

Multi-functional Cutter for High Efficiency Machining

VPX Series

Inserts
Expansion

Boost Your Milling with a Tough Tangential Insert !



TOUGH

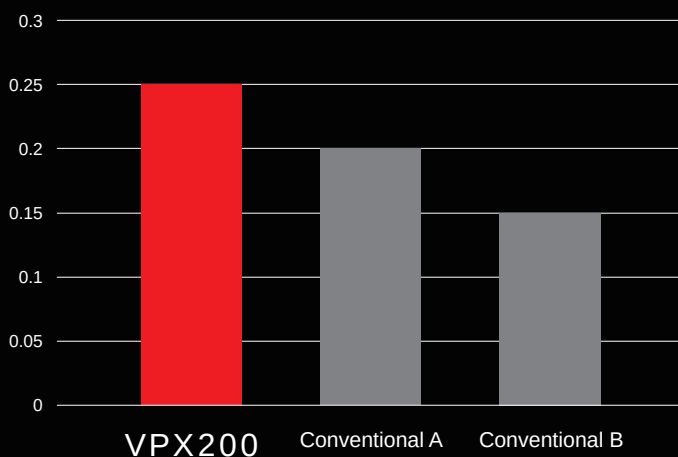


& MULTI

VPX Series

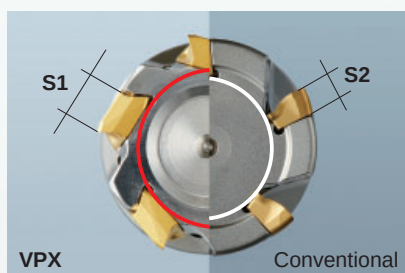
Extremely rigid and functional.
Our thoroughly calculated design
will completely change how you
see the tangential cutter.

f_z (mm/t.) Possible Machining Feed per Tooth (using JIS SCM440)



About TOUGH

Pursuing the tough machining characteristic of tangential blade inserts.



By arranging the inserts tangentially, high holder rigidity is secured. Also, because the part subjected to the highest loads during machining is larger ($S1 > S2$), it has great fracture resistance and can be used without worry for high efficiency machining.

The wide seating surfaces provided allow the insert to clamp on more firmly. Suppresses deviation of the insert caused by vibrations during machining.



Comments from developers

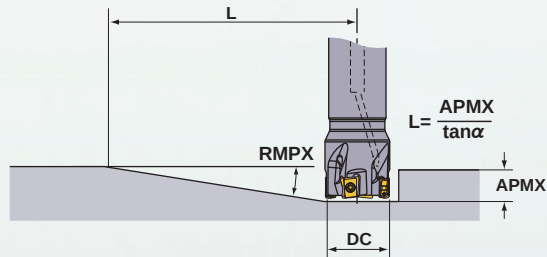
Durability born through repeated destructive tests.

In order to improve durability, we began development by first applying a load to the cutter until it broke. After analyzing the reasons it broke, we produced an improved version then broke that as well. We repeated this process until we were satisfied with the results. As a result of this pursuit of durability through thorough destructive tests, we were able to come up with a cutter that is ideal for unmanned operation and high efficiency machining.



About MULTI

Solving problems as a multi-functional cutter.



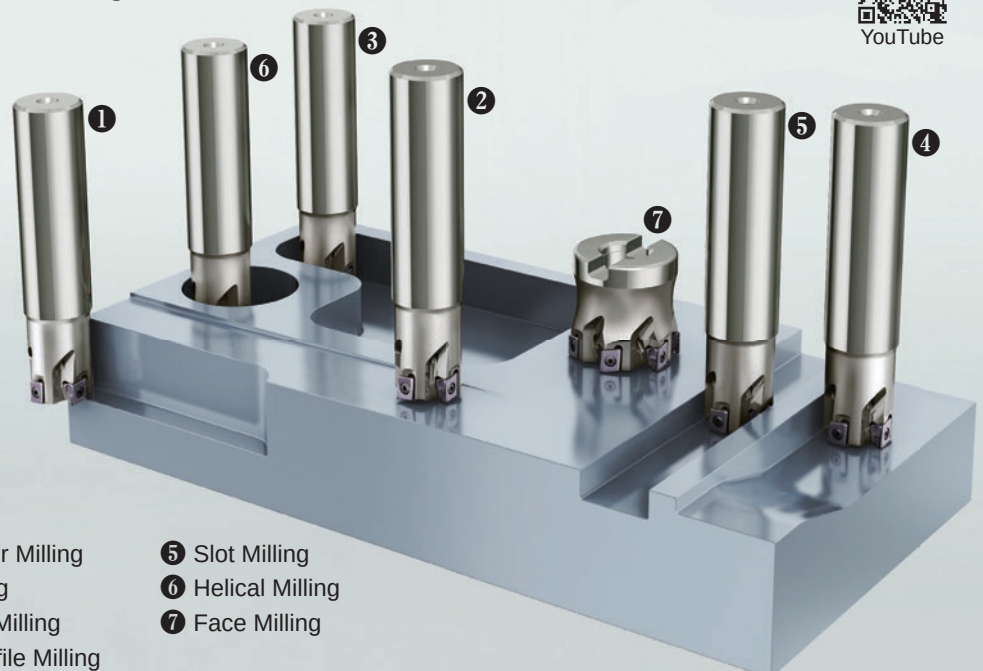
Comments from developers

Through trial and error, we've solved industry problems.

The surface-to-surface balance of the insert is what allows the multi-functionality of ramping to be achieved, while maintaining the good chip ejection and the cutting performance inherent to tangential blade cutters. Most tangential blade cutters must be changed out with dedicated inserts for ramping. We made it a priority to unify these two styles of inserts, so as to avoid the trouble of managing two sets of inserts, and prevent installation mistakes.

By focusing on the surface design of these new inserts, and through repeated trial and error, we were able to resolve one of the major issues in the industry.

Different types of milling cover a wide variety of situations.

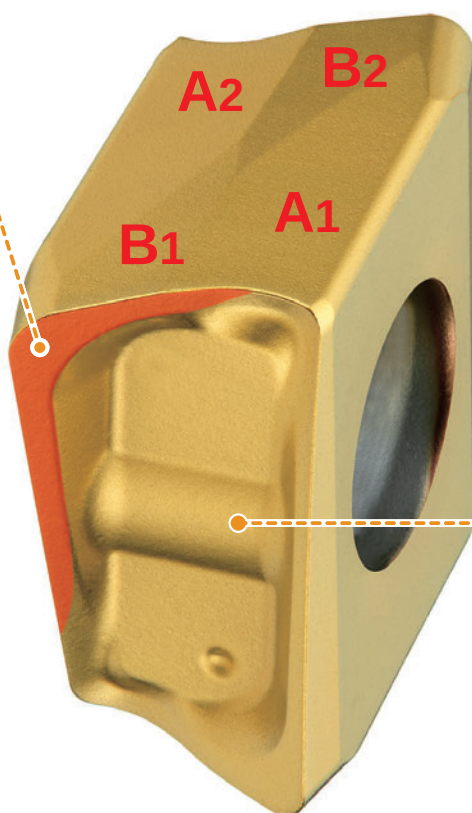


- ① Shoulder Milling
- ② Ramping
- ③ Pocket Milling
- ④ 3-D Profile Milling
- ⑤ Slot Milling
- ⑥ Helical Milling
- ⑦ Face Milling

Inserts

Double-sided insert that has revolutionized tangential blade machining.

Single Flat Surface
Rake Blade Improves
Chip Ejection



Two-sided Structure
Supports Insert Performance

A Makes Possible Ramping
B Realizes Good Finish Surface

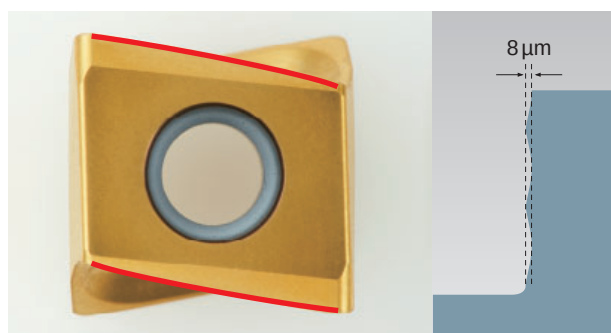
Improved Insert
Strength by Convex

Comments from developers

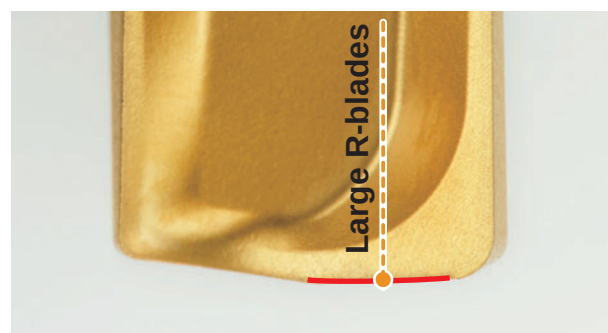
An insert shape that was possible to design, but difficult to commercialize.

The shape of the insert makes it tough while still enabling multi-cutting. It has been extremely difficult to move from the prototype, to maintaining a stable shape as a product. It is not an exaggeration to call this product, which has finally been commercialized through repeated improvements, the jewel of Mitsubishi Materials' technology.

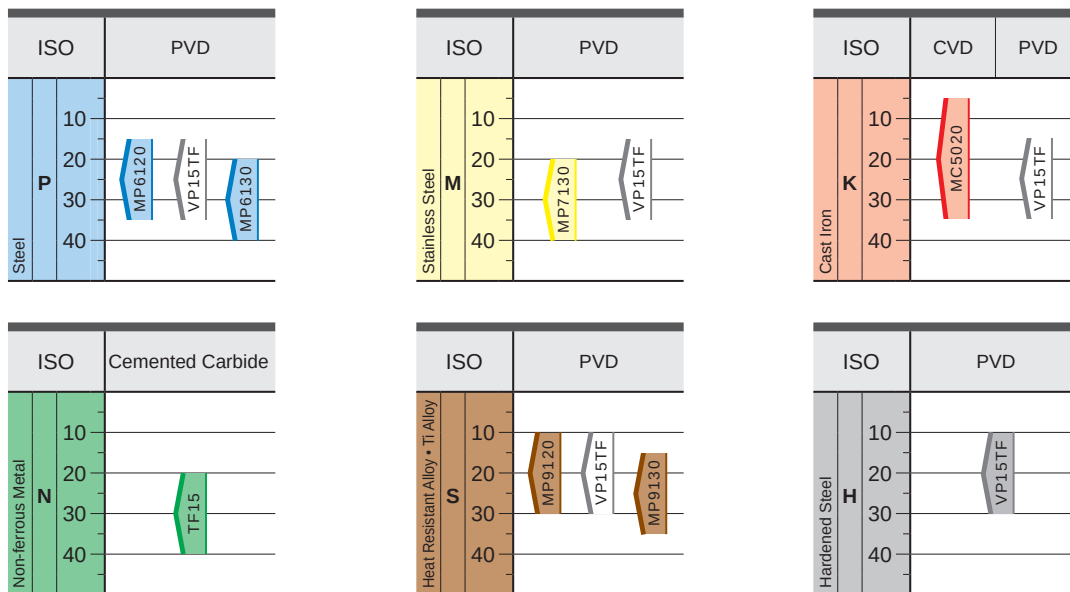
High Wall Surface Accuracy



Large R-blades Achieve a Good Finish Surface



Insert Grades for a Wide Range of Materials



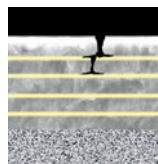
MP6100/MP7100/MP9100 Series

TOUGH-Σ Technology

A fusion of the separate coating technologies; PVD and multi-layering provides extra toughness.

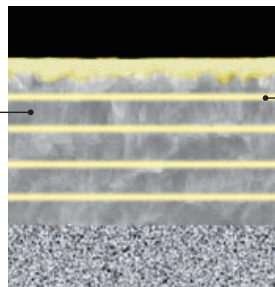
Base Layer High Al-(Al, Ti)N

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.



*Graphical Representation.

Al-Ti-Cr-N Based PVD Coating



*Graphical Representation.

Best Layer of Each Work Material

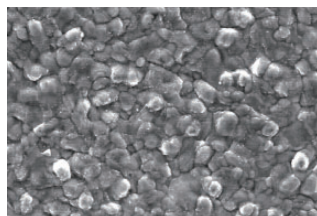
P	(Al,Cr)N	
	Tough! Thermal Cracks	Thermal Cracks
M	TiN	
	Tough! Notching	Notching
S	CrN	
	Tough! Resistant Chipping	Welding by Chipping

CVD Coating MC5020

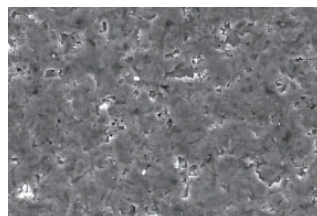
First recommendation for cast iron milling.

MC5020 has excellent wear resistance and also controls thermal cracking and chipping that are common when machining ductile cast iron.

Comparison of Coating Surface



Conventional Coating



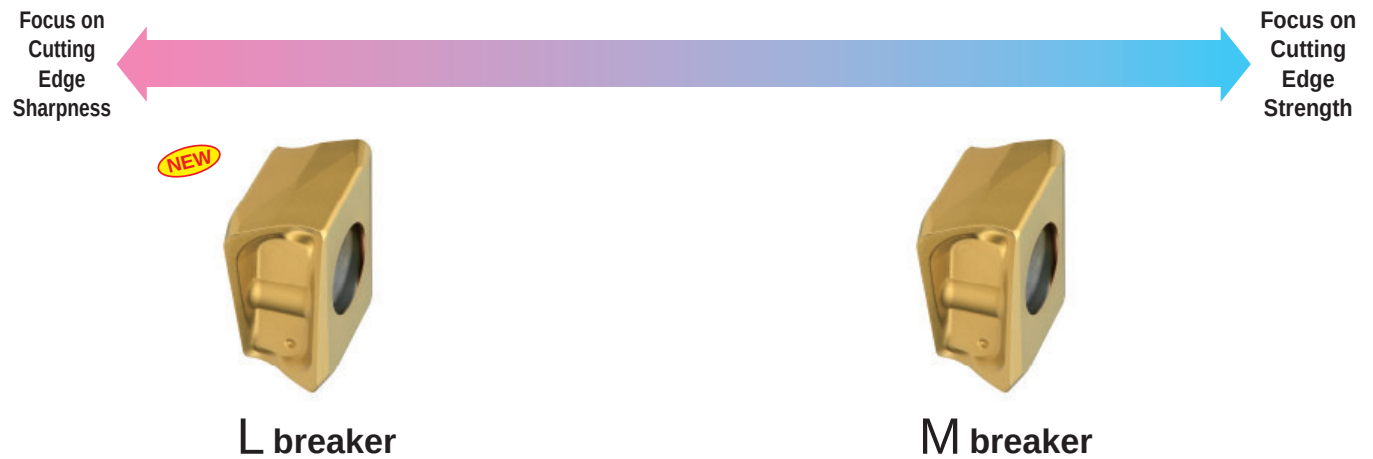
Black Super-smooth Coating

Black Super-smooth Coating

Black super-smooth coating prevents abnormal damage such as weld chipping.

Chip Breaker System

New L breaker with low cutting resistance has been added.



Workpiece Material	Cutting Conditions		
	Stable Cutting	General	Unstable Cutting
P			
M			
K			
N			
S Heat Resistant Alloys			
S Titanium Alloys			
H			

Refer to page18, for chip breaker selection table.

MULTI-FUNCTIONAL MILLING



VPX200

P

M

K

N

S

H



Fig.1

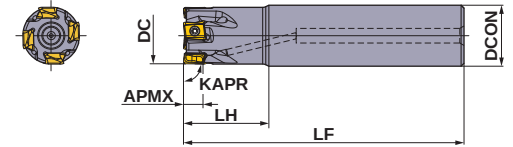
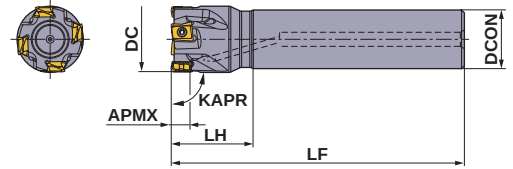


Fig.2



Right hand tool holder only.

Shank Type

With Coolant Hole

(mm)

DC	Order Number	Stock R	* No.T	DCON	LF	LH	APMX	RMPX	RPMX (min ⁻¹)	WT (kg)	Fig.	Insert Type
16	VPX200R1602SA16S	●	2	16	85	25	8	1.85°	37900	0.11	1	LOGU09
18	VPX200R1802SA16S	●	2	16	85	25	8	1.56°	35300	0.12	2	LOGU09
18	VPX200R1802SA16L	●	2	16	120	25	8	1.56°	35300	0.17	2	LOGU09
20	VPX200R2002SA16S	●	2	16	100	25	8	1.35°	33200	0.14	2	LOGU09
20	VPX200R2003SA16S	●	3	16	100	25	8	1.35°	33200	0.14	2	LOGU09
20	VPX200R2002SA20S	●	2	20	100	30	8	1.35°	33200	0.21	1	LOGU09
20	VPX200R2003SA20S	●	3	20	100	30	8	1.35°	33200	0.21	1	LOGU09
20	VPX200R2002SA20L	●	2	20	150	60	8	1.35°	33200	0.32	1	LOGU09
22	VPX200R2202SA20S	●	2	20	115	30	8	1.16°	31400	0.26	2	LOGU09
22	VPX200R2203SA20S	●	3	20	115	30	8	1.16°	31400	0.25	2	LOGU09
22	VPX200R2202SA20L	●	2	20	150	30	8	1.16°	31400	0.34	2	LOGU09
25	VPX200R2503SA20S	●	3	20	115	30	8	0.97°	29000	0.26	2	LOGU09
25	VPX200R2504SA20S	●	4	20	115	30	8	0.97°	29000	0.26	2	LOGU09
25	VPX200R2503SA25S	●	3	25	115	35	8	0.97°	29000	0.39	1	LOGU09
25	VPX200R2504SA25S	●	4	25	115	35	8	0.97°	29000	0.39	1	LOGU09
25	VPX200R2503SA25L	●	3	25	170	70	8	0.97°	29000	0.57	1	LOGU09
28	VPX200R2803SA25S	●	3	25	115	35	8	0.84°	27200	0.41	2	LOGU09
28	VPX200R2804SA25S	●	4	25	115	35	8	0.84°	27200	0.41	2	LOGU09
28	VPX200R2803SA25L	●	3	25	170	35	8	0.84°	27200	0.61	2	LOGU09
30	VPX200R3003SA25S	●	3	25	125	35	8	0.77°	26000	0.46	2	LOGU09
30	VPX200R3004SA25S	●	4	25	125	35	8	0.77°	26000	0.46	2	LOGU09
32	VPX200R3203SA32S	●	3	32	125	45	8	0.71°	25100	0.70	1	LOGU09
32	VPX200R3204SA32S	●	4	32	125	45	8	0.71°	25100	0.70	1	LOGU09
32	VPX200R3205SA32S	●	5	32	125	45	8	0.71°	25100	0.70	1	LOGU09
32	VPX200R3203SA32L	●	3	32	190	90	8	0.71°	25100	1.06	1	LOGU09
35	VPX200R3503SA32L	●	3	32	190	45	8	0.63°	23800	1.14	2	LOGU09
40	VPX200R4004SA32S	●	4	32	125	45	8	0.54°	22000	0.81	2	LOGU09
40	VPX200R4006SA32S	●	6	32	125	45	8	0.54°	22000	0.80	2	LOGU09
50	VPX200R5005SA32S	●	5	32	125	45	8	0.42°	19200	0.91	2	LOGU09
50	VPX200R5007SA32S	●	7	32	125	45	8	0.42°	19200	0.91	2	LOGU09

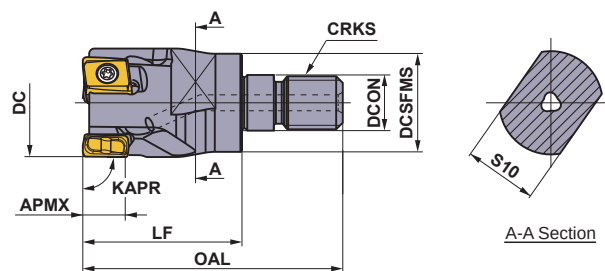
Note 1) The maximum spindle speeds are set to ensure tool and insert stability.

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

* Number of Teeth

CUTTING CONDITIONS ➤ P18

Multi-functional Cutter for High Efficiency Machining



Right hand tool holder only.

■ Screw-in Type

With Coolant Hole

(mm)

DC	Order Number	Stock R	*1 No.T	DCON	DCSFMS	OAL	LF	S10	CRKS	WT (kg)	APMX	RMPX	Insert Type
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 page 16—17.

*1 Number of Teeth

CUTTING CONDITIONS ➤ P18

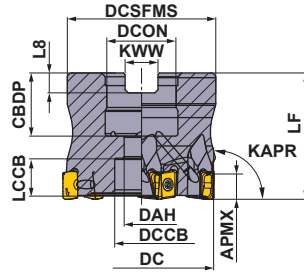
Spare Parts

(mm)

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

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

● : Inventory maintained in Japan.



Right hand tool holder only.

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

Arbor Type

With Coolant Hole

GAMP: -6° T: +5°

GAMF: -25° I: +4°

DC=mm size, DCON=mm size

(mm)

DC	Order Number	Stock	★ No.T	LF	DCON	WT (kg)	APMX	RMPX	RPMX (min ⁻¹)	Insert Type
		R								
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.

★ Number of Teeth

CUTTING CONDITIONS ➤ P18

Mounting Dimensions

(mm)

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

Spare Parts

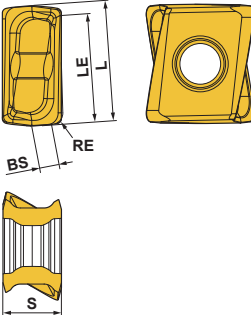
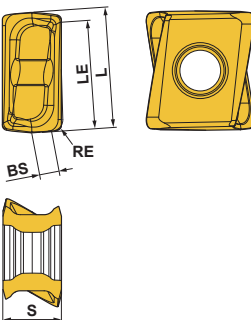
Tool Holder Type			
	Clamp Screw	Wrench	Anti-seize Lubricant
VPX200	TPS27F2	TIP07F	MK1KS

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

Multi-functional Cutter for High Efficiency Machining

Inserts

(mm)

Workpiece Material	P	Steels											Cutting Conditions (Guide) :					Edge Preparation : E : Round F : Sharp
	M	Stainless Steels											● : Stable Cutting ● : General Cutting ✖ : Unstable Cutting					
	K	Cast Irons																
	N	Non-ferrous Metals																
	S	Heat Resistant Alloys, Titanium Alloys																
	H	Hardened Steels																
Shape	Order Number	Class	Edge Preparation	Coated							Carbide	L	RE	LE	S	BS	Geometry	
				MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	TF15							
Low Cutting Resistance L Breaker  	LOGU0904020PNER-L	G E	●	●	●	●	●	●	●			8.7	0.2	7.6	4.3	1.7	 Right hand insert only.	
	LOGU0904040PNER-L	G E	●	●	●	●	●	●	●			8.7	0.4	7.6	4.3	1.5		
	LOGU0904080PNER-L	G E	●	●	●	●	●	●	●			8.7	0.8	7.6	4.3	1.2		
	LOGU0904100PNER-L	G E	●	●	●	●	●	●	●			8.7	1.0	7.6	4.3	1.0		
	LOGU0904120PNER-L	G E	●	●	●	●	●	●	●			8.7	1.2	7.6	4.3	0.8		
	LOGU0904160PNER-L	G E	●	●	●	●	●	●	●			8.7	1.6	7.6	4.3	0.5		
	LOGU0904020PNFR-L	G F								●		8.7	0.2	7.6	4.3	1.7		
	LOGU0904040PNFR-L	G F								●		8.7	0.4	7.6	4.3	1.5		
	LOGU0904080PNFR-L	G F								●		8.7	0.8	7.6	4.3	1.2		
	LOGU0904100PNFR-L	G F								●		8.7	1.0	7.6	4.3	1.0		
	LOGU0904120PNFR-L	G F								●		8.7	1.2	7.6	4.3	0.8		
	LOGU0904160PNFR-L	G F								●		8.7	1.6	7.6	4.3	0.5		
General Use M Breaker 	LOGU0904020PNER-M	G E	●	●	●	●	●	●	●			8.7	0.2	7.6	4.3	1.7	 Right hand insert only.	
	LOGU0904040PNER-M	G E	●	●	●	●	●	●	●			8.7	0.4	7.6	4.3	1.6		
	LOGU0904080PNER-M	G E	●	●	●	●	●	●	●			8.7	0.8	7.6	4.3	1.2		
	LOGU0904100PNER-M	G E	●	●	●	●	●	●	●			8.7	1.0	7.6	4.3	1.0		
	LOGU0904120PNER-M	G E	●	●	●	●	●	●	●			8.7	1.2	7.6	4.3	0.9		
	LOGU0904160PNER-M	G E	●	●	●	●	●	●	●			8.7	1.6	7.6	4.3	0.5		
	LOGU0904020PNFR-M	G F								●		8.7	0.2	7.6	4.3	1.7		
	LOGU0904040PNFR-M	G F								●		8.7	0.4	7.6	4.3	1.6		
	LOGU0904080PNFR-M	G F								●		8.7	0.8	7.6	4.3	1.2		
	LOGU0904100PNFR-M	G F								●		8.7	1.0	7.6	4.3	1.0		
	LOGU0904120PNFR-M	G F								●		8.7	1.2	7.6	4.3	0.9		
	LOGU0904160PNFR-M	G F								●		8.7	1.6	7.6	4.3	0.5		

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

MULTI-FUNCTIONAL MILLING



VPX300

P M K N S H



Fig.1

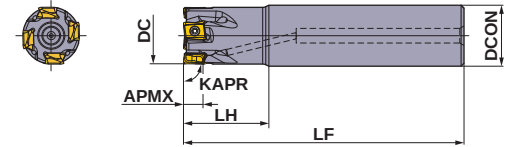
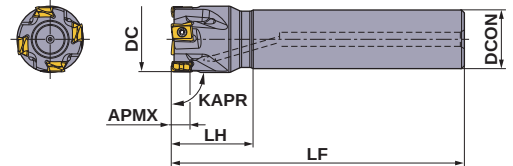


Fig.2



Right hand tool holder only.

Shank Type

With Coolant Hole

(mm)

DC	Order Number	Stock R	* No.T	DCON	LF	LH	APMX	RMPX	RPMX (min ⁻¹)	WT (kg)	Fig.	Insert Type
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

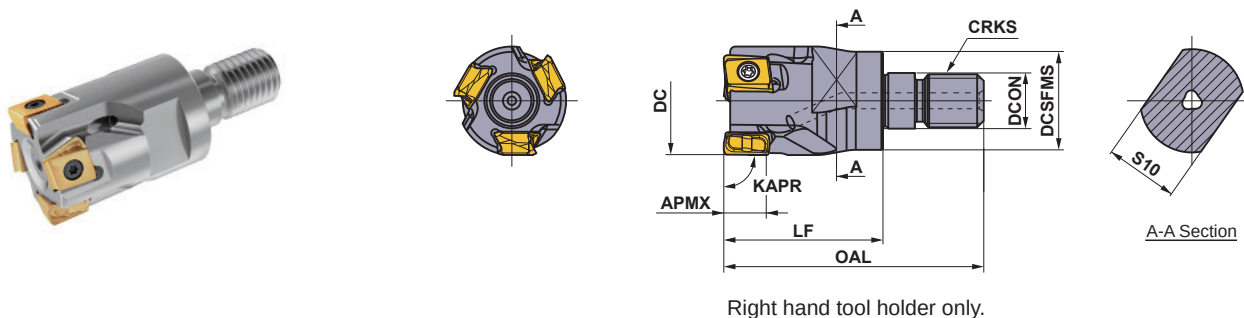
Note 1) The maximum spindle speeds are set to ensure tool and insert stability.

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

* Number of Teeth

CUTTING CONDITIONS ➤ P25

Multi-functional Cutter for High Efficiency Machining



■ Screw-in Type

With Coolant Hole

(mm)

DC	Order Number	Stock R	*1 No.T	DCON	DCSFMS	OAL	LF	S10	CRKS	WT (kg)	APMX	RMPX	Insert Type
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 page 16—17.

*1 Number of Teeth

CUTTING CONDITIONS ➤ P25

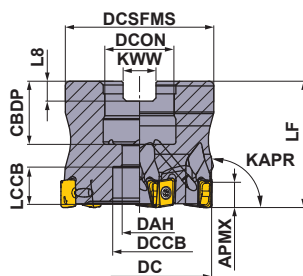
Spare Parts

(mm)

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

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

● : Inventory maintained in Japan.



Right hand tool holder only.

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

Arbor Type

With Coolant Hole

GAMP: -6° T: +5°

GAMF: -22.5° I: +5°

DC=mm size, DCON=Inch size

(mm)

DC	Order Number	Stock R	* No.T	LF	DCON	WT (kg)	APMX	RMPX	RPMX (min ⁻¹)	Insert Type
80	VPX300R08007CA	●	7	50	25.4	1.00	11	0.45°	11500	LOGU12
80	VPX300R08010CA	●	10	50	25.4	1.00	11	0.45°	11500	LOGU12

DC=mm size, DCON=mm size

(mm)

DC	Order Number	Stock R	* No.T	LF	DCON	WT (kg)	APMX	RMPX	RPMX (min ⁻¹)	Insert Type
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.

* Number of Teeth

CUTTING CONDITIONS > P25

Mounting Dimensions

DC=mm size, DCON=Inch size

(mm)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
80	VPX300R08007CA	25.4	26	13	20	13.4	56	9.5	6
80	VPX300R08010CA	25.4	26	13	20	13.4	56	9.5	6

DC=mm size, DCON=mm size

(mm)

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

Spare Parts

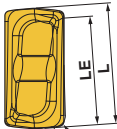
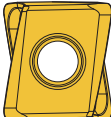
Tool Holder Type	*	*	*
	Clamp Screw	Wrench	Anti-seize Lubricant
VPX300	TPS40F1	TIP15W	MK1KS

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

Multi-functional Cutter for High Efficiency Machining

■ Inserts

(mm)

Workpiece Material	P	Steels											Cutting Conditions (Guide) : ● : Stable Cutting ● : General Cutting ✖ : Unstable Cutting					
	M	Stainless Steels																
	K	Cast Irons											Edge Preparation : E : Round F : Sharp					
	N	Non-ferrous Metals																
	S	Heat Resistant Alloys, Titanium Alloys																
	H	Hardened Steels																
Shape	Order Number	Class	Edge Preparation	Coated						Carbide	L	RE	LE	S	BS	Geometry		
				MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF							TF15	
	LOGU1207020PNER-M	G	E	●	●	●	●	●	●				12.4	0.2	11.3	7.0	3.0	  
	LOGU1207040PNER-M	G	E	●	●	●	●	●	●				12.4	0.4	11.3	7.0	2.8	
	LOGU1207080PNER-M	G	E	●	●	●	●	●	●				12.4	0.8	11.3	7.0	2.4	
	LOGU1207100PNER-M	G	E	●	●	●	●	●	●				12.4	1.0	11.3	7.0	2.3	
	LOGU1207120PNER-M	G	E	●	●	●	●	●	●				12.4	1.2	11.3	7.0	2.1	
	LOGU1207160PNER-M	G	E	●	●	●	●	●	●				12.4	1.6	11.3	7.0	1.7	
	LOGU1207200PNER-M	G	E	●	●	●	●	●	●				12.4	2.0	11.3	7.0	1.4	
	LOGU1207240PNER-M	G	E	●	●	●	●	●	●				12.4	2.4	11.3	7.0	1.0	
	LOGU1207300PNER-M	G	E	●	●	●	●	●	●				12.4	3.0	11.3	7.0	0.5	
	LOGU1207320PNER-M	G	E	●	●	●	●	●	●				12.4	3.2	11.3	7.0	0.3	
	LOGU1207020PNFR-M	G	F								●		12.4	0.2	11.3	7.0	3.0	
	LOGU1207040PNFR-M	G	F								●		12.4	0.4	11.3	7.0	2.8	
	LOGU1207080PNFR-M	G	F								●		12.4	0.8	11.3	7.0	2.4	
	LOGU1207100PNFR-M	G	F								●		12.4	1.0	11.3	7.0	2.3	
	LOGU1207120PNFR-M	G	F								●		12.4	1.2	11.3	7.0	2.1	
	LOGU1207160PNFR-M	G	F								●		12.4	1.6	11.3	7.0	1.7	
	LOGU1207200PNFR-M	G	F								●		12.4	2.0	11.3	7.0	1.4	
	LOGU1207240PNFR-M	G	F								●		12.4	2.4	11.3	7.0	1.0	
	LOGU1207300PNFR-M	G	F								●		12.4	3.0	11.3	7.0	0.5	
	LOGU1207320PNFR-M	G	F								●		12.4	3.2	11.3	7.0	0.3	

Right hand insert only.

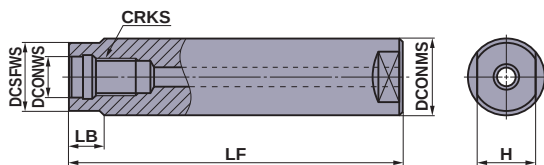
Right hand insert only.

ARBORS

Arbors for Screw-in Tools

■ Straight Shank Arbor

(mm)



Type	Order Number	Stock	DCONWS	DCONMS	DCSFWS	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	●	17.0	32	28.5	140	15	24	M16
	SC32M16S280L	●	17.0	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	●	17.0	32	28.5	140	15	24	M16
	SC32M16S280LW	●	17.0	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.

(mm)

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

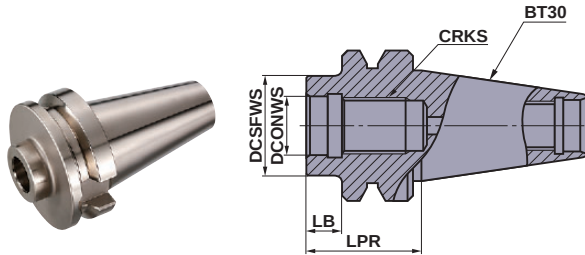


- Cutting tools become extremely hot during cutting. Never touch them with bare hands after operation as this may produce risk of injuries or burns.
- Do not handle the cutting tools with bare hands as this may cause injuries.

Multi-functional Cutter for High Efficiency Machining

■ BT30 Shank Arbor

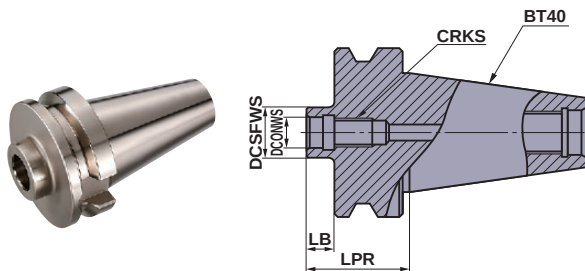
(mm)



Order Number	Stock	DCONWS	DCSFWS	LPR	LB	CRKS
SC16M08S10-BT30	●	8.5	14.5	32	10	M8
SC20M10S10-BT30	●	10.5	18.5	32	10	M10
SC25M12S10-BT30	●	12.5	23.5	32	10	M12
SC32M16S10-BT30	●	17.0	28.5	32	10	M16

■ BT40 Shank Arbor

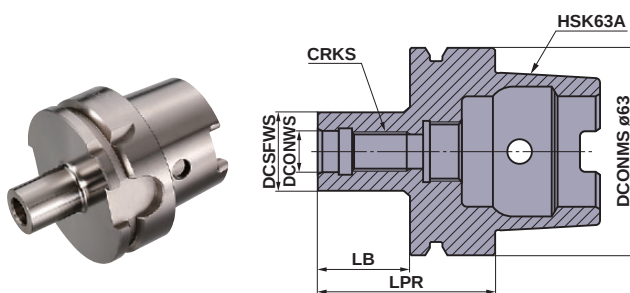
(mm)



Order Number	Stock	DCONWS	DCSFWS	LPR	LB	CRKS
SC16M08S10-BT40	●	8.5	14.5	37	10	M8
SC20M10S10-BT40	●	10.5	18.5	37	10	M10
SC25M12S10-BT40	●	12.5	23.5	37	10	M12
SC32M16S10-BT40	●	17.0	28.5	37	10	M16

■ HSK63A Shank Arbor

(mm)



The coolant tube has been already set.

Order Number	Stock	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

VPX200

Cutting Conditions (Guide) :

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

Chip Breaker Recommendation

Chip Breaker Selection Table

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

For cutting conditions please refer to page 19—25.

VPX200

Recommended Cutting Conditions

■ Dry Cutting
Cutting Speed

(mm)

Workpiece Material	Properties	Cutting Conditions	Grade	ae			
				≤0.25DC	0.25—0.5DC	0.5—0.75DC	DC(Slot)
				vc (m/min)			
P	Mild Steels	Hardness ≤180HB	MP6120,VP15TF	230 (180—270)	220 (170—260)	180 (140—210)	180 (140—210)
			MP6130	200 (150—240)	190 (140—230)	150 (110—180)	150 (110—180)
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 180—350HB ≤350HB (Annealing)	MP6120,VP15TF	180 (140—210)	170 (130—200)	140 (110—160)	140 (110—160)
			MP6130	150 (110—180)	140 (100—170)	110 (80—130)	110 (80—130)
	Pre-hardened Steels	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 Steels	Hardness ≤200HB	MP7130,VP15TF	180 (140—210)	170 (130—200)	140 (110—160)	140 (110—160)
		Hardness >200HB	MP7130,VP15TF	150 (110—180)	140 (100—160)	110 (80—130)	110 (80—130)
	Duplex Stainless Steels	Hardness ≤280HB	MP7130,VP15TF	140 (110—170)	130 (90—150)	100 (70—120)	100 (70—120)
	Ferritic and Martensitic Stainless Steels	—	MP7130,VP15TF	180 (140—210)	170 (130—200)	140 (110—160)	140 (110—160)
	Precipitation Hardening Stainless Steels	Hardness <450HB	MP7130,VP15TF	130 (100—160)	120 (80—140)	90 (60—110)	90 (60—110)
K	Gray Cast Irons	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 Irons	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 Alloys	Content Si <5%	TF15	600 (400—1000)	600 (400—1000)	600 (400—1000)	600 (400—1000)
H	Hardened Steels	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 vibration is 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 material or attachment of workpiece material is low
- Corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius 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 under 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

(mm)

Workpiece Material	Properties	ae	Cutting Conditions	DC					
				ø16—ø18		ø20—ø25		ø28—ø63	
				ap	fz (mm/t.)	ap	fz (mm/t.)	ap	fz (mm/t.)
P	Mild Steels	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 Steels Alloy Steels Alloy Tool Steels	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 Steels Alloy Steels Alloy Tool Steels	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 Steels	Hardness 35—45HRC	≤0.25DC	≤6	0.10—0.15	≤8	0.10—0.15	≤8	0.10—0.20
			0.25—0.5DC	≤5	0.08—0.12	≤8	0.08—0.12	≤8	0.10—0.15
			0.5—0.75DC	≤4	0.08—0.12	≤6	0.06—0.10	≤6	0.08—0.12
			DC(Slot)	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.06—0.10

Cutting Conditions (Guide) :

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

Depth of Cut / Feed per Tooth

(mm)

Workpiece Material	Properties	ae	Cutting Conditions	DC					
				ø16-ø18		ø20-ø25		ø28-ø63	
				ap	fz (mm/t.)	ap	fz (mm/t.)	ap	fz (mm/t.)
M	Austenitic Stainless Steels	—	≤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 Steels	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 Steels	—	≤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 Steels	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 Irons	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 Irons	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 Alloys	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 Steels	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 vibration is 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 material or attachment of workpiece material is low
- Corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius 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 under 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.

VPX200

Recommended Cutting Conditions

■ Wet Cutting
Cutting Speed

(mm)

Workpiece Material	Properties	Cutting Conditions	Grade	ae			
				≤0.25DC	0.25—0.5DC	0.5—0.75DC	DC(Slot)
				vc (m/min)			
P	Mild Steels	Hardness ≤180HB ● ● ✱	MP6120 MP6130 VP15TF	140 (100—190)	130 (90—180)	100 (70—120)	100 (70—120)
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 180—350HB ● ● ✱ ≤350HB (Annealing)	MP6120 MP6130 VP15TF	120 (90—140)	110 (80—130)	100 (70—120)	100 (70—120)
	Pre-hardened Steels	Hardness 35—45HRC ● ● ✱	MP6120 MP6130 VP15TF	100 (80—120)	90 (70—110)	80 (60—100)	80 (60—100)
M	Austenitic Stainless Steels	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 Steels	Hardness ≤280HB ● ● ✱	MP7130,VP15TF	100 (80—130)	90 (70—120)	70 (50—100)	70 (50—100)
	Ferritic and Martensitic Stainless Steels	— ● ● ✱	MP7130,VP15TF	120 (100—150)	110 (90—140)	90 (70—120)	90 (70—120)
	Precipitation Hardening Stainless Steels	Hardness <450HB ● ● ✱	MP7130,VP15TF	90 (70—120)	80 (60—110)	60 (40—90)	60 (40—90)
K	Gray Cast Irons	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 Irons	Tensile Strength ≤800MPa ● ● ✱	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 Alloys	Content Si <5% ● ● ✱	TF15	600 (400—1000)	600 (400—1000)	600 (400—1000)	600 (400—1000)
S	Titanium Alloys (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 Alloys (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)
H	Hardened Steels	● ● ✱	MP9130	30 (20—40)	30 (20—40)	30 (20—40)	30 (20—40)
		● ● ✱	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 vibration is 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 material or attachment of workpiece material is low
- Corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius 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 under higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

Cutting Conditions (Guide) :

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

Depth of Cut / Feed per Tooth

(mm)

Workpiece Material		Properties	ae	Cutting Conditions	DC						
					ø16—ø18		ø20—ø25		ø28—ø63		
					ap	fz (mm/t.)	ap	fz (mm/t.)	ap	fz (mm/t.)	
P	Mild Steels	Hardness ≤180HB	≤0.25DC	● ● ✖	≤6	0.10—0.15	≤8	0.10—0.20	≤8	0.10—0.25	
			0.25—0.5DC	● ● ✖	≤5	0.10—0.15	≤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 Steels Alloy Steels Alloy Tool Steels	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 Steels Alloy Steels Alloy Tool Steels	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 Steels	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 Steels	—	≤0.25DC	● ● ✖	≤6	0.10—0.15	≤8	0.10—0.20	≤8	0.10—0.20	
					✖	≤6	0.08—0.12	≤8	0.08—0.15	≤8	0.08—0.15
			0.25—0.5DC	● ● ✖	≤5	0.08—0.12	≤8	0.08—0.15	≤8	0.08—0.15	
					✖	≤5	0.06—0.10	≤8	0.08—0.12	≤8	0.08—0.12
			0.5—0.75DC	● ● ✖	≤4	0.06—0.10	≤6	0.08—0.12	≤6	0.08—0.12	
			✖	≤4	0.06—0.08	≤6	0.06—0.10	≤6	0.06—0.10		
			✖	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.06—0.10		
			✖	≤2	0.06—0.08	≤4	0.06—0.08	≤4	0.06—0.08		
	Duplex Stainless Steels	Hardness ≤280HB	≤0.25DC	● ● ✖	≤6	0.10—0.15	≤8	0.10—0.20	≤8	0.10—0.20	
					✖	≤6	0.08—0.12	≤8	0.08—0.15	≤8	0.08—0.15
			0.25—0.5DC	● ● ✖	≤5	0.08—0.12	≤8	0.08—0.15	≤8	0.08—0.12	
					✖	≤5	0.06—0.10	≤8	0.08—0.12	≤8	0.08—0.12
			0.5—0.75DC	● ● ✖	≤4	0.06—0.10	≤6	0.06—0.10	≤6	0.06—0.10	
			✖	≤4	0.06—0.08	≤6	0.06—0.10	≤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		
Ferritic and Martensitic Stainless Steels	—	≤0.25DC	● ● ✖	≤6	0.10—0.15	≤8	0.10—0.20	≤8	0.10—0.20		
				✖	≤6	0.08—0.12	≤8	0.08—0.15	≤8	0.08—0.15	
		0.25—0.5DC	● ● ✖	≤5	0.08—0.12	≤8	0.08—0.15	≤8	0.08—0.15		
				✖	≤5	0.06—0.10	≤8	0.08—0.12	≤8	0.08—0.12	
		0.5—0.75DC	● ● ✖	≤4	0.06—0.10	≤6	0.08—0.12	≤6	0.08—0.12		
		✖	≤4	0.06—0.08	≤6	0.06—0.10	≤6	0.05—0.10			
		✖	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.05—0.10			
		✖	≤2	0.06—0.08	≤4	0.06—0.08	≤4	0.05—0.08			
Precipitation Hardening Stainless Steels	Hardness <450HB	≤0.25DC	● ● ✖	≤6	0.10—0.15	≤8	0.10—0.15	≤8	0.10—0.15		
				✖	≤6	0.08—0.12	≤8	0.08—0.12	≤8	0.08—0.12	
		0.25—0.5DC	● ● ✖	≤5	0.08—0.12	≤8	0.08—0.12	≤8	0.08—0.12		
				✖	≤5	0.06—0.10	≤8	0.08—0.12	≤8	0.08—0.12	
		0.5—0.75DC	● ● ✖	≤4	0.06—0.10	≤6	0.06—0.10	≤6	0.05—0.10		
		✖	≤4	0.06—0.08	≤6	0.06—0.08	≤6	0.05—0.08			
		✖	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.05—0.10			
		✖	≤2	0.06—0.08	≤4	0.06—0.08	≤4	0.05—0.08			
K	Gray Cast Irons	Tensile Strength ≤350MPa	≤0.25DC	● ● ✖	≤6	0.10—0.15	≤8	0.10—0.20	≤8	0.10—0.25	
					✖	≤6	0.08—0.12	≤8	0.08—0.15	≤8	0.10—0.20
			0.25—0.5DC	● ● ✖	≤5	0.08—0.12	≤8	0.08—0.15	≤8	0.10—0.20	
					✖	≤5	0.06—0.10	≤8	0.08—0.12	≤8	0.10—0.15
			0.5—0.75DC	● ● ✖	≤4	0.08—0.12	≤6	0.06—0.10	≤6	0.10—0.15	
			✖	≤4	0.08—0.12	≤6	0.06—0.10	≤6	0.08—0.12		
			✖	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.08—0.15		
			✖	≤2	0.06—0.08	≤4	0.06—0.08	≤4	0.06—0.10		
	Ductile Cast Irons	Tensile Strength ≤800MPa	≤0.25DC	● ● ✖	≤6	0.10—0.15	≤8	0.10—0.20	≤8	0.10—0.20	
					✖	≤6	0.08—0.12	≤8	0.10—0.15	≤8	0.10—0.15
0.25—0.5DC			● ● ✖	≤5	0.08—0.12	≤8	0.10—0.15	≤8	0.10—0.15		
				✖	≤5	0.06—0.10	≤8	0.08—0.12	≤8	0.08—0.12	
0.5—0.75DC			● ● ✖	≤4	0.08—0.12	≤6	0.08—0.12	≤6	0.08—0.12		
		✖	≤4	0.08—0.12	≤6	0.08—0.12	≤6	0.06—0.10			
		✖	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.06—0.10			
		✖	≤2	0.06—0.08	≤4	0.06—0.08	≤4	0.06—0.08			

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

Note 2) Chattering vibration is 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 material or attachment of workpiece material is low
- Corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius 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 under 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.

VPX200

Recommended Cutting Conditions

Cutting Conditions (Guide) :

● : Stable Cutting ● : General Cutting ✱ : Unstable Cutting

Wet Cutting

Depth of Cut / Feed per Tooth

(mm)

Workpiece Material		Properties	ae	Cutting Conditions	DC					
					ø16—ø18		ø20—ø25		ø28—ø63	
					ap	fz (mm/t.)	ap	fz (mm/t.)	ap	fz (mm/t.)
N	Aluminium Alloys	Content Si < 5%	≤0.25DC	● ●	≤6	0.10—0.20	≤8	0.10—0.25	≤8	0.10—0.25
				✱	≤6	0.10—0.15	≤8	0.10—0.20	≤8	0.10—0.20
			0.25—0.5DC	● ●	≤5	0.10—0.15	≤8	0.10—0.20	≤8	0.10—0.20
				✱	≤5	0.08—0.12	≤8	0.10—0.15	≤8	0.10—0.15
			0.5—0.75DC	● ●	≤4	0.08—0.12	≤6	0.06—0.15	≤6	0.08—0.15
				✱	≤4	0.06—0.10	≤6	0.06—0.15	≤6	0.08—0.15
DC(Slot)	● ●	≤2	0.06—0.10	≤4	0.06—0.15	≤4	0.08—0.15			
	✱	≤2	0.06—0.08	≤4	0.06—0.12	≤4	0.08—0.12			
S	Titanium Alloys (Ti-6Al-4V, etc.)	—	≤0.25DC	● ● ● ✱	≤6	0.08—0.15	≤8	0.08—0.15	≤8	0.08—0.15
			0.25—0.5DC	● ● ● ✱	≤5	0.08—0.12	≤8	0.08—0.12	≤8	0.08—0.12
			0.5—0.75DC	● ● ● ✱	≤4	0.06—0.10	≤6	0.06—0.10	≤6	0.06—0.10
			DC(Slot)	● ● ● ✱	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.06—0.10
	Titanium Alloys (Ti-5Al-5V-5Mo-3Cr, etc.)	—	≤0.25DC	● ● ● ✱	≤6	0.08—0.12	≤8	0.08—0.12	≤8	0.08—0.12
			0.25—0.5DC	● ● ● ✱	≤5	0.08—0.12	≤8	0.08—0.12	≤8	0.08—0.12
			0.5—0.75DC	● ● ● ✱	≤4	0.06—0.10	≤6	0.06—0.10	≤6	0.06—0.10
			DC(Slot)	● ● ● ✱	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.06—0.10
	Heat Resistant Alloys	—	≤0.25DC	● ● ● ✱	≤6	0.08—0.12	≤8	0.08—0.12	≤8	0.08—0.12
			0.25—0.5DC	● ● ● ✱	≤5	0.08—0.12	≤8	0.08—0.12	≤8	0.08—0.12
			0.5—0.75DC	● ● ● ✱	≤4	0.06—0.10	≤6	0.06—0.10	≤6	0.06—0.10
			DC(Slot)	● ● ● ✱	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.06—0.10
H	Hardened Steels	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 vibration is 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 material or attachment of workpiece material is low
- Corner radius during pocket milling

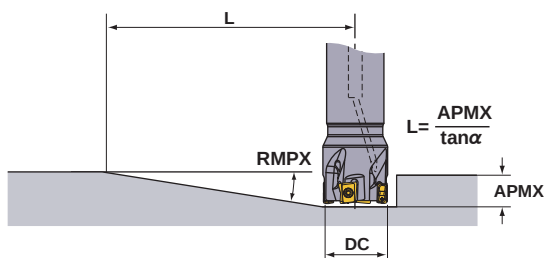
Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is 0.5 DC or more.

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

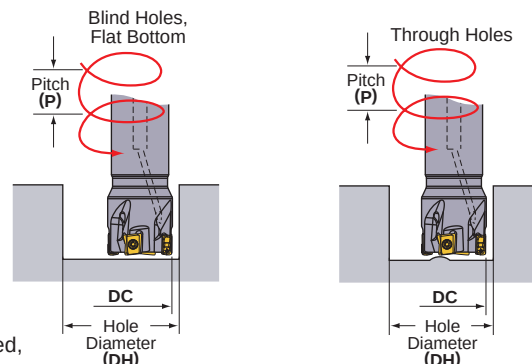
Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

Ramping / Helical Milling

Ramping



Helical Milling



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

(mm)

DC	RE	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.
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

(mm)									
DC	RE	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.
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
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 material with the ramping angles in the table above, chips may be elongated.
 ★ Shows the distance until a maximum depth of cut of 8 mm is achieved at the maximum ramping angle $L (= 8/\tan \alpha)$.

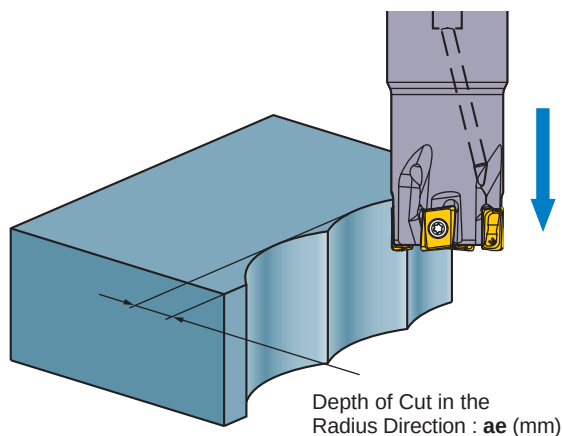
VPX200

Recommended Cutting Conditions

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.

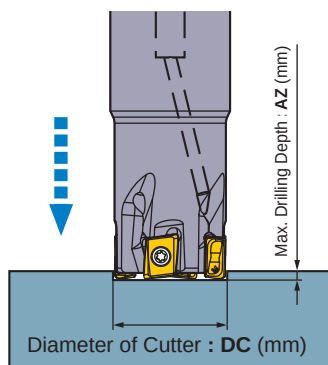
● Plunging



Note 1) No step feed necessary.

(mm)	
DC	ae max.
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

● Drilling



Note 1) Exercise due caution as chips scatter easily.

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

(mm)	
DC	AZ max.
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

VPX300

Recommended Cutting Conditions

■ Dry Cutting
Cutting Speed

(mm)

Workpiece Material	Properties	Cutting Conditions	Insert		ae			
			Grade	Chip Breaker	≤0.25DC	0.25—0.5DC	0.5—0.75DC	DC(Slot)
					vc (m/min)			
P	Mild Steels	Hardness ≤180HB	MP6120	M	230 (180—270)	220 (170—260)	180 (140—210)	180 (140—210)
			VP15TF	M	230 (180—270)	220 (170—260)	180 (140—210)	180 (140—210)
			MP6130	M	200 (150—240)	190 (170—260)	150 (110—180)	150 (110—180)
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 180—350HB ≤350HB (Annealing)	MP6120	M	180 (140—210)	170 (130—200)	140 (110—160)	140 (110—180)
			VP15TF	M	180 (140—210)	170 (130—200)	140 (110—160)	140 (110—180)
			MP6130	M	150 (110—180)	140 (100—170)	110 (80—130)	110 (80—130)
	Pre-hardened Steels	Hardness 35—45HRC	MP6120	M	120 (90—140)	110 (80—130)	100 (70—120)	100 (70—120)
			VP15TF	M	120 (90—140)	110 (80—130)	100 (70—120)	100 (70—120)
			MP6130	M	100 (80—120)	90 (70—110)	80 (60—100)	80 (60—100)
M	Austenitic Stainless Steels	Hardness ≤200HB	MP7130	M	180 (140—210)	170 (130—200)	140 (110—160)	140 (110—160)
			VP15TF	M	180 (140—210)	170 (130—200)	140 (110—160)	140 (110—160)
		Hardness >200HB	MP7130	M	150 (110—180)	140 (100—160)	110 (80—130)	110 (80—130)
			VP15TF	M	150 (110—180)	140 (100—160)	110 (80—130)	110 (80—130)
	Duplex Stainless Steels	Hardness ≤280HB	MP7130	M	140 (110—170)	130 (90—150)	100 (70—120)	100 (70—120)
			VP15TF	M	140 (110—170)	130 (90—150)	100 (70—120)	100 (70—120)
	Ferritic and Martensitic Stainless Steels	—	MP7130	M	180 (140—210)	170 (130—200)	140 (110—160)	140 (110—160)
			VP15TF	M	180 (140—210)	170 (130—200)	140 (110—160)	140 (110—160)
	Precipitation Hardening Stainless Steels	Hardness <450HB	MP7130	M	130 (100—160)	120 (80—140)	90 (60—110)	90 (60—110)
			VP15TF	M	130 (100—160)	120 (80—140)	90 (60—110)	90 (60—110)
K	Gray Cast Irons	Tensile Strength ≤350MPa	MC5020	M	250 (200—300)	240 (190—290)	210 (160—260)	210 (160—260)
			VP15TF	M	200 (150—250)	190 (140—240)	160 (110—210)	160 (110—210)
	Ductile Cast Irons	Tensile Strength ≤800MPa	MC5020	M	180 (150—200)	170 (140—190)	150 (120—170)	150 (120—170)
			VP15TF	M	130 (100—150)	120 (90—140)	100 (80—120)	100 (80—120)
N	Aluminium Alloys	Content Si<5%	TF15	M	600 (400—1000)	600 (400—1000)	600 (400—1000)	600 (400—1000)
H	Hardened Steels	Hardness 40—55HRC	VP15TF	M	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 vibration is 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 material or attachment of workpiece material is low
- Corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius 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 under 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

(mm)

Workpiece Material		Properties	ae	Cutting Conditions	DC			
					ø25		ø28—ø80	
					ap	fz (mm/t.)	ap	fz (mm/t.)
P	Mild Steels	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 Steels Alloy Steels Alloy Tool Steels	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 Steels Alloy Steels Alloy Tool Steels	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 Steels	Hardness 35—45HRC	≤0.25DC	● ● ● *	≤11	0.10—0.15	≤11	0.10—0.25
			0.25—0.5DC	● ● ● *	≤11	0.08—0.12	≤11	0.10—0.20
			0.5—0.75DC	● ● ● *	≤8	0.06—0.10	≤8	0.10—0.15
			DC(Slot)	● ● ● *	≤5	0.06—0.10	≤5	0.08—0.12

Cutting Conditions (Guide) :

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

Depth of Cut / Feed per Tooth

(mm)

Workpiece Material	Properties	ae	Cutting Conditions	DC			
				ø25		ø28—ø80	
				ap	fz (mm/t.)	ap	fz (mm/t.)
M	Austenitic Stainless Steels	—	≤0.25DC	● ●	≤11	≤11	0.10—0.20
				● ● ✖	≤11	≤11	0.08—0.15
			0.25—0.5DC	● ●	≤11	≤11	0.08—0.15
				● ● ✖	≤11	≤11	0.08—0.12
			0.5—0.75DC	● ●	≤8	≤8	0.08—0.12
				● ● ✖	≤8	≤8	0.06—0.10
			DC(Slot)	● ●	≤5	≤5	0.06—0.10
				● ● ✖	≤5	≤5	0.06—0.08
	Duplex Stainless Steels	Hardness ≤280HB	≤0.25DC	● ●	≤11	≤11	0.10—0.20
				● ● ✖	≤11	≤11	0.08—0.15
			0.25—0.5DC	● ●	≤11	≤11	0.08—0.15
				● ● ✖	≤11	≤11	0.08—0.12
			0.5—0.75DC	● ●	≤8	≤8	0.08—0.12
				● ● ✖	≤8	≤8	0.06—0.10
			DC(Slot)	● ●	≤5	≤5	0.06—0.10
				● ● ✖	≤5	≤5	0.06—0.08
	Ferritic and Martensitic Stainless Steels	—	≤0.25DC	● ●	≤11	≤11	0.10—0.20
				● ● ✖	≤11	≤11	0.08—0.15
			0.25—0.5DC	● ●	≤11	≤11	0.08—0.15
				● ● ✖	≤11	≤11	0.08—0.12
			0.5—0.75DC	● ●	≤8	≤8	0.08—0.12
				● ● ✖	≤8	≤8	0.06—0.10
			DC(Slot)	● ●	≤5	≤5	0.06—0.10
				● ● ✖	≤5	≤5	0.06—0.08
	Precipitation Hardening Stainless Steels	Hardness <450HB	≤0.25DC	● ●	≤11	≤11	0.10—0.15
				● ● ✖	≤11	≤11	0.08—0.12
			0.25—0.5DC	● ●	≤11	≤11	0.08—0.12
				● ● ✖	≤11	≤11	0.06—0.10
			0.5—0.75DC	● ●	≤8	≤8	0.06—0.10
				● ● ✖	≤8	≤8	0.06—0.08
			DC(Slot)	● ●	≤5	≤5	0.06—0.10
				● ● ✖	≤5	≤5	0.06—0.08
K	Gray Cast Irons	Tensile Strength ≤350MPa	≤0.25DC	● ●	≤11	≤11	0.10—0.20
				● ● ✖	≤11	≤11	0.08—0.15
			0.25—0.5DC	● ●	≤11	≤11	0.08—0.15
				● ● ✖	≤11	≤11	0.08—0.12
			0.5—0.75DC	● ●	≤8	≤8	0.08—0.12
				● ● ✖	≤8	≤8	0.06—0.10
			DC(Slot)	● ●	≤5	≤5	0.06—0.10
				● ● ✖	≤5	≤5	0.08—0.12
	Ductile Cast Irons	Tensile Strength ≤800MPa	≤0.25DC	● ●	≤11	≤11	0.10—0.20
				● ● ✖	≤11	≤11	0.10—0.15
			0.25—0.5DC	● ●	≤11	≤11	0.10—0.15
				● ● ✖	≤11	≤11	0.08—0.12
			0.5—0.75DC	● ●	≤8	≤8	0.08—0.12
				● ● ✖	≤8	≤8	0.08—0.12
			DC(Slot)	● ●	≤5	≤5	0.06—0.10
				● ● ✖	≤5	≤5	0.06—0.08
N	Aluminium Alloys	Content Si <5%	≤0.25DC	● ●	≤11	≤11	0.10—0.25
				● ● ✖	≤11	≤11	0.10—0.20
			0.25—0.5DC	● ●	≤11	≤11	0.10—0.20
				● ● ✖	≤11	≤11	0.10—0.15
			0.5—0.75DC	● ●	≤8	≤8	0.06—0.15
				● ● ✖	≤8	≤8	0.06—0.15
			DC(Slot)	● ●	≤5	≤5	0.06—0.15
				● ● ✖	≤5	≤5	0.08—0.12
H	Hardened Steels	Hardness 40—55HRC	≤0.25DC	● ●	≤5	≤5	0.08—0.15
				● ● ✖	≤5	≤5	0.08—0.12
			0.25—0.5DC	● ●	≤4	≤4	0.08—0.12
				● ● ✖	≤4	≤4	0.06—0.10
			0.5—0.75DC	● ●	≤3	≤3	0.06—0.10
				● ● ✖	≤3	≤3	0.06—0.08
			DC(Slot)	● ●	≤2	≤2	0.06—0.10
				● ● ✖	≤2	≤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 vibration is 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 material or attachment of workpiece material is low
- Corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius 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 under 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.

VPX300

Recommended Cutting Conditions

Wet Cutting
Cutting Speed

(mm)

Workpiece Material	Properties	Cutting Conditions	Insert		ae			
			Grade	Chip Breaker	≤0.25DC	0.25—0.5DC	0.5—0.75DC	DC(Slot)
					vc (m/min)			
P	Mild Steels	Hardness ≤180HB	MP6120	M	140 (100—190)	130 (90—180)	100 (70—120)	100 (70—120)
			VP15TF	M	140 (100—190)	130 (90—180)	100 (70—120)	100 (70—120)
			MP6130	M	140 (100—190)	130 (90—180)	100 (70—120)	100 (70—120)
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 180—350HB ≤350HB (Annealing)	MP6120	M	120 (90—140)	110 (80—130)	100 (70—120)	100 (70—120)
			VP15TF	M	120 (90—140)	110 (80—130)	100 (70—120)	100 (70—120)
			MP6130	M	120 (90—140)	110 (80—130)	100 (70—120)	100 (70—120)
	Pre-hardened Steels	Hardness 35—45HRC	MP6120	M	100 (80—120)	90 (70—110)	80 (60—100)	80 (60—100)
			VP15TF	M	100 (80—120)	90 (70—110)	80 (60—100)	80 (60—100)
			MP6130	M	100 (80—120)	90 (70—110)	80 (60—100)	80 (60—100)
M	Austenitic Stainless Steels	Hardness ≤200HB	MP7130	M	120 (100—150)	110 (90—140)	90 (70—120)	90 (70—120)
			VP15TF	M	120 (100—150)	110 (90—140)	90 (70—120)	90 (70—120)
		Hardness >200HB	MP7130	M	100 (80—130)	90 (70—120)	70 (50—100)	70 (50—100)
			VP15TF	M	100 (80—130)	90 (70—120)	70 (50—100)	70 (50—100)
	Duplex Stainless Steels	Hardness ≤280HB	MP7130	M	100 (80—130)	90 (70—120)	70 (50—100)	70 (50—100)
			VP15TF	M	100 (80—130)	90 (70—120)	70 (50—100)	70 (50—100)
	Ferritic and Martensitic Stainless Steels	—	MP7130	M	120 (100—150)	110 (90—140)	90 (70—120)	90 (70—120)
			VP15TF	M	120 (100—150)	110 (90—140)	90 (70—120)	90 (70—120)
	Precipitation Hardening Stainless Steels	Hardness <450HB	MP7130	M	90 (70—120)	80 (60—110)	60 (40—90)	60 (40—90)
			VP15TF	M	90 (70—120)	80 (60—110)	60 (40—90)	60 (40—90)
K	Gray Cast Irons	Tensile Strength ≤350MPa	MC5020	M	180 (160—220)	170 (150—210)	150 (130—190)	150 (130—190)
			VP15TF	M	130 (100—150)	120 (90—140)	100 (80—120)	100 (80—120)
	Ductile Cast Irons	Tensile Strength ≤800MPa	MC5020	M	160 (140—180)	150 (130—170)	130 (110—150)	130 (110—150)
			VP15TF	M	110 (80—140)	100 (70—130)	80 (60—120)	80 (60—120)
N	Aluminium Alloys	Content Si<5%	TF15	M	600 (400—1000)	600 (400—1000)	600 (400—1000)	600 (400—1000)
S	Titanium Alloys (Ti-6Al-4V, etc.)	—	MP9120	M	50 (40—70)	50 (40—70)	50 (40—70)	50 (40—70)
			VP15TF	M	50 (40—70)	50 (40—70)	50 (40—70)	50 (40—70)
			MP9130	M	40 (30—60)	40 (30—60)	40 (30—60)	40 (30—60)
	Titanium Alloys (Ti-5Al-5V-5Mo-3Cr, etc.)	—	MP9120	M	30 (20—40)	30 (20—40)	30 (20—40)	30 (20—40)
			VP15TF	M	30 (20—40)	30 (20—40)	30 (20—40)	30 (20—40)
			MP9130	M	30 (20—40)	30 (20—40)	30 (20—40)	30 (20—40)
	Heat Resistant Alloys	—	MP9120	M	40 (30—60)	40 (30—60)	40 (30—60)	40 (30—60)
			VP15TF	M	40 (30—60)	40 (30—60)	40 (30—60)	40 (30—60)
			MP9130	M	30 (20—40)	30 (20—40)	30 (20—40)	30 (20—40)
H	Hardened Steels	Hardness 40—55HRC	VP15TF	M	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 vibration is 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 material or attachment of workpiece material is low
- Corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius 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 under higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

Cutting Conditions (Guide) :

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

Depth of Cut / Feed per Tooth

(mm)

Workpiece Material		Properties	ae	Cutting Conditions	DC			
					ø25		ø28—ø80	
					ap	fz (mm/t.)	ap	fz (mm/t.)
P	Mild Steels	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 Steels Alloy Steels Alloy Tool Steels	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 Steels Alloy Steels Alloy Tool Steels	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 Steels	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 Steels	—	≤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 Steels	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 Steels	—	≤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 Steels	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 vibration is 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 material or attachment of workpiece material is low
- Corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius 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 under 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.

VPX300

Recommended Cutting Conditions

Cutting Conditions (Guide) :

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

Wet Cutting

Depth of Cut / Feed per Tooth

(mm)

Workpiece Material		Properties	ae	Cutting Conditions	DC						
					ø25		ø28—ø80				
					ap	fz (mm/t.)	ap	fz (mm/t.)			
K	Gray Cast Irons	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 Irons	Tensile Strength ≤800MPa	≤0.25DC	● ●	≤11	0.10—0.20	≤11	0.10—0.25			
				✖	≤11	0.10—0.15	≤11	0.10—0.20			
			0.25—0.5DC	● ●	≤11	0.10—0.15	≤11	0.10—0.20			
				✖	≤11	0.08—0.12	≤11	0.10—0.15			
			0.5—0.75DC	● ●	≤8	0.08—0.12	≤8	0.10—0.15			
				✖	≤8	0.06—0.10	≤8	0.08—0.12			
			DC(Slot)	● ●	≤5	0.06—0.10	≤5	0.08—0.12			
				✖	≤5	0.06—0.08	≤5	0.06—0.10			
	N	Aluminium Alloys	Content Si<5%	≤0.25DC	● ●	≤11	0.10—0.25	≤11	0.10—0.25		
					✖	≤11	0.10—0.20	≤11	0.10—0.20		
0.25—0.5DC				● ●	≤11	0.10—0.20	≤11	0.10—0.20			
				✖	≤11	0.10—0.15	≤11	0.10—0.15			
0.5—0.75DC				● ●	≤8	0.06—0.15	≤8	0.08—0.15			
				✖	≤8	0.06—0.15	≤8	0.08—0.15			
DC(Slot)				● ●	≤5	0.06—0.15	≤5	0.08—0.15			
				✖	≤5	0.06—0.15	≤5	0.08—0.12			
S				Titanium Alloys (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 Alloys (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 Alloys	—	≤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 Steels	Hardness 40—55HRC	≤0.25DC	● ●	≤5	0.08—0.15	≤5	0.08—0.15		
					✖	≤5	0.08—0.12	≤5	0.08—0.12		
				0.25—0.5DC	● ●	≤4	0.08—0.12	≤4	0.08—0.12		
					✖	≤4	0.06—0.10	≤4	0.06—0.10		
0.5—0.75DC				● ●	≤3	0.06—0.10	≤3	0.06—0.10			
				✖	≤3	0.06—0.10	≤3	0.06—0.08			
DC(Slot)				● ●	≤2	0.06—0.10	≤2	0.06—0.10			
				✖	≤2	0.06—0.10	≤2	0.06—0.08			

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

Note 2) Chattering vibration is 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 material or attachment of workpiece material is low
- Corner radius during pocket milling

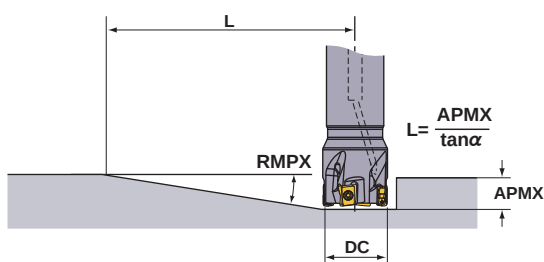
Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is 0.5 DC or more.

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

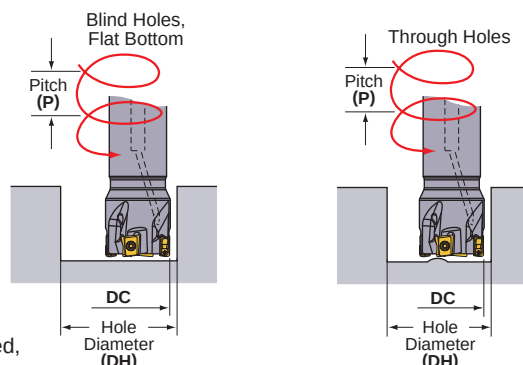
Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

Ramping / Helical 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	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.
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
35	0.2	1.28°	493	63.0	2.0	62.8	1.9	56.6	1.5

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

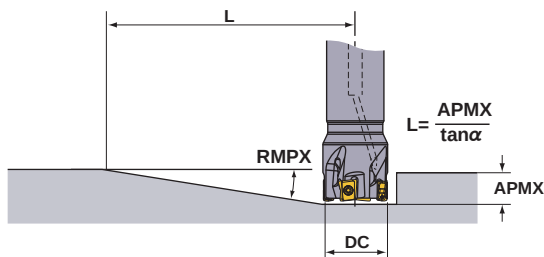
* Shows the distance until a maximum depth of cut of 11 mm is achieved at the maximum ramping angle $L (= 11/\tan \alpha)$.

VPX300

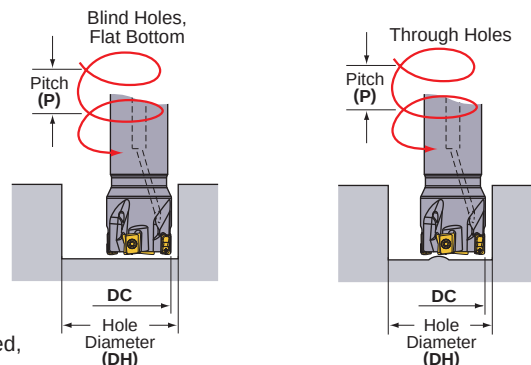
Recommended Cutting Conditions

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.

Follow the cutting conditions for slot milling. (mm)									
DC	RE	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.
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	

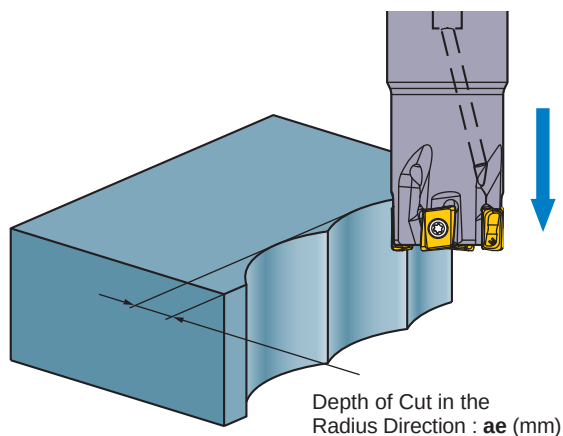
Note 1) When machining a highly ductile workpiece material with the ramping angles in the table above, chips may be elongated.

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

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

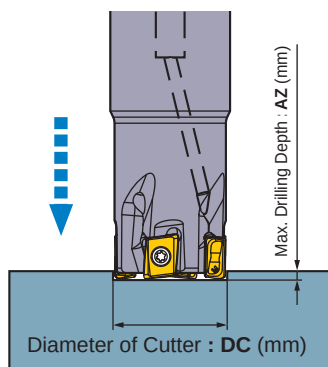


(mm)

DC	ae max.
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

Note1) No step feed necessary.

● Drilling



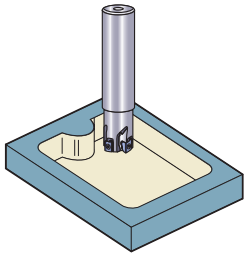
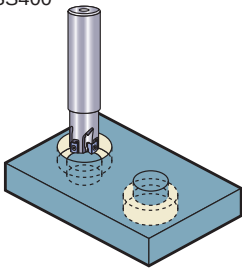
(mm)

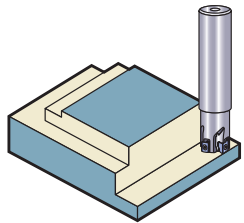
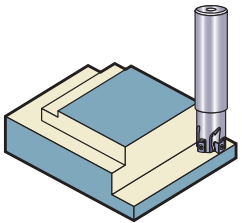
DC	AZ max.
25	0.55
28	0.55
30	0.55
32	0.55
35	0.55
40	0.55
50	0.55
63	0.55
80	0.55

Note 1) Exercise due caution as chips scatter easily.

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

Application Examples

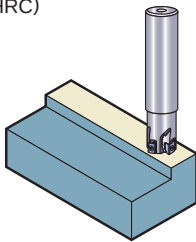
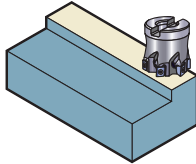
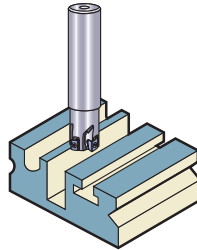
Holder		VPX200R2503SA25S	VPX200R1602SA16S	VPX200R1602SA16S
Insert (Grade)		LOGU0904080PNER-M(MP6120)	LOGU0904080PNER-M(MP6130)	LOGU0904080PNER-M(MP7130)
Workpiece	JIS S45C		JIS SS400	
				
Component		Chucked Parts	Machined Parts	Machined Parts
Cutting Conditions	Cutting Speed vc (m/min)	150	85.4	200
	Feed per Tooth fz (mm/t.)	0.11	0.095	0.1
	Depth of Cut (mm)	ap = 4.5 , ae = 25 Max.	ap = 4.25	ap = 1.5—3
Cutting Mode		Dry Cutting	Wet Cutting	Wet Cutting
Results		Compared with conventional products with varying service life due to breakage, VPX has a stable service life that allows for 1.7 times more machining.	Solves the problem of easily damaged clamp screws for conventional products, ensuring an excellent finish.	Achieves triple the machining of conventional products whose service life is limited by defects, ensuring an excellent finish.

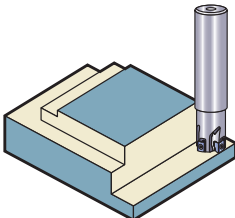
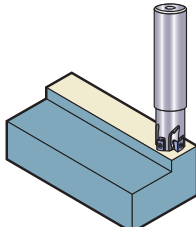
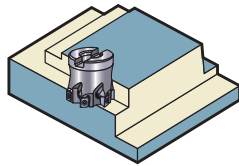
Holder		VPX200R2003SA20S	VPX200R2504SA25S	VPX200R2504SA25S
Insert (Grade)		LOGU0904080PNER-M(MP6120)	LOGU0904080PNER-M(MP6120)	LOGU0904080PNER-M(MP6120)
Workpiece	20MnCr5(Alloy Steel)		Cast Iron	
				
Component		Machined Parts	Automotive Components	Machined Parts
Cutting Conditions	Cutting Speed vc (m/min)	176	200	102
	Feed per Tooth fz (mm/t.)	0.179	0.173	0.13
	Depth of Cut (mm)	ap = 2	ap = 3	ap = 1.4 , ae = 11
Cutting Mode		Dry Cutting	Dry Cutting	Wet Cutting
Results		Conventional products have achieved machining times of 330 min before breaking, whereas VPX can maintain sustained machining for over 400 mins.	It is capable of cutting speeds of 200 m/min compared to 170 m/min for conventional products, increasing machining efficiency. Good machining accuracy makes possible stable machining.	VPX has less load on its main shaft than conventional vertical cutters, achieving more than triple as much machining. It also has excellent clamp rigidity compared to other conventional products suppressing clamp screw breakage.

The above application examples are customer's applications, so it can be different from the recommended conditions.

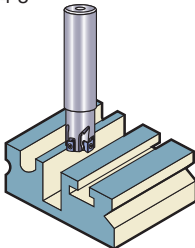
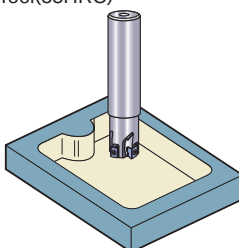
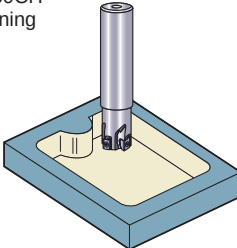
Multi-functional Cutter for High Efficiency Machining

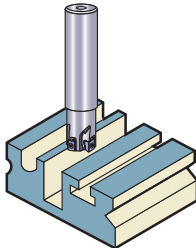
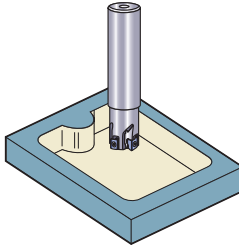
Application Examples

Holder		VPX200R3004SA25S	VPX200-050A05AR	VPX200R2503SA25S
Insert (Grade)		LOGU0904080PNER-M(MP9130)	LOGU0904040PNER-M(VP15TF)	LOGU0904080PNER-M(MP6120)
Workpiece		Precipitation Hardening Stainless Steel (38-43HRC) 	JIS FCD400 	JIS SS400, S50C 
Component		Machined Parts	Parts	Machined Parts
Cutting Conditions	Cutting Speed vc (m/min)	40	345	118
	Feed per Tooth fz (mm/t.)	0.06	0.14	0.16
	Depth of Cut (mm)	ap = 1.8	ap = 2—3 , ae = 40	ap = 6
Cutting Mode		Dry Cutting	Wet Cutting	Dry Cutting
Results		Good sharpness compared to conventional products allows VPX to achieve double their service life.	Conventional vertical cutters can only be used for roughing, but VPX can be used for finishing as well, eliminating processing steps.	VPX achieves good chip ejection and finish compared to conventional products, extending its service life.

Holder		VPX200R2503SA25S	VPX300R4004SA32S	VPX300-080A10AR
Insert (Grade)		LOGU0904040PNER-M(MP7130)	LOGU1207080PNER-M(MP6120)	LOGU1207080PNER-M(MP6120)
Workpiece		JIS SUS304 	JIS SCM440 	Alloy Tool Steel 
Component		Machined Parts	Centre Block	Machined Parts
Cutting Conditions	Cutting Speed vc (m/min)	180	150	226
	Feed per Tooth fz (mm/t.)	0.6	0.15	0.13
	Depth of Cut (mm)	ap = 2.7	ap = 5	ap = 5 , ae = 70
Cutting Mode		—	Dry Cutting	—
Results		Less cutting noise than conventional products, allowing cutting conditions to be improved. Also, service life has been lengthened when using the same inserts to machine JIS S45C.	Compared to conventional products, chattering vibration is low and wall surface accuracy good, achieving more than triple the usual service life.	Achieves 2.7 times the machining of conventional products whose service life is limited by finish degradation.

The above application examples are customer's applications, so it can be different from the recommended conditions.

Holder		VPX300R4004SA32S	VPX300R2502SA25S	VPX200R2504SA25S
Insert (Grade)		LOGU1207080PNER-M(MP6120)	LOGU1207080PNER-M(VP15TF)	LOGU0904080PNER-M(MP6120)
Workpiece		13CrMo4-5 	Alloy Tool(55HRC) 	JIS S50CH Hardening 
Component		Machined Parts	Dies	Dies
Cutting Conditions	Cutting Speed vc (m/min)	160 → 180	70	200
	Feed per Tooth fz (mm/t.)	0.12 → 0.15	0.08	0.15
	Depth of Cut (mm)	ap = 3 → 4.2 , ae = 40	ap = 5 , ae = 18.75	ap = 3
Cutting Mode		Wet Cutting	Dry Cutting	Dry Cutting
Results		Achieves twice the service life of conventional products, even when changing to high efficiency conditions.	When machining hardened steel, it achieves double the machining of conventional products whose service life is limited by defects.	There is no seating flattening or deformation even when machining for 2500 minutes. And the number of tools has been reduced by increasing corner count to four.

Holder		VPX200R1602SA16S	VPX200R3203SA32S
Insert (Grade)		LOGU0904040PNER-L(VP15TF)	LOGU0904040PNER-L (MP6120)
Workpiece		JIS SKD11 Mild Steel	JIS S45C
			
Component		Machined Parts	Machined Parts
Cutting Conditions	Cutting Speed vc (m/min)	200	140
	Feed per Tooth fz (mm/t.)	0.1 → 0.15	0.1
	Depth of Cut (mm)	ap = 0.1	ap = 1.4
Cutting Mode		Dry Cutting	Dry Cutting
Results		Compared to conventional products, cutting noise is reduced and chattering vibration is suppressed. Furthermore, cutting conditions have been improved and high efficiency machining has been achieved.	Compared to conventional products, the sharpness is better and the surface accuracy has been improved.

The above application examples are customer's applications, so it can be different from the recommended conditions.



Multi-functional Indexable Cutter

VPX Series

For Your Safety

●Don't handle inserts and chips without gloves. ●Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage. ●Please use safety covers and wear safety glasses. ●When using compounded cutting oils, please take fire precautions. ●When attaching inserts or spare parts, please use only the correct wrench or driver. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

MITSUBISHI MATERIALS CORPORATION

MMC Hardmetal (Thailand) Co., Ltd.

CTI Tower 24th Floor, 191/32 Ratchadapisek Road,
Klongtoey, Klongtoey, Bangkok, 10110 Thailand
Tel : +66-2661-8170 Fax : +66-2661-8175

Thailand Rayong Branch

24/1 Moo4 ESIE PLaza 1, 1st Flor., unit G6-B and G6-C,
Tambon Pluak Daeng, Rayong 21140 Thailand
Tel : +66-3895-5658 Fax : +66-3895-5659

Singapore Branch

33 Ubi Avenue3, #05-14 Vertex, Singapore
408868
Tel : +65-6634-8250 Fax : +65-6634-8257

Ho Chi Minh Representative Office

1205 12th Floor SROC, 2A-4A Ton Duc Thang, Ben
Nghe, Dist. 1, Ho Chi Minh City, Vietnam
Tel : +84-28-3829-7700 Fax : +84-28-3824-3344

Thailand Amata Nakorn Branch

Amata Nakorn Industrial Estate Phase 9
700/843 Moo 5, Tambon Nongkakra, Amphur
Phanthong, Chonburi, 20160 Thailand
Tel : +66-3821-0728 Fax : +66-3821-0732

Thailand Korat Branch

1444/2 Moo13, Tambon Choho, Amphur Muang Nakhon
Ratchasima, Nakhon Ratchasima 30310 Thailand
Tel : +66-6-1416-7246

Indonesia Representative Office

MM2100 Industrial Town
Jl. Jawa Blok GG-6 No.2 Jatiwangi, Cikarang,
Bekasi Indonesia 17520
Tel : +62-21-2214-3639 Fax : +62-21-2214-3745

Hanoi Representative Office

201 2nd Floor, International Center, 17 Ngo Quyen,
Hoan Kiem District, Hanoi, Vietnam
Tel : +84-24-3772-8362 Fax : +84-24-3772-8299