



FMR P-POSITIVE

RECOMMENDED CUTTING CONDITIONS

ISO	WORK PIECE		Grades	Chip Breaker					Cutting Data				
	Material	Hardness		MA	ML	MF	MM	None	vc (m/min)	fz (mm/t)	ap (mm)	ae (mm)	
P	Low Carbon Steel	HB80-180	PC5400		-	-	●	○	-	100-200	0.20-0.60	0.3-6.0	0.7D-0.1D
	High Carbon Steel	HB180-280	PC5400		-	-	●	○	-	180-290	0.20-0.60	0.3-6.0	0.7D-0.1D
	Low Alloy Steel	<HRC27	PC3600		-	-	-	●	○	50-150	0.30-0.50	~0.5	0.7D-0.1D
			PC5300	PC5400	-	-	-	●	○	130-250	0.30-0.50	~0.5	0.7D-0.1D
	Low Pre-Hardened Steel	Hrc20-50	PC3600		-	-	-	-	●	100-220	0.30-0.50	~0.5	0.7D-0.1D
			PC5300		-	-	-	-	●	130-250	0.30-0.50	~0.5	0.7D-0.1D
	High Alloy Steel	<HRC27	PC3600		-	-	-	●	○	50-150	0.30-0.50	~0.5	0.7D-0.1D
PC5300			-	-	-	●	○	100-250	0.12-0.70	0.3-6.0	0.7D-0.1D		
High Pre-Hardened Steel	HRC20-48	PC5300		-	-	-	-	●	100-220	0.12-0.70	0.3-6.0	0.7D-0.1D	
M	Stainless Steel	<HB270	PC5300	PC5400	-	-	○	●	-	100-150	0.20-0.60	0.3-6.0	0.7D-0.1D
K	Grey & Ductile Cast Iron	<350MPa	PC5300		-	-	○	●	-	120-210	0.20-0.60	0.3-6.0	0.7D-0.1D
N	Aluminium	-	H01		●	-	-	-	-	300-800	0.30-0.60	0.3-6.0	0.7D-0.1D
S	HRSA Fe	Hrc20-30	PC5300	PC5400	-	-	-	○	●	35-60	0.30-0.50	~0.5	0.7D-0.1D
	HRSA Ni or Co	Hrc40-45	PC5300	PC5400	-	-	-	○	●	30-50	0.30-0.50	~0.5	0.7D-0.1D
	Titanium	Hrc35-45	PC5300	PC5400	-	●	○	-	-	40-70	0.30-0.50	~1.5	0.7D-0.1D
H	High Hardened Materials	<Hrc60	PC5300	PC5400	-	-	-	-	●	30-50	0.30-0.50	~0.5	0.7D-0.1D

● First Choice ○ Second Choice

FEED PER TOOTH ACCORDING TO DEPTH OF CUT ap (fz, mm/t)

INSERT	Feed Per Tooth According To ap							
	ap=1	ap=2	ap=3	ap=4	ap=5	ap=6	ap=8	ap=10
RPMT08	0.30	0.22	0.18	0.15	-	-	-	-
RPMT10	0.40	0.28	0.25	0.20	0.12	-	-	-
RPMT12	0.60	0.45	0.35	0.30	0.25	0.20	-	-
RPMT16	0.65	0.45	0.40	0.32	0.30	0.28	0.23	-
RPMT20	0.70	0.50	0.42	0.35	0.32	0.29	0.25	0.22

ANTI-VIBRATION FACE MILL ARBORS

REDUCED VIBRATION IN LONG REACH INDEXABLE MILLING

- ▶ Taper or straight neck profile
- ▶ Damped design reduces vibration in long reach applications
- ▶ Increased cut depths and feed rates
- ▶ Improved surface finish
- ▶ Increased tool life

Vibration reduced up to 60% compared to any other conventional shell mill adaptor



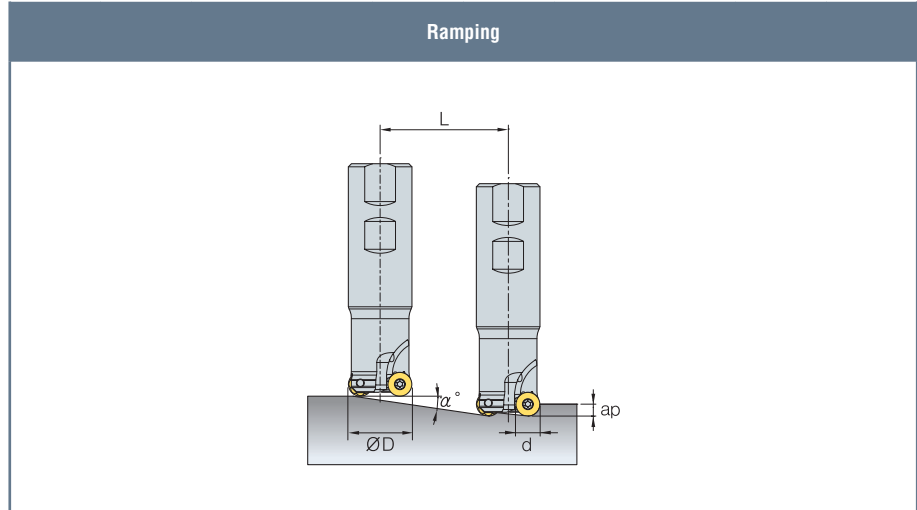
BACK TO RANGE INDEX SECTION INDEX MAIN INDEX ULTIMATE



Maximum Ramping Angle

$$L = \frac{ap}{\tan \alpha^\circ} \text{ (mm)}$$

L(mm) : Cutting length
 α° : Max. ramping angle
 ap(mm) : Depth of cut



Tool Series	Tool Dia. ØD(min)	Insert Size (d)	Ramping Angle α° (max)	Cutting Length L(mm) by ap									
				ap=1	ap=2	ap=2.5	ap=3	ap=3.5	ap=4	ap=5	ap=6	ap=8	ap=10
FMR2500	17	8	4.7	12	24	30	36	42	48	-	-	-	-
	18	8	4.1	14	28	34	41	48	55	-	-	-	-
	20	8	15.4	4	7	9	11	13	14	-	-	-	-
	21	8	13.9	4	8	10	12	14	16	-	-	-	-
	25	8	9.8	6	12	14	17	20	23	-	-	-	-
	26	8	9.2	6	12	16	19	22	25	-	-	-	-
FMR3000	25	10	13.8	4	8	10	12	14	16	20	-	-	-
	26	10	12.6	4	9	11	13	16	18	22	-	-	-
	32	10	8.4	7	14	17	20	24	27	34	-	-	-
	33	10	8.0	7	14	18	21	25	29	36	-	-	-
	40	10	5.8	10	20	25	30	34	39	49	-	-	-
	50	10	4.2	14	27	34	41	48	55	68	-	-	-
	63	10	3.1	19	37	47	56	65	75	93	-	-	-
	66	10	2.9	20	40	50	60	69	79	99	-	-	-
FMR4000	25	12	4.5	13	25	32	38	44	51	63	76	-	-
	26	12	4.1	14	28	35	42	49	56	70	84	-	-
	32	12	14.7	4	8	10	11	13	15	19	23	-	-
	33	12	13.8	4	8	10	12	14	16	20	24	-	-
	40	12	9.6	6	12	15	18	21	24	30	36	-	-
	50	12	6.7	9	17	21	26	30	34	43	51	-	-
	63	12	4.8	12	24	30	36	42	48	60	72	-	-
	66	12	4.5	13	26	32	38	45	51	64	77	-	-
	80	12	3.5	17	33	41	50	58	66	83	99	-	-
	100	12	2.6	22	44	55	65	76	87	109	131	-	-
FMR5000	40	16	17.8	3	6	8	9	11	12	16	19	25	-
	50	16	11.3	5	10	13	15	18	20	25	30	40	-
	63	16	7.6	7	15	19	22	26	30	37	45	60	-
	66	16	7.1	8	16	20	24	28	32	40	48	64	-
	80	16	5.3	11	21	27	32	37	43	53	64	85	-
	100	16	4.0	14	29	36	43	51	58	72	87	116	-
	125	16	3.0	19	38	48	58	67	77	96	115	154	-
	160	16	2.2	26	52	65	78	90	103	129	155	207	-
FMR6000	50	20	17.8	3	6	8	9	11	12	16	19	25	31
	63	20	11.1	5	10	13	15	18	20	25	30	41	51
	80	20	7.4	8	15	19	23	27	31	38	46	61	77
	100	20	5.3	11	21	27	32	37	43	53	64	85	107
	125	20	4.0	14	29	36	43	51	58	72	87	116	145
	160	20	2.9	20	40	49	59	69	79	99	119	158	198
	200	20	2.2	26	52	65	78	90	103	129	155	207	258
	250	20	1.7	33	67	84	100	117	134	167	200	267	334

FMR P-POSITIVE

P

H

M

S

K

N

BACK TO

RANGE INDEX

SECTION INDEX

MAIN INDEX

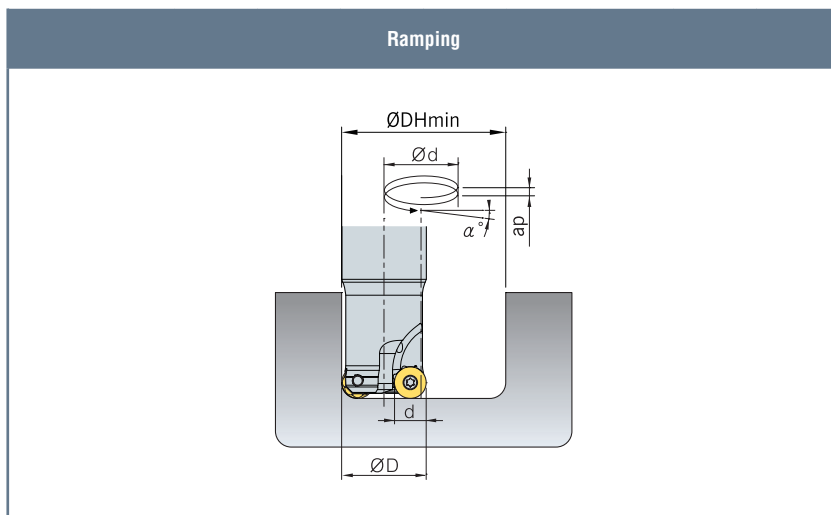
ULTIMATE



Minimum Hole Diameter for Helical Machining(ØDHmin)

FMR P-POSITIVE

- ØD = Tool Dia.(mm)
 - Ød(Tool Path, mm) = ØDHmin, max - ØD
 - ØDHmin(Minimum hole diameter) = ØD × 2 - Insert size(d)
 - ØDHmax(Maximum hole diameter) = ØD × 2 - 2
 - Ramping angle by ap(α°) = $\tan^{-1} \left(\frac{ap}{\pi \times \text{Ød}} \right)$
- Helical angle adjusted by ap cannot exceed maximum angle
- ap = Depth of cut



Tool Series	Tool Dia. ØD(min)	Insert Size (d)	Ramping Angle α°(max)	ØDH min	Ød	Ramping angle α° by ap									
						ap=1	ap=2	ap=2.5	ap=3	ap=3.5	ap=4	ap=5	ap=6	ap=8	ap=10
FMR2500	17	8	4.7	26	9	2.03	4.06	-	-	-	-	-	-	-	-
	18	8	4.1	28	10	1.83	3.65	-	-	-	-	-	-	-	-
	20	8	15.4	32	12	1.52	3.04	3.81	4.57	5.34	6.11	-	-	-	-
	21	8	13.9	34	13	1.40	2.81	3.51	4.22	4.92	5.63	-	-	-	-
	25	8	9.8	42	17	1.07	2.15	2.69	3.22	3.76	4.30	-	-	-	-
	26	8	9.2	44	18	1.01	2.03	2.54	3.04	3.55	4.06	-	-	-	-
FMR3000	25	10	13.8	40	15	1.22	2.43	3.04	3.65	4.27	4.88	-	-	-	-
	26	10	12.6	42	16	1.14	2.28	2.85	3.43	4.00	4.57	-	-	-	-
	32	10	8.4	54	22	0.83	1.66	2.07	2.49	2.91	3.32	-	-	-	-
	33	10	8.0	56	23	0.79	1.59	1.98	2.38	2.78	3.18	-	-	-	-
	40	10	5.8	70	30	0.61	1.22	1.52	1.83	2.13	2.43	-	-	-	-
	50	10	4.2	90	40	0.46	0.91	1.14	1.37	1.60	1.83	-	-	-	-
	63	10	3.1	116	53	0.34	0.69	0.86	1.03	1.21	1.38	-	-	-	-
	66	10	2.9	122	56	0.33	0.65	0.81	0.98	1.14	1.30	-	-	-	-
FMR4000	25	12	4.5	38	13	1.40	2.81	3.51	-	-	-	-	-	-	-
	26	12	4.1	40	14	1.30	2.61	3.26	-	-	-	-	-	-	-
	32	12	14.7	52	20	0.91	1.83	2.28	2.74	3.20	3.65	4.57	5.49	-	-
	33	12	13.8	54	21	0.87	1.74	2.17	2.61	3.04	3.48	4.35	5.23	-	-
	40	12	9.6	68	28	0.65	1.30	1.63	1.96	2.28	2.61	3.26	3.92	-	-
	50	12	6.7	88	38	0.48	0.96	1.20	1.44	1.68	1.92	2.40	2.88	-	-
	63	12	4.8	114	51	0.36	0.72	0.89	1.07	1.25	1.43	1.79	2.15	-	-
	66	12	4.5	120	54	0.34	0.68	0.84	1.01	1.18	1.35	1.69	2.03	-	-
	80	12	3.5	148	68	0.27	0.54	0.67	0.81	0.94	1.07	1.34	1.61	-	-
	100	12	2.6	188	88	0.21	0.41	0.52	0.62	0.73	0.83	1.04	1.24	-	-
FMR5000	40	16	17.8	64	24	0.76	1.52	1.90	2.28	2.66	3.04	3.81	4.57	6.11	-
	50	16	11.3	84	34	0.54	1.07	1.34	1.61	1.88	2.15	2.69	3.22	4.30	-
	63	16	7.6	110	47	0.39	0.78	0.97	1.16	1.36	1.55	1.94	2.33	3.11	-
	66	16	7.1	116	50	0.36	0.73	0.91	1.09	1.28	1.46	1.83	2.19	2.92	-
	80	16	5.3	144	64	0.29	0.57	0.71	0.86	1.00	1.14	1.43	1.71	2.28	-
	100	16	4.0	184	84	0.22	0.43	0.54	0.65	0.76	0.87	1.09	1.30	1.74	-
	125	16	3.0	234	109	0.17	0.33	0.42	0.50	0.59	0.67	0.84	1.00	1.34	-
	160	16	2.2	304	144	0.13	0.25	0.32	0.38	0.44	0.51	0.63	0.76	1.01	-
FMR6000	50	20	17.8	80	30	0.61	1.22	1.52	1.83	2.13	2.43	3.04	3.65	4.88	6.11
	63	20	11.1	106	43	0.42	0.85	1.06	1.27	1.49	1.70	2.12	2.55	3.40	4.25
	80	20	7.4	140	60	0.30	0.61	0.76	0.91	1.06	1.22	1.52	1.83	2.43	3.04
	100	20	5.3	180	80	0.23	0.46	0.57	0.68	0.80	0.91	1.14	1.37	1.83	2.28
	125	20	4.0	230	105	0.17	0.35	0.43	0.52	0.61	0.70	0.87	1.04	1.39	1.74
	160	20	2.9	300	140	0.13	0.26	0.33	0.39	0.46	0.52	0.65	0.78	1.04	1.30
	200	20	2.2	380	180	0.10	0.20	0.25	0.30	0.35	0.41	0.51	0.61	0.81	1.01
	250	20	1.7	480	230	0.08	0.16	0.20	0.24	0.28	0.32	0.40	0.48	0.63	0.79

ULTIMATE

BACK TO RANGE INDEX SECTION INDEX MAIN INDEX

P

H

M

S

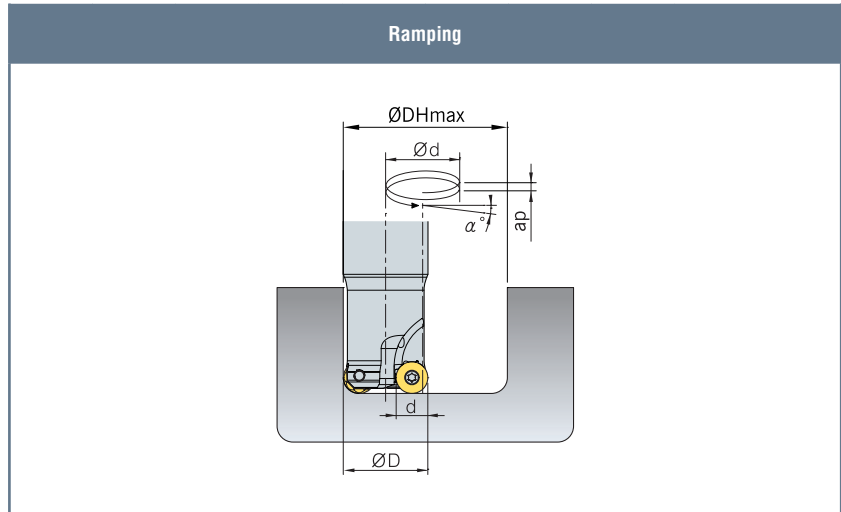
K

N



Maximum Hole Diameter for Helical Machining(ØDHmin)

- ØD = Tool Dia.(mm)
 - Ød(Tool Path, mm) = ØDHmin, max - ØD
 - ØDHmin(Minimum hole diameter) = ØD × 2 - Insert size(d)
 - ØDHmax(Maximum hole diameter) = ØD × 2 - 2
 - Ramping angle by ap(α°) = $\tan^{-1} \left(\frac{ap}{\pi \times \text{Ød}} \right)$
- Helical angle adjusted by ap cannot exceed maximum angle
- ap = Depth of cut



Tool Series	Tool Dia. ØD(min)	Insert Size (d)	Ramping Angle α°(max)	ØDH max	Ød	Ramping angle α° by ap									
						ap=1	ap=2	ap=2.5	ap=3	ap=3.5	ap=4	ap=5	ap=6	ap=8	ap=10
FMR2500	17	8	4.7	32	15	1.22	2.43	3.04	3.65	-	-	-	-	-	-
	18	8	4.1	34	16	1.14	2.28	2.85	3.43	-	-	-	-	-	-
	20	8	15.4	38	18	1.01	2.03	2.54	3.04	3.55	4.06	-	-	-	-
	21	8	13.9	40	19	0.96	1.92	2.40	2.88	3.37	3.85	-	-	-	-
	25	8	9.8	48	23	0.79	1.59	1.98	2.38	2.78	3.18	-	-	-	-
	26	8	9.2	50	24	0.76	1.52	1.90	2.28	2.66	3.04	-	-	-	-
FMR3000	25	10	13.8	48	23	0.79	1.59	1.98	2.38	2.78	3.18	-	-	-	-
	26	10	12.6	50	24	0.76	1.52	1.90	2.28	2.66	3.04	-	-	-	-
	32	10	8.4	62	30	0.61	1.22	1.52	1.83	2.13	2.43	-	-	-	-
	33	10	8.0	64	31	0.59	1.18	1.47	1.77	2.06	2.36	-	-	-	-
	40	10	5.8	78	38	0.48	0.96	1.20	1.44	1.68	1.92	-	-	-	-
	50	10	4.2	98	48	0.38	0.76	0.95	1.14	1.33	1.52	-	-	-	-
	63	10	3.1	124	61	0.30	0.60	0.75	0.90	1.05	1.20	-	-	-	-
66	10	2.9	130	64	0.29	0.57	0.71	0.86	1.00	1.14	-	-	-	-	
FMR4000	25	12	4.5	48	23	0.79	1.59	1.98	2.38	2.78	3.18	-	-	-	-
	26	12	4.1	50	24	0.76	1.52	1.90	2.28	2.66	3.04	-	-	-	-
	32	12	14.7	62	30	0.61	1.22	1.52	1.83	2.13	2.43	3.04	3.65	-	-
	33	12	13.8	64	31	0.59	1.18	1.47	1.77	2.06	2.36	2.95	3.54	-	-
	40	12	9.6	78	38	0.48	0.96	1.20	1.44	1.68	1.92	2.40	2.88	-	-
	50	12	6.7	98	48	0.38	0.76	0.95	1.14	1.33	1.52	1.90	2.28	-	-
	63	12	4.8	124	61	0.30	0.60	0.75	0.90	1.05	1.20	1.50	1.80	-	-
	66	12	4.5	130	64	0.29	0.57	0.71	0.86	1.00	1.14	1.43	1.71	-	-
	80	12	3.5	158	78	0.23	0.47	0.58	0.70	0.82	0.94	1.17	1.40	-	-
100	12	2.6	198	98	0.19	0.37	0.47	0.56	0.65	0.74	0.93	1.12	-	-	
FMR5000	40	16	17.8	78	38	0.48	0.96	1.20	1.44	1.68	1.92	2.40	2.88	3.85	-
	50	16	11.3	98	48	0.38	0.76	0.95	1.14	1.33	1.52	1.90	2.28	3.04	-
	63	16	7.6	124	61	0.30	0.60	0.75	0.90	1.05	1.20	1.50	1.80	2.39	-
	66	16	7.1	130	64	0.29	0.57	0.71	0.86	1.00	1.14	1.43	1.71	2.28	-
	80	16	5.3	158	78	0.23	0.47	0.58	0.70	0.82	0.94	1.17	1.40	1.87	-
	100	16	4.0	198	98	0.19	0.37	0.47	0.56	0.65	0.74	0.93	1.12	1.49	-
	125	16	3.0	248	123	0.15	0.30	0.37	0.45	0.52	0.59	0.74	0.89	1.19	-
160	16	2.2	318	158	0.12	0.23	0.29	0.35	0.40	0.46	0.58	0.69	0.92	-	
FMR6000	50	20	17.8	98	48	0.38	0.76	0.95	1.14	1.33	1.52	1.90	2.28	3.04	3.81
	63	20	11.1	124	61	0.30	0.60	0.75	0.90	1.05	1.20	1.50	1.80	2.39	2.99
	80	20	7.4	158	78	0.23	0.47	0.58	0.70	0.82	0.94	1.17	1.40	1.87	2.34
	100	20	5.3	198	98	0.19	0.37	0.47	0.56	0.65	0.74	0.93	1.12	1.49	1.86
	125	20	4.0	248	123	0.15	0.30	0.37	0.45	0.52	0.59	0.74	0.89	1.19	1.48
	160	20	2.9	318	158	0.12	0.23	0.29	0.35	0.40	0.46	0.58	0.69	0.92	1.16
	200	20	2.2	398	198	0.09	0.18	0.23	0.28	0.32	0.37	0.46	0.55	0.74	0.92
	250	20	1.7	498	248	0.07	0.15	0.18	0.22	0.26	0.29	0.37	0.44	0.59	0.74

FMR P-POSITIVE

P

H

M

S

K

N

BACK TO

RANGE INDEX

SECTION INDEX

MAIN INDEX

ULTIMATE