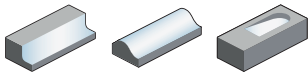


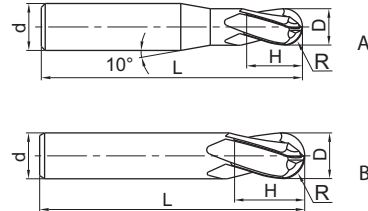
Ball nose cutter

Hard machining

HM-4B



- Factory standard
- Centre cutting
- Helix angle 35°



Article	*	Dimensions [mm]					Teeth	Geometry	Grade
		R	D	d (h6)	H	L			KMG555
HM-4B-R1.5		1.5	3	6	6	50	4	A	●
HM-4B-R2.0		2	4	6	8	50	4	A	●
HM-4B-R2.5		2.5	5	6	10	50	4	A	●
HM-4B-R3.0		3	6	6	12	50	4	B	●
HM-4B-R4.0		4	8	8	16	60	4	B	●
HM-4B-R5.0		5	10	10	20	75	4	B	●
HM-4B-R6.0		6	12	12	24	75	4	B	●
HM-4B-R7.0		7	14	14	28	75	4	B	●
HM-4B-R8.0		8	16	16	32	100	4	B	●
HM-4B-R9.0		9	18	18	36	100	4	B	●
HM-4B-R10.0		10	20	20	40	100	4	B	●

● Ex stock ○ On demand

* With internal cooling

Application field

P	M	K	N	S	H
					✓

✓ Very suitable

✓ Suitable

System code > B268

Cutting data > B436

Nonstandard order > B477

End mill – HM series

Material group		Composition / structure / heat treatment		Brinell hardness HB	Machining group	Starting values for cutting speed v_c [m/min]								
						HM-2E HM-2EP HM-2ES HM-4E				HM-2EFP HM-4EL HM-4EFP				
								Shoulder milling				Shoulder milling		
								$\varnothing$ [mm]	a_e max			$\varnothing$ [mm]	a_e max	
								$0 < x \leq 20$	$0,05 \times D$			$0 < x \leq 20$	$0,05 \times D$	
				KMG555				KMG555						
				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									
		approx. 0,45 % C	annealed	190	2									
		approx. 0,45 % C	tempered	250	3									
		approx. 0,75 % C	annealed	270	4									
		approx. 0,75 % C	tempered	300	5									
	Low-alloyed steel		annealed	180	6									
			tempered	275	7									
			tempered	300	8									
			tempered	350	9									
	High-alloyed steel and high-alloyed tool steel		annealed	200	10									
		hardened and tempered	325	11										
M	Stainless steel	ferritic/martensitic	annealed	200	12									
		martensitic	tempered	240	13									
		austenitic	quench hardened	180	14									
		austenitic-ferritic		230	15									
K	Grey cast iron	perlitic/ferritic		180	16									
		perlitic (martensitic)		260	17									
	Cast iron with spheroidal graphite	ferritic		160	18									
		perlitic		250	19									
	Malleable cast iron	ferritic		130	20									
		perlitic		230	21									
N	Aluminium wrought alloys	cannot be hardened		60	22									
		hardenable	hardened	100	23									
	Cast aluminium alloys	$\leq 12\%$ Si, cannot be hardened		75	24									
		$\leq 12\%$ 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	55	100	125	3	50	95	115	3	
			hardened and tempered	60 HRC	38	55	95	120	3	50	95	110	3	
	Hard cast iron		cast	400	39	70	125	160	3	65	120	145	3	
	Hardened cast iron		hardened and tempered	55 HRC	40	55	100	125	3	50	95	115	3	
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.

Index

Recommended feed rate

Solid carbide milling group 5 – Ball nose cutters GM series

	a_e / D	Feed rate per cutting edge (f_z) [mm]																
		Ø0,5	Ø0,8	Ø 1	Ø 2	Ø 3	Ø 4	Ø 5	Ø 6	Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 18	Ø 20		
P	1/1																	
	1/10	0,02	0,05	0,05	0,05	0,05	0,05	0,07	0,07	0,09	0,14	0,16	0,16	0,18	0,18	0,20		
	1/20	0,03	0,06	0,06	0,06	0,06	0,06	0,08	0,08	0,11	0,17	0,20	0,20	0,23	0,23	0,25		
M	1/1																	
	1/10	0,02	0,04	0,04	0,04	0,04	0,04	0,05	0,05	0,07	0,11	0,13	0,13	0,15	0,15	0,16		
	1/20	0,02	0,05	0,05	0,05	0,05	0,05	0,07	0,07	0,09	0,14	0,16	0,16	0,18	0,18	0,21		
K	1/1																	
	1/10	0,02	0,05	0,05	0,05	0,05	0,05	0,07	0,07	0,09	0,14	0,16	0,16	0,18	0,18	0,20		
	1/20	0,03	0,06	0,06	0,06	0,06	0,06	0,08	0,08	0,11	0,17	0,20	0,20	0,23	0,23	0,25		
H	1/1																	
	1/10	0,02	0,04	0,04	0,04	0,04	0,04	0,05	0,05	0,07	0,11	0,13	0,13	0,15	0,15	0,16		
	1/20	0,02	0,05	0,05	0,05	0,05	0,05	0,07	0,07	0,09	0,14	0,16	0,16	0,18	0,18	0,21		

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

Solid carbide milling group 6 – High feed mills PM series

	a_e / D	Feed rate per cutting edge (f_z) [mm]																
		Ø 3	Ø 4	Ø 5	Ø 6	Ø 8	Ø 10	Ø 12										
P	1/1																	
	1/10																	
	1/20	0,15	0,25	0,28	0,33	0,44	0,55	0,66										
M	1/1																	
	1/10																	
	1/20	0,12	0,22	0,25	0,30	0,41	0,52	0,63										
K	1/1																	
	1/10																	
	1/20	0,15	0,25	0,28	0,33	0,44	0,55	0,66										
H	1/1																	
	1/10																	
	1/20	0,12	0,22	0,25	0,30	0,41	0,52	0,63										

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

Solid carbide milling group 7 – Ball nose cutters HM series

	a_e / D	Feed rate per cutting edge (f_z) [mm]																
		Ø0,5	Ø0,8	Ø 1	Ø 2	Ø 3	Ø 4	Ø 5	Ø 6	Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 18	Ø 20		
H	1/1																	
	1/2	0,02	0,04	0,04	0,04	0,04	0,04	0,05	0,05	0,07	0,11	0,13	0,13	0,15	0,15	0,16		
	1/10	0,02	0,05	0,05	0,05	0,05	0,05	0,07	0,07	0,09	0,14	0,16	0,16	0,18	0,18	0,21		

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

Solid carbide milling group 8 – High feed mills AL series

	a_e / D	Feed rate per cutting edge (f_z) [mm]																
		Ø 6	Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 18	Ø 20									
N	1/1	0,04	0,05	0,08	0,09	0,11	0,13	0,16	0,18									
	3/4	0,05	0,07	0,10	0,12	0,14	0,16	0,20	0,23									
	1/10	0,08	0,11	0,16	0,19	0,22	0,25	0,31	0,36									

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

A

Turning

B

Milling

C

Drilling

D

Technical Information

E

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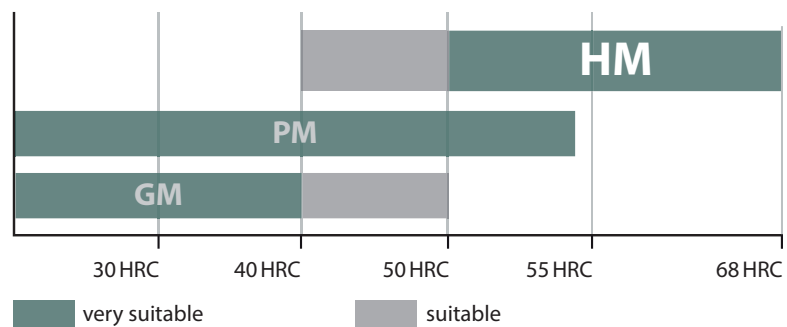


HM series

For machining of hardened materials

- For machining of steel up to 68 HRC.
- Very stable cutting edge with high stiffness and newest coating technology for high cutting speeds and feed rates.
- End mills, ball nose cutters, torus mills and mini cutters
- Diameter range 0.3–20.0 mm

Application fields for machining of steel



GM – 2 E L P – D12 R0.5 – M08 – W

1

2

3

4

5

6

7

8

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A

Turning

B

Milling

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Drilling

D

Technical
Information

E

Index

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

8

Weldon shank	
--------------	--

9



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

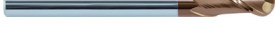
Uncoated cemented carbide

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

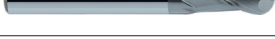
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Machining high hardness steel

Products	Solid carbide cutters	Teeth	Ø	Application						Type	Page
				P	M	K	N	S	H		
HM-6E		6	6.0-20.0						✓	End mills	B363
HM-6EL		6	6.0-20.0						✓	End mills	B364
HM-2B		2	1.0-20.0						✓	Ball nose cutters	B365
HM-2BL		2	2.0-20.0						✓	Ball nose cutters	B366
HM-2BFP		2	1.0-20.0						✓	Ball nose cutters	B367
HM-2BS		2	0.3-3.0						✓	Mini ball nose cutters	B368
HM-2BP		2	0.5-5.0						✓	Mini ball nose cutters	B369
HM-4B		4	3.0-20.0						✓	Ball nose cutters	B371
HM-4BL		4	3.0-20.0						✓	Ball nose cutters	B372
HM-4R		4	3.0-12.0						✓	Torus mills	B373
HM-4RF		4	6.0-12.0						✓	Torus mills	B374
HM-4RP		4	6.0-16.0						✓	Torus mills	B375

✓ Very suitable ✓ Suitable

Copper and copper alloys

5502R402NM		2	3.0-20.0				✓			End mills	B378
NM-2E		2	1.0-12.0				✓			End mills	B379
NM-2EP		2	0.5-5.0				✓			Mini end mills	B380
NM-4E		4	3.0-12.0				✓			End mills	B381
NM-2B		2	1.0-12.0				✓			Ball nose cutters	B382
NM-2BP		2	0.5-5.0				✓			Mini ball nose cutters	B383

✓ Very suitable ✓ Suitable