6
32	VPX200-032A03A035R15	16	18	9	14	37	8.4	5.6
40	VPX200-040A03A042R18	16	18	9	14	37	8.4	5.6
40	VPX200-040A04A042R24	16	18	9	14	37	8.4	5.6
50	VPX200-050A04A042R24	22	20	11	17	47	10.4	6.3
50	VPX200-050A05A042R30	22	20	11	17	47	10.4	6.3

SPARE PARTS

Tool Holder Type			
VPX200	TPS27F2	TIP07F	MK1KS

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

ROTATING TOOLS

INSERTS

Material	P	Steels																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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● = NEW

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

CHIPBREAKER RECOMMENDATION

■ Chipbreaker Selection Table

	Material	Properties	Cutting Conditions	Chipbreaker		Grade	
				1st Recommendation	2nd Recommendation	1st Recommendation	2nd Recommendation
P	Mild Steel	Hardness ≤180HB	● ●	L	M	MV1020	—
			● ●	L	M	MV1030	—
			● ●	L	M	MP6120	VP15TF
			✱	M	L	MP6130	—
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 180-350HB ≤350HB (Annealing)	● ●	L	M	MV1020	—
			● ●	L	M	MV1030	—
			●	L	M	MP6120	VP15TF
			●	M	L	MP6120	VP15TF
	Pre-hardened Steel	Hardness 35—45HRC	✱	M	L	MP6130	—
			✱	M	L	MP6130	—
M	Austenitic Stainless Steel	Hardness ≤280HB	● ●	L	M	MV1030	—
			● ●	L	M	MP7130	VP15TF
		Hardness >200HB	✱	M	L	MP7130	—
			● ●	L	M	MV1030	—
	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	MV1020	—
			● ●	M	L	MV1030	—
			● ●	M	L	MC5020	VP15TF
N	Aluminium Alloy	Content Si<5%	✱	M	L	VP15TF	—
			✱	M	L	VP15TF	—
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	—
H	Hardened Steel	Hardness 40—55HRC	● ●	M	—	VP15TF	—
			✱	M	—	VP15TF	—

K

ROTATING TOOLS

RECOMMENDED CUTTING CONDITIONS

Cutting Speed

(mm)

	Material	Properties	Cutting Conditions	Grade	ae				Cutting Mode
					≤0.25DC	0.25—0.5DC	0.5—0.75DC	DC(Slot)	
					Vc (m/min)				
P	Mild Steel	Hardness ≤180HB	● ●	MV1020	280 (220—330)	270 (210—320)	220 (170—260)	220 (170—260)	Dry, Wet
			● ●	MV1030	230 (180—270)	220 (170—260)	180 (140—210)	180 (140—210)	Dry, Wet
			● ●	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	● ●	MV1020	220 (170—260)	210 (160—240)	170 (130—200)	170 (130—200)	Dry, Wet
			● ●	MV1030	180 (140—210)	170 (130—200)	140 (110—160)	140 (110—160)	Dry, Wet
			● ●	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	● ●	MV1030	180 (140—210)	170 (130—200)	140 (110—160)	140 (110—160)	Dry
			● ●	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	● ●	MV1030	150 (110—180)	140 (100—160)	110 (80—130)	110 (80—130)	Dry
			● ●	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	● ●	MV1020	180 (140—250)	170 (130—240)	150 (120—210)	150 (120—210)	Dry, Wet
			● ●	MV1030	150 (100—200)	140 (90—190)	125 (80—170)	150 (120—210)	Dry, Wet
			● ●	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, workpiece or attachment of workpiece 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 the clamp screw periodically.

Cutting Conditions (Guide) :

● : Stable Cutting ● : General Cutting ✖ : Unstable Cutting

Depth of Cut / Feed per Tooth

(mm)

	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)	

K

ROTATING TOOLS

RECOMMENDED CUTTING CONDITIONS

■ Depth of Cut / Feed per Tooth

(mm)

	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)
	Ductile Cast Iron	—	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)
			≤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)
N	Aluminium Alloy	Content Si<5%	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)
			≤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)
S	Titanium Alloy (Ti-6Al-4V etc.)	—	0.25—0.5DC	● ● ✖	≤8	0.10(0.08—0.12)	≤28	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	0.08(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)
				● ● ✖	≤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)
				● ● ✖	≤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)
				● ● ✖	≤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)
				● ● ✖	≤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, workpiece or attachment of workpiece is low
- At a corner radius during pocket milling

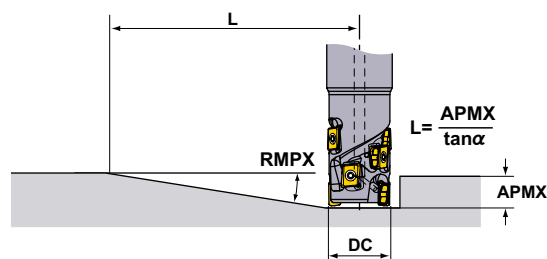
Note 3) A type with fewer teeth is recommended when the depth of cut in the radial direction (ae) is 0.5 DC or more.

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

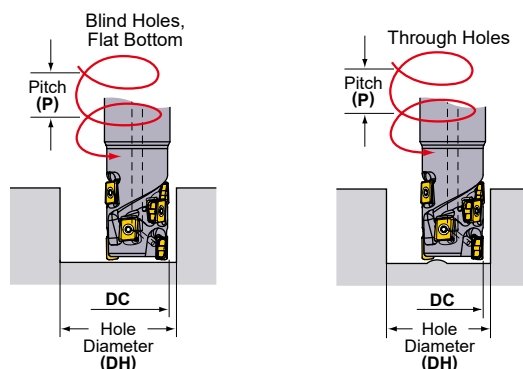
Note 5) When using higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change the clamp screw periodically.

■ 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 workpiece 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 $L (= 8/\tan \alpha)$.

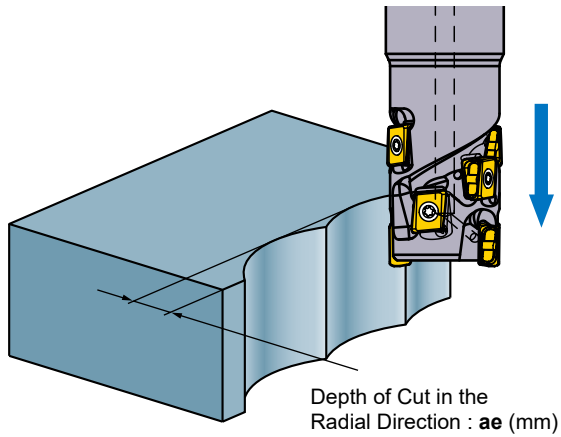
For Plunging and Drilling

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

● Plunging

ROTATING TOOLS

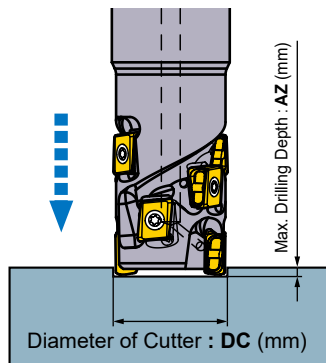
K



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.

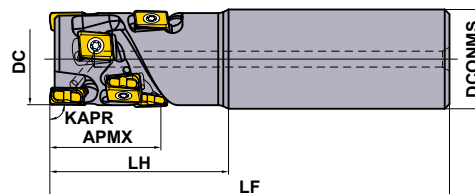
Note 2) Use compressed air to eliminate chips (or coolant for when machining aluminium alloy).

DEEP SHOULDER MILLING



VPX300

LONG CUTTING EDGE



Right hand tool holder only.

K

ROTATING TOOLS

■ CYLINDRICAL SHANK

DC (mm)	Order Number	Stock		Number of Flutes	Total	Dimensions (mm)			APMX (mm)	RMPX	WT ^{*2} (kg)	Insert Type ^{*1}
		R				DCONMS	LF	LH				
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 0.8 mm is recommended for the peripheral cutting edges except the bottom cutting edge (end cutting).

Insert RE 0.2 mm 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.

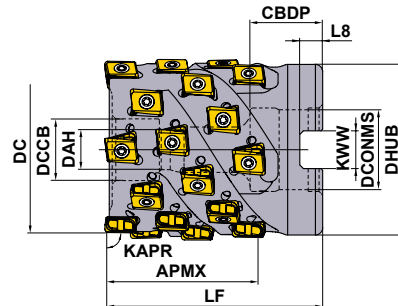
SPARE PARTS > N001
TECHNICAL DATA > P001

K137

ROTATING TOOLS

ROTATING TOOLS

K



Right hand tool holder only.

SHELL TYPE

KAPR: 90°

GAMP: -6° GAMP: -22.5°

DCONMS = mm size

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	

DC (mm)	Order Number	Stock R		Number of Flutes	Total	Dimensions (mm)		WT *2 (kg)	APMX (mm)	RMPX	Insert Type *1
						LF	DCONMS				
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

DCONMS = inch size

DC (mm)	Order Number	Stock R	Number of Flutes	Total	Dimensions (mm)		WT (kg)	APMX (mm)	RMPX	Insert Type
					LF	DCONMS				
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)						
		DCONMS	CBDP	DAH	DCCB	DHUB	KWW	L8
40	VPX300-040A02A031R06	16	18	9	14	37	8.4	5.6
40	VPX300-040A02A042R08	16	18	9	14	37	8.4	5.6
50	VPX300-050A03A031R09	22	20	11	17	47	10.4	6.3
50	VPX300-050A03A042R12	22	20	11	17	47	10.4	6.3
50	VPX300-050A03A052R15	22	20	11	17	47	10.4	6.3
63	VPX300-063A04A042R16	27	23	13	20	76	12.4	7.0
63	VPX300-063A04A052R20	27	23	13	20	76	12.4	7.0
80	VPX300-080A05A052R25	27	23	13	20	76	12.4	7.0
80	VPX300-080A05A063R30	27	23	13	20	76	12.4	7.0
80	VPX300R08005CA05225	31.75	32	17	26	76	12.7	8.0
80	VPX300R08005CA06330	31.75	32	17	26	76	12.7	8.0

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

(10 inserts in one case)

CHIPBREAKER RECOMMENDATION

■ Chipbreaker Selection Table

	Material	Properties	Cutting Conditions	Chipbreaker		Grade	
				1st Recommendation	2nd Recommendation	1st Recommendation	2nd Recommendation
P	Mild Steel	Hardness ≤180HB	 	L	M	MV1020	—
			 	L	M	MV1030	—
			 	L	M	MP6120	VP15TF
			 	M	L	MP6130	—
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 180-350HB ≤350HB (Annealing)	 	L	M	MV1020	—
			 	L	M	MV1030	—
			 	L	M	MP6120	VP15TF
			 	M	L	MP6120	VP15TF
	Pre-hardened Steel	Hardness 35—45HRC	 	M	L	MP6120	VP15TF
			 	M	L	MP6130	—
M	Austenitic Stainless Steel	Hardness ≤200HB	 	L	M	MV1030	—
			 	L	M	MP7130	VP15TF
		Hardness >200HB	 	M	L	MP7130	—
			 	L	M	MV1030	—
	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	MV1020	—
			 	M	L	MV1030	—
			 	M	L	MC5020	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	—
H	Hardened Steel	Hardness 40—55HRC	 	M	L	MP9120	VP15TF
			 	M	L	MP9130	—

Cutting Conditions (Guide) :

● : Stable Cutting ● : General Cutting ✖ : Unstable Cutting

RECOMMENDED CUTTING CONDITIONS

Cutting Speed

(mm)

	Material	Properties	Cutting Conditions	Grade	ae				Cutting Mode
					≤0.25DC	0.25—0.5DC	0.5—0.75DC	DC(Slot)	
					Vc (m/min)				
P	Mild Steel	Hardness ≤180HB	● ●	MV1020	280 (220—330)	270 (210—320)	220 (170—260)	220 (170—260)	Dry, Wet
			● ●	MV1030	230 (180—270)	220 (170—260)	180 (140—210)	180 (140—210)	Dry, Wet
			● ●	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	● ●	MV1020	220 (170—260)	210 (160—240)	170 (130—200)	170 (130—200)	Dry, Wet
			● ●	MV1030	180 (140—210)	170 (130—200)	140 (110—160)	140 (110—160)	Dry, Wet
			● ●	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 35—45HRC	● ●	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	● ●	MV1030	180 (140—210)	170 (130—200)	140 (110—160)	140 (110—160)	Dry
			● ●	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	● ●	MV1030	150 (110—180)	140 (100—160)	110 (80—130)	110 (80—130)	Dry
			● ●	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	● ●	MV1020	200 (150—280)	170 (130—240)	150 (120—210)	150 (120—210)	Dry, Wet
			● ●	MV1030	150 (100—200)	140 (90—190)	125 (80—170)	125 (80—170)	Dry, Wet
			● ●	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, workpiece or attachment of workpiece 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 the clamp screw periodically.

K

ROTATING TOOLS

RECOMMENDED CUTTING CONDITIONS

■ Depth of Cut / Feed per Tooth

(mm)

	Material	Properties	ae	Cutting Conditions	DC			
					ø40		ø50—ø80	
					ap	fz (mm/t.)	ap	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 (0.06—0.08)	

Cutting Conditions (Guide) :

● : Stable Cutting ● : General Cutting ✖ : Unstable Cutting

								(mm)
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)

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, workpiece or attachment of workpiece 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.)

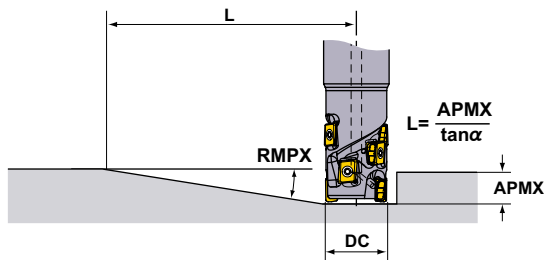
Note 5) When using higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change the clamp screw periodically.

K

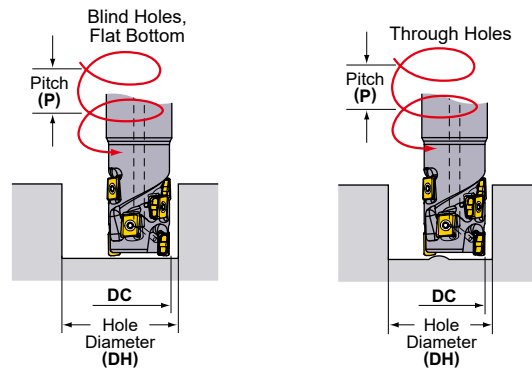
ROTATING TOOLS

■ 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

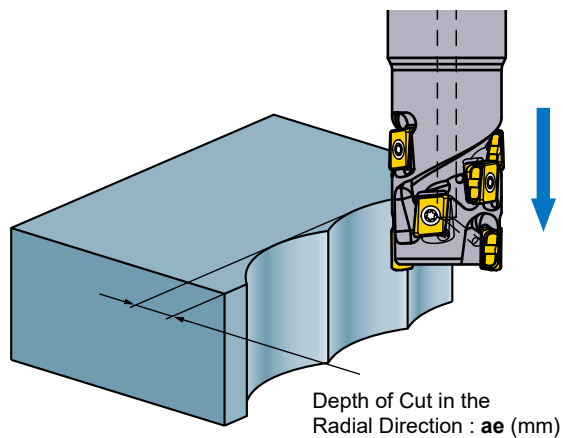
Note 1) When machining a highly ductile workpiece with the ramping angles in the table above, chips may be elongated.

* Shows the distance until a maximum depth of cut of 11 mm is achieved at the maximum ramping angle $L (= 11/\tan \alpha)$.

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.

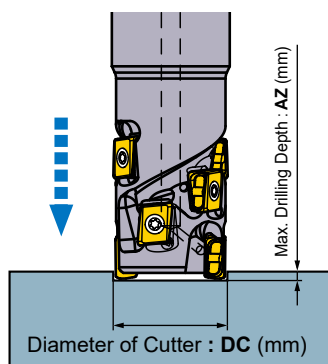
● Plunging



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).

ROTATING TOOLS

MULTI FUNCTIONAL MILLING



APX3000

P

M

K

N

S

H

K

ROTATING TOOLS



WELDON SHANK TYPE

KAPR : 90°

Fig.1

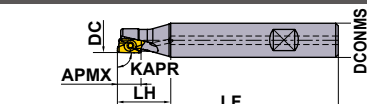


Fig.2

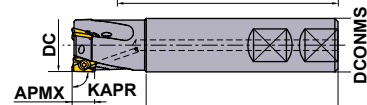
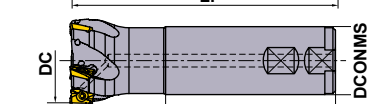


Fig.3



Right hand tool holder only.

DC (mm)	Order Number	Stock		Number of Teeth	Dimensions(mm)			WT* (kg)	APMX (mm)	RMPX	RPMX (min ⁻¹)	Fig.	
					DCONMS	LF	LH						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 K150.

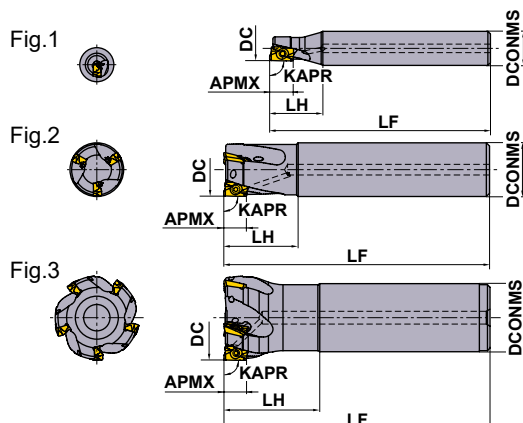
Note 2) The maximum allowable spindle speeds (RPMX) are set to ensure tool and insert stability.

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.

□ : Non stock, produced to order only.



STRAIGHT SHANK TYPE

KAPR : 90°

Right hand tool holder only.

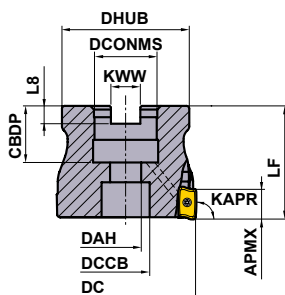
DC (mm)	Order Number	Stock R	Number of Teeth	Dimensions(mm)			WT* (kg)	APMX (mm)	RMPX	RPMX (min ⁻¹)	Fig.	Insert Type
				DCONMS	LF	LH						
12	APX3000R121SA16SA	★	1	16	85	25	0.10	10	6.0°	10500	1	AO○T12
14	APX3000R141SA16SA	★	1	16	85	25	0.11	10	6.0°	9000	1	AO○T12
16	APX3000R162SA16SA	●	2	16	85	25	0.11	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 K150.

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



Right hand tool holder only.

ARBOR TYPE

KAPR :90°

GAMP: +7°—+21° GAMF: +15°—+27°

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

DC (mm)	Order Number	Stock		Number of Teeth	Dimensions(mm)		WT [*] (kg)	APMX (mm)	RMPX	RPMX (min ⁻¹)	
					LF	DCONMS					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 K150.

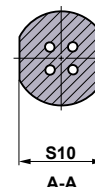
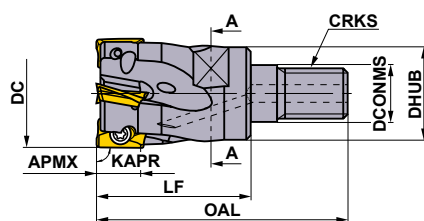
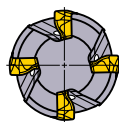
Note 2) The maximum allowable spindle speeds (**RPMX**) are set to ensure tool and insert stability.

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)						
		DCONMS	CBDP	DAH	DCCB	DHUB	KWW	L8
32	APX3000-032A05RA	16	18	9	14	30	8.4	5.6
40	APX3000-040A06RA	16	18	9	14	34	8.4	5.6
50	APX3000-050A07RA	22	20	11	17	45	10.4	6.3
63	APX3000-063A08RA	22	20	11	17	55	10.4	6.3
80	APX3000-080A09RA	27	23	13	20	70	12.4	7
100	APX3000-100A11RA	32	26	17	26	80	14.4	8



K

ROTATING TOOLS

SCREW-IN TYPE

KAPR : 90°

Right hand tool holder only.

DC (mm)	Order Number	Stock		Number of Teeth	Dimensions(mm)						WT* (kg)	APMX (mm)	RMPX	
					DCONMS	DHUB	OAL	LF	S10	CRKS				
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 $RE \geq 2.4\text{mm}$, machining of the holder is required as shown on page K150.

Note 2) For screw-in type arbors, refer to page K260.

* 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

ROTATING TOOLS

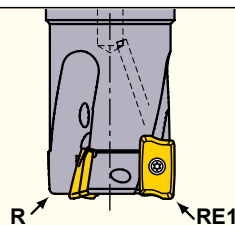
INSERTS

Material	P	Steels																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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* Corner radius RE1 is different from the workpiece 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 1 $\geq$ R2.4mm,
please machine the holder with a radius form as shown
in the table.



RE1 (mm)	R (mm)
2.4	1.9
3.0	2.5
3.2	2.7

R : Holder End Radius
RE1 : Insert Corner Radius

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED

	Material	Hardness	Insert			ae (mm)			
			Grade Priority		Chipbreaker	≤0.25DC	0.25—0.5DC	0.5—0.75DC	DC (Slot)
			1st	2nd					
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)
S	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)

K

ROTATING TOOLS

DEPTH OF CUT AND FEED PER TOOTH

	Material	Hardness	ae (mm)	DC (mm)					
				ø12—ø16		ø18—ø25		ø28—ø100	
				Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)
P	Mild Steel 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

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED

Material	Hardness	ae (mm)	DC (mm)					
			ø12-ø16		ø18-ø25		ø28-ø100	
			Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t.)
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
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
			≤2	0.10	≤2	0.05	≤2	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
		0.25-0.5DC	—	—	7-8.5	0.07	—	—
			≤2	0.10	≤3	0.15	≤3	0.15
S Heat-resistant Alloy	—	0.5-0.75DC	2-5	0.07	3-5.5	0.10	—	—
			≤4	0.07	≤4	0.07	≤3	0.07
		DC (Slot)	≤3	0.07	≤4	0.07	≤3	0.07
			≤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.

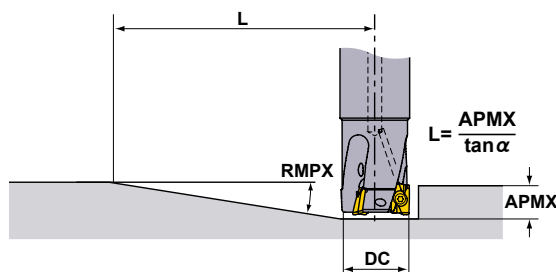
- When using the long shank type and extra long shank type.
- When using long tool overhang with the standard or arbor type.
- When the application has poor clamping rigidity or when using a low rigidity machine.

Note 3) In case of coarse and fine pitch cutters, the coarse pitch type is recommended to prevent vibration.

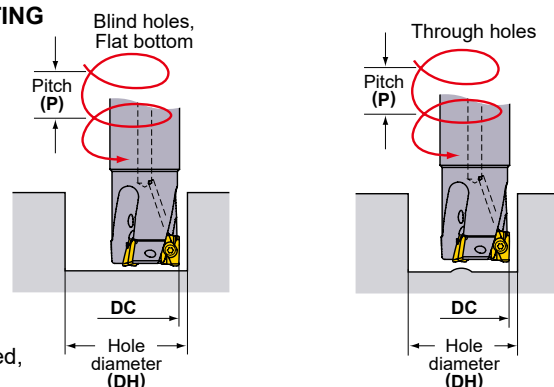
Note 4) For heavy interrupted and unstable cutting, the H chipbreaker is first recommendation.

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)
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 workpiece with ramping angles above, chips could be continuous. In this case, decrease the ramping angle or feed per tooth.

*1 $L (=10 / \tan \alpha)$. 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.

$\{(\text{cutting edge diameter DC}) - (\text{corner radius}) - 0.2\} \times 2$

MULTI FUNCTIONAL MILLING

90°
KAPR



APX4000

P M K N S H



WELDON SHANK TYPE

KAPR : 90°

Fig.1

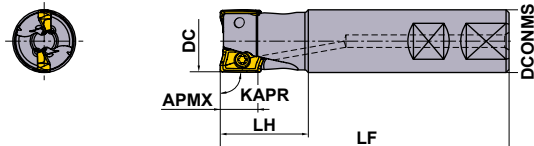
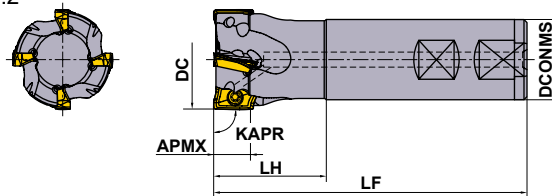


Fig.2



Right hand tool holder only.

K

ROTATING TOOLS

DC (mm)	Order Number	Stock		Number of Teeth	Dimensions(mm)			WT [*] (kg)	APMX (mm)	RMPX	RPMX (min ⁻¹)	Fig.	
		R			DCONMS	LF	LH						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 $RE \geq 3.2\text{mm}$, machining of the holder is required as shown on page K157.

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.

SPARE PARTS > N001
TECHNICAL DATA > P001

K153



STRAIGHT SHANK TYPE

KAPR : 90°

Fig.1

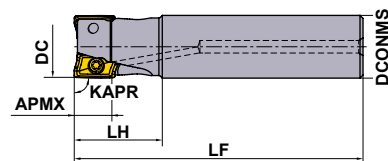
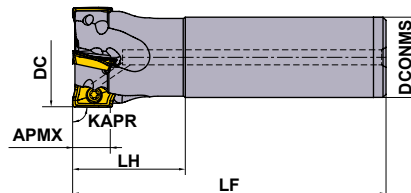
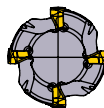


Fig.2



Right hand tool holder only.

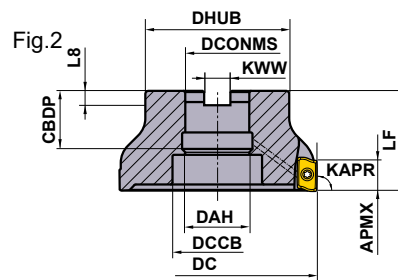
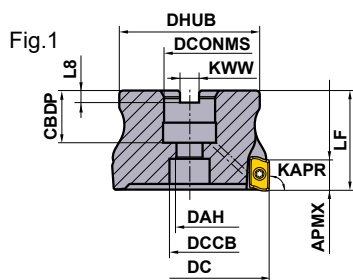
DC (mm)	Order Number	Stock		Number of Teeth	Dimensions(mm)			WT* (kg)	APMX (mm)	RMPX	RPMX (min ⁻¹)	Fig.	
					DCONMS	LF	LH						Insert Type
25	APX4000R252SA25SA	★	●	2	25	115	35	0.40	15	11.0°	18900	1	AO○T18
25	APX4000R252SA25LA	★	●	2	25	170	35	0.61	15	11.0°	18900	1	AO○T18
25	APX4000R252SA25ELA	★	●	2	25	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 K157.

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



Right hand tool holder only.

ARBOR TYPE

KAPR :90°

GAMP: +15°—+22° GAMF: +21°—+28°

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

DC (mm)	Order Number	Stock		Number of Teeth	Dimensions(mm)		WT (kg)	APMX (mm)	RMPX	RPMX (min ⁻¹)	Fig.		Insert Type
					LF	DCONMS							
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 $RE \geq 3.2\text{mm}$, machining of the holder is required as shown on page K157.

Note 2) The maximum allowable spindle speeds (**RPMX**) are set to ensure tool and insert stability.

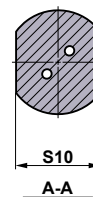
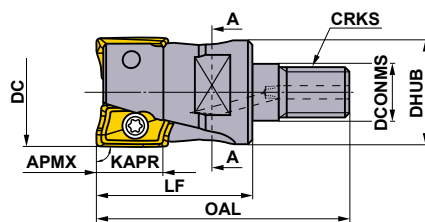
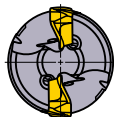
Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.

* WT : Tool Weight

MOUNTING DIMENSIONS

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

ROTATING TOOLS



ROTATING TOOLS

K

SCREW-IN TYPE

Right hand tool holder only.

DC (mm)	Order Number	Stock R		Number of Teeth	Dimensions(mm)						WT* (kg)	APMX (mm)	RMPX	
					DCONMS	DHUB	OAL	LF	S10	CRKS				Insert Type
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 $RE \geq 3.2\text{mm}$, machining of the holder is required as shown on page K157.

Note 2) For screw-in type arbors, refer to page K260.

* 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

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

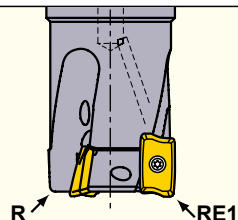
INSERTS

Material	P	Steels																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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* Corner radius RE1 is different from the workpiece 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 1 $\geq$ R3.2mm,
please machine the holder with a radius form as shown
in the table.



RE1 (mm)	R (mm)
3.2	2.0
4.0	2.5
5.0	3.5
6.35	5.0

R : Holder End Radius
RE1 : Insert Corner Radius

ROTATING TOOLS

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED

Material		Hardness	Insert				ae (mm)			
			Grade Priority		Chipbreaker	≤0.25DC	0.25—0.5DC	0.5—0.75DC	DC (Slot)	
			1st	2nd						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

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
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
		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
	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

	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	—	—
	Heat-resistant Alloy	—	DC (Slot)	≤5	0.05	0.05	0.05
				≤2	0.10	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
				≤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.

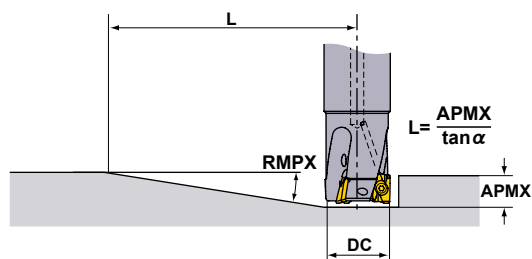
- When using the long shank type and extra long shank type.
- When using long tool overhang with the standard or arbor type.
- When the application has poor clamping rigidity or when using a low rigidity machine.

Note 3) In case of coarse and fine pitch cutters, the coarse pitch type is recommended to prevent vibration.

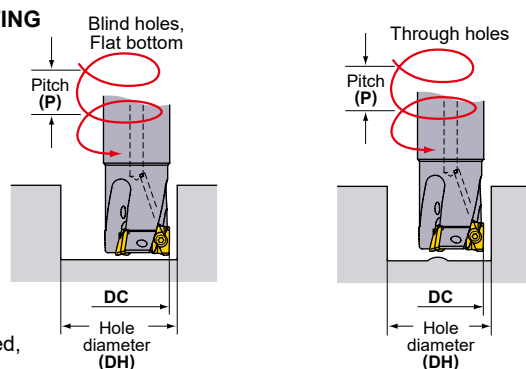
Note 4) For heavy interrupted and unstable cutting, the H chipbreaker is first recommendation.

■ 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	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)
	RMPX							
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 workpiece with ramping angles above, chips could be continuous.

In this case, decrease the ramping angle or feed per tooth.

*1 $L = (15 / \tan \alpha)$. 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 formula below.

$$\{(\text{cutting edge diameter DC}) - (\text{corner radius}) - 0.2\} \times 2$$

ROTATING TOOLS

DEEP SHOULDER MILLING



APX3000

LONG CUTTING EDGE

P

M

K

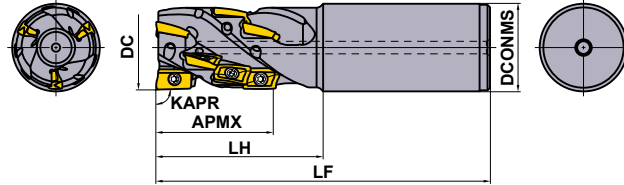
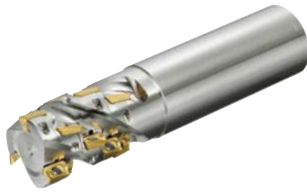
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S

H

K

ROTATING TOOLS



Right hand tool holder only.

SHANK TYPE

DC (mm)	Order Number	Stock R		Number of Flutes	Total	Dimensions(mm)			WT [*] (kg)	APMX (mm)	
						DCONMS	LF	LH			
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 $RE \geq 2.4\text{mm}$, machining of the holder is required as shown on page K162.

Note 2) Corner radius RE 0.8 mm is recommended for the peripheral cutting edges except the bottom cutting edge (end cutting).

Inserts RE 0.2 mm and 0.4 mm can also be used.

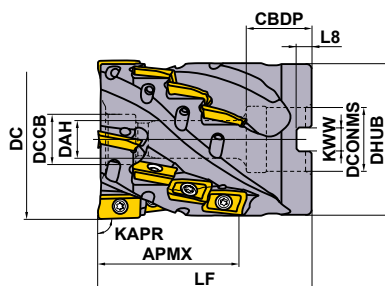
* WT : Tool Weight

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.



Right hand tool holder only.

■ SHELL TYPE

KAPR: 90°

GAMP: +12° GAMF: +6°

DC (mm)	Set Bolt	Geometry
40	HSC08040	
50	HSC10045	

DC (mm)	Order Number	Stock R		Number of Flutes	Total	Dimensions(mm)		WT [*] (kg)	APMX (mm)	 Insert Type
						LF	DCONMS			
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 $RE \geq 2.4\text{mm}$, machining of the holder is required as shown on page K162.

Note 2) Corner radius RE 0.8 mm is recommended for the peripheral cutting edges except the bottom cutting edge (end cutting).

Inserts RE 0.2 mm and 0.4 mm can also be used.

Note 3) Coolant can be supplied from the end face of the central 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)						
		DCONMS	CBDP	DAH	DCCB	DHUB	KWW	L8
40	APX3K-040A16A037RA	16	18	9	14	38.5	8.4	5.6
50	APX3K-050A20A046RA	22	20	11	17	48.4	10.4	6.3

ROTATING TOOLS

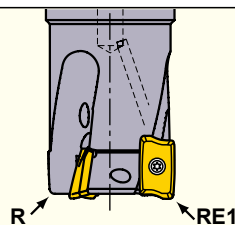
INSERTS

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* Corner radius RE1 is different from the workpiece 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 1 $\geq$ R2.4mm,
please machine the holder with a radius form as shown
in the table.



RE1 (mm)	R (mm)
2.4	1.9
3.0	2.5
3.2	2.7

R : Holder End Radius
RE1 : Insert Corner Radius

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED

Material		Insert				ae (mm)		
		Grade Priority		Chipbreaker		≤0.25DC	0.25—0.75DC	DC (Slot)
P	Mild Steel	MP6120	VP15TF	M	H	180(140—220)	150(110—180)	120(100—140)
		MP6130	VP20RT	M	H	160(120—200)	130(100—160)	100(80—120)
	Carbon Steel Alloy Steel, Alloy Tool Steel	MP6120	VP15TF	M	H	150(100—200)	120(90—150)	100(80—120)
		MP6130	VP20RT	M	H	130(90—170)	90(70—110)	80(60—100)
	Pre-hardened Steel	MP6120	VP15TF	M	H	120(80—160)	100(70—130)	90(50—120)
		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)	—
		VP15TF	—	M	H	180(120—240)	150(100—200)	100(60—140)
	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)
		MP9120	—	M	—	50(40—70)	—	50(40—70)
	Heat Resistant Alloy	MP9120	VP15TF	M	H	40(30—60)	—	40(30—60)
		MP9130	VP20RT	M	H	30(20—40)	—	30(20—40)

DEPTH OF CUT / FEED PER TOOTH

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
			0.25-0.75DC	≤28	0.12	≤37	0.15	≤55
			DC (Slot)	≤18	0.08	≤18	0.08	≤18
	Carbon Steel Alloy Steel	180—280HB	≤0.25DC	≤28	0.12	≤37	0.15	≤55
			0.25-0.75DC	≤28	0.1	≤37	0.12	≤55
			DC (Slot)	≤18	0.08	≤18	0.08	≤18
	Tool Alloy Steel	≤350HB (Annealing)	≤0.25DC	≤28	0.12	≤37	0.15	≤55
			0.25-0.75DC	≤28	0.1	≤37	0.12	≤55
			DC (Slot)	≤18	0.08	≤18	0.08	≤18
	Pre-hardened Steel	35—45HRC	≤0.25DC	≤28	0.12	≤37	0.15	≤55
			0.25-0.75DC	≤28	0.1	≤37	0.12	≤55
			DC (Slot)	≤18	0.08	≤18	0.08	≤18
M	Ferritic and Martensitic Stainless Steel	—	≤0.25DC	≤28	0.12	≤37	0.15	≤55
			0.25-0.75DC	≤28	0.1	≤37	0.12	≤55
			DC (Slot)	≤18	0.08	≤18	0.08	≤18
	Duplex Stainless Steel	≤280HB	≤0.25DC	≤28	0.12	≤37	0.15	≤55
			0.25-0.75DC	≤28	0.1	≤37	0.12	≤55
			DC (Slot)	≤18	0.08	≤18	0.08	≤18
	Precipitation Hardening Stainless Steel	<450HB	≤0.25DC	≤28	0.12	≤37	0.15	≤55
			0.25-0.75DC	≤28	0.1	≤37	0.12	≤55
			DC (Slot)	≤18	0.08	≤18	0.08	≤18
K	Gray Cast Iron	Tensile Strength ≤350MPa	≤0.25DC	≤28	0.15	≤37	0.17	≤55
			0.25-0.75DC	≤28	0.12	≤37	0.15	≤55
			DC (Slot)	≤18	0.1	≤18	0.1	≤18
	Ductile Cast Iron	Tensile Strength ≤800MPa	≤0.25DC	≤28	0.12	≤37	0.15	≤55
			0.25-0.75DC	≤28	0.1	≤37	0.12	≤55
			DC (Slot)	≤18	0.08	≤18	0.08	≤18
N	Aluminium Alloy	—	≤0.25DC	≤28	0.15	≤37	0.17	≤55
			0.25-0.75DC	—	—	≤9	0.17	≤9
			DC (Slot)	—	—	≤9	0.17	≤9
S	Titanium Alloy	≤350HB	≤0.25DC	≤28	0.1	≤37	0.1	≤55
			0.25-0.75DC	—	—	—	—	—
			DC (Slot)	≤18	0.06	≤18	0.06	≤18
	Heat Resistant Alloy	—	≤0.25DC	≤28	0.08	≤37	0.08	≤55
			0.25-0.75DC	—	—	—	—	—
			DC (Slot)	≤18	0.05	≤18	0.05	≤18

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

K

ROTATING TOOLS

ROTATING TOOLS

DEEP SHOULDER MILLING



APX4000

LONG CUTTING EDGE



K

ROTATING TOOLS



Fig.1

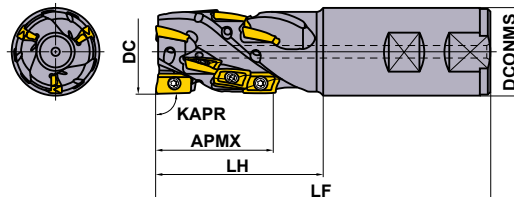
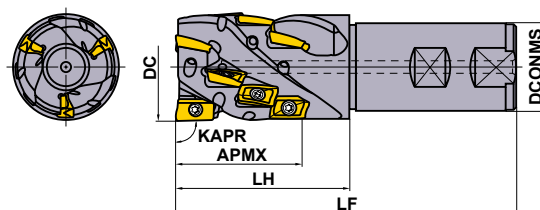


Fig.2



SHANK TYPE

KAPR : 90°

Right hand tool holder only.

DC (mm)	Order Number	Stock R		Number of Flutes	Total	Dimensions(mm)			WT [*] (kg)	APMX (mm)	Fig.		Insert Type
						DCONMS	LF	LH					
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 $RE \geq 3.2$ mm, machining of the holder is required as shown on page K166.

Note 2) Only corner radius RE 0.4 mm and 0.8 mm can be used for the peripheral cutting edges except the bottom cutting edge (the end cutting edge).

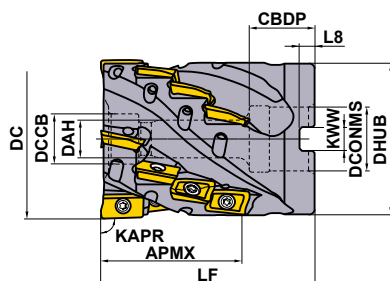
* WT : Tool Weight

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

KAPR :90°

GAMP :+12° GAMF :+6°

DC (mm)	Order Number	Stock R		Number of Flutes	Total	Dimensions(mm)		WT [*] (kg)	APMX (mm)	 Insert Type
						LF	DCONMS			
50	APX4K-050A09A042RA	●	●	3	9	65	22	0.75	42	AO _T 18
63	APX4K-063A16A056RA	●	●	4	16	85	27	1.63	56	AO _T 18

Note 1) When using inserts with corner radius $RE \geq 3.2$ mm, machining of the holder is required as shown on page K166.

Note 2) Only corner radius RE 0.4 mm and 0.8 mm can be used for the peripheral cutting edges except the bottom cutting edge (the end cutting edge).

Note 3) Coolant can be supplied from the end face of the central 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)						
		DCONMS	CBDP	DAH	DCCB	DHUB	KWW	L8
50	APX4K-050A09A042RA	22	22	11	17	48	10.4	6.3
63	APX4K-063A16A056RA	27	28	13	20	60.7	12.4	7

ROTATING TOOLS

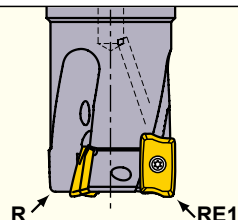
INSERTS

Material	P	Steels																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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* Corner radius RE1 is different from the workpiece 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 1 $\geq$ R3.2mm,
please machine the holder with a radius form as shown
in the table.



RE1 (mm)	R (mm)
3.2	2.0
4.0	2.5
5.0	3.5
6.35	5.0

R : Holder End Radius
RE1 : Insert Corner Radius

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED

	Material	Hardness	Insert				Cutting Width a_e (mm)		
			Grade		Chipbreaker		$\leq 0.15DC$	0.15–0.3DC	DC (Slot)
			1st Recommendation	2nd Recommendation					
P	Mild Steel	$\leq 180HB$	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	$\leq 270HB$	MP7130	VP15TF	M	H	160(120–200)	120(100–140)	100(80–120)
K	Gray Cast Iron	$\leq 350MPa$	MC5020	VP15TF	H	—	230(180–280)	190(140–240)	190(140–240)
	Ductile Cast Iron	$\leq 800MPa$	MC5020	VP15TF	H	—	190(140–220)	170(120–220)	170(120–220)
S	Titanium Alloy	$\leq 350HB$	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

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
	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 workpieces, where no vibration occurred.
Please adjust processing conditions if vibration is generated.

K

ROTATING TOOLS

ROTATING TOOLS

MULTI FUNCTIONAL MILLING

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



AXD4000

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ROTATING TOOLS

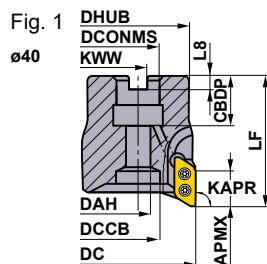


Fig. 2

ø50
ø63
ø80
ø100

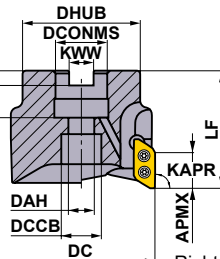
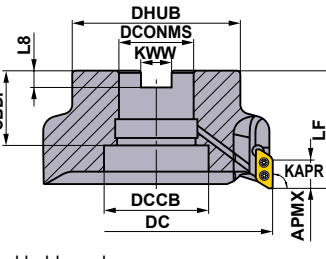


Fig. 3

ø125



Right hand tool holder only.

Cutter Diameter DC (mm)	Set Bolt	Geometry		
Ø40	HFF08043H	①	①	③
Ø50, Ø63	HSC10030H	②	②	③
Ø80	HSC12035H			
Ø100	HSC16040H			
Ø125	MBA20040H	③	③	③

ARBOR TYPE

KAPR :90°

GAMP :+14°-15° GAMF :+21°-+26°

Type	Insert Corner Radius 	Order Number	Stock 		Number of Teeth	Dimensions(mm)								WT *2 (kg)	APMX (mm)	Max. Allowable Revolution (min ⁻¹)	Fig. 					
						DC	LF	DCONMS	CBDP	DAH	DHUB	KWW	L8									DCCB
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 K182.

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

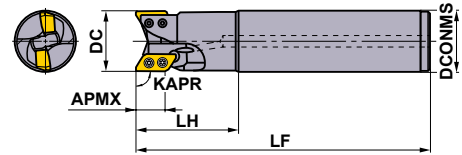
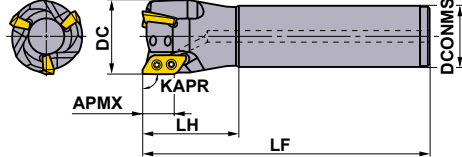


Fig.2



Right hand tool holder only.

SHANK TYPE

KAPR :90°

Type	Insert Corner Radius	Order Number	Stock		Number of Teeth	Dimensions(mm)				APMX (mm)	Max. Allowable Revolution (min ⁻¹)	Fig.				
						DC	LF	LH	DCONMS							
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	XDGX1750
		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 K182.

Note 2) When using the tool at high spindle speeds, ensure that the tool and milling chuck are correctly balanced.

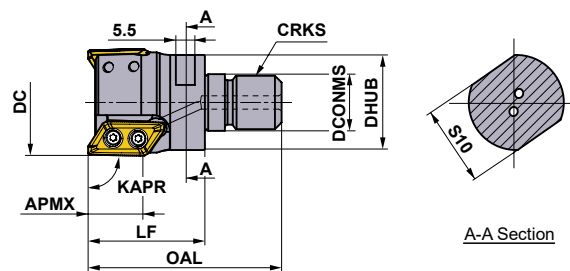
Note 3) Note for inserts with a corner radius of 1.6 and above, as corner radius increases the LF and LH dimensions decrease.

★ Clamp Torque (N • m) : TS3SBS=1.5, TS3SB=1.5

ROTATING TOOLS



Fig.1



Right hand tool holder only.

SCREW-IN TYPE

DC (mm)	Type	Insert Corner Radius RE	Order Number	Stock R		Number of Teeth	Dimensions (mm)						WT* (kg)	APMX (mm)	Max. Allowable Revolution (min ⁻¹)	Insert Type
							DCONMS	DHUB	OAL	LF	S10	CRKS				
25	A Type	0.4-3.2	NEW AXD4000R252AM1228A	●	●	2	12.5	23.5	50	28	19	M12	0.06	15.0	49000	XDGX1750
25	B Type	4.0-5.0	NEW AXD4000R252AM1228B	●	●	2	12.5	23.5	50	28	19	M12	0.06	14.8	49000	XDGX1750
28	A Type	0.4-3.2	NEW AXD4000R282AM1228A	●	●	2	12.5	23.5	50	28	19	M12	0.07	15.0	48500	XDGX1750
28	B Type	4.0-5.0	NEW AXD4000R282AM1228B	●	●	2	12.5	23.5	50	28	19	M12	0.07	14.8	48500	XDGX1750
32	A Type	0.4-3.2	NEW AXD4000R322AM1635A	●	●	2	17.0	28.5	58	35	24	M16	0.15	15.0	48000	XDGX1750
32	B Type	4.0-5.0	NEW AXD4000R322AM1635B	●	●	2	17.0	28.5	58	35	24	M16	0.15	14.8	48000	XDGX1750
35	A Type	0.4-3.2	NEW AXD4000R353AM1635A	●	●	3	17.0	28.5	58	35	24	M16	0.15	15.0	41000	XDGX1750
35	B Type	4.0-5.0	NEW AXD4000R353AM1635B	●	●	3	17.0	28.5	58	35	24	M16	0.15	14.8	41000	XDGX1750
40	A Type	0.4-3.2	NEW AXD4000R403AM1635A	●	●	3	17.0	28.5	58	35	24	M16	0.18	15.0	38000	XDGX1750
40	B Type	4.0-5.0	NEW AXD4000R403AM1635B	●	●	3	17.0	28.5	58	35	24	M16	0.18	14.8	38000	XDGX1750

Note 1) For screw-in type arbors, refer to page K260.

Note 2) The maximum allowable revolutions are set to ensure tool and insert stability.

Before operating the tool read the operational guidance on page K182.

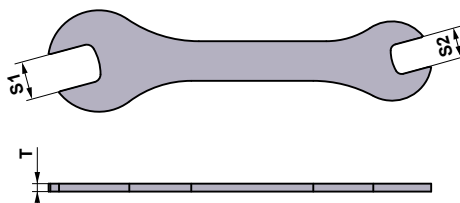
* WT : Tool Weight

SPARE PARTS

	*		
Clamp Screw		Wrench	Anti-seize Lubricant
TS3SB		TKY08D	MK1KS

* Clamp Torque (N · m) : TS3SB=1.5

Parts Sold Separately Arbor Mounting Spanner



Order Number	Dimensions (mm)				
	S1	*	S2	*	T
AKY1924050A	24		19		5

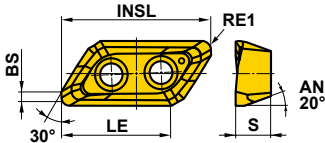
* Clamp Torque (N · m) : 19 = 80, 24 = 90

Note 1) Due to the structure of the head, it may not be possible to use a commercially available spanner to attach the arbor. It is recommended to use the dedicated spanner.

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

(10 inserts in one case)

INSERTS

Material	N	Aluminium Alloy		●	✱	✱	✱	Cutting Conditions (Guide):					Geometry		
	S	Titanium Alloy						● :Stable Cutting	● :General Cutting	✱ :Unstable Cutting					
								Honing : F :Sharp E :Round							
Shape	Order Number	Class	Honing	Stock				Dimensions (mm)							
				Coated		Carbide		INSL	LE	S	BS	RE1*			
				LC15TF	MP9120									TF15	MT2010
	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	
	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	
	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(RE1) has a different shape than machined workpiece R.
When a GM chipbreaker is recommended, take note of the dimensional precision of the workpiece shape.

HOLDER AND INSERT CORNER RADIUS COMBINATION

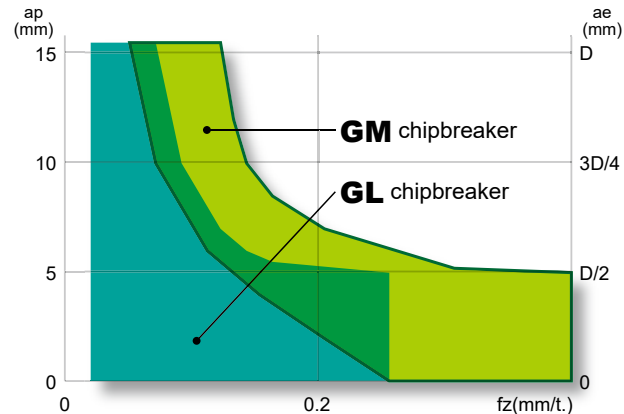
Holder	A Type Holder								B Type Holder	
	AXD4000-○○○○○○○○A AXD4000R○○○○○○○○A								AXD4000-○○○○○○○○B AXD4000R○○○○○○○○B	
Applicable Insert Corner R (RE1)										
	XDGX 175004PD R	XDGX 175008PD R	XDGX 175012PD R	XDGX 175016PD R	XDGX 175020PD R	XDGX 175024PD R	XDGX 175030PD R	XDGX 175032PD R	XDGX 175040PD R	XDGX 175050PD R

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

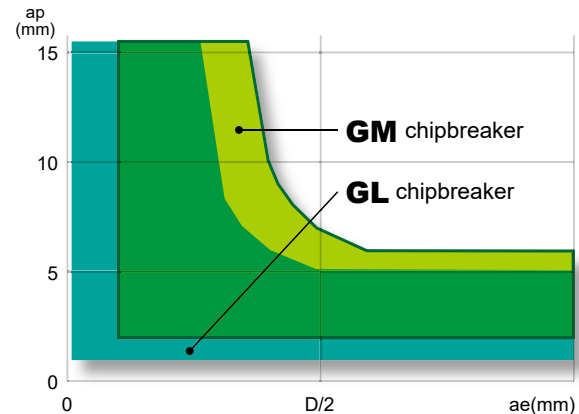
AXD4000 Selection of insert

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 chipbreaker with a strong cutting edge.

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



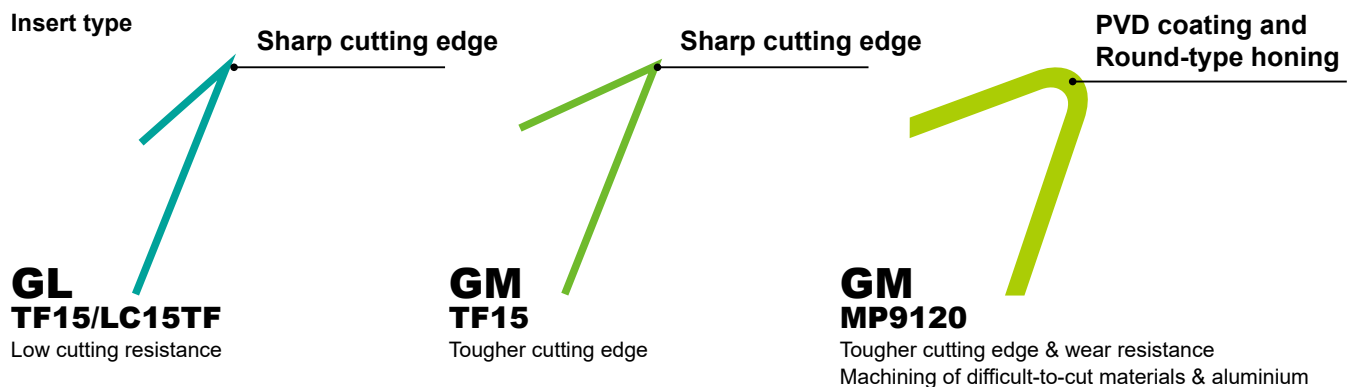
Selection of insert according to the width of cut and the required cutting depth



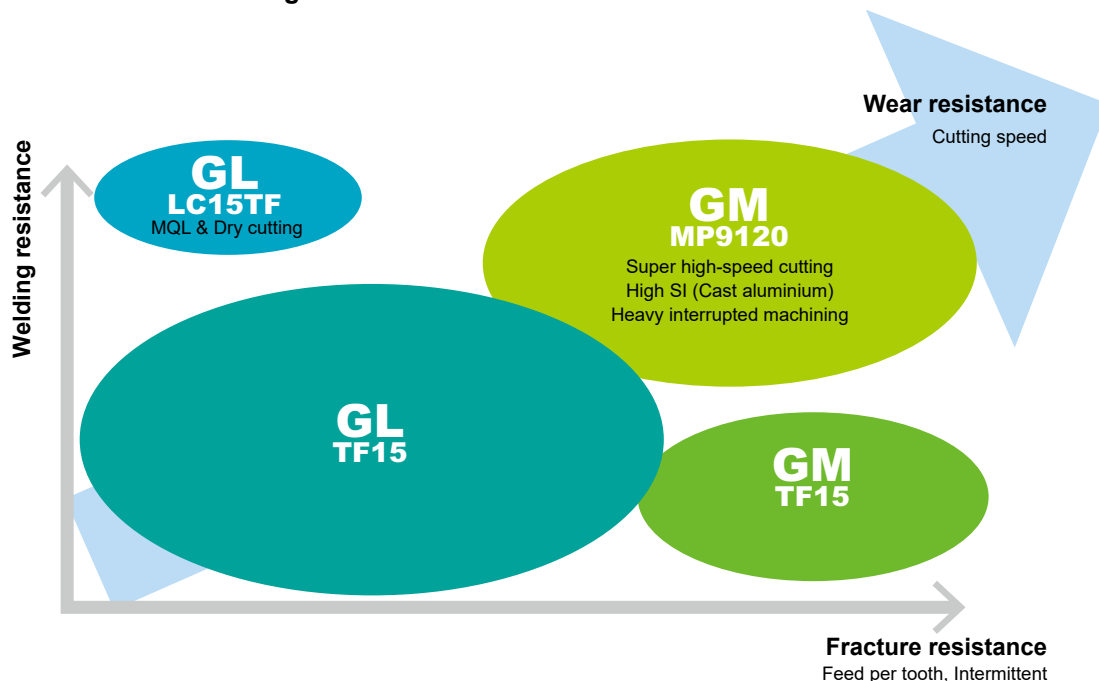
1st recommendation for machining aluminium alloys is GL chipbreaker.

Under high-load conditions such as deep or high feed cutting, it is advisable to use the GM chipbreaker.

Selection of insert according to cutting edge



Selection of insert according to wear resistance



RECOMMENDED CUTTING CONDITIONS

■ Cutting Speed

	Material		Grade	Chipbreaker	Cutting Speed V _c (mm/min)
N	Aluminium Alloy (AlMg1SiCu, AlZn6MgCu etc)	Si<5%	TF15 LC15TF	GL	1000 (200—3000)
			TF15 MT2010 MP9120	GM	1000 (200—3000)
	Aluminium Alloy (AlSi9Cu3, AlSi11Cu2, AlSi17Cu4Mg 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

	Material	Chipbreaker	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 (AlMg1SiCu, AlZn6MgCu etc)	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 (AlMg1SiCu, AlZn6MgCu etc)	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 (AlSi9Cu3 etc) Aluminium Alloy (AlSi11Cu2, AlSi17Cu4Mg etc)	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.

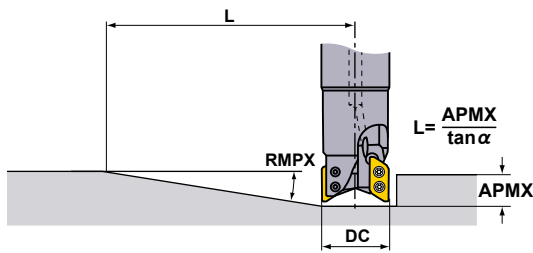
K

ROTATING TOOLS

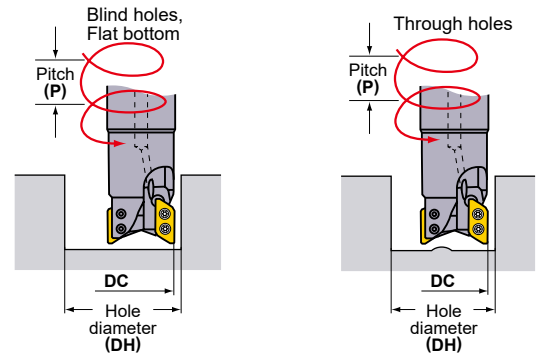
ROTATING TOOLS

■ RAMPING/HELICAL MILLING

● RAMPING



● HELICAL MILLING



RAMPING/HELICAL MILLING (Aluminium Alloy)

Holder Type	Cutting Edge Diameter DC (mm)	Insert Corner R RE (mm)	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling	
			Maximum Ramping Angle RMPX	Minimum Distance L *1 (mm)	Maximum Hole Diameter DH max. (mm)	Maximum Pitch P max. (mm)	Minimum Hole Diameter DH min. (mm)	Maximum Pitch P max. (mm)	Minimum Hole Diameter DH min. (mm)	Maximum Pitch P max. (mm)
A type	20	0.4—1.2	20.7°	42	37.1 *2	14	36.1	14	22	2
		1.6—2.4	19.9°	43	34.7 *3	13	34.6	13	22	2
		3.0—3.2	18.9°	46	33.1 *4	12	33.3	12	22	1
	25	0.4—1.2	23.1°	37	47.1 *2	14	46	14	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:

$L = (\text{maximum depth of cut}) / \tan \alpha$. 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. $\{(\text{cutting edge diameter DC}) - (\text{corner radius RE}) - 0.25\} \times 2$

*3 Corner radius of 2.4mm. For other corner radii, use the following formula. $\{(\text{cutting edge diameter DC}) - (\text{corner radius RE}) - 0.25\} \times 2$

*4 Corner radius of 3.2mm. For other corner radii, use the following formula. $\{(\text{cutting edge diameter DC}) - (\text{corner radius RE}) - 0.25\} \times 2$

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:

$L = (\text{maximum depth of cut} / \tan \alpha)$. 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. $\{(\text{cutting edge diameter DC}) - (\text{corner radius RE}) - 0.25\} \times 2$

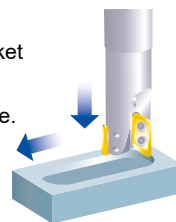
*3 Corner radius of 2.4mm. For other corner radii, use the following formula. $\{(\text{cutting edge diameter DC}) - (\text{corner radius RE}) - 0.25\} \times 2$

*4 Corner radius of 3.2mm. For other corner radii, use the following formula. $\{(\text{cutting edge diameter DC}) - (\text{corner radius RE}) - 0.25\} \times 2$

Max.Drilling Depth (Aluminium Alloy)

Type	Insert Corner R RE (mm)	Max.Drilling Depth (mm)					
		Cutting Edge Diameter DC (mm)					
		Ø20	Ø25	Ø28	Ø32	Ø35	Ø40-Ø125
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.



ROTATING TOOLS

MULTI FUNCTIONAL MILLING

<FOR ALUMINIUM ALLOY CUTTING>



AXD4000A

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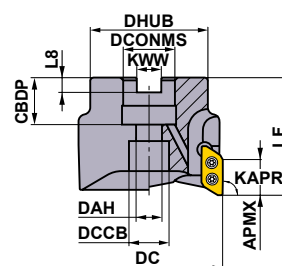
H

K

ROTATING TOOLS



ø50



Right hand tool holder only.

Cutter Diameter DC (mm)	Set Bolt	Geometry
Ø50	HSC10030H	

ARBOR TYPE

KAPR : 90°

GAMP : +10° GAMF : +21°

DC	Type	Insert Corner Radius RE	Order Number	Stock R		Number of Teeth	Dimensions (mm)		WT (kg)	APMX (mm)	RPMX (min ⁻¹)	 Insert Type
							LF	DCONMS				
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 situations 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)						
		DCONMS	CBDP	DAH	DCCB	DHUB	KWW	L8
50	AXD4000A-050A04RD	22	20	11	17	45	10.4	6.3
50	AXD4000A-050A04RE	22	20	11	17	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.

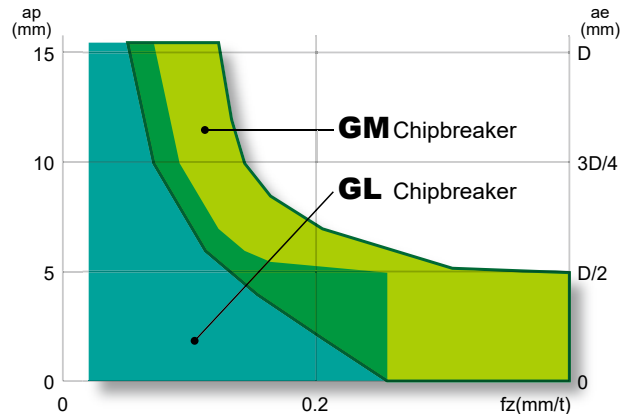
(10 inserts in one case)

Technical drawing of a yellow angle bracket. The drawing shows a side view and a cross-section. Dimensions include: INSL (overall length), BS (overall width), LE (length of the main body), RE1 (radius of the rounded end), AN 20° (angle of the flange), and S (thickness of the flange). The bracket has two mounting holes and a 30° chamfer on the side.

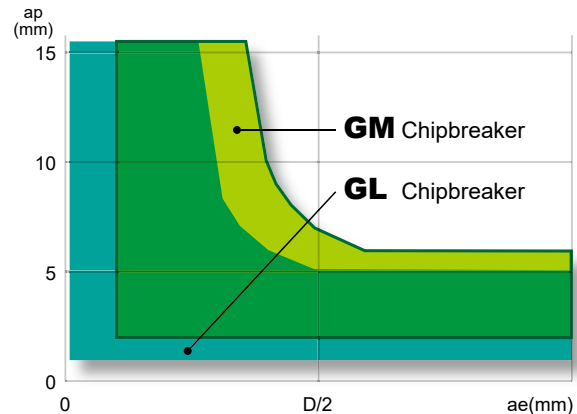
AXD4000A Selection of Insert

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 chipbreaker with a strong cutting edge.

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



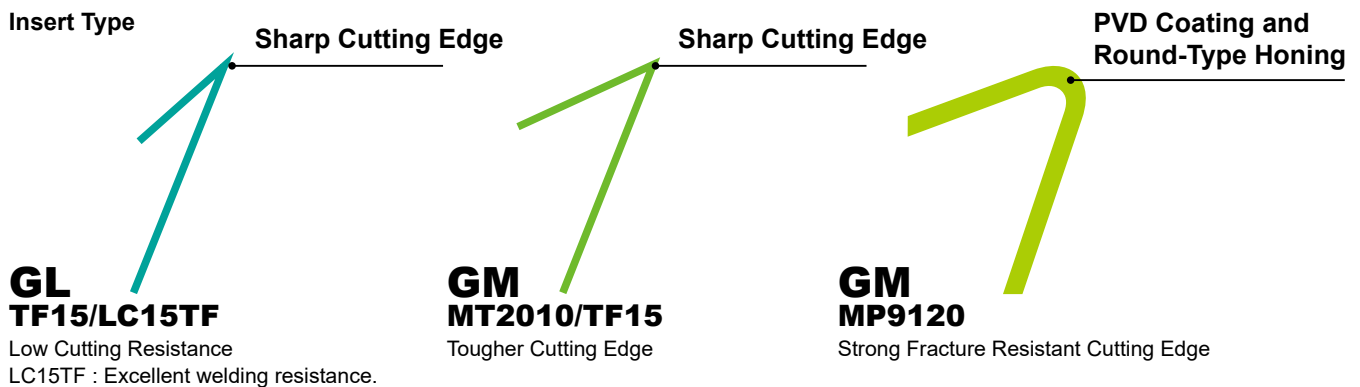
Selection of insert according to the width of cut and the required cutting depth



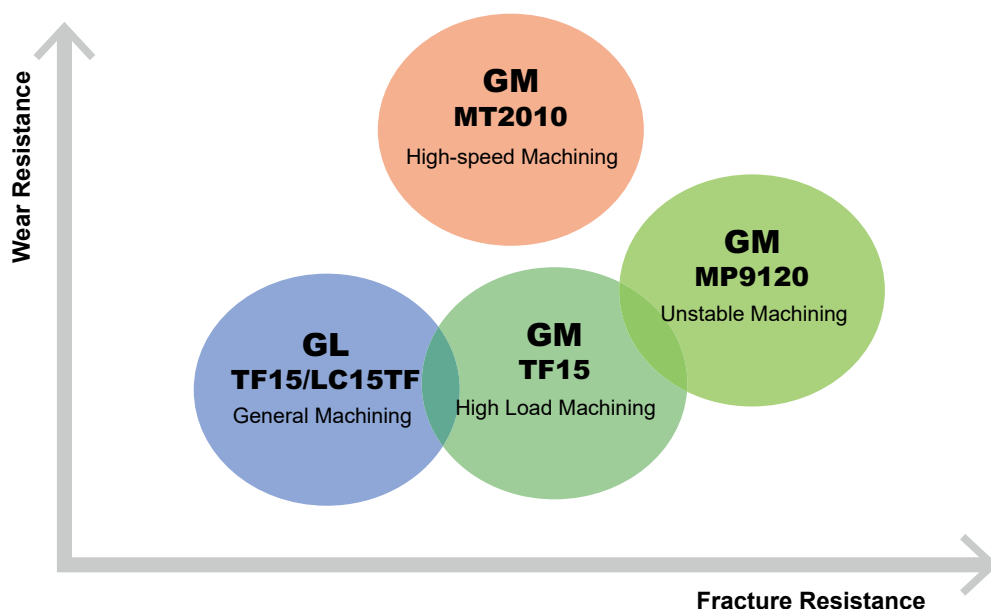
1st recommendation for machining aluminium alloys is GL chipbreaker.

Under high-load conditions such as deep or high feed cutting, it is advisable to use the GM chipbreaker.

Selection of Insert According to Cutting Edge



Selection of insert according to wear resistance



RECOMMENDED CUTTING CONDITIONS

Material	Properties	Grade	Chipbreaker	Cutting Speed V_c (mm/min)	Cutting Width a_e (mm)	Depth of Cut a_p (mm)	Feed per Tooth (mm/t.)
N	Aluminium Alloys (AlZn6MgZr, AlZn6MgCu, AlCuMg1, AlMg1SiCu etc) Aluminium-lithium Alloy	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
		TF15 LC15TF	GL	4000(2000—5000)	DC (Slot)	≤ 5	≤ 0.30
					≤ 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 workpieces and machine rigidity, where no vibration occurred.

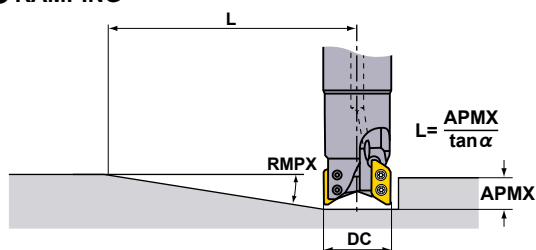
If vibrations occur make adjustments according to the machining conditions.

Note 2) Vibrations may occur in the following conditions:

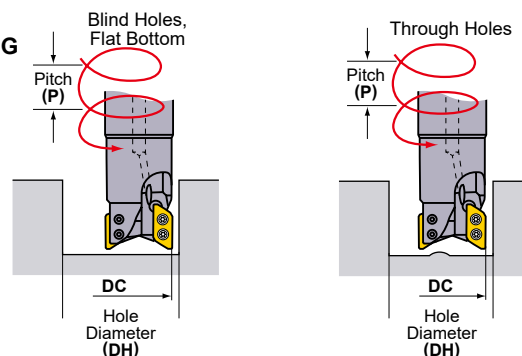
- When using a long tool overhang.
- When pocket machining corner radii.
- When the workpieces has poor clamping rigidity or when the machine rigidity or workpiece rigidity is low, vibrations can occur easily, if so, reduce cutting conditions such as width and depth of cut and feed per tooth.

RAMPING / HELICAL MILLING / 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 *1 (mm)	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:

$L = (\text{maximum depth of cut } APMX) / \tan \alpha$. 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. $\{(\text{cutting edge diameter } DC) - (\text{corner radius } RE) - 0.3\} \times 2$

*3 Corner radius of 2.4mm. For other corner radii, use the following formula. $\{(\text{cutting edge diameter } DC) - (\text{corner radius } RE) - 0.3\} \times 2$

*4 Corner radius of 3.2mm. For other corner radii, use the following formula. $\{(\text{cutting edge diameter } DC) - (\text{corner radius } RE) - 0.3\} \times 2$

Note 1) The recommended ramping feed is 0.05mm/t. or under.

ROTATING TOOLS

MULTI FUNCTIONAL MILLING

<FOR ALUMINIUM ALLOY CUTTING>



AXD7000

P

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S

H



ROTATING TOOLS

Fig.1

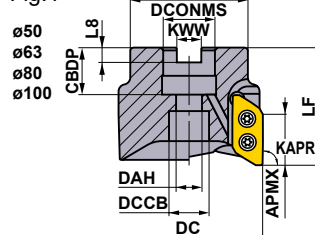
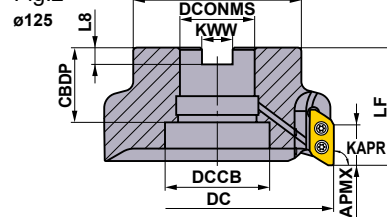


Fig.2



Right hand tool holder only.

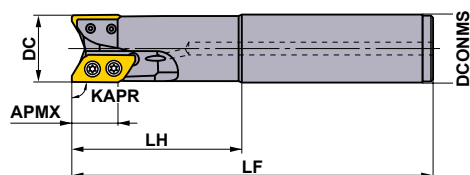
ARBOR TYPE

KAPR:90°

GAMP:+11° GAMF:+26°—+29°

Cutter Diameter DC (mm)	Set Bolt	Geometry
Ø50, Ø63	HSC10030H	
Ø80	HSC12035H	
Ø100	HSC16040H	
Ø125	MBA20040H	

Type	Insert Corner Radius RE	Order Number	Stock	Number of Teeth	Dimensions (mm)										*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	Order Number	Stock		Number of Teeth	Dimensions (mm)				APMX	Max. Allowable Revolution (min ⁻¹)	 *1			
	RE		R			DC	LF	LH	DCONMS	(mm)		Clamp Screw	Wrench	Anti-seize Lubricant	Insert
A Type	0.8	AXD7000R322SA32SA	●	—	2	32	170	80	32	21	41000	TS4SB	TKY15D	MK1KS	XDGX2270 
	3.2	AXD7000R402SA40SA	●	—	2	40	170	80	40	21	36000	TS4SBL	TKY15D	MK1KS	
B Type	4.0	AXD7000R322SA32SB	●	—	2	32	170	80	32	20.4	41000	TS4SB	TKY15D	MK1KS	
	5.0	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 K182.

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.

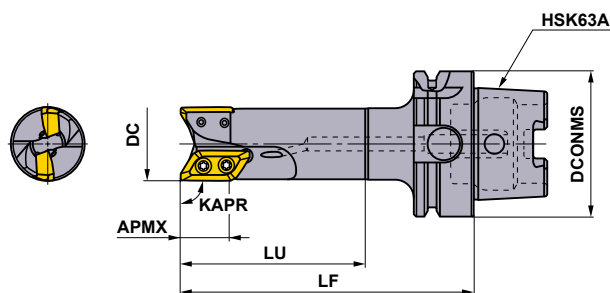
*1 Clamp Torque (N · m) : TS4SB=3.5, TS4SBL=3.5

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	Order Number	Stock	Number of Teeth	Dimensions (mm)				APMX	RMPX *2	Max. Allowable Revolution	Clamp Screw	Wrench	Anti-seize Lubricant	Insert
A type	RE		R		DC	LF	LU	DCONMS	(mm)		(min ⁻¹)				
0.8	AXD7000R03202A-H63A	●	—	2	32	127	80	63	21	19°	41000	TS4SB	TKY15D	MK1KS	XDGX227000 PDFR-GL
—	AXD7000R04002A-H63A	●	—	2	40	132	85	63	21	13°	36000	TS4SBL	TKY15D	MK1KS	
3.2	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 K182.

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

Material	N	Aluminium Alloy				Cutting Conditions (Guide):				Honing:			

■ 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 (RE1)							
	XDGX227008PDFR-GL	XDGX227016PDFR-GL	XDGX227020PDFR-GL	XDGX227030PDFR-GL	XDGX227032PDFR-GL	XDGX227040PDFR-GL	XDGX227050PDFR-GL

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

■ 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.

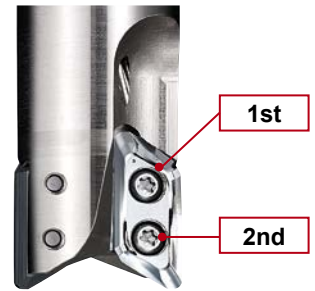
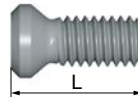


Fig.1

Type	AXD4000		AXD7000	
Cutting Edge Diameter DC (mm)	ø20	ø25-ø125	ø32	ø40-ø125
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

Material		Grade	Chipbreaker	Cutting Speed V_c (mm/min)
N	Aluminium Alloy	LC15TF	GL	1000 (200—3000)
		TF15	GL	1000 (200—3000)
		LC15TF	GL	1000 (200—3000)

■ Depth of Cut / Feed per Tooth

Material		Chipbreaker	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	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
		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.

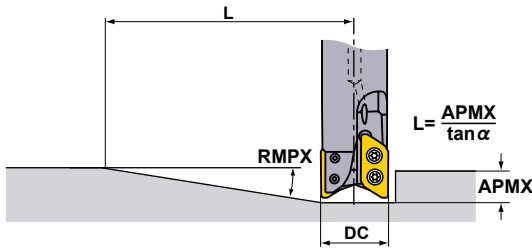
Note 2) Vibrations may occur in the following conditions:

- 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.

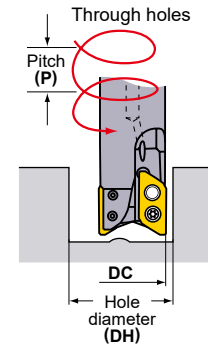
ROTATING TOOLS

■ 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
B type	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
	32	4, 5	18°	63
	40	4, 5	11°	105

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
B type	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
	32	4	41	7
		5	41	6

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 = $15 / \tan \alpha$). 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.

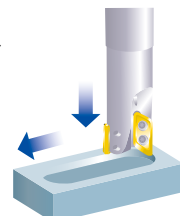
For other corner radii, use the formula below.

{(cutting edge diameter DC) - (corner radius) - (Width of wiper edge BS) - 0.1} × 2

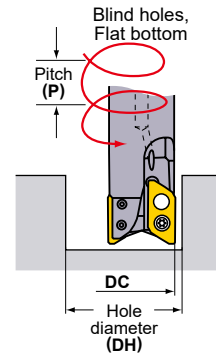
■ Max. Drilling Depth (Aluminium Alloy)

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.



● HELICAL MILLING



RAMPING/HELICAL MILLING (ALUMINIUM ALLOY)

Type	DC (mm)	RE (mm)	BS (mm)	Helical Milling (Blind Hole, Flat Bottom)			
				DH max. (mm) *2	P max. (mm)	DH min. (mm) *3	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 = $15 / \tan \alpha$). 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.

$$\{(\text{cutting edge diameter DC}) - (\text{corner radius}) - 0.3\} \times 2$$

*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 using the formula below.

$$\{(\text{cutting edge diameter DC}) - (\text{corner radius}) - (\text{Width of wiper edge BS}) - 0.1\} \times 2$$

ROTATING TOOLS

MULTI FUNCTIONAL MILLING



AQX

P

M

K

N

S

H

K

ROTATING TOOLS



Fig.1



Number of Teeth : 4

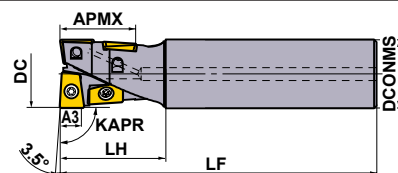
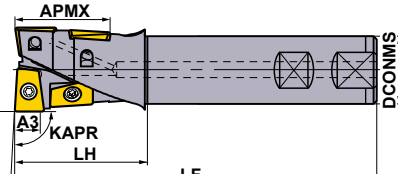


Fig.2



Number of Teeth : 4



Right hand tool holder only.

STANDARD EDGE TYPE

KAPR : 90°

Type	Order Number	Stock		Dimensions (mm)						Type (Fig.)	 *3		
				DC	LF	DCONMS	LH	A3*1	APMX*2		Clamp Screw	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



Number of Teeth : 2

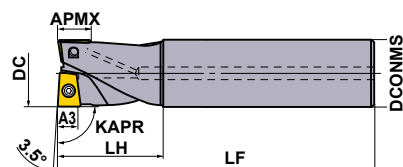
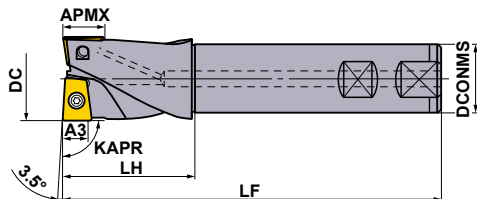


Fig.2



Number of Teeth : 2



K

ROTATING TOOLS

SHORT EDGE TYPE

KAPR : 90°

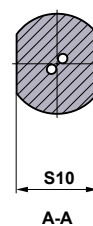
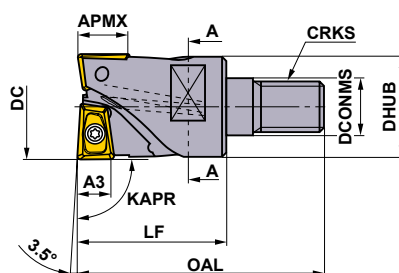
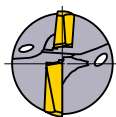
Right hand tool holder only.

Type	Order Number	Stock		Dimensions (mm)						Type (Fig.)			
				DC	LF	DCONMS	LH	A3 ^{*1}	APMX ^{*2}				
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	
Long	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	
	AQXR502SN42L	★	—	50	170	42	70	15	23	1	TS6S	③TKY30T	
	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



SCREW-IN TYPE

KAPR :90°

Right hand tool holder only.

Order Number	Stock		Dimensions (mm)									*4 WT (kg)	 *3	 ① ②	
			DC	DCONMS	DHUB	OAL	LF	S10	CRKS	A3	*1		APMX	*2	Clamp Screw
AQXR162M08A30	●	●	16	8.5	14.7	48	30	10	M8	4.5	7.4	0.1	TS2A	①TKY06F	QOOT0830R-000
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	QOOT1035R-000
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	QOOT1342R-000
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	QOOT1651R-000
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	QOOT1856R-000
AQXR402M16A45	●	●	40	17	28.5	68	45	24	M16	12	18	0.3	TS55	②TKY25D	QOOT2062R-000

Note 1) For screw-in type arbors, refer to page K260.

*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

INSERTS

[illegible]

* HTi10 insert honing is "F" type.

RECOMMENDED CUTTING CONDITIONS

■ CUTTING SPEED

Material	No.	Hardness	Chipbreaker	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

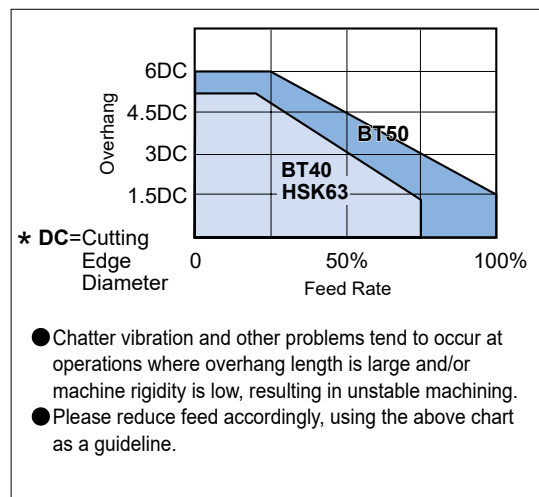
K189

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.

Tool diameter	Recommended depth of cut t (mm)
Ø16, 17	12 — 14
Ø20, 21	14 — 17
Ø25, 26	17 — 22
Ø32, 33	22 — 28
Ø35	25 — 32
Ø40	28 — 35
Ø50	35 — 45

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



CUTTING CONDITIONS FOR SHOULDER MILLING

Material	No.	Hardness	Ø16, 17			Ø20, 21			Ø25, 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	≤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
M	Carbon Steel Alloy Steel	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
K	Stainless Steel	—	≤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
N	Cast Iron	—	≤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
S	Aluminium Alloy	—	≤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
H	Titanium Alloy	—	≤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	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

Material	No.	Hardness	Ø32, 33			Ø35			Ø40			Ø50		
			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	≤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
M	Carbon Steel Alloy Steel	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
K	Stainless Steel	—	≤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
N	Cast Iron	—	≤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
S	Aluminium Alloy	—	≤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
H	Titanium Alloy	—	≤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	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 chipbreaker (VP15TF), please reduce the feed rate by 20%.

Note 3) For the details of the material number, please refer to the cutting speed on page K189.

■ CUTTING CONDITIONS FOR SLOT MILLING

	Material	No.	Hardness	Ø16, 17		Ø20, 21		Ø25, 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
				—	—	—	—	—	—

	Material	No.	Hardness	Ø32, 33		Ø35		Ø40		Ø50	
				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
				—	—	—	—	—	—	—	—

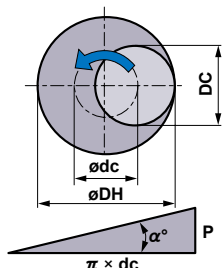
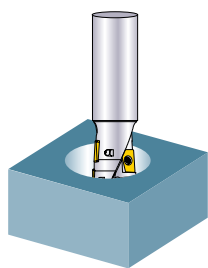
Note 1) Please pay special attention on the depth of cut when using the short edge type.

Note 2) When using the G1 chipbreaker (VP15TF), please reduce the feed rate by 20%.

Note 3) For the details of the material number please refer to the cutting speed on page K189.

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 chipbreaker (VP15TF), please reduce the feed rate by 20%.

$$\varnothing dc = \varnothing DH - DC$$

Locus of the centre of the tool Desired hole diameter Cutting edge diameter

$$P = \pi \times dc \times \tan \alpha^\circ$$

(Note) $\alpha^\circ \leq 3^\circ$

	Material	No.	Hardness	Ø16, 17				Ø20, 21				Ø25, 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

	Material	No.	Hardness	Ø32, 33				Ø35				Ø40				Ø50			
				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

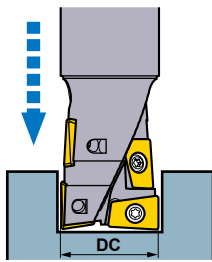
Note 1) Helical grooving is strongly recommended for machining tempered steel.

Note 2) When using G1 chipbreaker (VP15TF), please reduce the feed rate by 20%.

Note 3) For the details the material number please refer to the cutting speed on page K189.

■ FOR DRILLING AND PLUNGING

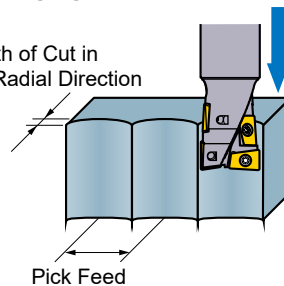
● Drilling



- 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

Depth of Cut in the Radial Direction



- 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

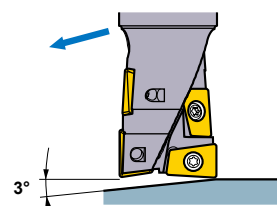
	Material	No.	Hardness	Ø16, 17		Ø20, 21		Ø25, 26		Ø32, 33, 35		Ø40		Ø50	
				fr (mm/rev)	Step (mm)	fr (mm/rev)	Step (mm)	fr (mm/rev)	Step (mm)	fr (mm/rev)	Step (mm)	fr (mm/rev)	Step (mm)	fr (mm/rev)	Step (mm)
P	Mild Steel	1	≤180HB	0.035	0.2	0.045	0.3	0.05	0.3	0.055	0.3	0.06	0.3	0.065	0.3
	Carbon Steel 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 chipbreaker (VP15TF), please reduce the feed rate by 20%.

Note 3) For the details the material number please refer to the cutting speed on page K189.

■ 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.

K

ROTATING TOOLS

ROTATING TOOLS

MULTI FUNCTIONAL MILLING



AJX

P M K N S H

ROTATING TOOLS

K



Fig.1

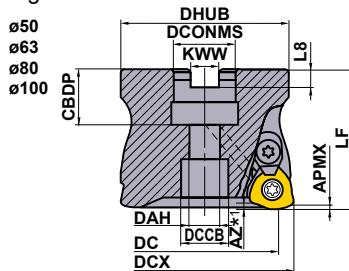
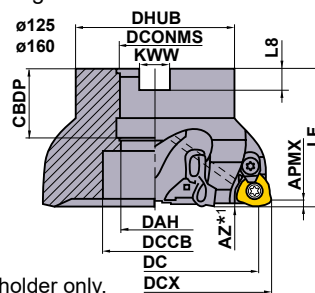


Fig.2



Right hand tool holder only.

(mm)

DCX	Set Bolt	Geometry
DCONMS mm size		
Ø50, Ø52, Ø63, Ø66	HSC10030H	
Ø80	HSC12035H	
Ø100	HSC16040H	
Ø125, Ø160	MBA20040H	

ARBOR TYPE

AJX09 GAMP :+8°
GAMF :-6°

AJX12 GAMP :+8°
GAMF :-5°—4°

AJX14 GAMP :+8°
GAMF :-5°—3°

DCX (mm)	Order Number	Stock	Number of Teeth	Dimensions (mm)			WT*2 (kg)	APMX (mm)	RMPX	Fig.	Insert Type
		R		DC	LF	DCONMS					
50	AJX12-050A03R	●	3	38.3	50	22	0.4	1.2	2°	1	JDM1204
50	AJX12-050A04R	●	4	38.3	50	22	0.4	1.2	2°	1	JDM1204
50	AJX09-050A05R	●	5	40	50	22	0.5	1.2	1.1°	1	JDM09T3
52	AJX12-052A03R	□	3	40.3	50	22	0.4	1.2	1.8°	1	JDM1204
52	AJX12-052A04R	●	4	40.3	50	22	0.4	1.2	1.8°	1	JDM1204
52	AJX09-052A05R	●	5	42	50	22	0.4	1.2	1.1°	1	JDM09T3
63	AJX14-063A03R	★	3	51.1	50	22	0.7	1.2	2.8°	1	JDM1405
63	AJX14-063A04R	●	4	51.1	50	22	0.7	1.2	2.8°	1	JDM1405
63	AJX12-063A05R	●	5	51.3	50	22	0.9	1.2	1.5°	1	JDM1204
NEW 63	AJX14-063X03R	★	3	51.1	50	27	0.6	1.2	2.8°	1	JDM1405
NEW 63	AJX14-063X04R	★	4	51.1	50	27	0.6	1.2	2.8°	1	JDM1405
NEW 63	AJX12-063X05R	★	5	51.3	50	27	0.6	1.2	1.5°	1	JDM1204
NEW 66	AJX14-066X03R	★	3	54.1	50	27	0.6	1.2	2.6°	1	JDM1405
NEW 66	AJX14-066X04R	★	4	54.1	50	27	0.6	1.2	2.6°	1	JDM1405
NEW 66	AJX12-066X05R	★	5	54.3	50	27	0.7	1.2	1.4°	1	JDM1204
66	AJX14-066A03R	□	3	54.1	50	22	0.7	1.2	2.5°	1	JDM1405
66	AJX14-066A04R	●	4	54.1	50	22	0.7	1.2	2.5°	1	JDM1405
66	AJX12-066A05R	●	5	54.3	50	22	0.8	1.2	2.5°	1	JDM1204
80	AJX14-080A04R	★	4	68.1	50	27	1.2	1.2	1.8°	1	JDM1405
80	AJX14-080A05R	●	5	68.1	50	27	1.2	1.2	1.8°	1	JDM1405
80	AJX12-080A06R	●	6	68.3	50	27	1.2	1.2	1.1°	1	JDM1204
100	AJX14-100A05R	●	5	88.1	63	32	2.4	1.2	1.2°	1	JDM1405
100	AJX14-100A06R	●	6	88.1	63	32	2.4	1.2	1.2°	1	JDM1405
100	AJX12-100A07R	●	7	88.3	63	32	2.6	1.2	0.8°	1	JDM1204
125	AJX14-125B05R	★	5	113.2	63	40	3.3	1.2	0.8°	2	JDM1405
125	AJX14-125B07R	●	7	113.2	63	40	3.3	1.2	0.8°	2	JDM1405
160	AJX14-160B06R	★	6	148.2	63	40	5	1.2	0.5°	2	JDM1405
160	AJX14-160B08R	★	8	148.2	63	40	5	1.2	0.5°	2	JDM1405

*1 Refer to page K203, for the max. drilling depth (AZ).

*2 WT : Tool Weight

Note 1) Refer to page K203, for the max. depth of cut (APMX) and max. drilling depth (AZ).

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

□ : Non stock, produced to order only.



■ ARBOR TYPE – ULTRA FINE PITCH

DCX = mm size, DCONMS = mm size

Fig.3

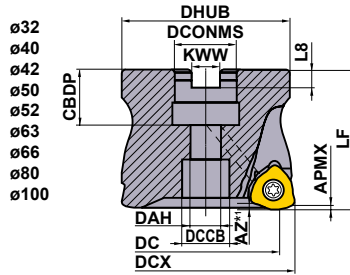
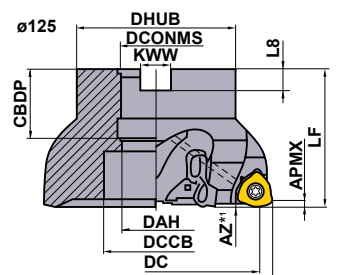


Fig.4



Right hand tool holder only.

(mm)

DCX	Set Bolt	Geometry
ø32, ø40, ø42	HSC08025H	
ø50, ø52, ø63 ø66 (DCONMS=22)	HSC10030H	
ø63 ø66 (DCONMS=27), ø80	HSC12035H	
ø100	HSC16040H	
ø125	MBA20040H	

DCX (mm)	Order Number	Stock		Number of Teeth	Dimensions (mm)			WT*2 (kg)	APMX (mm)	RMPX	Fig.	Insert Type
		R			DC	LF	DCONMS					
NEW 32	AJX06-032A05R	●	●	5	24.9	40	16	0.1	0.6	0.5°	3	JOM-06T2
NEW 32	AJX06-032A06R	●	●	6	24.9	40	16	0.1	0.6	0.5°	3	JOM-06T2
NEW 40	AJX08-040A06R	●	●	6	31.4	40	16	0.2	0.9	1°	3	JOM-0803
NEW 42	AJX08-042A06R	●	●	6	33.4	40	16	0.2	0.9	0.9°	3	JOM-0803
NEW 50	AJX09-050A06R	●	●	6	39.3	50	22	0.4	1.2	1.1°	3	JDM-09T3
NEW 50	AJX08-050A07R	●	●	7	41.4	50	22	0.4	0.9	0.7°	3	JOM-0803
NEW 52	AJX09-052A06R	●	●	6	41.9	50	22	0.4	1.2	1°	3	JDM-09T3
NEW 52	AJX08-052A07R	●	●	7	43.4	50	22	0.5	0.9	0.7°	3	JOM-0803
NEW 63	AJX12-063A06R	●	●	6	51.3	50	22	0.7	1.2	1.5°	3	JDM-1204
NEW 63	AJX09-063A07R	●	●	7	52.9	50	22	0.7	1.2	0.8°	3	JDM-09T3
NEW 63	AJX12-063X06R	●	●	6	51.3	50	27	0.6	1.2	1.5°	3	JDM-1204
NEW 63	AJX09-063X07R	●	●	7	52.9	50	27	0.7	1.2	0.8°	3	JDM-09T3
NEW 66	AJX12-066A06R	●	●	6	54.3	50	22	0.7	1.2	1.4°	3	JDM-1204
NEW 66	AJX09-066A07R	●	●	7	55.9	50	22	0.8	1.2	0.8°	3	JDM-09T3
NEW 66	AJX12-066X06R	●	●	6	54.3	50	27	0.7	1.2	1.4°	3	JDM-1204
NEW 66	AJX09-066X07R	●	●	7	55.9	50	27	0.8	1.2	0.8°	3	JDM-09T3
NEW 80	AJX12-080A08R	●	●	8	68.3	50	27	1.1	1.2	1.1°	3	JDM-1204
NEW 100	AJX12-100A09R	●	●	9	88.3	63	32	2.5	1.2	0.8°	3	JDM-1204
NEW 125	AJX14-125B09R	●	●	9	113.2	63	40	3.0	1.2	0.8°	4	JDM-1405

*1 Refer to page K203, for the max. drilling depth (AZ).

*2 WT : Tool Weight

Note 1) Refer to page K203, for the max. depth of cut (APMX) and max. drilling depth (AZ).

K

ROTATING TOOLS

ROTATING TOOLS

MOUNTING DIMENSIONS

Fig.1

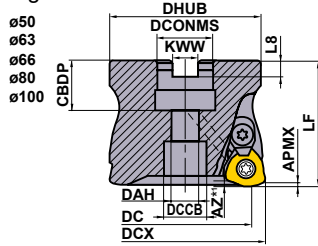


Fig.2

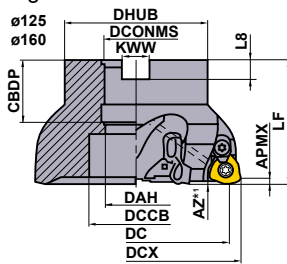


Fig.3

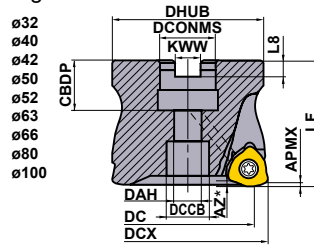
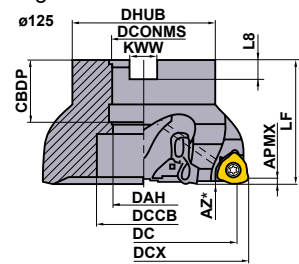


Fig.4



DCX = mm size, DCONMS = inch size

DCX (mm)	Order Number	Dimensions (mm)							Fig.
		DCONMS	CBDP	DAH	DCCB	DHUB	KWW	L8	
50	AJX12R050	22.225	19	11	17	47	8.4	5	1
50	AJX09R050	22.225	19	11	17	47	8.4	5	1
63	AJX14R063	22.225	19	11	17	60	8.4	5	1
63	AJX12R063	22.225	19	11	17	60	8.4	5	1
80	AJX14R080	31.75	32	17	26	76	12.7	8	1
80	AJX12R080	31.75	32	17	26	76	12.7	8	1
100	AJX14R100	31.75	32	17	26	96	12.7	8	1
100	AJX12R100	31.75	32	17	26	96	12.7	8	1
125	AJX14R125	38.1	40	40	56	100	15.9	10	2
160	AJX14R160	50.8	43	53	72	100	19.1	11	2

DCX = mm size, DCONMS = mm size

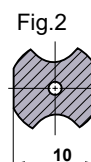
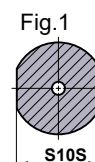
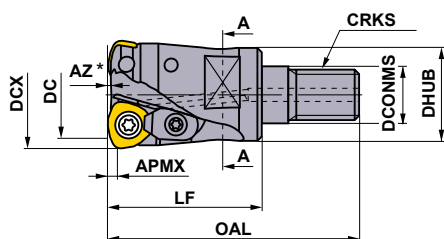
DCX (mm)	Order Number	Dimensions (mm)							Fig.
		DCONMS	CBDP	DAH	DCCB	DHUB	KWW	L8	
32	AJX06-032A	16	18	9	14	30	8.4	5.6	3
40	AJX08-040A	16	18	9	14	37	8.4	5.6	3
42	AJX08-042A	16	18	9	14	37	8.4	5.6	3
50	AJX12-050A	22	20	11	17	47	10.4	6.3	1
50	AJX09-050A	22	20	11	17	47	10.4	6.3	1, 3
50	AJX08-050A	22	20	11	17	47	10.4	6.3	3
52	AJX09-052A	22	20	11	17	47	10.4	6.3	3
52	AJX08-052A	22	20	11	17	47	10.4	6.3	3
63	AJX14-063A	22	20	11	17	60	10.4	6.3	1
63	AJX12-063A	22	20	11	17	60	10.4	6.3	1, 3
63	AJX09-063A	22	20	11	17	60	10.4	6.3	3
63	AJX14-063X	27	23	13	20	60	12.4	7.0	1
63	AJX12-063X	27	23	13	20	60	12.4	7.0	3
63	AJX09-063X	27	23	13	20	60	12.4	7.0	3
66	AJX12-066A	22	20	11	17	60	10.4	6.3	3
66	AJX09-066A	22	20	11	17	60	10.4	6.3	3
66	AJX14-066X	27	23	13	20	60	12.4	7.0	1
66	AJX12-066X	27	23	13	20	60	12.4	7.0	1, 3
66	AJX09-066X	27	23	13	20	60	12.4	7.0	3
80	AJX14-080A	27	23	13	19	76	12.4	7.0	1
80	AJX12-080A	27	23	13	19	76	12.4	7.0	1, 3
100	AJX14-100A	32	26	17	26	96	14.4	8.0	1
100	AJX12-100A	32	26	17	26	96	14.4	8.0	1, 3
125	AJX14-125B	40	40	42	56	100	16.4	9.0	2, 4
160	AJX14-160B	40	40	42	56	100	16.4	9.0	2

SPARE PARTS

Tool Holder Type	 *		 *		
	Clamp Screw	Clamp Bridge	Clamp Bridge Screw	Spring	Wrench
AJX06 Super Extra Fine Pitch	TS25	—	—	—	TKY08F
AJX08 Super Extra Fine Pitch	TS33	—	—	—	TKY08D
AJX09	TS351	AMS3	AJS3010T10	ASS2	TKY10D
AJX09 Super Extra Fine Pitch	TS351	—	—	—	TKY10D
AJX12	TS43	AMS4	AJS4012T15	ASS2	TKY15T
AJX12 Super Extra Fine Pitch	TS43	—	—	—	TKY15T
AJX14	TS54	AMS5	AJS5014T25	ASS3	TKY25T
AJX14 Super Extra Fine Pitch	TS54	—	—	—	TKY25T

* Clamp Torque (N · m) : TS25=1.0, TS33=1.5, TS351=2.5, TS43=3.5, TS54=7.5, AJS3010T10=2.5, AJS4012T15=3.5, AJS5014T25=7.5

● : Inventory maintained.



A-A section

SCREW-IN TYPE

Right hand tool holder only.

DCX (mm)	Order Number	Stock		Number of Teeth	Dimensions (mm)							WT *2 (kg)	APMX (mm)	RMPX	Fig.	Shank Type	Insert Type	
		R			DC	LF	OAL	DCONMS	DHUB	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	
NEW	25	AJX06R254AM1235	●	●	4	17.9	35	57	12.5	23.5	19	M12	0.1	0.6	0.8°	1	SC25M12	JOM-06T2
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	
NEW	28	AJX06R284AM1235	●	●	4	20.9	35	57	12.5	23.5	19	M12	0.1	0.6	0.7°	1	SC25M12	JOM-06T2
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	
NEW	32	AJX08R324AM1645	●	●	4	23.4	45	68	17	29	24	M16	0.2	0.9	1.4°	1	SC32M16	JOM-0803
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	
NEW	35	AJX08R354AM1645	●	●	4	26.4	45	68	17	29	24	M16	0.2	0.9	1.2°	1	SC32M16	JOM-0803
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	
NEW	40	AJX08R406AM1645	●	●	6	31.4	45	68	17	29	24	M16	0.3	0.9	1°	1	SC32M16	JOM-0803

*1 Refer to page K203, for the max. drilling depth (AZ).

*2 WT : Tool Weight

Note 1) Refer to page K203, for the max. depth of cut (APMX) and max. drilling depth (AZ).

Note 2) For screw-in type arbors, refer to page K260.

ROTATING TOOLS



Fig.1

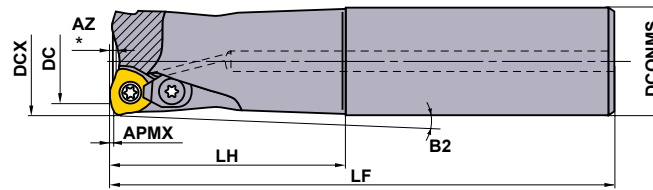
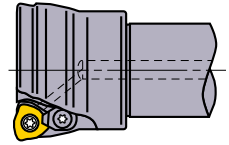


Fig.2



Right hand tool holder only.

STRAIGHT SHANK TYPE

DCX (mm)	Order Number	Stock			Number of Teeth	Dimensions (mm)				B2	APMX (mm)	RMPX	Fig.	Insert Type
		R				LF	DC	LH	DCONMS					
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	
NEW	25	AJX06R254SA25S	●	●	4	140	17.9	60	25	1.11°	0.6	0.8°	1	JOM  06T2
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	
NEW	25	AJX06R254SA25L	●	●	4	200	17.9	120	25	0.54°	0.6	0.8°	1	JOM  06T2
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	
NEW	28	AJX06R284SA25S	●	●	4	140	20.9	40	25	—	0.6	0.7°	1	JOM  06T2
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	
NEW	28	AJX06R284SA25L	●	●	4	200	20.9	40	25	—	0.6	0.7°	1	JOM  06T2
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	
NEW	32	AJX08R324SA32S	●	●	4	150	23.4	70	32	0.95°	0.9	1.4°	1	JOM  0803
NEW	32	AJX06R325SA32S	●	●	5	150	24.9	70	32	0.94°	0.6	0.5°	1	JOM  06T2
NEW	32	AJX06R326SA32S	●	●	6	150	24.9	70	32	0.94°	0.6	0.5°	1	JOM  06T2
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	
NEW	32	AJX08R324SA32L	●	●	4	200	23.4	120	32	0.55°	0.9	1.4°	1	JOM 0803
NEW	32	AJX06R325SA32L	●	●	5	200	24.9	120	32	0.54°	0.6	0.5°	1	JOM 06T2
32	AJX12R322SA32EL	★	●	2	300	20.3	180	32	0.36°	1.2	4°	1	JDM 1204	

★ Refer to page K203, for the max. drilling depth (AZ).

Note 1) Refer to page K203, for the max. depth of cut (APMX) and max. drilling depth (AZ).

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

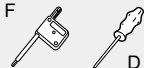
□ : Non stock, produced to order only.

DCX (mm)	Order Number	Stock		Number of Teeth	Dimensions (mm)				B2	APMX (mm)	RMPX	Fig.	Insert Type	
		R			LF	DC	LH	DCONMS						
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	
NEW	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	AJX08R406SA32S	●	●	6	150	31.4	50	32	—	0.9	1°	1	JOM  0803
	40	AJX12R403SA32L	●	●	3	250	28.3	50	32	—	1.2	3°	1	JDM  1204
NEW	40	AJX09R404SA32L	●	●	4	250	29.9	50	32	—	1.2	1.5°	1	JDM  09T3
	40	AJX08R406SA32L	●	●	6	250	31.4	50	32	—	0.9	1°	1	JOM  0803
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 K203, for the max. drilling depth (AZ).

Note 2) Refer to page K203, for the max. depth of cut (APMX) and max. drilling depth (AZ).

SPARE PARTS

Tool Holder Type	 *		 *		 F D
	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

ROTATING TOOLS

INSERTS

[illegible]

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

Memo

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED

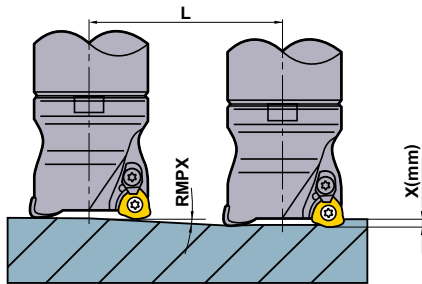
Material		Characteristics	Cutting Speed (m/min) for Different Grades			
P			FH7020	MP6120	MP6130	VP30RT
	Mild Steel	Hardness ≤180HB	170 (120—220)	150 (100—200)	130 (80—180)	110 (60—160)
	Carbon Steel Alloy Steel	Hardness 180—280HB	150 (100—200)	130 (80—180)	110 (60—160)	90 (40—140)
	Carbon Steel Alloy 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)	—	—	—

K

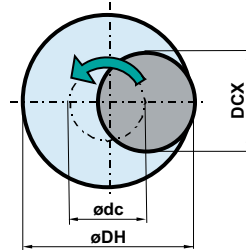
ROTATING TOOLS

MAXIMUM CAPACITIES BY MODE

■ RAMPING



■ HELICAL DRILLING



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

$$\phi_{dc} = \phi_{DH} - DCX$$

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.

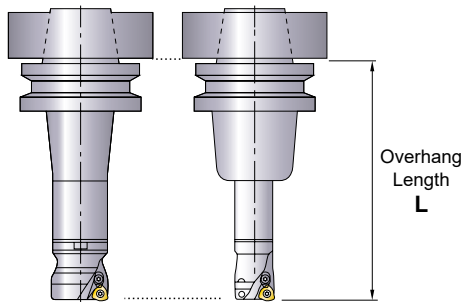
Tool Holder Type		DCX (mm)	DC (mm)	APMX (mm)		RMPX	Ramping				Helical Drilling		AZ (mm)
				FT/JM/ST Chipbreaker	JL Chipbreaker		L Required distance for X mm depth (mm)	DH (mm)					
								X=1	X=1.2	X=1.5	X=2	Min	
Shank type/Screw-in type	AJX06	16	8.9	1	0.6	3°	19.1	—	—	—	23	29	0.3
	AJX06	17	9.9	1	0.6	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

	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
	Titanium Alloy	—	180	0.4	0.4	210	0.6	0.4	230	0.8	0.4
			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

$$n(\text{min}^{-1}) = (\text{Recommended Cutting Speed} \times 1000) \div (\text{DCX} \times 3.14)$$

③ Table Feed Rate

$$V_f(\text{mm/min}) = n \times \text{Feed per Tooth} \times \text{Number of Teeth}$$

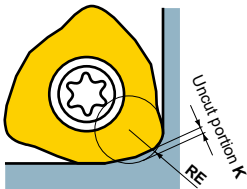
- ④ Recommended width of cut (ae) is more than 60% of the cutting edge diameter (DCX).
- ⑤ The above cutting conditions are guides to cutting on a #50 BT machine. In case of #40 BT and #63 HSK machines, a cutting edge diameter of under 35mm is recommended. In this case, reduce the depth of cut and table 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 workpiece.
- 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 chipbreaker 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 chipbreaker is up to 1.2 mm.

NOTE FOR PROGRAMMING



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

(mm)

Insert Size	Chipbreaker	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.

K

ROTATING TOOLS

ROTATING TOOLS

MULTI FUNCTIONAL MILLING



BRP

P M K N S H

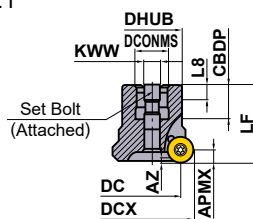


K

ROTATING TOOLS

Fig.1

ø40
ø42



Set an attached bolt.

Fig.2

ø50
ø52
ø63
ø66
ø80

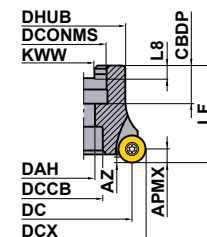
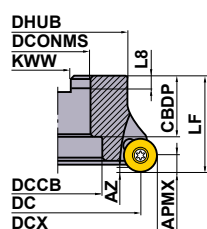


Fig.3

ø100



ARBOR TYPE

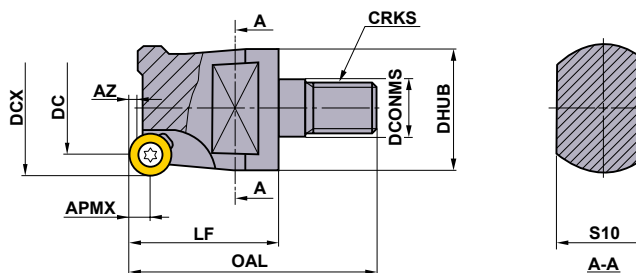
GAMP: +5°
GAMF: -4°—0°

Right hand tool holder only.

Cutting Edge R (APMX)	Order Number	Stock		Number of Teeth	Dimensions (mm)										*2 WT (kg)	Max. Depth of Cut (mm)		*1 				Type (Fig.)
					DCX	DC	DHUB	LF	DCONMS	CBDP	DAH	KWW	L8	DCCB		APMX	AZ	Clamp Screw	Wrench	Set Bolt		
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		Number of Teeth	Dimensions (mm)										 *		
					DCX	DC	OAL	LF	DCONMS	DHUB	S10	CRKS	APMX	AZ			
		R	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			

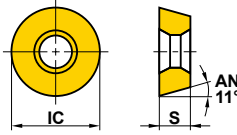
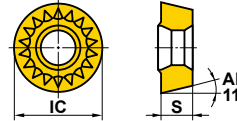
Note 1) For screw-in type arbors, refer to page K260.

* 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

Material	P	Steel	●	●	●	●	●	Cutting Conditions (Guide): ●: Stable Cutting ●: General Cutting ✖: Unstable Cutting Honing: E: Round T: Chamfer						
	M	Stainless Steel	●	●	●	●	●						●	
	K	Cast Iron			✖		✖							✖
	S	Heat-resistant Alloy, Titanium Alloy			●									
	H	Hardened Materials		●										
Shape	Order Number	Class	Honing	Coated		Cermet		Carbide	Dimensions (mm)		Geometry			
				F7010	F7030	VP15TF	AP20M	NX2525	NEW MX3030	NX4545		UTi20T	IC	S
	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		

K

ROTATING TOOLS

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED (m/min)

Material		Hardness	Coated		Carbide
			F7030	VP15TF	UTi20T
P	Mild Steel	≤180HB	250 (200—300)	250 (200—300)	150 (100—200)
	Carbon Steel Alloy Steel	180—280HB	180 (130—220)	180 (130—220)	140 (100—170)
		280—380HB	160 (110—190)	160 (110—190)	100 (70—120)
	Pre-Hardened Steel	35—45HRC	120 (80—140)	120 (80—140)	90 (60—100)
	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)
	Ductile Cast Iron	Tensile Strength 360—500MPa	—	140 (100—180)	120 (80—140)
		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 > K260
SPARE PARTS > N001
TECHNICAL DATA > P001

K207

ROTATING TOOLS

DEEP SHOULDER MILLING

<MILLING FOR TITANIUM ALLOY>



VFX5

P

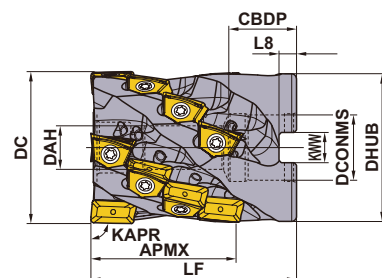
M

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	DCONMS	CBDP	DAH	DHUB	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

End of sale – Items only available while stocks last.

● : Inventory maintained.

SPARE PARTS

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

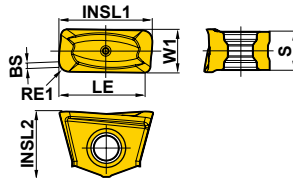
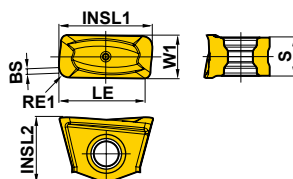
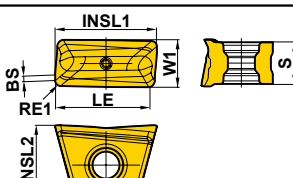
Corner radius 3.2: LF+0.7mm Corner radius 4.0: LF+1.5mm

K

ROTATING TOOLS

ROTATING TOOLS

INSERTS

Material	S	Heat-resistant Alloy, Titanium Alloy	✚			Cutting Conditions (Guide) :							Geometry
						● : Stable Cutting	● : General Cutting	✚ : Unstable Cutting					
Shape	Order Number	Stock	Dimensions (mm)										
		Coated				INSL1	LE	W1	INSL2	S	BS		RE1
		MP9130											
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

RECOMMENDED CUTTING CONDITIONS

■ VFX5

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	Ø40	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
	Ø50	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
	Ø63	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
	Ø80	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
	Ø40	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
	Ø50	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
	Ø63	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
	Ø80	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.

K

ROTATING TOOLS

ROTATING TOOLS

DEEP SHOULDER MILLING

<MILLING FOR TITANIUM ALLOY>



VFX6

P

M

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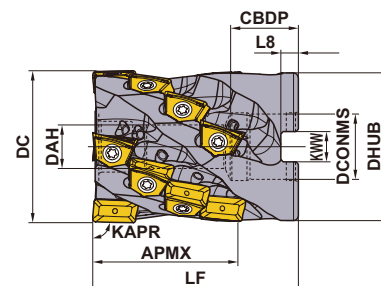
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H

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ROTATING TOOLS



Right hand tool holder only.

■ SHELL TYPE

KAPR :90°

Order Number	Stock		Number of Flutes	Total	Dimensions (mm)								APMX (mm)	WT* (kg)
					DC	LF	DCONMS	CBDP	DAH	DHUB	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

End of sale – Items only available while stocks last.

● : Inventory maintained.

SPARE PARTS

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

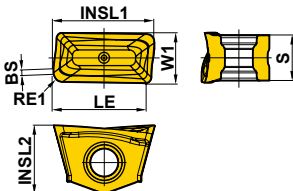
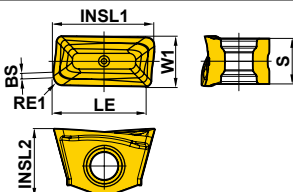
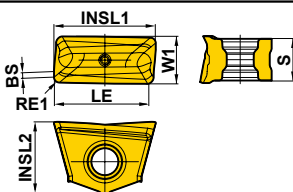
Corner radius 3.2: LF+0.7mm Corner radius 4.0: LF+1.5mm Corner radius 5.0: LF+1.5mm

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ROTATING TOOLS

ROTATING TOOLS

INSERTS

Material	S	Heat-resistant Alloy, Titanium Alloy		✦		Cutting Conditions (Guide) :						Geometry
						● : Stable Cutting	● : General Cutting	✦ : Unstable Cutting				
Shape	Order Number	Stock			Dimensions (mm)							
		Coated			INSL1	LE	W1	INSL2	S	BS		RE1
		MP9130										
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

RECOMMENDED CUTTING CONDITIONS

■ VFX6

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)	Ø63	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
		Ø80	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
		Ø100	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)	Ø63	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
		Ø80	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
		Ø100	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.

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ROTATING TOOLS

ROTATING TOOLS

DEEP SHOULDER MILLING



DCCC

P

M

K

N

S

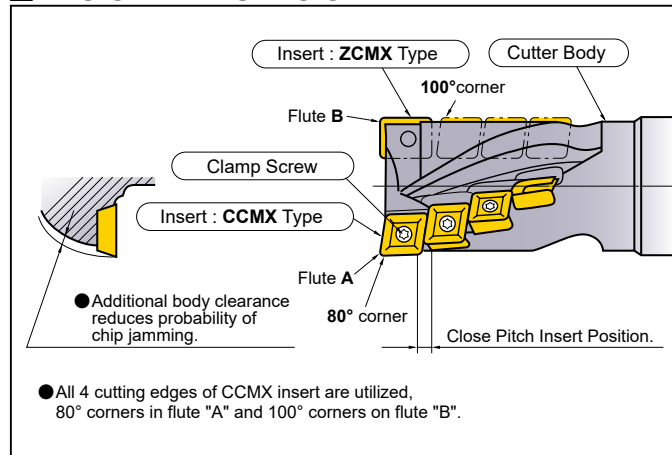
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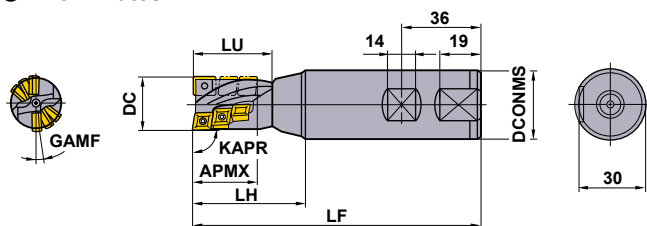
ROTATING TOOLS



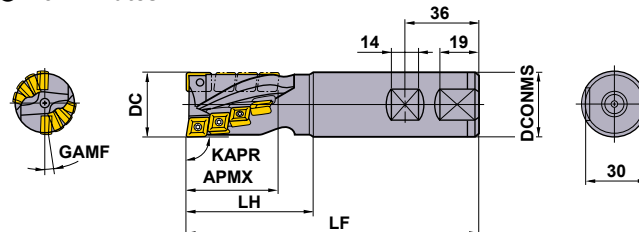
DESIGN FEATURES OF DCCC TYPE END MILL



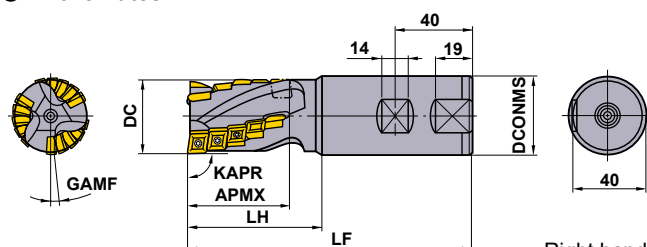
● Ø25 2 flutes



● Ø32 2 flutes



● Ø40 3 flutes



Right hand tool holder only.

WELDON SHANK TYPE

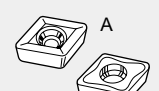
KAPR : 90°

DC (mm)	Order Number	Stock		Dimensions (mm)					GAMF	WT* (kg)	Number of Teeth		Peripheral and Bottom		Bottom insert only	
				LF	DCONMS	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

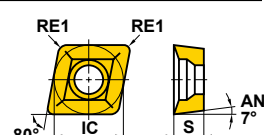
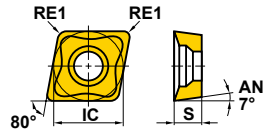
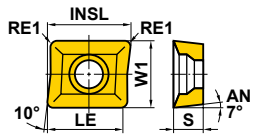
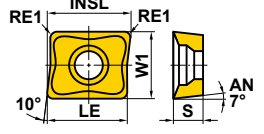
● : Inventory maintained. ★ : Inventory maintained in Japan.
(10 inserts in one case)

SPARE PARTS

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

★ Clamp Torque (N · m) : CS300890T=1.0, CS350990T=2.5

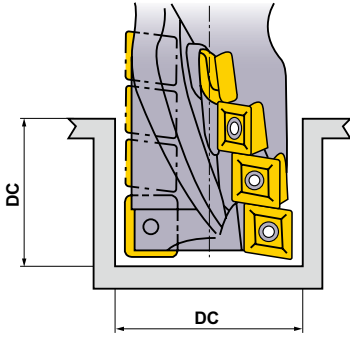
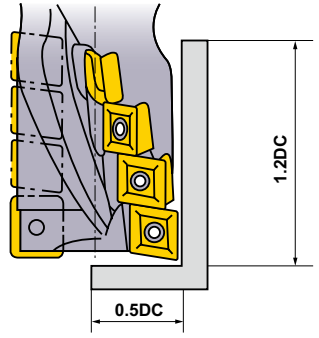
INSERTS

Material	P	Steel			●	●	●			Cutting Conditions (Guide) :					
	M	Stainless Steel			●	●	●			● : Stable Cutting ● : General Cutting ✖ : Unstable Cutting					
	K	Cast Iron			✖					Honing : E : Round					
Shape	Order Number	Class	Honing	Coated				Carbide	Dimensions (mm)						Geometry
				F7030	VP15TF	UP20M		UT120T	INSL	LE	W1	IC	S	RE1	
	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	

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ROTATING TOOLS

RECOMMENDED CUTTING CONDITIONS

Cutting Mode	A : Slot Milling (APMX Short Type)	B : Shoulder Milling (APMX Short Type)
		

Material	Hardness	Grade	Cutting Mode	Cutting Speed (m/min)	Table Feed (mm/min)		
					Ø25	Ø32	Ø40
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)

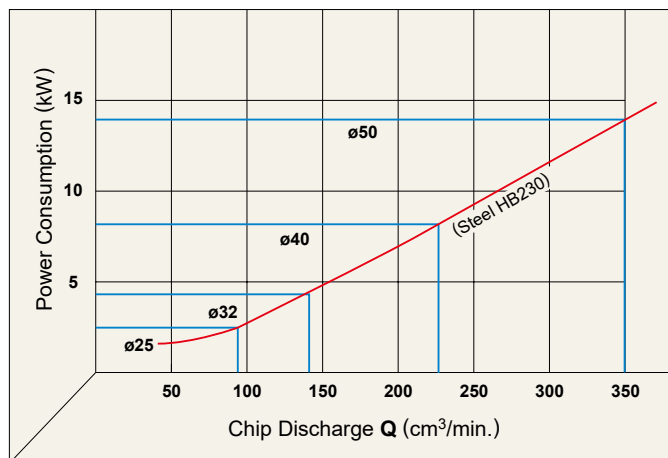
● Revolution (min⁻¹)=(1000 x Cutting Speed)÷(3.14 x DC)

● Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

POWER CONSUMPTION

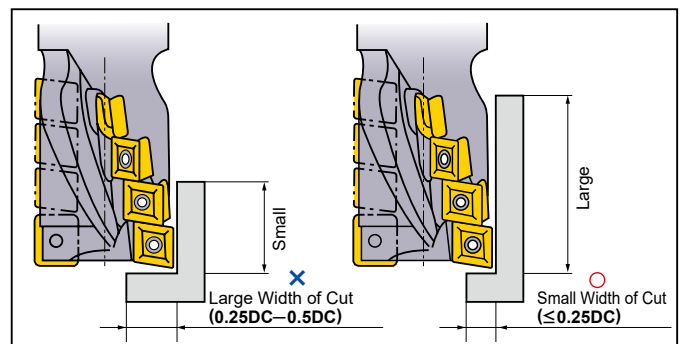
● Please use the chart below for reference, please select the conditions that suits the machines power.

● Chip Discharge Q (cm³/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

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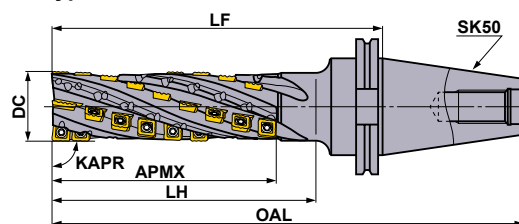
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● SK50 shank type



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ROTATING TOOLS

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.

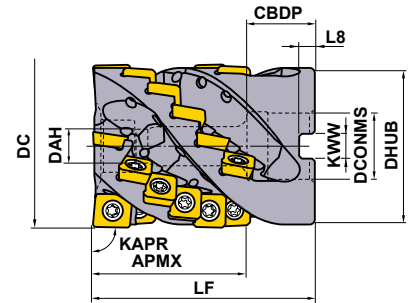
SPARE PARTS > N001
TECHNICAL DATA > P001

K219

ROTATING TOOLS

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ROTATING TOOLS



Right hand tool holder only.

Cutter Diameter DC (mm)	Set Bolt	Geometry
Ø63	HSC12070	
Ø80	HSC16065	

■ SHELL TYPE

KAPR :90°

Order Number	Stock		Number of Teeth		Dimensions (mm)									Number of Insert		
	R		Flutes	Total	DC	LF	DCONMS	CDBP	DAH	DHUB	KWW	L8	APMX	Bottom On-edge A	Bottom On-edge B	Peripheral
														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 centre-thru or side-thru arbors can't be used.

SPARE PARTS

Tool Holder Number	*			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

Material		P	Steel	●		●		Cutting Conditions (Guide) : ● : Stable Cutting ● : General Cutting ✖ : Unstable Cutting					
		M	Stainless Steel	●		●							
		K	Cast Iron	✖		✖							
		S	Heat-resistant Alloy, Titanium Alloy	●		✖							
Type	Shape	Order Number	Class	Coated			Dimensions (mm)						Geometry
				VP15TF	VP20RT		INSL	LE	W1	IC	S	RE1	
Wavy cutting edge type (WH Chipbreaker)	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	
	Bottom On-edge B	MPMX120412-WH	M	●	●		—	—	—	12.7	4.76	1.2	
	Peripheral	SPMX120408-WH	M	●	●		—	—	—	12.7	4.76	0.8	
Straight cutting edge type (JM Chipbreaker)	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	
	Bottom On-edge B	MPMX120412-JM	M	●	●		—	—	—	12.7	4.79	1.2	
	Peripheral	SPMX120408-JM	M	●	●		—	—	—	12.7	4.80	0.8	

* Only for use with a shell type holder.

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ROTATING TOOLS

ROTATING TOOLS

RECOMMENDED CUTTING CONDITIONS (SHANK TYPE)

CUTTING CONDITIONS FOR SHOULDER MILLING

Material		Hardness	Grade Chipbreaker	Cutting Speed V _c (m/min)	Cutting Width : ae (mm) Feed per Tooth : fz (mm/t.)							
					Ø 50 (the last letter of order number for cutter body) S (APMX≤110) M (APMX=157) L (APMX=205)			Ø 63 (the last letter of order number for cutter body) 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 conditions 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 90° when machining corners. Reduce the cutting speed and table feed by 10-20% and ae by 50%. Also if possible, set a radius cutting path for corners.

CUTTING CONDITIONS FOR SLOT MILLING

Material		Hardness	Grade Chipbreaker	Cutting Speed Vc (m/min)	Depth of Cut: ap : (mm) Feed per Tooth: fz (mm/t.)							
					Ø 50 (the last letter of order number for cutter body)			Ø 63 (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 conditions 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

	Material	Hardness	Grade Chipbreaker	Cutting Speed V_c (m/min)	Depth of Cut a_p (mm)	Cutting Width a_e (mm)	Feed per Tooth f_z (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 conditions 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

	Material	Hardness	Grade Chipbreaker	Cutting Speed V_c (m/min)	Depth of Cut a_p (mm)	Cutting Width a_e (mm)	Feed per Tooth f_z (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 conditions are determined based on high rigidity machine and workpiece, where no vibration occurred.
Please adjust machining conditions if vibration is generated.

K

ROTATING TOOLS

ROTATING TOOLS

DEEP SHOULDER MILLING

<CUTTING FOR TITANIUM ALLOY>



ASPX

P

M

K

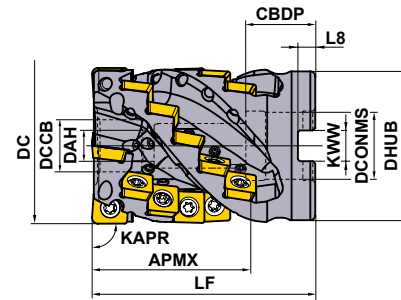
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ROTATING TOOLS



Right hand tool holder only.

Cutter Diameter DC (mm)	Set Bolt	Geometry
Ø50	HSC10070	
Ø63	HSC12070	
Ø80	HSC16080	

SHELL TYPE

KAPR: 90°

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

DC (mm)	Order Number	Stock R		Number of Flutes	Total	Dimensions (mm)		WT (kg)	APMX (mm)
						LF	DCONMS		
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)						
		DCONMS	CBDP	DAH	DCCB	DHUB	KWW	L8
50	ASPX4-050A03A054RA15	22	21	10.5	17	47	10.4	6.3
63	ASPX4-063A04A064RA24	27	28	12.5	21	60	12.4	7
80	ASPX4-080A05A075RA35	32	28	16.5	27	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

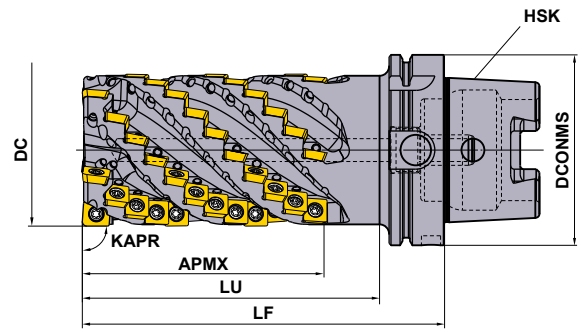
	≤1Mpa (≤20 l/min.)	←Standard→	≥5Mpa (≥30 l/min.)	≥7Mpa (≥50 l/min.)	To Plug a Coolant Hole
Nozzle Dia.	ø0.6mm	ø0.8mm	ø1.2mm	ø1.6mm	—
Order Number	HSD04004H06	HSD04004H08	HSD04004H12	HSD04004H16	HSS04004

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.

K

ROTATING TOOLS

■ HSK SHANK TYPE

KAPR: 90°

DC	Order Number	Stock		Number of Flutes	Total	Dimensions (mm)			HSK	APMX (mm)
		R				LF	LU	DCONMS		
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		Number of Insert	
	Clamp Screw	Wrench	Coolant Nozzle		Anti-seize Lubricant	JPGX	SPGX
ASPX4R0805H100A	TS55	TKY25D	HSD04004H08	65	MK1KS	5	55
ASPX4R0805H125A	TS55	TKY25D	HSD04004H08	65	MK1KS	5	55

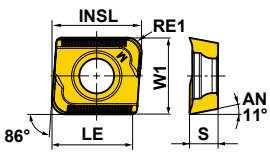
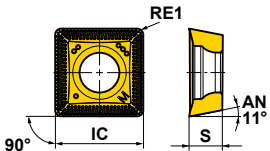
★ Clamp Torque (N • m) : TS55 = 5.0

ROTATING TOOLS

INSERTS

ROTATING TOOLS

K

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			Dimensions (mm)						Geometry
					MP9140			INSL	LE	W1	IC	S	RE1	
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

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 K227)

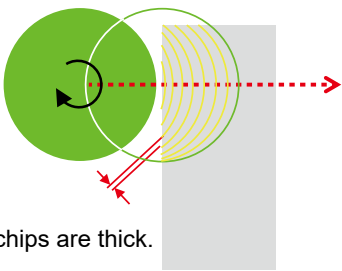
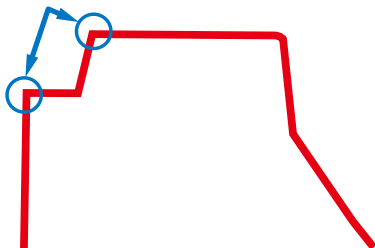
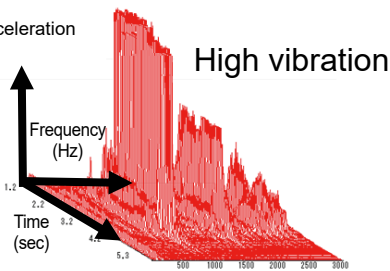
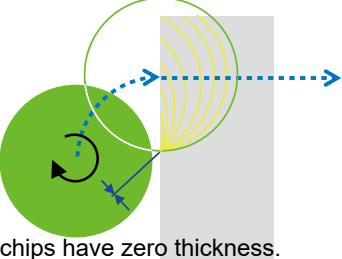
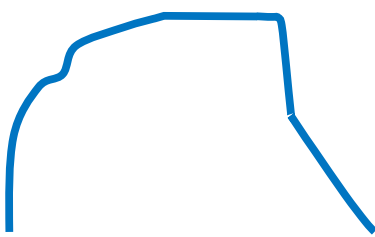
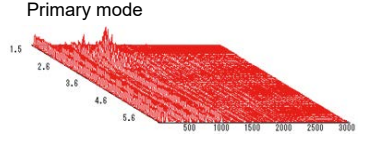
● : Inventory maintained.

(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. 	Primary mode Acceleration  High vibration
Roll Into Cutting Approach  Exit chips have zero thickness.	Cutting load increases smoothly. 	Almost no vibration Primary mode 

Down cutting (climb milling) is recommended.

Notes on Use of Inserts with Large Corner Radii

When using inserts with corner radius $RE \geq R3.2\text{mm}$, please machine the cutter body with a radius form as shown on the table below.



Insert Corner R (RE)

Cutter Body Radius R

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

ROTATING TOOLS

BALL NOSE END MILL



SRF/SRB

P M **K** N S H

K

ROTATING TOOLS



Fig.1

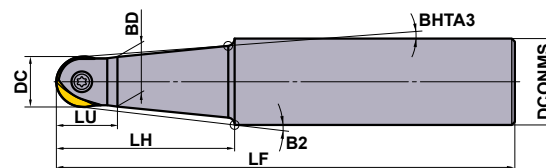


Fig.2

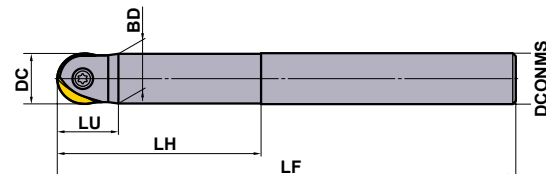
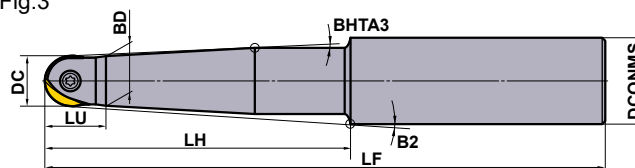


Fig.3



Right hand tool holder only.

STEEL SHANK TYPE

Type	Order Number	Stock		Number of Teeth	Dimensions (mm)									Fig.	 *1	 ①②	
		R				RE*2	DC	DCONMS	LF	BD	LH	LU	B2				
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

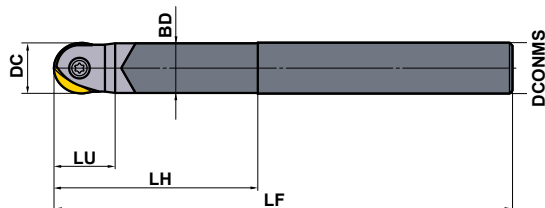
*1 Clamp Torque (N • m) : RS3008T=1.5, RS3510T=2.5, RS4015T=3.3, RS5020T=5.0, RS6025T=7.5, RS8030T=10.0

*2 RE is shown for insert corner R.

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



Fig.1



Right hand tool holder only.

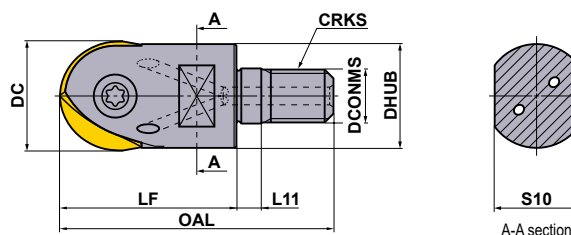
CARBIDE SHANK TYPE

Type	Order Number	Stock	Number of Teeth	Dimensions (mm)							Fig.	*1	①	②	Insert
				RE*2	DC	DCONMS	LF	BD	LH	LU					
Standard	SRFH10S10MW	●	—	1	5	10	10	110	9.5	40	13	1	RS3008T	①TKY08D	SRFT10 SRBT10
	SRFH12S12MW	●	—	1	6	12	12	120	11.5	50	15	1	RS3510T	①TKY10D	SRFT12 SRBT12
	SRFH16S16MW	●	—	1	8	16	16	130	15.5	50	20	1	RS4015T	②TKY15T	SRFT16 SRBT16
	SRFH20S20MW	●	—	1	10	20	20	180	19.5	80	24	1	RS5020T	②TKY20T	SRFT20 SRBT20
	SRFH25S25MW	●	—	1	12.5	25	25	200	24.5	100	30	1	RS6025T	②TKY25T	SRFT25 SRBT25
	SRFH30S32MW	★	—	1	15	30	32	230	29.5	130	35	1	RS8030T	②TKY30T	SRFT30 SRBT30
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.



SCREW-IN TYPE

Right hand tool holder only.

Order Number	Stock		Number of Teeth	Dimensions (mm)									*3 WT (kg)	 *1		
	R			RE*2	DC	DCONMS	DHUB	OAL	LF	L11	S10	CRKS	Clamp Screw	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 K260.

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

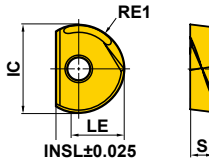
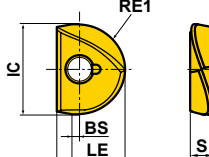
*2 RE is shown for insert corner R.

*3 WT : Tool Weight

ARBORS	➤ K260
SPARE PARTS	➤ N001
TECHNICAL DATA	➤ P001

ROTATING TOOLS

INSERTS

Material	P	Steel				Cutting Conditions (Guide) : ● : Stable Cutting ● : General Cutting ✖ : Unstable Cutting						
	M	Stainless Steel										
	K	Cast Iron										
	N	Non-ferrous Metal										
	H	Hardened Steel										
Shape	Order Number	Coated			Dimensions (mm)						Geometry	
		EP6120	VP15TF	MP8010	IC	RE1		INSL	LE	BS		S
						Corner R	Tolerance					
	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. It is recommended to use the special lubricant to prevent the screw seizing, MK1KS, and to fasten to the recommended torque.



RECOMMENDED CUTTING CONDITIONS

	Material	Hardness	Grade	Cutting Speed V_c (m/min)	Feed per Tooth f_z (mm/t.)	Depth of Cut a_p (mm)
P	Mild Steel	≤180HB	EP6120	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
	Carbon Steel, Alloy Steel	180—280HB	EP6120	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
			VP15TF	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
	Carbon Steel, Alloy Steel	280—350HB	EP6120	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
	Pre-Hardened Steel	35—45HRC	EP6120	150 (80—200)	0.2 (0.1—0.3)	≤0.05DC
			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
	Ductile Cast Iron	Tensile Strength ≤450MPa	MP8010	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
	Ductile Cast Iron	Tensile Strength ≤800MPa	MP8010	200 (80—300)	0.2 (0.1—0.3)	≤0.05DC
	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
	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 θ° ➡ Calculate cutting speed at point P.
(Cutting speed at the cutting depth border for oblique machining)

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

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

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

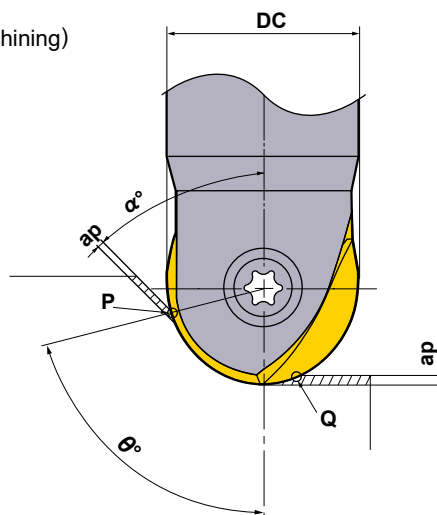
2. Employing a_p ➡ Calculate cutting speed at point Q.
(Cutting speed at the cutting depth border)

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

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

DC : Cutting Edge Diameter (mm)

a_p : Depth of Cut (mm)



ROTATING TOOLS

RADIUS END MILL



SUF

P

M

K

N

S

H

K

ROTATING TOOLS



Fig.1

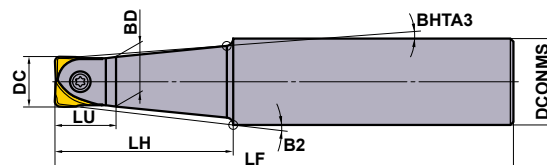


Fig.2

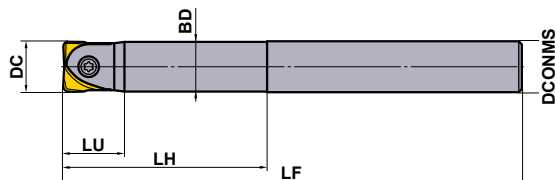
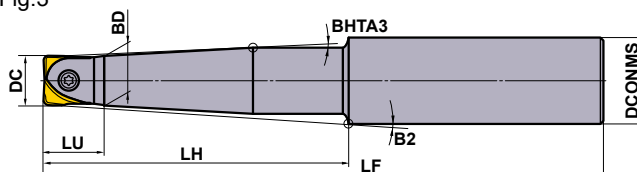


Fig.3



STEEL SHANK TYPE

Right hand tool holder only.

Type	Order Number	Stock		Number of Teeth	Dimensions (mm)								Fig.			
					DC	DCONMS	LF	BD	LH	LU	B2	BHTA3		Clamp Screw	Wrench	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.

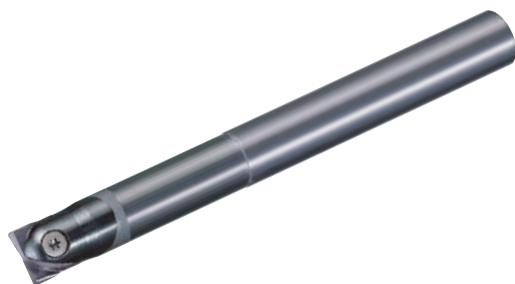
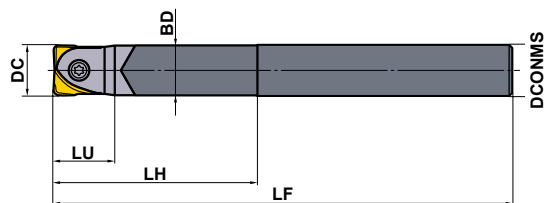


Fig.1



CARBIDE SHANK TYPE

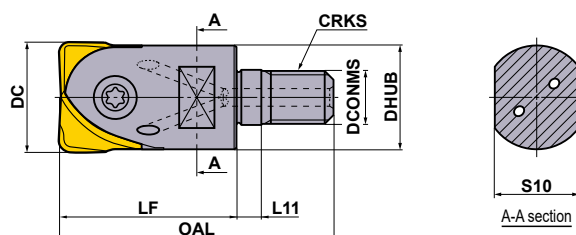
Right hand tool holder only.

Type	Order Number	Stock	Number of Teeth	Dimensions (mm)						Fig.	* Clamp Screw	① Wrench	② Insert
				DC	DCONMS	LF	BD	LH	LU				
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	SUFT30R
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	SUFT30R
					32	32	231	29.5	131	36			SUFT32R
													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		Number of Teeth	Dimensions (mm)								*2 WT (kg)	 *1		
	R			DC	DCONMS	DHUB	OAL	LF	L11	S10	CRKS		Clamp Screw	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 K260.

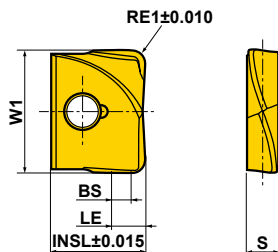
*1 Clamp Torque (N · m) : RS4015T=3.3, RS5020T=5.0, RS6025T=7.5, RS8030T=10.0

*2 WT : Tool Weight

ARBORS	➤ K260
SPARE PARTS	➤ N001
TECHNICAL DATA	➤ P001

ROTATING TOOLS

INSERTS

Material	P	Steel				Cutting Conditions (Guide) : ● : Stable Cutting ● : General Cutting ✖ : Unstable Cutting						
	M	Stainless Steel										
	K	Cast Iron										
	H	Hardened Steel										
Shape	Order Number	Coated				Dimensions (mm)					Geometry	
		MP8010	VP15TF			W1	RE1	BS	LE	INSL		S
	SUFT10R05	●	●			10	0.5	1	1.5	8.5	2.6	
	SUFT10R10	●	●			10	1	1	2	8.5	2.6	
	SUFT10R20	●	★			10	2	1	3	8.5	2.6	
	SUFT12R05	●	●			12	0.5	1.2	1.7	10	3	
	SUFT12R10	●	●			12	1	1.2	2.2	10	3	
	SUFT12R20	●	●			12	2	1.2	3.2	10	3	
	SUFT12R30	★	●			12	3	1.2	4.2	10	3	
	SUFT16R05	●	●			16	0.5	1.6	2.1	12	4	
	SUFT16R10	●	●			16	1	1.6	2.6	12	4	
	SUFT16R15	★	●			16	1.5	1.6	3.1	12	4	
	SUFT16R20	●	●			16	2	1.6	3.6	12	4	
	SUFT16R30	★	●			16	3	1.6	4.6	12	4	
	SUFT20R05	●	●			20	0.5	2	2.5	15	5	
	SUFT20R10	●	●			20	1	2	3	15	5	
	SUFT20R15	★	●			20	1.5	2	3.5	15	5	
	SUFT20R20	●	●			20	2	2	4	15	5	
	SUFT20R30	●	●			20	3	2	5	15	5	
	SUFT25R05	★	●			25	0.5	2.5	3	18.5	6	
	SUFT25R10	●	★			25	1	2.5	3.5	18.5	6	
	SUFT25R20	★	●			25	2	2.5	4.5	18.5	6	
	SUFT25R30	★	●			25	3	2.5	5.5	18.5	6	
	SUFT30R05	★	★			30	0.5	3	3.5	22.5	7	
	SUFT30R10	★	★			30	1	3	4	22.5	7	
	SUFT30R20	★	★			30	2	3	5	22.5	7	
	SUFT30R30	★	★			30	3	3	6	22.5	7	
	SUFT32R05	★	★			32	0.5	3.2	3.7	23.5	7	
	SUFT32R10	★	★			32	1	3.2	4.2	23.5	7	
	SUFT32R20	★	★			32	2	3.2	5.2	23.5	7	

FITTING INSERTS ON HOLDERS

1. Clean the insert seat

Clean the insert seat in the holder body by blowing air or using a brush.

2. Fit the insert

Place the concave mark of the insert into the clamp-screw-fastening part of the holder (only SRF type inserts). Fasten the clamp screw while firmly pressing the insert against the insert seat wall. 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.*)

	Material	Hardness	Grade	Cutting Speed V_c (m/min)	Depth of Cut a_p (mm)	Cutting Width a_e (mm)	Feed per Tooth f_z (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.*)

	Material	Hardness	Grade	Cutting Speed V_c (m/min)	Depth of Cut a_p (mm)	Cutting Width a_e (mm)	Feed per Tooth f_z (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 $n(\text{min}^{-1}) = 1000 \times \text{Cutting speed } V_c \div \text{Diameter of cutting tool } DC \div 3.14$

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.
- Correct setting of the depth of cut is especially important to prevent fracturing.

ROTATING TOOLS

BALL NOSE END MILL



SRM2

P

M

K

N

S

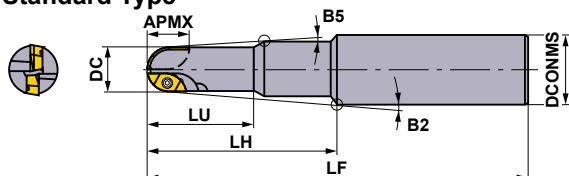
H

K

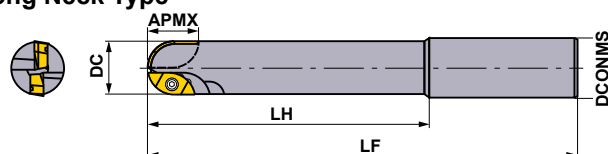
ROTATING TOOLS



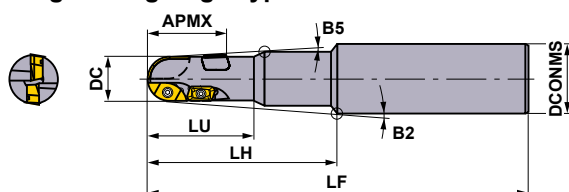
● Standard Type



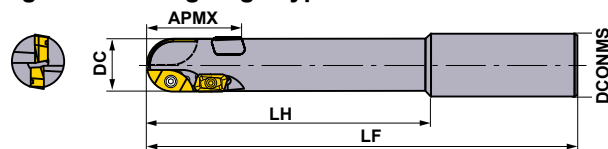
● Long Neck Type



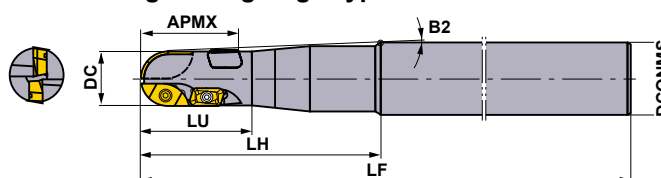
● Long Cutting Edge Type



● Long Neck Cutting Edge Type



● Extra Long Cutting Edge Type



Right hand tool holder only.

Type	Order Number	Stock	Number of Teeth	Dimensions (mm)									*1	*1	①	②	③	Inner	Outer	Peripheral
				RE	DC	DCONMS	LF	LH	LU	APMX	B2	B5								
		R											Inner, Outer	Peripheral	Inner, Outer	Peripheral		Inner	Outer	Peripheral
Standard	SRM2160SNM	★	—	2	8	16	20	130	50	25	12	2.8°	1.5°	TS25H	—	①TKY08D	—	SRG16C	SRG16E	—
	SRM2160SAM	●	●	2	8	16	20	130	50	25	12	2.8°	1.5°	TS25H	—	①TKY08D	—	SRM16C-M	SRM16E-M	—
	SRM2200SNM	★	—	2	10	20	25	150	70	35	14	2.45°	1.5°	TS32	—	①TKY08D	—	SRG20C	SRG20E	—
	SRM2200SAM	●	●	2	10	20	25	150	70	35	14	2.45°	1.5°	TS32	—	①TKY08D	—	SRM20C-M	SRM20E-M	—
	SRM2250SNM	★	—	2	12.5	25	32	180	80	40	19	3.22°	1.5°	TS43	—	②TKY15T	—	SRG25C	SRG25E	—
	SRM2250SAM	●	●	2	12.5	25	32	180	80	40	19	3.22°	1.5°	TS43	—	②TKY15T	—	SRM25C-M	SRM25E-M	—
	SRM2300SNM	★	—	2	15	30	32	200	100	50	24	0.73°	0.5°	TS55	—	②TKY25T	—	SRG30C	SRG30E	—
	SRM2300SAM	●	●	2	15	30	32	200	100	50	24	0.73°	0.5°	TS55	—	②TKY25T	—	SRM30C-M	SRM30E-M	—
	SRM2320SAM	●	—	2	16	32	32	200	100	45	28	0.5°	0.5°	TS55	—	②TKY25T	—	SRG32C	SRG32E	—
																		SRM32C-M	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		Number of Teeth	Dimensions (mm)																	
					*2	DC	DCONMS	LF	LH	LU	APMX	B2	B5	Inner, Outer	Peripheral	Inner, Outer	Peripheral	Inner	Outer	Peripheral		
														Clamp	Screw	Wrench		Insert				
		R			RE	DC	DCONMS	LF	LH	LU	APMX	B2	B5									
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		

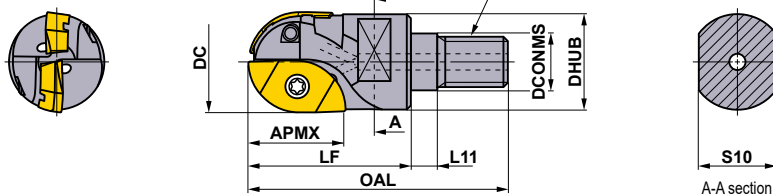
*1 Clamp Torque (N • m) : TS25H=1.7, TS25=1.0, TS32=2.0, TS43=3.5, TS55=7.5

*2 RE is shown for insert corner R.

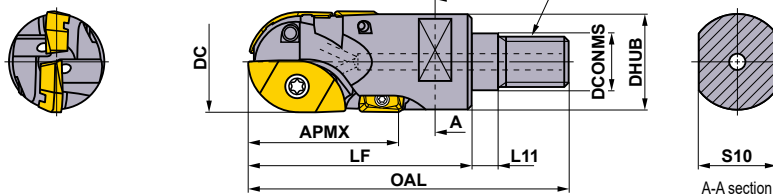
ROTATING TOOLS



● Standard Type



● Long Cutting Edge Type



■ SCREW-IN TYPE

Right hand tool holder only.

Type	Order Number	Stock		Dimensions (mm)										*3 WT (kg)	 *1	 *1	 ①②③										
				*2	RE	DC	DCONMS	DHUB	OAL	LF	L11	S10	CRKS								APMX	Inner, Outer	Peripheral	Wrench	Inner	Outer	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 K260.

*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

Material		P	Steel								Cutting Conditions (Guide) :													
		M	Stainless Steel								● : Stable Cutting ● : General Cutting ✖ : Unstable Cutting													
		K	Cast Iron																					
		S	Heat-resistant Alloy, Titanium Alloy																					
		H	Hardened Steel																					
Type	Shape	Order Number	Class	Coated				Dimensions (mm)								Geometry								
				F7030	MP6120	MP9120	VP15TF	RE1	INSL	LE	W1	S	BS	AN	B9									
Inner		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		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		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		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		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°	—									
		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°	—									
★1																								

(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 chipbreaker (APMT...PDER-M2).

When cutting edge strength is particularly important, use the H chipbreaker (APMT...PDER-H2).

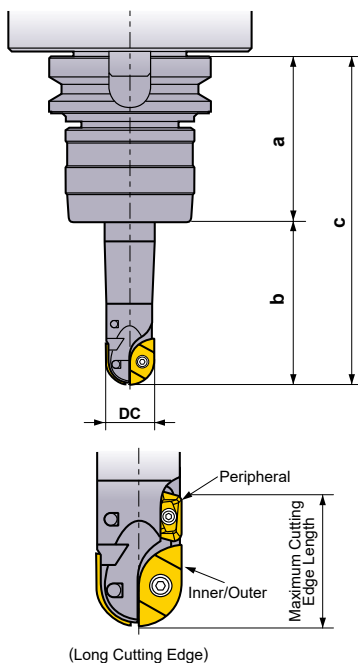
K

ROTATING TOOLS

RECOMMENDED CUTTING CONDITIONS

SRM2 $\varnothing 16\text{--}\varnothing 32$

ROTATING TOOLS



Tool Overhang

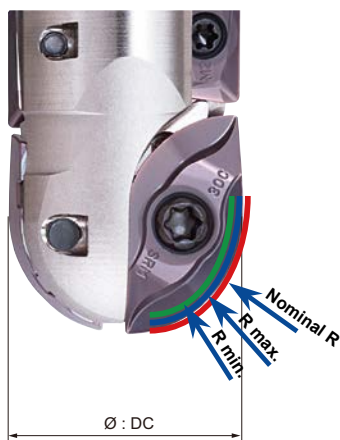
The recommended cutting conditions are chosen based on deflection, vibration and surface finish when using a BT50 arbor under the conditions below -"a", a length from the gauge line to the arbor end face and "b", neck length (tool overhang from the arbor).

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

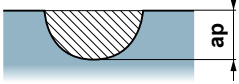
Cutting Edge Diameter DC	Nominal R	Tolerance	R min.	R max.
16	8	G	7.925	7.975
		M	7.910	7.970
20	10	G	9.925	9.975
		M	9.910	9.970
25	12.5	G	12.425	12.475
		M	12.410	12.470
30	15	G	14.925	14.975
		M	14.910	14.970

Dimensions with an insert mounted in the body

Cutting Edge Diameter DC	Tolerance	DC min.	DC max.
16	G	15.650	15.950
	M	15.620	15.940
20	G	19.650	19.950
	M	19.620	19.940
25	G	24.650	24.950
	M	24.620	24.940
30	G	29.650	29.950
	M	29.620	29.940

*M : Precision M class

SLOT MILLING

Cutting Mode	
	N : Revolution (min⁻¹) F : Table Feed (mm/min)

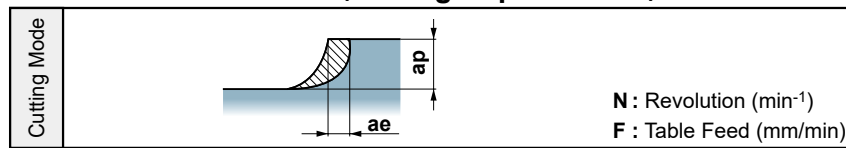
	Material	Hardness	Cutting Speed (m/min)	Insert Grade, Type	Holder Type	Ø16			Ø20			Ø25			Ø30		
						N	F	ap	N	F	ap	N	F	ap	N	F	ap
P	Carbon Steel Alloy Steel	180–280HB	160 (120–200)	MP6120 VP15TF Low Resistance Type	Standard	3183	382	6	2546	306	8	2037	489	12.5	1698	407	15
					Long Neck	3183	382	4	2546	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

K

ROTATING TOOLS

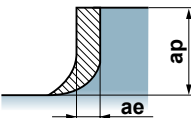
RECOMMENDED CUTTING CONDITIONS

■ SHOULDER MILLING (Cutting Depth : Small)



	Material	Hardness	Cutting Speed (m/min)	Insert Grade, Type	Holder Type	Ø16				Ø20				Ø25				Ø30			
						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	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.

	Material	Hardness	Cutting Speed (m/min)	Insert Grade, Type	Holder Type	Ø16				Ø20				Ø25				Ø30			
						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	—

K

ROTATING TOOLS

ROTATING TOOLS

BALL NOSE END MILL



SRM2 $\phi 40$
 $\phi 50$

P

M

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N

S

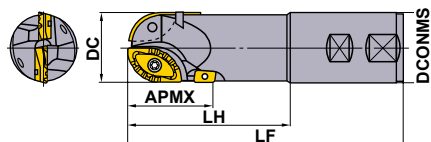
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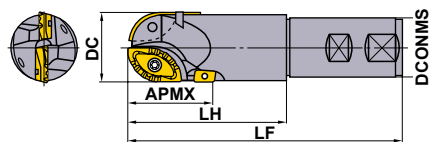
ROTATING TOOLS



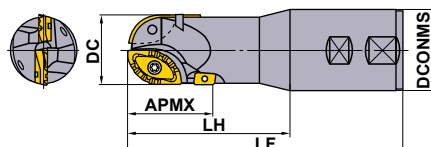
● Weldon Type (Fig.1)



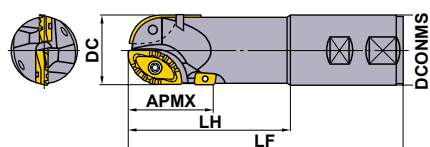
● Weldon Type (Fig.2)



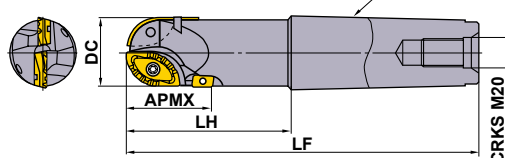
● Weldon Type (Fig.3)



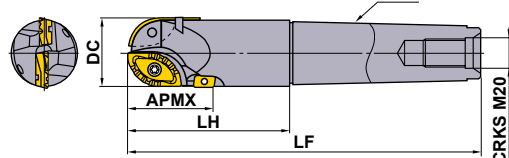
● Weldon Type (Fig.4)



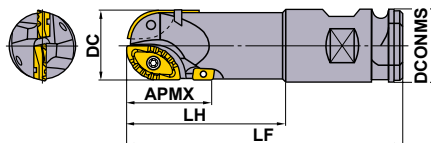
● Morse Taper Type (Fig.5)



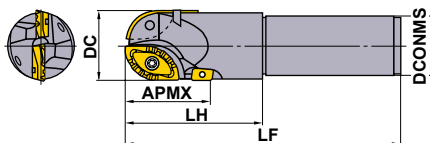
● Morse Taper Type (Fig.6)



● Combination Type (Fig.7)



● Straight Type (Fig.8)



Right hand tool holder only.

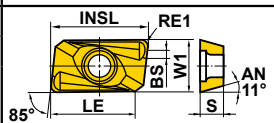
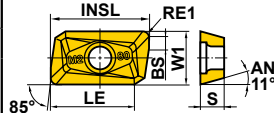
Type		Order Number	Stock		Number of Teeth	Dimensions (mm)						Type (Fig.)							
						DC	DCONMS	LF	LH	APMX	Inner/Outer		Peripheral	Inner/Outer	Peripheral	Inner	Outer	Peripheral	
			Clamp			Screw	Wrench		Insert										
Weldon Type	Short	SRM2400I40NLS	●	—	2	20	40	40	190	120	54	1	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604 PDER-02
		SRM2400I50NLS	□	—	2	20	40	50	200	120	54	3	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604 PDER-02
		SRM2500I40NLS	●	—	2	25	50	40	190	120	63	2	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-02
		SRM2500I50NLS	□	—	2	25	50	50	200	120	63	4	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-02
	Medium	SRM2400I40NLM	□	—	2	20	40	40	220	150	54	1	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604 PDER-02
		SRM2400I50NLM	□	—	2	20	40	50	230	150	54	3	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604 PDER-02
		SRM2500I40NLM	□	—	2	25	50	40	220	150	63	2	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-02
		SRM2500I50NLM	□	—	2	25	50	50	230	150	63	4	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-02
Morse Taper Type	Short	SRM2400MNLS	□	—	2	20	40	—	256	120	54	5	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604 PDER-02
		SRM2500MNLS	★	—	2	25	50	—	256	120	63	6	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-02
	Medium	SRM2400MNLM	●	—	2	20	40	—	286	150	54	5	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604 PDER-02
		SRM2500MNLM	★	—	2	25	50	—	286	150	63	6	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-02
Combination Type	Short	SRM2400WNLS	★	—	2	20	40	50.8	200	120	54	7	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604 PDER-02
		SRM2500WNLS	★	—	2	25	50	50.8	200	120	63	7	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-02
	Medium	SRM2400WNLM	★	—	2	20	40	50.8	250	170	54	7	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604 PDER-02
		SRM2500WNLM	★	—	2	25	50	50.8	250	170	63	7	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-02
	Long	SRM2500WNLL	★	—	2	25	50	50.8	300	220	63	7	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-02
		SRM2500WNLX	★	—	2	25	50	50.8	350	270	63	7	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-02
Straight Type	Short	SRM2400SNLS	★	—	2	20	40	42	200	100	54	8	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604 PDER-02
		SRM2500SNLS	★	—	2	25	50	42	200	100	63	8	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-02
	Medium	SRM2400SNLM	★	—	2	20	40	42	250	150	54	8	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604 PDER-02
		SRM2500SNLM	★	—	2	25	50	42	250	100	63	8	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-02

*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

Material		P	Steel	● ● ● ✱				Cutting Conditions (Guide) : ● : Stable Cutting ● : General Cutting ✱ : Unstable Cutting							
		K	Cast Iron												
Type	Shape	Order Number		Class	Coated				Dimensions (mm)						Geometry
					F7030	VP15TF	VP20RT	VP30RT	RE1	INSL	LE	W1	S	BS	
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°	
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 chipbreaker (APMT...PDER-M2).

When cutting edge strength is particularly important, use the H chipbreaker (APMT...PDER-H2).

RECOMMENDED CUTTING CONDITIONS

Cutting Mode	A : Slot Milling	B : Shoulder Milling (Standard Type)	C : Shoulder Milling (Long Cutting Edge Type)

	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

ROTATING TOOLS

CHAMFER MILLING



CESP/CFSP/CGSP

P

M

K

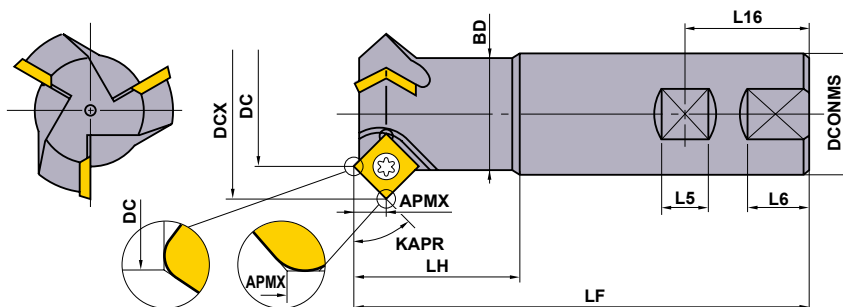
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S

H

K

ROTATING TOOLS



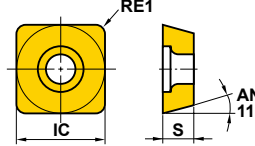
Right hand tool holder only.

Order Number	Stock	Number of Teeth	Dimensions (mm)											* Clamp Screw	① Wrench	② Insert
			KAPR	DC	DCX	LF	DCONMS	BD	LH	L16	L5	L6	APMX			
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

Material	P	Steel									Cutting Conditions (Guide) :			
	K	Cast Iron	⚙️	⚙️	⚙️	⚙️	⚙️	⚙️	⚙️	⚙️	● : Stable Cutting	● : General Cutting	⚡ : Unstable Cutting	
Shape	Order Number	Class	Honing	Coated		Cermet		Carbide		Dimensions (mm)			Geometry	
				VP15TF	UP20M	NX2525	NEW MX3030	NX4545	UTi20T	HTi10	IC	S		RE1
	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

Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)	
				Chamfer Milling	Face Milling
P	Carbon Steel Alloy Steel	180—280HB	UTi20T	80 (60—100)	0.4
			UP20M	130 (100—160)	0.2
		280—350HB	NX4545	130 (100—160)	0.2
			UTi20T	80 (60—100)	0.3
K	Cast Iron	Tensile Strength ≤450MPa	UTi20T	100 (85—120)	0.5
			HTi10	100 (85—120)	0.5

● Revolution (min⁻¹)=(1000 x Cutting Speed)÷(3.14 x DC)

● Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

ROTATING TOOLS

T-SLOT MILLING



TSMP

P

M

K

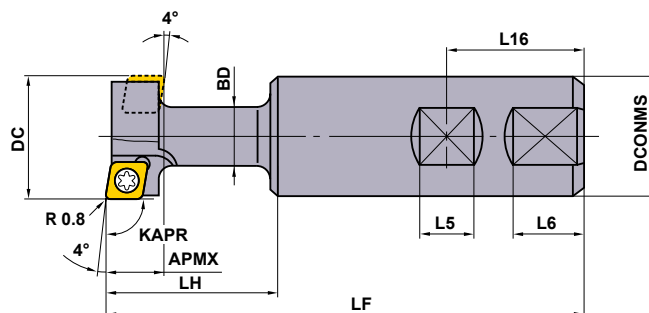
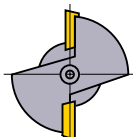
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K

ROTATING TOOLS



KAPR :90°

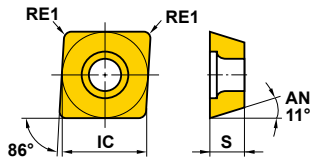
Right hand tool holder only.

Order Number	T Slot Nomenclature	Stock		Number of Teeth	Dimensions (mm)									 *	 ①  ②	
					DC	LF	DCONMS	BD	LH	L16	L5	L6	APMX	Clamp Screw	Wrench	Insert
TSMR252S25	14	●	—	2	25	112	25	12.5	33.2	32	12	17	11	TS3	①TKY08D	MPMW070308
TSMR322S32	18	●	—	2	32	120	32	16	41.2	36	14	19	14	TS4	②TKY15R	MPMW090308
TSMR402S32	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

Material	P	Steel	Carbide	Cutting Conditions (Guide) :		
	K	Cast Iron		● : Stable Cutting	● : General Cutting	✱ : Unstable Cutting
Shape	Order Number	Class	UTi20T	Dimensions (mm)		
				IC	S	RE1
	MPMW070308	M	●	7.94	3.18	0.8
	MPMW090308	M	●	9.525	3.18	0.8
	MPMW120408	M	●	12.7	4.76	0.8
						

K

ROTATING TOOLS

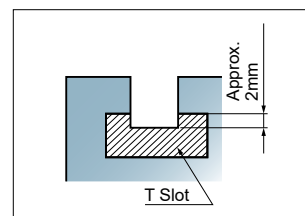
RECOMMENDED CUTTING CONDITIONS

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.



ROTATING TOOLS

VERTICAL FEED MILLING



PMF

P

M

K

N

S

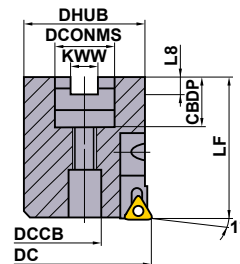
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K

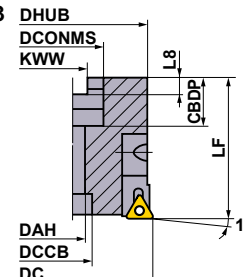
ROTATING TOOLS



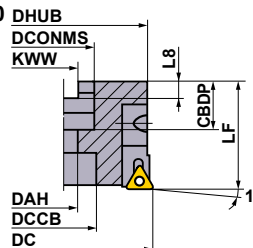
ø50



ø63



ø80

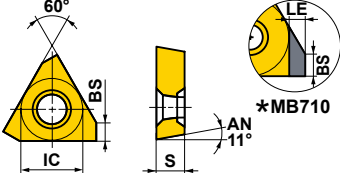


Right hand tool holder only.

Order Number	Stock		Number of Teeth	Dimensions (mm)																
	R			DC	LF	DCONMS	CBDP	DAH	DCCB	KWW	L8	DHUB	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
PMF06306A22R	★	—	6	63	63	22	20	11	18	10.4	6.3	60	PMFA13R	TS254	TSS04005	HBH06012	TKY08F	HKY40R	②HSC10050	1303
PMF08008A27R	●	—	8	80	50	27	23	13.5	30	12.4	7	75	PMFA13R	TS254	TSS04005	HBH06012	TKY08F	HKY40R	②HSC12035	ZP R2

* Clamp Torque (N • m) : TS254=1.0, HBH06012=8.5

INSERTS

Material	P	Steel	●	●				●	Cutting Conditions (Guide) :			
	K	Cast Iron							● : Stable Cutting ● : General Cutting ✖ : Unstable Cutting			
Shape	Order Number	Class	Coated		CBN		Dimensions (mm)				Geometry	
			VP15TF	AP10H			MB710		IC	LE		S
 	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

	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)	

● 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.).

	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)	

K

ROTATING TOOLS

ROTATING TOOLS

VERTICAL FEED MILLING



PMR

P

M

K

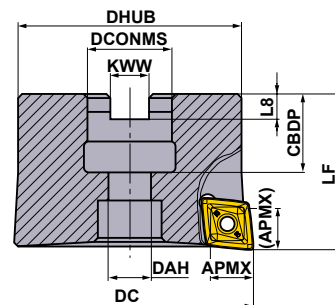
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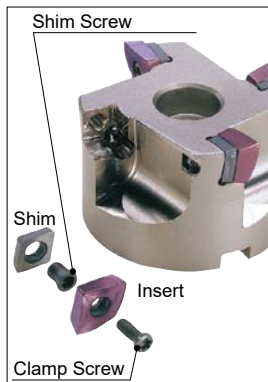
K

ROTATING TOOLS



Right hand tool holder only.

Type	Order Number	Stock	R	Number of Teeth	Dimensions (mm)									Insert
					DC	LF	DCONMS	CBDP	DAH	DHUB	KWW	L8	APMX	
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

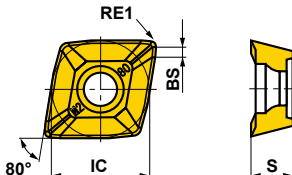
Tool Holder Number						
	Shim	Shim Screw	Clamp Screw	Wrench (Insert)	Wrench (Shim)	Set Bolt
PMR405003A22R	STPMR4N	WCS503507H	①TPS35	①TIP15T	HKY35R	HSC10035
PMR405203A22R	STPMR4N	WCS503507H	①TPS35	①TIP15T	HKY35R	HSC10035
PMR406304A22R	STPMR4N	WCS503507H	①TPS35	①TIP15T	HKY35R	HSC10035
PMR406604A22R	STPMR4N	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

Material	P	Steel	●			Cutting Conditions (Guide) : ● : Stable Cutting ● : General Cutting ✖ : Unstable Cutting				
	K	Cast Iron								
Shape	Order Number	Class	Coated			Dimensions (mm)				Geometry
			VP15TF			IC	S	BS	RE1	
	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

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%.

ROTATING TOOLS

MULTI FUNCTIONAL MILLING



ARP

P

M

K

N

S

H

K

ROTATING TOOLS



Fig.1

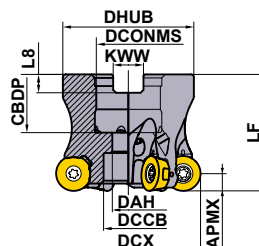
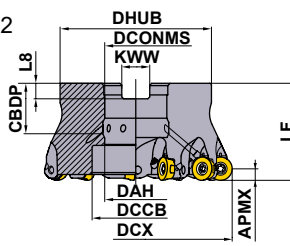


Fig.2



Right hand (R) only for the standard.

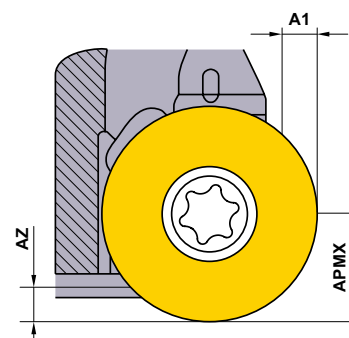
Cutter Diameter DCX (mm)	Set Bolt	Geometry	
Ø40	HSC08025H	①	
Ø50, Ø63	HSC10030H		
Ø80	HSC12035H		
Ø100	MBA16033H		
		②	

ARBOR TYPE

GAMP: +4° GAMF: -6°

Type	Cutting Edge R (APMX)	Order Number	Stock		Number of Teeth	Dimensions (mm)									* WT (kg)	Max. Depth of Cut (mm)			RMPX	Fig.
						DCX	DHUB	LF	DCONMS	CBDP	DAH	DCCB	KWW	L8		APMX	A1	AZ		
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.

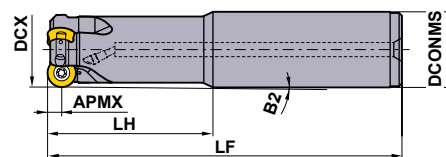


Fig.1

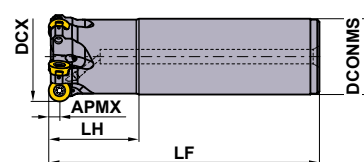
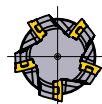


Fig.2

SHANK TYPE

GAMP: +4° GAMF: -6° — -7°

Type	Cutting Edge R (APMX)	Order Number	Stock		Number of Teeth	Dimensions (mm)					WT (kg)	Max. Depth of Cut (mm)			RMPX	Fig.
						DCX	DCONMS	LF	LH	B2		APMX	A1	AZ		
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	RPOT1040M0E4-○
ARP6	TPS4	TIP15D	MK1KS	RPOT1248M0E4-○

*1 Clamp Torque (N • m) : TPS351B=2.5, TPS4=3.5

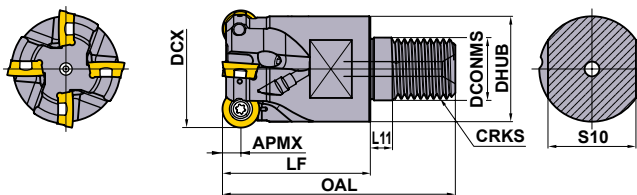
*2 Coolant nozzles are available with varying diameters for adjusting coolant pressure. Select nozzles as required by the specification.

	≤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.

ROTATING TOOLS



ROTATING TOOLS

K

SCREW-IN TYPE

GAMP: +4° GAMF: -6° - -7°

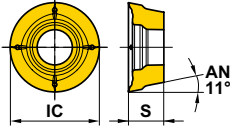
Type	Cutting Edge R (APMX)	Order Number	Stock	Number of Teeth	Dimensions (mm)								* WT (kg)	Max. Depth of Cut (mm)			RMPX
					DCX	DCONMS	DHUB	OAL	LF	L11	S10	CRKS		APMX	A1	AZ	
Standard	5	ARP5PR2502AM1235	●	2	25	12.5	23.5	57	35	6	19	M12	0.10	5.0	—	0.40	1.8°
		ARP5PR3203AM1640	●	3	32	17.0	28.5	63	40	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 K260.

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

INSERTS

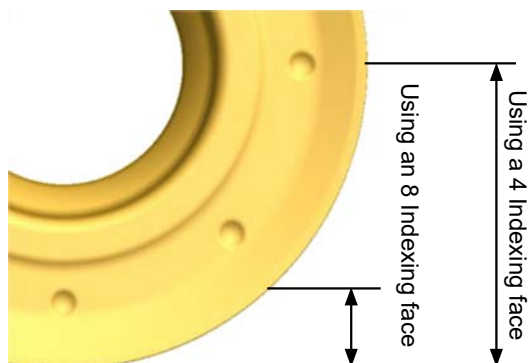
Material		M	Stainless Steels		G	G	C	C	Cutting Conditions (Guide) :					
		S	Heat-resistant Alloys, Titanium Alloys											
									Honing : E : Round					
Shape	Holder	Order Number	Type	Class	Honing	Coated				Dimensions (mm)		APMX (mm)		Geometry
						MC7020	MP7130	MP9130	MP9140	IC	S	4 Seats	8 Seats	
	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	–	
		RPMT1040M0E8-L1	Low Resistance, 8 Seats	M	E	●	●	●	●	10	3.97	5.0	1.4	
		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	–	
		RPMT1040M0E8-M1	General, 8 Seats	M	E	●	●	●	●	10	3.97	5.0	1.4	
		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	–	
		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	–	
		RPMT1248M0E8-L1	Low Resistance, 8 Seats	M	E	●	●	●	●	12	4.76	6.0	1.7	
		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	–	
		RPMT1248M0E8-M1	General, 8 Seats	M	E	●	●	●	●	12	4.76	6.0	1.7	
		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	–	
		RPMT1248M0E8-R1	Reinforced Edge, 8 Seats	M	E	●	●	●		12	4.76	6.0	1.7	

K

ROTATING TOOLS

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.



ARBORS	> K260
SPARE PARTS	> N001
TECHNICAL DATA	> P001

K257

RECOMMENDED CUTTING CONDITIONS

■ Dry cutting

	Material	Hardness	Grade	Vc (m/min)	fz (mm/t.)
K ROTATING TOOLS	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

	Material	Hardness	Grade	Vc (m/min)	fz (mm/t.)
K ROTATING TOOLS	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 depth of cut is $a_p = 2.5\text{mm}$ with ARP5 axial cutting. With ARP6, use $a_p = 3\text{mm}$.

Use while matching the a_p fluctuation and correction value F of the respective table.

Example: The feed for when using ARP5, SUS304, MP7130, $a_p=1$: $0.2\text{ mm/t.} \times 1.5$ (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 separately available coolant nozzle is used, it is more effective.

MAXIMUM CAPACITIES BY EACH CUTTING

Cutting Edge	Maximum hole diameter	Order Number	Install	Type	Recommendation (mm)		Ramping	Helical Drilling		Drilling Depth	Plunging
APMX (mm)	DCX (mm)				ap	ae		Smallest hole DH min.(mm)	Largest hole DH max.(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 Ødc when cutting helical holes : Centre tool tracks Ødc=desired hole diameter ØDH tool diameter ØDCX

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.

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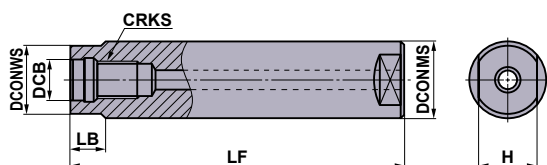
ROTATING TOOLS

ARBORS

STRAIGHT SHANK ARBOR

K

ROTATING TOOLS



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

- ① Thoroughly clean the clamp section of the head and the arbor with an air blower or brush before installation.
- ② Tighten the head at the recommended torque and ensure that there is no gap between the head and arbor.

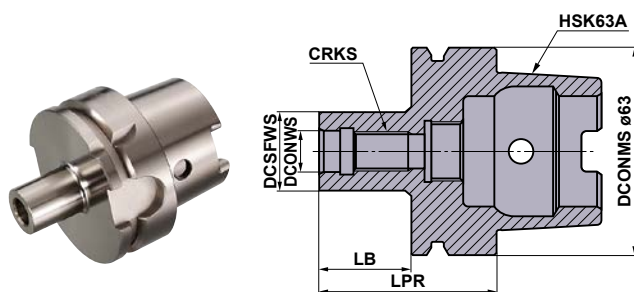
Screw Size	Recommended Torque (N · m)	Wrench Size (mm)
M8	23	10
M10	46	14
M12	80	19
M16	90	24



- 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.

K

ROTATING TOOLS

MAXIMUM ALLOWABLE REVOLUTION FOR EACH CUTTER

K
ROTATING TOOLS

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	-0.1 -0.3
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.)

K

ROTATING TOOLS

HOW TO READ THE STANDARD OF ROTATING TOOL INSERTS

● How the section of milling inserts is organised

- ① Organised according to cutter type.
- ② Cutters are arranged in alphabetical order.

● How the standards for milling inserts are organised

- ① Classified into milling inserts, wiper inserts and drilling inserts.
② Arranged alphabetically by order number.

GRADE APPLICATION RECOMMENDED FOR EACH MATERIAL

cutting conditions suitable for each materials are shown as a general guide to select grade.

- : Stable Cutting ●: General Cutting ✖: Unstable Cutting

PAGE TITLE BY TOOL APPLICATION

- INSERT NUMBER

**INSERT TOLERANCE •
HONING**

- INSERT GRADE

PAGE TITLE

PRODUCT SECTION

● ROTATING TOOL INSERTS

● CLASSIFICATION

Cutter Type	Order Number	Page	Cutter Type	Order Number	Page	Cutter Type	Order Number	Page
AXH4405	NNMU1300682Z- L	L030	AXH405 AXH40W	NNMU200608Z- MK	L031	APX3000	AOMT123602PEER-M AOMT123604PEER-M AOMT123609PEER-M AOMT123610PEER-M AOMT123612PEER-M AOMT123616PEER-M AOMT123620PEER-M	L022
	WNEU13052ENC-M	L049		NNMU200608Z- MK	L031		AOMT123604PEER-H AOMT123609PEER-H AOMT123623PEER-M AOMT123604PEER-H AOMT123609PEER-H AOMT123616PEER-H AOMT123618PEER-H	L022
AXH4405 AXH4755	NNMU1300682Z-M NNMU130532Z-M	L030		NNMU2007105Z- ET	L031			
	NNMU130532Z- R	L030		WNEU20060Z- MK	L050	APX4000	AOMT184804PEER-M AOMT184809PEER-M AOMT184810PEER-M AOMT184820PEER-M AOMT184804PEER-H AOMT184810PEER-H AOMT184820PEER-H AOMT184804PEER-H AOMT184810PEER-H AOMT184820PEER-H	L023
AXH5445	WNEU20072Z- M	L049	AJX	JOMT96721ZSSR-JM JOMT080320ZSSR-JM JOMT097320ZSSR-JM JOMT120420ZSSR-JM JOMT140520ZSSR-JM	L023			
	NNMU200708Z-MP NNMU200708Z-M	L031		JOMW96721ZSSR-FT JOMW960320ZSSR-FT JOMW097320ZSSR-FT JOMW120420ZSSR-FT JOMW140520ZSSR-FT	L024	AQX	QOGT0830R-G1 QOGT1033R-G1 QOGT1343R-G1 QOGT1651R-G1 QOGT1856R-G1 QOGT2062R-G1 QOGT2576R-G1 QOGT0830R-M2 QOGT1033R-M2 QOGT1342R-M2 QOGT1651R-M2 QOGT1856R-M2 QOGT2062R-M2 QOGT2576R-M2	L032
	NNMU20071ZSSR-MM	L031		JOMT96721ZSSR-JL JOMT080320ZSSR-JL JOMT097320ZSSR-JL JOMT120420ZSSR-JL JOMT140520ZSSR-JL	L024			
	NNMU200721ZSSR-L	L031		JOMT120420ZSSR-ST JOMT140520ZSSR-ST	L026			
	WNEU2007Z- WP	L050	APX3000	AOGT123602PEFR-GM AOGT123604PEFR-GM AOGT123609PEFR-GM	L022	ARP66	RPH1T1040M0E-L4 RPH1T1040M0E-M4 RPH1T1240M0E-M4 RPH1T1240M0E-R4 RPH1T240M0E-R4	L054

L014

■ INSERT NUMBER

CUTTER TYPE

PHOTO OF INSERT

PAGE TO GO TO

indicates the reference pages for detailed standards of specific inserts.

ROTATING TOOL INSERTS

ROTATING INSERTS

Material		Coated		Cutting Conditions (Isual):			
P	Steel	Coated	Coated	●: Stable Cutting	●: General Cutting		
M	Stainless Steel	Coated	Coated	●: Stable Cutting	●: General Cutting		
K	Cast Iron	Coated	Coated	●: Stable Cutting	●: General Cutting		
N	Non-ferrous Metal	Coated	Coated	●: Stable Cutting	●: General Cutting		
H	High Speed Steel	Coated	Coated	●: Stable Cutting	●: General Cutting		
Shape	Order Number	Coated	Coated	Dimensions (mm)		Geometry	
WXX450 CK062	NGNU0906040PNFR-L	G	—	12	10	6.6 3.6 1.8 0.4	
	NGNU0906080PNFR-L	G	—	12	10	6.6 3.12 0.8	
	NGNU0906040PNR-M	M	—	12	10	6.6 3.6 1.8 0.4	
	NGNU0906080PNR-M	M	—	12	10	6.6 3.12 0.8	
WXX450 CK067	NGNU1409040PNR-L	G	—	12	10	6.6 3.12 0.4	
	NGNU1409080PNR-L	G	—	12	10	6.6 3.12 0.8	
	NGNU1409040PNR-M	M	—	12	10	6.6 3.12 0.4	
	NGNU1409080PNR-M	M	—	12	10	6.6 3.12 0.8	
APX3000 CK146	AOMT123604PEER-H	M	—	12	10	6.6 3.6 1.8 0.4	
	AOMT123608PEER-H	M	—	12	10	6.6 3.6 1.8 0.4	
	AOMT123612PEER-H	M	—	12	10	6.6 3.6 1.8 0.4	
	AOMT123616PEER-H	M	—	12	10	6.6 3.6 1.8 0.4	
APX3000 CK146	AOMT123604PEER-M	M	—	12	10	6.6 3.6 1.8 0.2	
	AOMT123608PEER-M	M	—	12	10	6.6 3.6 1.6 0.4	
	AOMT123612PEER-M	M	—	12	10	6.6 3.6 1.6 0.4	
	AOMT123616PEER-M	M	—	12	10	6.6 3.6 1.6 0.4	
APX3000 CK146	AOMT123602PEER-M	M	—	12	10	6.6 3.6 1.8 0.2	
	AOMT123604PEER-M	M	—	12	10	6.6 3.6 1.6 0.4	
	AOMT123608PEER-M	M	—	12	10	6.6 3.6 1.6 0.4	
	AOMT123612PEER-M	M	—	12	10	6.6 3.6 1.6 0.4	
APX3000 CK146	AOMT123616PEER-M	M	—	12	10	6.6 3.6 1.6 0.4	
	AOMT123620PEER-M	M	—	12	10	6.6 3.6 0.4 2.0	
	AOMT123624PEER-M	M	—	12	10	6.6 3.6 0.4 2.4	
	AOMT123632PEER-M	M	—	12	10	6.6 3.6 0.4 3.2	

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

L022

L022

INSERT GEOMETRY

– INSERT DIMENSIONS

STOCK STATUS

LEGEND FOR STOCK STATUS MARK

is shown on the left hand page of each double-page spread.

- To Order : Please specify

- ①insert number and grade.

INDEXABLE MILLING TOOLS

INSERT STANDARDS

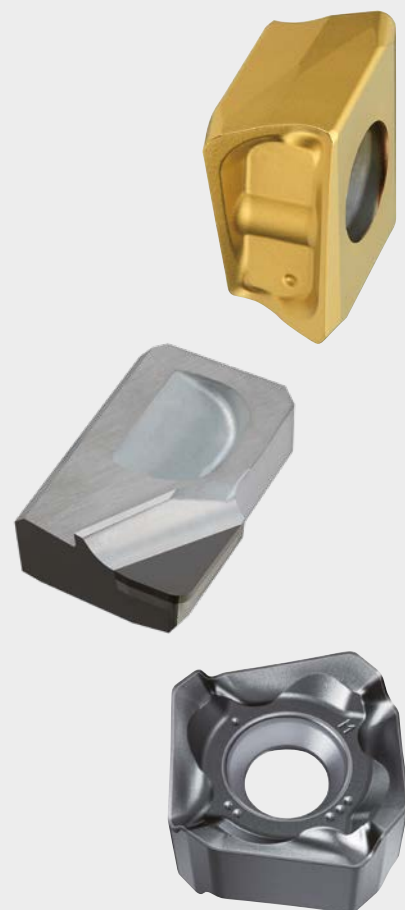
CBN & PCD INSERT STANDARDS

INSERT GRADES

IDENTIFICATION.....	L002
GRADES FOR MILLING	L004
MILLING APPLICATION RANGE	L005
COATED CARBIDE (CVD & PVD).....	L008
CERMET	L010
CEMENTED CARBIDE	L011
CBN (SINTERED CBN).....	L012
PCD (SINTERED DIAMOND)	L013
CLASSIFICATION	L014

STANDARD ROTATING TOOL INSERTS

ROTATING INSERTS	L022
WIPER INSERTS	L049
CBN AND PCD.....	L051
CBN AND PCD WITH WIPER.....	L052



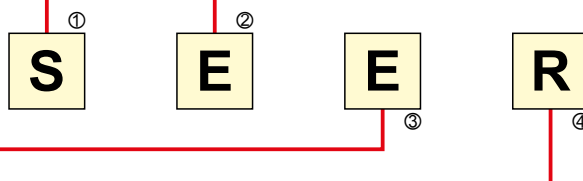
IDENTIFICATION

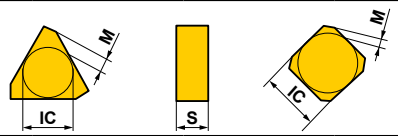
L

ROTATING INSERTS

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		



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				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

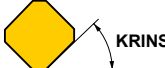
	
Symbol	Insert Thickness (mm)
03	3.18
T3	3.97
04	4.76
©Insert Thickness	

⑥Insert Thickness

Symbol	Honing
F	 Sharp
E	 Round
T	 Chamfer
S	 Chamfer+Hone
X	 Round (small)
Z	 Chamfer (Strong Cutting Edge Type)

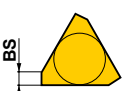
⑨Cutting Edge Condition

12 03 A F E R 1 - JS

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	
	
Symbol	BS (mm)
1	1.4 (1.94 only for TEKN)
2	2.4

⑫Chipbreaker	
Symbol	Name
FT	FT Chipbreaker
HS	HS Chipbreaker
JH	JH Chipbreaker
JM	JM Chipbreaker
JS	JS Chipbreaker
JL	JL Chipbreaker
JP	JP Chipbreaker
LS	LS Chipbreaker
MM	MM Chipbreaker
MS	MS Chipbreaker
L	L Chipbreaker
M	M Chipbreaker
R	R Chipbreaker

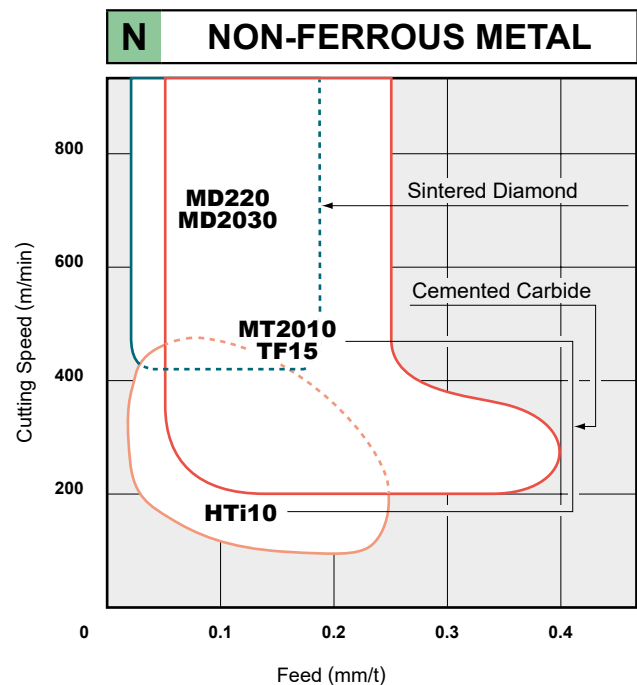
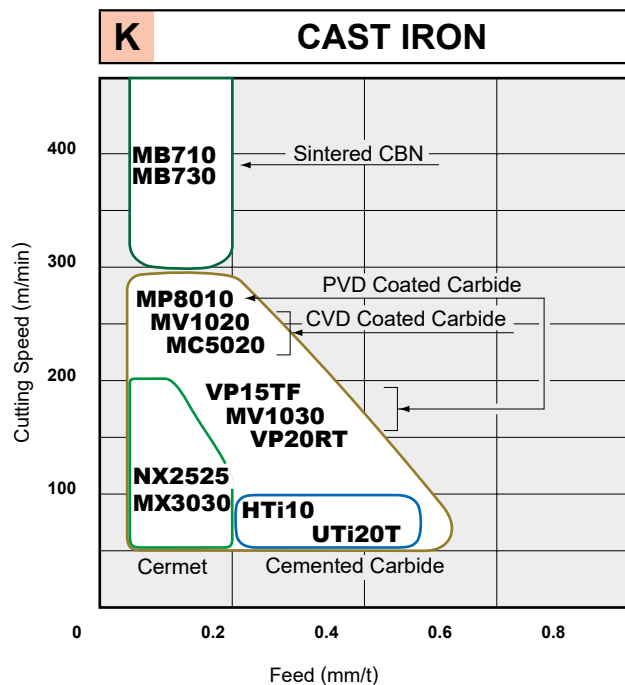
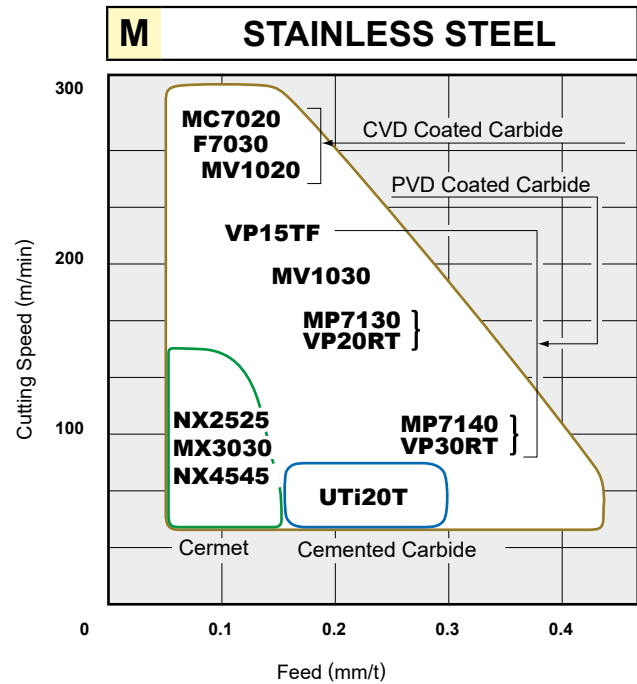
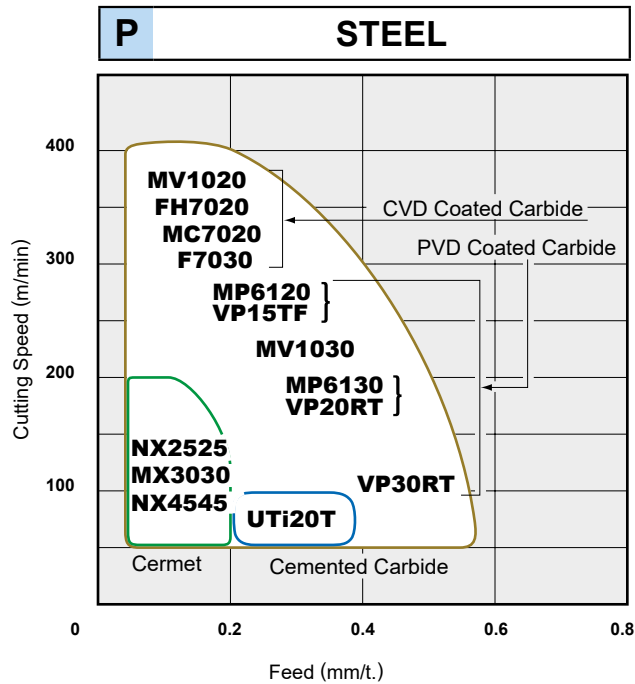
GRADES FOR MILLING

● INDEXABLE INSERT GRADES FOR MILLING

ISO	Coated Carbide		Coated Cermet	Cermet	Cemented Carbide	CBN (Sintered CBN)	PCD (Sintered Diamond)
	CVD	PVD					
Steel	P	10					
		20					
		30					
		40					
Stainless Steel	M	10					
		20					
		30					
		40					
Cast Iron	K	10					
		20					
		30					
Non-Ferrous Metal	N	10					
		20					
		30					
Heat Resistant Alloy • Ti Alloy	S	10					
		20					
		30					
		40					
Hardened Materials	H	10					
		20					
		30					



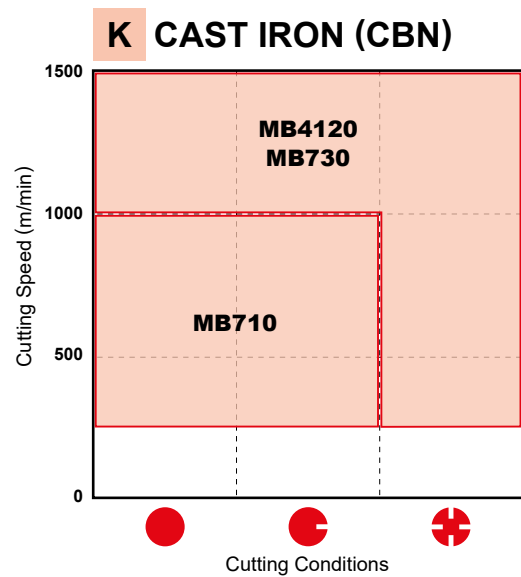
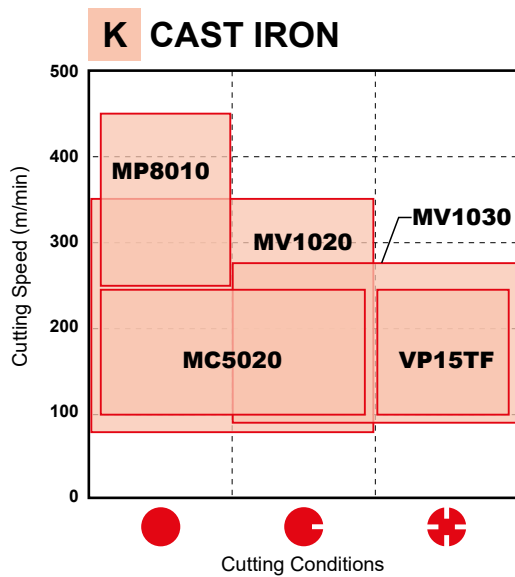
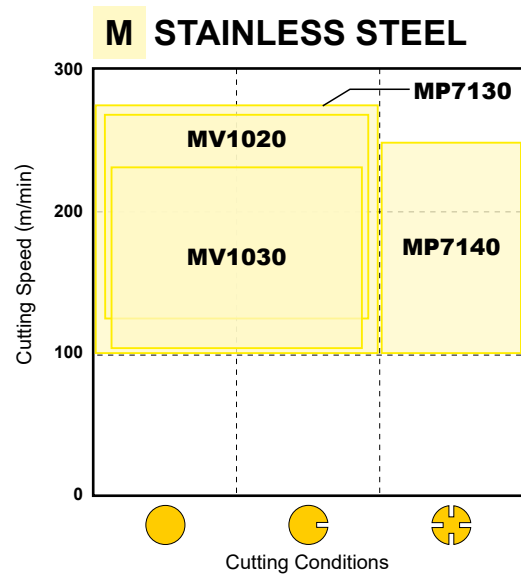
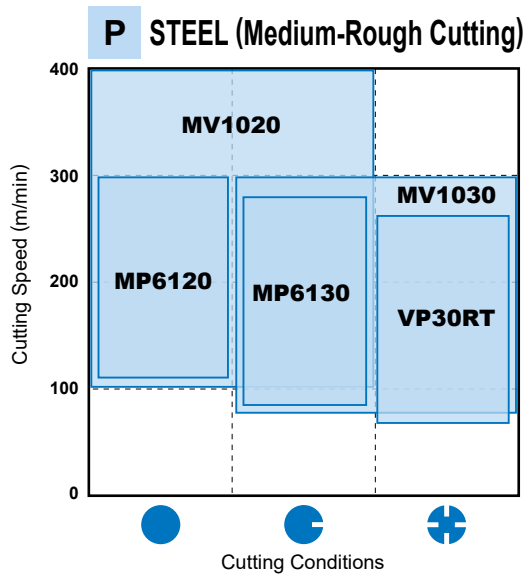
MILLING APPLICATION RANGE



MILLING APPLICATION RANGE

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

ROTATING INSERTS



CUTTING CONDITIONS

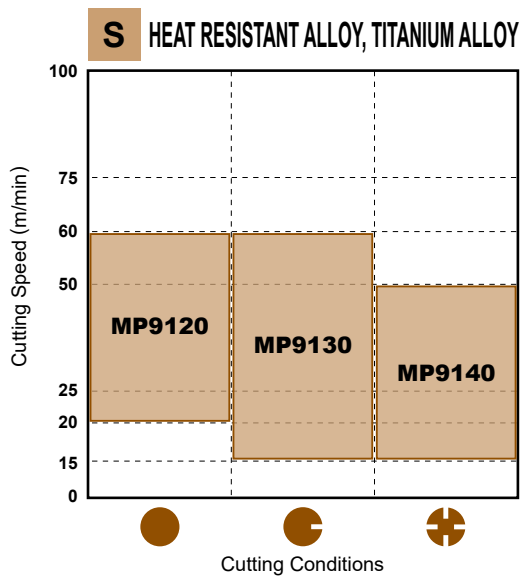
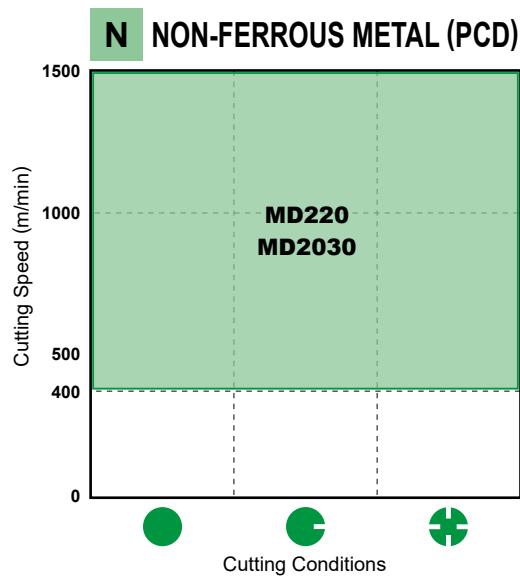
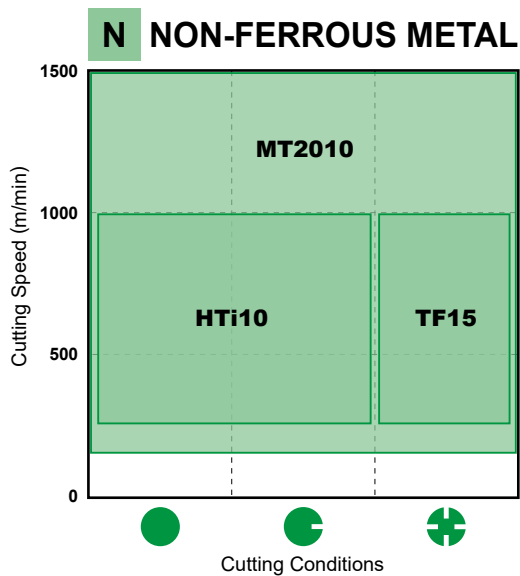
- Stable Cutting

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



ROTATING INSERTS

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

Material	Recommended Grade	ISO	Application Range
P Steel	NEW MV1020	P	
	NEW MV1030		
	F7030		
	MC7020		
	MP6120		
	MP6130		
	VP15TF		
M Stainless Steel	NEW MV1030	M	
	F7030		
	MC7020		
	MP7030		
	MP7130		
	MP7140		
	VP15TF		
K Cast Iron	NEW MV1020	K	
	NEW MV1030		
	MC5020		
	MC520		
	VP15TF		
N Aluminium Alloy	LC15TF	N	
S Heat Resistant Alloy Ti Alloy	MP9120	S	
	VP15TF		
	MP9130		
	MP9140		
H Hardened Materials	MP8010	H	
	VP15TF		

■ GRADE CHARACTERISTICS

Grade	Substrate	Coating Layer	
	Hardness (HRA)	Composition	Thickness
NEW MV1020	89.0	(Al,Ti)N	Thin
NEW MV1030	89.0	(Al,Ti)N	Thin
MC5020	91.0	TiCN-Al ₂ O ₃ -Ti Compound	Thick
MC520	91.0	TiCN-Al ₂ O ₃ -Ti Compound	Thick
MC7020	88.8	TiCN-Al ₂ O ₃ -Ti Compound	Thick
FH7020	89.0	TiCN-Al ₂ O ₃ -Ti Compound	Thick
F7030	88.8	TiCN-Al ₂ O 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

Grade	Substrate	Coating Layer	
	Hardness (HRA)	Composition	Thickness
MP7130	90.5	(Al,Ti)N-Ti Compound	Thin
MP7140	88.8	(Al,Ti)N-Ti Compound	Thin
MP8010	93.5	(Al,Ti,Si)N	Thin
MP9120	91.5	(Al,Ti,Cr)N	Thin
MP9130	90.5	(Al,Ti,Cr)N	Thin
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	TiN-TiCN-TiN	Thin

Note 1) Internal hardness represent typical values shown as hardness.

For machining of steels and stainless steels

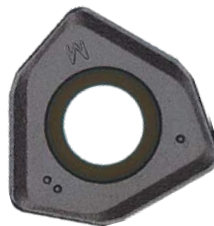
NEW MV1000 Series



Advanced Wear Resistance

By adopting the newly developed Al-Rich coating technology, the (Al,Ti)N with a high Al content ratio displays a very high hardness. This greatly improves oxidation and wear resistance.

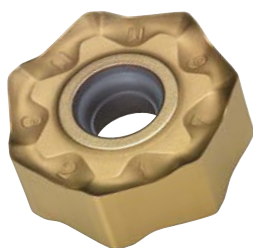
MC7020



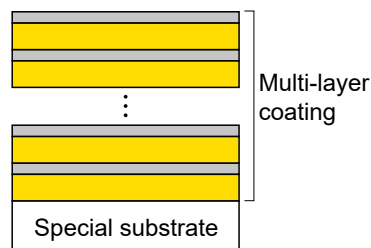
The micro-grain wear resistant Al₂O₃ and fibrous TiCN layers deliver excellent wear resistance during high speed cutting. Use of a specially developed cemented carbide that provides superior resistance to fracture and thermal cracking prevents the cutting edge from sudden breakage..

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.

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

ROTATING INSERTS

Material	Recommended Grade	ISO	Application Range
P Steel Stainless Steel M	NX2525	P	
	MX3020	10	
	MX3030	20	
	NX4545	30	
K Cast Iron	NX2525	M	
	MX3020	10	
	MX3030	20	

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

Material	Recommended Grade	ISO	Application Range
P Steel	UTi20T	10	
		20	
		30	UTi20T
M Stainless Steel	UTi20T	10	
		20	
		30	UTi20T
K Cast Iron	HTi05T	10	HTi05T
	HTi10	20	HTi10
	UTi20T	30	UTi20T
N Non-Ferrous Metal	HTi10	10	HTi10
	MT2010	20	MT2010
	TF15	30	TF15

ROTATING INSERTS

MAIN COMPONENT AND APPLICATION

ISO	Main Component	Characteristics	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	MT2010	91.8
	TF15	91.5

Note 1) Internal hardness represent typical values shown as hardness.

CBN (SINTERED CBN)

● MB710 and MB730 for cast iron finishing.

L

ROTATING INSERTS

■ SELECTION STANDARD / RECOMMENDED CUTTING CONDITIONS

FINISHING

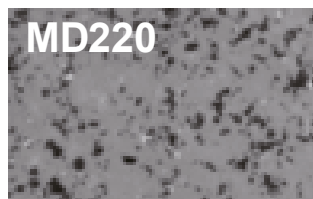
Material		Structure	Cutting Speed (m/min)					Feed (mm/t)	Depth of Cut (mm)	Coolant
			250	500	750	1000	1250			
Grey Cast Iron	DIN GG25	Ferritic + Pearlitic	MB710					—0.3	—0.5	Dry
	DIN GG30	Pearlitic								

■ 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 ₂ O ₃	—

PCD (SINTERED DIAMOND)

- Suitable for cutting non-ferrous metals such as aluminium alloy.
- Suitable for extremely high speed finishing.



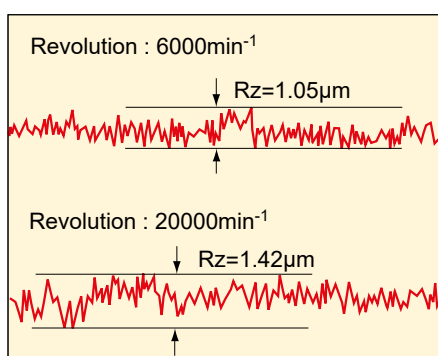
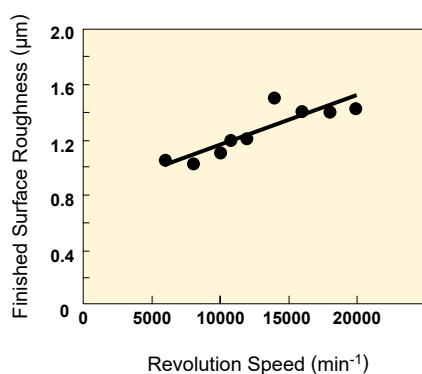
■ GRADE FEATURES

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 material and cutting conditions.

■ RECOMMENDED CUTTING CONDITIONS

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>

Material : 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

ROTATING INSERTS

L

Cutter Type	Order Number	Page
AHX440S	NNMU130508ZER-L	L030
		
	WNEU1305ZEN4C-M	L049
		
AHX440S AHX475S	NNMU130508ZEN-M NNMU130532ZEN-M	L030
		
	NNMU130532ZEN-R	L030
		
AHX640S	WNEU2007ZEN7C-M	L049
		
	NNMU200708ZEN-MP NNMU200708ZEN-M	L031
		
	NNMU200712ZER-MM	L031
		
	NNMU200712ZER-L	L031
		
	WNEU2007ZEN7C-WP	L050
		

Cutter Type	Order Number	Page
AHX640S AHX640W	NNMU200608ZEN-MK	L031
		
	NNMU200608ZEN-HK	L031
		
	NNMQ200708ZEN-FT	L031
		
	WNEU2006ZEN7C-WK	L050
		
AJX	JOMT06T215ZZSR-JM JOMT080320ZZSR-JM JDMT09T320ZDSR-JM JDMT120420ZDSR-JM JDMT140520ZDSR-JM	L025
		
	JOMW06T215ZZSR-FT JOMW080320ZZSR-FT JDMW09T320ZDSR-FT JDMW120420ZDSR-FT JDMW140520ZDSR-FT	L024
		
	JOMT06T216ZZER-JL JOMT080322ZZER-JL JDMT09T323ZDER-JL JDMT120423ZDER-JL JDMT140523ZDER-JL	L024
		
	JDMT120420ZDSR-ST JDMT140520ZDSR-ST	L025
		
APX3000	AOGT123602PEFR-GM AOGT123604PEFR-GM AOGT123608PEFR-GM	L022
		

Cutter Type	Order Number	Page
APX3000	AOMT123602PEER-M AOMT123604PEER-M AOMT123608PEER-M AOMT123610PEER-M AOMT123612PEER-M AOMT123616PEER-M AOMT123620PEER-M AOMT123624PEER-M AOMT123630PEER-M AOMT123632PEER-M	L022
		
	AOMT123604PEER-H AOMT123608PEER-H AOMT123616PEER-H	L022
		
APX4000	AOMT184804PEER-M AOMT184808PEER-M AOMT184810PEER-M AOMT184812PEER-M AOMT184816PEER-M AOMT184820PEER-M	L023
		
	AOMT184804PEER-H AOMT184808PEER-H AOMT184816PEER-H AOMT184832PEER-H AOMT184840PEER-H AOMT184850PEER-H AOMT184864PEER-H	L023
		
AQX	QOGT0830R-G1 QOGT1035R-G1 QOGT1342R-G1 QOGT1651R-G1 QOGT1856R-G1 QOGT2062R-G1 QOGT2576R-G1	L032
		
	QOMT0830R-M2 QOMT1035R-M2 QOMT1342R-M2 QOMT1651R-M2 QOMT1856R-M2 QOMT2062R-M2 QOMT2576R-M2	L032
		
ARP5/6	RPHT1040M0E4-L RPHT1248M0E4-L RPHT1040M0E4-M RPHT1248M0E4-M RPHT1040M0E4-R RPHT1248M0E4-R	L034
		

Cutter Type	Order Number	Page
	RPMT1040M0E4-L	L034
	RPMT1040M0E8-L1	
	RPMT1040M0E4-L2	
	RPMT1248M0E4-L	
	RPMT1248M0E8-L1	
	RPMT1248M0E4-L2	
	RPMT1040M0E4-M	
	RPMT1040M0E8-M1	
	RPMT1040M0E4-M2	
	RPMT1248M0E4-M	
	RPMT1248M0E8-M1	
	RPMT1248M0E4-M2	
	RPMT1040M0E4-R	
	RPMT1040M0E8-R1	
	RPMT1248M0E4-R	
	RPMT1248M0E8-R1	
	JPGX1404080PPER-JM	L025
	JPGX1404120PPER-JM	
	JPGX1404160PPER-JM	
	JPGX1404240PPER-JM	
	JPGX1404320PPER-JM	
	JPGX1404400PPER-JM	
	JPGX1404500PPER-JM	
	JPGX1404635PPER-JM	
	SPGX1204100PPER-JM	L040
	SOGT12T308PEFR-JP	L038
	SOET12T308PEER-JL	L038
	SOMT12T308PEER-JM	L038
	SOMT12T308PEEL-JM	

Cutter Type	Order Number	Page
	SOMT12T308PEER-JH	L038
	SOMT12T320PEER-FT	L039
	WOEW12T308PEER8C	L050
	WOEW12T308PETR8C	
	SEGT13T3AGFN-JP	L036
	SEET13T3AGEN-JL	L036
	SEMT13T3AGSN-JM	L037
	SEMT13T3AGSN-JH	L037
	SEMT13T3AGSN-FT	L037
	WEEW13T3AGFR3C	L052
	WEEW13T3AGTR3C	
	WEEW13T3AGER8C	L049
	WEEW13T3AGTR8C	

Cutter Type	Order Number	Page
	XDGX175004PDFR-GL	L046
	XDGX175008PDFR-GL	
	XDGX175012PDFR-GL	
	XDGX175016PDFR-GL	
	XDGX175020PDFR-GL	
	XDGX175024PDFR-GL	
	XDGX175030PDFR-GL	
	XDGX175032PDFR-GL	
	XDGX175040PDFR-GL	
	XDGX175050PDFR-GL	
	XDGX175004PDER-GM	L046
	XDGX175008PDER-GM	
	XDGX175012PDER-GM	
	XDGX175016PDER-GM	
	XDGX175020PDER-GM	
	XDGX175024PDER-GM	
	XDGX175030PDER-GM	L046
	XDGX175032PDER-GM	
	XDGX175040PDER-GM	
	XDGX175050PDER-GM	
	XDGX175004PDFR-GM	L046
	XDGX175008PDFR-GM	
	XDGX175012PDFR-GM	
	XDGX175016PDFR-GM	
	XDGX175020PDFR-GM	
	XDGX175024PDFR-GM	
	XDGX175030PDFR-GM	L046
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	XDGX227008PDFR-GL	L046
	XDGX227016PDFR-GL	
	XDGX227020PDFR-GL	
	XDGX227030PDFR-GL	
	XDGX227032PDFR-GL	
	XDGX227040PDFR-GL	
	XDGX227050PDFR-GL	L023
	APGT1135PDFR-G2	L023

CLASSIFICATION

ROTATING INSERTS

Cutter Type	Order Number	Page	Cutter Type	Order Number	Page	Cutter Type	Order Number	Page
BAP300 SRM2	APMT1135PDER-M0	L024	BN425 DN	SNMF43B2G	L038	DCCC	CCMX083508EN-A	L024
	APMT1135PDER-M1						CCMX09T308EN-A	
	APMT1135PDER-M2							
	APMT1135PDER-H1	L023	BRP	RPMT08T2M0E-JS	L034		CCMX09T308EN-B	L024
	APMT1135PDER-H2			RPMT10T3M0E-JS				
	APMT1135PDER-H3			RPMT1204M0E-JS				
	APMT1135PDER-H4			RPMT1606M0E-JS				
	APMT1135PDER-H6							
BAP400	APGT1604PDFR-G2	L023		RPMW08T2M0E	L034		ZCMX083508ER-A	L048
				RPMW08T2M0T			ZCMX09T308ER-A	
	RPMW10T3M0E							
	RPMW10T3M0T							
	RPMW1204M0E							
	RPMW1204M0T							
	RPMW1606M0E							
	RPMW1606M0T							
BAP400 SRM2	APMT1604PDER-M2	L024	BSP	SPMB1204APT	L040		ZCMX09T308ER-B	L048
	APMT1604PDER-H1	L023	CBJP TAB	JPMT060204-E	L025		SPEN1203EEER1	L039
	APMT1604PDER-H2						SPEN1203EEEL1	
	APMT1604PDER-H4						SPNN1203EEER1	
	APMT1604PDER-H6						SPNN1203EEEL1	
	APMT1604PDER-H8							
BF407	SFAN1203ZFFR2	L037	CBMP ECMP TAB	MPMT070308	L030		SPER1203EEER-JS	L039
	SFAN1203ZFFL2			MPMT090308				
	SFCN1203ZFFR2			MPMT120408				
BN425 DN	SNC43B2S	L037	CESP CFSP CGSP	SPMW090304	L040		WPC42EEER10C	L050
				SPMW090308				
				SPMW120304				
				SPMW120308				

Cutter Type	Order Number	Page
FMAX 	GOER1404PXFR2 GOER1408PXFR2	L051
	GOER1408PXFR2-8	L051
	GOER1401ZXFR2	L051
	NP-GOEN1404PXSR05 NP-GOEN1408PXSR05	L051
FP490 	SPEN424A	L039
LSE445 SE445  	SEEN1203AFEN1 SEEN1203AFTN1 SEEN1203AFTN3	L035
	SEER1203AFEN-JS	L035
NSE300 SE300  	TECN1603PEFR1W TECN1603PEER1W TECN1603PETR1W	L044

Cutter Type	Order Number	Page
NSE300 SE300  	TECN1603PEFR1	L051
	TEEN1603PEFR1 TEEN1603PEER1 TEEN1603PETR1 TEEN1603PESR1 TEEN1603PEZR1	L044
NSE300  	TEER1603PEER-JS	L044
NSE400  	TEER2204PEER-JS	L044
NSE400 SE400   	TECN2204PEFR1 TECN2204PEER1 TECN2204PETR1 TEEN2204PEFR1 TEEN2204PEER1 TEEN2204PETR1 TEEN2204PESR1	L044
OCTACUT   	OEMX12T3ETR1 OEMX12T3ESR1 OEMX1705ETR1 OEMX1705ESR1	L031
	OEMX12T3EER1-JS OEMX1705EER1-JS OEMX1705ETR1-JS	L032
	REMX1705SN	L033

Cutter Type	Order Number	Page
OCTACUT 	REMX12T3EN-JS REMX1705EN-JS	L033
PMF  	TPEW1303ZPER2	L045
	TPEW1303ZPTR2	L052
RRD    	RDHX0501M0E RDHX0501M0S RDHX07T1M0E RDHX07T1M0S RDHX0702M0E RDHX0702M0S RDHX1003M0E RDHX1003M0S	L032
	RDHX12T3M0E RDHX12T3M0S RDHX1604M0E RDHX1604M0S	L032
	RDMX07T1M0E RDMX07T1M0T RDMX0702M0E RDMX0702M0T RDMX1003M0E RDMX1003M0S RDMX1003M0T RDMX12T3M0E RDMX12T3M0S RDMX12T3M0T RDMX1604M0E RDMX1604M0S RDMX1604M0T	L033

CLASSIFICATION

ROTATING INSERTS

Cutter Type	Order Number	Page
 	RDZX0501M0E	L033
	RDZX07T1M0E	
	RDZX0702M0E	
	RDZX1003M0E	
	RDZX1003M0S	
	RDZX12T3M0E	
	RDZX12T3M0S	
	RDZX1604M0E	
	RDZX1604M0S	
	CPMT1205ZPEN-M2	L024
	CPMT1205ZPEN-M3	
	CPMT1906ZPEN-M2	
	CPMT1906ZPEN-M3	
	SEEN1203EFFR1	L036
	SEEN1203EFER1	
	SEEN1203EFTR1	
	SEEN1203EFTR3	
	SEEN1203EFSR1	
	SEER1203EFER-JS	L036
	SECN1203EFFR1	L051
	WEC42EFTR5C	L049
	SECN1504EFTR1	L036
	SEEN1504EFER1	
	SEEN1504EFTR1	
	SEEN1504EFSR1	
	WEC53EFTR5C	L049

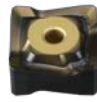
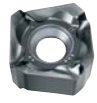
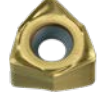
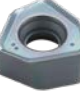
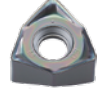
Cutter Type	Order Number	Page
	SEEN1504AFEN1	L035
	SEEN1504AFTN1	
	SEEN1504AFTN3	L035
	SEEN1504AFSN1	
	SEER1504AFEN-JS	L035
	WEC53AFTR5C	L049
	RGEN2004M0EN	L033
	RGEN2004M0SN	
	JPMX140412-JM	L025
	JPMX190412-JM	
	JPMX140412-WH	L025
	JPMX190412-WH	
	MPMX120412-JM	L030
	MPMX120412-WH	L030
	SPMX120408-JM	L041
	SPMX120408-WH	L041

Cutter Type	Order Number	Page
	SRBT10	L042
	SRBT12	
	SRBT16	
	SRBT20	
	SRBT25	
	SRBT30	
	SRBT32	
	SRFT10	L042
	SRFT12	
	SRFT16	
	SRFT20	
	SRFT25	
	SRFT30	
	SRFT32	
	SRG16C	L042
	SRG20C	
	SRG25C	
	SRG30C	
	SRG32C	L042
	SRG16E	
	SRG20E	
	SRG25E	
	SRG30E	L043
	SRG32E	
	SRM16C-M	
	SRM20C-M	
	SRM25C-M	L043
	SRM30C-M	
	SRM32C-M	
	SRM16E-M	
	SRM20E-M	L043
	SRM25E-M	
	SRM30E-M	
	SRM32E-M	
	SRG40C	L042
	SRG50C	
	SRG40E	L042
	SRG50E	
	APMT1135PDER-M2	L024
	APMT1604PDER-M2	

Cutter Type	Order Number	Page	Cutter Type	Order Number	Page	Cutter Type	Order Number	Page						
SRM2 Ø40 Ø50 	APMT1135PDER-H2	L023	DCV3 Side Cutter 	LNGU090604PNER-M	L026	DCV4 Side Cutter 	LNGU171004PNER-R	L027						
	APMT1604PDER-H2			LNGU090604PNEL-M			LNGU171004PNEL-R							
SUF 	SUFT10R05	L043		DCV4 Side Cutter 			LNGU090608PNER-M		L026	VPX200 	LNGU171008PNER-R	L028		
	SUFT10R10						LNGU090608PNEL-M				LNGU171008PNEL-R			
	SUFT10R20						LNGU090612PNER-M				LNGU171012PNER-R			
	SUFT12R05						LNGU090612PNEL-M				LNGU171012PNEL-R			
	SUFT12R10						LNGU090616PNER-M				LNGU171016PNER-R			
	SUFT12R20						LNGU090616PNEL-M				LNGU171016PNEL-R			
	SUFT12R30						LNGU090620PNER-M				LNGU171020PNER-R			
	SUFT16R05						LNGU090620PNEL-M				LNGU171020PNEL-R			
	SUFT16R10						LNGU090624PNER-M				LNGU171024PNER-R			
	SUFT16R15						LNGU090624PNEL-M				LNGU171024PNEL-R			
	SUFT16R20						LNGU090630PNER-M				LNGU171030PNER-R			
	SUFT16R30						LNGU090630PNEL-M				LNGU171030PNEL-R			
	SUFT20R05		LNGU090640PNER-M		LNGU171040PNER-R									
	SUFT20R10		LNGU090640PNEL-M		LNGU171040PNEL-R									
	SUFT20R15		LNGU130804PNER-M	L026	LNGU171050PNER-R	L028								
	SUFT20R20		LNGU130804PNEL-M		LNGU171050PNEL-R									
	SUFT20R30		LNGU130808PNER-M		LNGU171060PNER-R									
	SUFT25R05		LNGU130808PNEL-M		LNGU171060PNEL-R									
	SUFT25R10		LNGU130820PNER-M		LNGU171070PNER-R									
	SUFT25R20		LNGU130820PNEL-M		LNGU171070PNEL-R									
	SUFT25R30		LNGU130830PNER-M		VPX200 		LOGU0904020PNER-L	L028						
	SUFT25R30		LNGU130830PNEL-M				LOGU0904040PNER-L							
	SUFT30R05		LNGU130840PNER-M				LOGU0904080PNER-L							
	SUFT30R10		LNGU130840PNEL-M				LOGU0904100PNER-L							
	SUFT30R20		LNGU130840PNER-M				LOGU0904120PNER-L							
	SUFT30R30		LNGU130840PNEL-M				LOGU0904160PNER-L							
	SUFT32R05		LNGU130850PNER-M				LOGU0904020PNFR-L							
	SUFT32R10		LNGU130850PNEL-M				LOGU0904040PNFR-L							
SUFT32R20	LNGU130804PNER-R	LOGU0904080PNFR-L												
TBE1 	SPMT120408-A	L040		LNGU130812PNER-R		L026			LNGU171030PNER-R	L028				
				LNGU130812PNEL-R					LNGU171040PNER-R					
TSMP 	MPMW070308	L030							LNGU130816PNER-R		L026		LNGU171050PNER-R	L028
	MPMW090308								LNGU130816PNEL-R				LNGU171060PNER-R	
	MPMW120408								LNGU130820PNER-R				LNGU171070PNER-R	
					LNGU130820PNEL-R			LNGU171080PNER-R						
					LNGU130824PNER-R			LNGU171090PNER-R						
					LNGU130824PNEL-R			LNGU171100PNER-R						
	LNGU130830PNER-R	LNGU171110PNER-R		LNGU171120PNER-R										
	LNGU130830PNEL-R	LNGU171130PNER-R		LNGU171140PNER-R										
	LNGU130840PNER-R	LNGU171150PNER-R		LNGU171160PNER-R										
	LNGU130840PNEL-R	LNGU171170PNER-R		LNGU171180PNER-R										
	LNGU130850PNER-R	LNGU171190PNER-R		LNGU171200PNER-R										
	LNGU130850PNEL-R	LNGU171210PNER-R		LNGU171220PNER-R										

CLASSIFICATION

ROTATING INSERTS

Cutter Type	Order Number	Page	Cutter Type	Order Number	Page	Cutter Type	Order Number	Page
	LOGU1207020PNER-L	L029	VFX5	XNMU160708R-HS	L047	WSF406W	SNMU1206C05ZNER-M	L038
	LOGU1207040PNER-L							
	LOGU1207080PNER-L			XNMU160708R-LS	L047	WSX445	SNGU140812ANFR-L	L037
	LOGU1207100PNER-L						SNGU140812ANFL-L	
	LOGU1207120PNER-L			XNMU190912R-MS	L047		SNGU140812ANER-L	
	LOGU1207160PNER-L			XNMU190916R-MS			SNGU140812ANEL-L	
	LOGU1207200PNER-L			XNMU190924R-MS			SNGU140812ANER-M	
	LOGU1207240PNER-L			XNMU190932R-MS			SNGU140812ANEL-M	
	LOGU1207300PNER-L			XNMU190940R-MS			SNGU140812ANER-M	
	LOGU1207320PNER-L			XNMU190950R-MS			SNGU140812ANEL-M	
	LOGU1207020PNFR-L			XNMU190912R-HS	L047		SNGU140812ANEL-M	
	LOGU1207040PNFR-L						SNGU140812ANER-M	
	LOGU1207080PNFR-L						SNGU140812ANER-M	
	LOGU1207100PNFR-L						SNGU140812ANER-M	
	LOGU1207120PNFR-L						SNGU140812ANER-M	
	LOGU1207160PNFR-L						SNGU140812ANER-M	
	LOGU1207200PNFR-L						SNGU140812ANER-M	
	LOGU1207240PNFR-L						SNGU140812ANER-M	
	LOGU1207300PNFR-L						SNGU140812ANER-M	
	LOGU1207320PNFR-L						SNGU140812ANER-M	
	LOGU1207020PNER-M	L029	VOX400	SONX1206PER	L039	WWW200	6NGU0906040PNFR-L	L022
	LOGU1207040PNER-M			SONX1206PEL			6NGU0906080PNFR-L	
	LOGU1207080PNER-M			WOEX1206PER5C	L050		6NMU0906040PNER-M	
	LOGU1207100PNER-M						6NMU0906080PNER-M	
	LOGU1207120PNER-M			JOMU090512ZZER-L	L025		6NMU0906080PNER-M	
	LOGU1207160PNER-M			JOMU140715ZZER-L			6NMU0906080PNER-R	
	LOGU1207200PNER-M			JOMU090512ZZER-M				
	LOGU1207240PNER-M			JOMU140715ZZER-M				
	LOGU1207300PNER-M			JOMU090512ZZER-R				
	LOGU1207320PNER-M			JOMU140715ZZER-R				
	LOGU1207020PNFR-M							
	LOGU1207040PNFR-M							
	LOGU1207080PNFR-M							
	LOGU1207100PNFR-M							
	LOGU1207120PNFR-M							
	LOGU1207160PNFR-M							
	LOGU1207200PNFR-M							
	LOGU1207240PNFR-M							
	LOGU1207300PNFR-M							
	LOGU1207320PNFR-M							
VFX5	XNMU160708R-MS	L047		XNMU160712R-MS	L025		2NGU1406ZNER6C-M	L049
	XNMU160716R-MS			XNMU160724R-MS				
	XNMU160732R-MS			XNMU160740R-MS				

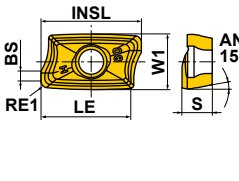
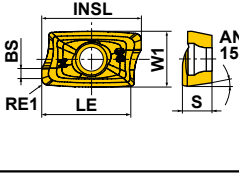
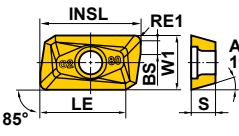
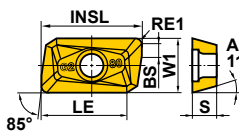
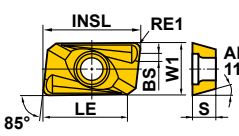
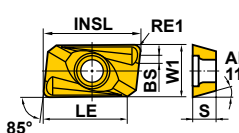
Cutter Type	Order Number	Page
415SD 	SDMT125530ZEN-L	L035
	SDMT125530ZEN-M	
	SDMT125530ZEN-R	
Corner Angle 0° 11° Positive 	TPEN1603PPR TPEN1603PPN TPEN2204PDR TPEN2204PDL	L045
	TPNN2204PDR	L045
Corner Angle 15° 11° Positive 	SPEN1203EDR SPEN1203EDL SPEN1504EDR SPEN1504EDL	L039
	SPNN1203EDR	L041
Corner Angle 45° 15° Positive 	SDEN1203AEN	L035
Corner Angle 45° 20° Positive 	SEER1204AFEN-JS	L035
	SEEW1204AFTN	L036

Cutter Type	Order Number	Page
Corner Angle 45° 20° Positive 	SEM1204AZTN	L036
Negative 	SNEN1204EN SNEN1504EN	L037
	SNMN120408 SNMN120412	L038
11° Positive 	SPGN120304 SPGN120308 SPGN120312 SPGN150404 SPGN150408 SPMN120304 SPMN120304T SPMN120308 SPMN120312 SPMN120408 SPMN120412 SPMN150408 SPMN150412	L040
	TPMN160304 TPMN160308 TPMN160312 TPMN220404 TPMN220408 TPMN220408T TPMN220412	L045

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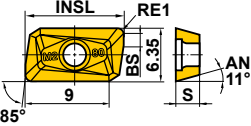
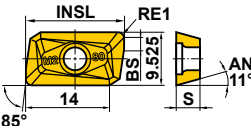
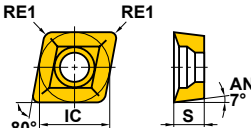
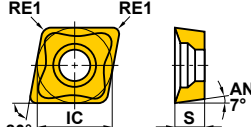
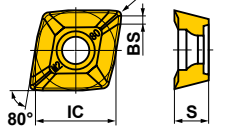
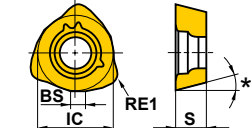
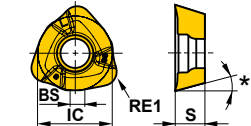
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● = NEW

Material	P	Steel											Cutting Conditions (Guide): ●:Stable Cutting ●:General Cutting ✖:Unstable Cutting Honing: E:Round F:Sharp											
	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										Cermet		Carbide	Dimensions (mm)						Geometry	
				F7030	MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	VP20RT	UP20M	NX2525	NEW MX3030	NX4545	UT120T	HT110	INSL	LE	W1	S		BS
APX4000 ➡K153 APX4000 Long Cutting Edge ➡K164 	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 ➡K153 APX4000 Long Cutting Edge ➡K164 	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	
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 ➡K236 	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 ➡K236 SRM2Ø40 ➡K244 	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		

● = NEW

ROTATING INSERTS

Material	P	Steel																Cutting Conditions (Guide): ●: Stable Cutting ●: General Cutting ✖: Unstable Cutting							
	M	Stainless Steel																							
	K	Cast Iron																Honing: E: Round S: Chamfer + Hone							
	N	Non-ferrous Metal																							
	S	Heat-resistant Alloy, Titanium Alloy																							
H	Hardened Materials																								
Shape	Order Number	Class	Honing	Coated										Cermet	Carbide	Dimensions (mm)					Geometry				
				F7030	FH7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	MP9140	VP15TF	VP30RT	UP20M	NEW MX3030	NX4545	UT120T	INSL	IC		S	BS	RE1	
	BAP300 SRM2 K236	APMT1135PDER-M0	M	E	★														11.25	—	3.5	1.8	0.2		
		APMT1135PDER-M1	M	E	★														11.25	—	3.5	1.5	0.4		
		APMT1135PDER-M2	M	E	●							●		●	●				11.18	—	3.5	1.2	0.8		
	BAP400 SRM2 K236 SRM2Ø40 Ø50 K244	APMT1604PDER-M2	M	E	●						●		●	●					17.10	—	4.76	1.4	0.8		
	DCCC K216	CCMX083508EN-A	M	E	●								★		★			—	7.94	3.5	—	0.8			
		CCMX09T308EN-A	M	E	●						●		★		★			—	9.525	3.97	—	0.8			
	DCCC K216	CCMX09T308EN-B	M	E	●										★			—	9.525	3.97	—	0.8			
	PMR K252	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 K194	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			
	AJX K194	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			
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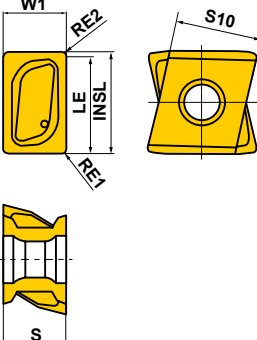
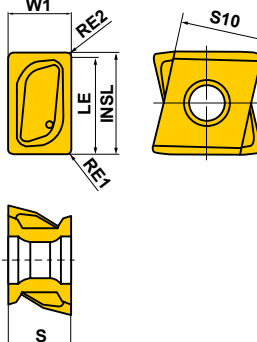
Material	P	Steel	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
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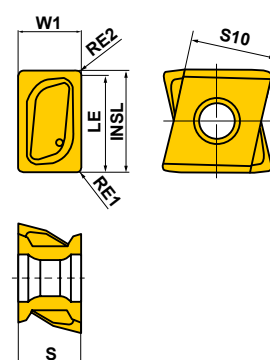
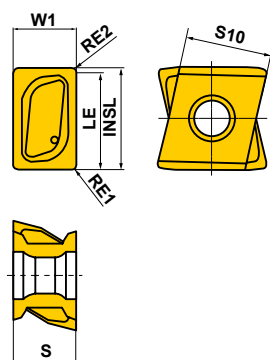
● = NEW

ROTATING INSERTS

ROTATING INSERTS

L

Material	P	Steel	● ● ✖ ●	Cutting Conditions (Guide): ●:Stable Cutting ●:General Cutting ✖:Unstable Cutting										
	M	Stainless Steel		Honing: E:Round										
	K	Cast Iron												
	N	Non-ferrous Metal												
	S	Heat-resistant Alloy, Titanium Alloy												
H	Hardened Steel													
Shape	Order Number	Hand	Class	Honing	Coated	Dimensions (mm)							Geometry	
					MP6120 VP15TF	INSL	LE	S	S10	RE1	RE2	W1		
DCV3 Side Cutter	LNGU090604PNER-M	R	G	E	●		9.0	8.6	6.0	8.5	0.4	0.4	6.0	 Right hand insert shown.
	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	
	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	
DCV4 Side Cutter	LNGU130804PNER-M	R	G	E	●		13.0	12.2	8.0	11.0	0.4	0.8	8.0	 Right hand insert shown.
	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	
	LNGU130804PNER-R	R	G	E	● ●		13.0	12.2	8.0	11.0	0.4	0.8	8.0	
	LNGU130804PNEL-R	L	G	E	● ●		13.0	12.2	8.0	11.0	0.4	0.8	8.0	
	LNGU130808PNER-R	R	G	E	● ●		13.0	12.2	8.0	11.0	0.8	0.8	8.0	
	LNGU130808PNEL-R	L	G	E	● ●		13.0	12.2	8.0	11.0	0.8	0.8	8.0	
	LNGU130812PNER-R	R	G	E	● ●		13.0	12.2	8.0	11.0	1.2	0.8	8.0	
	LNGU130812PNEL-R	L	G	E	● ●		13.0	12.2	8.0	11.0	1.2	0.8	8.0	
	LNGU130816PNER-R	R	G	E	● ●		13.0	12.2	8.0	11.0	1.6	0.8	8.0	
	LNGU130816PNEL-R	L	G	E	● ●		13.0	12.2	8.0	11.0	1.6	0.8	8.0	
LNGU130820PNER-R	R	G	E	● ●		13.0	12.2	8.0	11.0	2.0	0.8	8.0		
LNGU130820PNEL-R	L	G	E	● ●		13.0	12.2	8.0	11.0	2.0	0.8	8.0		



ROTATING INSERTS

● = NEW

Material	P	Steel	● ● ● ✱ ● ● ● ● ● ● ●										Cutting Conditions (Guide): ●: Stable Cutting ●: General Cutting ✱: Unstable Cutting							
	M	Stainless Steel	● ● ● ● ● ● ● ● ● ● ●										Honing: E: Round F: Sharp							
	K	Cast Iron	● ● ● ● ● ● ● ● ● ● ●																	
	N	Non-ferrous Metal	● ● ● ● ● ● ● ● ● ● ●																	
	S	Heat-resistant Alloy, Titanium Alloy	● ● ● ● ● ● ● ● ● ● ●																	
	H	Hardened Steel	● ● ● ● ● ● ● ● ● ● ●																	
Shape	Order Number	Class	Honing	Coated								Carbide	Dimensions (mm)					Geometry		
				MV1020 NEW NEW	MV1030	MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	TF15	INSL	RE1	LE	S		BS	
	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	
	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	
	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	

● = NEW

ROTATING INSERTS

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

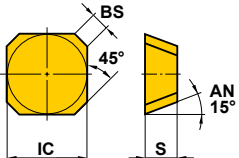
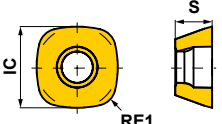
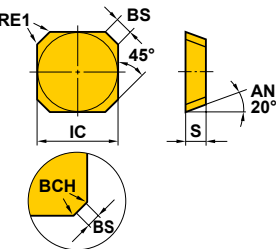
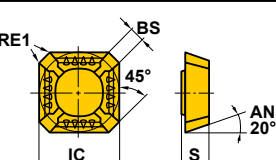
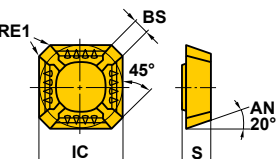
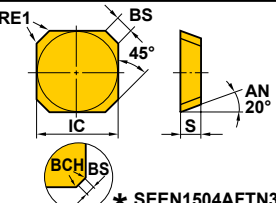
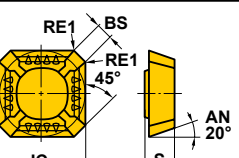
● = NEW

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

ROTATING INSERTS

Material	P	Steel	
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● = NEW

Material	P	Steel	●	●			●	●	●	●	●	Cutting Conditions (Guide): ●: Stable Cutting ●: General Cutting ✖: Unstable Cutting Honing: E: Round F: Sharp S: Chamfer + Hone T: Chamfer					
	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			Cermet	Carbide	Dimensions (mm)					Geometry			
				F7010	F7030	MC5020	MP9130	VP15TF	UP20M	NX2525	NX4545	UTi20T	HTi10		IC	S	BS
	SDEN1203AEN	E	T						●			12.7	3.18	1.2	—	—	
	SDMT125530ZEN-L	L	—			●						12.25	5.56	—	—	3.0	
	SDMT125530ZEN-M	M	—			●						12.25	5.56	—	—	3.0	
	SDMT125530ZEN-R	R	—			●							12.25	5.56	—	—	
	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	—	
	SEER1203AFEN-JS	E	E	●	●	●	●					12.7	3.18	1.4	—	1.0	
	SEER1204AFEN-JS	E	E	●								12.7	4.76	1.4	—	1.0	
	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	
	SEER1504AFEN-JS	E	E	●	●	★						15.875	4.76	1.4	—	1.0	

Mplus...

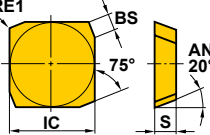
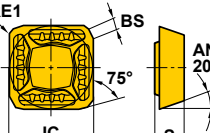
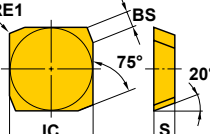
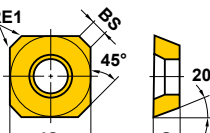
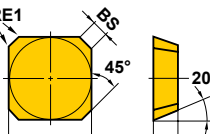
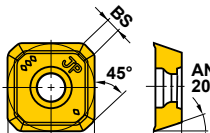
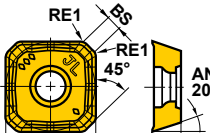
MPlus is a product manufactured by our contracted suppliers.

● = NEW

ROTATING INSERTS

ROTATING INSERTS

ROTATING INSERTS

Material	P	Steel																	Cutting Conditions (Guide): ●: Stable Cutting ●: General Cutting ✖: Unstable Cutting				Honing: E: Round F: Sharp S: Chamfer + Hone T: Chamfer			
	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												Cermet	Carbide	Dimensions (mm)				Geometry				
				NEW NEW MV1020 MV1030	F7030	MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT	UP20M	NEW NX2525 NX3030 NX4545	UT120T	HT110	IC	S	BS		RE1			
	SE415 SEEN1203EFFR1	E	F														●	12.7	3.18	1.4	1.0	 * SEEN1203EFTR3 Right hand insert shown.				
	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			
	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				

● = NEW

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

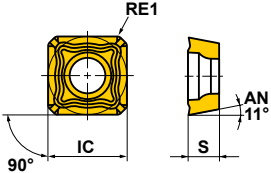
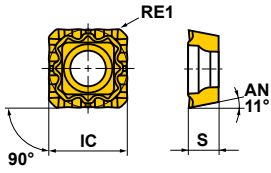
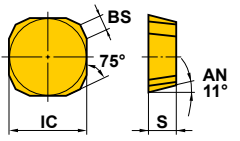
● = NEW

L038

*1 Grade HTi10 is "F".
*2 Grade HTi10 is "T".

● = NEW

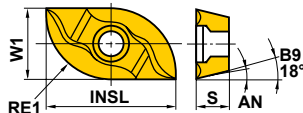
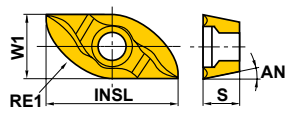
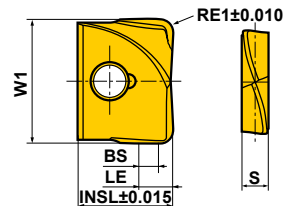
L040

Material	P	Steel	●	●			●	Cutting Conditions (Guide): ●: Stable Cutting ●: General Cutting ✖: Unstable Cutting Honing: E: Round			
	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		Carbide	Dimensions (mm)				Geometry
				VP15TF	VP20RT		IC	S	BS	RE1	
SPX 	SPMX120408-JM	M	E	●	●		12.7	4.80	—	0.8	
SPX 	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.

*2 inserts in one case.

L042

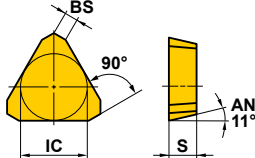
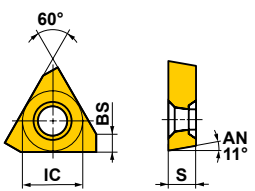
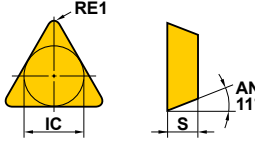
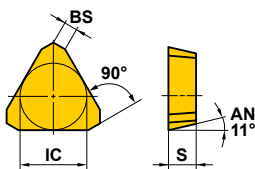
Material	P	Steel						Cutting Conditions (Guide):				
	M	Stainless Steel						●:Stable Cutting ●:General Cutting ✖:Unstable Cutting				
	K	Cast Iron										
	N	Non-ferrous Metal										
	S	Heat-resistant Alloy, Titanium Alloy										
	H	Hardened Materials										
								Honing:				
								E:Round F:Sharp				
Shape	Order Number	Class	Honing	Coated	Dimensions (mm)							Geometry
				MP6120 MP9120 VP15TF MP8010	RE1	INSL	LE	W1	S	BS	AN	
	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°	
	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°	
	* 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

ROTATING INSERTS

Material	P	Steel	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●
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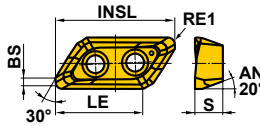
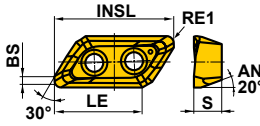
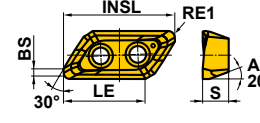
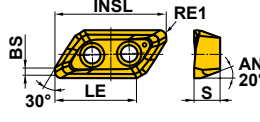
Material	P	Steel	●	●	●			●	●	●	Cutting Conditions (Guide): ●:Stable Cutting ●:General Cutting ✖:Unstable Cutting Honing: E:Round T:Chamfer				
	M	Stainless Steel	●	●	●			●	●	●					
	K	Cast Iron		✖		●			✖	●					
	N	Non-ferrous Metal								●					
	S	Heat-resistant Alloy, Titanium Alloy	●												
	H	Hardened Materials	●												
Shape	Order Number	Class	Honing	Coated				Cermet	Carbide	Dimensions (mm)				Geometry	
				F7030	VP15TF	UP20M	AP10H	NX2525	NX4545	UT120T	HT110	IC	S		BS
	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 ➡K250	TPEW1303ZPER2	E	E		●	●				7.94	3.18	2	—	
	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	—	

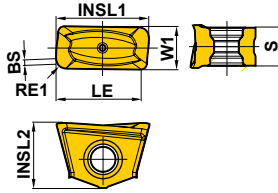
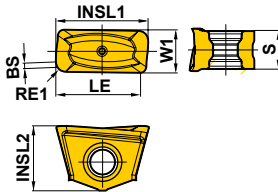
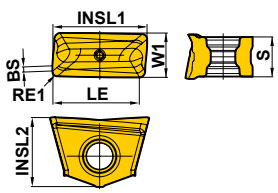
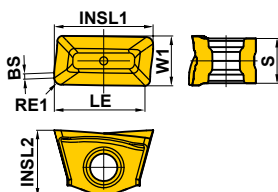
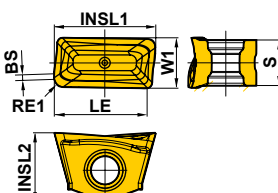
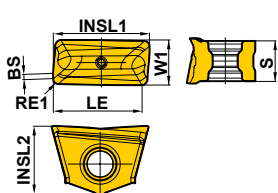
*1 Grade HT10 is "F".

*2 Grade HT10 is "F", Grade NX2525 is "T".

ROTATING INSERTS

ROTATING INSERTS

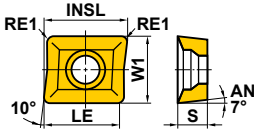
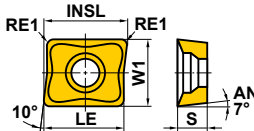
Material	P	Steel	✱ ✱	✪ ✪	Cutting Conditions (Guide):							
	M	Stainless Steel			●	Stable Cutting	●	General Cutting	✱	Unstable Cutting		
	K	Cast Iron			Honing:							
	N	Non-ferrous Metal			E	Round <th>F</th> <td>Sharp</td>	F	Sharp				
	S	Heat-resistant Alloy, Titanium Alloy										
	H	Hardened Materials										
Shape	Order Number	Class	Honing	Coated	Carbide	Dimensions (mm)					Geometry	
				MP9120 LC15TF	MT2010 TF15	INSL	LE	S	BS	RE1		
AXD4000 ✪K168 AXD4000A ✪K176 	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 ✪K168 AXD4000A ✪K176 	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 ✪K168 AXD4000A ✪K176 	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 ✪K180 	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	

Material	P	Steel					Cutting Conditions (Guide): ●:Stable Cutting ●:General Cutting ✖:Unstable Cutting Honing: E:Round						
	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	Dimensions (mm)							Geometry	
				MP9130	INSL1	LE	W1	INSL2	S	BS	RE1		
	VFX5 ➡K208 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 ➡K208 XNMU160708R-HS	M	E	●		16.0	13.4	7.0	11.1	6.5	1.0	0.8	
	VFX5 ➡K208 XNMU160708R-LS	M	E	●		16.0	13.4	7.0	11.1	6.5	1.0	0.8	
	VFX6 ➡K212 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 ➡K212 XNMU190912R-HS	M	E	●		19.1	16.5	9.5	12.7	8.5	1.0	1.2	
	VFX6 ➡K212 XNMU190912R-LS	M	E	●		19.1	16.5	9.5	12.7	8.5	1.0	1.2	

ROTATING INSERTS

ROTATING INSERTS

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Material	P	Steel	  				Cutting Conditions (Guide): ●:Stable Cutting ●:General Cutting ✖:Unstable Cutting Honing: E:Round						
	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			Carbide	Dimensions (mm)					Geometry
				F7030	VP15TF	UP20M	UT20T	INSL	LE	W1	S	RE1	
	DCCC ⚠K216 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 ⚠K216 ZCMX09T308ER-B	M	E	●	★			12.7	11	9.525	3.97	0.8	

WIPER INSERTS

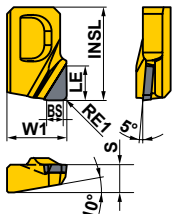
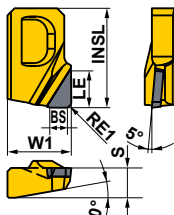
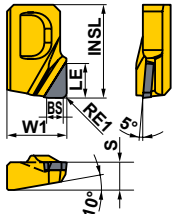
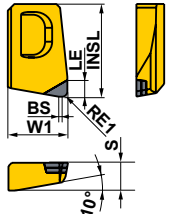
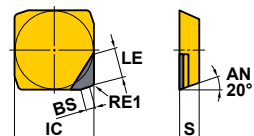
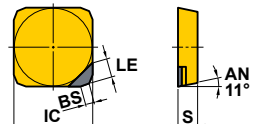
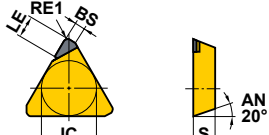
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WIPER INSERTS

ROTATING INSERTS

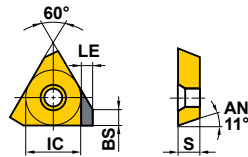
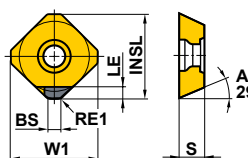
● = NEW

CBN AND PCD

Material	K	Cast Iron	● ●	● ●	Cutting Conditions (Guide):							Geometry	
	N	Non-ferrous Metal			●: Stable Cutting	●: General Cutting	✱: Unstable Cutting						
Shape	Order Number	Class	CBN		PCD		Dimensions (mm)						
			MB4120 MB710	MD2030 MD220	INSL	LE	W1	IC	S	BS	RE1		
	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		
	GOER1408PXFR2-8	E		★	14.0	8.0	9.0	—	4.2	2.0	0.8		
	GOER1401ZXFR2	E		●	14.0	5.0	9.0	—	4.2	2.0	0.1		
	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		
	SECN1203EFFR1	C		★	—	5.0	—	12.7	3.18	1.4	1.0		
	SPEN1203EETR1	E	★		—	3.0	—	12.7	3.175	1.4	—		
	TECN1603PEFR1	C		★	—	5.0	—	9.525	3.175	1.4	0.4		

● : Inventory maintained. ★ : Inventory maintained in Japan.
(1 insert in one case)

CBN AND PCD WITH WIPER

Material	K	Cast Iron			Cutting Conditions (Guide):							Geometry
	N	Non-ferrous Metal										
Shape	Order Number	Class	CBN	PCD	Dimensions (mm)							
			MB710	MD220	INSL	LE	W1	IC	S	BS	RE1	
PMF 	TPEW1303ZPTR2	E	●		—	1.5	—	7.94	3.18	2	—	
ASX445 	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	

ROTATING INSERTS

L

[illegible]

SPARE PARTS

IDENTIFICATION N002

SPARE PARTS

CLAMP SCREW N003

SET BOLT N008

ADJUSTMENT SCREW / NUT N009

SHIM N010

SHIM PIN AND CLAMP LEVER N013

LOCK PIN N014

CLAMP BRIDGE N014

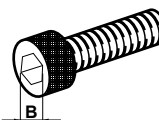
BREAKER PIECE N016

ANTI SEIZE LUBRICANT N017



IDENTIFICATION

IDENTIFICATION OF CLAMP SCREW (Metric coarse right hand screw thread)



H SC 060 05

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

SPARE PARTS

N

Screw Head

Symbol	Geometry
H	
S	
C	

Hexagonal Hole Dimensions

With Slot

With Cross Hole

BH

BHA

FC

SC

PM

FM

SD

SP

SR

SS

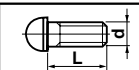
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UNBRAKO CO.

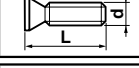
CHUUBURASHI CO.

JIS
Standard

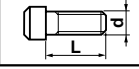
Button Head



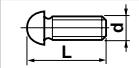
Flat Head



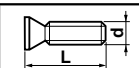
Socket Head



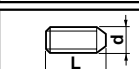
Pan Head



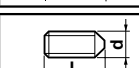
Flat Head



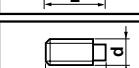
Set Screw (Cut Point)



Set Screw (Cone Point)



Set Screw (Dog Point)



Set Screw (Flat Point)



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

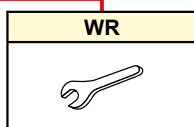
R	Standard L Wrench	
L	Long L Wrench	
T	T Wrench	
F	Flag Wrench	
W	Flag Wrench	
D	Driver	
S	Wrench	

IMX 10 - WR

Symbol	Wrench
IMX	Wrench for iMX Series

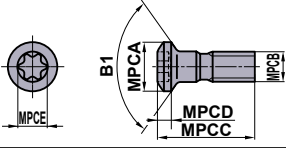
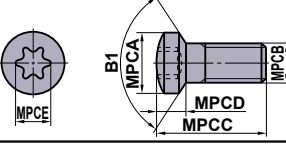
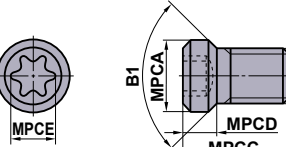
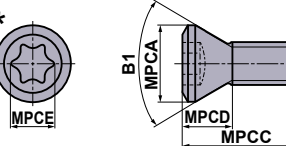
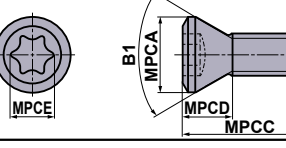
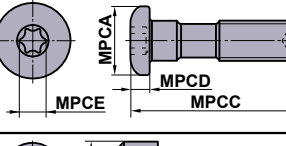
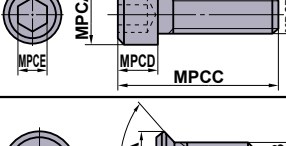
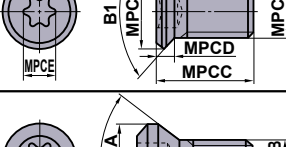
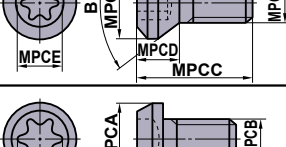
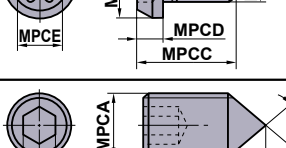
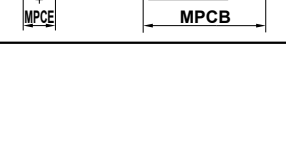
Hexagonal Wrench	
Symbol	B
10	8
12	10
16	13
20	16
25	20

WR



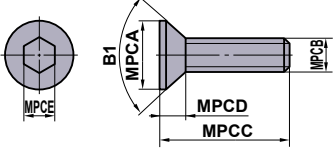
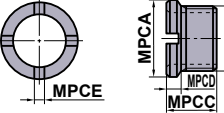
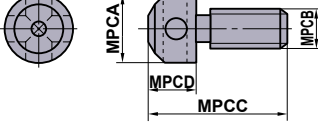
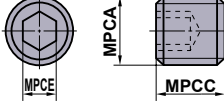
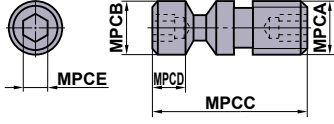
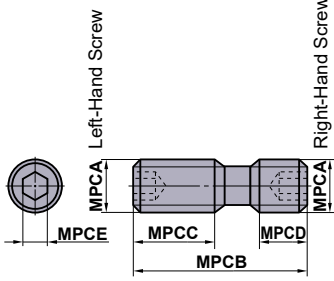
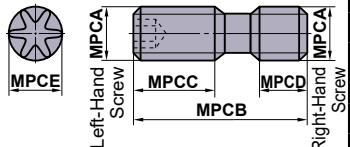
SPARE PARTS

CLAMP SCREW

Geometry	Order Number	Dimensions (mm)					Angle	MPCCS	TQ (N·m)	Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE				
	AJS3010T10	5	M3×0.5	10	1.5	2.8	120°	T10	2.5	Profile Holder (☛C032) AJX (☛K194) AJX (☛K194)
	AJS4012T15	7	M4×0.7	12	2.2	3.4	120°	T15	3.5	
	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	
 	CS200T	3.2	M2×0.4	5	1.6	1.8	90°	T6	0.6	F Type Boring Bar (☛E028) Milling Tools Series (☛K001) BRP (☛K206) DCCC (☛K216) MMTI Type Boring Bar (☛G026) BRP (☛K206) DCCC (☛K216) AL Type Holder (☛C034) AHX640S (☛K042)
	CS250T	3.7	M2.5×0.45	6	1.8	2.4	90°	T8	1.0	
	* CS250560T	3.9	M2.5×0.45	5.2	2.5	2.4	60°	T8	1.0	
	CS300590T	4.1	M3×0.5	5.5	2.1	2.4	90°	T8	1.0	
	CS300890T	4.1	M3×0.5	8	2.1	2.4	90°	T8	1.0	
	* CS350860T	5.5	M3.5×0.6	8.4	4.0	3.4	60°	T15	3.5	
	CS350990T	4.8	M3.5×0.6	9	2.4	2.8	90°	T10	2.5	
	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	
	* CS5015060T	7.2	M5×0.8	15	2.4	3.9	60°	T20	5.0	
	CS502190T	8.5	M5×0.8	21	4.0	5.1	90°	T27	7.5	
	CSF401260T	7.2	M4×0.5	12	5.2	3.9	60°	T20	5.0	PMR (☛K252)
	DC0520T	8.5	M5×0.8	22.5	2.5	3.4	—	T15	3.5	DOUBLE CLAMP Holder (☛C008) DOUBLE CLAMP DIMPLE BAR (☛E015) HSK Tool Holder (☛H001)
	DC0621T	10.5	M6×1.0	25	4	3.9	—	T20	5.0	
	DKS4	5.6	M4×0.7	18	3.5	3	—	—	3.3	
	FC400890T	5.6	M4×0.7	7.5	1.3	2.8	90°	T10	2.5	AL Type Holder (☛C035) AL Type Boring Bar (☛E043)
	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)
	HSP05008C	M5×0.8	8	—	—	2.5	—	—	2.5	MP Type Holder (☛C019)

SPARE PARTS

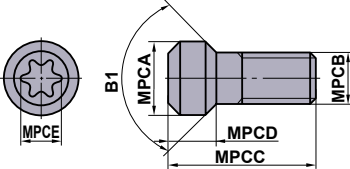
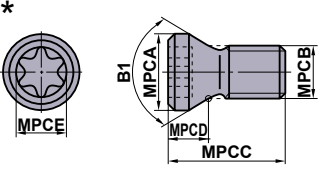
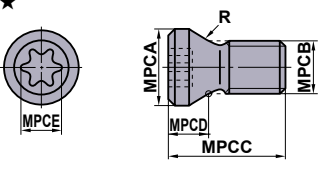
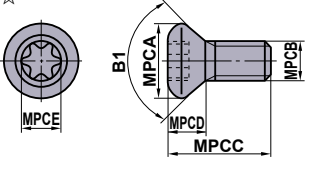
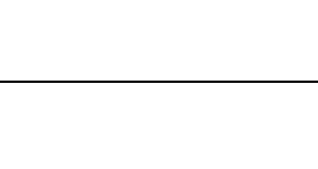
CLAMP SCREW

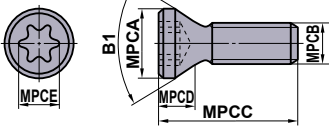
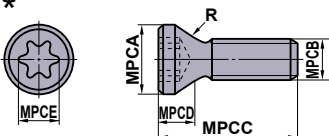
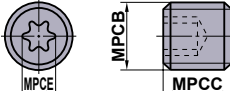
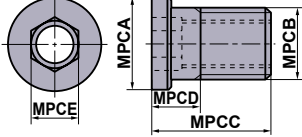
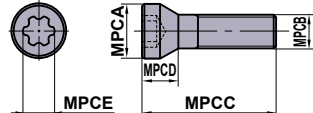
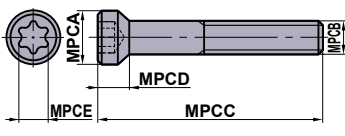
Geometry	Order Number	Dimensions (mm)					Angle B1	MPCDS	TQ (N·m)	Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE				
	HY-A1	4.4	M3×0.5	7	2.1	2	82°	—	1.5	
	HY-V1	5.5	M3×0.5	7	2.5	2	82°	—	1.5	
	HY2	5.5	M3×0.5	10	2.5	2	82°	—	1.5	
	HY3	7	M3.5×0.6	12	2.9	2	82°	—	1.5	
	HY4	9.3	M5×0.8	16	3.6	3	82°	—	3.3	
	JSS6	6.9	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	—	—	—	—	
	LLR1	M5×0.8	—	3.5	—	2.5	—	—	—	
	LLR2	M6×1	—	5	—	3	—	—	—	
 LLCS103, LLCS105 LLCS112, LLCS125 LLCS205 The products with "*" do not have a hexagonal hole at the end marked MPCB. The products with "☆" do not have a hexagonal hole at the end marked MPCA.	☆ LLCS103	M3×0.5	4	11	4.6	2	—	—	1.5	P Type Boring Bar (☉E038) HSK Tool Holder (☉H001)
	* LLCS105	M5×0.8	M5×0.8	10	1.5	2	—	—	1.5	
	LLCS106	M6×1	6	16.5	3.5	2.5	—	—	2.2	
	* 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	
	LLCS208	M8×1.25	8	24	6.5	3	—	—	3.3	
	LLCS306	M6×1	6	21	4	2.5	—	—	2.2	
	LLCS310	M10×1	10	29	8	4	—	—	7.0	
	LLCS410	M10×1	10	30	6.6	4	—	—	7.0	
	LLCS508	M8×1	8	24	6.5	3	—	—	3.3	
 Left-Hand Screw Right-Hand Screw *Without Hexagonal Hole on Right-Hand Screw	LS1	M6×1	22	8	8	3	—	—	5.0	Milling Tools Series (☉K001)
	LS2	M8×1	29	13	10	4	—	—	8.2	
	* LS4	M6×1	15	8	4	3	—	—	5.0	
	* 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	
	* LS16	M7×0.75	23	11	8	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	
 Left-Hand Screw Right-Hand Screw	LS14T	M7×0.75	24	10	10	4.5	—	T25	8.0	DOUBLE CLAMP Holder (☉C009) AHX640W (☉K049)
	LS15T	M7×0.75	18	7	7	4.5	—	T25	8.0	
	LS10TS	M7×0.75	13	6	4	4.5	—	T25	8.5	
	LS0622T	M6×0.75	22	8	8	3.4	—	T15	6.0	

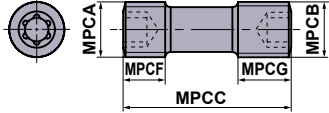
Geometry	Order Number	Dimensions (mm)					Angle	MPCCS	TQ (N·m)	Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE				
	MGS6	10	M6×1	26	4	5	—	—	9.0	APX3000 (⊕K146)
	MHT1	11	M8×1	18.5	3.5	4	—	—	8.7	
	NS251 NS401	3.6 5.8	M2.5×0.45 M4×0.7	7 6	— —	2.2 3.6	60° 60°	— —	0.7 3.5	BT VH (⊕D016) CTAH-S (⊕D020)
	NS402W NS403W NS404W	5.85 5.85 5.8	M4×0.7 M4×0.7 M4×0.7	10 12 10	— — —	2.2 2.2 2.2	60° 60° 90°	— — —	0.7 0.7 0.7	CTAH (⊕D020) CTBH (⊕D022)
	NS501W NS502W	8 8	M5×0.8 M5×0.8	16 20	— —	2.5 2.5	120° 120°	— —	2.2 2.2	SMALL TOOLS (⊕D001)
	RS3008T RS3510T RS4015T RS5020T RS6025T RS8030T	4.3 5 6 8.1 9.5 12	M3×0.35 M3.5×0.35 M4×0.5 M5×0.5 M6×0.75 M8×0.75	8.6 10 14 16.4 21.5 25	2 2.3 2.7 3.6 4.2 5	2.4 2.8 3.4 3.9 4.5 5.6	61° 61° 61° 61° 61° 61°	T8 T10 T15 T20 T25 T30	1.5 2.5 3.3 5.0 7.5 10.0	SRF (⊕K228) SUF (⊕K232)
	S1 S3 S4 S5	3.5 4.5 5.3 6.8	M2×0.4 M3×0.5 M4×0.7 M5×0.8	5.5 7.7 8 9	2.2 2.4 1.8 2.4	1.5 2 2.5 3	92° 92° 62° 62°	— — — —	0.6 1.5 2.2 3.3	
	SD32 SD40 SD50 SD63	12 12 16 16	M8×1.25 M8×1.25 M10×1.5 M10×1.5	28 36 46 61	7.2 7.2 8.2 8.2	6 6 8 8	50° 50° 50° 50°	— — — —	9.5 9.5 1.0 1.0	
	SETS51 SETS61	6.8 8	M5×0.8 M6×1	14.8 20	1.5 1.8	3.4 3.9	— —	T15 T20	3.5 5.0	MMTE Type Holder (⊕G019) MMTI Type Boring Bar (⊕G026) HSK Tool Holder (⊕H001)
	SLCS105 SLCS106	10 12	M5×0.8 M6×1	25 32	6.3 6.2	4 4	90° 90°	— —	7.0 7.0	WP Type Holder (⊕C017)
	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	

SPARE PARTS

CLAMP SCREW

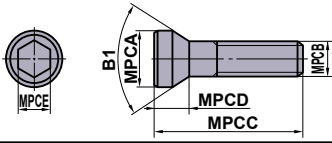
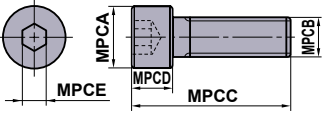
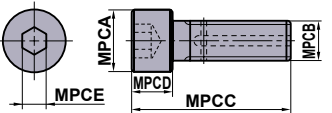
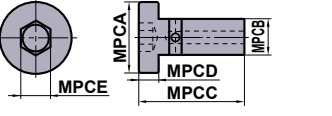
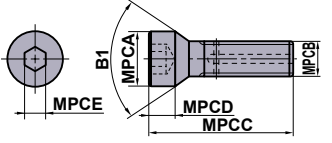
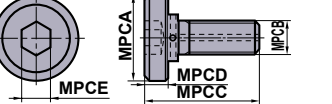
Geometry	Order Number	Dimensions (mm)					Angle	MPCD	TQ (N·m)	Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE				
	* TS16	2.5	M1.6×0.35	3.2	1.6	1.8	60°	T6	0.6	MICRO-DEX (☉E018)
	TS2	2.7	M2×0.4	4.6	1.4	1.8	60°	T6	0.6	
	* TS2A	2.7	M2×0.4	4.5	1.2	1.8	60°	T6	0.6	AQX (☉K186)
	TS2C	2.7	M2×0.4	3.8	1.4	1.8	60°	T6	0.6	
	☆ 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 (☉E030)
	* TS22	3.0	M2.2×0.45	5	1.2	1.8	60°	T6	0.6	S Type Boring Bar (☉E031)
	* TS25	3.3	M2.5×0.45	5.5	1.7	2.4	60°	T8	1.0	AQX (☉K186) AJX (☉K194)
	☆ 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 (☉K236)
	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 (☉K250)
	* 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 (☉K248)
	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 (☉K168)
	TS3SBS	4.4	M3×0.5	6.5	2	2.4	80°	T8	1.5	AXD4000 (☉K168)
	☆ 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 (☉K236)
	* TS33	3.9	M3×0.5	6.7	2	2.4	60°	T8	1.5	AQX (☉K186) AJX (☉K194)
	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 (☉K194) SRM2 (☉K236)
	TS352	4.8	M3.5×0.6	10	3	2.8	60°	T10	2.5	VFX5 (☉K208)
	* TS4SB	5.8	M4×0.7	9	2.7	3.4	80°	T15	3.5	AXD7000 (☉K180)
	* TS4SBL	5.8	M4×0.7	10.5	2.7	3.4	80°	T15	3.5	GY SERIES (☉F004) AXD7000 (☉K180)
	TS4	5.4	M4×0.7	8	2.6	3.4	60°	T15	3.5	CE/CF/CGSP (☉K246) TSMP (☉K248)
	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 (☉K194) BRP (☉K206) SRM2 (☉K236)
	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 (☉K186) AJX (☉K194)
	TS450	5.9	M4.5×0.75	13	3.6	3.9	60°	T20	5.0	VFX6 (☉K212)
	TS5S	6.8	M5×0.8	9	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 (☉K246) TSMP (☉K248)
	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 (☉K067) WJX (☉K085)
	TS52	6.8	M5×0.8	8	3.2	4.5	60°	T25	7.5	CE/CF/CGSP (☉K246)
	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 (☉K194)
	TS55	6.8	M5×0.8	10.5	3.2	4.5	60°	T25	7.5	GY SERIES (☉F004) AQX (☉K186) SPX (☉K219) SRM2 (☉K236)
	* TS6S	8.5	M6×1.0	13	4.4	5.6	60°	T30	10.0	AQX (☉K186) SRM2 (☉K236)
	* TS6	8.5	M6×1.0	16	4.4	5.6	60°	T30	10.0	SRM2 (☉K236)

Geometry	Order Number	Dimensions (mm)					Angle	MPCDS	TQ (N·m)	Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE				
 	TPS20-1	2.65	M2×0.4	4.7	2.4	1.8	60°	6IP	0.6	MVX (⊙M158)
	TPS25	3.3	M2.5×0.45	5.5	1.7	2.1	60°	7IP	1.0	APX3000 (⊙K146) MVX (⊙M158)
	TPS25-1	3.3	M2.5×0.45	6.5	1.7	2.1	60°	7IP	1.0	APX3000 (⊙K146)
	TPS27F1	3.7	M2.7×0.35	6.5	1.8	2.1	60°	7IP	1.0	VPX200 (⊙K099)
	TPS27F2	3.7	M2.7×0.35	8.0	1.8	2.1	60°	7IP	1.0	VPX300 (⊙K113)
	TPS3	3.9	M3×0.5	6.7	1.4	2.82	60°	10IP	1.0	MVX (⊙M158)
	* TPS3R	4.6	M3×0.5	8.5	1.4	2.82	—	10IP	2.0	WJX09 (⊙K085)
	TPS3SB	4.4	M3×0.5	8	2.0	2.82	80°	10IP	3.0	AXD4000A (⊙K176)
	TPS35	5.3	M3.5×0.6	11.5	2.8	3.4	60°	15IP	3.5	ASX445 (⊙K026) ASX400 (⊙K080) PMR (⊙K252)
	TPS351	4.8	M3.5×0.6	7.2	1.4	2.82	60°	10IP	2.5	MVX (⊙M158)
	TPS351B	5.1	M3.5×0.6	7.2	1.4	2.82	60°	10IP	2.5	ARP (⊙K254)
	TPS4	5.3	M4×0.7	8	2.6	3.4	60°	15IP	3.5	APX4000 (⊙K153) ARP (⊙K254) MVX (⊙M158)
	TPS40F1	5.3	M4×0.5	10.5	2.8	3.4	60°	15IP	3.0	VPX300 (⊙K113)
	TPS43	5.3	M4×0.7	10	2.6	3.4	60°	15IP	4.0	APX4000 (⊙K153) MVX (⊙M158)
	* 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 (⊙M158)
	TSS04005	—	M4×0.7	5	—	2.4	—	T8	—	PMF (⊙K250)
	TSS04505S	—	M4.5×0.7	5	—	3.5	—	T10	3.5	FMAX (⊙K056)
	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 (⊙K080) PMR (⊙K252)
	WCS604010H	7.8	M6×0.75	10	4.1	4.0	—	—	7.0	PMR (⊙K252)
	WS203107TPS	3.1	M2×0.25	7.3	1.7	1.8	60°	6IP	1.0	STAW (⊙M139)
	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 (⊙M148)
	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	

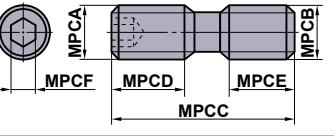
Geometry	Order Number	Dimensions (mm)					Angle	MPCDS	TQ (N·m)	Tool Holder
		MPCA	MPCB	MPCC	MPCF	MPCG				
	RX1ST8TP1	M4×0.7	M4×0.5	16.5	7.0	7.0	—	TX8	2.0	RX1S (⊙M197)
	RX1ST10TP23	M5×0.8	M5×0.5	17.0	7.5	7.0	—	TX10	3.0	
	RX1ST15TP45	M6×1.0	M6×0.75	18.0	6.5	8.5	—	TX15	6.5	
	RX1ST25TP6	M10×1.5	M10×1.25	30.0	7.5	9.5	—	TX25	15.0	

SPARE PARTS

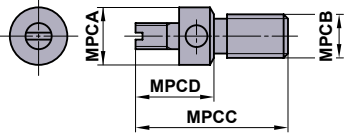
SET BOLT

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	
 	* HSC08025H	13	M8×1.25	33	8	5	—	—	24	VPX200/300 (☉K099,K113) ARP (☉K254)
	HSC05030	8.5	M5×0.8	35	5	4	—	—	10	APX3000/4000 (☉K146,K153)
	* HSC08030H	13	M8×1.25	38	8	5	—	—	24	WSX445 (☉K016)
	HSC08045	13	M8×1.25	53	8	5	—	—	24	VPX200/300 (☉K099,K113)
	HSC08040	13	M8×1.25	48	8	5	—	—	24	WSX445 (☉K016)
	HSC08050	13	M8×1.25	58	8	5	—	—	24	VPX200/300 (☉K099,K113)
	* HSC10030H	16	M10×1.5	40	10	6	—	—	40	APX3000/4000 (☉K146,K153) AJX (☉K194) WSX445 (☉K016)
	HSC10035	16	M10×1.5	45	10	6	—	—	44	VFX5 (☉K208) VFX6 (☉K212)
	HSC10050	16	M10×1.5	60	10	8	—	—	44	APX3000/4000 (☉K146,K153) VPX200/300 (☉K099,K113)
	HSC10055	16	M10×1.5	65	10	8	—	—	44	VFX5 (☉K208)
	HSC10060	16	M10×1.5	70	10	8	—	—	44	VPX200/300 (☉K099,K113)
	HSC10070	16	M10×1.5	80	10	8	—	—	44	VPX200/300 (☉K099,K113) ASPX (☉K224)
	HSC12035	18	M12×1.75	47	12	10	—	—	80	WSX445 (☉K016)
	* HSC12035H	18	M12×1.75	47	12	10	—	—	80	APX3000/4000 (☉K146,K153) AJX (☉K194)
	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 (☉K099,K113)
	HSC12070	18	M12×1.75	82	12	10	—	—	80	APX3000/4000 (☉K146,K153) AJX (☉K194) WSX445 (☉K016)
	HSC16040	24	M16×2	56	16	14	—	—	150	WSX445 (☉K016)
	* HSC16040H	24	M16×2	56	16	14	—	—	150	APX3000/4000 (☉K146,K153) AJX (☉K194)
HSC16055	24	M16×2	71	16	14	—	—	150	VPX200/300 (☉K099,K113)	
HSC16065	24	M16×2	81	16	14	—	—	150	VPX200/300 (☉K099,K113)	
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 (☉K056)
	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 (☉K085)
	HFF08043H	11	M8×1.25	43	5	5	90°	—	8.2	AXD4000 (☉K168)
	MBA16033H	40	M16×2	43	10	14	—	—	150	AHX640 (For φ100) (☉K042) WSX445 (☉K016)
	MBA20040H	50	M20×2.5	54	14	17	—	—	320	APX4000 (☉K153) AHX475S (☉K038) AHX640S (☉K042) AXD4000 (☉K168) AXD7000 (☉K180) AJX (☉K194)

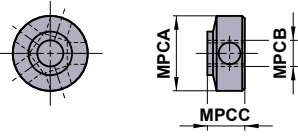
* With coolant hole.

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 (⊙K206)
	HDS10031	M10×1.0	M10×1.5	31	14	12	5	9.0	PMF (⊙K250)

LARGE ADJUSTMENT SCREW

Geometry	Order Number	Dimensions (mm)					Angle	MPCCS	TQ (N•m)	Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE	B1			
	KSS2	6.6	M5×0.8	17.5	9	—	—	—	—	FMAX (⊕K056)

MICRO ADJUSTMENT NUT

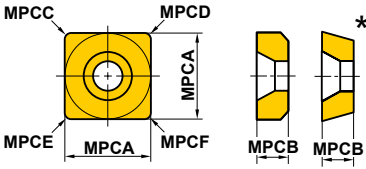
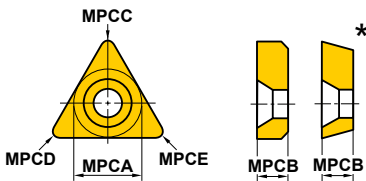
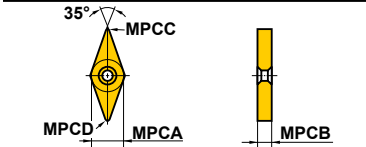
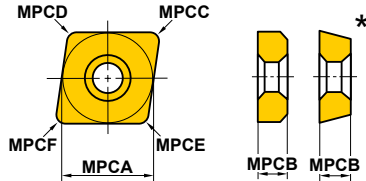
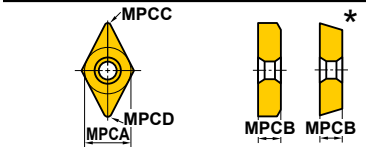
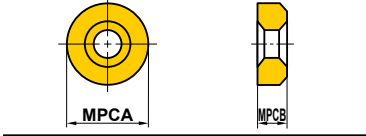
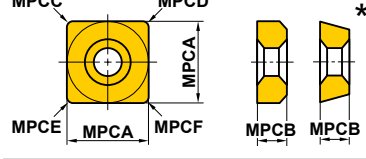
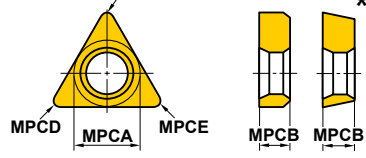
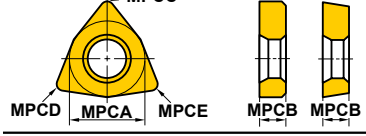
Geometry	Order Number	Dimensions (mm)					Angle	MPCCS	TQ (N•m)	Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE	B1			
	KSN3	8.6	M3×0.35	4.3	—	—	—	—	—	FMAX (⊕K056)

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SPARE PARTS

SPARE PARTS

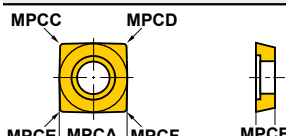
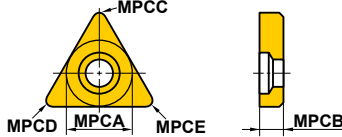
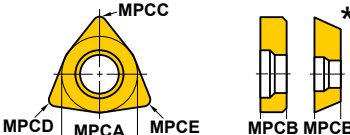
SHIM

Geometry	Order Number	Dimensions (mm)						Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE	MPCF	
	* PS42	11.46	3.18	0.2	0.2	0.6	1.0	
	* PT21 * PT32 * PT42	5.11 8.28 10.85	2.38 3.18 3.18	0.2 0.2 0.3	0.2 0.2 0.3	0.6 0.6 0.7	— — —	F Type Boring Bar (☎E029)
	DCSVN32	9.52	3.18	0.8	1.2	—	—	DOUBLE CLAMP Holder (☎C019) DOUBLE CLAMP DIMPLE BAR (☎E017)
	LLSCN3T3 LLSCN33 LLSCN42 LLSCN53 LLSCN63 * LLSCP42 * LLSCP63	9.52 9.52 12.70 15.87 19.05 12.70 19.05	3.97 4.76 3.18 4.76 4.76 3.18 4.76	0.4 0.4 0.8 1.2 1.2 0.8 1.2	0.4 0.4 0.8 1.2 1.2 0.8 1.2	0.8 0.8 1.2 1.6 1.6 1.2 1.6	0.8 0.8 1.2 1.6 1.6 1.2 1.6	LL Type Holder (☎C008) LL Type Holder (☎C008) DOUBLE CLAMP DIMPLE BAR (☎E015) P Type Boring Bar (☎E039) HSK Tool Holder (☎H001) DOUBLE CLAMP DIMPLE BAR (☎E015) P Type Boring Bar (☎E039) HSK Tool Holder (☎H001)
	LLSDN32 LLSDN42 LLSDN43 LLSDN53 * LLSDP42	9.52 12.70 12.70 15.87 12.70	3.18 3.18 4.76 4.76 3.18	0.8 0.8 0.8 1.2 0.8	1.2 1.2 1.2 1.6 1.2	— — — — —	— — — — —	DOUBLE CLAMP Holder (☎C010) LL Type Holder (☎C010) DOUBLE CLAMP DIMPLE BAR (☎E015) P Type Boring Bar (☎E039) HSK Tool Holder (☎H001) DOUBLE CLAMP DIMPLE BAR (☎E015)
	LLSRN103 LLSRN123 LLSRN164 LLSRN204 LLSRN326	8.3 9.8 13.6 17.3 28.0	3.18 3.18 4.76 4.76 6.35	— — — — —	— — — — —	— — — — —	— — — — —	LL Type Holder (☎C026) HSK Tool Holder (☎H001)
	LLSSN33 LLSSN42 LLSSN53 LLSSN63 LLSSN84 * LLSSP42	9.52 12.70 15.87 19.05 25.40 12.70	4.76 3.18 4.76 4.76 6.35 3.18	0.8 0.8 1.2 1.2 1.6 0.8	0.8 0.8 1.2 1.2 1.6 0.8	1.2 1.2 1.6 1.6 2.4 1.2	1.2 1.6 1.6 2.0 2.4 1.6	DOUBLE CLAMP DIMPLE BAR (☎C014) P Type Boring Bar (☎E038) DOUBLE CLAMP DIMPLE BAR (☎E016)
	LLSTE32 LLSTN32 LLSTN33 LLSTN42 LLSTN53 * LLSTP32	7.6 9.52 9.52 12.70 15.87 9.52	3.18 3.18 4.76 3.18 4.76 3.18	0.4 0.4 0.4 0.4 0.8 0.4	0.4 0.8 0.8 0.8 1.2 0.8	0.4 1.2 1.2 1.2 1.6 1.2	— — — — — —	LL Type Holder (☎C016) DOUBLE CLAMP DIMPLE BAR (☎E016) P Type Boring Bar (☎E038)
	LLSWN32 LLSWN3T3 LLSWN42 * LLSWP32 * LLSWP42	9.52 9.52 12.70 9.52 12.70	3.18 3.97 3.18 3.18 3.18	0.4 0.4 0.4 0.4 0.4	0.8 0.8 0.8 0.8 0.8	1.2 1.2 1.2 1.2 1.2	— — — — —	LL Type Holder (☎C022) DOUBLE CLAMP Holder (☎C022) DOUBLE CLAMP DIMPLE BAR (☎E017)

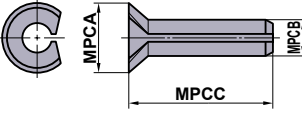
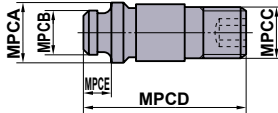
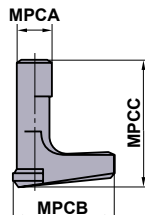
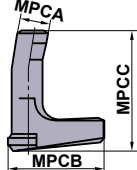
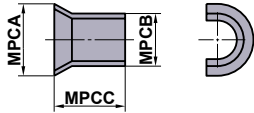
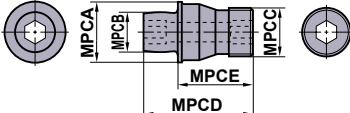
Geometry	Order Number	Dimensions (mm)						Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE	MPCF	
	MHS532R	9.4	15.7	4.5	0.8	0.8	—	
Hole position of this item is offset from centre.	MLCP42	12.58	3.18	1.2	1.2	1.2	1.2	P Type Boring Bar (☛E039)
Hole position of this item is offset from centre.	MLDP42	12.56	3.18	1.2	1.2	—	—	P Type Boring Bar (☛E039)
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 (☛E038)
Hole position of this item is offset from centre.	MLTP32	9.50	3.18	1.2	1.2	1.2	—	P Type Boring Bar (☛E038)
	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)
	* PT32T1R * PT32T2R	8.28 8.28	13.34 13.19	3.18 3.18	— —	— —	— —	
	PV321 PV322 PV323	9.52 9.52 9.52	3.18 3.18 3.18	0.4 0.8 1.2	0.4 0.8 1.2	— — —	— — —	MP Type Holder (☛C019)
	SPSVN32	8.06	3.18	0.3	0.3	—	—	SP Type Holder (☛C030) HSK Tool Holder (☛H001)

SPARE PARTS

SHIM

Geometry	Order Number	Dimensions (mm)						Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE	MPCF	
	STASX400N	11.00	3.00	0.4	0.4	0.4	0.4	ASX400 (☯K080)
	STASX445N	10.76	3.00	—	—	—	—	ASX445 (☯K026)
	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	—	WP Type Holder (☯C023)
	WPSWN43	12.50	4.76	0.4	0.8	1.2	—	

SHIM PIN AND CLAMP LEVER

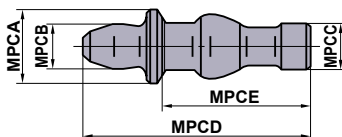
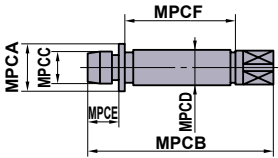
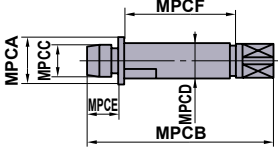
Geometry	Order Number	Dimensions (mm)					Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE	
	BCP141	3.0	1.4	5.6	—	—	SP Type Holder (☯C030) F Type Boring Bar (☯E029) HSK Tool Holder (☯H013)
	BCP201	4.3	2	7.4	—	—	
	BCP202	4.3	2	6.4	—	—	
	CCP33	6.5	3.66	M5×0.8	18.5	3	WP Holder (☯C017)
	CCP34	7.5	5.0	M6×1.0	18.5	3	
	CCP44	7.5	5.0	M5×0.8	14.2	3	
	LLCL12S	2.1	9.3	5.6	—	—	LL Type Holder (☯C016) P Type Boring Bar (☯E039) HSK Tool Holder (☯H001)
	LLCL13	3.6	10	12.5	—	—	
	LLCL13S	3.6	10	7.8	—	—	
	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) DOUBLE CLAMP Holder (☯C008) DOUBLE CLAMP DIMPLE BAR (☯E015) P Type Boring Bar (☯E038) HSK Tool Holder (☯H001)
	LLP14	7.25	6.55	5.8	—	—	
	LLP15	8.8	8.05	8.6	—	—	
	LLP16	10.85	9.85	11.1	—	—	
	LLP18	15.35	13.05	12.0	—	—	
	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)

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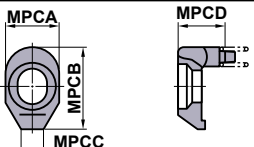
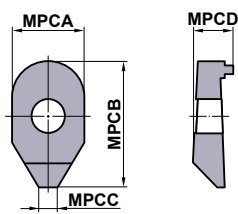
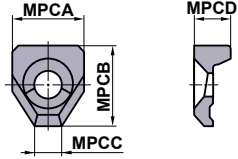
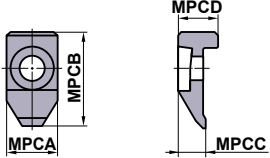
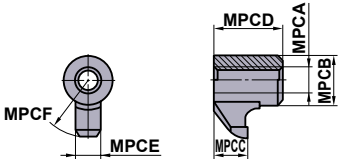
SPARE PARTS

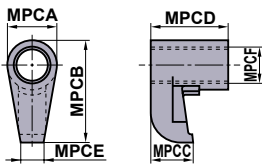
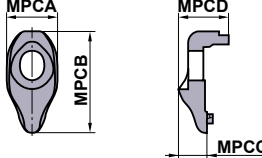
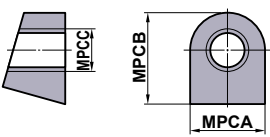
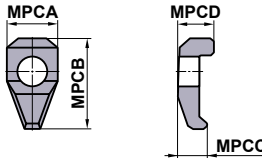
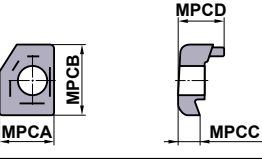
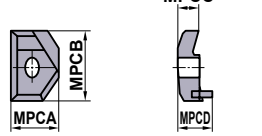
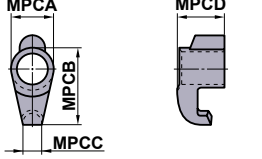
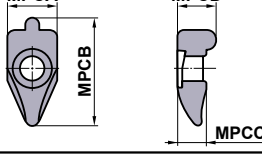
SPARE PARTS

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	

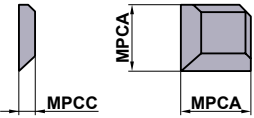
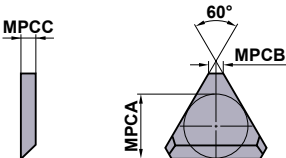
CLAMP BRIDGE

Geometry	Order Number	Dimensions (mm)						Tool Holder
		MPCA	MPCB	MPCC	MPCD	MPCE	MPCF	
	AMS3	7	12	3	3.3	—	—	Profile Holder (☺C032) AJX (☺K196)
	AMS4	9	13.5	3	3.8	—	—	
	AMS5	10	15	3.5	5	—	—	
	CA161	13	20	6	8	—	—	
	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	

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)
	DCK2613	13	26.5	7.35	12.9	—	—	DOUBLE CLAMP DIMPLE BAR (☯E015)
	DCK3113	13	31	9	14.5	—	—	HSK Tool Holder (☯H001)
	KGC1	12.0	15.0	M7×0.75	—	—	—	
	LK1	8	14.3	4.5	5.9	—	—	
	MTK1R/L	13	17.5	5	12	—	—	MG Type Holder (☯F132) 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)
	SETK61	8.9	18.1	4.1	8.6	—	—	MMTI Type Holder (☯G026)
								HSK Tool Holder (☯H001)
	SRK1R	9.4	21	5.5	7.5	—	—	

SPARE PARTS

BREAKER PIECE

Geometry	Order Number	Dimensions (mm)					Tool Holder
		MPCA	MPCB	MPCC	IC	LBB	
	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 (☺E029) *For positive inserts, the breaker width is 0.5mm larger than the figures in the list.
	CBT3F	8.53	1.4	2.5	9.525	1.5	
	CBT4N	11.07	1.4	2.5	12.70	2.5	

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SPARE PARTS

ANTI SEIZE LUBRICANT

ANTI SEIZE LUBRICANT

Shape	Order Number	Stock	Volume (g)
	MK1K	★	20
	MK1KS	★	3

N

SPARE PARTS

★ : Inventory maintained in Japan.

N017

TECHNICAL DATA

ISO13399 COMPLIANCE	P002
TROUBLE SHOOTING FOR FACE MILLING	P006
FUNCTION OF TOOL FEATURES FOR FACE MILLING	P007
FORMULAE FOR FACE MILLING	P010
TROUBLE SHOOTING FOR END MILLING	P012
METALLIC MATERIALS CROSS REFERENCE LIST	P014
SURFACE ROUGHNESS	P018
HARDNESS COMPARISON TABLE	P019
FIT TOLERANCE TABLE (HOLE)	P020
FIT TOLERANCE TABLE (SHAFT)	P022
INTERNATIONAL SYSTEM OF UNITS	P024
TOOL WEAR AND DAMAGE	P025
CUTTING TOOL MATERIALS	P026
GRADE CHAIN	P027
GRADES COMPARISON TABLE	P028



ISO13399 COMPLIANCE

List of Property Symbols Complying with ISO13399

Alphabetical

Source: ISO13399 standard

URL : <https://www.iso.org/search/x/query/13399>

TECHNICAL DATA

P

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

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

TECHNICAL DATA

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 centre 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

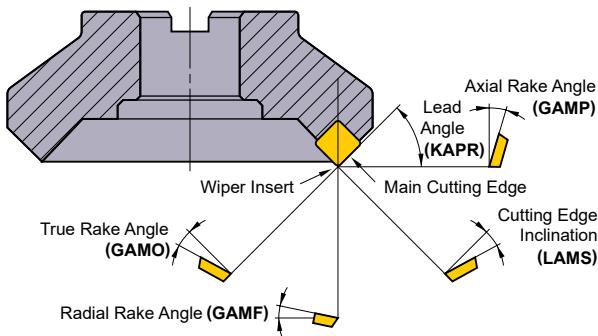
TECHNICAL DATA

P

Solution Trouble Factors			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		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								
											Do not use water-soluble cutting fluid	Determine dry or wet cutting																				
							Up	Down	Up	Down	Up	Down	Up	Down	Up	Down	Up	Down	Smaller	Larger												
							Up		Down		Up		Down		Smaller		Larger		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	
Deterioration of Tool Life	Insert wear quickly generated	Improper tool grade	●																													
		Improper cutting edge geometry																														
		Improper cutting speed																														
		Improper cutting conditions																														
	Chipping or fracturing of cutting edge	Improper tool grade		●																												
Improper cutting conditions																																
Lack of cutting edge strength.																																
Thermal crack occurs					●																											
	Build-up edge occurs					●																										
	Lack of rigidity																															
Deterioration of Surface Finish	Poor finished surface	Improper cutting conditions	●																													
		Welding occurs																														
		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																														

FUNCTION OF TOOL FEATURES FOR FACE MILLING

FUNCTION OF EACH CUTTING EDGE ANGLE IN FACE MILLING

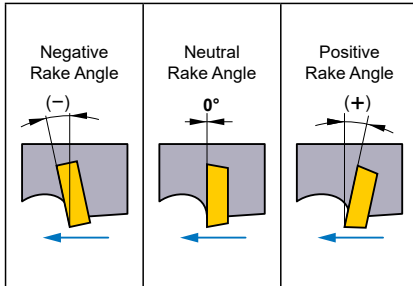


Each Cutting Edge Angle in Face Milling

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

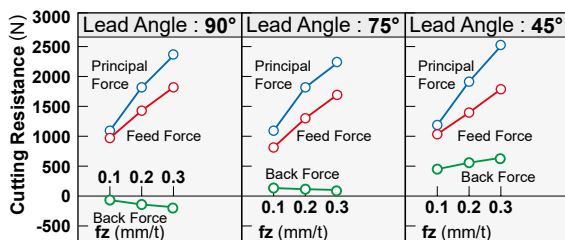


- Insert shape whose cutting edge precedes is a positive rake angle.
- Insert shape whose cutting edge follows is a negative rake angle.

Standard Cutting Edge Shape

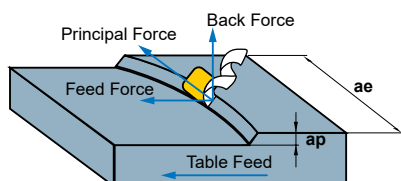
Standard Cutting Edge Combinations	(+) Axial Rake Angle	(-) Axial Rake Angle	(+) Axial Rake Angle
	Radial Rake Angle (+)	Radial Rake Angle (-)	Radial Rake Angle (-)
	Double Positive (DP Edge Type)	Double Negative (DN Edge Type)	Negative/Positive (NP Edge Type)
Axial Rake Angle (GAMP)	Positive (+)	Negative (-)	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)
Material	Steel	●	●
	Cast Iron	-	●
	Aluminium Alloy	●	-
	Difficult-to-Cut Material	●	●

LEAD ANGLE (KAPR) AND CUTTING CHARACTERISTICS



Workpiece : DIN 41CrMo4 (281HB)
Tool : $\phi 125\text{mm}$ Single Insert
Cutting Conditions : $V_c=125.6\text{ m/min}$ $a_p=4\text{ mm}$ $a_e=110\text{mm}$

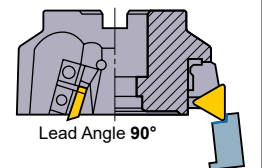
Cutting Resistance Comparison between Different Insert Shapes



Three Cutting Resistance Forces in Milling

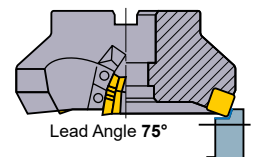
Lead Angle 90°

Back force is in the minus direction. Lifts the workpiece when workpiece clamp rigidity is low.



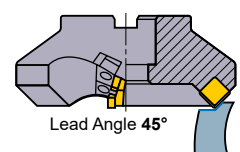
Lead Angle 75°

Lead angle 75° is recommended for face milling of workpieces with low rigidity such as thin workpieces.



Lead Angle 45°

The largest back force. Bends thin workpieces and lowers cutting accuracy.
*Prevents workpiece edge chipping when cast iron cutting.



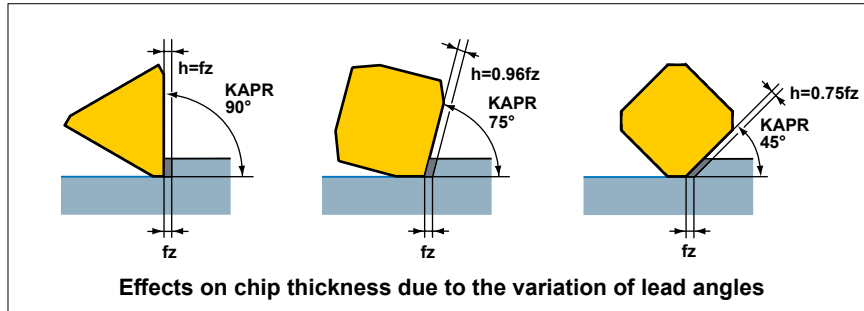
- * Principal force : Force is in the opposite direction of face milling rotation.
- * Back force : Force that pushes in the axial direction.
- * Feed force : Force is in the feed direction and is caused by table feed.

FUNCTION OF TOOL FEATURES FOR FACE MILLING

LEAD ANGLE AND TOOL LIFE

Lead angle and chip thickness

When the depth of cut and feed per tooth, f_z , 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.



Lead angle and crater wear

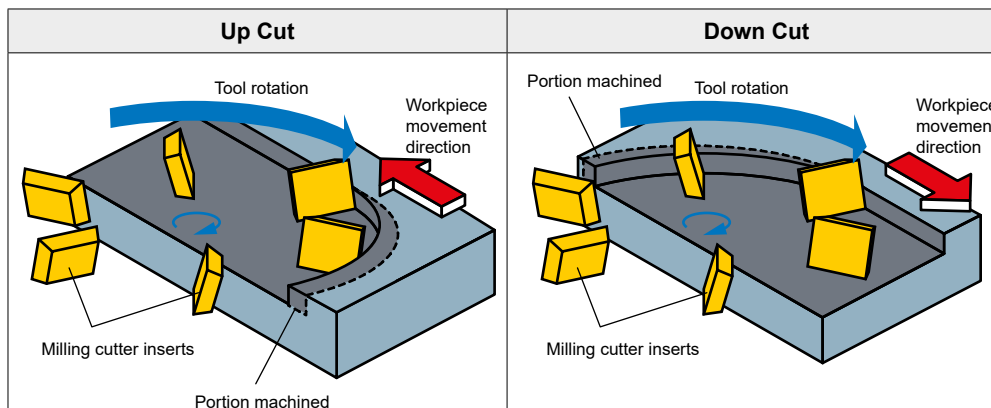
The table below shows wear patterns for different lead angles. When comparing crater wear for 90° and 45° lead angles, it can be clearly seen that the crater wear for 90° lead angle is larger. This is because if the chip thickness is relatively large, the cutting resistance increases and so promotes 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 : M20Cemented Carbide
Cutting Conditions : $a_p=3.0$ mm
 $a_e=110$ m
 $f_z=0.2$ mm/t
Dry Cutting

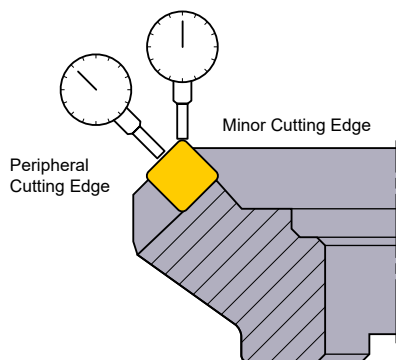
UP AND DOWN CUT (CLIMB) MILLING

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.



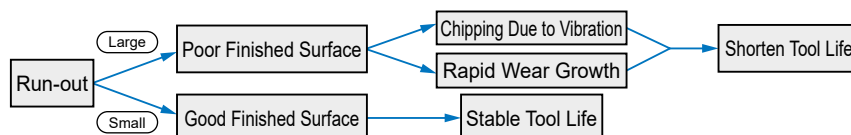
■ FINISHED SURFACE

● Cutting Edge Run-out Accuracy

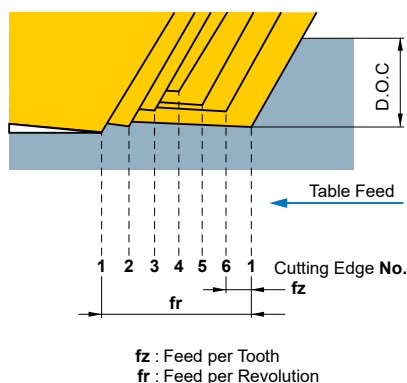


Cutting Edge Run-out and Accuracy in Face Milling

Cutting edge run-out accuracy of indexable inserts on the cutter body greatly affects the surface finish and tool life.



● Improve Finished Surface Roughness



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.

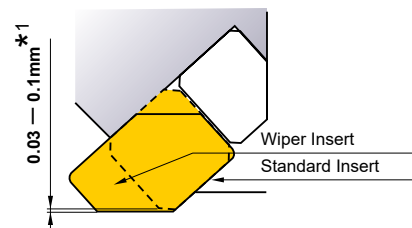
Actual Problems

- Cutting edge run-out.
- Sub cutting edge inclination.
- Milling cutter body accuracy.
- Spare parts accuracy.
- Welding, vibration, chattering.

Countermeasure

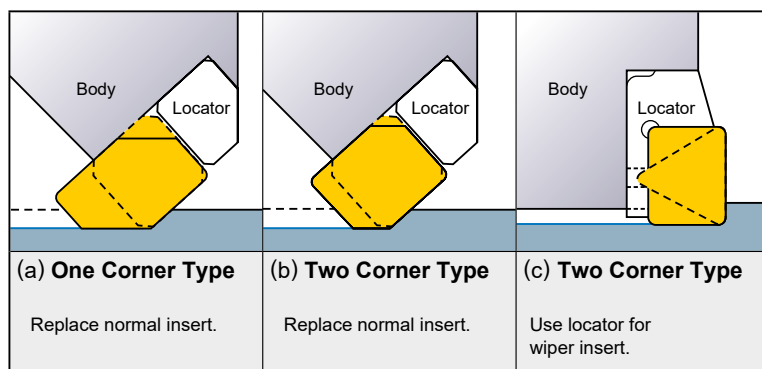
Wiper Insert

- ★ 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



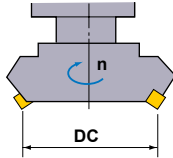
- Sub cutting edge length has to be longer than the feed per revolution.
- ★ A sub cutting edge that is too long causes chatter.
- When the cutter diameter is large and feed per revolution is longer than the sub cutting edge of the wiper insert, use two or three wiper inserts.
- When using more than 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)

$$V_c = \frac{\pi \cdot DC \cdot n}{1000} \text{ (m/min)}$$

*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 ϕ 125 ?

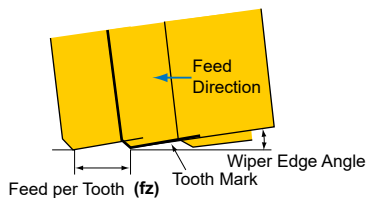
(Answer) Substitute $\pi=3.14$, DC=125, n=350 into the formula.

$$V_c = \frac{\pi \cdot DC \cdot n}{1000} = \frac{3.14 \times 125 \times 350}{1000} = 137.4 \text{ m/min}$$

The cutting speed is 137.4 m/min.

FEED PER TOOTH (fz)

$$f_z = \frac{V_f}{z \cdot n} \text{ (mm/t.)}$$



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 $f = z \times f_z$)

(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 ?

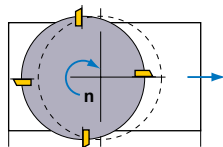
(Answer) Substitute the above figures into the formula.

$$f_z = \frac{V_f}{z \cdot n} = \frac{500}{10 \times 500} = 0.1 \text{ mm/t.}$$

The answer is 0.1mm/t.

TABLE FEED (Vf)

$$V_f = f_z \cdot z \cdot n \text{ (mm/min)}$$



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?

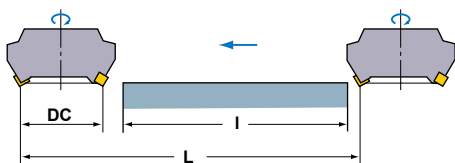
(Answer) Substitute the above figures into the formula.

$$V_f = f_z \cdot z \cdot n = 0.1 \times 10 \times 500 = 500 \text{ mm/min}$$

The table feed is 500 mm/min.

CUTTING TIME (Tc)

$$T_c = \frac{L}{V_f} \text{ (min)}$$



Tc (min) : Cutting Time

Vf (mm/min) : Table Feed per Min.

L (mm) : Total Table Feed Length (Workpiece Length: I+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 ϕ 200, 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 $V_f = 0.25 \times 16 \times 200 = 800$ mm/min
 Calculate total table feed length. $L = 300 + 200 = 500$ mm
 Substitute the above answers into the formula.

$$T_c = \frac{500}{800} = 0.625 \text{ (min)}$$

$0.625 \times 60 = 37.5$ (sec). The answer is 37.5 sec.

■ CUTTING POWER (Pc)

$$P_c = \frac{a_p \cdot a_e \cdot V_f \cdot K_c}{60 \times 10^6 \times \eta}$$

P_c (kW) : Actual Cutting Power
a_e (mm) : Cutting Width
K_c (MPa) : Specific Cutting Force

a_p (mm) : Depth of Cut
V_f (mm/min) : Table Feed per Min.
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 $\phi 250$ cutter with 12 inserts. Machine coefficient 80%.

(Answer) First, calculate the spindle speed in order to obtain the feed per tooth.

$$n = \frac{1000V_c}{\pi DC} = \frac{1000 \times 80}{3.14 \times 250} = 101.91 \text{ min}^{-1}$$

$$\text{Feed per Tooth } f_z = \frac{V_f}{z \times n} = \frac{280}{12 \times 101.9} = 0.228 \text{ mm/t}$$

Substitute the specific cutting force into the formula.

$$P_c = \frac{2 \times 80 \times 280 \times 1800}{60 \times 10^6 \times 0.8} = 1.68 \text{ kW}$$

● K_c

Material	Tensile Strength (MPa) and Hardness	Specific Cutting Force K _c (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

TECHNICAL DATA

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Solution Factors Trouble			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			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 ↘	Down cut	Use air blow			Increase coolant quantity	Do not use water-soluble cutting fluid	Determine dry or wet cutting	Up ↗ Down ↘	Up ↗ Down ↘	Up ↗ Down ↘	Up ↗ Down ↘								
Deterioration of Tool Life	Large peripheral cutting edge wear	Non-coated end mill is used	●												↗									
		A small number of cutting edges																						
		Improper cutting conditions		↘						●														
	Severe chipping	Up cut milling is used					Down Cut																	
		Improper cutting conditions																						
		Fragile cutting edge														●								
	Breakage during cutting	Insufficient clamping force																			●	●		
		Low clamping rigidity																	●	●	●	●	●	●
		Improper cutting conditions				↘																		
Deterioration of Surface Finish	Vibration during cutting	Low end mill rigidity		↘	↘								↗	↗		↗	●							
		Low clamping rigidity																	●	●	●	●	●	●
		Improper cutting conditions		↘		↘																		
	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					↘																	
		Improper cutting conditions		↘	↘	↘																		
	Out of vertical	Large cutting edge wear	●																					
		Improper cutting conditions			↘	↘																		
		Lack of end mill rigidity											↗	↗		↗	●							
Poor dimensional accuracy	Improper cutting conditions		↘	↘	↘																			
	Low clamping rigidity																		●	●	●	●	●	
Burs, Chipping, etc.	Burr or chipping occurs	Improper cutting conditions			↘	↘																		
		Large helix angle											↘											
	Quick bur formation	Notch wear	●																					
Poor Chip Dispersal	Chip packing	Improper cutting conditions		↘	↘																			
		Metal removal too large			↘	↘																		
		Lack of chip pocket												↘			●							

This image shows a blank sheet of white paper designed as a memo template. At the top left, the word "Memo" is written in a large, bold, black sans-serif font. A thick horizontal black line runs across the entire width of the page directly beneath the word. The rest of the page is filled with horizontal dashed gray lines, providing space for writing. The lines are evenly spaced and extend from the left margin to the right edge of the page.

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	C50	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	–	–	–	X165CrMoV12KU	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	0Cr13 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	0Cr13Al
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	0Cr19Ni10
1.4350	X5CrNi189	304S11	58E	Z6CN18.09	X5CrNi1810	F.3551 F.3541 F.3504	2332	SUS304	304	0Cr18Ni9
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	0Cr17Ni13Mo
1.4404	–	316S13	–	Z2CND17.12	X2CrNiMo1712	–	2348	–	316L	–
1.4435	X2CrNiMo1812	316S13	–	Z2CND17.12	X2CrNiMo1712	–	2353	SCS16 SUS316L	316L	0Cr27Ni12Mo3
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	—	316S111	—	Z8CNA17-07	X2CrNiMo1712	—	—	—	17-7PH	—
1.4504	—	—	—	—	—	—	—	—	—	—
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	FGE 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 $y=f(x)$: $Ra = \frac{1}{l} \int_0^l f(x) dx$	
Maximum Height	Rz	Rz shall be that only when the reference length is sampled from the roughness curve in the direction of the mean line, the distance between the top profile peak line and the bottom profile valley line on this sampled portion is measured in the longitudinal magnification direction of roughness curve and the obtained value is expressed in micrometer (μm). Note) When finding Rz, a portion without an exceptionally high peak or low valley, which may be regarded as a flaw, is selected as the sampling length. $Rz = R_p + R_v$	
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). $Rz_{JIS} = \frac{(Y_{p1} + Y_{p2} + Y_{p3} + Y_{p4} + Y_{p5}) + (Y_{v1} + Y_{v2} + Y_{v3} + Y_{v4} + Y_{v5})}{5}$	$Y_{p1}, Y_{p2}, Y_{p3}, Y_{p4}, Y_{p5}$: altitudes of the five highest profile peaks of the sampled portion corresponding to the reference length l. $Y_{v1}, Y_{v2}, Y_{v3}, Y_{v4}, Y_{v5}$: 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	0.25	
0.05 a		0.2 s	0.2 z		
0.1 a		0.4 s	0.4 z		
0.2 a		0.8 s	0.8 z		
0.4 a	0.8	1.6 s	1.6 z	0.8	▽▽▽
0.8 a		3.2 s	3.2 z		
1.6 a		6.3 s	6.3 z		
3.2 a		12.5 s	12.5 z		
6.3 a	2.5	25 s	25 z	2.5	▽▽
12.5 a		50 s	50 z		
25 a		100 s	100 z		
50 a		200 s	200 z		
100 a	—	400 s	400 z	—	—

*The correlation among the three is shown for convenience and is not exact.

*Ra: The evaluation length of Rz and RzJIS is the cutoff value and sampling length multiplied by 5, respectively.

HARDNESS COMPARISON TABLE

HARDNESS CONVERSION NUMBERS OF STEEL

Brinell Hardness (HB), 10mm Ball, Load: 3000kgf		Vickers Hardness	Rockwell Hardness				Shore Hardness	Tensile Strength (Approx.) MPa	Brinell Hardness (HB), 10mm Ball, Load: 3000kgf		Vickers Hardness	Rockwell Hardness				Shore Hardness	Tensile Strength (Approx.) MPa
Standard Ball	Tungsten Carbide Ball		A Scale, Load: 60kgf, Diamond Point	B Scale, Load: 100kgf, 1/16" Ball	C Scale, Load: 150kgf, Diamond Point	D Scale, Load: 100kgf, Diamond Point			Standard Ball	Tungsten Carbide Ball		A Scale, Load: 60kgf, Diamond Point	B Scale, Load: 100kgf, 1/16" Ball	C Scale, Load: 150kgf, Diamond Point	D Scale, Load: 100kgf, Diamond Point		
			(HRA)	(HRB)	(HRC)	(HRD)						(HRA)	(HRB)	(HRC)	(HRD)		
—	—	940	85.6	—	68.0	76.9	97	—	429	429	455	73.4	—	45.7	59.7	61	1510
—	—	920	85.3	—	67.5	76.5	96	—	415	415	440	72.8	—	44.5	58.8	59	1460
—	—	900	85.0	—	67.0	76.1	95	—	401	401	425	72.0	—	43.1	57.8	58	1390
—	(767)	880	84.7	—	66.4	75.7	93	—	388	388	410	71.4	—	41.8	56.8	56	1330
—	(757)	860	84.4	—	65.9	75.3	92	—	375	375	396	70.6	—	40.4	55.7	54	1270
—	(745)	840	84.1	—	65.3	74.8	91	—	363	363	383	70.0	—	39.1	54.6	52	1220
—	(733)	820	83.8	—	64.7	74.3	90	—	352	352	372	69.3	(110.0)	37.9	53.8	51	1180
—	(722)	800	83.4	—	64.0	73.8	88	—	341	341	360	68.7	(109.0)	36.6	52.8	50	1130
—	(712)	—	—	—	—	—	—	—	331	331	350	68.1	(108.5)	35.5	51.9	48	1095
—	(710)	780	83.0	—	63.3	73.3	87	—	321	321	339	67.5	(108.0)	34.3	51.0	47	1060
—	(698)	760	82.6	—	62.5	72.6	86	—	—	—	—	—	—	—	—	—	—
—	(684)	740	82.2	—	61.8	72.1	—	—	311	311	328	66.9	(107.5)	33.1	50.0	46	1025
—	(682)	737	82.2	—	61.7	72.0	84	—	302	302	319	66.3	(107.0)	32.1	49.3	45	1005
—	(670)	720	81.8	—	61.0	71.5	83	—	293	293	309	65.7	(106.0)	30.9	48.3	43	970
—	(656)	700	81.3	—	60.1	70.8	—	—	285	285	301	65.3	(105.5)	29.9	47.6	—	950
—	(653)	697	81.2	—	60.0	70.7	81	—	277	277	292	64.6	(104.5)	28.8	46.7	41	925
—	(647)	690	81.1	—	59.7	70.5	—	—	269	269	284	64.1	(104.0)	27.6	45.9	40	895
—	(638)	680	80.8	—	59.2	70.1	80	—	262	262	276	63.6	(103.0)	26.6	45.0	39	875
—	630	670	80.6	—	58.8	69.8	—	—	255	255	269	63.0	(102.0)	25.4	44.2	38	850
—	627	667	80.5	—	58.7	69.7	79	—	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
—	—	677	80.7	—	59.1	70.0	—	—	235	235	247	61.4	99.0	21.7	41.4	35	785
—	601	640	79.8	—	57.3	68.7	77	—	229	229	241	60.8	98.2	20.5	40.5	34	765
—	—	640	79.8	—	57.3	68.7	—	—	223	223	234	—	97.3	(18.8)	—	—	—
—	578	615	79.1	—	56.0	67.7	75	—	217	217	228	—	96.4	(17.5)	—	33	725
—	—	607	78.8	—	55.6	67.4	—	—	212	212	222	—	95.5	(16.0)	—	—	705
—	555	591	78.4	—	54.7	66.7	73	2055	207	207	218	—	94.6	(15.2)	—	32	690
—	—	579	78.0	—	54.0	66.1	—	2015	201	201	212	—	93.8	(13.8)	—	31	675
—	534	569	77.8	—	53.5	65.8	71	1985	197	197	207	—	92.8	(12.7)	—	30	655
—	—	533	77.1	—	52.5	65.0	—	1915	192	192	202	—	91.9	(11.5)	—	29	640
—	514	547	76.9	—	52.1	64.7	70	1890	187	187	196	—	90.7	(10.0)	—	—	620
(495)	—	539	76.7	—	51.6	64.3	—	1855	183	183	192	—	90.0	(9.0)	—	28	615
—	—	530	76.4	—	51.1	63.9	—	1825	179	179	188	—	89.0	(8.0)	—	27	600
—	495	528	76.3	—	51.0	63.8	68	1820	174	174	182	—	87.8	(6.4)	—	—	585
(477)	—	516	75.9	—	50.3	63.2	—	1780	170	170	178	—	86.8	(5.4)	—	26	570
—	—	508	75.6	—	49.6	62.7	—	1740	167	167	175	—	86.0	(4.4)	—	—	560
—	477	508	75.6	—	49.6	62.7	66	1740	143	143	150	—	80.8	—	—	23	505
(461)	—	495	75.1	—	48.8	61.9	—	1680	143	143	150	—	78.7	—	—	22	490
—	—	491	74.9	—	48.5	61.7	—	1670	137	137	143	—	76.4	—	—	21	460
—	461	491	74.9	—	48.5	61.7	65	1670	131	131	137	—	74.0	—	—	—	450
444	—	474	74.3	—	47.2	61.0	—	1595	126	126	132	—	72.0	—	—	20	435
—	—	472	74.2	—	47.1	60.8	—	1585	121	121	127	—	69.8	—	—	19	415
—	444	472	74.2	—	47.1	60.8	63	1585	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/mm²

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													
140	160	+440 +280	+310 +210	+370 +210	+208 +145	+245 +145	+305 +145	+125 +85	+148 +85	+185 +85	+68 +43	+83 +43	+106 +43	+39 +14	+54 +14	+25 0	+40 0
160	180	+470 +310	+330 +230	+390 +230													
180	200	+525 +340	+355 +240	+425 +240													
200	225	+565 +380	+375 +260	+445 +260	+242 +170	+285 +170	+355 +170	+146 +100	+172 +100	+215 +100	+79 +50	+96 +50	+122 +50	+44 +15	+61 +15	+29 0	+46 0
225	250	+605 +420	+395 +280	+465 +280													
250	280	+690 +480	+430 +300	+510 +300	+271 +190	+320 +190	+400 +190	+162 +110	+191 +110	+240 +110	+88 +56	+108 +56	+137 +56	+49 +17	+69 +17	+32 0	+52 0
280	315	+750 +540	+460 +330	+540 +330													
315	355	+830 +600	+500 +360	+590 +360	+299 +210	+350 +210	+440 +210	+182 +125	+214 +125	+265 +125	+98 +62	+119 +62	+151 +62	+54 +18	+75 +18	+36 0	+57 0
355	400	+910 +680	+540 +400	+630 +400													
400	450	+1010 +760	+595 +440	+690 +440	+327 +230	+385 +230	+480 +230	+198 +135	+232 +135	+290 +135	+108 +68	+131 +68	+165 +68	+60 +20	+83 +20	+40 0	+63 0
450	500	+1090 +840	+635 +480	+730 +480													

Note 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 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 -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	—	—	—	—

P

TECHNICAL DATA

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	— 60	— 20	— 20	— 14	— 14	— 14	— 6	— 6	— 6	— 2	— 2	0	0	0
		— 165	— 85	— 34	— 45	— 24	— 28	— 39	— 12	— 16	— 20	— 6	— 8	— 4	— 6	— 10
3	6	— 140	— 70	— 30	— 30	— 20	— 20	— 20	— 10	— 10	— 10	— 4	— 4	0	0	0
		— 170	— 100	— 48	— 60	— 32	— 38	— 50	— 18	— 22	— 28	— 9	— 12	— 5	— 8	— 12
6	10	— 150	— 80	— 40	— 40	— 25	— 25	— 25	— 13	— 13	— 13	— 5	— 5	0	0	0
		— 186	— 116	— 62	— 76	— 40	— 47	— 61	— 22	— 28	— 35	— 11	— 14	— 6	— 9	— 15
10	14	— 150	— 95	— 50	— 50	— 32	— 32	— 32	— 16	— 16	— 16	— 6	— 6	0	0	0
14	18	— 193	— 138	— 77	— 93	— 50	— 59	— 75	— 27	— 34	— 43	— 14	— 17	— 8	— 11	— 18
18	24	— 160	— 110	— 65	— 65	— 40	— 40	— 40	— 20	— 20	— 20	— 7	— 7	0	0	0
24	30	— 212	— 162	— 98	— 117	— 61	— 73	— 92	— 33	— 41	— 53	— 16	— 20	— 9	— 13	— 21
30	40	— 170	— 120	— 80	— 80	— 50	— 50	— 50	— 25	— 25	— 25	— 9	— 9	0	0	0
40	50	— 232	— 182													
40	50	— 180	— 130	— 119	— 142	— 75	— 89	— 112	— 41	— 50	— 64	— 20	— 25	— 11	— 16	— 25
		— 242	— 192													
50	65	— 190	— 140	— 100	— 100	— 60	— 60	— 60	— 30	— 30	— 30	— 10	— 10	0	0	0
65	80	— 264	— 214													
65	80	— 200	— 150	— 146	— 174	— 90	— 106	— 134	— 49	— 60	— 76	— 23	— 29	— 13	— 19	— 30
		— 274	— 224													
80	100	— 220	— 170	— 120	— 120	— 72	— 72	— 72	— 36	— 36	— 36	— 12	— 12	0	0	0
100	120	— 307	— 257													
100	120	— 240	— 180	— 174	— 207	— 107	— 126	— 159	— 58	— 71	— 90	— 27	— 34	— 15	— 22	— 35
		— 327	— 267													
120	140	— 260	— 200	— 145	— 145	— 85	— 85	— 85	— 43	— 43	— 43	— 14	— 14	0	0	0
140	160	— 360	— 300													
		— 280	— 210													
140	160	— 380	— 310													
		— 410	— 330													
160	180	— 310	— 230	— 170	— 170	— 100	— 100	— 100	— 50	— 50	— 50	— 15	— 15	0	0	0
180	200	— 410	— 330													
		— 340	— 240													
180	200	— 455	— 355													
		— 380	— 260													
200	225	— 495	— 375	— 242	— 285	— 146	— 172	— 215	— 79	— 96	— 122	— 35	— 44	— 20	— 29	— 46
225	250	— 420	— 280													
225	250	— 535	— 395													
		— 480	— 300	— 190	— 190	— 110	— 110	— 110	— 56	— 56	— 56	— 17	— 17	0	0	0
250	280	— 610	— 430													
280	315	— 540	— 330													
		— 670	— 460													
315	355	— 600	— 360	— 210	— 210	— 125	— 125	— 125	— 62	— 62	— 62	— 18	— 18	0	0	0
355	400	— 740	— 500													
355	400	— 680	— 400	— 299	— 350	— 182	— 214	— 265	— 98	— 119	— 151	— 43	— 54	— 25	— 36	— 57
		— 820	— 540													
400	450	— 760	— 440	— 230	— 230	— 135	— 135	— 135	— 68	— 68	— 68	— 20	— 20	0	0	0
450	500	— 915	— 595													
450	500	— 840	— 480	— 327	— 385	— 198	— 232	— 290	— 108	— 131	— 165	— 47	— 60	— 27	— 40	— 63
		— 995	— 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	—	—	—	—

P

TECHNICAL DATA

INTERNATIONAL SYSTEM OF UNITS

UNIT CONVERSION TABLE for EASIER CHANGE into SI UNITS (Bold type Indicates SI unit)

● Pressure

Pa	kPa	MPa	bar	kgf/cm ²	atm	mmH ₂ O	mmHg or Torr
1	1×10 ⁻³	1×10 ⁻⁶	1×10 ⁻⁵	1.01972×10 ⁻⁵	9.86923×10 ⁻⁶	1.01972×10 ⁻¹	7.50062×10 ⁻³
1×10 ³	1	1×10 ⁻³	1×10 ⁻²	1.01972×10 ⁻²	9.86923×10 ⁻³	1.01972×10 ²	7.50062
1×10 ⁶	1×10 ³	1	1×10	1.01972×10	9.86923	1.01972×10 ⁵	7.50062×10 ³
1×10 ⁵	1×10 ²	1×10 ⁻¹	1	1.01972	9.86923×10 ⁻¹	1.01972×10 ⁴	7.50062×10 ²
9.80665×10 ⁴	9.80665×10	9.80665×10 ⁻²	9.80665×10 ⁻¹	1	9.67841×10 ⁻¹	1×10 ⁴	7.35559×10 ²
1.01325×10 ⁵	1.01325×10 ²	1.01325×10 ⁻¹	1.01325	1.03323	1	1.03323×10 ⁴	7.60000×10 ²
9.80665	9.80665×10 ⁻³	9.80665×10 ⁻⁶	9.80665×10 ⁻⁵	1×10 ⁻⁴	9.67841×10 ⁻⁵	1	7.35559×10 ⁻²
1.33322×10 ²	1.33322×10 ⁻¹	1.33322×10 ⁻⁴	1.33322×10 ⁻³	1.35951×10 ⁻³	1.31579×10 ⁻³	1.35951×10	1

Note 1) 1Pa=1N/m²

● 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/m²

● Work / Energy / Quantity of Heat

J	kW•h	kgf•m	kcal
1	2.77778×10 ⁻⁷	1.01972×10 ⁻¹	2.38889×10 ⁻⁴
3.600 ×10 ⁶	1	3.67098×10 ⁵	8.6000 ×10 ²
9.80665	2.72407×10 ⁻⁶	1	2.34270×10 ⁻³
4.18605×10 ³	1.16279×10 ⁻³	4.26858×10 ²	1

Note 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 ×10 ⁻¹
9.80665	1	1.33333×10 ⁻²	8.43371
7.355 ×10 ²	7.5 ×10	1	6.32529×10 ²
1.16279	1.18572×10 ⁻¹	1.58095×10 ⁻³	1

Note 1) 1W=1J/s, PS:French horse power

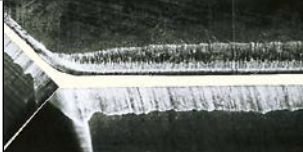
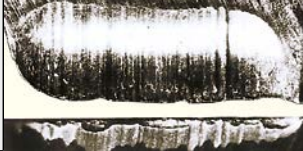
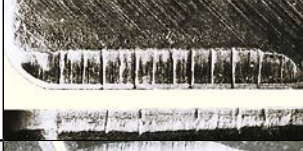
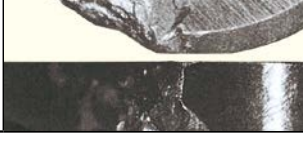
1PS=0.7355kW

1cal=4.18605J

(By the law of weights and measures)

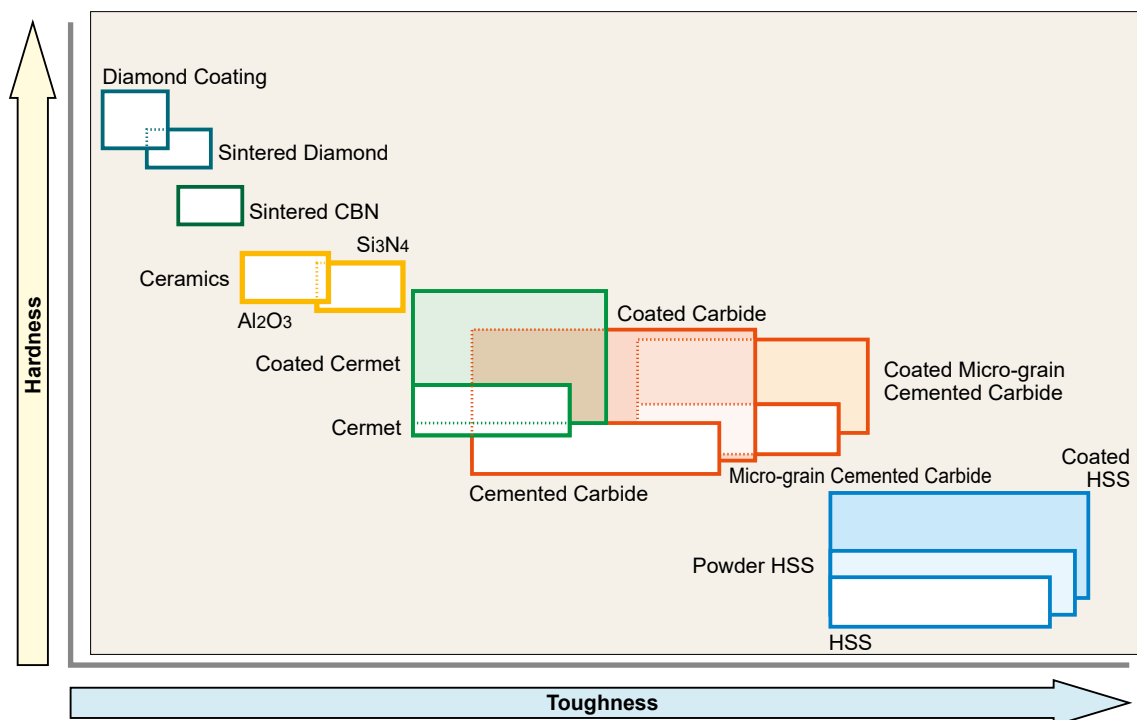
TOOL WEAR AND DAMAGE

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.

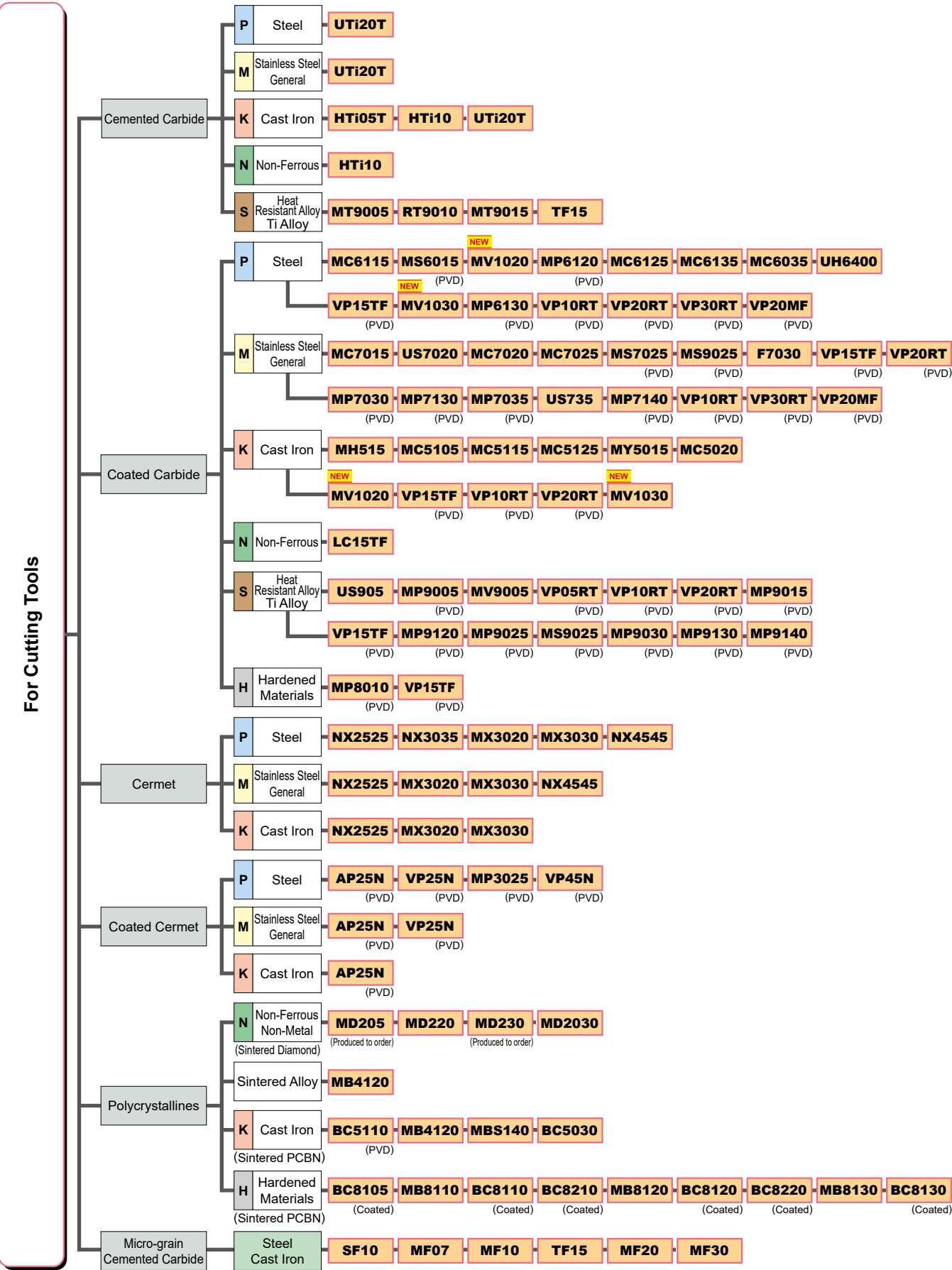


GRADE CHARACTERISTICS

Hard Materials	Hardness (HV)	Energy Formation (kcal/g·atom)	Solubility in Iron (%.1250°C)	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 ₃ N ₄	1600	—	—	100	3.4	Ceramics
Al ₂ O 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=2.39×10⁻³cal/cm·sec·°C

GRADE CHAIN



P
TECHNICAL DATA

GRADES COMPARISON TABLE

CEMENTED CARBIDE

		ISO	Mitsubishi	Sandvik	Kennametal	Seco	Iscar	Sumitomo	Tungaloy	Kyocera	Dijet	MOLDINO
	Classification	Symbol	Materials			Tools		Electric				
P	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
	Turning	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			
	Turning	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	KU10 K313 K68	HX	IC20	G10E H10E EH520	KS15F KS20	GW25	KT9	WH20
			K30	UTi20T		883		G10E H10E				
	Turning	N	N01		H10			H1 H2	KS05F	GW05 KW10		
			N10	HTi10	H10 HBA	890	IC08 IC20	EH510	TH10	KW10 GW15	KT9	WH10
			N20		H10 HBA	HX KX	IC08 IC20	G10E EH520	KS15F		KT9	WH20
			N30			883						
	Turning	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								
P	Turning	P	P10									
			P20	UTi20T		K125M		IC50M IC28	A30N			EX35
			P30	UTi20T	SM30	GX		IC50M IC28	A30N	UX30		EX35
			P40					IC28				EX35
	Turning	M	M10									
			M20	UTi20T				IC08 IC20	A30N			EX35
			M30	UTi20T	SM30			IC08 IC28	A30N			EX35
			M40					IC28				
	Turning	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								
P	Turning	P	P10									
			P20	UTi20T		K125M		IC50M IC28	A30N			EX35
			P30	UTi20T	SM30	GX		IC50M IC28	A30N	UX30		EX35
			P40					IC28				EX35
	Turning	M	M10									
			M20	UTi20T				IC08 IC20	A30N			EX35
			M30	UTi20T	SM30			IC08 IC28	A30N			EX35
			M40					IC28				
	Turning	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	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	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*	LN10	
		P10	NX2525 AP25N* VP25N*	CT5015	KT315 KTP10* KT125	TP1020 TP1030* CM CMP*	IC20N IC520N* IC530N*	T1500A T1500Z*	NS520 NS9530 GT9530* AT9530*	CCX* TN60 TN610 PV710* TN620 PV720*	CX75 PX75*	CZ25*
		P20	NX2525 AP25N* VP25N* NX3035 MP3025*	GC1525*	KT325 KTP10* KT1120 KT5020*	TP1020 TP1030*	IC20N IC520N* IC30N IC530N* IC75T	T1500A T1500Z* T2500A T2500Z* T3000Z*	NS9530 GT9530* AT9530*	TN60 TN620 PV720* TN6020	CX75 PX75* CX90 PX90*	CH550 CZ25*
		P30	MP3025* VP45N*				IC75T	T3000Z*		PV730* PV90*	CX90 PX90*	
	M	M10	NX2525 AP25N* VP25N*	GC1525*	KT315 KTP10*	TP1020 TP1030* CM CMP*		T1000A T1500Z*		TN60 TN620 PV720* TN6020	LN10	CZ25*
		M20	NX2525 AP25N* VP25N*					T1500A T1500Z*		TN90 TN6020 TN620 PV720* PV90*	CX75 PX75 CX90	CH550 CZ25*
		M30								PV730*		
		K01	NX2525 AP25N*					T1000A	NS520 GT720*	CCX* PV7005*	LN10	
	K	K10	NX2525 AP25N*	CT5015	KT315 KTP10*				NS520 NS9530 GT9530*	CCX* PV7005* TN60		CZ25*
		K20	NX2525 AP25N*									CH550
Milling	P	P10	NX2525			C15M	IC30N			TN100M 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.

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TECHNICAL DATA

GRADES COMPARISON TABLE

CVD COATED GRADE

	ISO Classification	Symbol	Mitsubishi Materials	Sandvik	Kennametal	Seco Tools	Iscar	Sumitomo Electric	Tungaloy	Kyocera	Dijet	MOLDINO
P	Turning	P01	MC6115	GC4305 GC4405 GC4415	KCP05B KCP05	TP0501 TP1501	IC9150 IC8150 IC428	AC810P AC8015P	T9105 T9205	CA510 CA115P CA5505	JC110V	HG8010
		P10	MC6115 MY5015 MC6125	GC4315 GC4325 GC4415	KCP10B KCP10 KCP25	TP1501 TP2501	IC9150 IC8150 IC8250	AC810P AC8020P	T9205 T9105 T9115 T9215	CA510 CA115P CA5505 CA515 CA5515	JC110V JC215V	HG8010 HG8025 GM8020
		P20	MC6115 MC6125 MC6135 MY5015	GC4315 GC4325 GC4425	KCP25B KCP30B KCP25 KCP25C	TP2501	IC8250 IC9250 IC8350	AC8020P AC820P AC2000 AC8025P	T9115 T9125 T9215 T9225	CA025P CA125P CA515 CA5515 CA525 CA5525 CR9025	JC110V JC215V	HG8025 GM8020 GM25
		P30	MC6125 MC6135 UH6400	GC4325 GC4335 GC4425	KCP30B KCP30	TP3501	IC8350 IC9250 IC9350	AC6030M AC8035P AC830P AC630M	T9125 T9135 T9225 T9235	CA025P CA125P CA525 CA5525 CA530 CA5535 CR9025	JC215V JC325V	GM25 GM8035
		P40	MC6035 UH6400	GC4335	KCP40 KCP40B	TP3501 TP40	IC9350	AC6030M AC8035P AC630M AC830P	T9135 T9235	CA530 CA5535	JC325V	GM8035 GX30
	M	M10	MC7015 US7020	GC2015 GC2220	KCM15B KCM15	TM1501 TM2000	IC6015 IC8250	AC610M AC6020M	T6120 T6215	CA6515		
		M20	MC7015 US7020 MC7025	GC2015 GC2220	KCM15 KCM25B KCP40B	TM2000 TM2501	IC8150 IC6015	AC6020M AC610M AC6030M AC630M	T6120 T6215	CA6515 CA6525		HG8025 GM25
		M30	MC7025 US735	GC2025	KCM35B KCP40	TM4000 TM3501	IC8250 IC6025	AC6030M AC630M	T6130	CA6525		GM8035 GX30
		M40	US735	GC2025	KCM35B	TM4000 TM3501	IC6025	AC6030M AC630M				GX30
	K	K01	MC5105	GC3205 GC3210	KCK05B KCK05	TK0501 TH1500	IC5005	AC405K AC4010K	T505 T5105	CA4505 CA310		HX3505
		K10	MC5115 MH515 MY5015	GC3205 GC3210	KCK15B KCK15 KCK20 KCK20B	TK0501 TK1501	IC5005 IC5010 IC428	AC405K AC4010K AC410K AC4015K AC415K	T515 T5115	CA315 CA4515		HX3515 HG8010
		K20	MC5125 MH515 MY5015	GC3225	KCK20B KCK20	TK1501	IC5010 IC8150	AC4015K AC415K AC420K AC4125K	T5115 T5125	CA320 CA4515		HG8025 GM8020
		K30	MC6115	GC3225	KCPK05			AC8025P AC4125K	T5125			HG8025 GM8020
	S	S01	MV9005 US905	S05F S205						CA6515 CA6525		HS9105 HS9115
	Milling	P	P10	MV1020 MV1030		MP1501	IC5400 IC5600	ACP2000 XCU2500 ACP100				
			P20	MV1020 MV1030 MC7020 F7030	GC4220	KCPM20	MP1501 MP2501 MP3501 T25M	IC5400 IC5500	ACP2000 XCU2500 ACP100	T3130 T3225		GX2140 GF30
			P30	MV1020 MV1030 MC7020 F7030	GC4330	KCPK30	MP1501 MP2501 MP3501 MS2500 T25M	IC5500	XCU2500 ACP100	T3130 T3225		GX2140 GX2160 GF30
			P40		GC4340	KC935M KC530M	MP2501 MP3501 MS2500 MM4500					GX2030 GX2160
		M	M10	MV1030			MP2501	XCU2500 XCS2000				
			M20	MV1030 MC7020 F7030		KC925M	MP2501 MP3501 MS2500 T25M MM4500	ACP100 ACM200 XCU2500 XCS2000	T3130 T3225	CA6535		AX2040 GX2140
			M30	MV1030 MC7020 F7030	GC2040	KC930M	MP2501 MP3501 MS2500 T25M MM4500	ACP100 XCU2500 ACM200 XCS2000	T3130 T3225	CA6535		AX2040 GX2140 GX2160 GX30
			M40			KC930M KC935M	MP3501 MM4500					GX2160
		K	K10	MV1020 MV1030 MC520 MC5020		KCK15	MK1500	XCK2000 ACK2000	T1215 T1115	CA420M	JC605W	GX2120
			K20	MV1020 MV1030 MC520 MC5020	GC3330 K20W	KC915M	MK1500 MP1501	IC5100	ACK2000 XCU2500 XCK2000 ACK200	T1115	JC605W	GX2120
			K30	MV1030	GC3330 GC3040	KC920M KC925M KCPK30 KC930M KC935M	MK1500 MP1501 MP2501 MP3501	IC5100 DT7150				
			K40				MP3501					
		S	Ni				MS2500 MP3501	XCS2000		CA6535		
			Ti		S40T		MP3501					

Note 1) The tables above are based on published data and not authorized by each manufacturer.

PVD COATED GRADE

	ISO Classification	Symbol	Mitsubishi Materials	Sandvik	Kennametal	Seco Tools	Iscar	Sumitomo Electric	Tungaloy	Kyocera	Dijet	MOLDINO
Turning	P	P10	VP10MF MS6015	GC1125	KCU10 KCU10B KC5010 KC5510	CP200 TS2000	IC250 IC807 IC907 IC908		AH710	PR1705 PR930 PR1025 PR1115 PR1225 PR1725 PR2025		
		P20	VP10RT VP20RT VP15TF VP20MF MS6015	GC1125	KCS10 KCU10 KCU10B KC5025 KC5525	TS2500	IC1007 IC250 IC308 IC807 IC808 IC907 IC908 IC1008 IC1028 IC3028		AH725 AH120 J740 SH730 SH725 SH7025	PR930 PR1025 PR1725 PR1115 PR1225 PR1425 PR1535 PR2025		IP2000
		P30	VP10RT VP20RT VP15TF VP20MF MS7025	GC1125	KCU25 KC5525	CP500	IC228 IC250 IC328 IC330 IC354 IC528 IC1008 IC1028	AC1030U AC530U	AH725 AH120 SH730 GH730 GH130 AH740 J740 SH725 AH7025 SH7025	PR1025 PR1725 PR1225 PR1425 PR1535 PR1625 PR2025		IP3000
		P40				CP500 CP600	IC228 IC328 IC528 IC928 IC1008 IC1028		AH740	PR1535		
	M	M01				CP200 TS2000				PR1725	JC5003	
		M10	VP10MF	GC1115 GC1125 GC1105	KCS10 KCU10 KCU10B KC5010	CP200 TS2000 TS2500	IC354 IC807 IC907 IC1007		AC8005 AH630 AH6225	PR1025 PR1225 PR930 PR1725 PR120S	JC5003 JC8015 JC5015	IP050S
		M20	VP10RT VP20RT VP15TF VP20MF MS7025 MS9025	GC1115 GC1125	KCU25 KC5025 KCU10 KCU10B KC5010 KCS10	TS2500 CP500 CP600	IC354 IC808 IC908 IC1008 IC1028	AC1030U AC530U AC6040M	AH725 AH120 SH730 AH630 SH725 AH8015 AH7025 AH6225 SH7025	PR1025 PR1225 PR930 PR1535 PR1725 PR120S	JC5015 JC8015 JC5118	IP100S
		M30	VP10RT VP20RT VP15TF VP20MF MS7025 MP7035	GC1125 GC2035	KC5025 KCU25	CP500 CP600	IC228 IC250 IC328 IC1008 IC1028	AC530U AC1030U AC6040M	AH725 AH120 SH730 J740 AH645 SH725 AH6235 SH7025	PR1025 PR1725 PR1535 PR1225 PR120S PR2035	JC5118	
		M40	MP7035	GC2035		CP600	IC328 IC928 IC1008 IC1028	AC530U AC6040M AC1030U	AH645 AH6235	PR1535 PR1225		
	K	K10		GC15	KCU10 KCS10 KC5010 KC5510	CP200 TS2000	IC350 IC1008		GH110 AH110			
		K20	VP10RT VP20RT VP15TF		KCU15 KCU25	CP200 TS2000 TS2500	IC228 IC808 IC830 IC908 IC1007 IC1008	AC1030U AC530U	AH7025 AH120			
		K30	VP10RT VP20RT VP15TF		KCU25 KC5525	CP500	IC228 IC350 IC808 IC830 IC908 IC928 IC1007 IC1008		AH120 GH130			
	S	S01	MP9005 VP05RT	GC1105 GC1205		TH1000	IC804 IC807 IC907	AC510U AC5005S AC5015S AC5005S	AH8005	PR005S PR015S	JC5003 JC8015 JC5015	JP9105
		S10	MP9005 MP9015 VP10RT	GC1105 GC1205 GC1115 GC1210	KCU10 KCU10B KC5010 KCS10 KCS10B	CP200 TS2000 TS2050 TS2500 TH1000	IC806 IC807	AC510U AC520U AC5015S AC5025S	AH8005 AH8015	PR005S PR015S PR115S	JC5003 JC5015 JC8015	JP9115
		S20	MP9015 MT9015	GC1115 GC1125	KCU10 KCU10B KCU25 KC5025 KCS10 KC5010 KCS10B	TS2000 TS2500 CP200	IC228 IC328 IC808 IC908 IC928 IC806	AC520U AC5015S AC5025S	AH7025 AH8015	PR015S PR1535 PR115S	JC5015 JC5118	
		S30	MP9025 VP15TF VP20RT	GC1125	KCU25 KC5025	CP600	IC928 IC830	AC1030U	AH630 AH7025	PR1535 PR120S	JC5118	
Milling	P	P01							AH710 AH110		JC8003	ATH80D JP4105
		P10		GC1010 GC1130	KC505M KC715M KC510M KC515M		IC250 IC350 IC808 IC810 IC910 IC950	ACU2500 ACP200	AH120 AH725	PR830 PR1225 PR1825	JC8003 JC8015 JC5015 JC5118	PN15M PN215 PCA12M JP4115
		P20	MP6120 VP15TF	GC1010 GC1030 GC1130 GC2030	KC522M KC525M KC527M KC610M KC620M KC635M KC715M KC730M KTPK20	F25M MP3000	IC250 IC328 IC330 IC350 IC808 IC810 IC830 IC910 IC928 IC950	ACU2500 ACP200	AH3135 AH3225 AH725 AH120 AH9130 AH6030 AH9030	PR830 PR1225 PR1230 PR1525 PR1825	JC5015 JC8015 JC5118	CY9020 JP4120 CY150

Note 1) The tables above are based on published data and not authorized by each manufacturer.

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TECHNICAL DATA

GRADES COMPARISON TABLE

PVD COATED GRADE

	ISO	Mitsubishi	Sandvik	Kennametal	Seco	Iscar	Sumitomo	Tungaloy	Kyocera	Dijet	MOLDINO	
	Classification Symbol	Materials			Tools		Electric					
Milling	P	P30	MP6120 VP15TF MP6130 VP30RT	GC1010 GC1030 GC2030 GC1130	KC735M KC725M KC530M KCPM40	F25M MP3000 F30M MP2050	IC250 IC300 IC330 IC350 IC830 IC845 IC928 IC950	ACU2500 ACP200 ACP300	AH725 AH130 AH140 AH3035 AH6030 AH3225 AH9130	PR1230 PR1525 PR1825	JC8050 JC5040 JC5118	JS4045 CY250 CY250V CY25 HC844
		P40	VP30RT	GC2030 GC1030 GC1130	KC735M KCPM40	F40M T60M	IC328 IC330 IC830 IC928	ACP300	AH140 AH3035	PR1525	JC8050 JC5040	JS4060 PTH30E PTH40H JS4060
	M	M01					IC907					PN08M PN208
		M10		GC1025 GC1030 GC1010 GC1130	KC715M KC515M		IC903	ACU2500 ACM100	AH725	PR1225		PN15M PN215
		M20	VP15TF MP7130 MP7030 VP20RT	GC1025 GC1030 GC1040 GC2030 S30T	KC610M KC635M KC730M KC522M KC525M KCPM40 KTPK20	F25M MP3000	IC250 IC808 IC830 IC928	ACU2500 ACP200	AH725 AH6030 AH130 AH330 AH9130	PR1025 PR1225	JC5015 JC5118 JC8015	JP4120
		M30	VP15TF MP7130 MP7030 VP20RT VP30RT MP7140	S30T GC1040 GC2030	KC725M KC735M KCPM40 KC530M	F30M F40M MP3000 MP2050	IC250 IC328 IC330 IC380 IC830 IC882 IC928	ACP300 ACM300 ACK300	AH130 AH140 AH730 AH3135 AH4035 AH9130	PR830 PR1225 PR1525 PR1535 PR1835	JC5015 JC8015 JC8050 JC5118	JS4045 CY250
		M40	MP7140 VP30RT			F40M MP2050	IC250 IC328 IC330 IC882	ACP300 ACM300	AH140 AH3135 AH4035	PR1535 PR1835	JC8050	PTH30E PTH40H JM4160
	K	K01	MP8010						AH110 AH330		JC8003	ATH80D ATH08M TH308
		K10	MP8010	GC1010	KCKP10 KC514M KC515M KC527M KC635M KCK20B	MK2050	IC350 IC810 IC830 IC900 IC910 IC928 IC950 IC380	ACU2500 ACK3000	AH110 AH725 AH120 AH330	PR1210 PR1510 PR1810	JC8015	ATH10E TH315 CY100H
		K20	VP15TF VP20RT	GC1010 GC1020	KTPK20 KC514M KC610M KC520M KC620M KC524M KCK20B	MK2000 MK2050	IC350 IC808 IC810 IC830 IC910 IC928 IC950	ACU2500 ACK300 ACK3000	AH120 AH9130 AH9030	PR1210 PR1510 PR1810	JC5015 JC8015	CY150 JP4120 CY9020 PTH13S
		K30	VP15TF VP20RT	GC1020	KC522M KC725M KC524M KC735M	MK2050	IC350 IC808 IC830 IC928 IC950	ACK300 ACK3000	AH120		JC5080 JC5015 JC8015	CY250 JS4045
	S	S01					IC907 IC808		AH110 AH710	PR1210	JC8003 JC8015 JC5118	PN08M PN208
		S10	MP9120 VP15TF	GC1130 GC1010 GC1030 GC2030	KC505M KC510M	MS2050	IC907 IC840 IC910 IC808	EH520Z EH20Z ACM100	AH120 AH725	PR1210	JC8003 JC5015 JC8015 JC5118 DS118	JS1025 JP4120
		S20	MP9120 VP15TF MP9130 MP9030	S30T GC2030 GC1030 GC1130	KC522M KC525M KCSM30 KCPM40	MS2050 MP2050	IC808 IC830 IC928 IC328 IC330 IC840 IC882 IC380	EH520Z EH20Z ACK300 ACP300	AH725 AH6030 AH130	PR1535	JC8015 JC5015 JC8050 JC5118 DS150	PTH30H
		S30	MP9140	GC2030 GC1040	KC725M KCPM40	MS2050 F40M KCSM40	IC830 IC882 IC928	ACP300 ACM300	AH130 AH3135	PR1535	JC8050 JC5118	JM4160
	H	H01	MP8010 VP05HT						AH110 AH710		JC8003	
		H10	VP15TF VP10H	GC1130 GC1010 GC1030	KC505M KC510M	MH1000 F15M	IC808 IC907		AH110 AH120 AH710		JC6102 JC8008	JP4105 TH303 TH308 PTH08M ATH08M ATH80D
		H20	VP15TF	GC1030 GC1130		F15M	IC808 IC380		AH120 AH3135 AH725 AH9030		JC8015 JC5118	JP4115 TH315
		H30				MP3000 F30M	IC380		AH3135			JP4120

Note 1) The tables above are based on published data and not authorized by each manufacturer.

PCBN

	Classification	ISO	Mitsubishi Materials	Sandvik	Seco Tools	Iscar	Sumitomo Electric	Tungaloy	Kyocera
		Symbol							
Turning	H	H01	BC8105 BC8210 BC8110 MB8110	CB7105 CB7015	CBN010 CBN060K CH0550	IB50 IB10H IB10HC	BNC2105 BNC2115 BNC2010 BN1000	BXA10 BXM10 BX310	KBN05M KBN010 KBN510
		H10	BC8110 BC8210 BC8120 BC8220 MB8110 MB8120	CB7115 CB7125 CB7025 CB20	CBN010 CBN060K CBN150 CH2540 CH1050	IB50 IB10H IB10HC IB55 IB20H IB25HA	BNC2115 BNC2125 BNC2010 BNC2020 BN2000	BXA10 BXA20 BXM10 BX330 BX530	KBN010 KBN020 KBN05M KBN25M KBN525
		H20	BC8220 BC8120 MB8120	CB7125 CB7025 CB50	CBN150 CBN160C CH2540 CH2581	IB20H IB25HA IB90 IB25HC	BNC2020 BNC2125 BN2000	BXM20 BXA20 BX360	KBN020 KBN25M
		H30	BC8130 MB8130	CB7135 CB7525	CBN160C CH3515	IB90 IB25HC	BNC300 BN350	BXC50 BX380 BR35F	KBN35M
	S	S01	MB4120		CBN170	IB05S	BN7125 BN7000 NBC100	BX815	
		S10				IB05S IB10S	BNS8125		
		S20				IB10S	BNS8125		
		S30							
	K	K01	BC5110 MB5015	CB50	CBN400C	IB50 IB55 IB85	BN7125 BNC500 BN500	BX910 BX930	KBN475 KBN60M
		K10	MB4120	CB7525	CBN300 CBN300 P CBN200	IB50 IB55 IB85	BN7125 BN500	BX480	KBN475 KBN60M
		K20	MB4120		CBN200		BN7125 BNC8115 BNS8125	BX480	KBN60M
		K30	BC5030 MBS140	CB7925	CBN500		BNS800 BNC8115 BNC8125	BXC90 BX90S	KBN900
	Sintered Alloy		MB4120		CBN200	IB05S IB10S	BN7115 BN7125	BX470 BX480	KBN570 KBN70M

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TECHNICAL DATA

PCD

	Classification	ISO	Mitsubishi Materials	Sandvik	Seco Tools	Iscar	Sumitomo Electric	Tungaloy	Kyocera
		Symbol							
Turning	N	N01	MD205*	CD05	PCD30 PCD30M	ID5	DA90	DX180 DX160	KPD230
		N10	MD220	CD10 CD1810	PCD10	ID5	DA150	DX160 DX140	KPD010 KPD230
		N20	MD220		PCD20		DA2200 DA1000	DX140 DX110	KPD010
		N30	MD230* MD2030		PCD05		DA2200 DA1000	DX120 DX110	KPD001

*Non stock, produced to order only.

Note 1) The tables above are based on published data and not authorized by each manufacturer.

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AHX475S-○○○○○○○R	AHX475S type face mill.....	K038	BOES101	Set bolt.....	N008
AHX640S-○○○○○○○R	AHX640S type face mill.....	K042	BRP○NR○○○M○○	BRP type end mill.....	K206
AHX640W-○○○○○○○R/L	AHX640W type face mill.....	K049	BRP6P/N-○○○○○○○R	BRP type face mill.....	K206
AJS○○○○○T○○	Clamp screw.....	N003	BRS○○○	Clamp screw.....	N003
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AJX○○R○○○AM○○	AJX type end mill.....	K197	CA○○○	Clamp bridge.....	N014
AJX○○R○○○SA○○S/L/ES/EL	AJX type end mill.....	K198, K199	CBS○○	Breaker piece.....	N016
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AOGT○○○○○PEFR-GM	Insert (For APX3000 type cutter) ...	K150, K162, L022	CCMX○○○○○EN-○	Insert (For DCCC type end mill).....	K217, L024
AOMT○○○○○PEER-○	Insert (For APX3000•4000 type cutter)	K150, K157, K162, K166, L022	CCP○○	Shim pin.....	N013
APGT○○○○○PDFR-G2	Insert (For BAP300•400 type cutter)	L023	CCTC1	Clamp bridge.....	N014
APMT○○○○○PDER-H○	Insert (For BAP300•400/SRM2 type cutter)	K245, L023	CESPR○○○S○○	CESP type end mill.....	K246
APMT○○○○○PDER-M○	Insert (For BAP300•400/SRM2 type cutter)	K245, L023	CFSPR○○○S○○	CFSP type end mill.....	K246
APX3K-○○○A○○A○○○RA	APX3000 type end mill.....	K161	CGSPR○○○S○○	CGSP type end mill.....	K246
APX3KR○○○S○○○○○○A	APX3000 type end mill.....	K160	CK○○○	Clamp bridge.....	N014
APX3000-○○○A○○○RA	APX3000 type face mill.....	K148	CKW6	Clamp bridge.....	N015
APX3000R○○○M○○A/A○○	APX3000 type end mill.....	K149	CPMT○○○○○ZPEN-M○	Insert (For PMR type end mill).....	K253, L024
APX3000R○○○SA○○SA/LA/ELA	APX3000 type end mill.....	K147	CSF401260T	Clamp screw.....	N003
APX3000R○○○WA○○○A	APX3000 type end mill.....	K146	CS○○○T	Clamp screw.....	N003
APX4K-○○○A○○A○○○RA	APX4000 type end mill.....	K165	CS○○○○○T	Clamp screw.....	N003
APX4KR○○○WA○○○○○○A	APX4000 type end mill.....	K164	D		
APX4000-○○○A○○○RA	APX4000 type face mill.....	K155	DCCCR○○○S○○	DCCC type end mill.....	K216
APX4000R○○○M○○A○○	APX4000 type end mill.....	K156	DCK○○○	Clamp bridge.....	N015
APX4000R○○○SA○○SA/LA/ELA	APX4000 type end mill.....	K154	DCSVN32	Shim.....	N010
APX4000R○○○WA○○SA/LA/ELA	APX4000 type end mill.....	K153	DC○○○T	Clamp screw.....	N003
AQXR○○○A/N○○S/L	AQX type end mill.....	K186, K187	DKS○	Clamp screw.....	N003
AQXR○○○M○○A○○	AQX type end mill.....	K188	F		
ARP○P-○○○○○○○AR	ARP type face mill.....	K254	FC400890T	Clamp screw.....	N003
ARP○PR○○○AM○○○○○	ARP type end mill.....	K256	FMAX-○○○A○○○R	FMAX type face mill.....	K057
ARP○PR○○○SA○○○L/M	ARP type end mill.....	K255	FMAX-○○○B○○○R	FMAX type face mill.....	K058
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ASX400-○○○○○○○R	ASX400 type face mill.....	K080	G		
ASX400R○○○M16	ASX400 type end mill.....	K081	GOER140○○XFR2	Insert (For FMAX type cutter).....	K060, L051
ASX400R○○○S32	ASX400 type end mill.....	K081	GOER14008PXFR2-8	Insert (For FMAX type cutter).....	K060, L051
ASX445-○○○○○○○R/L	ASX445 type face mill.....	K026	H		
ASX445R○○○S32	ASX445 type face mill.....	K027	HBH○○○○○	Clamp screw.....	N002
AXD4000A-050A04RD/E	AXD4000A type face mill.....	K176	HBHA○○○○○	Clamp screw.....	N002
AXD4000-○○○○○○○RA/B	AXD4000 type face mill.....	K168	HDS○○○○○	Set bolt.....	N008
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HKY ⁰⁰⁰ R	L-wrench	N002	LLSWN ⁰⁰⁰⁰	Shim	N010
HKY ⁰⁰⁰ T	T-wrench	N002	LLSWN ^{00T0}	Shim	N010
HKY ⁰⁰⁰ W	Flag wrench	N002	LLSWP ⁰⁰	Shim	N010
HSC ⁰⁰⁰⁰⁰⁰	Clamp screw	N002, N008	LNGU ⁰⁰⁰⁰⁰⁰⁰⁰⁰⁰ PNE ⁰⁰⁰	Insert (Side cutter)	L026, L027
HSC ⁰⁰⁰⁰⁰⁰ H	Set bolt	N008	LOGU ⁰⁰⁰⁰⁰⁰⁰⁰⁰⁰ PN ^{00R0}	Insert (For VPX200/VPX300 type cutter)	K103, K117, K130, K139, L028, L029
HSCX ⁰⁰⁰⁰⁰⁰ H	Set bolt	N008	LS ⁰	Clamp screw	N004
HSP05008C	Lock screw	N003	LS ⁰⁰	Clamp screw	N004
HSS ⁰⁰⁰⁰⁰⁰	Clamp screw	N002	LS ^{00T}	Clamp screw	N004
HY ⁰	Bush screw	N004	LS ^{0000T}	Clamp screw	N004
HY-A1	Bush screw	N004	LS10TS	Clamp screw	N004
HY-V1	Bush screw	N004			
J			M		
JDMT ⁰⁰⁰⁰⁰⁰⁰⁰⁰⁰ ZD ^{0R00}	Insert (For AJX/PMC type cutter)	K200, L024	MBA ⁰⁰⁰⁰⁰⁰ H	Clamp screw	N008
JDMW ⁰⁰⁰⁰⁰⁰⁰⁰⁰⁰ ZDSR-FT	Insert (For AJX type cutter)	K200, L024	MGS6	Clamp screw	N005
JOMT ⁰⁰⁰⁰⁰⁰⁰⁰⁰⁰ ZZ ^{0R00}	Insert (For AJX/PMC type cutter)	K200, L025	MHS ^{0000R/L}	Shim	N011
JOMU ⁰⁰⁰⁰⁰⁰⁰⁰⁰⁰ ZZER ⁰	Insert (For WJX type cutter)	K087, L025	MHT1	Clamp screw	N005
JOMW ⁰⁰⁰⁰⁰⁰⁰⁰⁰⁰ ZZSR-FT	Insert (For AJX/PMC type cutter)	K200, L024	MK1K	Anti seize lubricant	N017
JPGX ⁰⁰⁰⁰⁰⁰⁰⁰⁰⁰ PPER-JM	Insert (For ASPX type cutter)	K226, L025	MK1KS	Anti seize lubricant	N017
JPMT060204-E	Insert (For TAB/CBJP type end mill)	L025	MLCP42	Shim	N011
JPMX ⁰⁰⁰⁰⁰⁰⁰⁰⁰⁰	Insert (For SPX type cutter)	K221, L025	MLDP42	Shim	N011
JSS ⁰	Clamp screw	N004	MLSP42	Shim	N011
K			MLTP32	Shim	N011
KGC1	Clamp bridge	N015	MPMT ⁰⁰⁰⁰⁰⁰⁰⁰	Insert (For CBMP/ECMP/TAB type end mill)	L030
KS ⁰	Axial screw	N004	MPMW ⁰⁰⁰⁰⁰⁰⁰⁰	Insert (For TSMP type end mill)	K249, L030
KSN ⁰	Clamp screw	N009	MPMX120412- ⁰⁰	Insert (For SPX type end mill)	K221, L030
KSN3	Micro Adjustment Nut	N009	MP6	Shim pin	N013
KS ^{0S}	Pre-set screw	N004	MSCN63	Shim	N011
KSS2	Large Adjustment Screw	N009	MSSN63	Shim	N011
L			MTK ^{0R/L}	Clamp bridge	N015
LK1	Clamp bridge	N015	N		
LLCL ⁰⁰⁰⁰	Clamp lever	N013	NNMU1305 ⁰⁰⁰⁰ ZEN ⁰	Insert (For AHX440S type cutter)	K035, K039, L030
LLCL ^{000S}	Clamp lever	N013	NNMU130508ZER-L	Insert (For AHX440S type cutter)	K035, L030
LLCS ⁰⁰⁰⁰	Clamp screw	N004	NNMU200 ⁰⁰⁰⁰⁰⁰ ZEN ⁰	Insert (For AHX440S type cutter)	K043, L031
LLCS ^{0000S}	Clamp screw	N004	NNMU200 ⁰⁰⁰⁰⁰⁰ ZEN ⁰⁰	Insert (For AHX type cutter)	K043, K050, L031
LLP ⁰⁰	Shim pin	N013	NNMU200608ZEN ^{0K}	Insert (For AHX640W*640S type cutter)	K043, K050, L031
LLR ⁰	Radial screw	N004	NNMU200712ZER-L	Insert (For AHX640S type cutter)	K043, L031
LLSCN ⁰⁰	Shim	N010	NNMU200712ZER-MM	Insert (For AHX640S type cutter)	K043, L031
LLSCN ^{0T0}	Shim	N010	NS ⁰⁰⁰⁰	Clamp screw	N005
LLSCP ⁰⁰	Shim	N010	NS ^{0000W}	Clamp screw	N005
LLSDN ⁰⁰	Shim	N010	O		
LLSDP42	Shim	N010	OEMX ⁰⁰⁰⁰⁰⁰ E ^{0R1}	Insert (For OCTACUT type cutter)	L031
LLSRN ⁰⁰⁰⁰	Shim	N010	OEMX ⁰⁰⁰⁰⁰⁰ E ^{0R1-JS}	Insert (For OCTACUT type cutter)	L032
LLSSN ⁰⁰	Shim	N010			
LLSSP42	Shim	N010			
LLSTE32	Shim	N010			
LLSTN ⁰⁰	Shim	N010			

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PMR	PMR type end mill	K252	SEMT13T3AGSN-JH	Insert (For ASX445 type cutter).....	K028, L037
PMR	PMR type end mill	K252	SEMT13T3AGSN-JM	Insert (For ASX445 type cutter).....	K028, L037
P	Lock pin	N014	SETK	Clamp bridge	N015
PS	Shim	N010	SETS	Clamp screw	N005
PT	Shim	N010	SFAN	Insert (For BF407 type cutter)	L037
PT	Shim	N011	SFCN	Insert (For BF•QBF407 type cutter).....	L037
P	Lock pin	N014	SLCS	Clamp screw	N005
PV	Shim	N011	SNC43B2S	Insert (For BN425DN type cutter).....	L037
P	Lock pin	N014	SNEN	Insert (Class E tolerance).....	L037
P	Lock pin	N014	SNGU	Insert (For WSX445 type cutter).....	K019, L037
P	Lock pin	N014	SNMF43B2G	Insert (For BN425/DN type cutter).....	L038
Q			SOET12T308PEER-JL	Insert (For ASX400 type cutter).....	K082, L038
QOGT	Insert (For AQX type cutter)	K189, L032	SOGT12T308PEFR-JP	Insert (For ASX400 type cutter).....	K082, L038
QOMT	Insert (For AQX type cutter)	K189, L032	SOMT12T3	Insert (For ASX400 type cutter).....	K082, L038
R			SONX1206PE	Insert (For VOX400 type cutter)	K078, L039
RDHX	Insert (Class H tolerance).....	L032	SPEN1203EETR1	Insert (For FBP415 type cutter)	L051
RDMX	Insert (Class M tolerance)	L033	SPEN424A	Insert (For FP490•590•690 type cutter).....	L039
RDZX	Insert (Class M tolerance)	L033	SPEN	Insert (For 15° corner angle type cutter)	L039
REMX	Insert (For OCTACUT type cutter).....	L033	SPEN	Insert (For FBP415/QBP415 type cutter)	L039
REMX	Insert (For OCTACUT type cutter).....	L033	SPER1203EEER-JS	Insert (For FBP415/QBP415 type cutter)	L039
RGEN2004M	Insert (For SG20 type cutter).....	L033	SPGN	Insert (For 11° Positive type cutter).....	L040
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SEEN	Insert (For SE415•515/QSE415 type cutter)	L036	SRG	Insert (For SRM2 type end mill).....	K239, K245, L042
SEER	Insert (For SE445•545/LSE445 type cutter).....	L035	SRG	Insert (For SRM2 type end mill).....	K239, K245, L042
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			SRM2	SRM2 type end mill	K244

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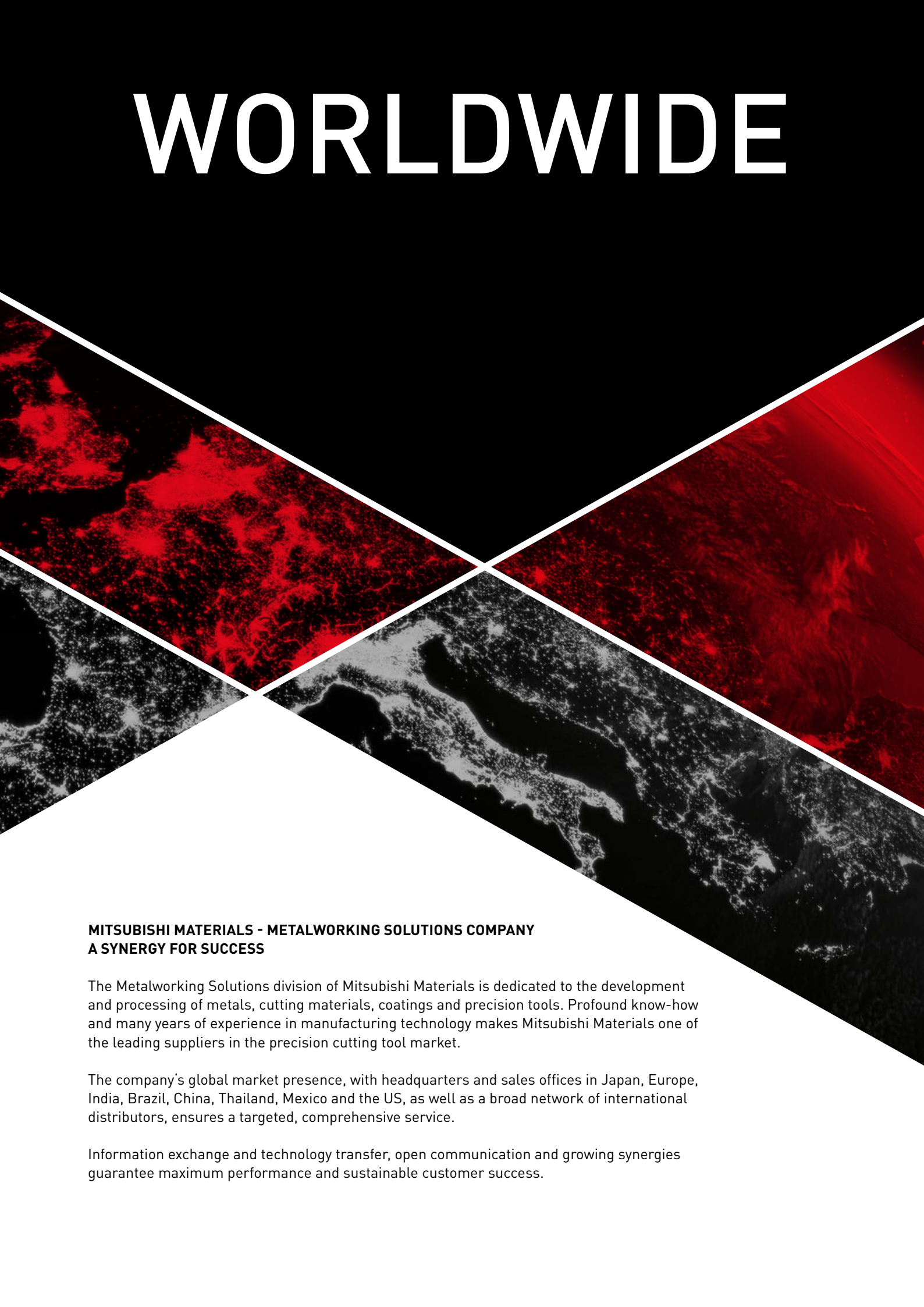
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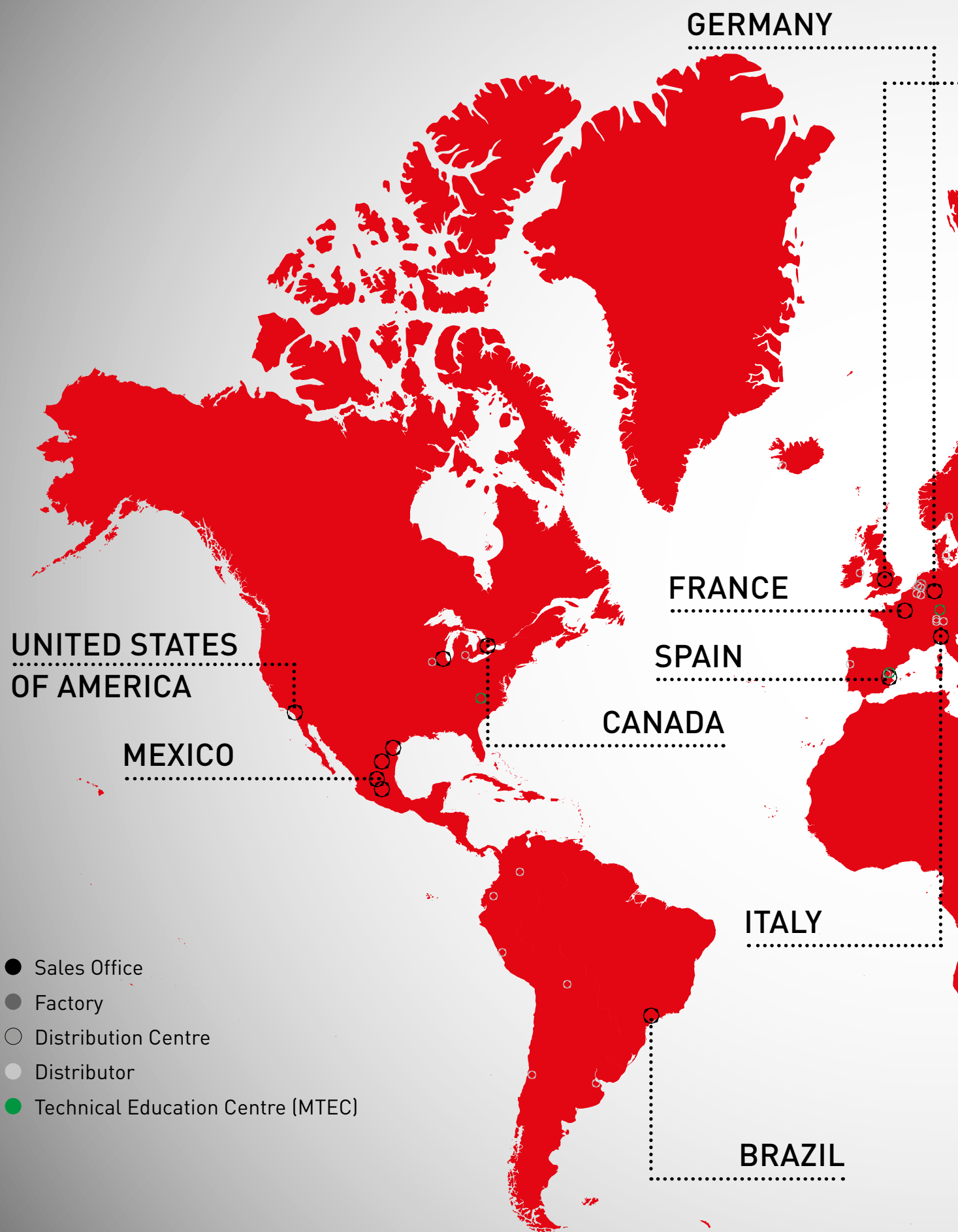
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