

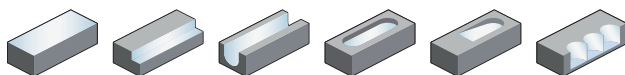
A

Turning

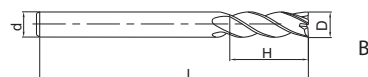
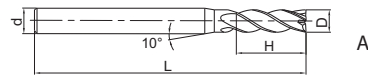
End mill long cutting edge

High-performance machining

PM-4EL



- Factory standard
- Centre cutting
- Helix angle 45°



B

Milling

Article	*	Dimensions [mm]				Teeth	Geometry	Grade
		D	d (h6)	H	L			KMG405
PM-4EL-D3.0		3	6	12	75	4	A	●
PM-4EL-D4.0		4	6	15	75	4	A	●
PM-4EL-D5.0		5	6	20	75	4	A	●
PM-4EL-D6.0		6	6	20	75	4	B	●
PM-4EL-D8.0		8	8	25	100	4	B	●
PM-4EL-D10.0		10	10	30	100	4	B	●
PM-4EL-D12.0		12	12	35	100	4	B	●
PM-4EL-D14.0		14	14	40	100	4	B	●
PM-4EL-D16.0		16	16	50	150	4	B	●
PM-4EL-D20.0		20	20	55	150	4	B	●

● Ex stock ○ On demand

* With internal cooling

C

Drilling

Application field

P	M	K	N	S	H
✓	✓	✓			✓

✓ Very suitable

✓ Suitable

D

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System code > B268

Cutting data > B436

Nonstandard order > B477

End mill – PM series

Material group		Composition / structure / heat treatment		Brinell hardness HB	Machining group	Starting values for cutting speed v _c [m/min]								
						PM-2E PM-4E PM-4E-G				PM-4EL PM-4EL-G PM-4EX-G				
						Slot milling		Shoulder milling		Slot milling		Shoulder milling		
						Ø [mm]	a _p max	Ø [mm]	a _e max	Ø [mm]	a _p max	Ø [mm]	a _e max	
						0 < x < 3	0,15xD	0 < x ≤ 20	0,15xD	0 < x < 3	0,15xD	0 < x ≤ 20	0,15xD	
						3 ≤ x < 6	0,3xD			3 ≤ x < 6	0,3xD			
						6 ≤ x ≤ 20	0,5xD			6 ≤ x ≤ 20	0,5xD			
KMG405				KMG405										
a _e / D				a _e / D										
1/1	1/2	1/10	f-group	1/1	1/2	1/10	f-group							
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	165	220	300	1	140	190	255	1	
		approx. 0,45 % C	annealed	190	2	160	210	285	1	135	185	245	1	
		approx. 0,45 % C	tempered	250	3	120	155	210	1	100	135	180	1	
		approx. 0,75 % C	annealed	270	4	100	135	180	1	85	115	155	1	
		approx. 0,75 % C	tempered	300	5	95	125	165	1	80	105	145	1	
	Low-alloyed steel		annealed	180	6	125	165	225	1	110	145	195	1	
			tempered	275	7	100	135	180	1	85	115	155	1	
			tempered	300	8	95	125	165	1	80	105	145	1	
			tempered	350	9	90	115	160	1	75	100	135	1	
High-alloyed steel and high-alloyed tool steel		annealed	200	10	120	155	210	1	100	135	180	1		
		hardened and tempered	325	11	90	120	160	1	75	105	140	1		
M	Stainless steel	ferritic/martensitic	annealed	200	12	55	75	100	1	45	65	85	1	
		martensitic	tempered	240	13	50	65	85	1	40	55	75	1	
		austenitic	quench hardened	180	14	60	75	105	1	50	65	90	1	
		austenitic-ferritic		230	15	50	65	85	1	40	55	75	1	
K	Grey cast iron	perlitic/ferritic		180	16	125	165	220	1	105	140	190	1	
		perlitic (martensitic)		260	17	100	135	180	1	85	115	155	1	
	Cast iron with spheroidal graphite	ferritic		160	18	150	200	270	1	130	175	230	1	
		perlitic		250	19	120	155	210	1	100	135	180	1	
	Malleable cast iron	ferritic		130	20	165	220	300	1	145	190	255	1	
		perlitic		230	21	135	180	240	1	115	155	205	1	
N	Aluminium wrought alloys	cannot be hardened		60	22									
		hardenable	hardened	100	23									
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24									
		≤ 12 % Si, hardenable	hardened	90	25									
		> 12 % Si, cannot be hardened		130	26									
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27									
		CuZn, CuSnZn		90	28									
CuSn, Pb-free copper, electrolytic copper		100	29											
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30									
			hardened	280	31									
		Ni or Co bass	annealed	250	32									
			hardened	350	33									
			cast	320	34									
	Titanium alloys	pure titanium		R _m 400	35									
		α and β alloys	hardened	R _m 1050	36									
H	Hardened steel		hardened and tempered	55 HRC	37	80	105	140	1	65	90	120	1	
			hardened and tempered	60 HRC	38									
	Hard cast iron		cast	400	39	105	140	185	1	85	120	160	1	
	Hardened cast iron		hardened and tempered	55 HRC	40									
X	Non-metallic materials	Thermoplasts			41									
		Thermosetting plastics			42									
		Plastic, glass-fibre reinforced GFRP			43									
		Plastic, carbon fibre reinforced CFRP			44									
		Graphite			45									
		Wood			46									

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B460.
For examples of material for cutting tool groups view page D22.

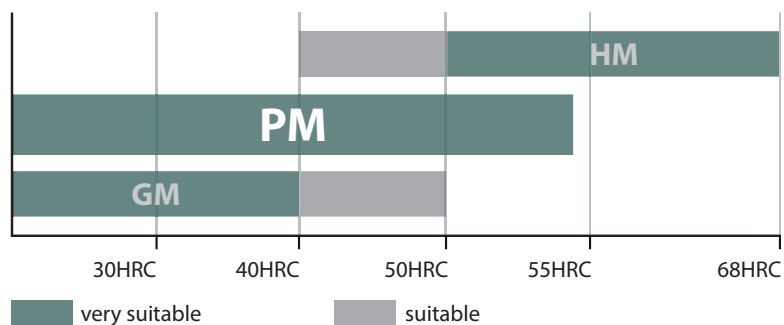


PM series

For demanding applications

- For machining of steel to max. 55 HRC and cast iron to heat-resistant alloys.
- Very solid cutting edge with high stiffness for higher cutting speeds and feed rates.
- End mills, ball nose cutters, torus mills and high feed mills
- Diameter range 3.0–20.0 mm

Application fields for machining of steel



GM – 2 E L P – D12 R0.5 – M08 – W

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A

Turning

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Milling

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Application	
Code	Description
GR	General roughing
GM	Semi-finishing
GF	Finishing
PM	High-performance machining
HM	Hard machining
HH	High-speed hard machining
NM	General machining of non-ferrous metals
AL	General machining of Al and Al alloys
ALP	High-performance machining of Al and Al alloys
ALG	General machining of Al and Al alloys
UM	HSC/HPC machining
VSM	General machining of heat-resistant alloys

Number
of teeth

1

2

Cutting edge type	
Code	Description
E	Square shoulder mill with protective chamfer
F	Square shoulder mill with sharp cutting edges
B	Ball nose cutter
R	Torus mill
W	Ripper
H	High-feed mill

3

Cutting edge length	
Code	Description
L	Long
X	Extra long
F	Short

4

Type	
Code	Description
S	Mini diameter
P	Ground neck
C	Conical neck

5

Diameter [mm]	
Code	Description
D3.0	3,0
D8.0	8,0
D20.0	20,0
...	

6

Radius [mm]	
Code	Description
R0.5	0,5
R1.0	1,5
R3.0	3,0
...	

7

Features	
Code	Description
G	Spiral angle 30°
M	Neck length [mm]
S	Thin shank
AIR	For aerospace industry

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Weldon shank	
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a Groove milling



b Square shoulder milling



c Profile milling



d Slot milling



e Face milling



f Chamfer milling



g Plunge milling



h Circular milling/Ramping

A

Turning

Coated cemented carbide PVD

Grade	Grade description
KMD401	PVD coated carbide substrate for high performance milling application of non-ferrous metals, CFRP and GFRP and organic materials. The DLC layer has very good wear protection and high thermal stability.

B

Milling

KMG303	PVD coated carbide substrate for universal milling application of steel (up to HRC<=48), stainless steel and cast iron.
KMG405	PVD coated carbide substrate for high performance milling application of steel (up to HRC <55), stainless steel, super alloy material and cast iron. High wear resistance and toughness for a wide application field.

C

Drilling

KMG555	PVD coated carbide substrate for hard milling application of steel (HRC 55–68), highest wear resistance and toughness for best cutting result.
KMG309	PVD coated carbide substrate for non ferrous materials. High wear resistance even in abrasive materials.

D

Technical Information

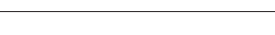
Uncoated cemented carbide

Grade	Grade description
YK30F	Uncoated K30 carbide substrate for steel, stainless steel, cast iron and non ferrous materials.
YK40F	Uncoated K20–K30/N20–N30 carbide substrate for cast iron and non ferrous materials.

E

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High performance milling

Products	Solid carbide cutters	Teeth	Ø	Application						Type	Page
				P	M	K	N	S	H		
PM-2E		2	1.0-20.0	✓	✓	✓			✓	End mills	B330
PM-2EL		2	3.0-20.0	✓	✓	✓			✓	End mills	B331
PM-4E-G		4	1.0-20.0	✓	✓	✓			✓	End mills	B332
PM-4EL-G		4	3.0-20.0	✓	✓	✓			✓	End mills	B333
PM-4EX-G		4	3.0-20.0	✓	✓	✓			✓	End mills	B334
PM-4E		4	1.0-20.0	✓	✓	✓			✓	End mills	B335
PM-4EL		4	3.0-20.0	✓	✓	✓			✓	End mills	B336
PM-6E		6	6.0-20.0	✓	✓	✓			✓	End mills	B337
PM-6EL		6	6.0-20.0	✓	✓	✓			✓	End mills	B338
PM-2B		2	1.0-20.0	✓	✓	✓			✓	Ball nose cutters	B339
PM-2BL		2	2.0-20.0	✓	✓	✓			✓	Ball nose cutters	B340
PM-2BFP		2	1.0-20.0	✓	✓	✓			✓	Ball nose cutters	B341
PM-2BC		2	0.5-4.0	✓	✓	✓			✓	Ball nose cutter with conical neck	B342
PM-4B		4	3.0-20.0	✓	✓	✓			✓	Ball nose cutters	B345
PM-4BL		4	3.0-20.0	✓	✓	✓			✓	Ball nose cutters	B346
PM-2R		2	1.0-12.0	✓	✓	✓			✓	Torus mills	B347
PM-4R		4	3.0-12.0	✓	✓	✓			✓	Torus mills	B350
PM-4RL		4	6.0-16.0	✓	✓	✓			✓	Torus mills	B351
PM-4H		4	3.0-12.0	✓	✓	✓			✓	High-feed mills	B348
PM-4HL		4	4.0-12.0	✓	✓	✓			✓	High-feed mills	B349

✓ Very suitable ✓ Suitable