

RECOMMENDED CUTTING CONDITIONS

Note 1) The cutting conditions below are a guide only. Please make adjustments according to the machining conditions.

Note 2) Please note the follows when machining the hardened steel by using MP8010.

- Please shorten the overhang length as much as possible.
- Please note the setting of the depth of cut especially to prevent the fracture.
- Use with carbide shank recommended.
- The first recommended grade when machining hardened steel of less than 50HRC is VP15TF.

■ SHOULDER MILLING • POCKET MILLING • RAMPING • COPYING

	Workpiece Material	Hardness	Grade	Cutting Speed vc (m/min)	ARX25R	SA	S	ARX30R	SA	S	ARX35R	SA	S
					ARX25R	M	A	ARX30R	M	A	ARX35R	M	A
					Depth of Cut ap (mm)	Feed per Tooth fz (mm/t)		Depth of Cut ap (mm)	Feed per Tooth fz (mm/t)		Depth of Cut ap (mm)	Feed per Tooth fz (mm/t)	
P	Mild Steel	≤180HB	VP15TF	180 (150—220)	≤1.0	≤0.5		≤1.2	≤0.5		≤1.5	≤0.5	
	Carbon Steel • Alloy Steel	180—350HB	VP15TF	160 (120—200)	≤0.7	≤0.3		≤0.9	≤0.3		≤1.2	≤0.3	
M	Stainless Steel	≤270HB	VP15TF	150 (120—180)	≤0.7	≤0.3		≤0.9	≤0.3		≤1.2	≤0.3	
K	Gray Cast Iron	Tensile Strength ≤350MPa	VP15TF	180 (150—220)	≤1.0	≤0.5		≤1.2	≤0.5		≤1.5	≤0.5	
	Ductile Cast Iron	Tensile Strength ≤800MPa	VP15TF	120 (80—160)	≤1.0	≤0.5		≤1.2	≤0.5		≤1.5	≤0.5	
H	Hardened Steel	<50HRC	VP15TF	80 (50—120)	≤0.5	≤0.2		≤0.7	≤0.2		≤1.0	≤0.2	
		≥50HRC	MP8010	80 (50—120)	≤0.3	≤0.2		≤0.4	≤0.2		≤0.5	≤0.2	

Note 1) For ramping process, refer to cutting criteria by type.

■ SLOT MILLING

	Workpiece Material	Hardness	Grade	Cutting Speed vc (m/min)	ARX25R	SA	S	ARX30R	SA	S	ARX35R	SA	S
					ARX25R	M	A	ARX30R	M	A	ARX35R	M	A
					Depth of Cut ap (mm)	Feed per Tooth fz (mm/t)		Depth of Cut ap (mm)	Feed per Tooth fz (mm/t)		Depth of Cut ap (mm)	Feed per Tooth fz (mm/t)	
P	Mild Steel	≤180HB	VP15TF	180 (150—220)	≤1.0	≤0.4		≤1.2	≤0.4		≤1.5	≤0.4	
	Carbon Steel • Alloy Steel	180—350HB	VP15TF	160 (120—200)	≤0.7	≤0.2		≤0.9	≤0.2		≤1.2	≤0.2	
M	Stainless Steel	≤270HB	VP15TF	150 (120—180)	≤0.7	≤0.2		≤0.9	≤0.2		≤1.2	≤0.2	
K	Gray Cast Iron	Tensile Strength ≤350MPa	VP15TF	180 (150—220)	≤1.0	≤0.4		≤1.2	≤0.4		≤1.5	≤0.4	
	Ductile Cast Iron	Tensile Strength ≤800MPa	VP15TF	120 (80—160)	≤1.0	≤0.4		≤1.2	≤0.4		≤1.5	≤0.4	
H	Hardened Steel	<50HRC	VP15TF	80 (50—120)	≤0.5	≤0.1		≤0.7	≤0.1		≤1.0	≤0.1	
		≥50HRC	MP8010	80 (50—120)	≤0.3	≤0.1		≤0.4	≤0.1		≤0.5	≤0.1	

■ PLUNGING

	Workpiece Material	Hardness	Grade	Cutting Speed vc (m/min)	ARX25R	SA	S	ARX30R	SA	S	ARX35R	SA	S
					ARX25R	M	A	ARX30R	M	A	ARX35R	M	A
					Cutting Width ae (mm)	Feed per Tooth fz (mm/t)		Cutting Width ae (mm)	Feed per Tooth fz (mm/t)		Cutting Width ae (mm)	Feed per Tooth fz (mm/t)	
P	Mild Steel	≤180HB	VP15TF	180 (150—220)	≤2.5	≤0.3		≤3.0	≤0.3		≤3.5	≤0.3	
	Carbon Steel • Alloy Steel	180—350HB	VP15TF	160 (120—200)	≤2.5	≤0.2		≤3.0	≤0.2		≤3.5	≤0.2	
M	Stainless Steel	≤270HB	VP15TF	150 (120—180)	≤2.5	≤0.2		≤3.0	≤0.2		≤3.5	≤0.2	
K	Gray Cast Iron	Tensile Strength ≤350MPa	VP15TF	180 (150—220)	≤2.5	≤0.3		≤3.0	≤0.3		≤3.5	≤0.3	
	Ductile Cast Iron	Tensile Strength ≤800MPa	VP15TF	120 (80—160)	≤2.5	≤0.3		≤3.0	≤0.3		≤3.5	≤0.3	
H	Hardened Steel	<50HRC	VP15TF	80 (50—120)	≤2.5	≤0.1		≤3.0	≤0.1		≤3.5	≤0.1	
		≥50HRC	MP8010	80 (50—120)	≤2.5	≤0.1		≤3.0	≤0.1		≤3.5	≤0.1	

■ HELICAL DRILLING

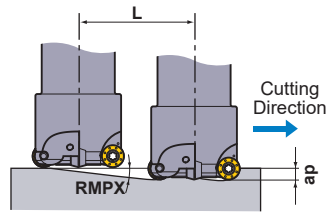
	Workpiece Material	Hardness	Grade	Cutting Speed vc (m/min)	ARX25R	SA	S	ARX30R	SA	S	ARX35R	SA	S
					ARX25R	M	A	ARX30R	M	A	ARX35R	M	A
					DOC/pass ap (mm/pass)	Feed per Tooth fz (mm/t)		DOC/pass ap (mm/pass)	Feed per Tooth fz (mm/t)		DOC/pass ap (mm/pass)	Feed per Tooth fz (mm/t)	
P	Mild Steel	≤180HB	VP15TF	180 (150—220)	≤1.0	≤0.3		≤1.0	≤0.3		≤1.0	≤0.3	
	Carbon Steel • Alloy Steel	180—350HB	VP15TF	160 (120—200)	≤0.7	≤0.2		≤0.9	≤0.2		≤1.0	≤0.2	
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K	Gray Cast Iron	Tensile Strength ≤350MPa	VP15TF	180 (150—220)	≤1.0	≤0.3		≤1.0	≤0.3		≤1.0	≤0.3	
	Ductile Cast Iron	Tensile Strength ≤800MPa	VP15TF	120 (80—160)	≤1.0	≤0.3		≤1.0	≤0.3		≤1.0	≤0.3	
H	Hardened Steel	<50HRC	VP15TF	80 (50—120)	≤0.5	≤0.1		≤0.7	≤0.1		≤1.0	≤0.1	
		≥50HRC	MP8010	80 (50—120)	≤0.3	≤0.1		≤0.4	≤0.1		≤0.5	≤0.1	

CUTTING MODE MAXIMUM CAPACITIES

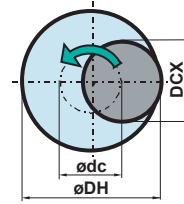
■ RAMPING

Finding a cutters' distance moved "L" when depth of cut reaches "ap" at a ramping angle of "RMPX".

$$L = ap / \tan RMPX \text{ (mm)}$$



■ 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 edge diameter

- For the depth of cut per cycle, refer to the cutting conditions for helical drilling.
- Set the machine spindle revolution so that the tool is rotating and cutting in a down cut direction.

Type	Order Number	Tool Diameter DCX (mm)	Number of Teeth	Ramping			Helical Drilling	
				RMPX *1	APMX (mm) *2	Distance L at Depth of Cut of ap L (mm)	Min. Hole Diameter DH min. (mm)	Max. Hole Diameter DH max. (mm)
Centre Cutting	ARX25R102SA10S	10	2	90°	2.5	0	15	19
	ARX25R102SA10LW	10	2	90°	2.5	0	15	19
	ARX30R122SA10S	12	2	90°	3.0	0	18	23
	ARX30R122SA10LW	12	2	90°	3.0	0	18	23
	ARX35R142SA12S	14	2	90°	3.5	0	21	27
	ARX35R142SA12LW	14	2	90°	3.5	0	21	27
Non-centre Cutting (Multi-tooth)	ARX25R122SA10S	12	2	27.17°	2.5	4.87	19	23
	ARX25R122SA10LW	12	2	27.17°	2.5	4.87	19	23
	ARX25R163M08A30	16	3	13.70°	2.5	10.76	27	31
	ARX25R163SA16S	16	3	13.70°	2.5	10.26	27	31
	ARX30R163M08A30	16	3	21.25°	3.0	7.71	26	31
	ARX30R163SA16S	16	3	21.25°	3.0	7.71	26	31
	ARX25R173M08A30	17	3	12.22°	2.5	11.54	29	33
	ARX25R173SA16S	17	3	12.22°	2.5	11.54	29	33
	ARX30R173M08A30	17	3	18.42°	3.0	9.01	28	33
	ARX30R173SA16S	17	3	18.42°	3.0	9.01	28	33
	ARX30R203M10A30	20	3	13.21°	3.0	12.78	34	39
	ARX30R203SA20S	20	3	13.21°	3.0	12.78	34	39
	ARX25R204M10A30	20	4	9.23°	2.5	15.38	35	39
	ARX25R204SA20S	20	4	9.23°	2.5	15.38	35	39
	ARX25R224M10A30	22	4	7.94°	2.5	17.92	39	43
	ARX25R224SA20S	22	4	7.94°	2.5	17.92	39	43
	ARX30R224M10A30	22	4	11.13°	3.0	15.25	38	43
	ARX30R224SA20S	22	4	11.13°	3.0	15.25	38	43
	ARX30R254M12A35	25	4	9.01°	3.0	18.92	44	49
	ARX30R254SA20S	25	4	9.01°	3.0	18.92	44	49
	ARX25R255M12A35	25	5	6.57°	2.5	21.71	45	49
	ARX25R255SA20S	25	5	6.57°	2.5	21.71	45	49

*1 RMPX : Max.Ramping Angle

*2 APMX : Max. Depth of Cut