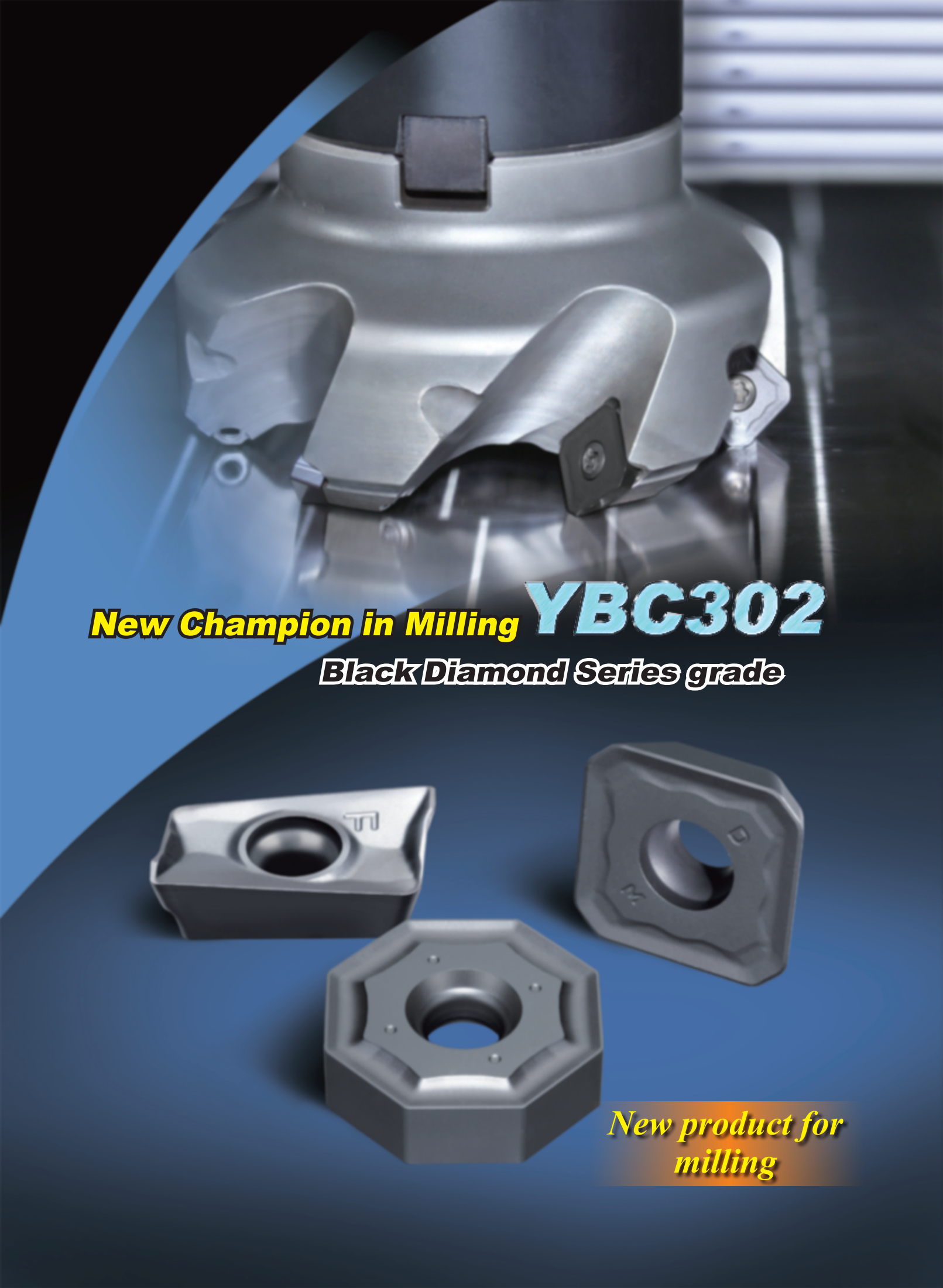
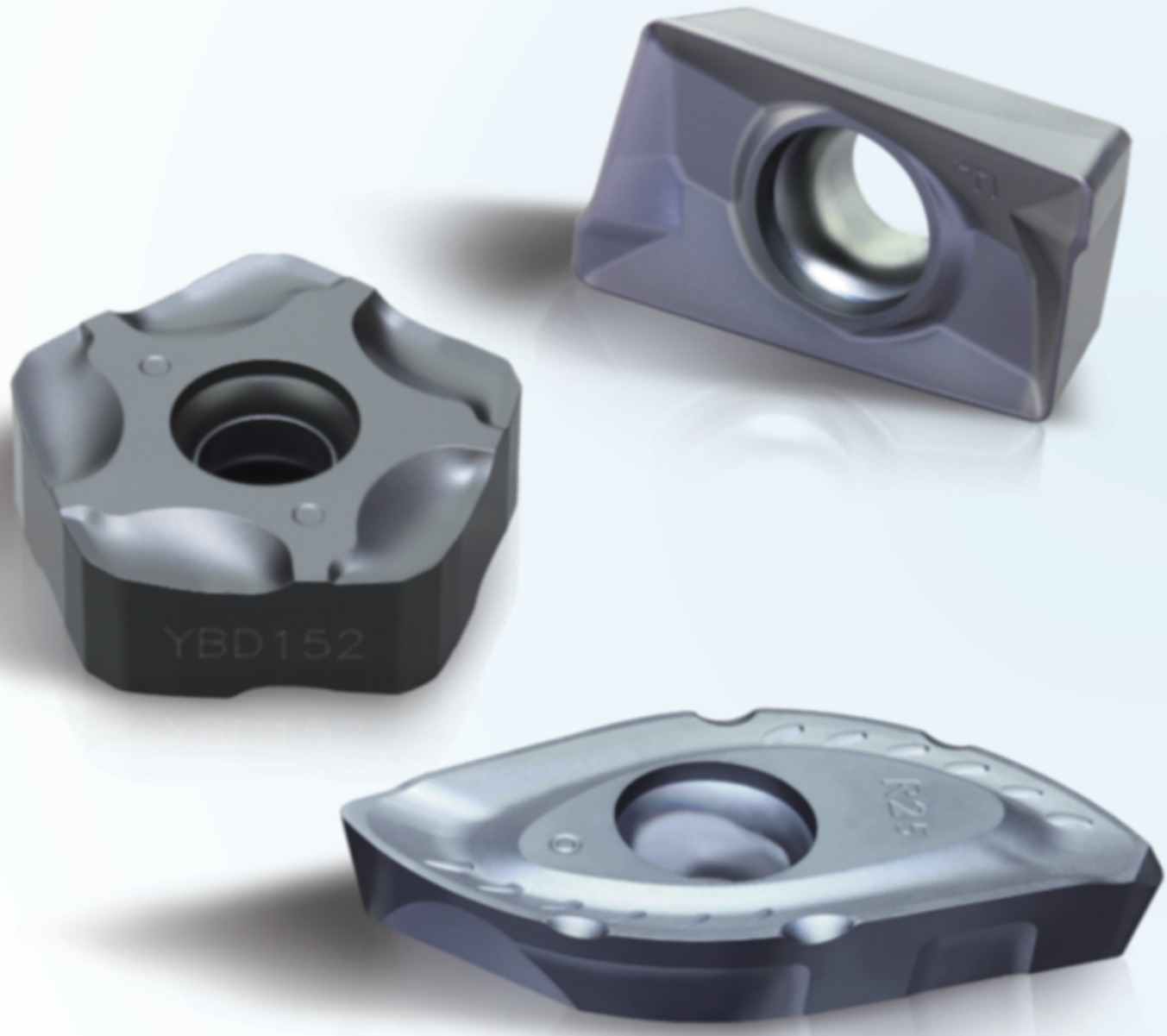
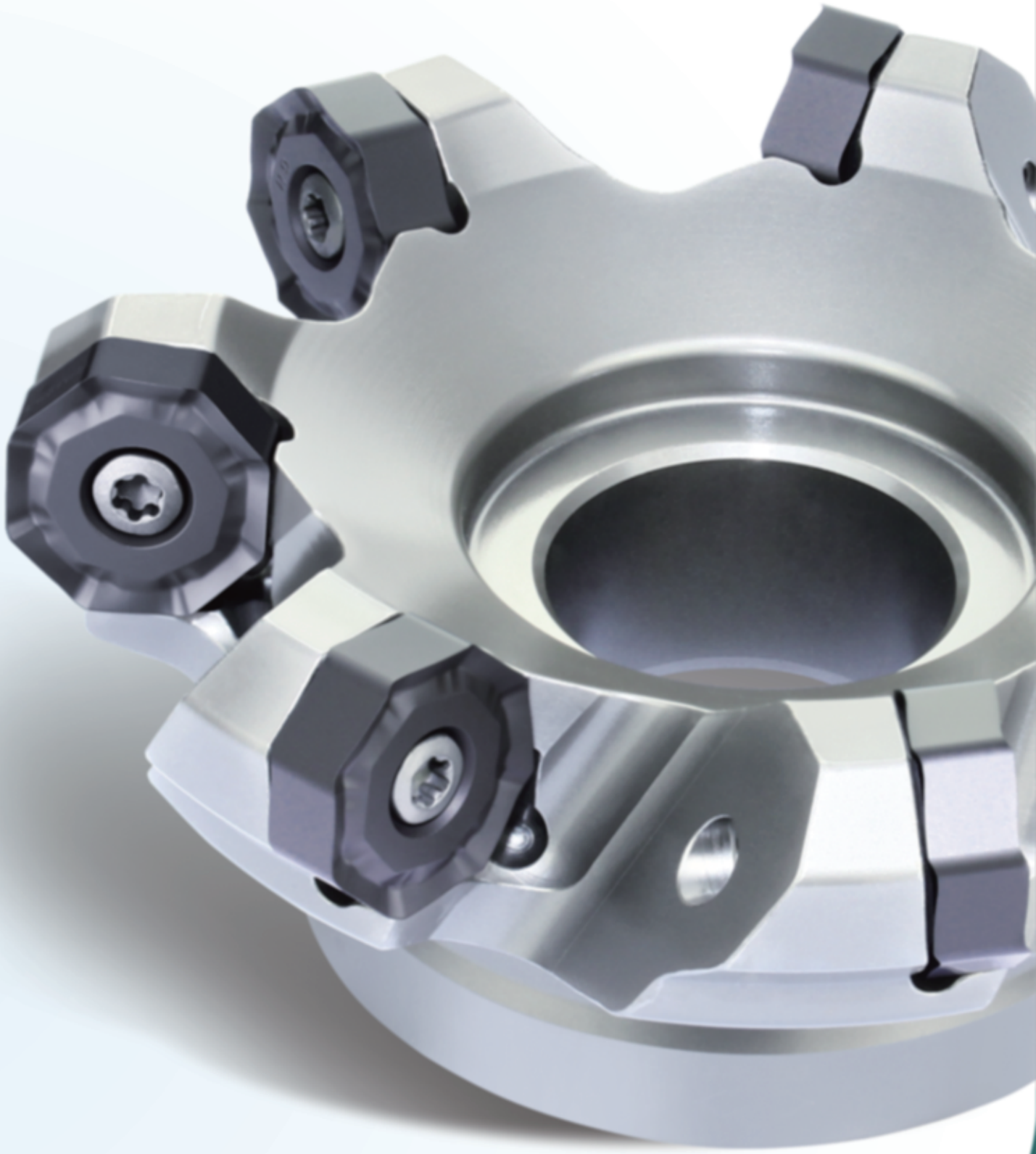

New Champion in Milling
YBC302
Black Diamond Series grade
New product for milling


YBD152
K2



Milling Tools

Indexable milling tools

New product for milling

FMA11 *Face milling cutter series*

FMA12

High Performance Face Mill with 16 edges for outstanding economy

New product for milling

New product for milling

EMP13 Series

Achieving high quality 90°square shoulding milling

Milling B

Indexable Milling Tools B1-B198

Indexable milling tools B2-B163

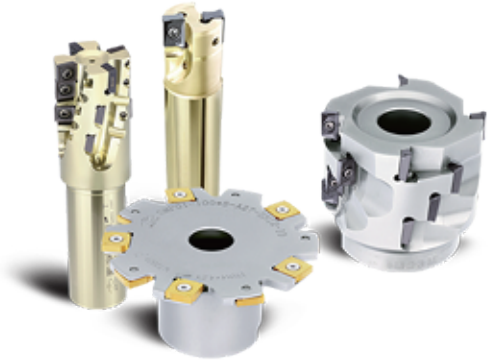
Indexable milling inserts B164-B191

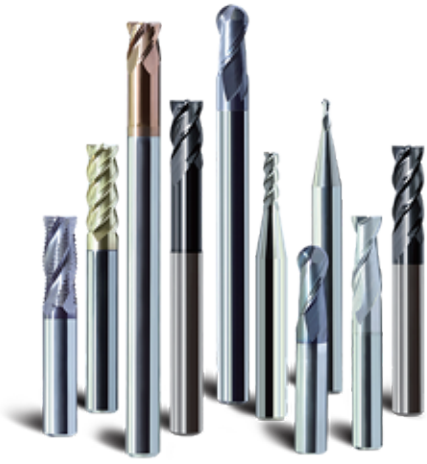
Technical information B192-B198

Solid Carbide End Mills B199-B434

Solid carbide end mills B199-B430

Technical information B431-B434





WHIRLWIND FMD02

milling cutter series

How to choose the right indexable milling tools

■ Classification of milling tools

According to types of machining operation

Applicable machining operations
For face milling, chamfering, shoulder milling etc.

product series

Type of machining

Workpiece materials

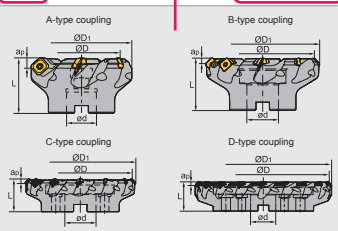
Approach angle

Structure and coupling size

Face milling tools | Kr:45°

FMA01 P M K N S

Close and even pitch



Face milling | Chamfering

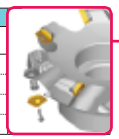
Specification of tools

Type		Stock R	Stock L	Basic dimensions(mm) ØD	ØD1	ød	L	apmax	Number of teeth Z	Type of coupling	Weight (kg)
FMA01	-050-A22-SE12-04	▲	△	50	61	22	40	6	4	A	0.3
	-063-A22-SE12-05	▲	△	63	74	22	40	6	5	A	0.5
	-080-A27-SE12-06	▲	△	80	91	27	50	6	6	A	1.2
	-100-B32-SE12-07	▲	△	100	107	32	50	6	7	B	1.2
	-125-B40-SE12-08	▲	△	125	136	40	63	6	8	B	2.6
	-160-B40-SE12-10	▲	△	160	170	40	63	6	10	B	4.3
	-200-C60-SE12-12	▲	△	200	210	60	63	6	12	C	7.6
	-250-C60-SE12-14	▲	△	250	260	60	63	6	14	C	13.5
	-315-D60-SE12-18	△	△	315	325	60	70	6	18	D	20.8

▲Stock available △Make-to-order

Spare parts

Diameter ØD	Insert screw	Shim	Shim screw	Wrench	Wrench
Ø50 -Ø100	I60M3.5×10	--	--	WT15IS	--
Ø125-Ø315	I60M3.5×12	S13BS	SM5×7XA		WH35L



Tools code key B22~B23 | Grade selection guide B18~B21 | Technical data B192~B198

Spare parts

Assembly of tools and spare parts

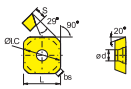
Tools specification
Tool shape, dimensions, stock, etc

Tools code key, reference to grade selection, technical data

Tool shape

Inserts specification
Insert shape, type, dimensions, grade, stock, etc.

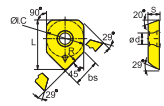
Selection of inserts



Good working condition | Normal working condition | Bad working condition

Workpiece material																															
P Steel	😃	😃	😃	😃	😐					😃	😃	😐			😊	😊	😊	😐													
M Stainless steel	😐	😐	😐	😐	😐					😐	😃	😐			😊	😊	😊	😐													
K Cast iron								😃	😃	😊							😃	😊					😊			😐					
N Non-ferrous metal																													😃	😐	
S Heat resistant alloy, Ti alloy										😊	😐	😐																			

Insert shape	Type	Basic dimensions(mm) L	ØI.C	S	ød	bs	R	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC305	YD051	YD101	YD201
	SEET12T3-DF	13.4	13.4	3.97	4.1	2.55		●	★	●						★		○								
	SEET12T3-CF	13.4	13.4	3.97	4.1	2.55							○		★	○		○								
	SEET12T3-EF	13.4	13.4	3.97	4.1	2.55										○		○								
	SEET12T3-DM	13.4	13.4	3.97	4.1	2.55		●	★	●			○			★		★								
	SEET12T3-CM	13.4	13.4	3.97	4.1	2.55							★			★		○								
	SEET12T3-EM	13.4	13.4	3.97	4.1	2.55				●		●				○		★								
	SEET12T3-DR	13.4	13.4	3.97	4.1	2.55		●	★			●				★		★								
	SEET12T3-CR	13.4	13.4	3.97	4.1	2.55		●					★					★								
	SEET12T3-LH	13.4	13.4	3.97	4.1	2.55																			○	★
	SEET12T3-W	17.82	13.4	3.97	4.1	9.46	500		★	●			★			★					★					



★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Chipbreaker selection for FMA01 milling inserts

Classification \ Function	For finishing	For semi-finishing	For roughing
P	-DF	-DM	-DR
M, S	-EF	-EM	
K	-CF	-CM	-CR
N	-LH		

Chipbreaker selection

How to choose indexable milling inserts

■ Detailed information for indexable milling inserts

Listed according to insert shape

Select insert grade according to workpiece material and working condition. Prior to selecting grade, please refer to the working condition suitable for the workpiece material.

😊 Good working condition: machine works well and stably. There are high requirements for dimensional precision of components and quality surface.

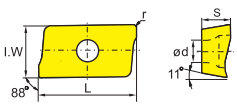
😐 Normal working condition: machine works normally. There are certain requirements for dimensional precision of components and surface quality.

☹ Bad working condition: machine works with bad stability. There are high requirements for high metal removal rate.

Insert shape and size

Insert shape

AP□□



Workpiece material	😊 Good working condition	😐 Normal working condition	☹ Bad working condition
P Steel	😐 😐 😐 😐 ☹	😐 😐 😐 ☹	😊 😊 😊 ☹
M Stainless steel	😐 😐 😐 😐 ☹	😐 😐 😐 ☹	😊 😊 😊 ☹
K Cast iron	☹ ☹ 😊	😐 😊	😊 ☹
N Non-ferrous metal			😐 ☹
S Heat resistant alloy, Ti alloy	😊 😐 😐		

Insert shape	Type	Basic dimensions(mm)					CVD Coating						PVD Coating					Cermet		Cemented carbide		
		L	I.W	S	ød	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	APKT11T304-PF	12.24	6.5	3.6	2.8	0.4	●	★	○		○			○	○		○								
	APKT11T308-PF	12.24	6.5	3.6	2.8	0.8		★	○					○	○										
	APKT11T312-PF	12.24	6.5	3.6	2.8	1.2		★							○										
	APKT11T316-PF	12.24	6.5	3.6	2.8	1.6		★							○										
	APKT160408-PF	17.877	9.33	5.76	4.4	0.8	●	★	○		○				○		○								
	APKT11T304-PM	12.24	6.5	3.6	2.8	0.4	●	★	●		●			★	★		★								
	APKT11T308-PM	12.24	6.5	3.6	2.8	0.8	●	★	●		○		★	★	★		★								
	APKT11T312-PM	12.24	6.5	3.6	2.8	1.2		★	○					○	★		○								
	APKT11T316-PM	12.24	6.5	3.6	2.8	1.6		★	○					○	★		○								
	APKT160408-PM	17.877	9.33	5.76	4.4	0.8	●	★	●		●		○	★	★		★								
	APKT11T304-PR	12.24	6.5	3.6	2.8	0.4	●	★	●		●			○	○		○								
	APKT11T308-PR	12.24	6.5	3.6	2.8	0.8		★									○								
	APKT11T312-PR	12.24	6.5	3.6	2.8	1.2		★									○								
	APKT11T316-PR	12.24	6.5	3.6	2.8	1.6		★									○								
	APKT160408-PR	17.877	9.33	5.76	4.4	0.8		★									○								
	APKT11T304-LH	12.24	6.5	3.6	2.8	0.4																	★	★
	APKT11T308-LH	12.24	6.5	3.6	2.8	0.8																	★	○
	APKT160408-LH	17.877	9.33	5.76	4.4	0.8																	★	★

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Insert grade

Insert shape

Stock condition

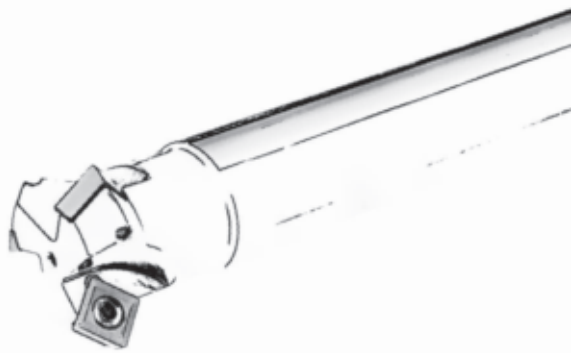
Insert dimension

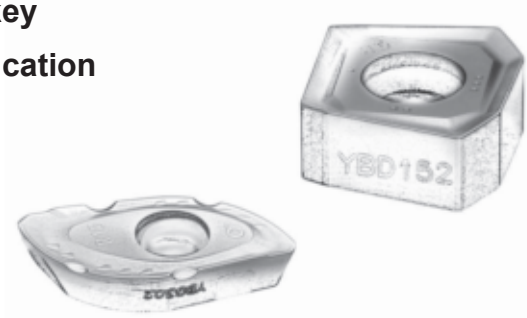
Insert type

MILLING

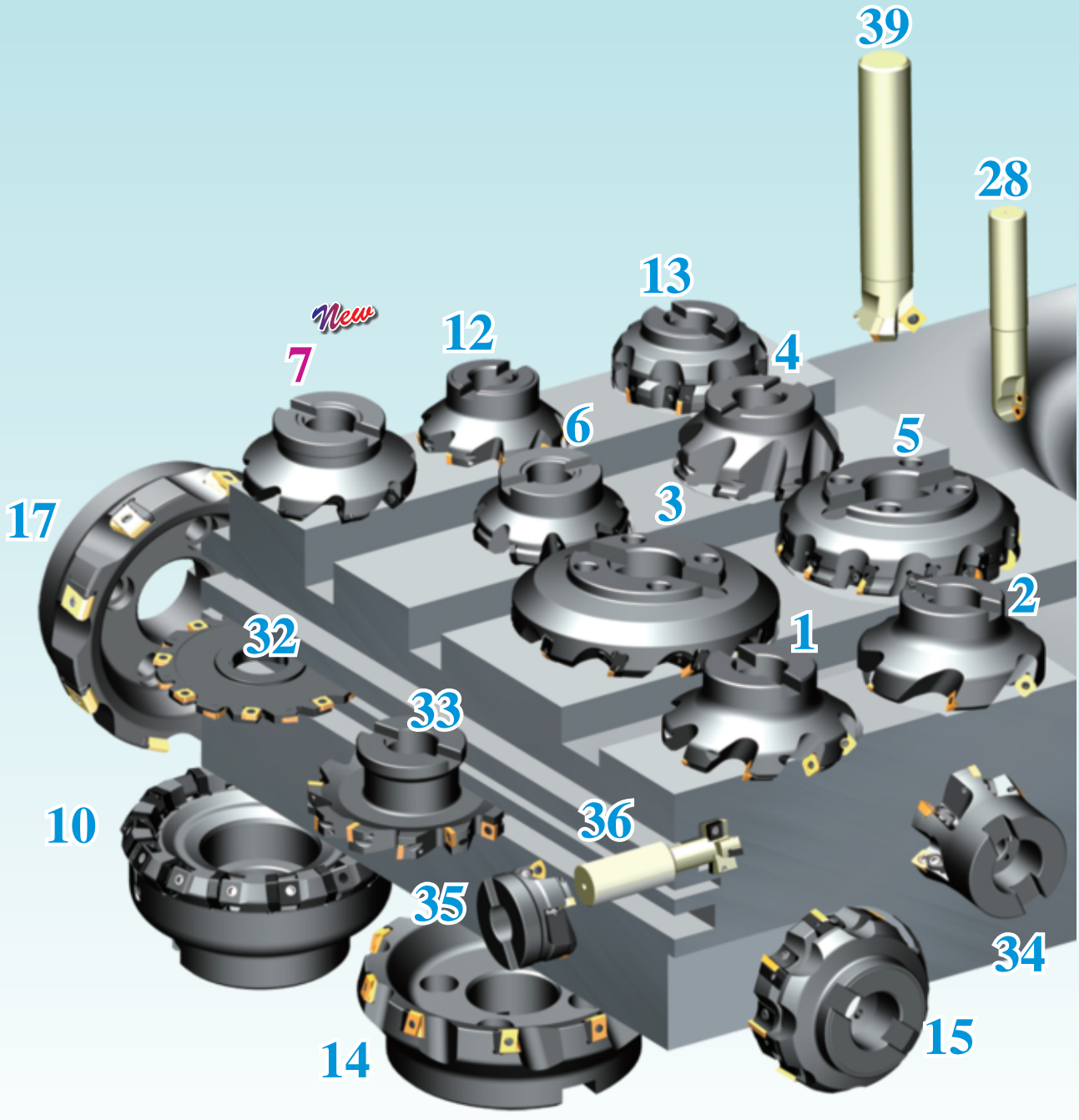
Indexable Milling Tools

B6-B7	**Indexable milling tools family**
B9-B14	**Indexable milling tools overview**
B17	**Milling insert grades overview**
B18-B21	**Grade classification for milling inserts**
B22-B23	**Indexable milling tools code key**
B24-B163	**Indexable milling tool series**
B24-B87	Face milling tool series
B88-B110	Square shoulder milling tool series
B111-B132	Profile milling tool series
B133-B139	Side and face milling series
B140-B148	Special milling tool series (high feed rate)
B149-B151	Boring millers
B152-B153	T-slot milling tool series
B154-B158	Helical end mill series
B159-B163	Chamfer milling tool series
B164-B165	**Indexable milling inserts overview**
B166-B167	**Indexable milling inserts code key**
B168-B191	**Indexable milling inserts specification**
B192-B198	**Technical information**





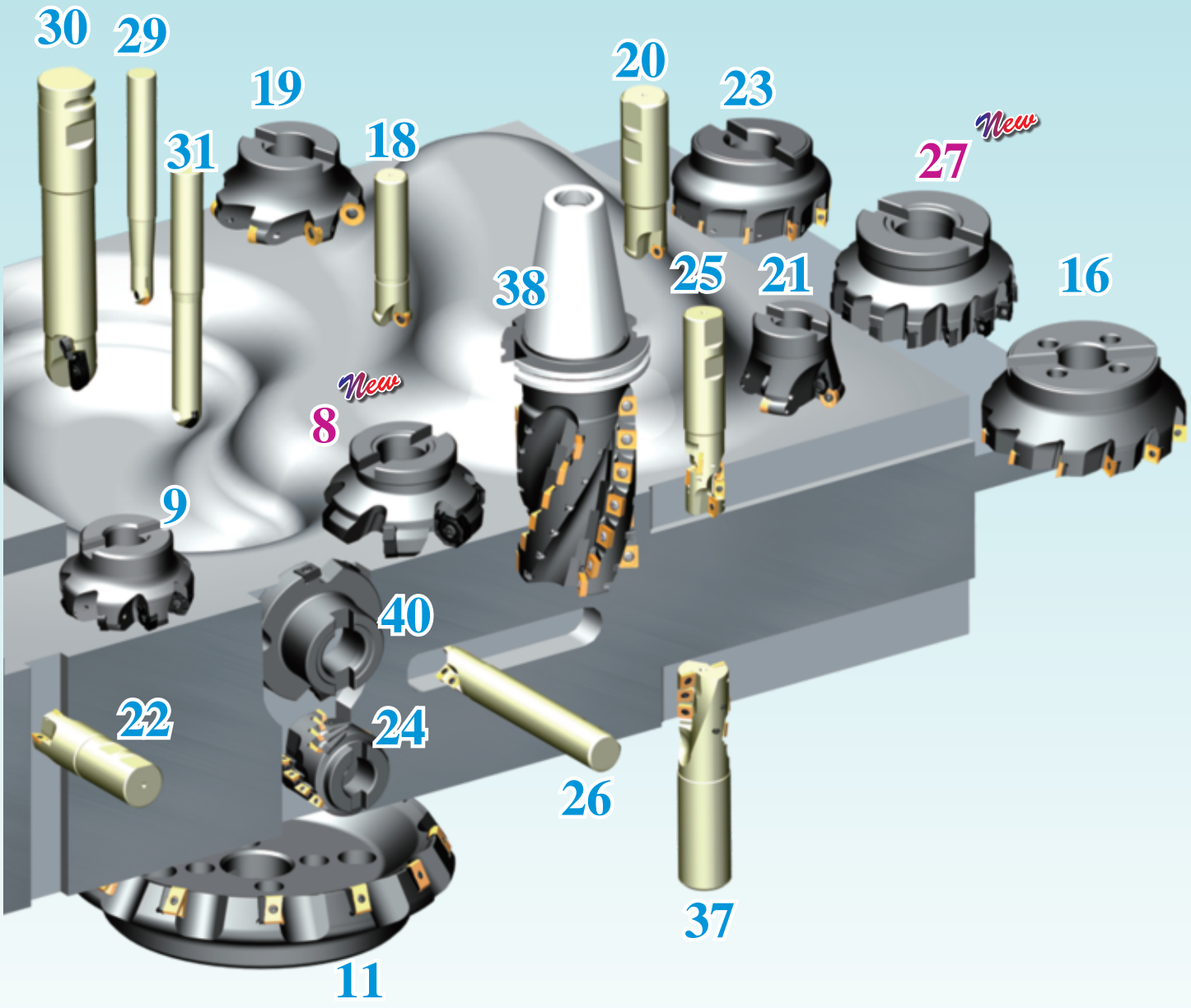
Indexable milling tools family



Number	Tool category	Page
1	FMA01	B24
2	FMA02	B25
3	FMA03	B29
4	FMA04(OFKT05□□)	B32
5	FMA04(OFKR07□□)	B36
6	FMA07	B40
7	FMA11	B44

Number	Tool category	Page
8	FMA12	B47
9	FMD02(PN11)	B50
10	FMD02(HN09)	B54
11	FMD03	B56
12	FME02	B59
13	FME03	B61
14	FME04	B65

Number	Tool category	Page
15	FMP01	B67
16	FMP02	B69
17	FMP03	B75
18	FMR01	B77
19	FMR02	B80
20	FMR03	B83
21	FMR04	B85



Number	Tool category	Page
22	EMP01	B88
23	EMP02	B95
24	EMP03	B98
25	EMP04	B99
26	EMP05	B103
27	EMP13	B106
28	BMR01	B111

Number	Tool category	Page
29	BMR02	B113
30	BMR03	B115
31	BMR04	B127
32	SMP01	B135
33	SMP03	B137
34	XMR01(SDMT□□)	B141
35	XMR01(WPGT□□)	B144

Number	Tool category	Page
36	TMP01	B152
37	HMP01(Ø40-Ø50)	B154
38	HMP01(Ø50-Ø80)	B155
	HMP01 EC(Ø50-Ø80)	B156
39	CM□01	B159
40	XMP01	B150

FMD03 FME04 FMP03

Heavy mill cutter series

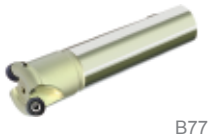
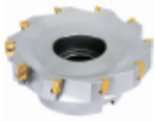
Indexable milling tools overview

Operating pattern	Series/Shape	Approach angle / Max. cutting depth.	Applicable insert	Application overview	Features
Face milling	**FMA01** B24	Kr=45° a_{pmax}=6.0	SEET12T3-DF/DM/DR SEET12T3-CF/CM/CR SEET12T3-EF/EM SEET12T3-LH/W	General face milling of the following materials: steel, alloy steel, stainless steel, cast iron, aluminum alloy, high-temperature alloy	• Diameter range Ø50-Ø315. • Large rake angle makes cutting easier and faster. • Wide applications can be achieved by using available inserts with different chipbreakers. • Adopting inserts with wiper can improve surface quality.
	FMA02 B25	Kr=45° a_{pmax} =6.0	SEET12T3-DF/DM/DR SEET12T3-CF/CM/CR SEET12T3-EF/EM SEET12T3-LH/W	General face milling of the following materials: steel, alloy steel, stainless steel, cast iron, aluminum alloy, high-temperature alloy	• Diameter range Ø50-Ø125. • Large rake angle makes cutting easier and faster. • Wide applications can be achieved by using available inserts with different chipbreakers. • Coarse and differential pitch, reducing vibration.
	FMA03 B29	Kr=45° a_{pmax}=5.5	SE□N1203AF□□ SE□R1203AF□□	General face milling of steel, stainless steel, cast iron	• Diameter range Ø80-Ø315. • large rake angle makes cutting easier and faster. • Top clamping achieves better vibration resistance.
		Kr=45° a_{pmax}=7.5	SE□N1504AF□□ SE□R1504AF□□		
	FMA04 B32	Kr=45° a_{pmax}=3.5	OFKT05T3-DF/DM OFKT05T3-LH	Face milling of steel, alloy steel, cast iron, aluminum alloy	• Diameter range Ø50-Ø160. • High-economy milling tool with 8 cutting edges. • Screw clamping, high precision.
	B36	Kr=45° a_{pmax} =5.0	OFKR0704-DF/DM	Face milling of steel, alloy steel and cast iron	• Diameter range Ø125-Ø315. • High-economy milling tool with 8 cutting edges. • Top clamping makes it easy to assemble and disassemble.
	FMA07 B41	Kr=45° a_{pmax}=4.0	ONHU060408-PF/PM/W	General face milling of steel and cast iron	• Diameter range Ø25-Ø50. • High-economy milling tool with 16 cutting edges.
	B40	Kr=45° a_{pmax}=5.0	ONHU08T508-PF/PM/W	General face milling of steel and cast iron	• Diameter range Ø50-Ø315. • High-economy milling tool with 16 cutting edges.
	FMA11 New B44	Kr=45° a_{pmax}=5.5	SNEG1205ANR-GM	General face milling of steel and cast iron	• Diameter range Ø63- Ø315. • Double-sided chipbreaker milling insert has eight cutting edges and high economy. • Large rake angle design and unique chip breaker structure of insert lead to low power consumption. • Double negative rake angle structure and super thick insert has higher safety and outstanding toughness, which can realize great depth cutting. • Insert has excellent machining performance with wiper edge.
		Kr=45° a_{pmax}=7.0	SNEG1506ANR-GM/GR		
		Kr=45° a_{pmax}=9.0	SNEG1907ANR-GR		
	FMA12 New B47	Kr=45° a_{pmax}=5.0	ONHU08T624R-GM ONHU08T508-PF/PM	General face milling of steel and cast iron	• Diameter rangeØ80-Ø315. • High Performance Face Mill with 16 edges for outstanding economy. • Double negative rake angle, in combination with helical insert structure, achieves double positive axial angle, which will help reduce cutting resistance and improve chip evacuation. • Unique 3-dimentional edge.

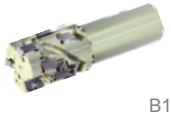
Indexable milling tools overview

Operating pattern	Series/Shape	Approach angle / Max. cutting depth.	Applicable insert	Application overview	Features
Face milling	**FMD02** B50-51	Kr=67° a_{pmax}=5.0	PNEG110512R/L-CF/CM/CR PNEG110512R/L-PF/PM/PR	General face milling of steel and cast iron	• Diameter range Ø50-Ø315. • High-economy milling tool with 10 cutting edges.
	B54	Kr=55° a_{pmax}=6.0	HNEX090512-DF/DM HNEX090512-DR	Face milling of cast iron	• Diameter range Ø80-Ø315. • High-economy milling tool with 12 cutting edges. • Top clamping makes it easy to assemble and disassemble.
	FMD03 B56	Kr=60° a_{pmax}=12.0	LNKT2007DN-ZR	Heavy-duty face milling of steel and alloy steel	• Diameter range Ø125-Ø400. • Double positive rake angles can reduce cutting forces. • Inserts are mounted upright, suitable for heavy machining with high cutting depth. • Easy to assemble and clamp inserts.
		Kr=60° a_{pmax}=17.0	LNKT2510-ZR		
	FME02 B59	Kr=75° a_{pmax}=6.0	SPKW1204EDFR SPKW1204EDSR SPKT1204EDR	Face milling of steel, alloy steel and cast iron	• Diameter range Ø50-Ø125. • Kr 75°, general face milling. • Wide applications can be achieved by using inserts with different chipbreakers.
	FME03 B61	Kr=75° a_{pmax}=6.0	SP□N1203(1504)ED□□ SP□R1203(1504)ED□□	Face milling of steel, alloy steel and cast iron	• Diameter range Ø80-Ø315. • Kr 75°, general face milling. • Top clamping makes it easy to assemble and disassemble.
		Kr=75° a_{pmax}=8.0	SP□N1504ED□□ SP□R1504ED□□		
	FME04 B65	Kr=75° a_{pmax}=8.0	LNKT1506EN-ZR	Heavy-duty face milling of steel and alloy steel	• Diameter range Ø125-Ø315. • Double positive rake angles can reduce the cutting force. • Inserts are mounted upright, suitable for heavy machining at high cutting depth. • Easy to assemble and clamp inserts.
	FMP01 B67	Kr=90° a_{pmax}=18.0	TP□N2204PD□ TPKN2204PDF□ TPKN2204PDT□	Face milling of steel, alloy steel and cast iron	• Diameter range Ø80-Ø315. • Kr 90° , for square shoulder milling. • Top clamping makes it easy to assemble and disassemble.
	FMP02 B69	Kr=90° a_{pmax}=6.7	SEET09T308PER-PF/PM SEET09T308PER-PR	Face milling of steel, alloy steel, stainless steel and cast iron	• Diameter range Ø50-Ø315. • Kr 90°, for square shoulder milling. • Different pitches: coarse pitch, close pitch and extra close pitch. • High precision insert, high work-piece surface quality. • Optimized chipbreaker and grade, suitable for finishing, semi-finishing and roughing.
		Kr=90° a_{pmax}=10.8	SEET120308PER-PF/PM SEET120308PER-PR		
	FMP03 B75	Kr=90° a_{pmax}=8.0	LNKT1506EN-ZR	Heavy-duty face milling of steel and alloy steel	• Diameter range Ø125-Ø315. • Double positive rake angles can reduce the cutting force. • Inserts are mounted upright, suitable for heavy machining at high cutting depth. • Easy to assemble and clamp inserts.
		Kr=90° a_{pmax}=12.0	LNKT2007DN-ZR		
		Kr=90° a_{pmax}=15.0	LNKT2510-ZR		

Indexable milling tools overview

Operating pattern	Series/Shape	Approach angle / Max. cutting depth.	Applicable insert	Application overview	Features
Face milling	**FMR01**  B77	a_{pmax}=5.0	RCKT10T3MO-DM	Cavity profile milling of steel, alloy steel, stainless steel and cast iron	• Diameter range Ø25-Ø50. • R-type inserts have extra-strong cutting edges. • Suitable for machining of curved surface of die. • Economical milling tools with screw clamping.
		a_{pmax}=6.0	RCKT1204MO-DM/DR/ER		
	FMR02 B80	a_{pmax}=6.0	RCKT1204MO-DM/DR /ER/PCBN	Face milling and cavity profile milling of steel, alloy steel, stainless steel and cast iron	• Diameter range Ø50-Ø160. • R-type inserts have extra-strong cutting edges. • Suitable for machining of curved surface of die. • Economical milling tools with screw clamping.
		a_{pmax}=8.0	RCKT1606MO-DM/DR/ER		
		a_{pmax}=10.0	RCKT2006MO-DR/ER		
	FMR03 B83	a_{pmax}=4.0	RDKW0803MO	Cavity profile milling of steel, alloy steel, stainless steel and cast iron	• Diameter range Ø16-Ø50. • R-type inserts have extra-strong cutting edges. • Suitable for machining of curved surface of die. • Economical milling tools with screw clamping.
		a_{pmax}=5.0	RDKW10T3MO		
		a_{pmax}=6.0	RDKW1204MO		
	FMR04 B85	a_{pmax}=6.0	RDKW1204MO	Face milling and cavity profile milling of steel, alloy steel, stainless steel and cast iron	• Diameter range Ø50-Ø160. • R-type inserts have extra-strong cutting edges. • Suitable for machining of curved surface of die.
		a_{pmax}=8.0	RDKW1605MO		
		a_{pmax}=10.0	RDKW2006MO		
Square shoulder milling	**EMP01** B88	Kr=90° a_{pmax}=10.5	APKT11T3□□-PF/PM/ PR APKT11T3□□-LH	Multi-function milling of steel, alloy steel, stainless steel, cast iron and aluminum alloy	• Two mounting styles: Straight shank and Weldon shank, diameter range Ø12-Ø63. • Kr 90° , for square shoulder milling, slot milling, ramp milling, etc. • Inserts with wiper, also suitable for face milling. • Inserts with 3D helical cutting edge, less cutting force.
		Kr=90° a_{pmax}=15.5	APKT160408- PF/PM/PR APKT160408-LH		
	EMP02  B95	Kr=90° a_{pmax}=11.5	APKT11T3□□- PF/PM/ PR APKT11T3□□-LH	Face milling of steel, alloy steel, stainless steel, cast iron and aluminum alloy	• Diameter range Ø50-Ø160. • Kr 90° , for square shoulder milling, slot milling, ramp milling, etc. • Inserts with wiper, also suitable for face milling. • Inserts with 3D helical cutting edge, less cutting force.
		Kr=90° a_{pmax}=15.5	APKT160408- PF/PM/PR APKT160408-LH		
	EMP03 B98	Kr=90° a_{pmax}=39.0	APKT11T3□□-PF/PM/ PR APKT11T3□□-LH	Milling of steel, alloy steel, stainless steel, cast iron and aluminum alloy at high cutting depth	• Diameter range Ø50-Ø100. • End mills with positive helical angle, good chip removal. • For side face milling and slot machining. • Close pitch, high machining efficiency.
	EMP04 B99	Kr=90° a_{pmax}=58.0	APKT11T3□□-PF/PM/ PR APKT11T3□□-LH	Multi-function drilling and milling of steel alloy steel, stainless steel and cast iron	• Diameter range Ø20-Ø40. • End mills with positive helical angle, good chip removal. • For side face milling and slot machining. • Close pitch, high machining efficiency.

Indexable milling tools overview

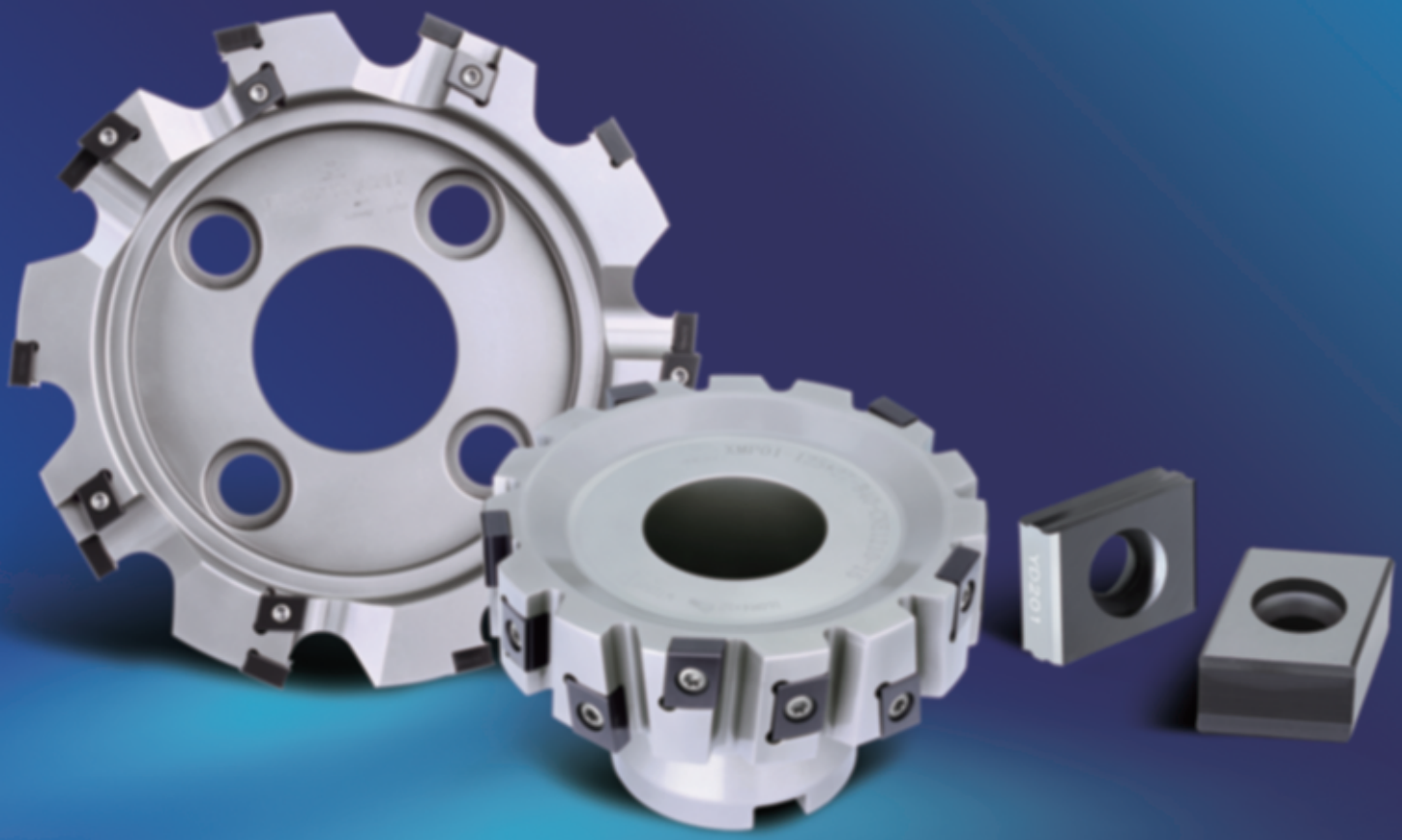
Operating pattern	Series/Shape	Approach angle / Max. cutting depth.	Applicable insert	Application overview	Features
Square shoulder milling	**EMP05** B103	Kr=90° a_{pmax}=40.0	APMT1135PDR APMT160408PDER	Face milling of steel, alloy steel, stainless steel, cast iron and Al alloy	• Diameter range Ø25-Ø40. • End edge over center, for drilling directly.
	EMP13 New B106	Kr=90° a_{pmax}=11.2	ANGX1105□□PNR-GM	Multi-functional milling of steel, alloy steel, stainless steel and cast iron	• Diameter range Ø25-Ø160. • Designed with extra thick insert in combination with double negative tool body, achieving double positive cutting angle, reducing cutting force, as well as greatly improving impact resistance. • Properly designed cutting edge with high precision control can achieve high quality 90°square shoulder milling.
	B107	Kr=90° a_{pmax}=14.5	ANGX1506□□PNR-GM		
	B108	Kr=90° a_{pmax}=64	ANGX1105□□PNR-GM ANGX1506□□PNR-GM		
	 B109	Kr=90° a_{pmax}=53			
Profile milling	**BMR01** B111	Cutting depth: see the detailed information about tool specifications	ZDET□□CYR□□ ZPNT2204CYR□□ SPMT060304 SDMT□□	Profile machining of steel, stainless steel and cast iron	• Diameter range Ø20-Ø63. • Very suitable for rough machining large mold. • Ball nose cutter with 3-cutting-edge inserts, perfect economical efficiency.
	BMR02 B113		ROHX□□	Profile machining of steel, stainless steel and cast iron	• Diameter range Ø12-Ø20. • For profile finish machining. • Stable assembly. • Insert with two cutting edges, perfect economical efficiency.
	BMR03 B115		XPHT□□R□□- GM	Profile machining of steel, stainless steel and cast iron	• Diameter range Ø16-Ø50. • For profile finish machining. • Stable assembly. • Insert with two cutting edges, perfect economical efficiency.
	B116				
	B117				
	B118				

Indexable milling tools overview

Operating pattern	Series/Shape	Approach angle / Max. cutting depth.	Applicable insert	Application overview	Features
Profile milling	**BMR04** B127 B128	Cutting depth: see the detailed information about tool specifications	ZOHX□□	Profile machining of steel, stainless steel and cast iron	• Diameter range Ø12-Ø32. • High precision, for finish profile machining • Two types of chipbreaker, used in different machining conditions. • High assembling precision, good stability.
Side and face milling	**SMP01** B134 B135	Cutting depth: see the detailed information about tool specifications	XSEQ12□□	Slot milling of steel, stainless steel and cast iron	• Diameter range Ø63-Ø250. • Two mounting styles: mounting by keyway and arbor mounting. • Groove width range : 8, 10, 12, 16, 18, 20mm.
	SMP03 B137 B138		MPHT□□	Slot milling of steel, stainless steel and cast iron	• Diameter range Ø80-Ø200. • Two mounting styles: mounting by keyway and arbor mounting. • Groove width range : 8, 10, 12, 16, 18, 20mm.
Special milling (high feed)	**XMR01** B140 B141	Cutting depth: see the detailed information about tool specifications	SDMT□□-DM/PM	Slot milling of steel, stainless steel and cast iron	• Diameter range Ø20-Ø160. • Two mounting types: straight shank and arbor mounting. • Cutting forces are resolved effectively, achieving cutting with high feed rate. • For plunge milling. • Double clamping, firm and reliable.
	B143 B144		WPGT□□ZSR WPGT□□ZSR-PM	Face and cavity profile milling of steel, stainless steel and cast iron in cavity applications	• Diameter range Ø20-Ø160. • Two mounting types: straight shank and arbor mounting. • Cutting forces are resolved effectively, achieving cutting with high feed rate. • Double clamping, firm and reliable.

Indexable milling tools overview

Operating pattern	Series/Shape	Approach angle / Max. cutting depth.	Applicable insert	Application overview	Features
Boring millers	**XMP01** B150	Kr=90° ap_{max}=15~90	CNE121006A/B	Flat Milling, Side Milling, Flute Milling, and Bored Hole-making for Steel/ Alloy Steel/ Cast Iron.	• Diameter range Ø80-Ø400. • Inserts are vertically loaded with 90 degrees approach angle. Both axial and radical cutting width could be adjusted according to customers' demands. Opened chip pocket, which lead to unobstructed chip removal. It has large width of bottom edges, which helps to strengthen the capability of helical interpolation milling holes. It is generally loaded inserts for two kinds chipbreaker, while fits for different machining conditions.
T-slot milling	**TMP01** B152	Kr=90°	MPHT□□	Machining T slot in cast iron	• Diameter range Ø21-Ø60. • Machining T-slot with nominal size 12, 14, 18, 22, 28, 36. • 86° rhombic inserts with positive angle.
Helical end mills	**HMP01** B154	Kr=90° a_{pmax}=55	APKT150412-PM/KM SPMT120408-PM/KM	Milling of steel, alloy steel and cast iron at high cutting depth.	• Diameter range Ø40、Ø80. • Coarse and differential pitch, less vibration. • Holistic structure with good rigidity, interchangeable heads achieve high economical efficiency.
	B155	Kr=90° a_{pmax}=144			
	HMP01 EC B156	Kr=90° a_{pmax}=144			
Chamfer milling	**CMZ01** B159	Kr=30°	SPMT120408	Chamfer machining of steel, alloy steel, stainless steel and cast iron	• Diameter range Ø12、Ø25、Ø32、Ø36. • With the function of milling small surface.
	CMA01 B160	Kr=45°			
	CMD01 B163	Kr=60°			



XMP01

Boring millers

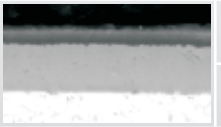
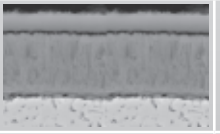
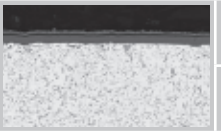
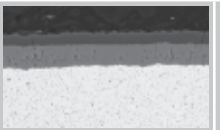
Profile milling tools series

Milling insert grades overview

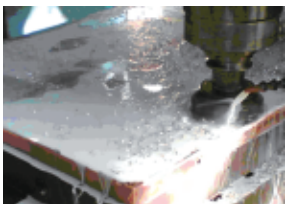
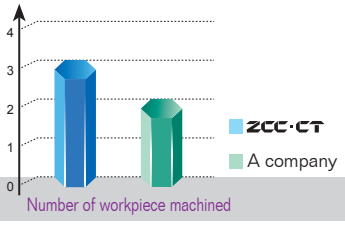
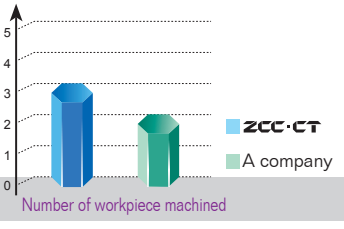
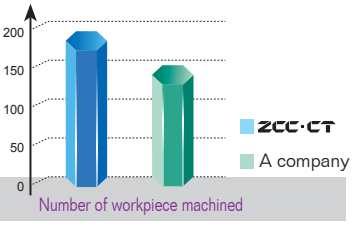
Workpiece material	ISO code	Coating						Cermet		Cemented carbide		PCBN and PCD material	
		CVD				PVD							
P Steel	P01												
	P10							YNG151	YNG151C				
	P20	YBC301	YBC302	YBM251	YBM351	YBG202	YBG252						
	P30									YC30S			
	P40						YBG302						
M Stainless steel	M01												
	M10	YBM251	YBC302	YBM351	YBM253	YBG202	YBG252	YNG151	YNG151C				
	M20					YBG205							
	M30						YBG302			YC30S			
	M40												
K Cast iron	K01												
	K10	YBD152				YBG102		YNG151	YNG151C	YD051		YCB011	
	K20		YBD252				YBG252				YD201		
	K30					YBG152							
	K40												
N Non ferrous metal	N01												
	N10									YD101		YCD011	
	N20										YD201		
	N30												
S Heat resistant alloy & Ti alloy	S01												
	S10					YBG202							
	S20												
	S30												
H Super hard material	H01											YCB012	
	H10												
	H20												
	H30												

Grade classification for milling inserts

Coated Cemented Carbide CVD

Grade	Coating structure	Micro-structure	ISO applied range	Application field
YBC301	Combination of high-toughness, high-strength substrate and coating compo sed of TiCN、thin Al_2O_3 and TiN		P15~35	Suitable for semi-finish and rough milling of P-type material
YBC302	Combination of high toughness, high strength substrate and coating composed of TiCN, thin Al_2O_3 and TiN		P15~35 M10~30	Suitable for rough and semi-finish milling of P-type, M-type, whose hardness is below HRC45 and under
YBM251	Combination of high-toughness, high-strength substrate and coating compo sed of TiCN、thin Al_2O_3 and TiN		P15~40 M10~30	Suitable for semi-finish and rough milling of P- and M-type material
YBM253	Combination of high-toughness gradient substrate and coating composed of TiCN and ultra fine Al_2O_3		M10~30	Suitable for rough milling of M-type material
YBM351	Combination of high-toughness substrate and coating compoed of TiCN、thin Al_2O_3 and TiN		P25~40 M20~35	Suitable for rough milling of P- and M-type material
YBD152	Good combination of substrate with high wear-resistance and coating composed of TiCN and thick Al_2O_3		K05~25	Suitable for finish and semi-finish milling of K-type material
YBD252	Good combination of substrate with high wear-resistance and coating composed of TiCN and thick Al_2O_3		K15~35	Suitable for rough and semi-finish milling of K-type material

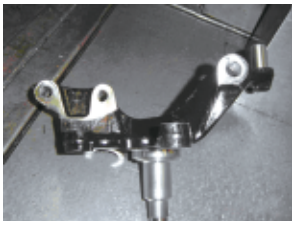
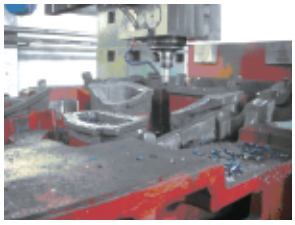
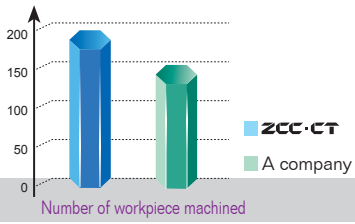
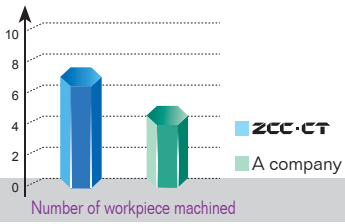
Application case

Component shape			
Machine and cooling	NC plane milling machine, wet machining	Vertical machining center, dry machining	Horizontal machining center, dry machining
Workpiece material and hardness	Casting stainless steel HB220-260	45# Forged steel HB240-270	HT250 HB220
Type of machining	Milling surface	Milling surface	Milling surface
Applicable tool	FMA04-200-C60-OF07-12	FMA01-125-B40-SE12-08	FMP02-100-B32-SE12-07
Applicable insert	YBM251/OFKR0704-DM	YBM351/SEET12T3-DR	YBD252/SEET120308PER-PM
Cutting parameters	Vc=120m/min, fz=0.15mm/z, a_p=2mm	Vc=212m/min, fz=0.2mm/z, a_p=3mm	Vc=160m/min, fz=0.2mm/z, a_p=1.5mm
Application results			

Coated Cemented Carbide PVD

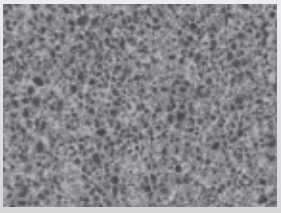
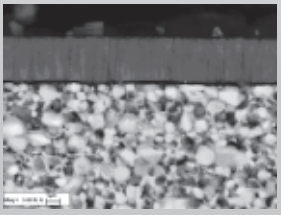
Grade	Coating structure	ISO applied range	Application field
YBG102	fine carbide substrate + Nano coating	K05~K20	Suitable for finish and semi-finish milling of K-type material
YBG202	Substrate with excellent deformation resistance + Nano coating	P10~30 M10~30 S05~20	PVD grade with wide application, widely applied in semi-finish milling of P-, M- and S-type material
YBG205	Ultra fine carbide substrate + Nano coating	M10~30	Suitable for rough milling of M-type material
YBG302	Substrate with good toughness and strength + Nano coating	P25~40 M25~40	Suitable for rough milling of P- and M-type material
YBG152	Substrate with moderate hardness and strength + Nano coating	K20~35	Suitable for rough and semi-finish milling of K-type material

Application case

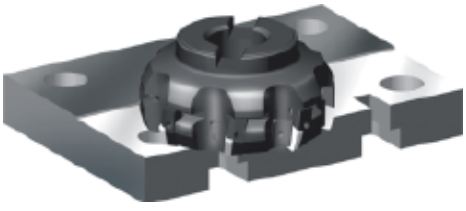
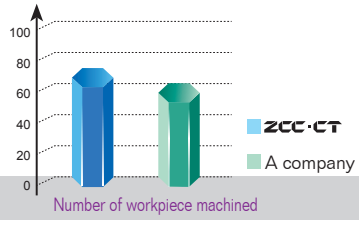
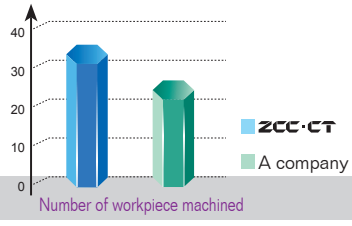
Component shape		
Machine and cooling	Machining center, dry cutting	Plane milling machine, dry cutting
Workpiece material and hardness	Nodular cast iron HB 220	7CrSiMoV HRC25
Type of machining	Milling surface	Cavity milling
Applicable tool	EMP02-050-A22-AP11-06	BMR03-050-MT5-M
Applicable insert	YBG102/APKT11T308-PM	YBG302/XPHT50R2507- GM
Cutting parameters	Vc=235m/min, fz=0.15mm/z, a_p=1~3mm	Vc=120m/min, fz=0.25mm/z, a_p=8mm
Application results		

Grade classification for milling inserts

Cermet

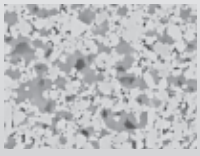
Grade	Coating structure	ISO applied range	Application field
YNG151		P05~20 M05~20 K05~20	Wide application in finish milling of P-, M-, and K-type material
YNG151C		P01~20 M01~20 K01~20	Wide application in finish milling of P-, M-, and K-type material

Application case

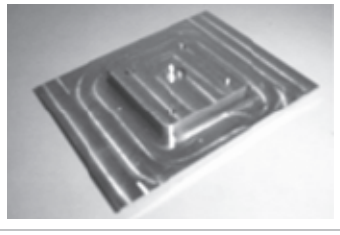
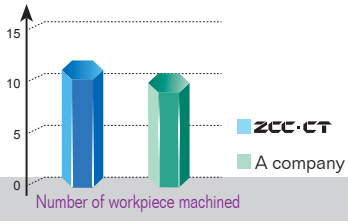
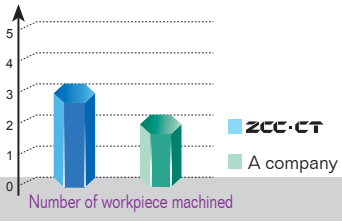
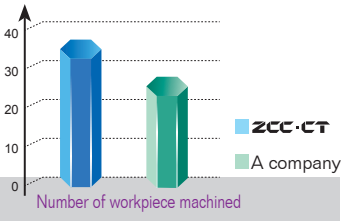
Component shape		
Machine and cooling	Machining center, dry cutting	Machining center, dry cutting
Workpiece material and hardness	45# HB 170~220	NAK80 HRC42~48
Type of machining	Finish milling surface	Finish milling surface
Applicable tool	FMA03-160-B40-SE12-08	FME03-160-B40-SP12-10
Applicable insert	YNG151/SEEN1203AFTN	YNG151C/SPEN1203EDER
Cutting parameters	Vc=400m/min, fz=0.1mm/z, a_p=0.3mm	Vc=420m/min, fz=0.12mm/z, a_p=0.35mm
Application results		

Grade classification for milling inserts

Cemented Carbide

Grade	Coating structure	ISO applied range	Application field
YC30S		P25~40 M25~40	Suitable for rough milling of P- and M-type material
YD051		K05~20	Suitable for finish milling of K-type material
YD101		N05~25	Suitable for rough milling of N-type material
YD201		K15~35 N15~30	Suitable for rough and semi-finish milling of K-type material, and for rough milling of N-type material

Application case

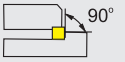
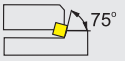
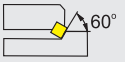
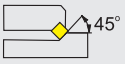
Component shape			
Machine and cooling	Vertical machining center, wet machining	Plane milling machine, wet machining	plane milling machine, dry cutting
Workpiece material and hardness	Aluminum alloy HB100	40CrMnMo HB240	HT250 HB220
Type of machining	Milling surface	Milling surface	Milling surface
Applicable tool	FMA01-100-B32-SE12-07	FMP01-100-B32-TP22-06	FME03-160-B40-SP15-10
Applicable insert	YD101/SEET12T3-LH	YC30S/TPKN2204PDR	YD201/SPKN1504EDTR
Cutting parameters	Vc=300-350m/min, a_p=1~2mm, fz=0.2mm/z	Vc=170m/min, a_p=5~7mm fz=0.3mm/z	Vc=100-130m/min, a_p=7mm, fz=0.35mm/z
Application results			

Indexable milling tools code key

Cutter type

FM	Face milling
EM	Square shoulder milling
HM	Helical end milling
SM	Side and face milling
BM	Profile milling
CM	Chamfer milling
XM	Special milling
TM	T-slot milling

Approach angle

P	90°	
E	75°	
D	60°	
A	45°	
R		

Series code

Cutting diameter ØD

Side and face milling tool : diameter X cutting edge width

Coupling structurebe (see below)

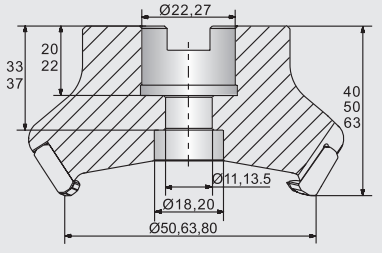
A	A-type coupling	XP	Weldon shank
B	B-type coupling	G	Straight shank
C	C-type coupling	MW	Morse adapter with a conical hole and without a flat tail
D	D-type coupling		

Coupling size(mm) (see below)

FM E 03-100-B 32

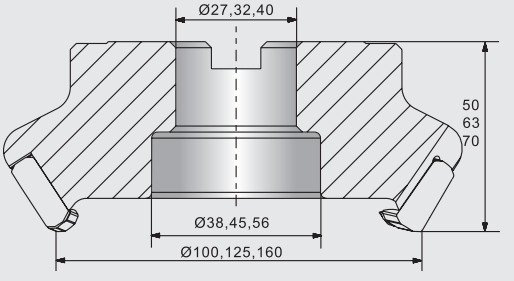
Coupling structure of arbor

A-type coupling



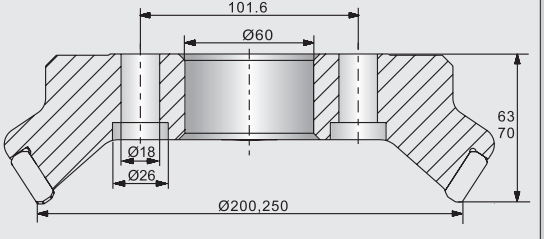
Ø50- Ø80 arbor face milling cutter as per GB5342-96

B-type coupling



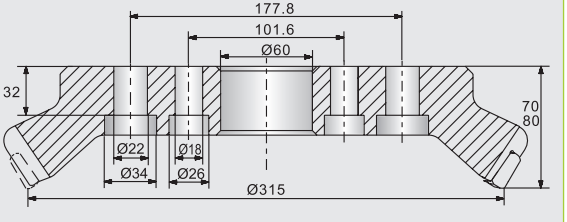
Ø100- Ø160 arbor face milling cutter as per GB5342-96

C-type coupling



Ø200- Ø250 arbor face milling cutter as per GB5342-96

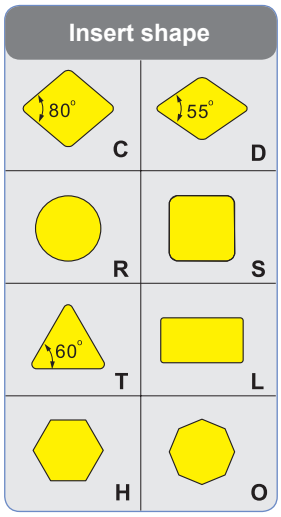
D-type coupling



D≥Ø315 arbor face milling cutter as per GB5342-96

For coupling methods of Weldon shank, straight shank and Morse taper shank, etc., see technical information of tooling systems.

Insert shape



Insert clearance angle

N	0°
B	5°
C	7°
P	11°
D	15°
E	20°
F	25°

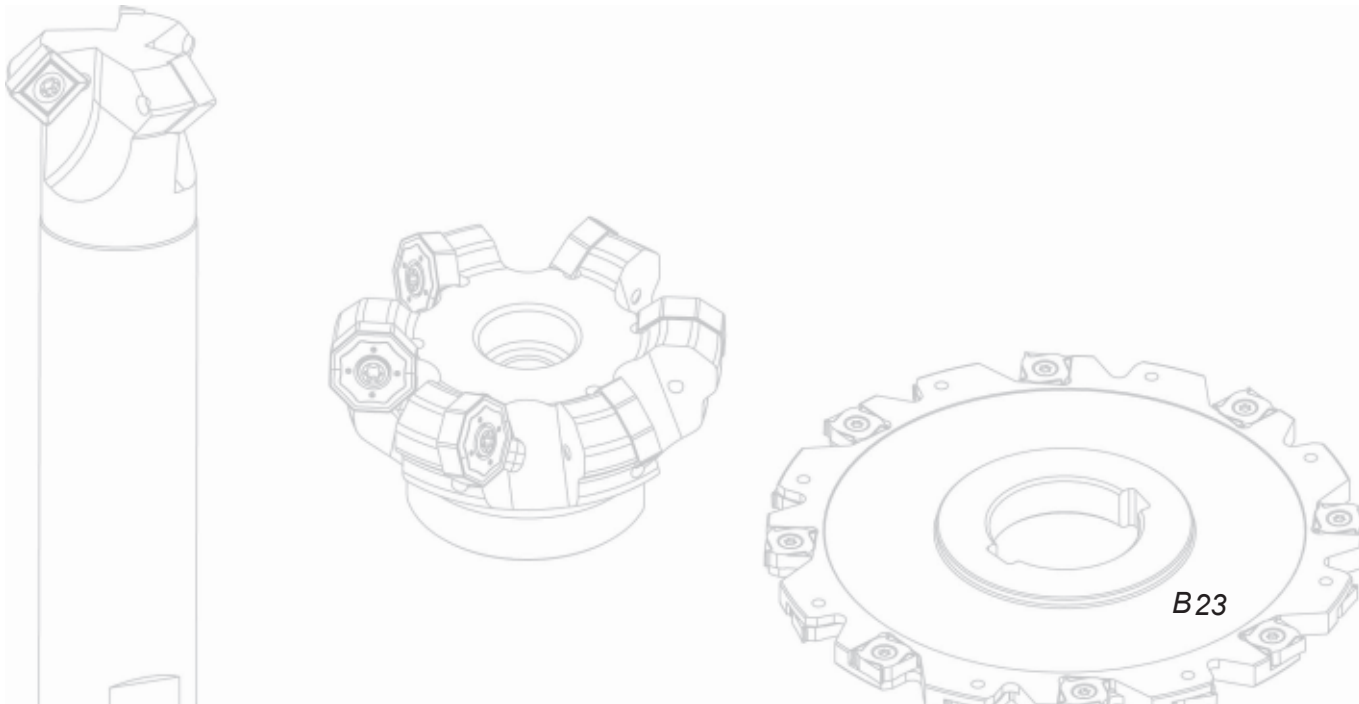
Length of cutting edge

Diameter of insert's inscribed circle	Insert shape					
	C	D	R	S	T	L
5.556	—	—	—	—	09	—
6.350	06	07	—	—	11	—
9.525	09	11	09	09	16	—
12.700	12	15	12	12	22	—
15.875	16	19	15	15	27	—
19.050	19	—	19	19	33	—
25.400	25	—	25	25	44	2

-SP12-06L

Number of teeth
(number of flute in the case of helical end mills)

Cutting direction
(R: Right L: Left R style as the default)



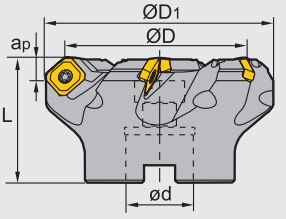
Face milling tools

Kr:45°

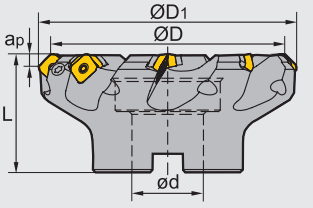
FMA01 P M K N S

Close and even pitch

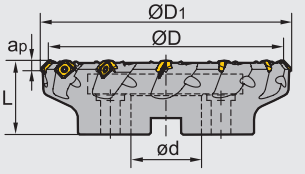
A-type coupling



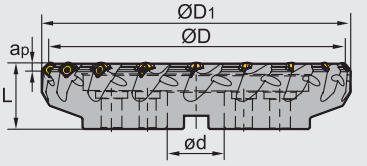
B-type coupling



C-type coupling



D-type coupling



Specification of tools

Type		Stock		Basic dimensions(mm)					Number of teeth Z	Type of coupling	Weight (kg)
		R	L	ØD	ØD1	ød	L	$a_p$max			
FMA01	**-050-A22-SE12-04**	▲	△	50	61	22	40	6	4	A	0.3
	-063-A22-SE12-05	▲	△	63	74	22	40	6	5	A	0.5
	-080-A27-SE12-06	▲	△	80	91	27	50	6	6	A	1.2
	-100-B32-SE12-07	▲	△	100	107	32	50	6	7	B	1.2
	-125-B40-SE12-08	▲	△	125	136	40	63	6	8	B	2.6
	-160-B40-SE12-10	▲	△	160	170	40	63	6	10	B	4.3
	-200-C60-SE12-12	▲	△	200	210	60	63	6	12	C	7.6
	-250-C60-SE12-14	▲	△	250	260	60	63	6	14	C	13.5
	-315-D60-SE12-18	△	△	315	325	60	70	6	18	D	20.8

▲Stock available △Make-to-order

Spare parts

Diameter ØD	Insert screw	Shim	Shim screw	Wrench	Wrench
Ø50 -Ø100	I60M3.5×10	--	--	WT15IS	--
Ø125-Ø315	I60M3.5×12	S13BS	SM5×7XA		WH35L

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

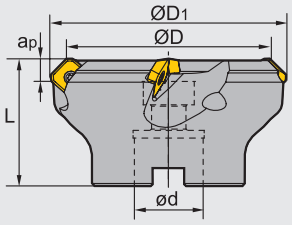
Face milling tools

Kr:45°

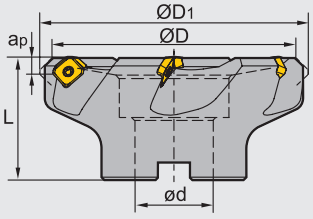
FMA02 P M K N S

Coarse and differential pitch

A-type coupling



B-type coupling



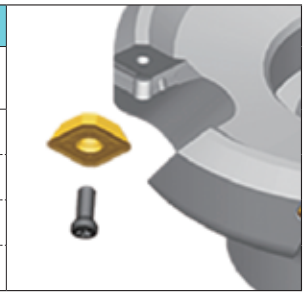
Specification of tools

Type		Stock		Basic dimensions(mm)					Number of teeth Z	Type of coupling	Weight (kg)
		R	L	ØD	ØD1	ød	L	apmax			
FMA02	**-050-A22-SE12-03**	▲	△	50	61	22	40	6	3	A	0.4
	-063-A22-SE12-04	▲	△	63	74	22	40	6	4	A	0.6
	-080-A27-SE12-04	▲	△	80	91	27	50	6	4	A	1.3
	-100-B32-SE12-05	▲	△	100	107	32	50	6	5	B	1.3
	-125-B40-SE12-06	▲	△	125	131	40	63	6	6	B	2.6

▲Stock available △Make-to-order

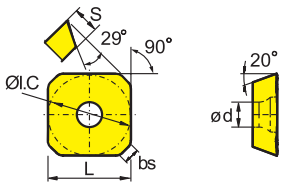
Spare parts

Diameter ØD	Insert screw	Wrench
Ø50-Ø125	I60M3.5×10	WT15IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

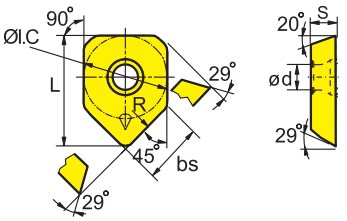
Selection of inserts



Workpiece material		YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P	Steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
M	Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
K	Cast iron						😐	☹	😊				😐	😊				😊		☹
N	Non-ferrous metal																		😐	☹
S	Heat resistant alloy, Ti alloy								😊	😐	😐									

😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	ød	bs	R	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	SEET12T3-DF	13.4	13.4	3.97	4.1	2.55		●	★	●						★		○								
	SEET12T3-CF	13.4	13.4	3.97	4.1	2.55							○		★	○		○								
	SEET12T3-EF	13.4	13.4	3.97	4.1	2.55										○		○								
	SEET12T3-DM	13.4	13.4	3.97	4.1	2.55		●	★	●		○				★		★								
	SEET12T3-CM	13.4	13.4	3.97	4.1	2.55							★			★		○								
	SEET12T3-EM	13.4	13.4	3.97	4.1	2.55				●		●				○		★								
	SEET12T3-DR	13.4	13.4	3.97	4.1	2.55		●	★			●				★		★								
	SEET12T3-CR	13.4	13.4	3.97	4.1	2.55		●					★					★								
	SEET12T3-LH	13.4	13.4	3.97	4.1	2.55																			○	★
	SEET12T3-W	17.82	13.4	3.97	4.1	9.46	500		★	●			★			★					★					



★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

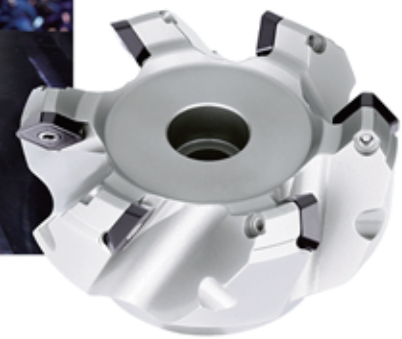
Chipbreaker selection for FMA01 milling inserts

Classification \ Function	For finishing	For semi-finishing	For roughing
P	-DF	-DM	-DR
M, S	-EF	-EM	
K	-CF	-CM	-CR
N	-LH		

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters			
				V(m/min)	f(mm/z)		
					-DF	-DM	-DR
P	Low-carbon steel、Soft steel	⩽180	YBM251 YBC301	270(220-350)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.4)
			YBG202	270(200-360)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.4)
			YBG302	230(170-350)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.4)
	High-carbon steel、Alloy steel	180-280	YBM251 YBC301	240 (200-320)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.4)
			YBG202	240 (180-350)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.4)
			YBG302	220 (150-330)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.4)
	Alloy tool steel	280-350	YBM251 YBC301	220 (180-300)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.4)
			YBG202	220 (170-340)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.4)
			YBG302	190 (130-300)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.4)
M					-EF	-EM	
	Stainless steel	⩽270	YBM251	150 (120-240)	0.15(0.1-0.2)	0.2 (0.1-0.3)	
			YBG202	160 (110-270)	0.15(0.1-0.2)	0.2 (0.1-0.3)	
			YBG302	140 (100-250)	0.15(0.1-0.2)	0.2 (0.1-0.3)	
K					-CF	-CM	-CR
	Cast iron	180-250	YBG102	210 (120-300)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.4)
			YBD152	240 (180-300)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.4)
N					-LH		
	Al alloy steel	-	YD101	300-	0.25 (0.1-0.4)		
			YD201	300-			
S					-EF	-EM	
	High-temperature alloy	⩽400	YBG102	50(20-60)	0.1 (0.1-0.2)	0.15 (0.1-0.3)	
			YBG202	40(20-50)	0.1 (0.1-0.2)	0.15 (0.1-0.3)	

Case for FMA01



Workpiece material：1Cr18Ni9Ti (HB180)
Cooling system: Dry cutting
Machine: Vertical machining center
Cutting parameters：
Vc=160m/min
a_p=1mm
fz=0.2mm/z
a_e=60mm

Surface roughness of workpiece:

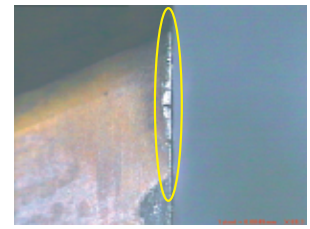
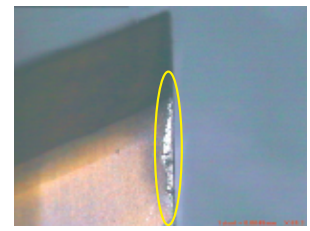
ZCC-CT:Ra1.2

Similar overseas products：Ra1.6

Tool type：FMA01-080-A27-SE12-06

Insert type/grade：SEET12T3-DM/YBG202

●Comparison of insert abrasion

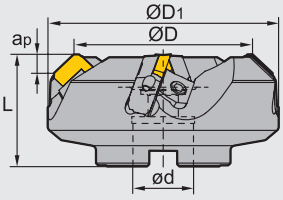
	ZCC-CT	Similar overseas products
17'30"		
29'30"		
33'30"		

Face milling tools

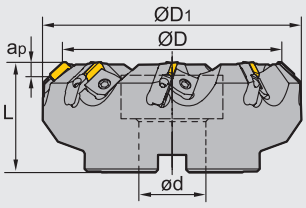
Kr:45°

FMA03 P M K

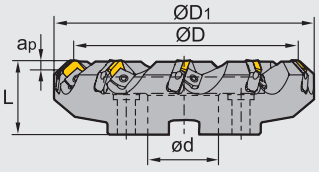
A-type coupling



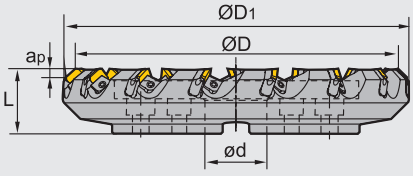
B-type coupling



C-type coupling



D-type coupling



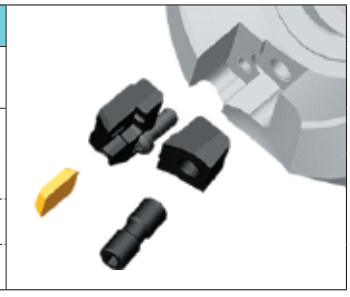
Specification of tools

Type		Stock		Basic dimensions(mm)					Number of teeth	Type of coupling	Weight (kg)
		R	L	ØD	ØD1	ød	L	apmax	Z		
FMA03	**-080-A27-SE12-04**	▲	△	80	103	27	50	5.5	4	A	1.8
	-100-B32-SE12-05	▲	△	100	122	32	50	5.5	5	B	2.4
	-125-B40-SE12-06	▲	△	125	147	40	63	5.5	6	B	4.4
	-160-B40-SE12-08	▲	△	160	181	40	63	5.5	8	B	6.4
	-200-C60-SE12-10	▲	△	200	221	60	63	5.5	10	C	8.5
	-250-C60-SE12-12	▲	△	250	270	60	63	5.5	12	C	14.1
	-315-D60-SE12-15	△	△	315	353	60	63	5.5	15	D	22.2
	-080-A27-SE15-04	▲	△	80	103	27	50	7.5	4	A	1.7
	-100-B32-SE15-05	▲	△	100	122	32	50	7.5	5	B	2.3
	-125-B40-SE15-06	▲	△	125	147	40	63	7.5	6	B	4.2
	-160-B40-SE15-08	▲	△	160	181	40	63	7.5	8	B	6.1
	-200-C60-SE15-10	▲	△	200	221	60	63	7.5	10	C	8.3
	-250-C60-SE15-12	▲	△	250	270	60	63	7.5	12	C	13.6
	-315-D60-SE15-15	▲	△	315	353	60	63	7.5	15	D	21.8

▲Stock available △Make-to-order

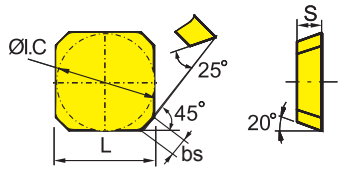
Spare parts

Diameter ØD	Inserts	Locator	Wedge	Wedge screw	Locator screw	Wrench
Ø80-Ø315	SE12	LSE12R/L	W01R/L	DM8×21X	LOM5×15.1	WT20T WH40T
Ø80-Ø315	SE15	LSE15R/L				



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts

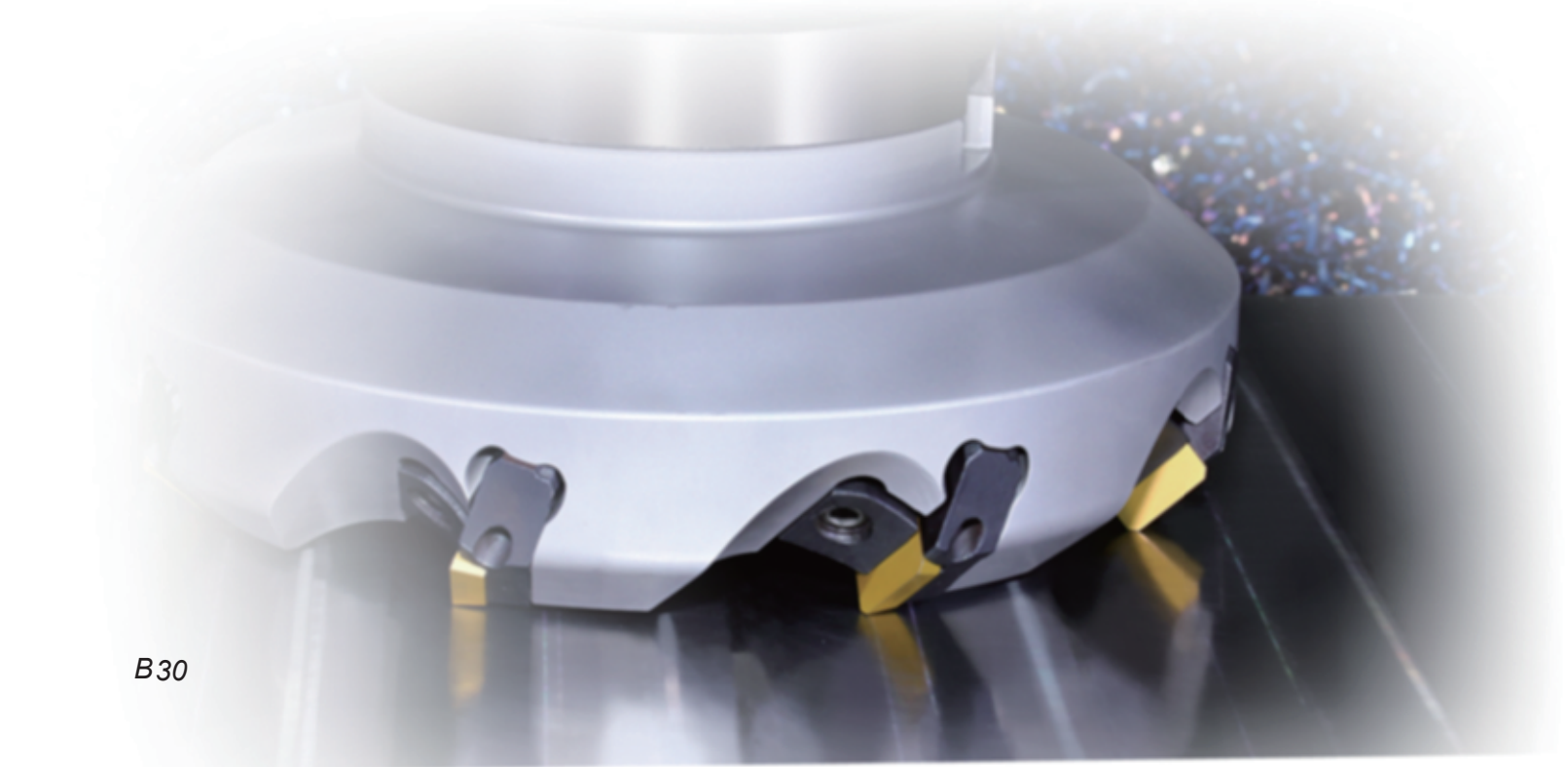


😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
M Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
K Cast iron						😐	☹	😊				😐	😊				😊		☹
N Non-ferrous metal																		😐	☹
S Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) L	ØI.C	S	bs	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	SEEN1203AFTN	12.7	12.7	3.18	1.8									○					●					
	SEKN1203AFFN	12.7	12.7	3.18	1.8								★											
	SEKN1203AFN	12.7	12.7	3.18	1.8	●								○							●			○
	SEKN1203AFTN	12.7	12.7	3.18	1.8	●		●		●				★		○					●			●
	SEKR1203AFN	12.7	12.7	3.18	1.8	●								○		○								
	SEKN1504AFN	15.875	15.875	4.76	1.6	●		●																●
	SEKN1504AFTN	15.875	15.875	4.76	1.6	○		●		●						○					●			●
	SEKR1504AFN	15.875	15.875	4.76	1.6							★				★					●			

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	≤180	YNG151	430 (340-500)	0.2 (0.1-0.4)
			YBM251 YBC301	270 (220-350)	0.2 (0.1-0.4)
			YBM351	220 (180-300)	0.25 (0.15-0.3)
			YBG202	270 (200-360)	0.2 (0.1-0.3)
			YC30S	140 (100-220)	0.27 (0.1-0.4)
	High-carbon steel、Alloy steel	180-280	YNG151	400 (320-480)	0.2 (0.1-0.4)
			YBM251 YBC301	240 (200-320)	0.2 (0.1-0.4)
			YBM351	200 (160-280)	0.25 (0.15-0.3)
			YBG202	240 (180-350)	0.2 (0.1-0.3)
			YC30S	120 (80-200)	0.27 (0.1-0.4)
	Alloy tool steel	280-350	YNG151	350 (300-450)	0.2 (0.1-0.4)
			YBM251 YBC301	220 (180-300)	0.2 (0.1-0.4)
			YBM351	180 (150-250)	0.25 (0.15-0.3)
			YBG202	220 (170-340)	0.2 (0.1-0.3)
			YC30S	100 (60-180)	0.27 (0.1-0.4)
M	Stainless steel	≤270	YNG151	220 (160-280)	0.2 (0.1-0.4)
			YBM251	130 (100-220)	0.2 (0.1-0.4)
			YBM351	140 (100-240)	0.25 (0.15-0.3)
			YBG202	140 (100-250)	0.2 (0.1-0.3)
K	Cast iron	180-250	YBG102	210 (120-300)	0.2 (0.1-0.3)
			YBD252	200 (150-250)	0.2 (0.1-0.4)
			YD201	100 (80-160)	0.25 (0.1-0.4)

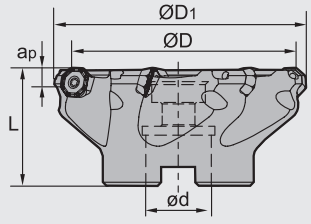
Face milling tools

Kr:45°

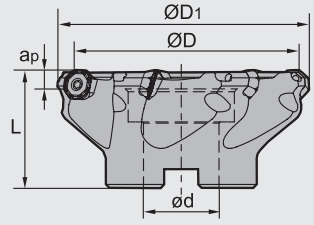
FMA04 P M K N

Screw clamping

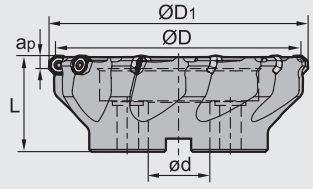
A-type coupling



B-type coupling



C-type coupling



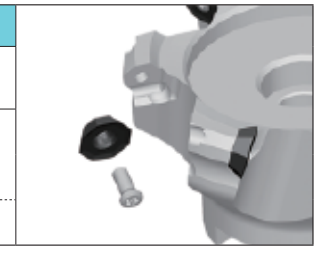
Specification of tools

Type		Stock		Basic dimensions(mm)					Number of teeth Z	Type of coupling	Weight (kg)
		R	L	ØD	ØD1	ød	L	apmax			
FMA04	**-050-A22-OF05-04**	▲	△	50	56	22	40	3.5	4	A	0.3
	-050-A22-OF05-05	△	△	50	56	22	40	3.5	5	A	0.4
	-063-A22-OF05-05	▲	△	63	69	22	40	3.5	5	A	0.5
	-080-A27-OF05-06	▲	△	80	86	27	50	3.5	6	A	0.8
	-100-B32-OF05-07	▲	△	100	106	32	50	3.5	7	B	1.2
	-125-B40-OF05-08	▲	△	125	130	40	63	3.5	8	B	2.7
	-160-B40-OF05-10	▲	△	160	165	40	63	3.5	10	B	5.1
	-160-C40-OF05-10	△	△	160	165	40	63	3.5	10	C	4.1

▲Stock available △Make-to-order

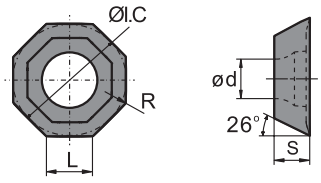
Spare parts

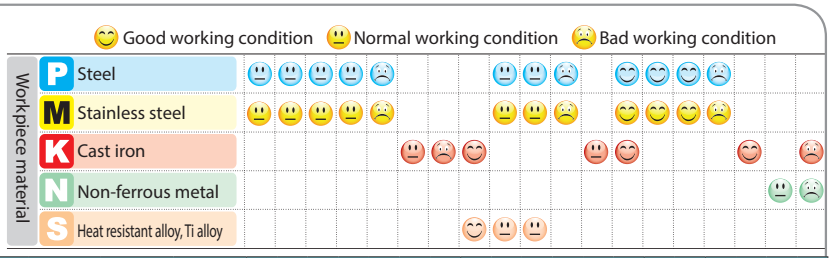
Diameter ØD	Insert screw	Wrench
Ø50- Ø63	I60M4×8.4	WT15IS
Ø80 -Ø160	I60M4×10	

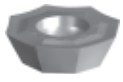
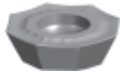


Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	ød	R	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**OFKT05T3-DF**	5.26	12.7	3.97	4.4	0.5								○	★										
	**OFKT05T3-DM**	5.26	12.7	3.97	4.4	0.5			○					★	★		★								
	OFKT05T3-LH	5.26	12.7	3.97	4.4	0.5																		○	

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

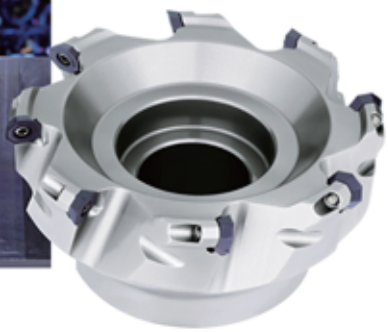
Chipbreaker selection for FMA04 milling inserts

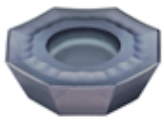
Classification \ Function	For finishing	For semi-finishing
P	-DF	-DM
M		
K		
N	-LH	

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters		
				V(m/min)	f(mm/z)	
					-DF	-DM
P	Low-carbon steel、Soft steel	≤180	YBM251	270 (220-350)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
			YBG202	270 (200-360)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
			YBM351	220 (180-300)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
			YBG302	230 (170-350)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
	High-carbon steel、Alloy steel	180-280	YBM251	240 (200-320)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBG202	240 (180-350)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBM351	200 (160-280)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
			YBG302	220 (150-330)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
	Alloy tool steel	280-350	YBM251	220 (180-300)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBG202	220 (170-340)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBM351	180 (150-250)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
			YBG302	190 (130-300)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
M	Stainless steel	≤270	YBG202	160 (110-270)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBG302	140 (100-250)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBM251	150 (120-250)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
K	Cast iron	180-250	YBG102	210 (120-300)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
N					-LH	
	Aluminium alloy	-	YD101	300-	0.15 (0.05-0.3)	

Case for FMA04





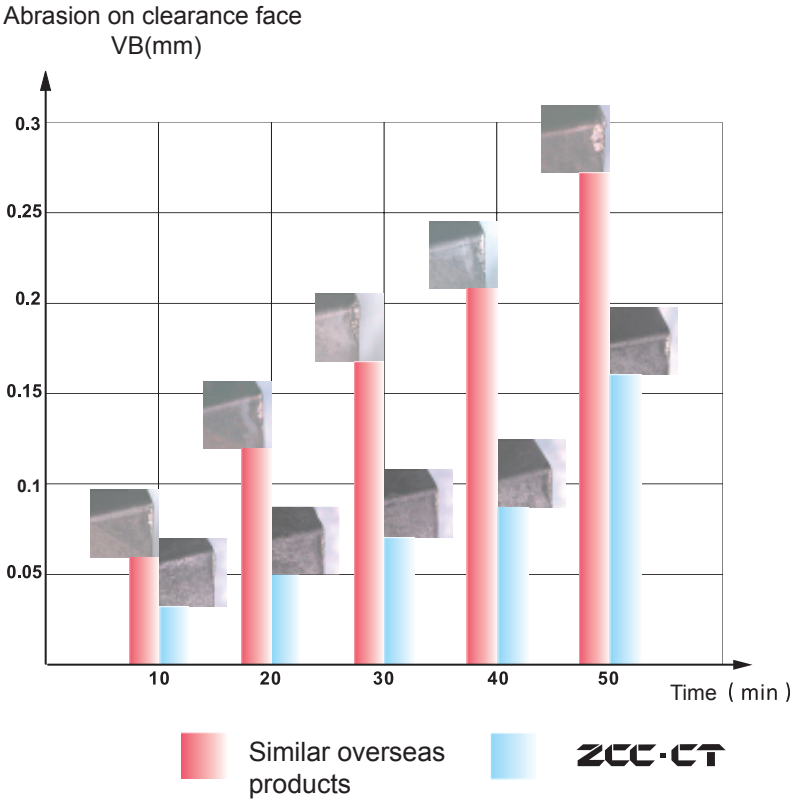
Workpiece material：42CrMo (HB280)
Cooling system: Dry cutting
Machine: Vertical machining center
Cutting parameters：
V_c=180m/min
a_p=1mm
fz=0.2mm/z
a_e=60mm

Tool type：FMA04-100-B32-OF05-07

Insert type/grade：OFKT05T3-DM/YBG202

Surface roughness of workpiece:
ZCC-CT:Ra1.2
Similar overseas products：
Ra1.6

●Comparison of insert abrasion



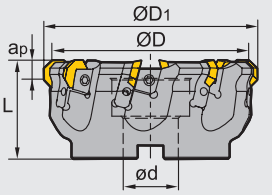
Face milling tools

Kr:45°

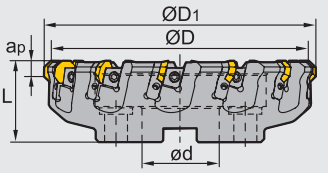
FMA04 P M K

Top clamping

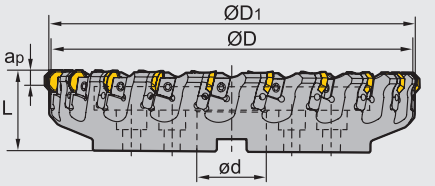
B-type coupling



C-type coupling



D-type coupling



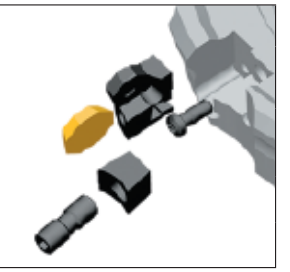
Specification of tools

Type		Stock		Basic dimensions(mm)					Number of teeth Z	Type of coupling	Weight (kg)
		R	L	ØD	ØD1	ød	L	apmax			
FMA04	**-125-B40-OF07-08**	▲	△	125	136	40	63	5	8	B	3.9
	-160-B40-OF07-10	▲	△	160	171	40	63	5	10	B	5.9
	-200-C60-OF07-12	▲	△	200	211	60	63	5	12	C	7.6
	-250-C60-OF07-16	▲	△	250	261	60	63	5	16	C	13.3
	-315-D60-OF07-20	▲	△	315	321	60	63	5	20	D	20.3

▲Stock available △Make-to-order

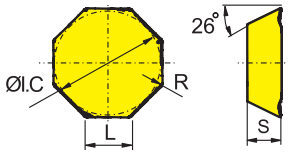
Spare parts

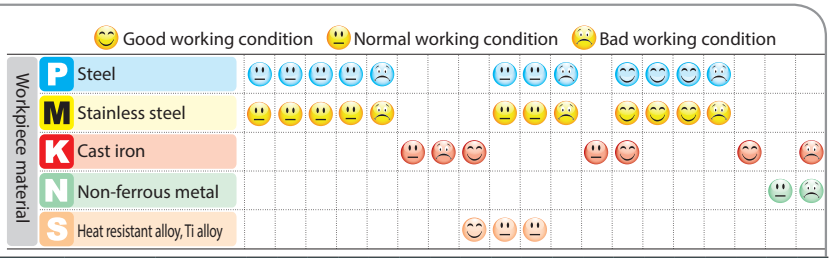
Diameter ØD	Locator	Wedge	Wedge screw	Locator screw	Wrench
Ø125-Ø315	LOF07R/L	W02R/L	DM8×21X	LOM5×15.1	WT20T WH40T



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	R	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	OFKR0704-DF	7.45	17.94	4.76	0.8			●	○					○										
	OFKR0704-DM	7.45	17.94	4.76	0.8	●		●	○	●		○	○	★		★								

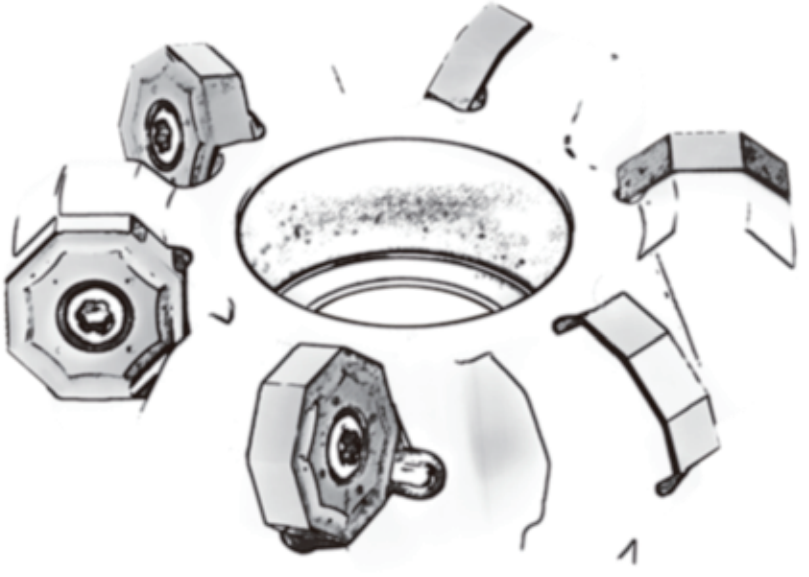
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Chipbreaker selection for FMA04 milling inserts

Classification \ Function	For finishing	For semi-finishing
P	-DF	-DM
M		
K		

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters		
				V(m/min)	f(mm/z)	
					-DF	-DM
P	Low-carbon steel、Soft steel	≤180	YBM251 YBM253 YBC301	270 (220-350)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
			YBG202	270 (200-360)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
			YBM351	220 (180-300)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
			YBG302	230 (170-350)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
	High-carbon steel、Alloy steel	180-280	YBM251 YBM253 YBC301	240 (200-320)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBG202	240 (180-350)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBM351	200 (160-280)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
			YBG302	220 (150-330)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
	Alloy tool steel	280-350	YBM251 YBM253 YBC301	220 (180-300)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBG202	220 (170-340)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBM351	180 (150-250)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
			YBG302	190 (130-300)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
M	Stainless steel	≤270	YBG202	160 (110-270)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBG302	140 (100-250)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBM251	150 (120-250)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBM253	230 (180-300)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
K	Cast iron	180-250	YBG102	210 (120-300)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
			YBD252	200 (150-250)	0.2 (0.1-0.3)	0.25 (0.1-0.4)

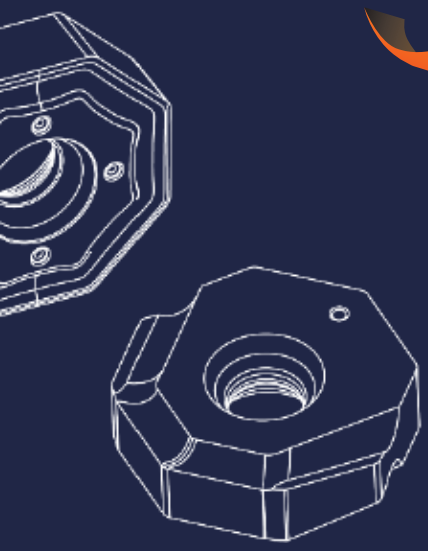


HURRICANE

FMA07 milling cutter series

New generation of high economy milling cutters

16 cutting edges
high economy
8×2=16



- Double negative rake angle structure, both axial and radial direction, super thick insert with outstanding toughness.
- Has good wiper capability, especially under the high feed rate, the wiper effect is better in comparison with similar tools.
- The unique hole design makes the insert clamp more secured.
- Tool diameters from 25 to 315mm and 3 geometries available, -PF, -PM and -W (wiper).

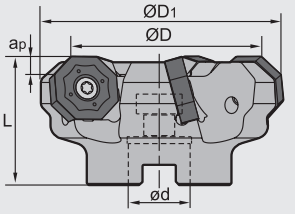
Face milling tools

Kr:45°

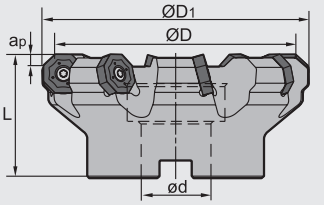
Face milling

FMA07 P M K

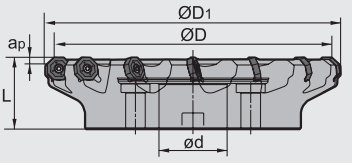
A-type coupling



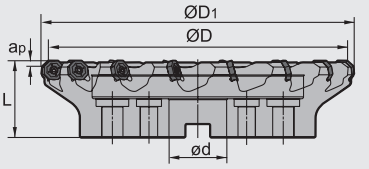
B-type coupling



C-type coupling



D-type coupling



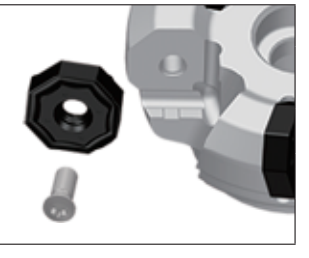
Specification of tools

type		Stock		Basic dimensions(mm)					Number of teeth Z	Style of coupling	Weight (kg)
		R	L	ØD	ØD1	Ød	L	apmax			
FMA07	**-050-A22-ON06-05**	▲	△	50	62	22	40	4	5	A	0.3
	-063-A22-ON06-06	▲	△	63	75	22	40	4	6	A	0.5
	-080-B27-ON06-07	▲	△	80	92	27	50	4	7	B	1.0
	-100-B32-ON06-08	▲	△	100	112	32	63	4	8	B	1.9
	-125-B40-ON06-09	▲	△	125	137	40	63	4	9	B	3.5
	-160-C40-ON06-11	▲	△	160	172	40	63	4	11	C	4.3
	-200-C60-ON06-13	▲	△	200	212	60	63	4	13	C	6.4
	-250-C60-ON06-15	▲	△	250	262	60	63	4	15	C	13.4
	-315-D60-ON06-17	▲	△	315	327	60	80	4	17	D	21.9
	-063-A22-ON08-05	▲	△	63	78	22	40	5	5	A	0.5
	-080-B27-ON08-06	▲	△	80	95	27	50	5	6	B	0.9
	-100-B32-ON08-07	▲	△	100	115	32	63	5	7	B	1.8
	-125-B40-ON08-08	▲	△	125	140	40	63	5	8	B	3.1
	-160-C40-ON08-10	▲	△	160	175	40	63	5	10	C	4.1
	-200-C60-ON08-12	▲	△	200	215	60	63	5	12	C	6.1
	-250-C60-ON08-14	▲	△	250	265	60	63	5	14	C	12.0
	-315-D60-ON08-16	▲	△	315	330	60	80	5	16	D	21.0

▲Stock available △Make-to-order

Spare parts

Diameter ØD	Inserts	Insert screw	Wrench	
Ø50 -Ø315	ONHU06□□□□-PF/PM/W	I60M4×10	--	WT15IS
Ø63 -Ø315	ONHU08□□□□-PF/PM/W	I60M5×13	WT20IT	--

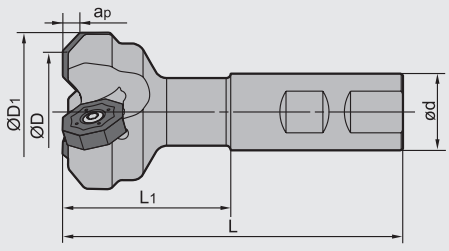


Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Face milling tools

Kr:45°

FMA07 P M K



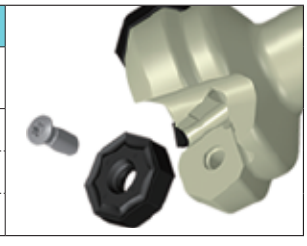
Specification of tools

type		Stock R	Stock L	Basic dimensions(mm) ØD	ØD1	Ød	L	L1	apmax	Number of teeth Z	Weight (kg)
FMA07	-025-XP20-ON06-02	▲	△	25	37	20	95	45	4	2	0.2
	-040-XP25-ON06-03	▲	△	40	52	25	106	50	4	3	0.4
	-032-XP25-ON08-02	▲	△	32	47	25	111	55	5	2	0.4
	-040-XP25-ON08-03	▲	△	40	55	25	111	55	5	3	0.5
	-050-XP25-ON08-04	▲	△	50	65	25	111	55	5	4	0.6

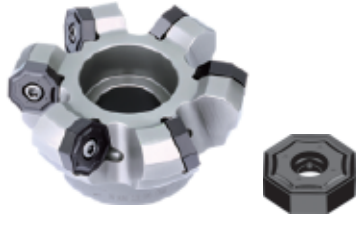
▲Stock available △Make-to-order

Spare parts

Diameter ØD	Inserts	Insert screw	Wrench	
Ø25 -Ø40	ONHU06□□□□-PF/PM/W	I60M4×10	--	WT15IS
Ø32 -Ø50	ONHU08□□□□-PF/PM/W	I60M5×13	WT20IT	--



Case for FMA07



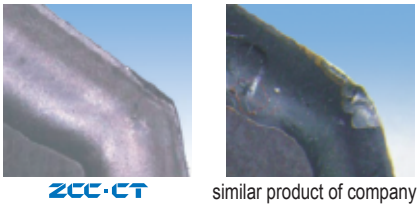
Tool type：FMA07-100-B32-ON08-07

Insert type/grade：ONHU08T508-PM/YBD152

Part: Gear pump body
Workpiece material：HT400
Hardness：HRC22
Cooling system: Dry cutting
Machine: Vertical machining center
Cutting parameters：V_c=267m/min
a_p=1.5mm
f_z=0.42mm/z
a_e=80mm
Milling style: Down milling
Area of machining: End surface

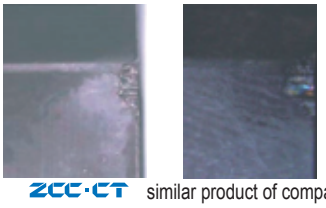
●Comparison of insert abrasion

Abrasion on rake face



ZCC-CT similar product of company A

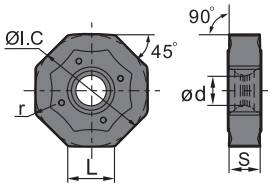
Abrasion on clearance face



ZCC-CT similar product of company A

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

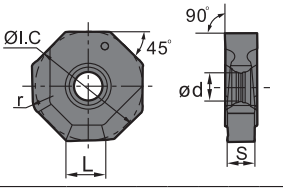
Selection of inserts



😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
M Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
K Cast iron						😐	☹	😊				😐	😊				😊		☹
N Non-ferrous metal																		😐	☹
S Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) L	ØI.C	S	ød	r	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	ONHU060408-PF	6.58	15.875	4.76	4.4	0.83		★				★			★										
	ONHU08T508-PF	8.37	20.2	5.77	5.3	0.83		★				★			★										
	ONHU060408-PM	6.58	15.875	4.76	4.4	0.83		★		★		★													
	ONHU08T508-PM	8.37	20.2	5.79	5.3	0.83		★		★		★													
	ONHU08T508-W	6.9	20.5	6.00	5.3	0.80		★				★		★											



★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters V_c(m/min)	f_z(mm/z)	a_{pmax}(mm) ONHU06□□□□-PF/PM	ONHU08□□□□-PF/PM/W
P	Low-carbon steel、Soft steel	≤180	YBG102 YBM253 YBG202 YBC302	270 (220-350)	0.2 (0.1-0.4)	4	5
P	High-carbon steel、Alloy steel	180-280	YBG102 YBM253 YBG202 YBC302	260 (200-320)	0.2 (0.1-0.4)	4	5
P	Alloy tool steel	280-350	YBG102 YBM253 YBG202 YBC302	240 (180-300)	0.2 (0.1-0.4)	4	5
M	Stainless steel	≤270	YBM253	230(180-300)	0.2(0.1-0.3)	4	5
K	Cast iron	180-250	YBD152	270 (150-300)	0.4 (0.1-0.5)	4	5

Note: The recommended feed rate per tooth for inserts with wiper fz≤0.25mm/z.

FMA11 Series

With outstanding economy and high performance

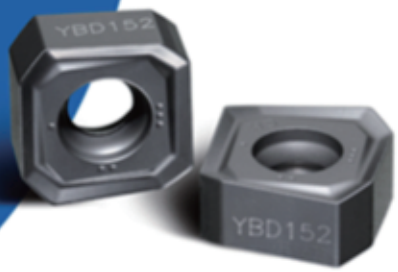
Kr:45°

PVD coating of cutter body provides outstanding corrosion resistance and heat resistance for longer tool life

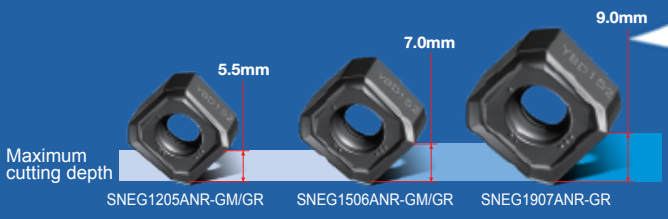
Unique geometry with large rake angle for excellent chip evacuation and low cutting force

Double-negative rake angle gives exceptional impact resistance.

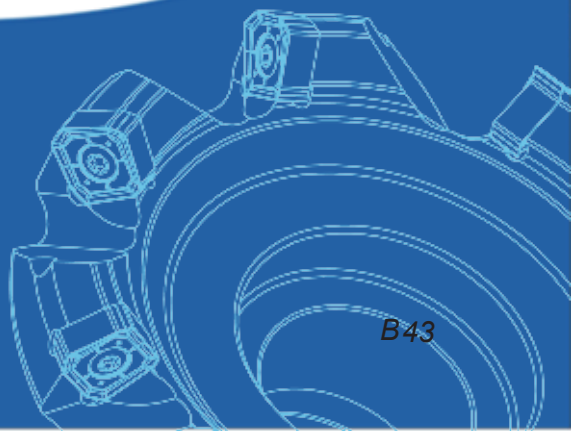
Optimized pitch and chip pocket ensure smooth chip evacuation and higher cutting efficiency.



Inserts with wiper ensure good surface finish.

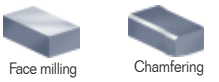


Complete range of insert sizes and geometries for various depths of cut and machining conditions

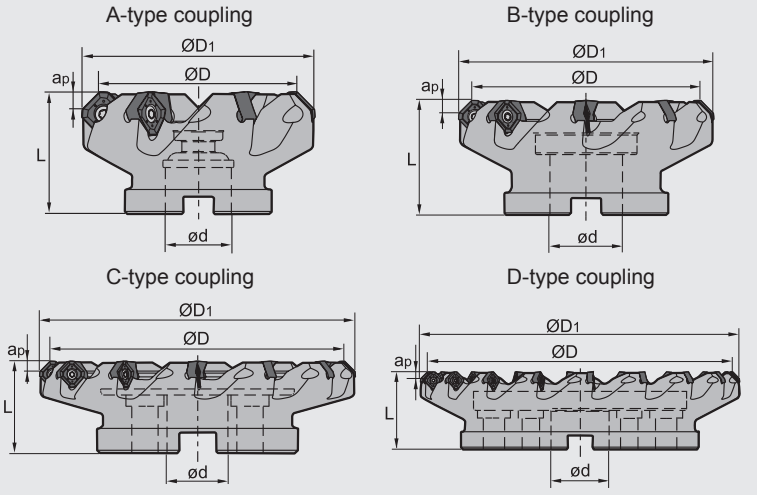


Face milling tools

Kr:45°



FMA11 P K



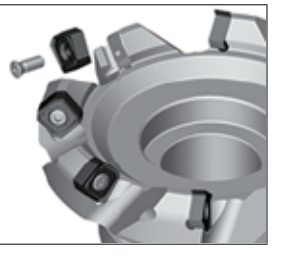
Specification of tools

type		Stock	Basic dimensions(mm)					Number of teeth Z	Style of coupling	Weight (kg)
		R	ØD	ØD1	Ød	L	apmax			
FMA11	**-063-A22-SN15-05**	▲	63	77.4	22	40	7.0	5	A	0.56
	-080-A27-SN15-06	▲	80	94.4	27	50	7.0	6	A	1.06
	-100-B32-SN15-07	▲	100	114.4	32	50	7.0	7	B	1.47
	-125-B40-SN15-08	▲	125	139.4	40	63	7.0	8	B	2.70
	-160-C40-SN15-10	▲	160	174.4	40	63	7.0	10	C	3.92
	-200-C60-SN15-12	▲	200	214.4	60	63	7.0	12	C	5.46
	-250-C60-SN15-14	▲	250	264.4	60	63	7.0	14	C	11.26
	-315-D60-SN15-18	▲	315	329.4	60	80	7.0	18	D	20.00
	-063-A22-SN12-05	▲	63	74.47	22	40	5.5	5	A	0.55
	-080-A27-SN12-06	▲	80	91.47	27	50	5.5	6	A	1.14
	-100-B32-SN12-07	▲	100	111.47	32	50	5.5	7	B	1.42
	-125-B40-SN12-08	▲	125	136.47	40	63	5.5	8	B	2.86
	-160-C40-SN12-10	▲	160	171.47	40	63	5.5	10	C	4.06
	-125-B40-SN19-07	▲	125	142.63	40	63	9.0	7	B	3.00
	-160-C40-SN19-09	▲	160	167.63	40	63	9.0	9	C	4.25
	-200-C60-SN19-11	▲	200	217.63	60	63	9.0	11	C	6.18
	-250-C60-SN19-13	▲	250	267.63	60	63	9.0	13	C	11.55
	-315-D60-SN19-16	▲	315	332.63	60	80	9.0	16	D	20.90

▲Stock available △Make-to-order

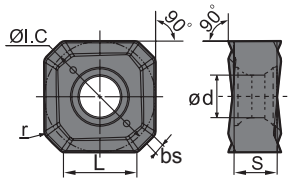
Spare parts

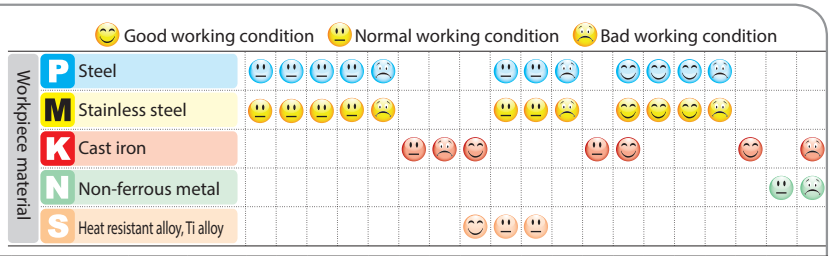
Diameter ØD	Inserts	Insert screw	Wrench	
Ø63 -Ø160	SNEG1205ANR-GR	I60M3.5×10	--	WT15IS
Ø63 -Ø315	SNEG1506ANR-GR	I60M5×13	WT20IT	--
Ø125 -Ø315	SNEG1907ANR-GR	I43M6×16	WT25IT	--



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	bs	ød	r	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	SNEG1205ANR-GM	7.6	12.0	4.76	1.05	4.6	0.8		★		★		★				★									
	SNEG1506ANR-GM	9.4	15.0	5.54	1.30	5.5	0.9		★		★		★				★									
	SNEG1506ANR-GR	9.4	15.0	5.54	1.30	5.5	0.9		★		★		★				★									
	SNEG1907ANR-GR	12.1	19.0	7.0	1.67	7.2	1.0		★		★		★				★									

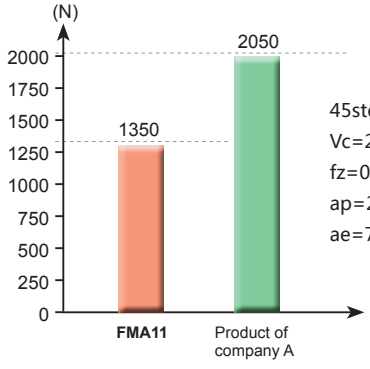
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters		
				V(m/min)	f(mm/z)	a_{pmax}(mm)
P	Low-carbon steel、Soft steel	≤180	YBG205 YBM253 YBC302	270 (220-350)	0.2 (0.1-0.4)	5.5-9.0
P	High-carbon steel、Alloy steel	180-280	YBG205 YBM253 YBC302	260 (200-320)	0.2 (0.1-0.4)	5.5-9.0
P	Alloy tool steel	280-350	YBG205 YBM253 YBC302	240 (180-300)	0.2 (0.1-0.4)	5.5-9.0
K	Cast iron	180-250	YBD152	270 (150-300)	0.4(0.1-0.5)	5.5-9.0

Case for FMA11

comparison of cutting force

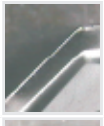


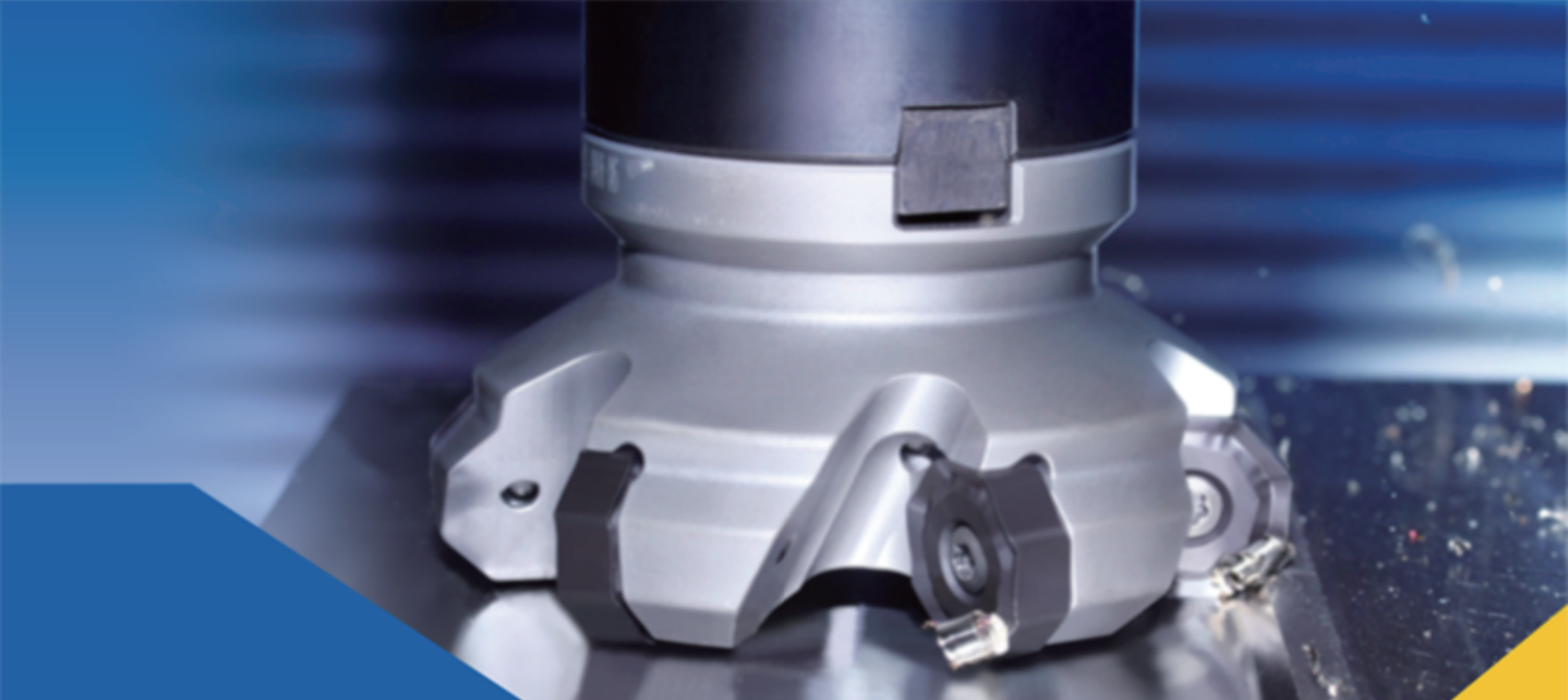
45steel Ø125 tool
Vc=270m/min
fz=0.2mm/z
ap=2mm
ae=75mm

Workpiece: HT300
Operation: Face milling
Tool: FMA11-125-B40-SN12-08
Inser: SNEG1205ANR-GM/YBD152

Cutting data: Vc=300m/min,
fz=0.3mm/z,
a_p=3mm, a_e=80mm

Tool life comparison

	Rake face	Clearance face	Wiper
FMA11 After machining 3 pcs, normal wear.			
Product of ompany A After machining 2 pcs, severe wear.			



FMA12 Series

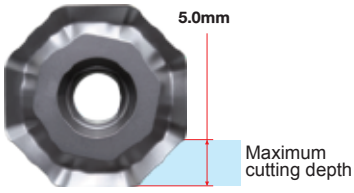
Kr:45°

High Performance Face Mill with 16 edges for outstanding economy

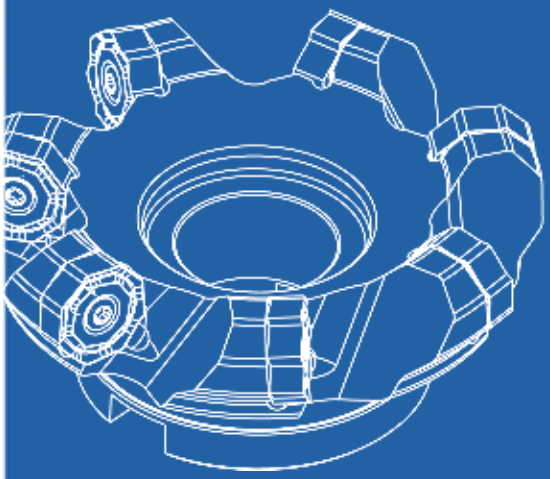
Unique 3-dimentional edge

Double negative rake angle, in combination with helical insert structure, achieves double positive axial angle, which will help reduce cutting resistance and improve chip evacuation.

8 × 2=16edges



ONHU08T624R-GM

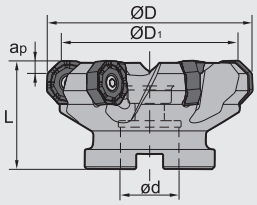


Face milling tools

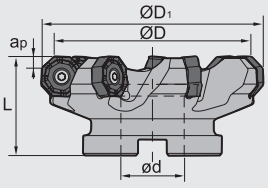
Kr:45°

FMA12 P K

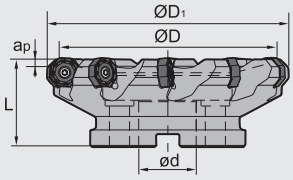
A-type coupling



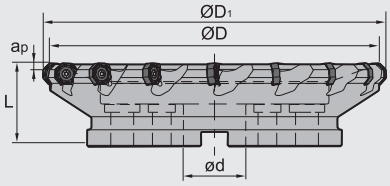
B-type coupling



C-type coupling



D-type coupling



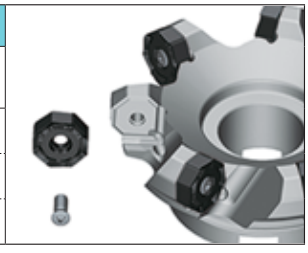
Specification of tools

type		Stock	Basic dimensions(mm)					Number of teeth Z	Style of coupling	Weight (kg)
			ØD	ØD1	Ød	L	apmax			
FMA12	**-080-A27-ON08 -06**	▲	80	95	27	50	5.0	6	A	0.97
	-100-B32-ON08 -07	▲	100	115	32	50	5.0	7	B	1.28
	-125-B40-ON08-08	▲	125	140	40	63	5.0	8	B	2.59
	-160-C40-ON08-10	▲	160	175	40	63	5.0	10	C	4.10
	-200-C60-ON08-12	▲	200	215	60	63	5.0	12	C	5.68
	-250-C60-ON08-14	▲	250	265	60	63	5.0	14	C	11.90
	-315-D60-ON08-18	▲	315	330	60	80	5.0	18	D	20.41

▲Stock available △Make-to-order

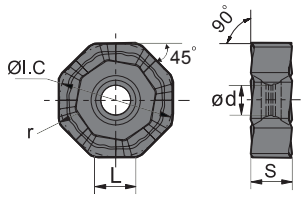
Spare parts

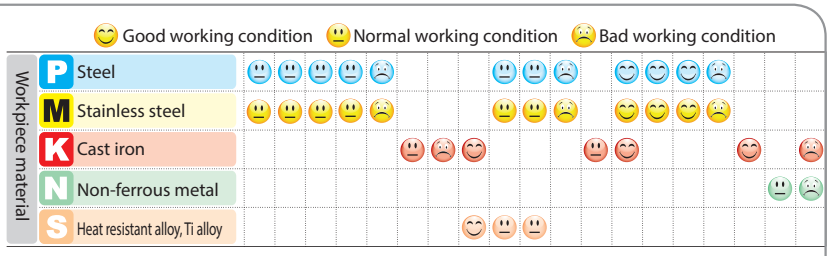
Diameter ØD	Inserts	Insert screw	Wrench
Ø80-Ø315	ONHU08T624R-GM	I60M5X13	WT20IT

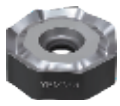


Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	ød	r	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**ONHU08T624R-GM**	6.38	20.2	6.3	5.3	2.4				★		★				★									

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Note：ONHU08T508-PF、ONHU08T508-PM also compatible.

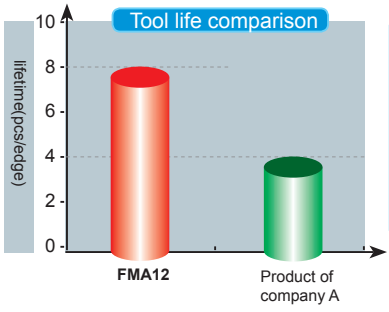
Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters		
				Cutting speed (m/min)	Feed per tooth (mm)	a_{pmax}(mm)
P	Low carbon steel	≤180	YBM253 YBG205	270(220-350)	0.2(0.1-0.3)	5
P	Alloy steel	180-350	YBM253 YBG205	240(180-320)	0.15(0.1-0.3)	5
M	Stainless steel	≤270	YBM253 YBG205	230 (180-300) 160 (110-270)	0.15 (0.1-0.3)	5
K	Cast iron	180-260	YBD152	270(150-300)	0.2(0.1-0.3)	5

Case for FMA12

Case (Cast iron machining)

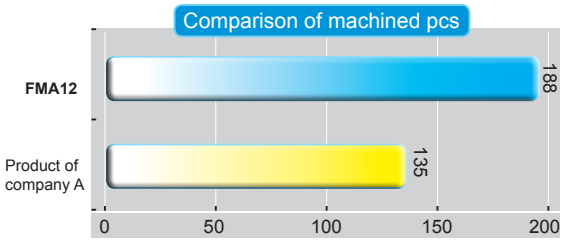
Workpiece: Cylinder
Workpiece material: Gray cast iron (HB250)
Machining location: Milling 4 sides
Tool: FMA12-160-C40-ON08-10
Insert: ONHU08T624R-GM/YBD152
Cutting data: V_c=150m/min，f_z=0.25mm/z，
a_p=3mm，a_e=160mm
System of cooling: External



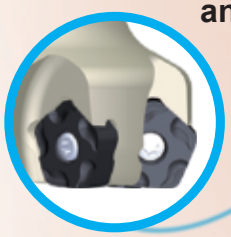
Doubled tool life of FMA12 series compared to similar product of company A.

Case (Steel machining)

A36(HB180~220)
Operation: Face milling
Tool: FMA12-200-C60-ON08-12
nsert: ONHU08T624R-GM/YBM253
Cutting data: V_c=250m/min，f_z=0.15mm/z，
a_p=3mm，a_e=125mm



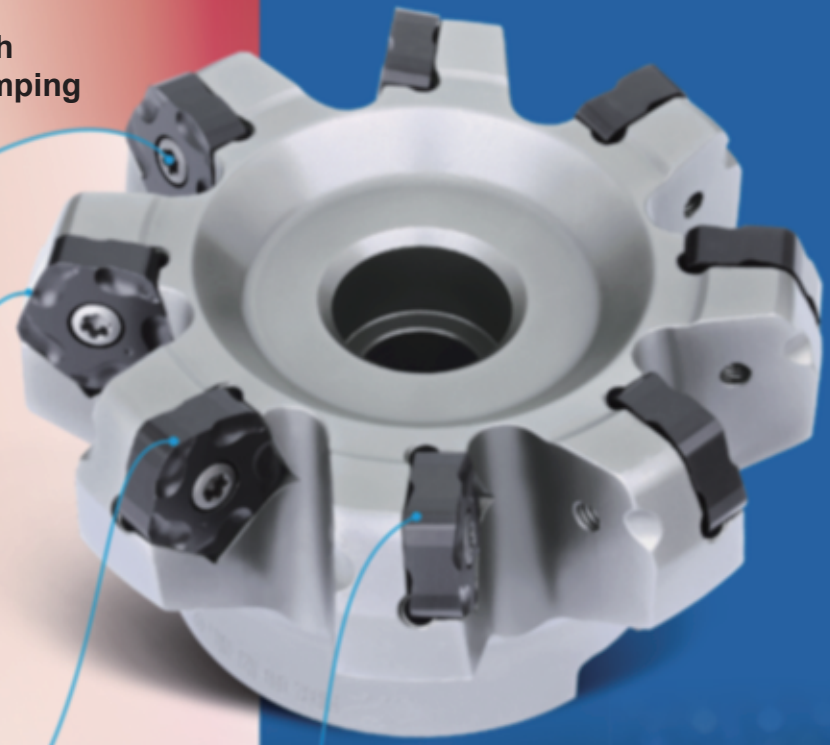
High strength screw clamping



67° approach angle

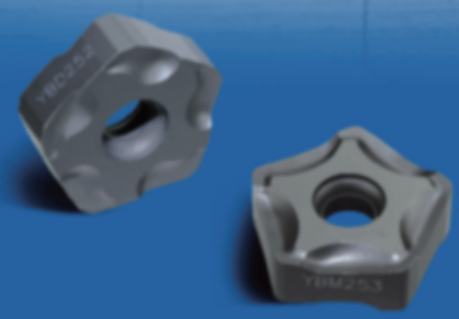
Wiper

Each insert has 10 cutting edges



WHIRLWIND FMD02 milling cutter series

- New generation of milling cutter for face miling mainly in automotive industry.
- Open chipbreaker and large rake angle design, suitable for machines of different power.
- Wiper insert guarantees stable good surface quality at different feed rates.
- The high precision insert pocket design, ensures high accuracy insert positioning and strong clamping of inserts for a stable machining process.
- The Pentagon insert with 10 cutting edges and offers outstanding machining economy.



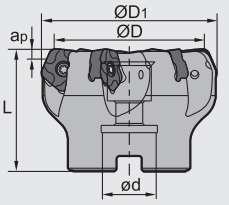
Face milling tools

Kr:67°

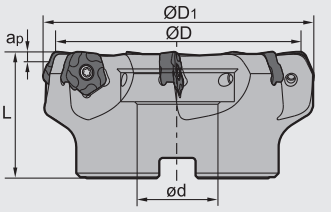
Face milling

FMD02 K

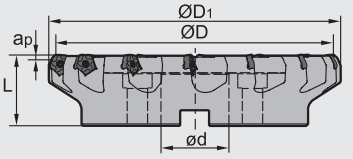
A-type coupling



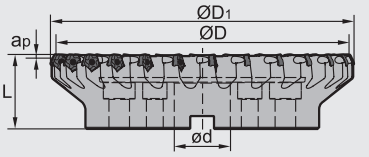
B-type coupling



C-type coupling



D-type coupling



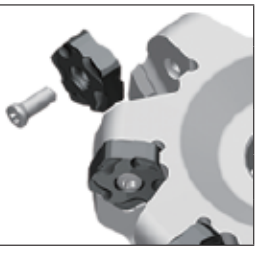
Specification of tools

type		Stock		Basic dimensions(mm)					Number of teeth Z	Style of coupling	Weight (kg)
		R	L	ØD	ØD1	Ød	L	apmax			
FMD02 Coarse pitch (unequal pitch)	**-050-A22-PN11-04**	▲	△	50	60.1	22	50	5/7.5	4	A	0.6
	-063-A22-PN11-05	▲	△	63	73.1	22	50	5/7.5	5	A	0.8
	-080-A27-PN11-06	▲	△	80	90.1	27	50	5/7.5	6	A	1.1
	-100-B32-PN11-07	▲	△	100	110.1	32	50	5/7.5	7	B	1.8
	-125-B40-PN11-08	▲	△	125	135.1	40	63	5/7.5	8	B	2.9
	-160-B40-PN11-10	▲	△	160	170.1	40	63	5/7.5	10	B	5.6
	-200-C60-PN11-12	▲	△	200	210.1	60	63	5/7.5	12	C	7.9
	-250-C60-PN11-14	▲	△	250	260.1	60	63	5/7.5	14	C	13.4
Close pitch	**-050-A22-PN11-05**	▲	△	50	60.1	22	50	5/7.5	5	A	0.6
	-063-A22-PN11-06	▲	△	63	73.1	22	50	5/7.5	6	A	0.9
	-080-A27-PN11-08	▲	△	80	90.1	27	50	5/7.5	8	A	1.2
	-100-B32-PN11-10	▲	△	100	110.1	32	50	5/7.5	10	B	1.9
	-125-B40-PN11-12	▲	△	125	135.1	40	63	5/7.5	12	B	3.2
	-160-B40-PN11-14	▲	△	160	170.1	40	63	5/7.5	14	B	6.4
	-200-C60-PN11-16	▲	△	200	210.1	60	63	5/7.5	16	C	8.5
	-250-C60-PN11-18	▲	△	250	260.1	60	63	5/7.5	18	C	18.0
	-315-D60-PN11-26	▲	△	315	325.1	60	80	5/7.5	26	D	24.5

▲Stock available △Make-to-order

Spare parts

Diameter ØD	Insert screw	Wrench
Ø50 -Ø315	I60M4×10	WT15IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

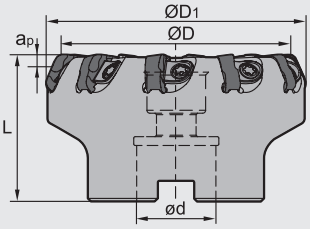
Face milling tools

Kr:67°

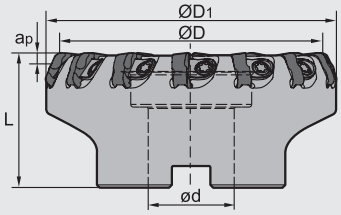
Face milling

FMD02 K

A-type coupling



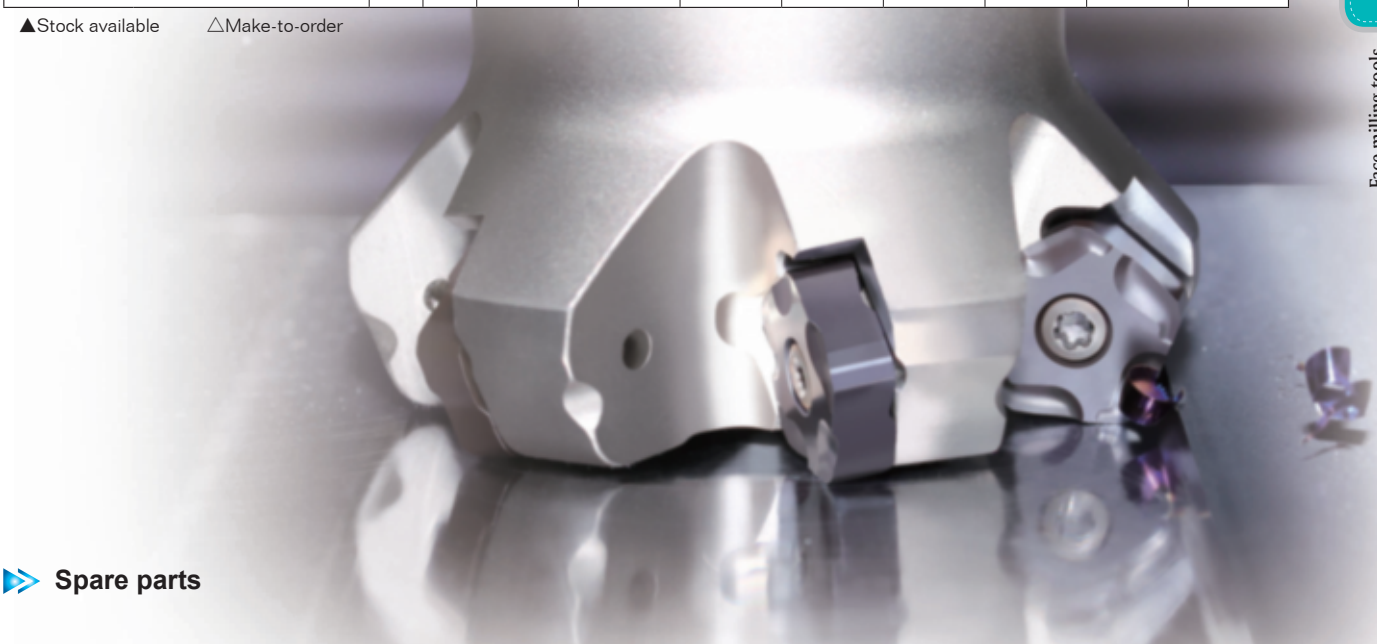
B-type coupling



Specification of tools

type		Stock		Basic dimensions(mm)					Number of teeth Z	Style of coupling	Weight (kg)
		R	L	ØD	ØD1	Ød	L	apmax			
FMD02 Extra close pitch	**-080-A27-PN11-10**	▲	△	80	90.1	27	50	5/7.5	10	A	1.3
	-100-B32-PN11-14	▲	△	100	110.1	32	50	5/7.5	14	B	1.6
	-125-B40-PN11-18	▲	△	125	135.1	40	63	5/7.5	18	B	3.2
	-160-B40-PN11-22	▲	△	160	170.1	40	63	5/7.5	22	B	5.8

▲Stock available △Make-to-order

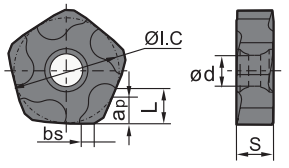


Spare parts

Diameter ØD	Wedge	Screw	Wrench
Ø80 -Ø160	W18N	DM6×20A	WT15IT

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts



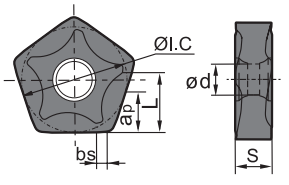
Good working condition | Normal working condition | Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	Normal	Normal	Normal	Normal	Bad			Normal	Normal	Bad		Good	Good	Good	Bad				
M Stainless steel	Normal	Normal	Normal	Normal	Bad			Normal	Normal	Bad		Good	Good	Good	Bad				
K Cast iron						Normal	Bad	Good			Normal	Good					Good		Bad
N Non-ferrous metal																		Normal	Bad
S Heat resistant alloy, Ti alloy								Good	Normal	Normal									

Insert shape	Type	L	ØI.C	S	ød	bs	$a_p$max	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
		Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
	PNEG110512R-CF	5.4	15.875	5.56	4.64	1.6	5						●													
	PNEG110512L-CF	5.4	15.875	5.56	4.64	1.6	5						●													
	PNEG110512R-CM	5.4	15.875	5.56	4.64	1.6	5						●													
	PNEG110512L-CM	5.4	15.875	5.56	4.64	1.6	5						●													
	PNEG110512R-CR	5.4	15.875	5.56	4.64	1.6	5						●													
	PNEG110512L-CR	5.4	15.875	5.56	4.64	1.6	5						●													

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Selection of inserts



Good working condition | Normal working condition | Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	Normal	Normal	Normal	Normal	Bad			Normal	Normal	Bad		Good	Good	Good	Bad				
M Stainless steel	Normal	Normal	Normal	Normal	Bad			Normal	Normal	Bad		Good	Good	Good	Bad				
K Cast iron						Normal	Bad	Good			Normal	Good					Good		Bad
N Non-ferrous metal																		Normal	Bad
S Heat resistant alloy, Ti alloy								Good	Normal	Normal									

Insert shape	Type	L	ØI.C	S	ød	bs	$a_p$max	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
		Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
	PNEG110512R-PF	7.5	15.875	5.56	4.64	1.4	7.5		★		●															
	PNEG110512L-PF	7.5	15.875	5.56	4.64	1.4	7.5		★		●															
	PNEG110512R-PM	7.5	15.875	5.56	4.64	1.4	7.5		★		●															
	PNEG110512L-PM	7.5	15.875	5.56	4.64	1.4	7.5		★		●															
	PNEG110512R-PR	7.5	15.875	5.56	4.64	1.4	7.5		★		●															
	PNEG110512L-PR	7.5	15.875	5.56	4.64	1.4	7.5		★		●															

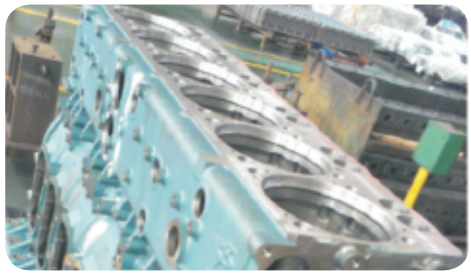
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

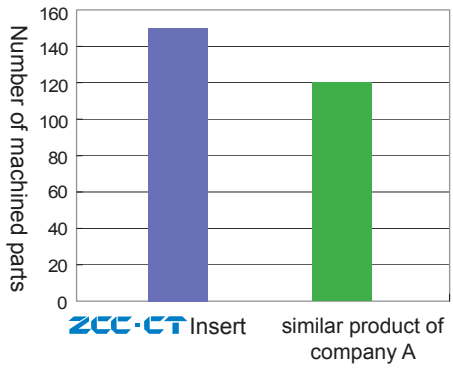
Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters				
				V(m/min)	f(mm/z)			a_{pmax}(mm)
					PF	PM	PR	
P	Low-carbon steel、Soft steel	≤180	YBM253 YBC302	270 (220-350)	0.15 (0.1-0.2)	0.2(0.1-0.3)	0.3(0.2-0.4)	7.5
P	High-carbon steel、Alloy steel	180-280	YBM253 YBC302	260 (200-320)	0.15 (0.1-0.2)	0.2(0.1-0.3)	0.3(0.2-0.4)	7.5
P	Alloy tool steel	280-350	YBM253 YBC302	240 (180-300)	0.15 (0.1-0.2)	0.2(0.1-0.3)	0.3(0.2-0.4)	7.5
K	Cast iron	180-250	YBD152	270 (150-300)	CF	CM	CR	5
					0.15(0.1-0.2)	0.2(0.1-0.3)	0.3(0.2-0.4)	

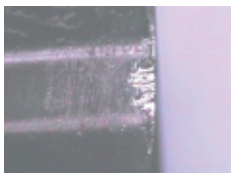
Case for FMD02

Tool type	FMD02-100-B32-PN11-10 ZCC-CT	similar product of company A
Insert type/ grade	PNEG110512R-CR/YBD152 (10-cutting-edge inserts without clearance angle)	
Cutting parameters	D=100mm a_p=3~5mm Vc=243m/min f_z=0.15mm/z T=145~155 piece	D=100mm a_p=3~5mm Vc=243m/min f_z=0.12mm/z T=120~133 piece





● Comparison of insert abrasion



ZCC-CT insert after 80 minutes machining

Insert of company A after 48 minutes machining

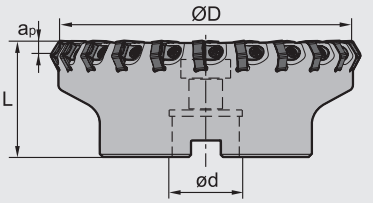
Face milling tools

Kr:55°

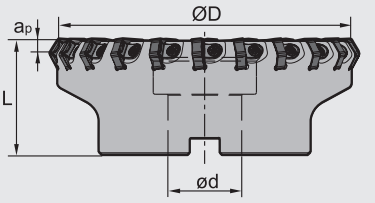
Face milling

FMD02 K

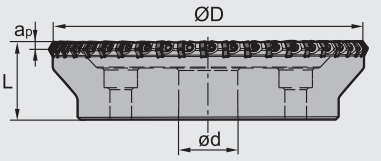
A-type coupling



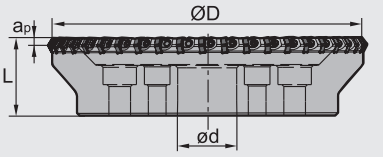
B-type coupling



C-type coupling



D-type coupling



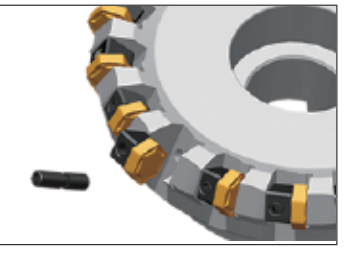
Specification of tools

Type		Stock		Basic dimensions(mm)				Number of teeth Z	Type of coupling	Weight (kg)
		R	L	ØD	ød	L	apmax			
FMD02	**-080-A27-HN09-10**	▲	△	80	27	50	6	8	A	1.1
	-100-B32-HN09-14	▲	△	100	32	63	6	10	B	2.6
	-125-B40-HN09-18	▲	△	125	40	70	6	14	B	3.7
	-160-B40-HN09-22	▲	△	160	40	63	6	18	B	5.6
	-200-C60-HN09-28	▲	△	200	60	63	6	22	C	6.3
	-250-C60-HN09-36	▲	△	250	60	63	6	28	C	10.3
	-315-D60-HN09-44	▲	△	315	60	63	6	32	D	21.7

▲Stock available △Make-to-order

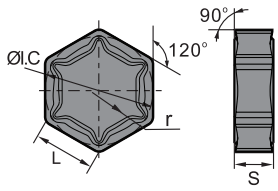
Spare parts

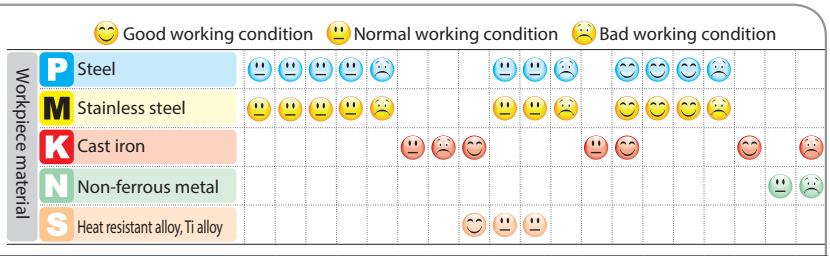
Diameter ØD	Wedge	Wedge screw	Wrench
Ø80-Ø315	W18N	DM6×20A	WT15IT



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	r	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	HNEX090512-DF	9.16	15.875	5.56	1.2						★													
	HNEX090512-DM	9.16	15.875	5.56	1.2						★													
	HNEX090512-DR	9.16	15.875	5.56	1.2						○	★												

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Chipbreaker selection for FMD02 milling inserts

Classification \ Function	For finishing	For semi-finishing	For roughing
K	-DF	-DM	-DR

Recommended cutting parameters

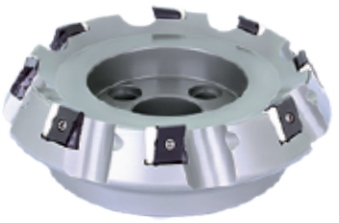
Workpiece material		Hardness HB	Insert grade	Cutting parameters			
				V(m/min)	f(mm/z)		
					-DF	-DM	-DR
K	Cast iron	180-250	YBD152	180 (110-250)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.5)
			YBD252	130 (110-200)	0.2(0.1-0.2)	0.25 (0.1-0.3)	0.3(0.2-0.5)

Face milling tools

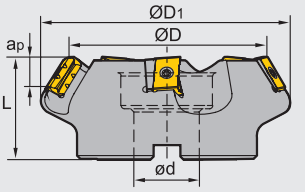
Kr:60°

Face milling

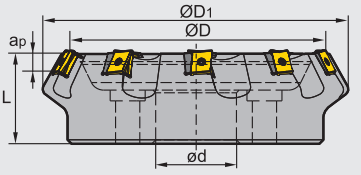
FMD03 P M K



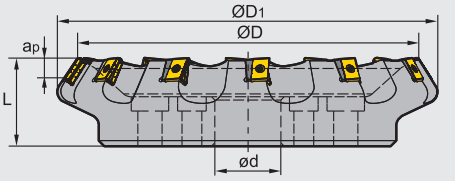
B-type coupling



C-type coupling



D-type coupling



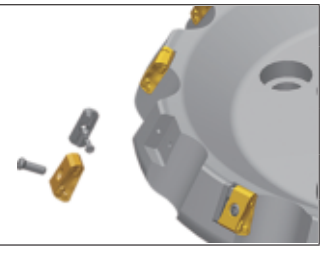
Specification of tools

type		Stock R	Stock L	Basic dimensions(mm) ØD	ØD1	Ød	L	apmax	Number of teeth Z	Applicable inserts	Style of coupling	Weight (kg)
FMD03	-125-B40-LN20-06	▲	△	125	153	40	63	12	6	LNKT2007DN-ZR	B	4.5
	-160-C40-LN20-08	▲	△	160	187	40	63	12	8		C	6.9
	-200-C60-LN20-10	▲	△	200	227	60	70	12	10		C	10.5
	-250-C60-LN20-12	▲	△	250	276	60	70	12	12		C	13.4
	-315-D60-LN20-15	▲	△	315	339	60	80	12	15		D	26.2
	-125-B40-LN25-05	▲	△	125	154	40	63	17	5	LNKT2510-ZR	B	4.5
	-160-C40-LN25-06	▲	△	160	189	40	63	17	6		C	6.9
	-200-C60-LN25-08	▲	△	200	229	60	70	17	8		C	10.5
	-250-C60-LN25-10	▲	△	250	278	60	70	17	10		C	16.7
	-315-D60-LN25-12	▲	△	315	346	60	80	17	12		D	27.3
	-400-D60-LN25-16	▲	△	400	427	60	80	17	16		D	47.1

▲Stock available △Make-to-order

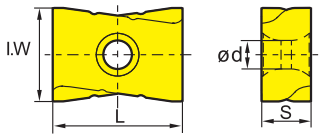
Spare parts

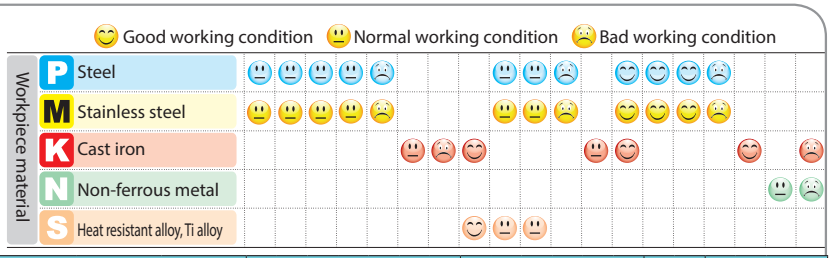
Inserts	Shim	Shim screw	Insert screw	Wrench	
LNKT2007DN-ZR	LLN20R-ZR	I60M3×7	I60M4×15	WT15IS	WT10IS
LNKT2510-ZR	LLN25R-ZR	I60M3.5×10.4	I60M5×17	WT20IT	WT15IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	I.W	S	ød	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	LNKT2007DN-ZR	20	17	7.94	4.6					○	○					★								
	LNKT2510-ZR	25	18	9.525	5.5					○		○				★								

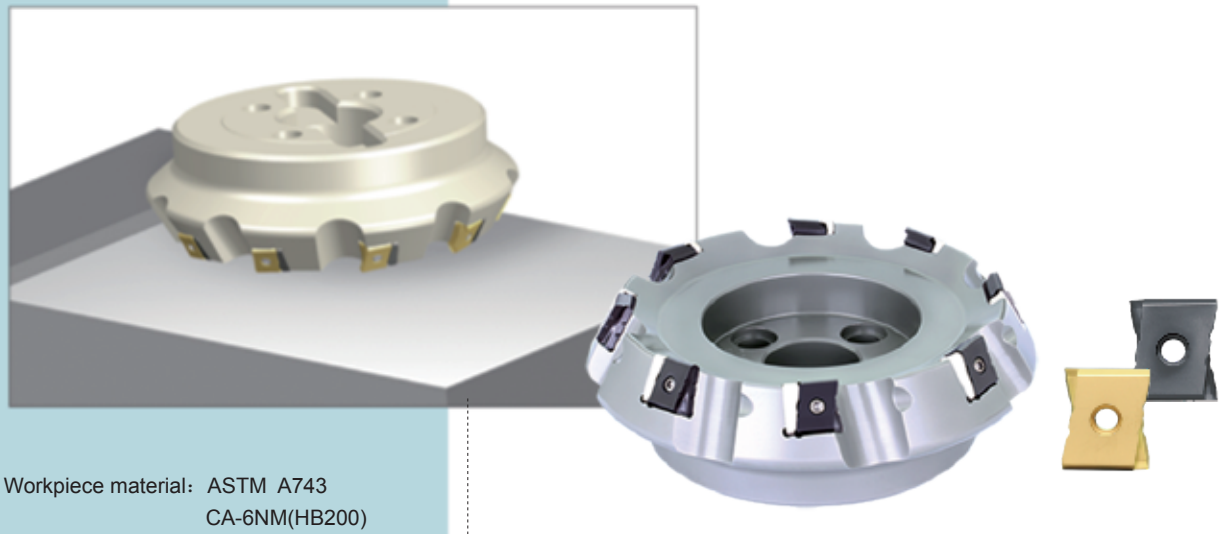
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	≤180	YBG302	180 (150-300)	0.5 (0.2-0.8)
			YBM351	180 (150-300)	0.5 (0.2-0.8)
	High-carbon steel、Alloy steel	180-280	YBG302	150 (120-280)	0.5 (0.2-0.8)
			YBM351	140 (120-280)	0.5 (0.2-0.8)
	Alloy tool steel	280-350	YBG302	120 (80-250)	0.45 (0.2-0.6)
			YBM351	100 (80-250)	0.45 (0.2-0.6)
M	Stainless steel	≤270	YBG302	120 (80-200)	0.45 (0.2-0.6)
			YBM351	100 (80-200)	0.45 (0.2-0.6)
K	Cast iron	180-250	YBD152	220 (150-300)	0.5 (0.2-0.8)
			YBD252	210 (150-300)	0.5 (0.2-0.8)
			YBG302	200 (150-300)	0.5 (0.2-0.8)

Note: Cutting parameters can be adjusted according to the Max. power of machine.

Case for FMD03

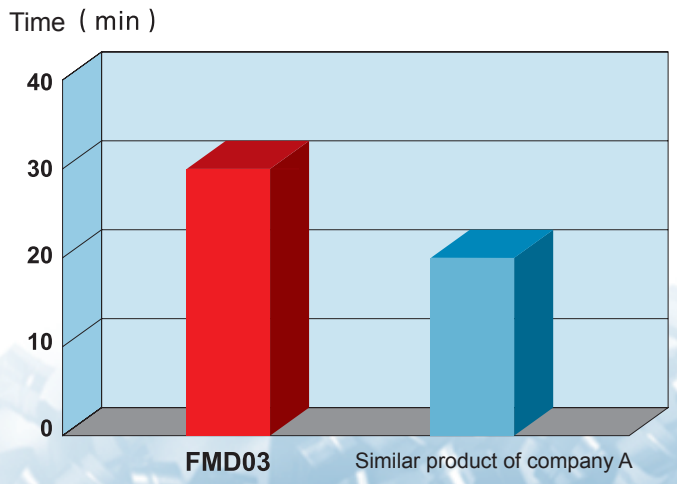


Workpiece material: ASTM A743
CA-6NM(HB200)
Cooling system: Dry cutting
Machine: NC floor type boring and milling machine, spindle power≥30KW
Cutting parameters: Vc=120m/min
a_p=12mm
f_z=0.55mm/z
a_e=230mm

Tool type: FMD03-315-D60-LN25-12

Insert type/grade: LNKT2510-ZR/YBG302

●Comparison of machining time



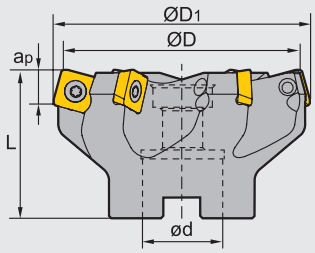
Face milling tools

Kr:75°

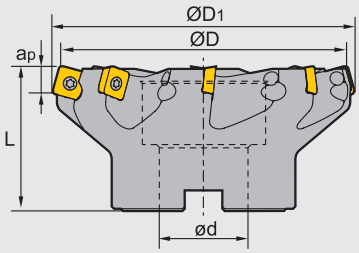
Face milling

FME02 P M K

A-type coupling



B-type coupling



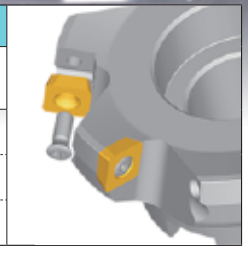
Specification of tools

Type		Stock	Basic dimensions(mm)					Number of teeth Z	Type of coupling	Weight (kg)
			ØD	ØD1	ød	L	apmax			
FME02	**-050-A22-SP12-04**	△	50	54	22	40	6	4	A	0.3
	-063-A22-SP12-05	△	63	66	22	50	6	5	A	0.6
	-080-A27-SP12-06	△	80	83	27	50	6	6	A	0.9
	-100-B32-SP12-07	△	100	103	32	50	6	7	B	1.4
	-125-B40-SP12-08	△	125	128	40	63	6	8	B	2.5

▲Stock available △Make-to-order

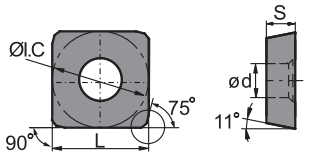
Spare parts

Diameter ØD	Insert screw	Wrench
Ø50-Ø125	I60M5×13.2	WT20IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts



😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
M Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
K Cast iron						😐	☹	😊				😐	😊				😊		☹
N Non-ferrous metal																		😐	☹
S Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) L	ØI.C	S	ød	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	SPKW1204EDFR	12.7	12.7	4.76	5.56									○										
	SPKW1204EDSR	12.7	12.7	4.76	5.56									○										
	SPKT1204EDR	12.7	12.7	4.76	5.56									★										

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Cutting edge treatment selection for FME02 milling inserts

Classification \ Function	For finishing	For semi-finishing	For roughing
P	EDFR	EDR	EDSR
M	EDFR	EDR	
K	EDFR	EDR	

Recommended cutting parameters

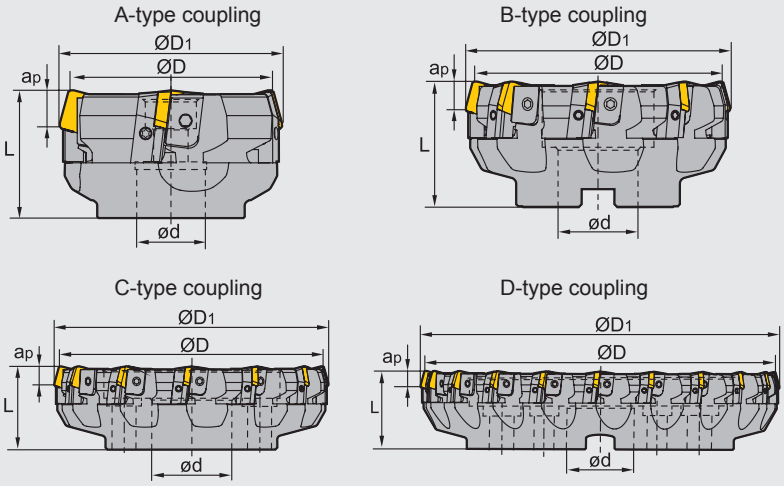
Workpiece material		Hardness HB	Insert grade	Cutting parameters V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	≤180	YBG202	270(200-360)	0.2 (0.1-0.3)
P	High-carbon steel、Alloy steel	180-280	YBG202	240 (180-350)	0.2 (0.1-0.3)
P	Alloy tool steel	280-350	YBG202	220 (170-340)	0.2 (0.1-0.3)
M	Stainless steel	≤270	YBG202	160 (110-270)	0.2 (0.1-0.3)
K	Cast iron	180-250	YBG202	160 (120-200)	0.2 (0.1-0.3)

Face milling tools

Kr:75°

Face milling

FME03 P M K



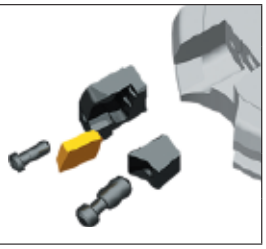
Specification of tools

Type		Stock		Basic dimensions(mm)					Number of teeth Z	Type of coupling	Weight (kg)
		R	L	ØD	ØD1	ød	L	apmax			
FME03	**-080-A27-SP12-04**	▲	△	80	84	27	50	6	4	A	1.1
	-100-B32-SP12-06	▲	△	100	104	32	50	6	6	B	1.9
	-125-B40-SP12-08	▲	△	125	129	40	63	6	8	B	3.5
	-160-B40-SP12-10	▲	△	160	164	40	63	6	10	B	5.7
	-200-C60-SP12-12	▲	△	200	203	60	63	6	12	C	8.2
	-250-C60-SP12-16	▲	△	250	253	60	63	6	16	C	13.8
	-315-D60-SP12-20	▲	△	315	318	60	70	6	20	D	23.5
	-080-A27-SP15-04	▲	△	80	84	27	50	8	4	A	1.0
	-100-B27-SP15-06	▲	△	100	104	27	50	8	6	B	1.8
	-125-B40-SP15-08	▲	▲	125	129	40	63	8	8	B	3.3
	-160-B40-SP15-10	▲	▲	160	164	40	63	8	10	B	5.4
	-200-C60-SP15-12	▲	▲	200	204	60	63	8	12	C	7.9
	-250-C60-SP15-16	▲	▲	250	253	60	63	8	16	C	13.6
	-315-D60-SP15-20	▲	▲	315	318	60	70	8	20	D	23.1

▲Stock available △Make-to-order

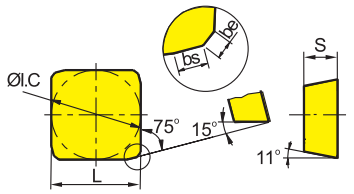
Spare parts

Diameter ØD	Inserts	Locator	Wedge	Wedge Screw	Locator screw	Wrench
Ø80-Ø100	SP12	LSP12R/L	W04R/L	WM8×17	LOM5×15.1	WT20T WT25T
Ø125-Ø315				WM8×22		
Ø80-Ø315	SP15	LSP15R/L	W04R/L	WM8×22		



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts



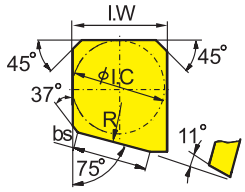
Workpiece material	😊 Good working condition	😐 Normal working condition	☹ Bad working condition
P Steel	😐 😐 😐 😐 ☹	😐 😐 ☹	😊 😊 😊 ☹
M Stainless steel	😐 😐 😐 😐 ☹	😐 😐 ☹	😊 😊 😊 ☹
K Cast iron	😐 ☹ 😊	😐 😊	😊 ☹
N Non-ferrous metal			😐 ☹
S Heat resistant alloy, Ti alloy	😊 😐 😐		

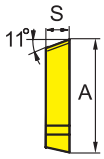
Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	be	bs	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	SPKN1203EDER	12.7	12.7	3.18	1	1.4									○										
	SPKN1203EDEL	12.7	12.7	3.18	1	1.4									○										
	SPKN1203EDFR	12.7	12.7	3.18	1	1.4								★	○										●
	SPKN1203EDFL	12.7	12.7	3.18	1	1.4								○	○										○
	SPKN1203EDSKR	12.7	12.7	3.18	1	1.4											○					○			
	SPKN1203EDSKL	12.7	12.7	3.18	1	1.4											○					○			
	SPKN1203EDTKR	12.7	12.7	3.18	1	1.4	●				●				○		★					●			○
	SPKN1203EDTKL	12.7	12.7	3.18	1	1.4									○		○					○			○
	SPKN1203EDS31R	12.7	12.7	3.18	1	1.4											○					○			
	SPKN1203EDS31L	12.7	12.7	3.18	1	1.4											○					○			
	SPKN1203EDT31R	12.7	12.7	3.18	1	1.4	●				●				○		★					●			○
	SPKN1203EDT31L	12.7	12.7	3.18	1	1.4									○		○					○			○
	SPKR1203EDR-GM	12.7	12.7	3.18	1	1.4			●						★		★					●			●
	SPKR1203EDL-GM	12.7	12.7	3.18	1	1.4			●						★		★					●			●
	SPKN1504EDER	15.875	15.875	4.76	1	1.4									○										
	SPKN1504EDEL	15.875	15.875	4.76	1	1.4									○										
	SPKN1504EDFR	15.875	15.875	4.76	1	1.4								○	○										○
	SPKN1504EDFL	15.875	15.875	4.76	1	1.4								○	○										○
	SPKN1504EDSKR	15.875	15.875	4.76	1	1.4											○					○			
	SPKN1504EDSKL	15.875	15.875	4.76	1	1.4											○					○			
	SPKN1504EDTKR	15.875	15.875	4.76	1	1.4	●								★		○					●			●
	SPKN1504EDTKL	15.875	15.875	4.76	1	1.4									○		○					○			●
	SPKN1504EDS32R	15.875	15.875	4.76	1	1.4											○					○			
	SPKN1504EDS32L	15.875	15.875	4.76	1	1.4											○					○			
	SPKN1504EDT32R	15.875	15.875	4.76	1	1.4	●								★		○					●			●
	SPKN1504EDT32L	15.875	15.875	4.76	1	1.4									○		○					○			●
	SPKR1504EDR-GM	15.875	15.875	4.76	1	1.4			●						★		★					●			●
	SPKR1504EDL-GM	15.875	15.875	4.76	1	1.4			●						★		★					●			●

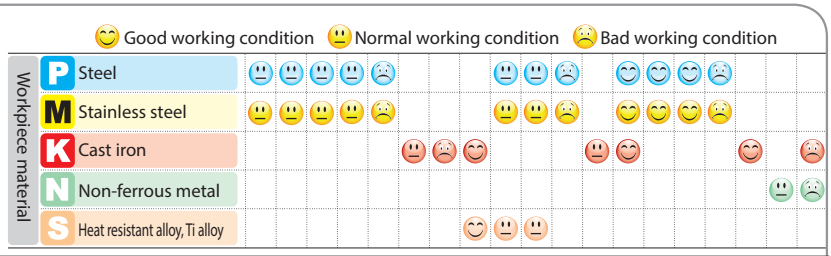
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Ordering guide: **SPKN1203EDT3 1 R** chamfering angle 20° , chamfering width 0.15mm. For other edge shapes, see inserts code key standard.

Selection of inserts







Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		A	ØI.C	I.W	S	bs	R	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
Wiper inserts	**SPEX1203EDL-1**	15	12.7	12.7	3.18	10	500																			●
	SPEX1203EDR-1	15	12.7	12.7	3.18	10	500																			●
	SPEX1504EDL-1	18.2	15.875	15.875	4.76	10	500																	○		●
	SPEX1504EDR-1	18.2	15.875	15.875	4.76	10	500																	○		●

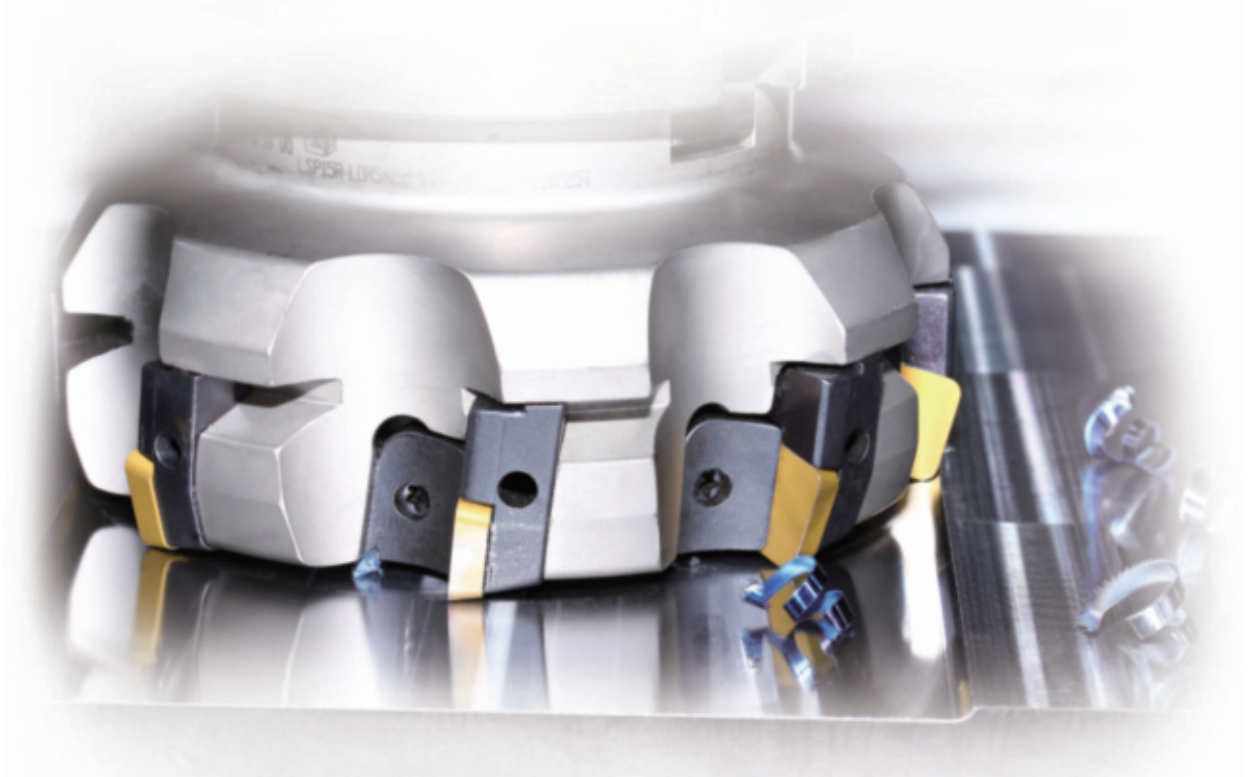
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Cutting edge treatment selection for FME03 milling inserts

Treatment of cutting edge	Recommended selection
SP□□EDER/L	Honing edge is suitable for semi-finish and finish machining of steel and stainless steel.
SP□□EDFR/L	Sharp cutting edge is suitable for finish machining of cast iron materials.
SP□□EDSKR/L **SP□□EDS□□R/L**	After chamfering and honing, the edge has strong anti-breakage capability, suitable for rough machining of steel parts under poor working conditions.
SP□□EDTKR/L **SP□□EDT□□R/L**	Chamfered edge is suitable for semi-finish and finish machining of steel, stainless steel and cast iron materials.
SP□□EDR/L-GM	3D chipbreaker can reduce cutting force, reinforce the capability of chip control, and improve insert life. It is widely applied in semi-finish machining of steel, stainless steel and cast iron materials.

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	≤180	YBG202	270(200-360)	0.2 (0.1-0.4)
			YBG302	230 (170-350)	0.24 (0.1-0.3)
			YBM251 YBC301	270(220-350)	0.2 (0.1-0.4)
			YBM351	220 (180-300)	0.25 (0.15-0.3)
			YC30S	140 (100-220)	0.22 (0.1-0.3)
	High-carbon steel、Alloy steel	180-280	YBG202	240 (180-350)	0.2 (0.1-0.3)
			YBG302	220 (150-330)	0.24 (0.1-0.3)
			YBM251 YBC301	240 (200-320)	0.2 (0.1-0.4)
			YBM351	200 (160-280)	0.25 (0.15-0.3)
			YC30S	120 (80-200)	0.22 (0.1-0.3)
	Alloy tool steel	280-350	YBG202	220 (170-340)	0.2 (0.1-0.3)
			YBG302	190 (130-300)	0.24 (0.1-0.3)
			YBM251 YBC301	220 (180-300)	0.2 (0.1-0.4)
			YBM351	180 (150-250)	0.25 (0.15-0.3)
			YC30S	100 (60-180)	0.22 (0.1-0.3)
M	Stainless steel	≤270	YBG202	160 (110-270)	0.2 (0.1-0.3)
			YBG302	140 (100-250)	0.24 (0.1-0.3)
			YBM251	150 (120-240)	0.2 (0.1-0.4)
			YBM351	140 (100-240)	0.25 (0.15-0.3)
K	Cast iron	180-250	YBG102	210 (120-300)	0.12 (0.08-0.3)
			YBG302	160 (120-200)	0.2 (0.1-0.3)
			YD201	100 (80-160)	0.24 (0.15-0.4)



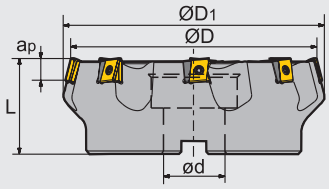
Face milling tools

Kr:75°

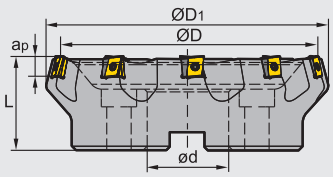
Face milling

FME04 P M K

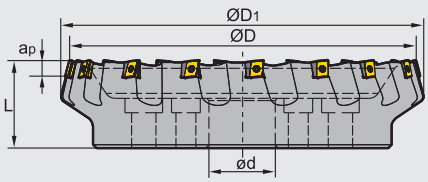
B-type coupling



C-type coupling



D-type coupling



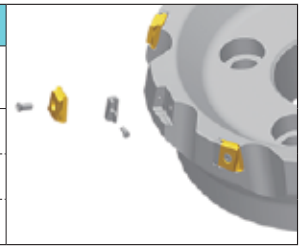
Specification of tools

type		Stock R	Stock L	ØD	ØD1	Ød	L	apmax	Number of teeth Z	Applicable inserts	Style of coupling	Weight (kg)
FME04	-125-B40-LN15-06	▲	△	125	137	40	63	8	6	LNKT1506EN-ZR	B	3.8
	-160-B40-LN15-08	▲	△	160	170	40	63	8	8		C	6.6
	-200-C60-LN15-10	▲	△	200	208	60	70	8	10		C	9.6
	-250-C60-LN15-12	▲	△	250	257	60	70	8	12		C	13.4
	-315-D60-LN15-16	▲	△	315	328	60	80	8	16		D	25.2

▲Stock available △Make-to-order

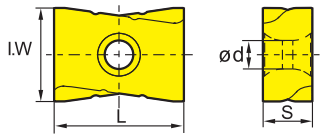
Spare parts

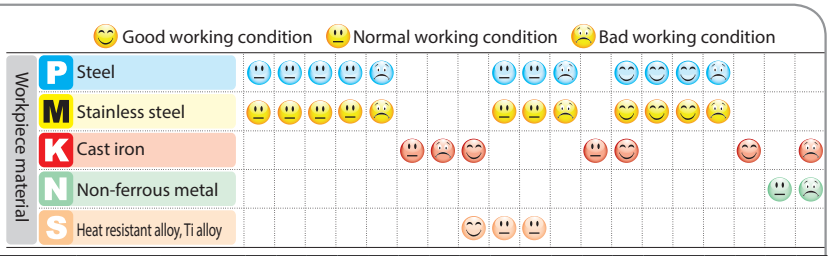
Diameter ØD	Shim	Shim screw	Insert screw	Wrench
Ø125-Ø315	LLN15-ZR	I60M3×7	I60M4×12	WT15IS, WT10IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	I.W	S	ød	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	LNKT1506EN-ZR	15.875	14	6.35	4.6					○	○					★								

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	≤180	YBG302	180 (150-300)	0.5 (0.2-0.8)
			YBM351	180 (150-300)	0.5 (0.2-0.8)
	High-carbon steel、Alloy steel	180-280	YBG302	150 (120-280)	0.5 (0.2-0.8)
			YBM351	140 (120-280)	0.5 (0.2-0.8)
	Alloy tool steel	280-350	YBG302	120 (80-250)	0.45 (0.2-0.6)
			YBM351	100 (80-250)	0.45 (0.2-0.6)
M	Stainless steel	≤270	YBG302	120 (80-200)	0.45 (0.2-0.6)
			YBM351	100 (80-200)	0.45 (0.2-0.6)
K	Cast iron	180-250	YBD152	220 (150-300)	0.5 (0.2-0.8)
			YBD252	210 (150-300)	0.5 (0.2-0.8)
			YBG302	200 (150-300)	0.5 (0.2-0.8)

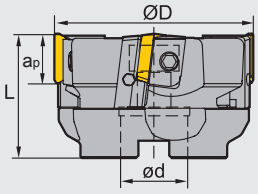
Note: Cutting parameters can be adjusted according to the Max. power of machine.

Face milling tools

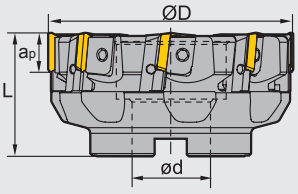
Kr:90°

FMP01 P M K

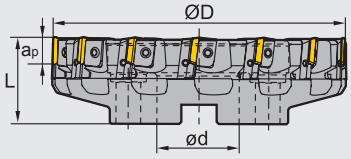
A-type coupling



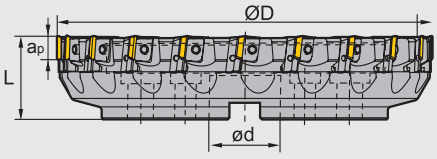
B-type coupling



C-type coupling



D-type coupling



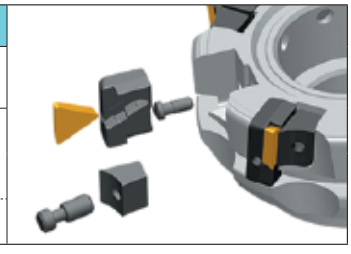
Specification of tools

Type		Stock		Basic dimensions(mm)				Number of teeth Z	Type of coupling	Weight (kg)
		R	L	ØD	ød	L	apmax			
FMP01	**-080-A27-TP22-04**	▲	△	80	27	50	18	4	A	1.2
	-100-B32-TP22-06	▲	△	100	32	50	18	6	B	1.7
	-125-B40-TP22-08	▲	△	125	40	63	18	8	B	3.2
	-160-B40-TP22-10	▲	△	160	40	63	18	10	B	5.1
	-200-C60-TP22-12	▲	△	200	60	63	18	12	C	7.4
	-250-C60-TP22-16	▲	△	250	60	63	18	16	C	12.3
	-315-D60-TP22-20	▲	△	315	60	70	18	20	D	21.9

▲Stock available △Make-to-order

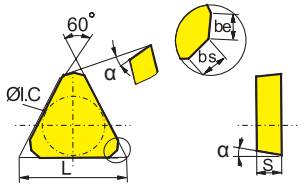
Spare parts

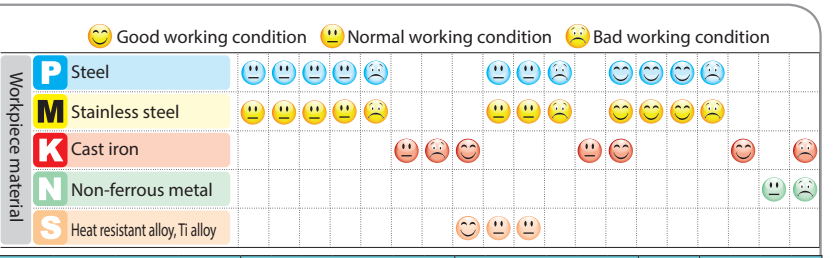
Diameter ØD	Locator	Wedge	Wedge Screw	Locator screw	Wrench
Ø80 Ø100	LTP4R1/L1	W04R/L	WM8×17	LOM5×15.1	WT20T WT25T
Ø125 ~ Ø315	LTP4R/L		WM8×22		



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	be	bs	α	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	TPKN2204PDFR	22	12.7	4.76	1.4	0.7	11°								○											○
	TPKN2204PDFL	22	12.7	4.76	1.4	0.7	11°								○											○
	TPKN2204PDR	22	12.7	4.76	1.4	0.7	11°	●				●			★	★		★					●	○	○	●
	TPKN2204PDL	22	12.7	4.76	1.4	0.7	11°																●			
	TPKN2204PDTR	22	12.7	4.76	1.4	0.7	11°	●															●			
	TPKN2204PDTL	22	12.7	4.76	1.4	0.7	11°	○															○			

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Recommended cutting parameters

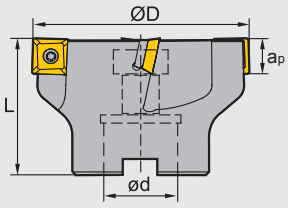
Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	≤180	YBC301	270 (220-350)	0.2 (0.1-0.4)
			YBM351	220 (180-300)	0.2 (0.08-0.3)
			YBG202	270 (200-360)	0.2 (0.1-0.3)
			YC30S	140 (100-220)	0.22 (0.1-0.3)
	High-carbon steel、Alloy steel	180—280	YBC301	240 (200-320)	0.2 (0.1-0.4)
			YBM351	200 (160-280)	0.2 (0.08-0.3)
			YBG202	240 (180-350)	0.2 (0.1-0.3)
			YC30S	120 (80-200)	0.22 (0.1-0.3)
	Alloy tool steel	280—350	YBC301	220 (180-300)	0.2 (0.1-0.4)
			YBM351	180 (150-250)	0.2 (0.08-0.3)
			YBG202	220 (170-340)	0.2 (0.1-0.3)
			YC30S	100 (60-180)	0.22 (0.1-0.3)
M	Stainless steel	≤270	YBM351	140 (100-240)	0.2 (0.08-0.3)
			YBG202	140 (100-250)	0.2 (0.1-0.3)
K	Cast iron	180—250	YBG102	210 (120-300)	0.2 (0.1-0.3)
			YBG302	160 (120-200)	0.35 (0.10-0.4)
			YD201	100 (80-160)	0.24 (0.15-0.4)

Face milling tools

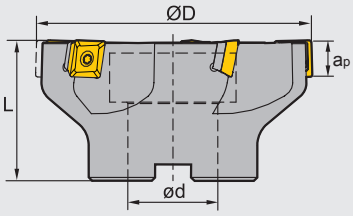
Kr:90°

FMP02 P M K

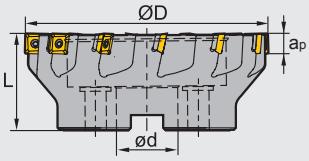
A-type coupling



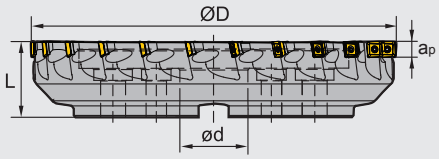
B-type coupling



C-type coupling



D-type coupling



Specification of tools

Type		Stock	Basic dimensions(mm)				Number of teeth Z	Type of coupling	Weight (kg)
			ØD	ød	L	apmax			
FMP02	**-050-A22-SE09-05**	▲	50	22	40	6.7	5	A	0.3
	-063-A22-SE09-06	▲	63	22	40	6.7	6	A	0.5
	-080-A27-SE09-08	▲	80	27	50	6.7	8	A	0.9
	-100-B32-SE09-08	▲	100	32	50	6.7	8	B	1.7
	-100-B32-SE09-10	△	100	32	50	6.7	10	B	1.7
	-125-B40-SE09-12	△	125	40	63	6.7	12	B	2.6

▲Stock available △Make-to-order

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

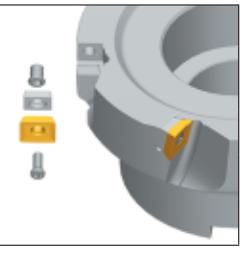
Specification of tools

Type		Stock	Basic dimensions(mm)				Number of teeth Z	Type of coupling	Weight (kg)
			ØD	ød	L	apmax			
FMP02	**-050-A22-SE12-03**	▲	50	22	40	10.8	3	A	0.3
	-063-A22-SE12-04	▲	63	22	40	10.8	4	A	0.4
	-080-A27-SE12-04	▲	80	27	50	10.8	4	A	0.9
	-100-B32-SE12-05	▲	100	32	50	10.8	5	B	1.2
	-125-B40-SE12-06	▲	125	40	63	10.8	6	B	3.1
	-160-C40-SE12-08	▲	160	40	63	10.8	8	C	4.1
	-250-C60-SE12-12	▲	250	60	63	10.8	12	C	11.1
	-050-A22-SE12-04	▲	50	22	40	10.8	4	A	0.3
	-063-A22-SE12-05	▲	63	22	40	10.8	5	A	0.4
	-080-A27-SE12-06	▲	80	27	50	10.8	6	A	0.8
	-100-B32-SE12-07	▲	100	32	50	10.8	7	B	1.2
	-125-B40-SE12-08	▲	125	40	63	10.8	8	B	3.0
	-160-C40-SE12-12	▲	160	40	63	10.8	12	C	3.9
	-050-A22-SE12-05	▲	50	22	40	10.8	5	A	0.2
	-063-A22-SE12-06	▲	63	22	40	10.8	6	A	0.4
	-080-A27-SE12-08	▲	80	27	50	10.8	8	A	0.8
	-100-B32-SE12-10	▲	100	32	50	10.8	10	B	1.2
	-125-B40-SE12-12	▲	125	40	63	10.8	12	B	2.9
	-200-C60-SE12-16	▲	200	60	63	10.8	16	C	6.1
	-250-C60-SE12-18	▲	250	60	63	10.8	18	C	10.9
	-315-D60-SE12-24	▲	315	60	63	10.8	24	D	21.6

▲Stock available △Make-to-order

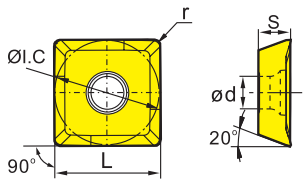
Spare parts

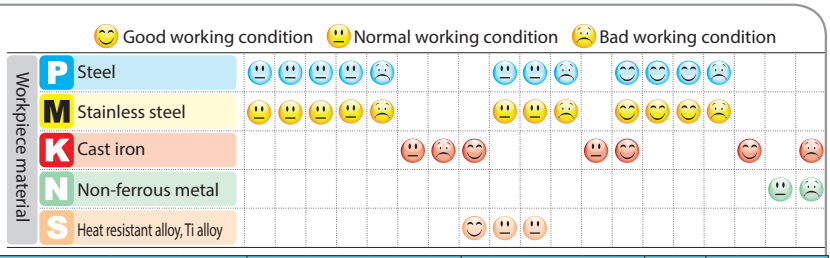
Diameter ØD	Inserts	Shim	Insert screw	Shim screw	Wrench	Wrench
Ø50 ~ Ø125	SE09	--	I60M3×7	--	WT09IS	--
Ø50	SE12	--	I60M3.5×10	--	WT15IS	--
Ø63 ~ Ø315		S12BSX	I60M3.5×12	SM5×7XA		WH35L



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





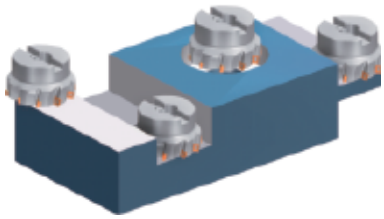
Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	ød	r	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	SEET09T308PER-PF	9.525	9.525	4.01	3.3	0.8									★										
	SEET09T308PER-PM	9.525	9.525	4.01	3.3	0.8						○			★										
	SEET09T308PER-PR	9.525	9.525	4.01	3.3	0.8						★			○										
	SEET120308PER-PF	13.308	13.308	4.04	4.1	0.8									○										
	SEET120308PER-PM	13.308	13.308	4.04	4.1	0.8			●				★	★	★		★								
	SEET120308PER-PR	13.308	13.308	4.04	4.1	0.8					○			★	★		★								

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Chipbreaker selection for FMP02 milling inserts

Classification \ Function	For finishing	For semi-finishing	For roughing
P	**PF**	**PM**	**PR**
M			
K			

Features of FMP02 series milling cutters

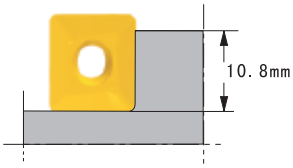


High economical efficiency

FMP02 series square shoulder milling cutters can carry out a variety of cutting operations including face milling, vertical square shoulder milling, slot milling, etc. Coarse pitch, close pitch and extra close pitch, each has its unique merit. Inserts' chipbreakers and grades have been applied and optimized over a long period of time. They can achieve high-efficiency machining under different conditions. Each insert has 4 cutting edges, which is highly economical.

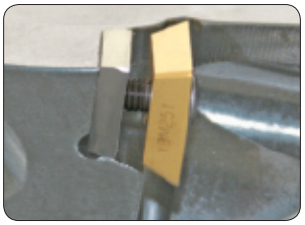
Low cutting force

Large positive rake angle makes cutting easy and fast.



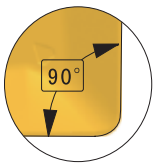
High productivity

The major cutting edge is a α-curve, therefore, the S type insert can obtain an ideal 90° approach angle while retaining a suitable minor angle, ensuring stable cutting operation. The maximum cutting depth can reach 10.8mm, and the maximum feed rate can reach 0.3mm/z.



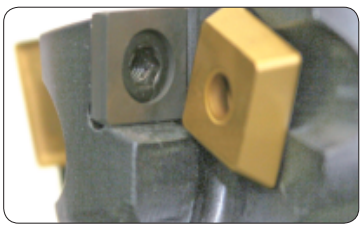
Easy and convenient use

Simple screw clamping, convenient insert displacement, large chip pocket of rake face for smooth chip removal.



High precision

Special structure design of inserts and tools and proper production ensure high precision, greatly improving the workpiece precision and surface quality.

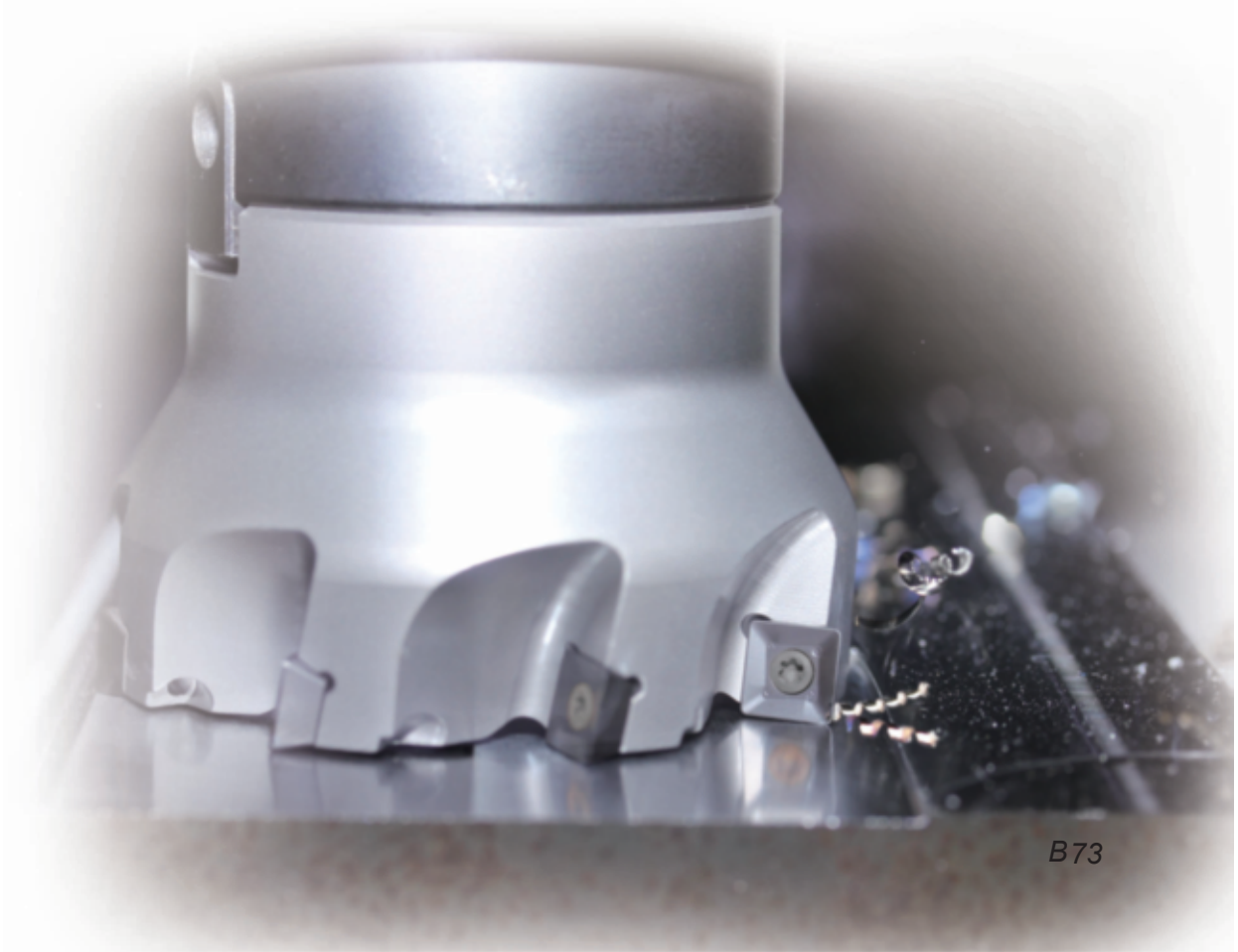


High security

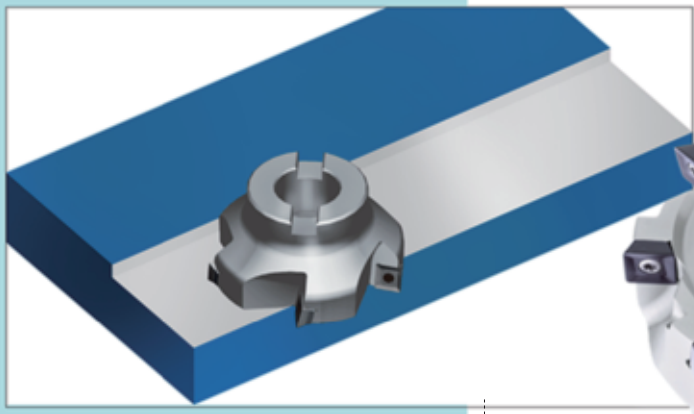
Precisely machined carbide shim is adopted to protect tool body and make it durable.

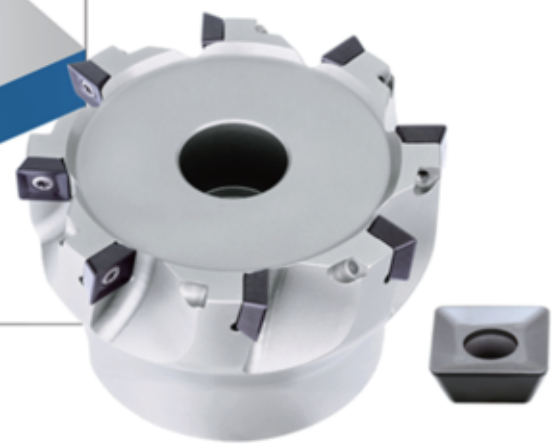
Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters			
				V(m/min)	f(mm/z)		
					-PF	-PM	-PR
P	Low-carbon steel、Soft steel	≤180	YBM251	270(220-350)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
			YBG202	270(200-360)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
			YBG302	230 (170-350)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
	High-carbon steel、Alloy steel	180—280	YBM251	240 (200-320)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
			YBG202	240 (180-350)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
			YBG302	220 (150-330)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
	Alloy tool steel	280—350	YBM251	220 (180-300)	0.1(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
			YBG202	220 (170-340)	0.1(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
			YBG302	190 (130-300)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
M	Stainless steel	≤270	YBM251	150 (120-240)	0.1(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
			YBG202	160 (110-270)	0.1(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
			YBG302	140 (100-250)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
K	Cast iron	180—250	YBG102	210 (120-300)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
			YBG202	160 (120-200)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
			YBD252	200 (150-250)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)



Case for FMP02



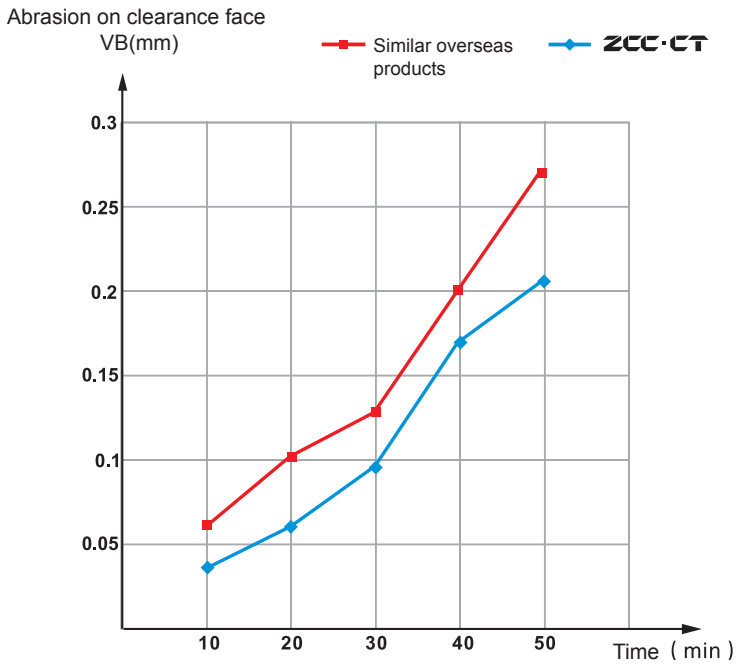


Workpiece material：HT300(HB150)
Cooling system: Dry cutting
Machine: Vertical machining center
Cutting parameters：
Vc=200m/min
a_p=3mm
f_z=0.2mm/z
a_e=80mm

Tool type：FMP02-100-B32-SE12-05

Insert type/grade：SEET120308PER-PM/YBD252

●Comparison of insert abrasion

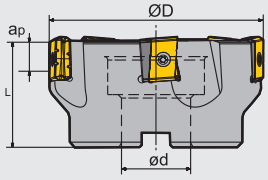


Face milling tools

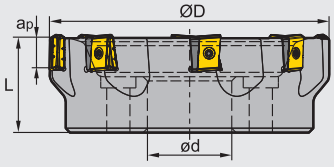
Kr:90°

FMP03 P M K

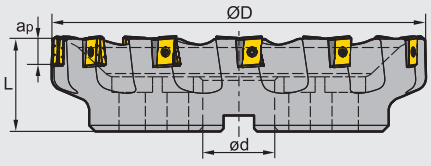
B-type coupling



C-type coupling



D-type coupling

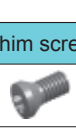
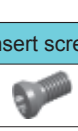


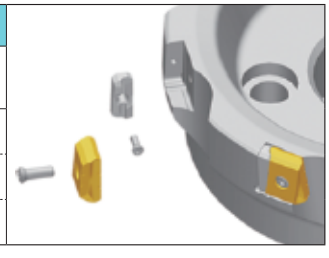
Specification of tools

type		Stock R	Stock L	ØD	Ød	L	apmax	Number of teeth Z	Applicable inserts	Style of coupling	Weight (kg)
FMP03	**-125-B40-LN15-06**	▲	△	125	40	63	8	6	LNKT1506EN-ZR	B	3.2
	-160-C40-LN15-08	▲	△	160	40	63	8	8		C	5.1
	-200-C60-LN15-10	▲	△	200	60	70	8	10		C	7.5
	-250-C60-LN15-12	▲	△	250	60	70	8	12		C	12.2
	-315-D60-LN15-16	▲	△	315	60	80	8	16		D	23.7
	-125-B40-LN20-06	▲	△	125	40	63	12	6	LNKT2007DN-ZR	B	3.3
	-160-C40-LN20-08	▲	△	160	40	63	12	8		C	5.3
	-200-C60-LN20-10	▲	△	200	60	70	12	10		C	8.8
	-250-C60-LN20-12	▲	△	250	60	70	12	12		C	14.0
	-315-D60-LN20-15	▲	△	315	60	80	12	15		D	23.9
	-125-B40-LN25-05	▲	△	125	40	63	15	5	LNKT2510-ZR	B	3.3
	-160-C40-LN25-06	▲	△	160	40	63	15	6		C	5.1
	-200-C60-LN25-08	▲	△	200	60	70	15	8		C	8.9
	-250-C60-LN25-10	▲	△	250	60	70	15	10		C	12.0
	-315-D60-LN25-12	▲	△	315	60	80	15	12		D	21.9

▲Stock available △Make-to-order

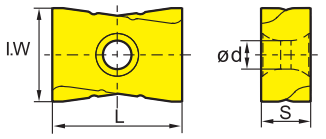
Spare parts

Inserts	Shim	Shim screw	Insert screw	Wrench	
					
LNKT1506EN-ZR	LLN15-ZR	I60M3×7	I60M4×12	WT15IS	WT10IS
LNKT2007DN-ZR	LLN20R-ZR	I60M3×7	I60M4×15	WT15IS	WT10IS
LNKT2510-ZR	LLN25R-ZR	I60M3.5×10.4	I60M5×17	WT20IT	WT15IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts



😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹			😐	😐	☹		😊	😊	😊	☹				
M Stainless steel	😐	😐	😐	😐	☹			😐	😐	☹		😊	😊	😊	☹				
K Cast iron						😐	☹	😊				😐	😊				😊		☹
N Non-ferrous metal																		😐	☹
S Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	I.W	S	ød	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	LNKT1506EN-ZR	15.875	14	6.35	4.6					○	○					★								
	LNKT2007DN-ZR	20	17	7.94	4.6					○	○					★								
	LNKT2510-ZR	25	18	9.525	5.5					○		○				★								

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	≤180	YBG302	180 (150-300)	0.5 (0.2-0.8)
			YBM351	180 (150-300)	0.5 (0.2-0.8)
	High-carbon steel、Alloy steel	180-280	YBG302	150 (120-280)	0.5 (0.2-0.8)
			YBM351	140 (120-280)	0.5 (0.2-0.8)
	Alloy tool steel	280-350	YBG302	120 (80-250)	0.45 (0.2-0.6)
			YBM351	100 (80-250)	0.45 (0.2-0.6)
M	Stainless steel	≤270	YBG302	120 (80-200)	0.45 (0.2-0.6)
			YBM351	100 (80-200)	0.45 (0.2-0.6)
K	Cast iron	180-250	YBD152	220 (150-300)	0.5 (0.2-0.8)
			YBD252	210 (150-300)	0.5 (0.2-0.8)
			YBG302	200 (150-300)	0.5 (0.2-0.8)

Note: Cutting parameters can be adjusted according to the Max. power of machine.

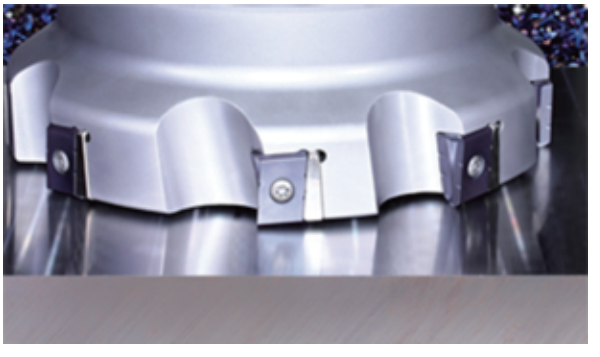
Case for FMP03

Tool type：FMP03-200-C60-LN25-08

Insert type/grade：LNKT2510-ZR/YBG302

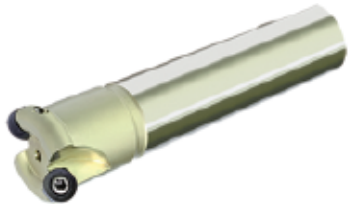
The tool operates easily and fast at high cutting depth with good chip breaking performance. Cutting efficiency is doubled, and tool life increases to 1-2 times that of the original.

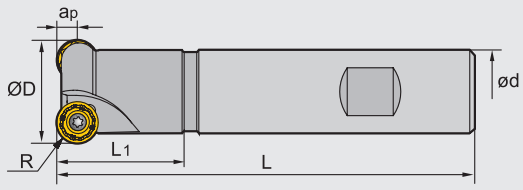
Workpiece material：45#
Hardness(HB)：190
Cooling system: Dry cutting
Cutting parameters：Vc=130m/min, a_p=12mm, f_z=0.5mm/z
a_e=140mm



Face milling tools

FMR01 P M K





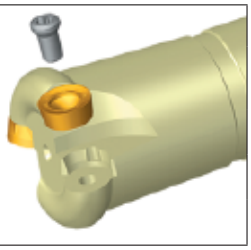
Specification of tools

Type		Stock	Basic dimensions(mm)						Number of teeth Z	Weight (kg)
			ØD	ød	L	L1	R	apmax		
FMR01	**-025-XP20-RC10-02**	▲	25	20	100	30	5	5	2	0.2
	-032-XP25-RC10-02	▲	32	25	120	35	5	5	2	0.5
	-040-XP32-RC12-03	▲	40	32	120	40	6	6	3	0.7
	-050-XP32-RC12-03	▲	50	32	120	40	6	6	3	0.8

▲Stock available △Make-to-order

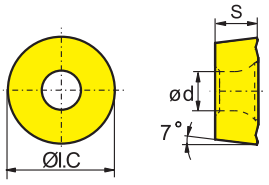
Spare parts

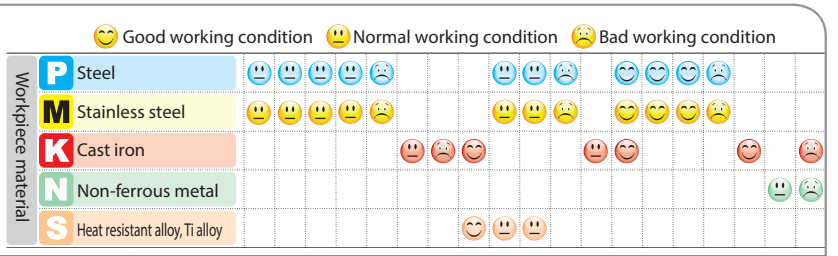
Diameter ØD	Insert screw	Wrench
Ø25 -Ø32	I60M4×8.4	WT15S
Ø40 -Ø50	I60M3.5×10	



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





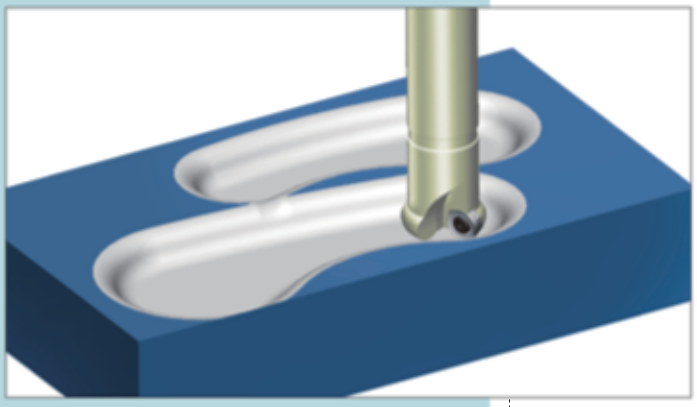
Insert shape	Type	Basic dimensions(mm)			CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	S	ød	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	RCKT10T3MO-DM	10.0	3.97	4.4	●								●	★									
	RCKT1204MO-DM	12.0	4.76	4.0	●		●		●	○			●	★	★								
	RCKT1204MO-DR	12.0	4.76	4.0	○		○		○				●	★									
	RCKT1204MO-ER	12.0	4.76	4.0				★															

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters		
				V(m/min)	f(mm/z)	
					-DM	-DR
P	Low-carbon steel、Soft steel	≤180	YBM251 YBC301	270 (220-350)	0.2(0.1-0.5)	0.3 (0.2-0.8)
			YBM351 YBC302	220 (180-300)	0.25(0.1-0.5)	0.3 (0.2-0.8)
			YBG202	270 (200-360)	0.2(0.1-0.5)	0.3 (0.2-0.8)
	High-carbon steel、Alloy steel	180-280	YBM251 YBC301	240 (200-320)	0.2(0.1-0.5)	0.3 (0.2-0.8)
			YBM351 YBG302	200 (160-280)	0.25(0.1-0.5)	0.3 (0.2-0.8)
			YBG202	240 (180-350)	0.2(0.1-0.5)	0.3 (0.2-0.8)
	Alloy tool steel	280-350	YBM251 YBC301	220 (180-300)	0.2(0.1-0.4)	0.3 (0.2-0.6)
			YBM351 YBG302	180 (150-250)	0.2(0.1-0.5)	0.3 (0.2-0.8)
			YBG202	220 (170-340)	0.2(0.1-0.4)	0.3 (0.2-0.6)
M	Stainless steel	≤270	YBM251	150 (120-240)	0.2(0.1-0.4)	0.3 (0.2-0.6)
			YBM253 YBM351	150 (100-220)	0.2(0.1-0.4)	0.3 (0.2-0.6)
			YBG202	160 (110-270)	0.2(0.1-0.4)	0.3 (0.2-0.6)
K	Cast iron	180-250	YBG302	210 (120-300)	0.2(0.1-0.5)	0.3 (0.2-0.8)

Case for FMR01



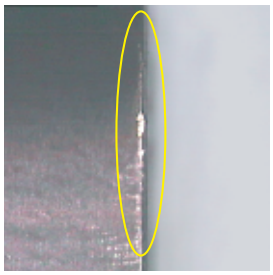
Workpiece material：42CrMo (HRC35)
Cooling system: Dry cutting
Machine: Vertical machining center
Cutting parameters：
Vc=200m/min
a_p=3mm
f_z=0.2mm/z

Tool type：FMR01-025-XP20-RC10-02

Insert type/grade：RCKT10T3MO-DM/YBG202

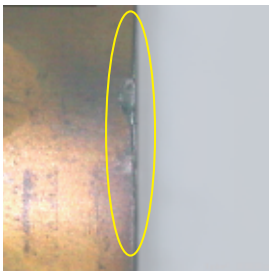
●Comparison of insert abrasion

ZCC-CT

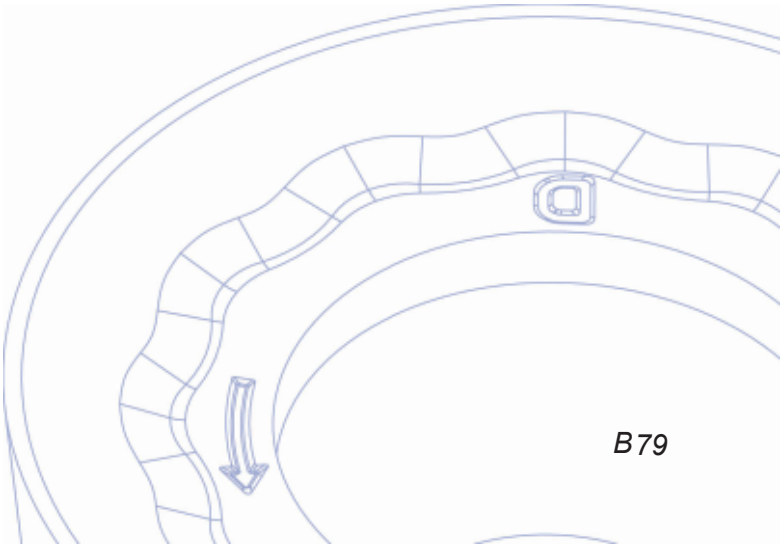


22minutes later

Similar overseas products



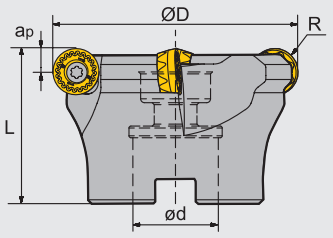
22minutes later



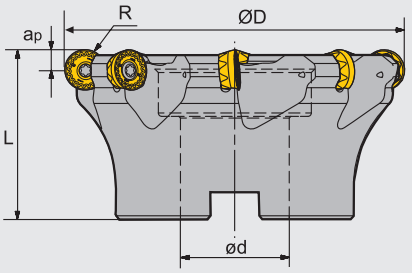
Face milling tools

FMR02 P M K

A-type coupling



B-type coupling



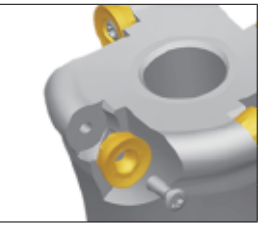
Specification of tools

Type		Stock	Basic dimensions(mm)					Number of teeth Z	Type of coupling	Weight (kg)
			ØD	ød	L	R	$a_p$max			
FMR02 Coarse pitch	**-050-A22-RC12-03**	△	50	22	40	6	6	3	A	0.29
	-063-A22-RC12-04	▲	63	27	50	6	6	4	A	0.41
	-080-B27-RC12-05	▲	80	27	50	6	6	5	B	0.81
	-100-B32-RC12-06	△	100	32	50	6	6	6	B	1.25
	-063-A22-RC16-04	△	63	22	40	8	8	4	A	0.35
	-080-B27-RC16-05	△	80	27	50	8	8	5	B	0.74
	-100-B32-RC16-06	▲	100	32	50	8	8	6	B	1.18
	-125-B40-RC16-07	△	125	40	63	8	8	7	B	2.49
	-080-A27-RC20-04	△	80	27	50	10	10	4	A	0.77
	-100-B32-RC20-05	△	100	32	50	10	10	5	B	1.07
	-125-B40-RC20-06	△	125	40	63	10	10	6	B	2.42
	-160-B40-RC20-06	△	160	40	63	10	10	6	B	4.17
Close pitch	**-050-A22-RC12-05**	△	50	22	40	6	6	5	A	0.27
	-063-A22-RC12-06	△	63	27	50	6	6	6	A	0.38
	-080-B27-RC12-07	△	80	27	50	6	6	7	B	0.79
	-100-B32-RC12-08	△	100	32	50	6	6	8	B	1.23
	-063-A22-RC16-05	△	63	22	40	8	8	5	A	0.34
	-080-B27-RC16-07	△	80	27	50	8	8	7	B	0.72
	-100-B32-RC16-08	△	100	32	50	8	8	8	B	1.17
	-125-B40-RC16-09	△	125	40	63	8	8	9	B	2.47
	-080-A27-RC20-05	△	80	27	50	10	10	5	A	0.74
	-100-B32-RC20-06	△	100	32	50	10	10	6	B	1.07
	-125-B40-RC20-07	△	125	40	63	10	10	7	B	2.39
	-160-B40-RC20-08	△	160	40	63	10	10	8	B	4.06

▲Stock available △Make-to-order

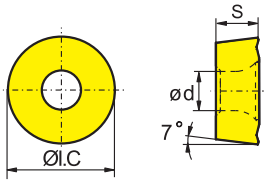
Spare parts

Diameter ØD	Insert	Insert screw	Wrench	
Ø50 -Ø100	RC□□1204MO-□□	I60M3.5×10	WT15IS	--
Ø63 -Ø125	RC□□1606MO-□□	I60M5×13	--	WT20IT
Ø125 -Ø160	RC□□2006MO-□□	I43M6×16	--	WT25IT



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts



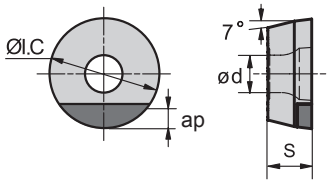
😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹		
M Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹		
K Cast iron						😐	☹	😊				😐	😊				😊		☹
N Non-ferrous metal																		😐	☹
S Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) ØI.C	S	ød	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	RCKT1204MO-DM	12.0	4.76	4.0	●		●		●	○			●	★	●								
	RCKT1606MO-DM	16.0	6.35	5.56	●										●								
	RCKT1204MO-DR	12.0	4.76	4.0	○		○		○				●	★									
	RCKT1606MO-DR	16.0	6.35	5.56	●				●		○		●	★									
	RCKT2006MO-DR	20.0	6.35	6.55	●				●		○		○	★	●								
	RCKT1204MO-ER	12.0	4.76	4.0				★															
	RCKT1606MO-ER	16.0	6.35	5.56				★															
	RCKT2006MO-ER	20.0	6.35	6.55				★															

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Selection of inserts



😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Workpiece material	YCB011	YCB012	YCB121	YCB211	YD051	YD101	YD201
H Super hard material		😐	😊				
K Cast iron	😊			😊	😊		☹
N Non-ferrous metal						😐	☹

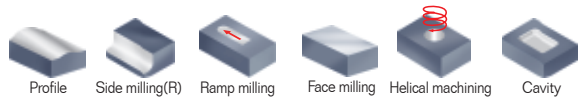
Insert shape	Type	Basic dimensions(mm) ØI.C	S	ød	$a_p$max	YCB011	YCB012	YCB121	YCB211	YD051	YD101	YD201
	RCMW1204MO-PCBN	12.0	4.76	4.1	2.7	○	●		●			

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

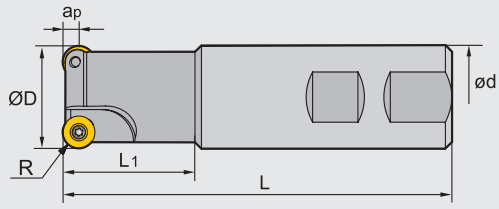
Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters				
				V(m/min)	f(mm/z)			
					-DM	-DR	-ER	-PCBN
P	Low-carbon steel、Soft steel	≤HB180	YBM251 YBC301	270 (220-350)	0.2(0.1-0.5)	0.3 (0.2-0.8)		
			YBM351 YBG302	220 (180-300)	0.25(0.1-0.5)	0.3 (0.2-0.8)		
			YBG202	270 (200-360)	0.2(0.1-0.5)	0.3 (0.2-0.8)		
	High-carbon steel、Alloy steel	HB180-280	YBM251 YBC301	240 (200-320)	0.2(0.1-0.5)	0.3 (0.2-0.8)		
			YBM351 YBG302	200 (160-280)	0.25(0.1-0.5)	0.3 (0.2-0.8)		
			YBG202	240 (180-350)	0.2(0.1-0.5)	0.3 (0.2-0.8)		
	Alloy tool steel	HB280-350	YBM251 YBC301	220 (180-300)	0.2(0.1-0.4)	0.3 (0.2-0.6)		
			YBM351 YBG302	180 (150-250)	0.2(0.1-0.5)	0.3 (0.2-0.8)		
			YBG202	220 (170-340)	0.2(0.1-0.4)	0.3 (0.2-0.6)		
M	Stainless steel	≤HB270	YBM251	150 (120-240)	0.2(0.1-0.4)	0.3 (0.2-0.6)		
			YBM253	150 (100-220)	0.2(0.1-0.4)	0.3 (0.2-0.6)	0.3(0.2-0.6)	
			YBM351	150 (100-220)	0.2(0.1-0.4)	0.3 (0.2-0.6)		
			YBG202	160 (110-270)	0.2(0.1-0.4)	0.3 (0.2-0.6)		
K	Cast iron	HB180-250	YBG302	210 (120-300)	0.2(0.1-0.5)	0.3 (0.2-0.8)		
			YCB011	800 (500-1200)				0.2(0.1-0.5)
			YCB211	800 (500-1200)				0.2(0.1-0.5)
H	Hardened steel	≥HRC45	YCB012	150 (100-500)				0.15(0.1-0.5)

Face milling tools



FMR03 P M K



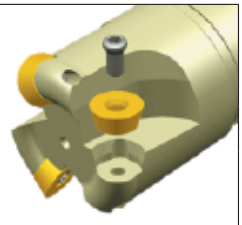
Specification of tools

Type		Stock	Basic dimensions(mm)						Number of teeth Z	Weight (kg)
			ØD	ød	L	L1	R	apmax		
FMR03	-016-XP16-RD08-02	▲	16	16	100	25	4	4	2	0.1
	-025-XP25-RD08-02	▲	25	25	100	30	4	4	2	0.3
	-032-XP32-RD10-02	▲	32	32	120	40	5	5	2	0.7
	-040-XP32-RD12-03	▲	40	32	120	40	6	6	3	0.7
	-050-XP32-RD12-04	▲	50	32	120	40	6	6	4	0.8

▲Stock available △Make-to-order

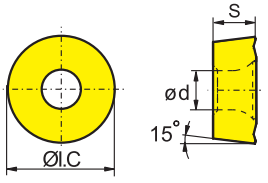
Spare parts

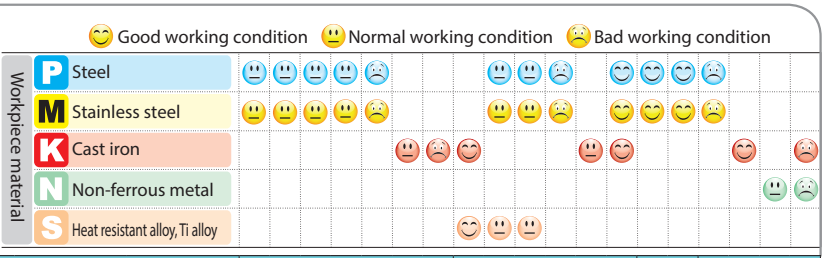
Diameter ØD	Insert screw	Wrench
Ø16-Ø25	I60M3×7	WT09IP
Ø32-Ø50	I60M4×10	WT15IP



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)			CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	S	ød	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	RDKW0803MO	8	3.18	3.4	○				○				●	★	○								
	RDKW10T3MO	10	3.97	4.4	○				●				●	★									
	RDKW1204MO	12	4.76	4.4	●		●		●				●	★	●								

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

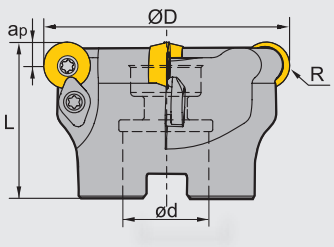
Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	≤180	YBM251 YBC301	270 (220-350)	0.2 (0.08-0.45)
			YBM351 YBG302	220 (180-300)	0.25 (0.15-0.45)
			YBG202	270 (200-360)	0.2 (0.1-0.45)
	High-carbon steel、Alloy steel	180-280	YBM251 YBC301	240 (200-320)	0.2 (0.08-0.45)
			YBM351 YBG302	200 (160-280)	0.25 (0.15-0.45)
			YBG202	240 (180-350)	0.2 (0.1-0.45)
	Alloy tool steel	280-350	YBM251 YBC301	220 (180-300)	0.2 (0.08-0.45)
			YBM351 YBG302	180 (150-250)	0.25 (0.15-0.45)
			YBG202	220 (170-340)	0.2 (0.1-0.45)
M	Stainless steel	≤270	YBG205	150 (120-240)	0.2 (0.08-0.45)
			YBM251	150 (120-240)	0.2 (0.08-0.45)
			YBM351	150 (100-220)	0.25 (0.1-0.45)
			YBG202	160 (110-270)	0.2 (0.1-0.45)
K	Cast iron	180-250	YBG302	210 (120-300)	0.2 (0.1-0.45)

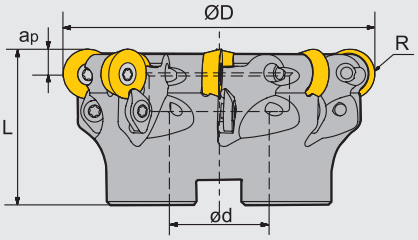
Face milling tools

FMR04 P M K

A-type coupling



B-type coupling



Specification of tools

Type		Stock	Basic dimensions(mm)					Number of teeth Z	Type of coupling	Weight (kg)
			ØD	ød	L	R	apmax			
FMR02 Coarse pitch	**-050-A22-RD12-03**	▲	50	22	40	6	6	3	A	0.25
	-063-A22-RD12-04	▲	63	22	40	6	6	4	A	0.37
	-080-B27-RD12-05	▲	80	27	50	6	6	5	B	0.77
	-063-A22-RD16-04	△	63	22	40	8	8	4	A	0.32
	-080-B27-RD16-05	△	80	27	50	8	8	5	B	0.67
	-100-B32-RD16-06	▲	100	32	50	8	8	6	B	1.18
	-125-B40-RD16-08	△	125	40	63	8	8	8	B	2.55
	-125-B40-RD20-06	▲	125	40	63	10	10	6	B	2.33
	-160-B40-RD20-07	▲	160	40	63	10	10	7	B	3.83
Close pitch	**-050-A22-RD12-05**	△	50	22	40	6	6	5	A	0.23
	-063-A22-RD12-06	△	63	22	40	6	6	6	A	0.48
	-080-B27-RD12-07	△	80	27	50	6	6	7	B	0.78
	-063-A22-RD16-05	△	63	22	40	8	8	5	A	0.3
	-080-B27-RD16-07	△	80	27	50	8	8	7	B	0.66
	-100-B32-RD16-08	△	100	32	50	8	8	8	B	1.18
	-125-B40-RD16-10	△	125	40	63	8	8	10	B	2.51
	-125-B40-RD20-08	△	125	40	63	10	10	8	B	2.45
	-160-B40-RD20-10	△	160	40	63	10	10	10	B	3.98

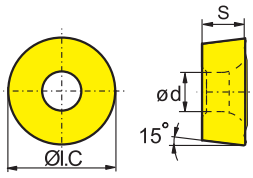
▲Stock available △Make-to-order

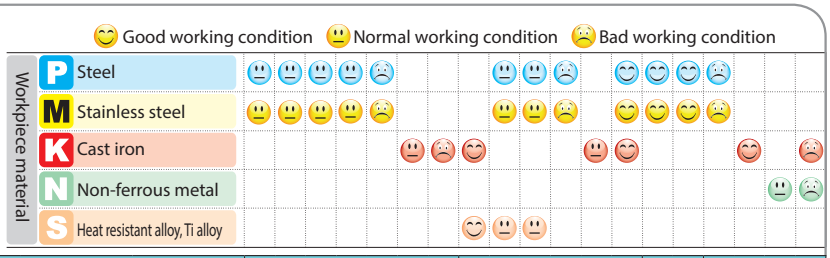
Spare parts

Diameter ØD	Insert	Insert screw	Clamp	Clamp screw	Wrench	
Ø50-Ø80	RDKW1204MO	I60M3.5×10	WD-204	I60M4×10	WT15IP	--
Ø63 -Ø125	RDKW1605MO	I60M5×13	WD-207	I60M5×13	--	WT20IT
Ø125 -Ø160	RDKW2006MO	I43M6×16	--	--	--	WT25IT

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)			CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	S	ød	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	RDKW1204MO	12.0	4.76	4.4	●		●		●				●	★	●								
	RDKW1605MO	16.0	5.56	5.5	○				○				○	★	○								
	RDKW2006MO	20.0	6.35	6.5	○				○					○									

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	≤180	YBM251 YBC301	270 (220-350)	0.2 (0.08-0.45)
			YBM351 YBG302	220 (180-300)	0.25 (0.15-0.45)
			YBG202	270 (200-360)	0.2 (0.1-0.45)
	High-carbon steel、Alloy steel	180-280	YBM251 YBC301	240 (200-320)	0.2 (0.08-0.45)
			YBM351 YBG302	200 (160-280)	0.25 (0.15-0.45)
			YBG202	240 (180-350)	0.2 (0.1-0.45)
	Alloy tool steel	280-350	YBM251 YBC301	220 (180-300)	0.2 (0.08-0.45)
			YBM351 YBG302	180 (150-250)	0.25 (0.15-0.45)
			YBG202	220 (170-340)	0.2 (0.1-0.45)
M	Stainless steel	≤270	YBG205	150 (120-240)	0.2 (0.08-0.45)
			YBM251	150 (120-240)	0.2 (0.08-0.45)
			YBM351 YBG302	150 (100-220)	0.25 (0.1-0.45)
			YBG202	160 (110-270)	0.2 (0.1-0.45)
K	Cast iron	180-250	YBG302	210 (120-300)	0.2 (0.1-0.45)

Case for FMR04

Workpiece material：42CrMo (HRC35)
Cooling system: Dry cutting
Machine: Vertical machining center
Cutting parameters：
V_c=200m/min
a_p=3mm
f_z=0.3mm/z

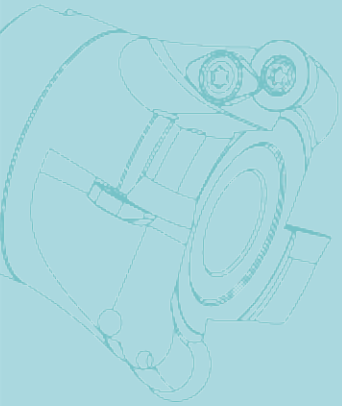
Tool type：FMR04-063-A22-RD12-04

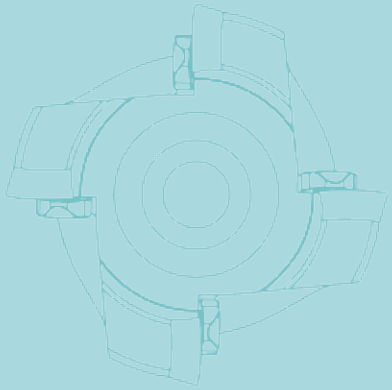
Insert type/grade：RDKW1204MO/YBG202

●Abrasion comparison after 90 minutes cavity milling

ZCC-CT

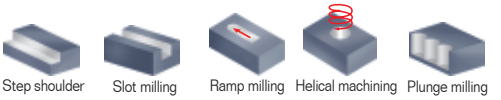
Similar overseas products





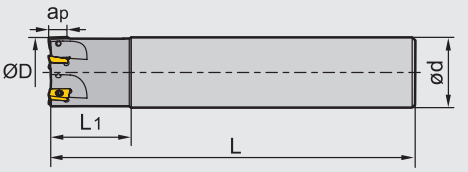
Square shoulder milling tools

Kr:90°



EMP01 P M K N

Straight shank



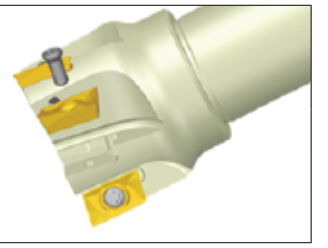
Specification of tools

Type		Stock	Basic dimensions(mm)					Number of teeth Z	Weight (kg)
			ØD	ød	L	L_1	$a_p$max		
EMP01 Straight shank	**-012-G16-AP11-01**	▲	12	16	85	25	10.5	1	0.1
	-016-G16-AP11-02	▲	16	16	90	25	10.5	2	0.1
	-020-G20-AP11-02	▲	20	20	100	30	10.5	2	0.2
	-025-G25-AP11-03	▲	25	25	115	35	10.5	3	0.4
	-032-G32-AP11-04	▲	32	32	125	40	10.5	4	0.7
	-025-G25-AP16-02	▲	25	25	115	35	15.5	2	0.4
	-032-G32-AP16-03	▲	32	32	125	40	15.5	3	0.7
	-040-G32-AP16-04	▲	40	32	130	42	15.5	4	0.8
	-050-G32-AP16-05	▲	50	32	135	45	15.5	5	1.0
	-063-G32-AP16-06	▲	63	32	135	45	15.5	6	1.4

▲Stock available △Make-to-order

Spare parts

Diameter ØD	Inserts	Screw	Wrench	
Ø12-Ø32	AP11	I60M2.5×6.5T	WT08IP	--
Ø25-Ø63	AP16	I60M4×8.4	--	WT15IS



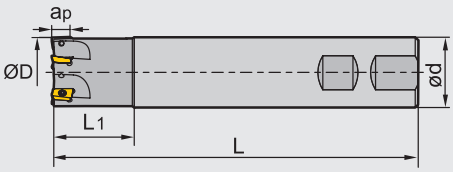
Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Square shoulder milling tools

Kr:90°

EMP01 P M K N

Weldon shank



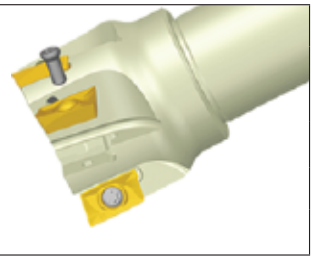
Specification of tools

Type		Stock	Basic dimensions(mm)					Number of teeth Z	Weight (kg)
			ØD	ød	L	L_1	a_{pmax}		
EMP01 Weldon shank	**-012-XP16-AP11-01**	▲	12	16	85	25	10.5	1	0.1
	-016-XP16-AP11-02	▲	16	16	90	25	10.5	2	0.1
	-020-XP20-AP11-02	▲	20	20	100	30	10.5	2	0.2
	-025-XP25-AP11-03	▲	25	25	115	35	10.5	3	0.4
	-032-XP32-AP11-04	▲	32	32	125	40	10.5	4	0.7
	-025-XP25-AP16-02	▲	25	25	115	35	15.5	2	0.4
	-032-XP32-AP16-03	▲	32	32	125	40	15.5	3	0.7
	-040-XP32-AP16-04	▲	40	32	130	42	15.5	4	0.8
	-050-XP32-AP16-05	▲	50	32	135	45	15.5	5	1.0
	-063-XP32-AP16-06	▲	63	32	135	45	15.5	6	1.4

▲Stock available △Make-to-order

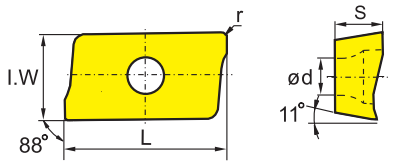
Spare parts

Diameter ØD	Inserts	Screw	Wrench	
Ø12-Ø32	AP11	I60M2.5×6.5T	WT08IP	--
Ø25-Ø63	AP16	I60M4×8.4	--	WT15IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts



Good working condition / Normal working condition / Bad working condition

Workpiece material		YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P	Steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
M	Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
K	Cast iron						😐	☹	😊				😐	😊				😊		☹
N	Non-ferrous metal																		😐	☹
S	Heat resistant alloy, Ti alloy								😊	😐	😐									

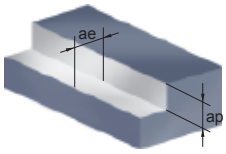
Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	I.W	S	ød	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	APKT11T304-PF	12.24	6.5	3.6	2.8	0.4	●	★	○		○			○	○		○								
	APKT11T308-PF	12.24	6.5	3.6	2.8	0.8		★	○					○	○										
	APKT11T312-PF	12.24	6.5	3.6	2.8	1.2		★							○										
	APKT11T316-PF	12.24	6.5	3.6	2.8	1.6		★							○										
	APKT160408-PF	17.877	9.33	5.76	4.4	0.8	●	★	○		○				○		○								
	APKT11T304-PM	12.24	6.5	3.6	2.8	0.4	●	★	●		●			★	★		★								
	APKT11T308-PM	12.24	6.5	3.6	2.8	0.8	●	★	●		○		★	★	★		★								
	APKT11T312-PM	12.24	6.5	3.6	2.8	1.2		★	○					○	★		○								
	APKT11T316-PM	12.24	6.5	3.6	2.8	1.6		★	○					○	★		○								
	APKT160408-PM	17.877	9.33	5.76	4.4	0.8	●	★	●		●		○	★	★		★								
	APKT11T304-PR	12.24	6.5	3.6	2.8	0.4	●	★	●		●			○	○		○								
	APKT11T308-PR	12.24	6.5	3.6	2.8	0.8		★									○								
	APKT11T312-PR	12.24	6.5	3.6	2.8	1.2		★									○								
	APKT11T316-PR	12.24	6.5	3.6	2.8	1.6		★									○								
	APKT160408-PR	17.877	9.33	5.76	4.4	0.8		★									○								
	APKT11T304-LH	12.24	6.5	3.6	2.8	0.4																		★	★
	APKT11T308-LH	12.24	6.5	3.6	2.8	0.8																		★	○
	APKT160408-LH	17.877	9.33	5.76	4.4	0.8																		★	★

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Chipbreaker selection

Classification \ Function	For finishing	For semi-finishing	For roughing
P	-PF	-PM	-PR
M	-PF	-PM	-PR
K	-PF	-PM	
N	-LH		

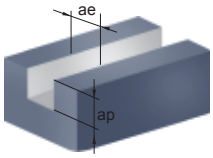
1 Square shoulder milling



Recommended cutting parameters (D: Diameter)

Workpiece material		Hardness HB	Insert grade	Cutting parameters				
				V（m/min）	f（mm/z）			ae(mm)
					-PF	-PM	-PR	
P	Low-carbon steel、Soft steel	≤180	YBM251 YBC301 YBC302	320 (240-400)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	≤0.5D
			YBM351	260 (180-380)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	≤0.5D
			YBG202	320 (200-400)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	≤0.5D
			YBG302	280 (180-400)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	≤0.5D
	High-carbon steel、Alloy steel	180-280	YBM251 YBC301 YBC302	280 (210-380)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	≤0.5D
			YBM351	240 (160-320)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	≤0.5D
			YBG202	280 (180-350)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	≤0.5D
			YBG302	260 (150-380)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	≤0.5D
	Alloy tool steel	280-350	YBM251 YBC301 YBC302	260 (180-350)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	≤0.5D
			YBM351	220 (150-280)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	≤0.5D
			YBG202	260 (160-330)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	≤0.5D
			YBG302	240 (120-350)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	≤0.5D
M	Stainless steel	≤270	YBM251	200 (120-270)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	≤0.5D
			YBM351	180 (150-300)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	≤0.5D
			YBG202	200 (110-300)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	≤0.5D
			YBG302	170 (100-280)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	≤0.5D
K	Cast iron	180-250	YBG102	220 (120-250)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	-	≤0.5D
			YBD252	200 (120-320)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	-	≤0.5D
N					-LH			
	Aluminium alloy	----	YD101	300-	0.2 (0.08-0.4)			≤0.5D
			YD201	300-	0.2 (0.08-0.4)			≤0.5D

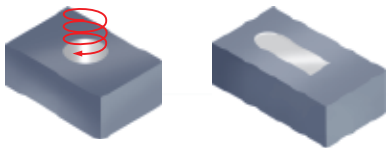
2 Slot milling



Recommended cutting parameters ((D: Diameter)

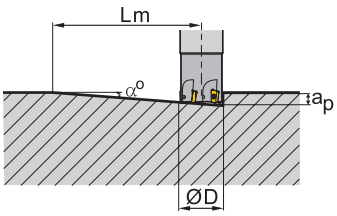
Workpiece material		Hardness HB	Insert grade	Cutting parameters				
				V（m/min）	f（mm/z）			ae(mm)
					-PF	-PM	-PR	
P	Low-carbon steel、Soft steel	≤180	YBM251 YBC301 YBC302	190 (170-250)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBM351	150 (130-210)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBG202	190 (140-250)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBG302	170 (130-250)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
	High-carbon steel、Alloy steel	180-280	YBM251 YBC301 YBC302	170 (150-220)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBM351	140 (110-200)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBG202	170 (130-250)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBG302	150 (110-230)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
	Alloy tool steel	280-350	YBM251 YBC301 YBC302	150 (130-210)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBM351	130 (100-180)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBG202	150 (110-240)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBG302	140 (80-210)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
M	Stainless steel	≤270	YBM251	110 (80-190)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBM351	100 (80-170)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBG202	120 (80-190)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBG302	100 (70-180)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
K	Cast iron	180-250	YBG102	130 (80-180)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	-	D
			YBD252	120 (80-210)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	-	D
N					-LH			
	Aluminium alloy	----	YD101	300-	0.2 (0.08-0.3)			D
			YD201	300-	0.2 (0.08-0.3)			D

3 Ramp milling, helical interpolation milling



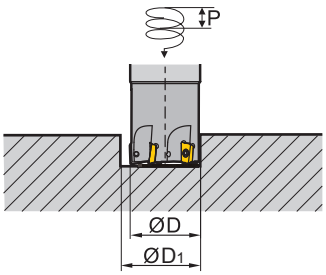
Recommended cutting parameters (D: Diameter)

● Ramp milling



$L_m = \frac{a_p}{tg\alpha}$ (α:Maximum ramp angle)

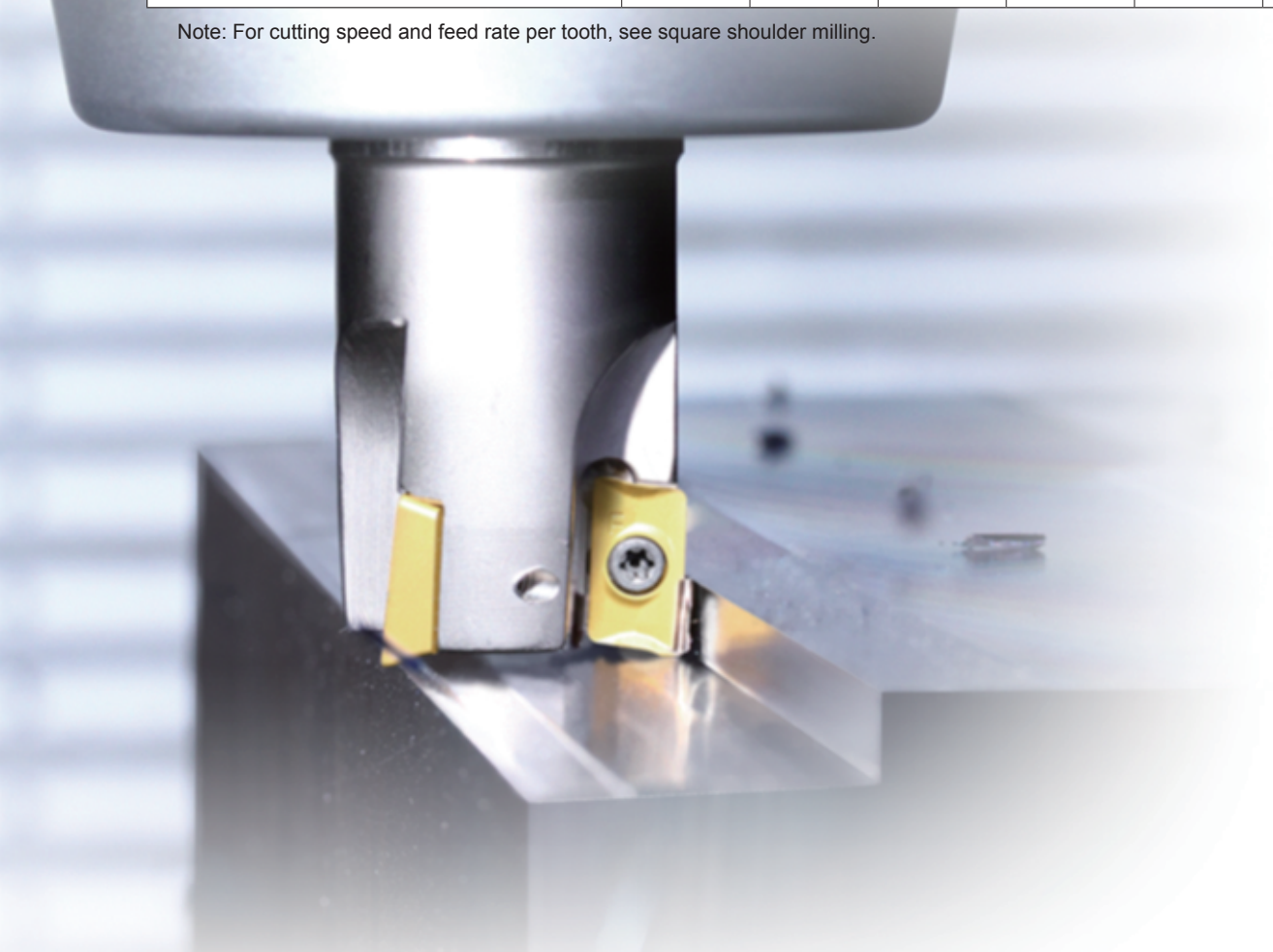
● Helical interpolation milling



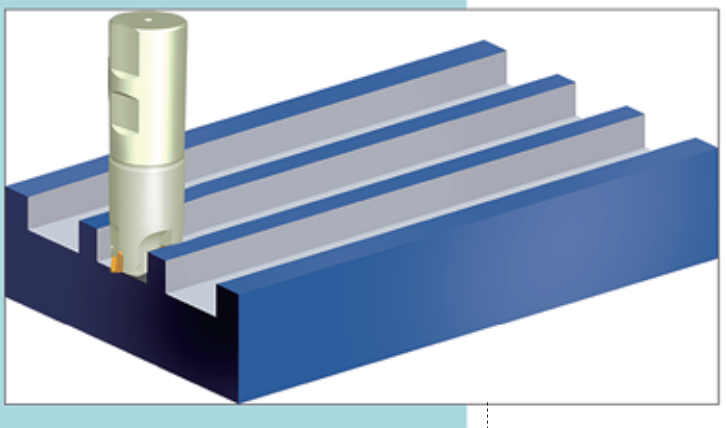
$tg\alpha = \frac{P}{\pi D_1}$ (α:Helical angle)

Diameter ØD(mm)	APKT Ramp milling, helical interpolation milling(Inserts—11)				
	Ramp milling			Helical interpolation milling	
	Maximum cutting depth a_p(mm)	Maximum ramp angle α°	Minimum length L_m(mm)	Minimum diameter $ØD_1$(mm)	Maximum pitch(mm)
16	10.0	10.0	56.7	20.0	2.0
20	10.0	5.0	114.4	28.0	2.0
25	10.0	4.5	127.0	40.0	2.0
32	10.0	3.0	190.8	56.0	2.0
40	10.0	2.0	286.4	70.0	2.0

Note: For cutting speed and feed rate per tooth, see square shoulder milling.



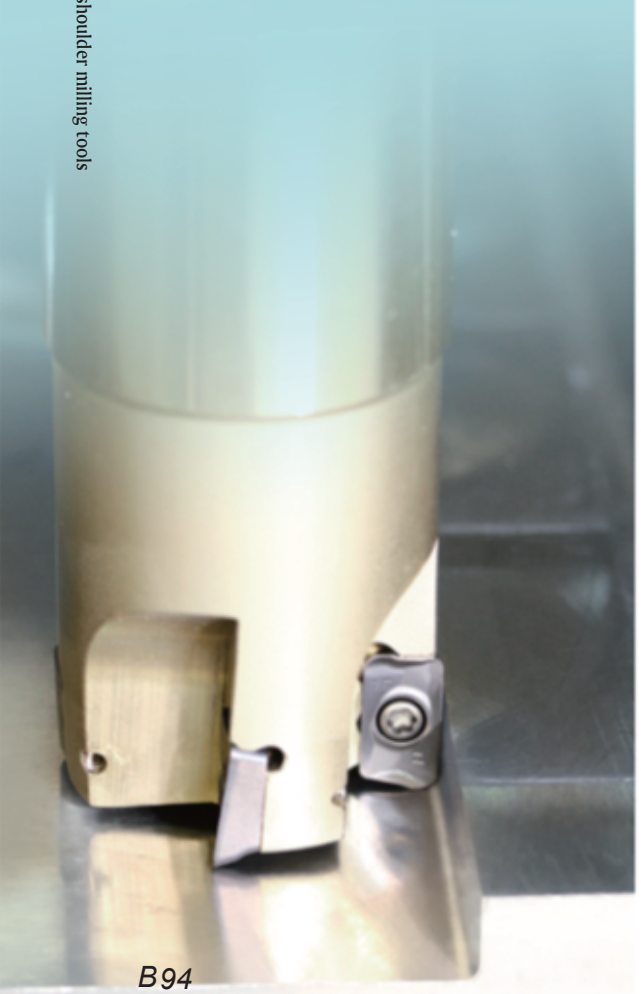
Case for EMP01



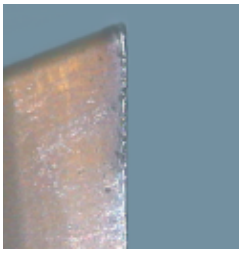
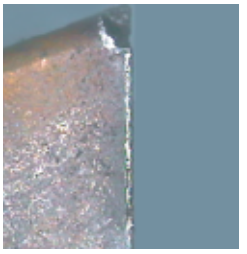
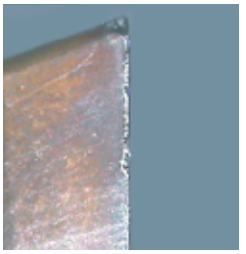
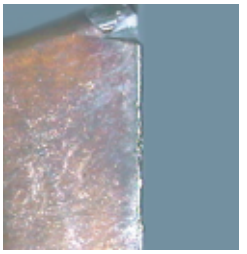
Workpiece material: Cast Stee (HB220)
Cooling system: Dry cutting
Machine: Vertical machining center
Cutting parameters:
Vc=180m/min
a_p=3mm
f_z=0.1mm/z

Insert type/grade: APKT160408-PM/YBC301

Tool type: EMP01-040-XP32-AP16-04



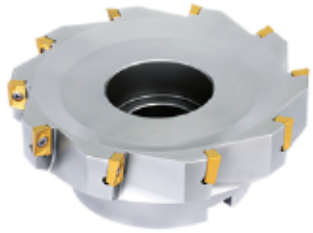
●Abrasion comparison of inserts

	ZCC-CT	Other company product
15'		
25'		

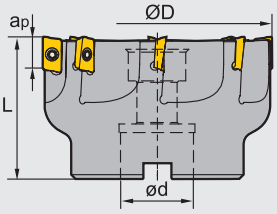
Square shoulder milling tools

Kr:90°

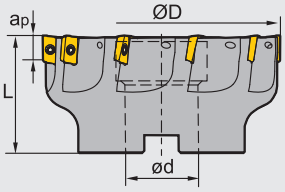
EMP02 P M K N



A-type coupling



B-type coupling



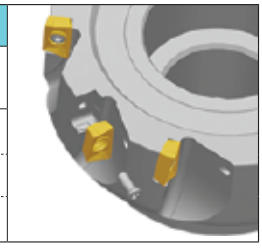
Specification of tools

Type		Stock	Basic dimensions(mm)				Number of teeth Z	Type of coupling	Weight (kg)
			ØD	ød	L	apmax			
EMP02	**-050-A22-AP11-06**	▲	50	22	40	11	6	A	0.3
	-063-A22-AP11-08	▲	63	22	40	11	8	A	0.6
	-080-A27-AP11-08	▲	80	27	50	11	8	A	1.2
	-100-B32-AP11-10	▲	100	32	50	11	10	B	1.7
	-050-A22-AP16-05	▲	50	22	40	15.5	5	A	0.3
	-063-A22-AP16-06	▲	63	22	40	15.5	6	A	0.5
	-080-A27-AP16-07	▲	80	27	50	15.5	7	A	1.1
	-100-B32-AP16-08	▲	100	32	50	15.5	8	B	1.6
	-125-B40-AP16-10	▲	125	40	63	15.5	10	B	3.2
	-160-B40-AP16-10	▲	160	40	63	15.5	10	B	6.3

▲Stock available △Make-to-order

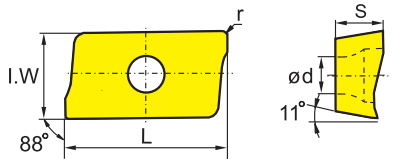
Spare parts

Diameter ØD	Inserts	Screw	Wrench
Ø50-Ø100	AP11	I60M2.5×6.5T	WT08IS
Ø50-Ø160	AP16	I60M4×10	WT15IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts

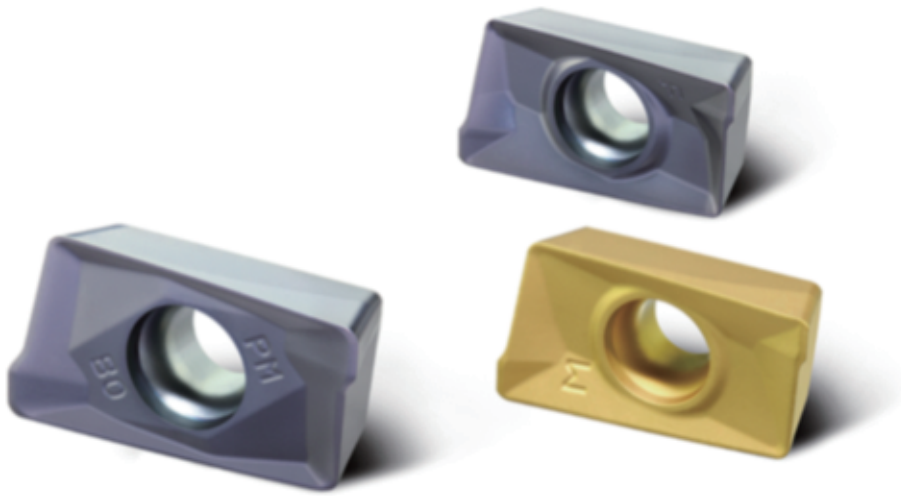


😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹		
M Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹		
K Cast iron						😐	☹	😊				😐	😊					😊		☹
N Non-ferrous metal																			😐	☹
S Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	I.W	S	ød	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	APKT11T304-PF	12.24	6.5	3.6	2.8	0.4	●	★	○		○			○	○		○								
	APKT11T308-PF	12.24	6.5	3.6	2.8	0.8		★	○					○	○										
	APKT11T312-PF	12.24	6.5	3.6	2.8	1.2		★							○										
	APKT11T316-PF	12.24	6.5	3.6	2.8	1.6		★							○										
	APKT160408-PF	17.877	9.33	5.76	4.4	0.8	●	★	○		○				○		○								
	APKT11T304-PM	12.24	6.5	3.6	2.8	0.4	●	★	●		●			★	★		★								
	APKT11T308-PM	12.24	6.5	3.6	2.8	0.8	●	★	●		○		★	★	★		★								
	APKT11T312-PM	12.24	6.5	3.6	2.8	1.2		★	○					○	★		○								
	APKT11T316-PM	12.24	6.5	3.6	2.8	1.6		★	○					○	★		○								
	APKT160408-PM	17.877	9.33	5.76	4.4	0.8	●	★	●		●		○	★	★		★								
	APKT11T304-PR	12.24	6.5	3.6	2.8	0.4	●	★	●		●			○	○		○								
	APKT11T308-PR	12.24	6.5	3.6	2.8	0.8		★									○								
	APKT11T312-PR	12.24	6.5	3.6	2.8	1.2		★									○								
	APKT11T316-PR	12.24	6.5	3.6	2.8	1.6		★									○								
	APKT160408-PR	17.877	9.33	5.76	4.4	0.8		★									○								
	APKT11T304-LH	12.24	6.5	3.6	2.8	0.4																		★	★
	APKT11T308-LH	12.24	6.5	3.6	2.8	0.8																		★	○
	APKT160408-LH	17.877	9.33	5.76	4.4	0.8																		★	★

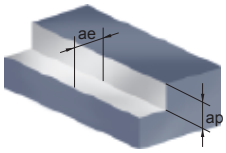
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



Chipbreaker selection

Function / Classification	For finishing	For semi-finishing	For roughing
P	-PF	-PM	-PR
M	-PF	-PM	-PR
K	-PF	-PM	
N	-LH		

Square shoulder milling



Recommended cutting parameters (D: Diameter)

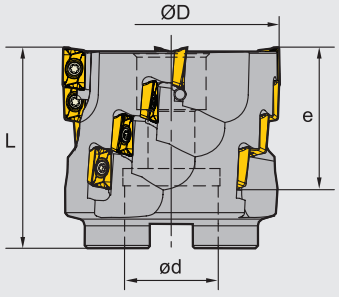
Workpiece material		Hardness HB	Insert grade	Cutting parameters				
				V（m/min）	f（mm/z）			ae(mm)
					-PF	-PM	-PR	
P	Low-carbon steel、Soft steel	≤180	YBM251 YBC301 YBC302	320 (240-400)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	≤0.5D
			YBM351	260 (180-380)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	≤0.5D
			YBG202	320 (200-400)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	≤0.5D
			YBG302	280 (180-400)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	≤0.5D
	High-carbon steel、Alloy steel	180-280	YBM251 YBC301 YBC302	280 (210-380)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	≤0.5D
			YBM351	240 (160-320)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	≤0.5D
			YBG202	280 (180-350)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	≤0.5D
			YBG302	260 (150-380)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	≤0.5D
	Alloy tool steel	280-350	YBM251 YBC301 YBC302	260 (180-350)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	≤0.5D
			YBM351	220 (150-280)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	≤0.5D
			YBG202	260 (160-330)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	≤0.5D
			YBG302	240 (120-350)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	≤0.5D
M	Stainless steel	≤270	YBM251	200 (120-270)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	≤0.5D
			YBM351	180 (150-300)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	≤0.5D
			YBG202	200 (110-300)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	≤0.5D
			YBG302	170 (100-280)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	≤0.5D
K	Cast iron	180-250	YBG102	220 (120-250)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	-	≤0.5D
			YBD252	200 (120-320)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	-	≤0.5D
N					-LH			
	Aluminium alloy	----	YD101	300-	0.2 (0.08-0.4)			≤0.5D
			YD201	300-	0.2 (0.08-0.4)			≤0.5D

Square shoulder milling tools

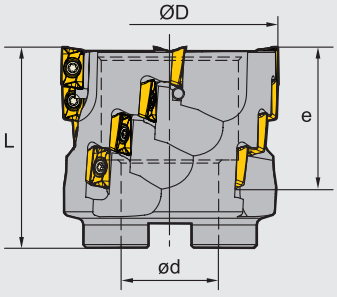
Kr:90°

EMP03 P M K N

A-type coupling



B-type coupling



Specification of tools

Type		Stock	Basic dimensions(mm)				Number of flute z	Number of inserts	Type of coupling	Weight (kg)
			ØD	ød	L	e				
EMP03	**-050-A22-AP11-04**	▲	50	22	58	39	4	16	A	0.5
	-063-A27-AP11-04	▲	63	27	58	39	4	16	A	0.9
	-080-B32-AP11-05	▲	80	32	63	39	5	20	B	1.3
	-100-B40-AP11-06	▲	100	40	63	39	6	24	B	2.0

▲Stock available △Make-to-order

Spare parts

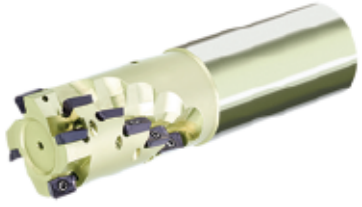
Diameter ØD	Screw	Wrench
Ø50-Ø100	I60M2.5×6.5T	WT08IS

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

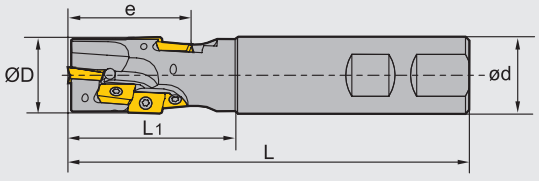
Square shoulder milling tools

Kr:90°

EMP04 P M K N



Weldon shank



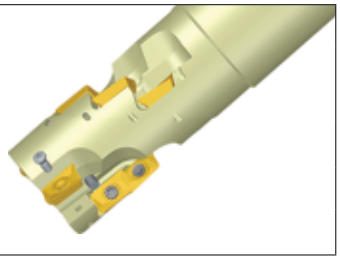
Specification of tools

Type		Stock	Basic dimensions(mm)					Number of flute z	Number of inserts	Weight (kg)
			ØD	ød	L	L1	e			
EMP04	**-020-XP20-AP11-01**	▲	20	20	120	45	29.4	1	3	0.3
	-025-XP25-AP11-02	▲	25	25	130	55	38.9	2	8	0.4
	-032-XP32-AP11-02	▲	32	32	140	65	48.5	2	10	0.7
	-040-XP40-AP11-02	▲	40	40	150	75	58.0	2	14	1.3

▲Stock available △Make-to-order

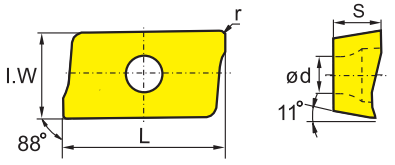
Spare parts

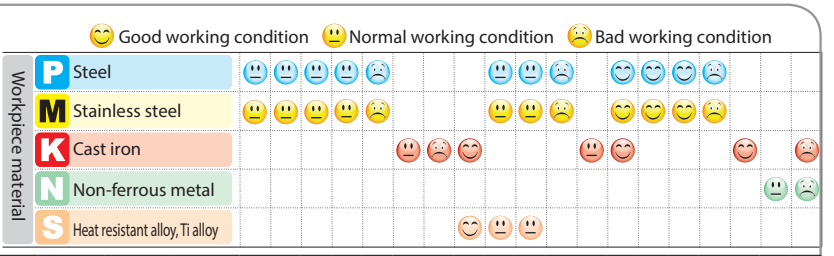
Diameter ØD	Screw	Wrench
Ø20-Ø40	I60M2.5×6.5T	WT08IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





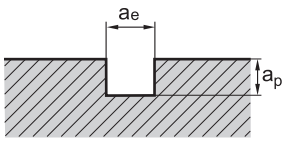
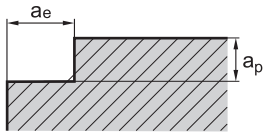
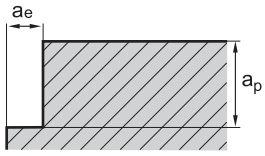
Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	I.W	S	ød	r	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	APKT11T304-PF	12.24	6.5	3.6	2.8	0.4	●	★	○		○			○	○		○								
	APKT11T308-PF	12.24	6.5	3.6	2.8	0.8		★	○					○	○										
	APKT11T312-PF	12.24	6.5	3.6	2.8	1.2		★							○										
	APKT11T316-PF	12.24	6.5	3.6	2.8	1.6		★							○										
	APKT11T304-PM	12.24	6.5	3.6	2.8	0.4	●	★	●		●			★	★		★								
	APKT11T308-PM	12.24	6.5	3.6	2.8	0.8	●	★	●		○		★	★	★		★								
	APKT11T312-PM	12.24	6.5	3.6	2.8	1.2		★	○					○	★		○								
	APKT11T316-PM	12.24	6.5	3.6	2.8	1.6		★	○					○	★		○								
	APKT11T304-PR	12.24	6.5	3.6	2.8	0.4	●	★	●		●			○	○		○								
	APKT11T308-PR	12.24	6.5	3.6	2.8	0.8		★									○								
	APKT11T312-PR	12.24	6.5	3.6	2.8	1.2		★									○								
	APKT11T316-PR	12.24	6.5	3.6	2.8	1.6		★									○								
	APKT11T304-LH	12.24	6.5	3.6	2.8	0.4																		★	★
	APKT11T308-LH	12.24	6.5	3.6	2.8	0.8																		★	○

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Chipbreaker selection

Classification \ Function	For finishing	For semi-finishing	For roughing
P	-PF	-PM	-PR
M	-PF	-PM	-PR
K	-PF	-PM	
N	-LH		

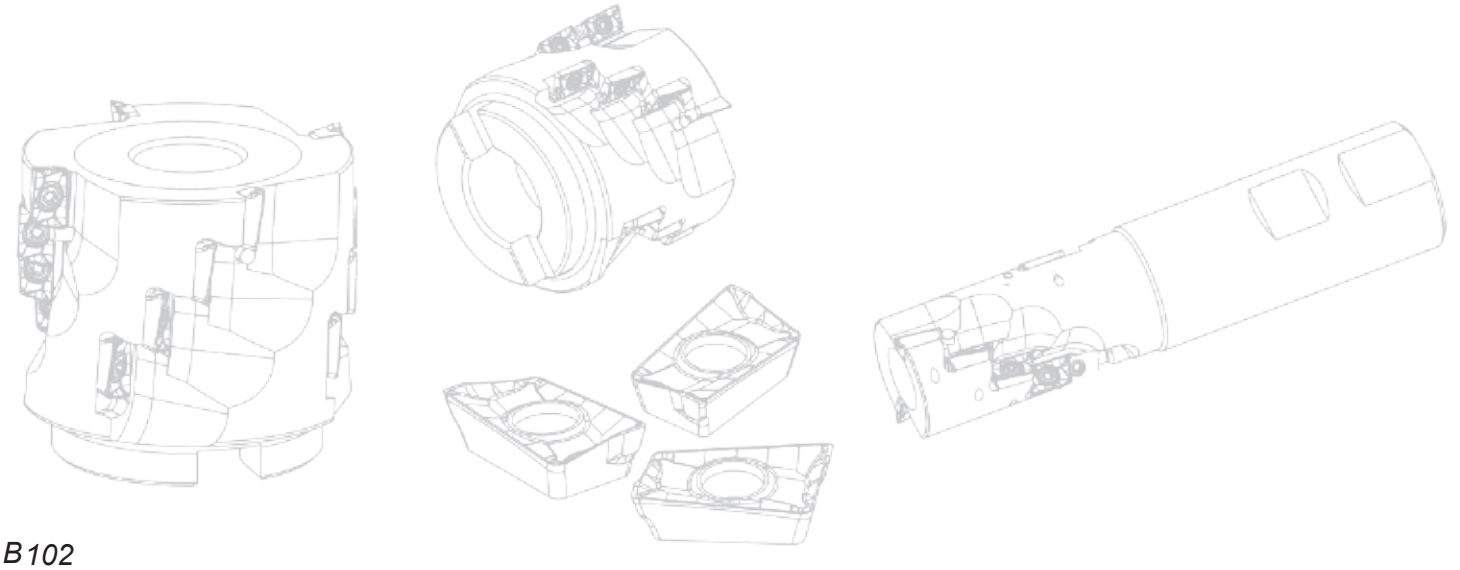
Recommended cutting parameters

Slot milling	Square shoulder milling	Deep square shoulder milling
		
a_e=D $a_p \leqslant 0.5D$	$a_e \leqslant 0.5D$ $a_p \leqslant 1.2D$	$a_e \leqslant 0.2D$ a_p<Cutting length of insert

Workpiece material		Hardness HB	Insert grade	Cutting parameters			
				Square shoulder milling			
				V（m/min）	f（mm/z）		
					-PF	-PM	-PR
P	Low-carbon steel、Soft steel	≤180	YBM251 YBC301 YBC302	270 (240-350)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBM351	220 (180-300)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBG202	270 (200-360)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBG302	240 (180-350)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
	High-carbon steel、Alloy steel	180-280	YBM251 YBC301 YBC302	240 (210-320)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBM351	200 (160-280)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBG202	240 (180-360)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBG302	220 (150-330)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
	Alloy tool steel	280-350	YBM251 YBC301 YBC302	220 (180-300)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBM351	180 (150-250)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBG202	220 (160-340)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBG302	200 (120-300)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
M	Stainless steel	≤270	YBM251	170 (120-240)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBM351	160 (150-270)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBG202	150 (110-270)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBG302	140 (100-250)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
K	Cast iron	180-250	YBG102	200 (120-240)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	
			YBD252	180 (120-300)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	
N					-LH		
	Aluminium alloy	----	YD101	300-	0.2 (0.08-0.4)		
			YD201	300-	0.2 (0.08-0.4)		

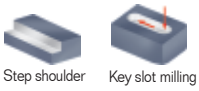
Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters			
				Slot milling、Deep square shoulder milling			
				V（m/min）	f（mm/z）		
					-PF	-PM	-PR
P	Low-carbon steel、Soft steel	≤180	YBM251 YBC301 YBC302	270 (240-350)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBM351	220 (180-300)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBG202	270 (200-360)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBG302	240 (180-350)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
	High-carbon steel、Alloy steel	180-280	YBM251 YBC301 YBC302	240 (210-320)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBM351	200 (160-280)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBG202	240 (180-360)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBG302	220 (150-330)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
	Alloy tool steel	280-350	YBM251 YBC301 YBC302	220 (180-300)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBM351	180 (150-250)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBG202	220 (160-340)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBG302	200 (120-300)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
M	Stainless steel	≤270	YBM251	170 (120-240)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBM351	160 (150-270)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBG202	150 (110-270)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBG302	140 (100-250)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
K	Cast iron	180-250	YBG102	200 (120-240)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	
			YBD252	180 (120-300)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	
N					-LH		
	Aluminium alloy	----	YD101	300-	0.2 (0.08-0.3)		
			YD201	300-	0.2 (0.08-0.3)		



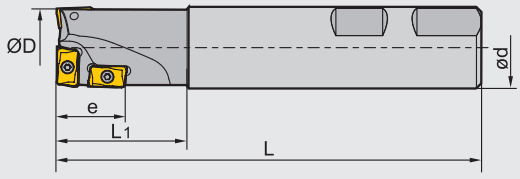
Square shoulder milling tools

Kr:90°



EMP05 P M K

Weldon shank



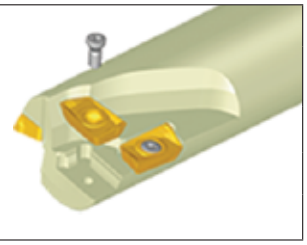
Specification of tools

Type		Stock	Basic dimensions(mm)					Number of inserts		Weight (kg)
		R	ØD	ød	L	L1	e	APMT11	APMT16	
EMP05	**-025-XP25**	▲	25	25	130	40	20	3	--	0.5
	-032-XP32	▲	32	32	140	50	30	--	3	0.8
	-040-XP32	▲	40	32	150	60	40	--	4	1.0

▲Stock available △Make-to-order

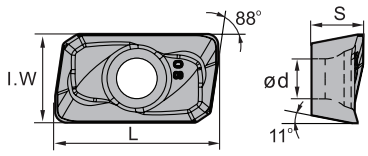
Spare parts

Diameter ØD	Inserts	Screw	Wrench
Ø25-Ø40	APMT11	I60M2.5×6.5T	WT08IP
	APMT16	I60M4×10	WT15IP



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts



😊 Good working condition 😐 Normal working condition ☹️ Bad working condition

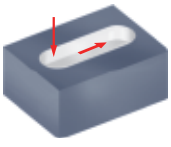
Workpiece material		YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P	Steel	😐	😐	😐	😐	☹️				😐	😐	☹️			😊	😊	😊	☹️		
M	Stainless steel	😐	😐	😐	😐	☹️				😐	😐	☹️			😊	😊	😊	☹️		
K	Cast iron						😐	☹️	😊				😐	😊				😊		☹️
N	Non-ferrous metal																		😐	☹️
S	Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	I.W	S	ød	r	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	APMT1135PDR	11.25	6.2	3.5	2.8	0.8			○					○	●	★	○								
	APMT160408PDER	17.25	9.25	4.76	4.4	0.8									●	★	○								

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Indexable milling tools
Square shoulder milling tools

1 Drilling



Recommended cutting parameters

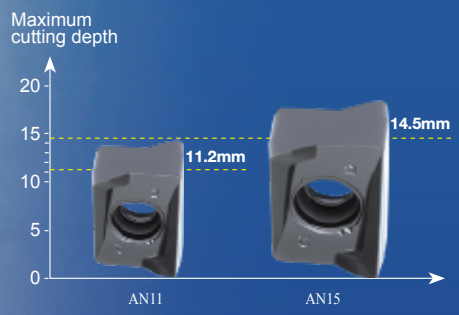
Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V（m/min）	f（mm/z）
P	Low-carbon steel、Soft steel	≤180	YBG202	180 (150-220)	0.2 (0.08-0.25)
P	High-carbon steel、Alloy steel	180-280	YBG202	160 (130-200)	0.15 (0.08-0.2)
P	Alloy tool steel	280-350	YBG202	140 (120-180)	0.12 (0.05-0.2)
M	Stainless steel	≤270	YBG202	80 (50-150)	0.08 (0.03-0.15)
K	Cast iron	180-250	YBG202	150 (100-220)	0.15 (0.08-0.2)

2 Milling

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V（m/min）	f（mm/z）
P	Low-carbon steel、Soft steel	≤180	YBG202	190 (140-250)	0.08 (0.04-0.15)
P	High-carbon steel、Alloy steel	180-280	YBG202	170 (130-250)	0.08 (0.04-0.15)
P	Alloy tool steel	280-350	YBG202	150 (110-240)	0.08 (0.04-0.15)
M	Stainless steel	≤270	YBG202	120 (80-190)	0.08 (0.04-0.15)
K	Cast iron	180-250	YBG202	120 (80-210)	0.08 (0.04-0.15)

chieving high quality 90°
square shoulding milling

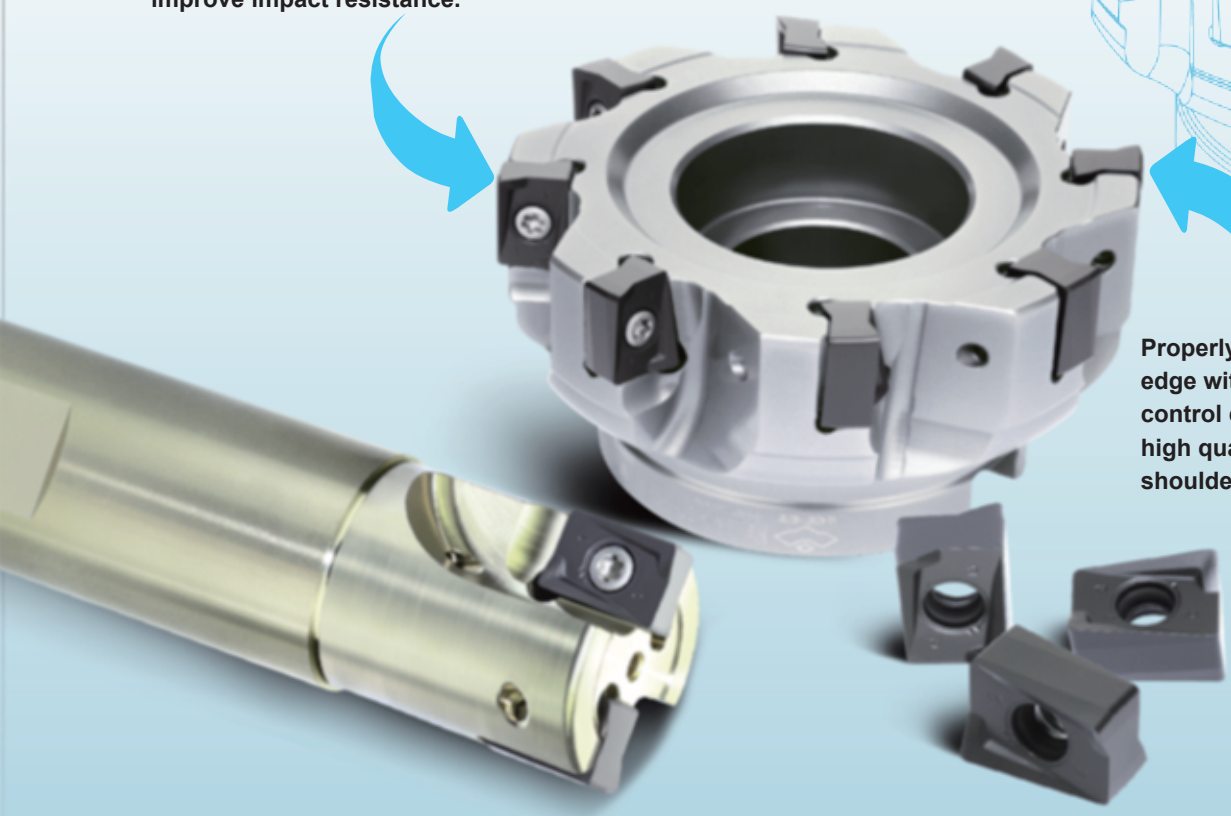


Kr:90°

EMP13

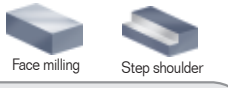
Series Square Shoulder Mills

Double negative rake angle of the tool body in combination with extra thick insert achieves double positive tool angle, which will help reduce cutting resistance and greatly improve impact resistance.

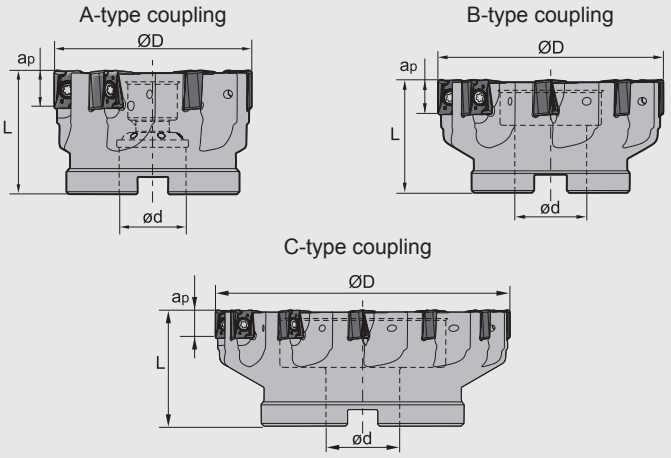


Properly designed cutting edge with high precision control can achieve high quality 90°square shoulder milling.

Square shoulder milling tools Kr:90°



EMP13 P K



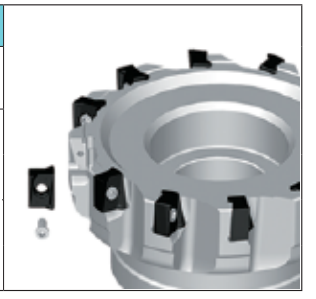
Specification of tools

Type		Stock	Basic dimensions(mm)				Number of flute z	Type of coupling	Weight (kg)
			ØD	Ød	L	$a_p$max			
EMP13	-050-A22-AN11-06	▲	50	22	40	11.2	6	A	0.30
	-063-A22-AN11-07	▲	63	22	40	11.2	7	A	0.49
	-080-A27-AN11-09	▲	80	27	50	11.2	9	A	1.18
	-100-B32-AN11-12	▲	100	32	50	11.2	12	B	1.46
	-125-B40-AN11-14	▲	125	40	63	11.2	14	B	2.92
	-160-C40-AN11-16	▲	160	40	63	11.2	16	C	4.30
	-050-A22-AN15-04	▲	50	22	40	14.5	4	A	0.26
	-063-A22-AN15-05	▲	63	22	40	14.5	5	A	0.53
	-080-A27-AN15-06	▲	80	27	50	14.5	6	A	1.23
	-100-B32-AN15-08	▲	100	32	50	14.5	8	B	1.52
	-125-B40-AN15-10	▲	125	40	63	14.5	10	B	3.05
	-160-C40-AN15-12	▲	160	40	63	14.5	12	C	4.46

▲Stock available △Make-to-order

Spare parts

Diameter ØD	Inserts	Screw	Wrench
Ø50-Ø160	ANGX110504PNR-GM	I60M3X9	WT09IS
	ANGX110508PNR-GM		
Ø50-Ø160	ANGX150608PNR-GM	I60M4X12	WT15IS
	ANGX150616PNR-GM		



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Square shoulder milling tools

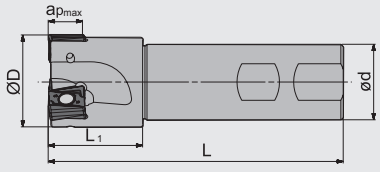
Kr:90°

EMP13 P K

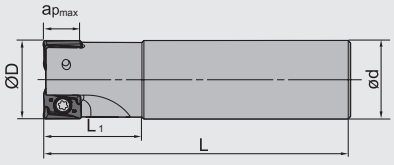
Weldon shank

Straight shank

Weldon shank



Straight shank



Specification of tools

Type		Stock	Basic dimensions(mm)					Number of flute	Weight (kg)
			ØD	Ød	L	L_1	a_{pmax}	z	
EMP13 Weldon shank	**-025-XP25-AN11-02**	▲	25	25	100	32	11.2	2	0.31
	-032-XP32-AN11-03	▲	32	32	115	40	11.2	3	0.61
	-040-XP32-AN11-04	▲	40	32	125	40	11.2	4	0.75
	-032-XP32-AN15-02	▲	32	32	125	40	14.5	2	0.66
	-040-XP32-AN15-03	▲	40	32	125	40	14.5	3	0.76
Straight shank	**-025-G25-AN11-02**	▲	25	25	100	32	11.2	2	0.31
	-032-G32-AN11-03	▲	32	32	115	40	11.2	3	0.61
	-040-G32-AN11-04	▲	40	32	125	40	11.2	4	0.75
	-032-G32-AN15-02	▲	32	32	125	40	14.5	2	0.66
	-040-G32-AN15-03	▲	40	32	125	40	14.5	3	0.76

▲Stock available △Make-to-order

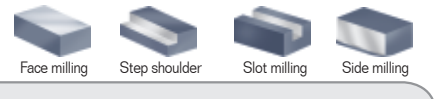
Spare parts

Diameter ØD	Inserts	Screw	Wrench
Ø25-Ø40	ANGX110504PNR-GM	I60M3X9	WT09IS
	ANGX110508PNR-GM		
Ø32-Ø40	ANGX150608PNR-GM	I60M4X12	WT15IS
	ANGX150616PNR-GM		

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

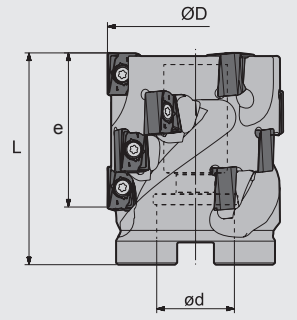
Square shoulder milling tools

Kr:90°



EMP13 P K

A-type coupling



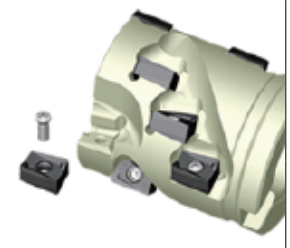
Specification of tools

Type		Stock	Basic dimensions(mm)				Number of grooves	Number of inserts	Type of coupling	Weight (kg)
			ØD	Ød	L	e				
EMP13	**-050×43-A22-AN11-03**	▲	50	22	60	43	3	12	A	0.52
	-063×65-A27-AN11-04	▲	63	27	80	64	4	24	A	1.15
	-063×53-A27-AN15-03	▲	63	27	75	53	3	12	A	1.14
	-080×56-A32-AN15-04	▲	80	32	75	53	4	16	A	1.82

▲Stock available △Make-to-order

Spare parts

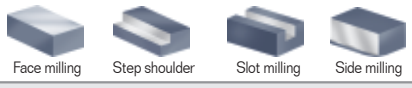
Diameter ØD	Inserts	Screw	Wrench
Ø50-Ø63	ANGX110504PNR-GM	I60M3X9	WT09IS
Ø63-Ø80	ANGX150608PNR-GM	I60M4X12	WT15IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

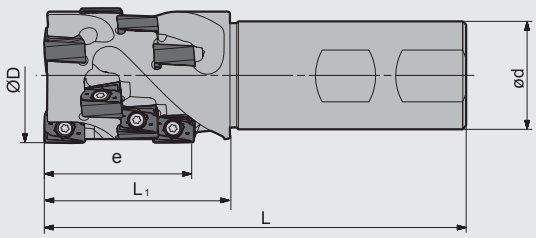
Square shoulder milling tools

Kr:90°



EMP13 P K

Weldon shank



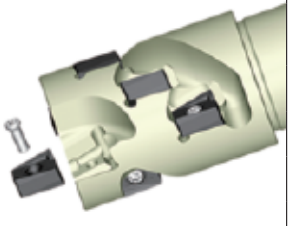
Specification of tools

Type		Stock	Basic dimensions(mm)					Number of grooves	Number of inserts	Weight (kg)
			ØD	Ød	L	L1	e			
EMP13	**-032×43-XP32-AN11-02**	▲	32	32	115	48	43	2	8	0.61
	-040×43-XP32-AN11-03	▲	40	32	125	55	43	3	12	0.79
	-040×40-XP32-AN15-02	▲	40	32	115	55	40	2	6	0.79
	-050×53-XP40-AN15-02	▲	50	40	145	70	53	2	8	1.53

▲Stock available △Make-to-order

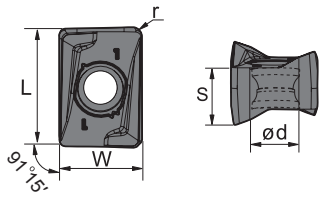
Spare parts

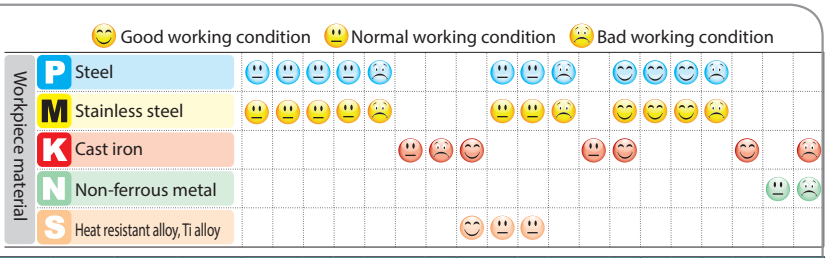
Diameter ØD	Inserts	Screw	Wrench
Ø32-Ø40	ANGX110504PNR-GM	I60M3X9	WT09IS
Ø40-Ø50	ANGX150608PNR-GM	I60M4X12	WT15IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	W	S	ød	r	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	ANGX110504PNR-GM	11.85	8.4	5.7	3.5	0.4				★		★				★									
	ANGX110508PNR-GM	11.85	8.4	5.7	3.5	0.8				★		★				★									
	ANGX150608PNR-GM	15.43	11.0	7.3	4.4	0.8				★		★				★									
	ANGX150616PNR-GM	15.43	11.0	7.3	4.4	1.6				★		★				★									

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

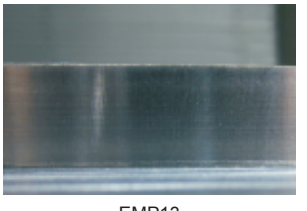
Recommended cutting parameters

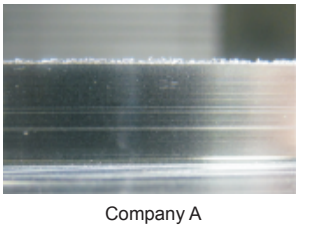
Workpiece material		Hardness HB	Insert grade	Cutting parameters		
				Cutting speed (m/min)	Feed rate per tooth (mm)	a_{pmax}(mm)
P	Low carbon steel	≤180	YBM253 YBG205	270(220-350)	0.25(0.1-0.4)	11.2(AN11) 14.5(AN15)
P	Alloy steel	180-350	YBM253 YBG205	240(180-320)	0.2(0.1-0.4)	
M	Stainless steel	≤270	YBM253 YBG205	230 (180-300) 160 (110-270)	0.15 (0.1-0.3)	
K	Cast iron	180-260	YBD152	270(150-300)	0.25(0.1-0.4)	

Case for EMP13

●Surface quality comparison

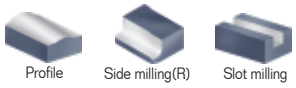
Workpiece material: NAK80(HRC36)
Tool: EMP13-032-G32-AN15-02
Insert: ANGX150608PNR-GM/YBG205
Cutting data: Vc=220m/min,
f_z=0.1mm/z,
a_p=14.5mm,
a_e=10mm
Cutting condition: Dry cutting


EMP13

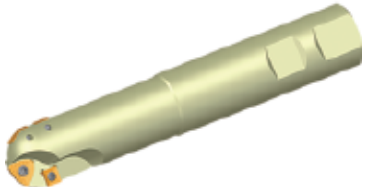

Company A

Surface quality and perpendicularity of workpiece machined by EMP13 is obviously superior to that of company A.

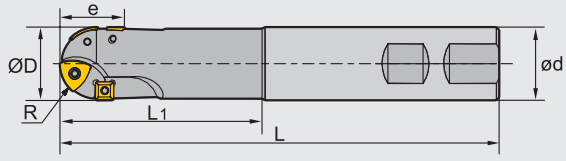
Profile milling tools



BMR01 P M K



Weldon shank



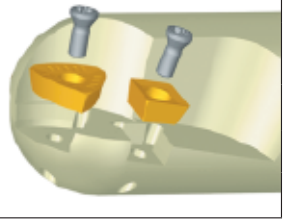
Specification of tools

Type		Stock	Basic dimensions(mm)						Applicable inserts				Weight (kg)
			R	ØD	e	ød	L	L1	Type	Quantity	Type	Quantity	
BMR01	-020-XP20-S	▲	10	20	20	20	125	50	ZDET08T2CYR10	2	SPMT060304	2	0.3
	-020-XP20-M	▲	10	20	20	20	150	75	ZDET08T2CYR10	2	SPMT060304	2	0.3
	-020-XP20-L	▲	10	20	20	20	200	100	ZDET08T2CYR10	2	SPMT060304	2	0.4
	-025-XP25-S	▲	12.5	25	23	25	150	70	ZDET1103CYR12.5	2	SPMT060304	2	0.5
	-025-XP25-M	▲	12.5	25	23	25	175	95	ZDET1103CYR12.5	2	SPMT060304	2	0.6
	-025-XP25-L	▲	12.5	25	23	25	200	100	ZDET1103CYR12.5	2	SPMT060304	2	0.7
	-032-XP32-S	▲	16	32	31	32	175	85	ZDET13T3CYR16	2	SDMT090308	2	0.9
	-032-XP32-M	▲	16	32	31	32	200	100	ZDET13T3CYR16	2	SDMT090308	2	1.1
	-032-XP32-L	▲	16	32	31	32	250	150	ZDET13T3CYR16	2	SDMT090308	2	1.4
	-040-XP40-S	▲	20	40	41	40	175	85	ZPNT2204CY(R20)	3	SPMT120408	2	1.4
	-040-XP40-M	▲	20	40	41	40	200	100	ZPNT2204CY(R20)	3	SPMT120408	2	1.7
	-040-XP40-L	▲	20	40	41	40	250	150	ZPNT2204CY(R20)	3	SPMT120408	2	2.1
	-050-XP40-S	▲	25	50	45	40	200	100	ZPNT2204CY(R25)	3	SPMT120408	2	1.8
	-050-XP40-M	▲	25	50	45	40	300	100	ZPNT2204CY(R25)	3	SPMT120408	2	2.8
	-063-XP40-S	▲	31.5	63	52	40	200	100	ZPNT2204CY(R31)	4	SPMT120408	2	3.0
	-063-XP40-M	▲	31.5	63	52	40	300	100	ZPNT2204CY(R31)	4	SPMT120408	2	3.5

▲Stock available △Make-to-order

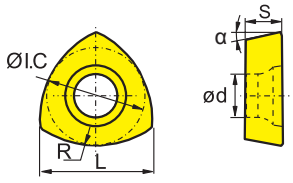
Spare parts

Diameter ØD	Screw	Wrench	
Ø20-Ø25	I43M2.5×5.7	WT07IP	--
Ø32	I43M4×8	--	WT15IS
Ø40-Ø63	I43M5×11	--	WT20IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

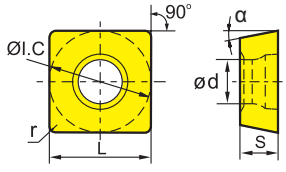
Selection of inserts



Workpiece material		😊 Good working condition	😐 Normal working condition	☹ Bad working condition
P	Steel	😐 😐 😐 😐 ☹	😐 😐 ☹	😊 😊 😊 ☹
M	Stainless steel	😐 😐 😐 😐 ☹	😐 😐 ☹	😊 😊 😊 ☹
K	Cast iron	😐 ☹ 😊	😐 😊	😊 ☹
N	Non-ferrous metal			😐 ☹
S	Heat resistant alloy, Ti alloy	😊 😐 😐		

Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		R	L	ØI.C	S	ød	α	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	ZDET08T2CYR10	10	8.4	6.75	2.78	2.8	14°			○								○								
	ZDET1103CYR12.5	12.5	10.6	8.5	3.18	2.8	14°			○								○								
	ZDET13T3CYR16	16	13.2	10.5	3.97	4.4	14°			○								○								
	ZPNT2204CY(R20)	20	16.1	12.7	4.76	5.56	11°			○								○								
	ZPNT2204CY(R25)	25	16.9	12.7	4.76	5.56	11°			○								○								
	ZPNT2204CY(R31)	31.5	17.6	12.7	4.76	5.56	11°			○								○								

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



Workpiece material		😊 Good working condition	😐 Normal working condition	☹ Bad working condition
P	Steel	😐 😐 😐 😐 ☹	😐 😐 ☹	😊 😊 😊 ☹
M	Stainless steel	😐 😐 😐 😐 ☹	😐 😐 ☹	😊 😊 😊 ☹
K	Cast iron	😐 ☹ 😊	😐 😊	😊 ☹
N	Non-ferrous metal			😐 ☹
S	Heat resistant alloy, Ti alloy	😊 😐 😐		

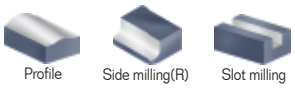
Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		r	L	ØI.C	S	ød	α	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	SPMT060304	0.4	6.35	6.35	3.18	2.8	11°			○								○								
	SDMT090308	0.8	9.525	9.525	3.18	4.4	15°			○								○								
	SPMT120408	0.8	12.7	12.70	4.76	5.5	11°			●								★								

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

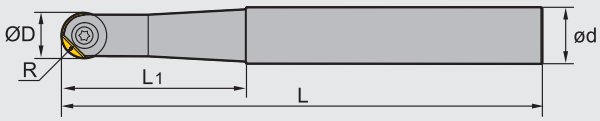
Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	≤180	YBM251	180(120-220)	0.25(0.1-0.4)
			YBG302	160(120-220)	0.25(0.1-0.4)
	High-carbon steel、Alloy steel	180-280	YBM251	150(100-200)	0.2(0.1-0.4)
			YBG302	120(100-200)	0.2(0.1-0.4)
	Alloy tool steel	280-350	YBM251	100(80-150)	0.2(0.1-0.3)
			YBG302	100(80-150)	0.2(0.1-0.3)
M	Stainless steel	≤270	YBM251	100(80-150)	0.2(0.1-0.3)
			YBG302	100(80-150)	0.2(0.1-0.3)
K	Cast iron	180-250	YBG302	150(100-180)	0.3(0.2-0.5)

Profile milling tools



BMR02 P M K



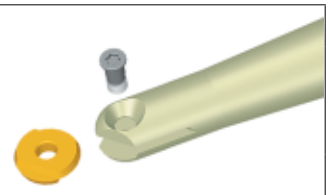
Specification of tools

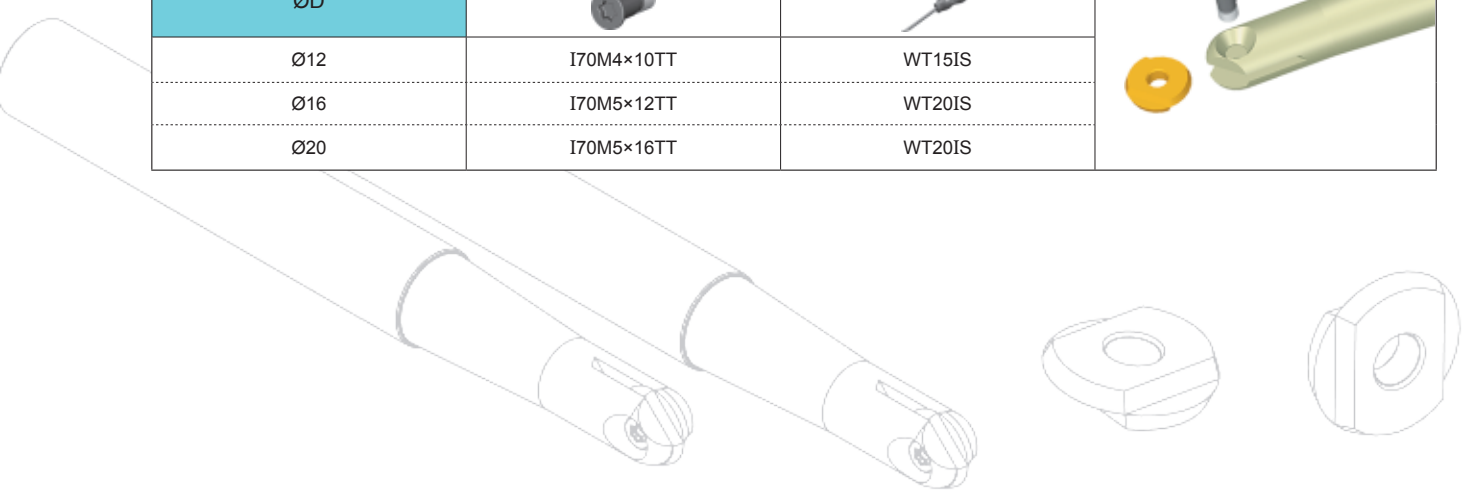
Type		Stock	Basic dimensions(mm)					Weight (kg)
			R	ØD	ød	L	L1	
BMR02	**-012-G16-S**	▲	6	12	16	110	40	0.1
	-012-G16-M	▲	6	12	16	130	50	0.2
	-012-G16-L	▲	6	12	16	160	50	0.2
	-016-G20-S	▲	8	16	20	140	45	0.3
	-016-G20-M	▲	8	16	20	170	65	0.3
	-016-G20-L	▲	8	16	20	200	65	0.4
	-020-G25-S	▲	10	20	25	160	60	0.5
	-020-G25-M	▲	10	20	25	200	80	0.6
	-020-G25-L	▲	10	20	25	240	80	0.8

▲Stock available △Make-to-order

Spare parts

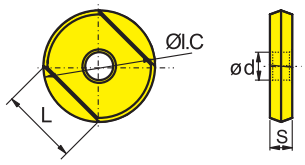
Diameter ØD	Screw	Wrench
Ø12	I70M4×10TT	WT15IS
Ø16	I70M5×12TT	WT20IS
Ø20	I70M5×16TT	WT20IS

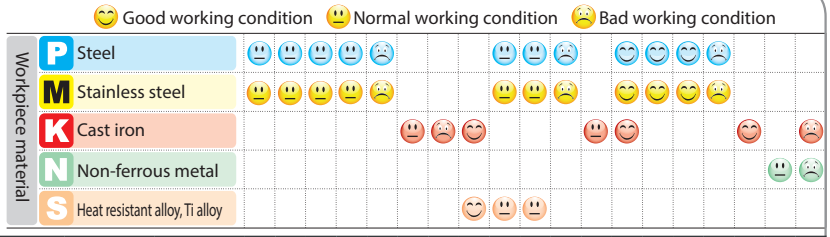




Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	L	S	ød	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	ROHX1203	12	8.5	3	4													○						
	ROHX1604	16	11.3	4	5													○						
	ROHX2005	20	14.1	5	5													○						

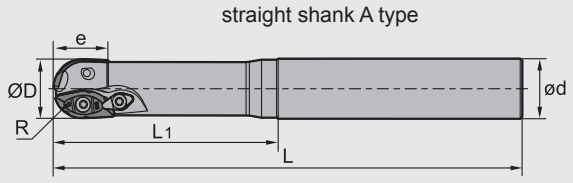
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

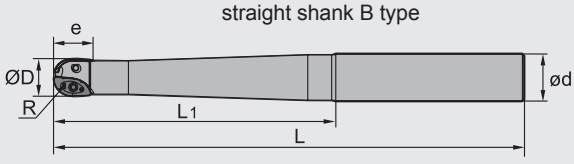
Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	Diameter		
					Ø12	Ø16	Ø20
P	Carbon steel	HB≤180	YBG252	V(m/min)	100~200	100~200	100~200
				f_z(mm/z)	0.15~0.25	0.2~0.3	0.2~0.3
				a_{pmax}(mm)	0.8	1	1.25
				a_{emax}(mm)	0.8	1	1.25
	Alloy steel	HB180~280		V(m/min)	80~180	80~180	80~180
				f_z(mm/z)	0.15~0.25	0.2~0.3	0.2~0.3
				a_{pmax}(mm)	0.8	1	1.25
				a_{emax}(mm)	0.8	1	1.25
	Hardened steel	HRC55~65		V(m/min)	60~100	60~100	60~100
				f_z(mm/z)	0.15~0.25	0.2~0.3	0.2~0.3
				a_{pmax}(mm)	0.4	0.5	0.6
				a_{emax}(mm)	0.4	0.5	0.6
M	Stainless steel	HB≤270		V(m/min)	70~150	70~150	70~150
				f_z(mm/z)	0.1~0.2	0.1~0.25	0.1~0.25
				a_{pmax}(mm)	0.6	0.8	1
				a_{emax}(mm)	0.6	0.8	1
K	Cast iron	HB180-250		V(m/min)	160~300	160~300	160~300
				f_z(mm/z)	0.2~0.3	0.25~0.35	0.25~0.35
				a_{pmax}(mm)	1	1.5	1.8
				a_{emax}(mm)	1	1.5	1.8

Profile milling tools

BMR03 P M K





Specification of tools

Type		Stock	Basic dimensions(mm)						Number of teeth	Weight (kg)	Type	Clamp
			R	ØD	ød	L	L1	e	Z			
BMR03	-016-G20-S	▲	8	16	20	150	70	16	2	0.3	B	--
	-016-G20-M	▲	8	16	20	180	80	16	2	0.4	B	
	-020-G25-S	▲	10	20	25	180	80	20	2	0.5	B	
	-020-G25-M	▲	10	20	25	200	100	20	2	0.6	B	
	-020-G25-L	▲	10	20	25	250	150	20	2	0.7	B	
	-020-G25-XL	▲	10	20	25	300	110	20	2	1.0	B	
	-025-G25-S	▲	12.5	25	25	180	80	25	2	0.6	B	
	-025-G25-M	▲	12.5	25	25	200	100	25	2	0.7	B	
	-025-G25-L	▲	12.5	25	25	250	110	25	2	0.8	B	
	-025-G25-XL	▲	12.5	25	25	300	120	25	2	1.0	B	
	-030-G32-S	△	15	30	32	200	120	30	2	1.0	A	WD-208
	-030-G32-M	▲	15	30	32	250	150	30	2	1.3	A	
	-030-G32-L	▲	15	30	32	300	200	30	2	1.6	A	
	-030-G32-XL	△	15	30	32	350	200	30	2	1.9	A	
	-032-G32-S	▲	16	32	32	200	120	32	2	1.1	A	
	-032-G32-M	▲	16	32	32	250	150	32	2	1.4	A	
	-032-G32-L	▲	16	32	32	300	200	32	2	1.6	A	
	-032-G32-XL	△	16	32	32	350	200	32	2	2.0	A	
	-040-G40-S	△	20	40	40	200	120	40	2	1.6	A	CBH5R1
	-040-G40-M	▲	20	40	40	250	150	40	2	2.0	A	
	-040-G40-L	▲	20	40	40	300	200	40	2	2.5	A	
	-040-G40-XL	△	20	40	40	350	200	40	2	3.0	A	

▲Stock available △Make-to-order

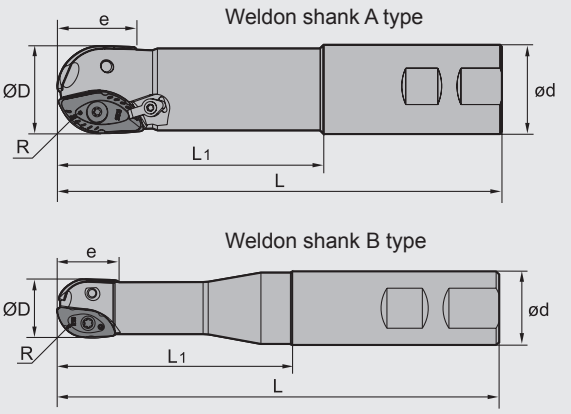
Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Profile milling tools

BMR03 P M K

A type(Ø30-Ø50)

B type(Ø16-Ø25)



Specification of tools

Type		Stock	Basic dimensions(mm)						Number of teeth	Weight (kg)	Type	Clamp
			R	ØD	ød	L	L1	e	Z			
BMR03	-016-XP20-M	▲	8	16	20	111	60	16	2	0.2	B	--
	-020-XP25-M	▲	10	20	25	127	70	20	2	0.3	B	
	-020-XP25-L	▲	10	20	25	150	80	20	2	0.4	B	
	-025-XP25-M	▲	12.5	25	25	137	80	25	2	0.4	B	
	-025-XP25-L	▲	12.5	25	25	200	100	25	2	0.6	B	
	-030-XP32-M	▲	15	30	32	161	100	30	2	0.8	A	WD-208
	-030-XP32-L	▲	15	30	32	250	150	30	2	1.3	A	
	-032-XP32-M	▲	16	32	32	161	100	32	2	0.8	A	
	-032-XP32-L	▲	16	32	32	250	120	32	2	1.3	A	
	-040-XP40-M	▲	20	40	40	175	100	40	2	1.3	A	CBH5R1
	-040-XP40-L	▲	20	40	40	250	120	40	2	2.0	A	
	-050-XP50-M	▲	25	50	50	200	100	50	2	2.5	A	
	-050-XP50-L	▲	25	50	50	250	150	50	2	3.1	A	

▲Stock available △Make-to-order

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

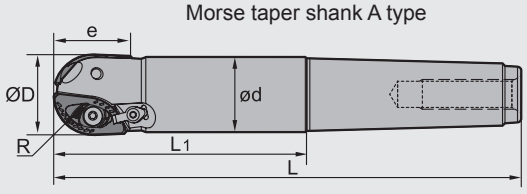
Profile milling tools

BMR03 P M K

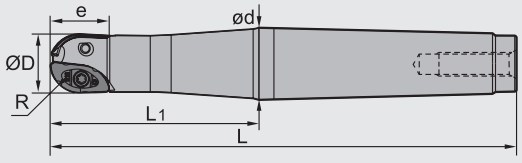
A type(Ø30-Ø50)

B type(Ø20-Ø25)

Morse taper shank A type



Morse taper shank B type



Specification of tools

Type		Stock	Basic dimensions(mm)						Number of teeth Z	Weight (kg)	Type	Clamp
			R	ØD	ød	L	L1	e				
BMR03	**-020-MT3-M**	▲	10	20	18.7	156	70	20	2	0.4	B	--
	-020-MT3-L	△	10	20	18.7	186	100	20	2	0.4	B	
	-025-MT3-M	▲	12.5	25	23.5	156	70	25	2	0.4	B	
	-025-MT3-L	△	12.5	25	23.5	186	100	25	2	0.4	B	
	-030-MT4-M	▲	15	30	28.2	189	70	30	2	0.8	A	WD-208
	-030-MT4-L	△	15	30	28.2	229	120	30	2	1.0	A	
	-032-MT4-M	▲	16	32	29.2	179	70	32	2	0.9	A	
	-032-MT4-L	△	16	32	29.2	209	100	32	2	0.9	A	
	-040-MT4-M	▲	20	40	36.9	199	100	40	2	1.0	A	CBH5R1
	-040-MT5-L	▲	20	40	36.9	226	90	40	2	1.8	A	
	-040-MT5-XL	▲	20	40	36.9	256	120	40	2	2.0	A	
	-050-MT5-M	▲	25	50	46.8	236	100	50	2	2.2	A	
	-050-MT5-L	▲	25	50	46.8	286	150	50	2	2.9	A	

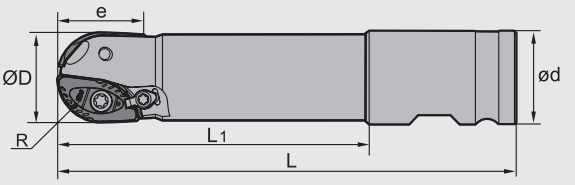
▲Stock available △Make-to-order

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Profile milling tools

BMR03 P M K

Compound shank



Specification of tools

Type		Stock	Basic dimensions(mm)						Number of teeth Z	Weight (kg)	Clamp
			R	ØD	ød	L	L1	e			
BMR03	**-040-XPX-M**	▲	20	40	50.8	250	170	40	2	1.3	CBH5R1
	-040-XPX-L	▲	20	40	50.8	300	220	40	2	3.1	
	-040-XPX-XL	▲	20	40	50.8	350	270	40	2	3.5	
	-050-XPX-M	▲	25	50	50.8	250	170	50	2	3.1	
	-050-XPX-L	▲	25	50	50.8	300	200	50	2	3.8	
	-050-XPX-XL	▲	25	50	50.8	350	270	50	2	4.4	

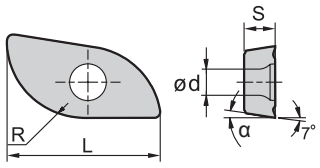
▲Stock available △Make-to-order

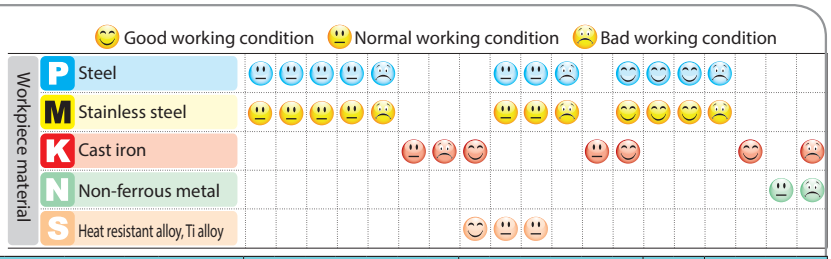
Spare parts

Diameter ØD	Clamp	Screw	Wrench	
Φ16	--	I60M2.5×6.5	--	WT07P
Φ20	--	I60M3.5×08TT		WT10IP
Φ25	--	I60M4×10		WT15S
Φ30	WD-208	I60M5×13	WT20IT	--
Φ32	WD-208	I60M5×13		
Φ40	CBH5R1	I43M6×16	WT25IT	
Φ50	CBH5R1	I43M8×21 I43M6×16	WT25IT WT30IT	

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

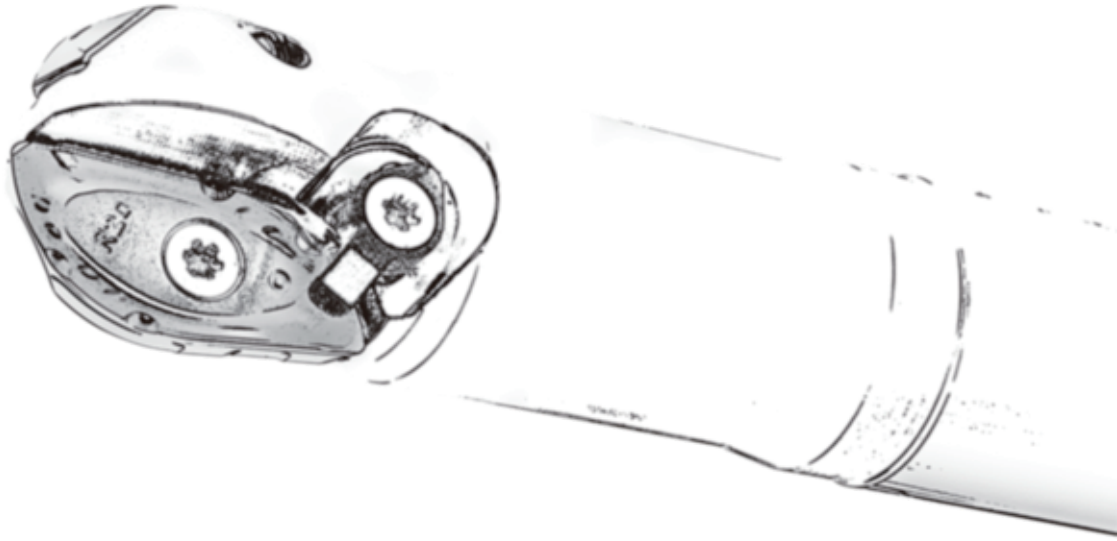
Selection of inserts

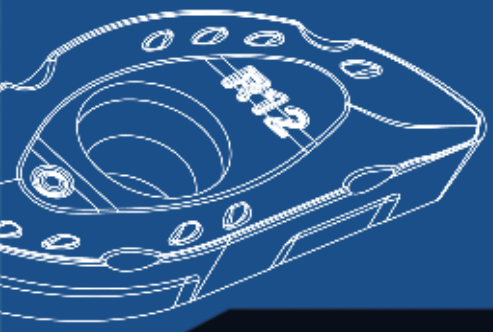




Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		R	ød	S	α	L	Applicable tools	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	XPHT16R0803-GM	8	3.1	3.18	9°	16	Φ16											★								
	XPHT20R10T3-GM	10	4.0	3.97	9°	20	Φ20											★								
	XPHT25R1204-GM	12.5	4.7	4.76	9°	25	Φ25											★								
	XPHT30R1506-GM	15	5.8	6.35	11°	30	Φ30											★								
	XPHT32R1606-GM	16	5.8	6.35	9°	32	Φ32											★								
	XPHT40R2007-GM	20	6.7	7.94	9°	40	Φ40											★								
	XPHT50R2507-GM	25	9.2	7.94	9°	50	Φ50											★								

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



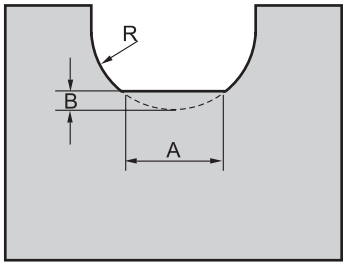


BMR03

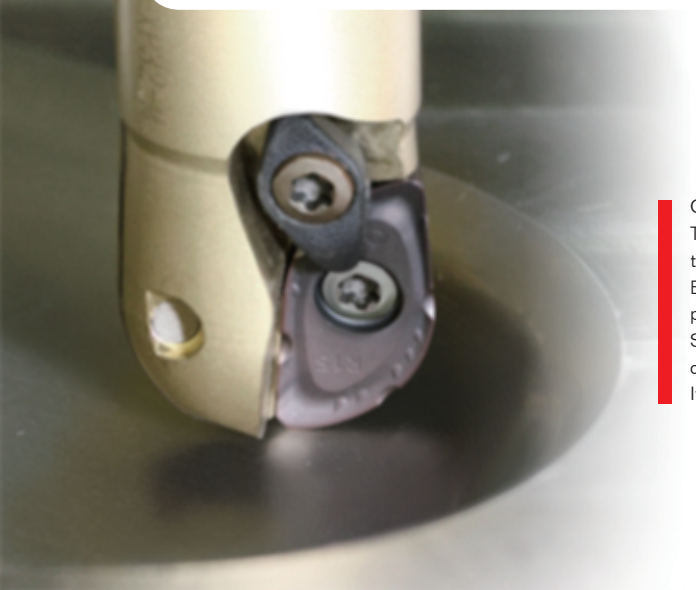
series ball nose end milling tools

- The unique chipbreaker and big rake angle can effectively control the curling and flowing direction of chips and reduce the cutting force, improving workpiece surface quality and tool life.
- After precise grinding of periphery and locating surface, the insert can sufficiently ensure the shape accuracy of cutting edge and the precision of installation and location, improving installation security and workpiece precision after machining.
- The concave structure of the flank can effectively enhance the strength of cutting edge and prevent scraping between the clearance face and workpiece surface. Therefore, it improves the workpiece surface quality and prolongs the life of insert.
- The designs of cutting edge over center and a large negative rake angle make it possible to cut vertically, thus anti-breakage capability is enhanced.
- The rough ball nose milling cutters with large diameter adopt the top and hole clamping style, so insert clamping becomes more firm and stable. The machining is also highly efficient even under poor conditions such as long overhang and large vibration, etc.
- The adapter types include straight shank, Weldon shank, Morse taper shank and combination shank.

Slot shape after machining



R	A	B
08	1.7	0.09
10	2.2	0.12
12.5	3.0	0.18
15	3.9	0.20
16	3.5	0.22
20	3.6	0.24
25	3.8	0.26



Cautions:

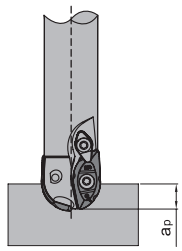
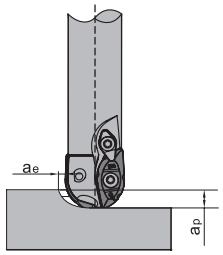
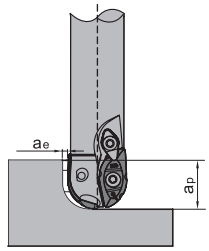
The insert edge should correspond to the locating face of insert pocket in the tool. Don't install the wrong side up.

Before screwing down the insert, confirm the good connection between insert and insert pocket.

Select and adjust the cutting parameters according to machine power and machining conditions.

If vibration occurs in the machining process, cutting speed should be reduced properly.

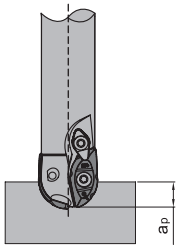
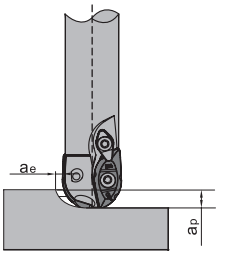
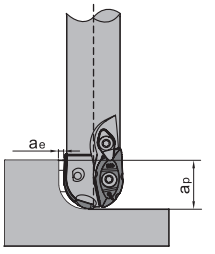
Recommended cutting parameters Diameter Ø16

Operations						
Workpiece material	Cutting parameters	Machining of slot	Side milling (slight)		Side milling (deep)	Insert grade
Medium carbon steel Hardness 150~250HB	V(m/min)	150~220	150~220	150~220	150~220	YBG302
	F_z(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	a_p(mm)	4	4	8	16	
	a_e(mm)	--	3	4	1.5	
Alloy steel Hardness 150~280HB	V(m/min)	100~150	100~150	100~150	100~150	
	F_z(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	a_p(mm)	4	4	8	16	
	a_e(mm)	--	3	4	1.5	
Die steel Hardness 150~255HB	V(m/min)	80~120	80~120	80~120	80~120	
	F_z(mm/z)	0.1~0.3	0.1~0.3	0.1~0.3	0.1~0.3	
	a_p(mm)	4	4	8	16	
	a_e(mm)	--	3	4	1.5	
Hardened steel Hardness 40~50HRC	V(m/min)	80~100	80~100	80~100	--	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	--	
	a_p(mm)	4	4	8	--	
	a_e(mm)	--	2	3	--	
Gray cast iron Hardness 160~260HB	V(m/min)	250~300	250~300	250~300	250~300	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	a_p(mm)	4	4	8	16	
	a_e(mm)	--	3	4	1.5	
Nodular cast iron Hardness 170~300HB	V(m/min)	200~250	200~250	200~250	200~250	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	a_p(mm)	4	4	8	16	
	a_e(mm)	--	3	4	1.5	

Note: 1, Parameters in the table shall be adjusted according to the rigidity of the machine or workpiece.

2. Wind cooling to be preferred.

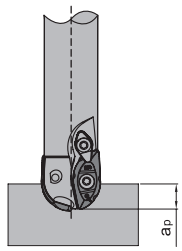
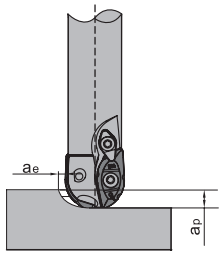
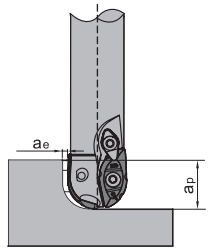
Recommended cutting parameters Diameter Ø20

Operations						
Workpiece material	Cutting parameters	Machining of slot	Side milling (slight)		Side milling (deep)	Insert grade
Medium carbon steel Hardness 150~250HB	V(m/min)	150~220	150~220	150~220	150~220	YBG302
	F_z(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	a_p(mm)	5	5	10	20	
	a_e(mm)	--	4	5	2	
Alloy steel Hardness 150~280HB	V(m/min)	100~150	100~150	100~150	100~150	
	F_z(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	a_p(mm)	5	5	10	20	
	a_e(mm)	--	4	5	2	
Die steel Hardness 150~255HB	V(m/min)	80~120	80~120	80~120	80~120	
	F_z(mm/z)	0.1~0.3	0.1~0.3	0.1~0.3	0.1~0.3	
	a_p(mm)	5	5	10	20	
	a_e(mm)	--	4	5	2	
Hardened steel Hardness 40~50HRC	V(m/min)	80~100	80~100	80~100	--	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	--	
	a_p(mm)	5	5	10	--	
	a_e(mm)	--	4	5	--	
Gray cast iron Hardness 160~260HB	V(m/min)	250~300	250~300	250~300	250~300	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	a_p(mm)	5	5	10	20	
	a_e(mm)	--	4	5	2	
Nodular cast iron Hardness 170~300HB	V(m/min)	200~250	200~250	200~250	200~250	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	a_p(mm)	5	5	10	20	
	a_e(mm)	--	4	5	2	

Note: 1, Parameters in the table shall be adjusted according to the rigidity of the machine or workpiece.

2. Wind cooling to be preferred.

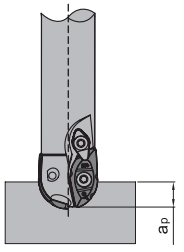
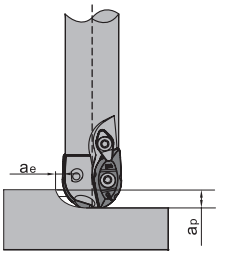
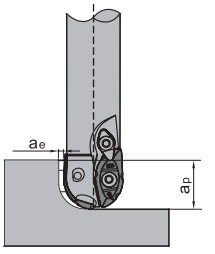
Recommended cutting parameters Diameter Ø25

Operations						
Workpiece material	Cutting parameters	Machining of slot	Side milling (slight)		Side milling (deep)	Insert grade
Medium carbon steel Hardness 150~250HB	V(m/min)	150~220	150~220	150~220	150~220	YBG302
	F_z(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	a_p(mm)	6	6	12.5	25	
	a_e(mm)	--	5	6.5	3	
Alloy steel Hardness 150~280HB	V(m/min)	100~150	100~150	100~150	100~150	
	F_z(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	a_p(mm)	6	6	12.5	25	
	a_e(mm)	--	5	6.5	3	
Die steel Hardness 150~255HB	V(m/min)	80~120	80~120	80~120	80~120	
	F_z(mm/z)	0.1~0.3	0.1~0.3	0.1~0.3	0.1~0.3	
	a_p(mm)	6	6	12.5	25	
	a_e(mm)	--	5	6.5	3	
Hardened steel Hardness 40~50HRC	V(m/min)	80~100	80~100	80~100	--	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	--	
	a_p(mm)	6	6	12.5	--	
	a_e(mm)	--	5	6.5	--	
Gray cast iron Hardness 160~260HB	V(m/min)	250~300	250~300	250~300	250~300	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	a_p(mm)	6	6	12.5	25	
	a_e(mm)	--	5	6.5	3	
Nodular cast iron Hardness 170~300HB	V(m/min)	200~250	200~250	200~250	200~250	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	a_p(mm)	6	6	12.5	25	
	a_e(mm)	--	5	6.5	3	

Note: 1, Parameters in the table shall be adjusted according to the rigidity of the machine or workpiece.

2. Wind cooling to be preferred.

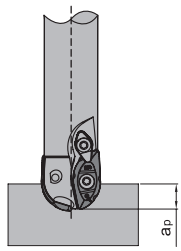
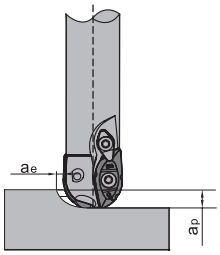
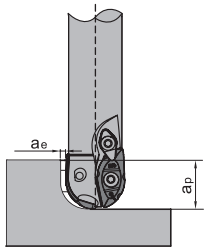
Recommended cutting parameters Diameter Ø30, Ø32

Operations						
Workpiece material	Cutting parameters	Machining of slot	Side milling (slight)		Side milling (deep)	Insert grade
Medium carbon steel Hardness 150~250HB	V(m/min)	150~220	150~220	150~220	150~220	YBG302
	F_z(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	a_p(mm)	10	10	16	28	
	a_e(mm)	--	6	9	6	
Alloy steel Hardness 150~280HB	V(m/min)	100~150	100~150	100~150	100~150	
	F_z(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	a_p(mm)	10	10	16	28	
	a_e(mm)	--	6	9	6	
Die steel Hardness 150~255HB	V(m/min)	80~120	80~120	80~120	80~120	
	F_z(mm/z)	0.1~0.3	0.1~0.3	0.1~0.3	0.1~0.3	
	a_p(mm)	10	10	16	28	
	a_e(mm)	--	6	9	6	
Hardened steel Hardness 40~50HRC	V(m/min)	80~100	80~100	80~100	--	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	--	
	a_p(mm)	10	10	16	--	
	a_e(mm)	--	6	9	--	
Gray cast iron Hardness 160~260HB	V(m/min)	250~300	250~300	250~300	250~300	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	a_p(mm)	10	10	16	28	
	a_e(mm)	--	6	9	6	
Nodular cast iron Hardness 170~300HB	V(m/min)	200~250	200~250	200~250	200~250	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	a_p(mm)	10	10	16	28	
	a_e(mm)	--	6	9	6	

Note: 1, Parameters in the table shall be adjusted according to the rigidity of the machine or workpiece.

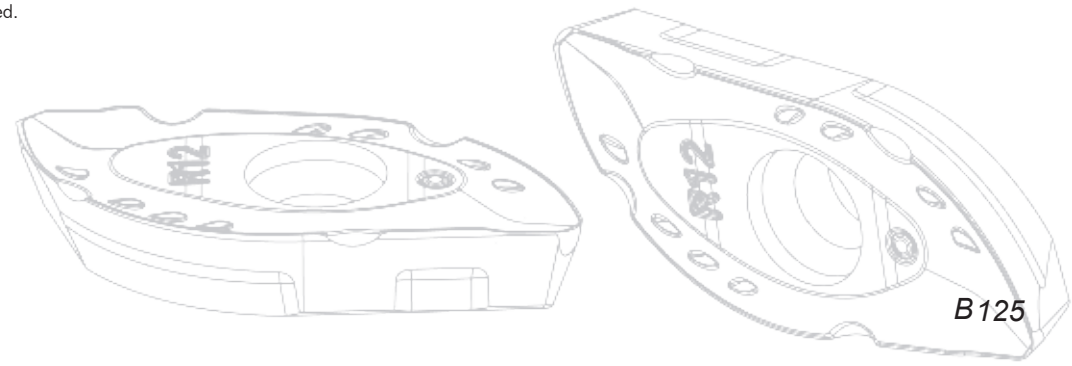
2. Wind cooling to be preferred.

Recommended cutting parameters Diameter Ø40

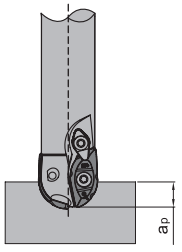
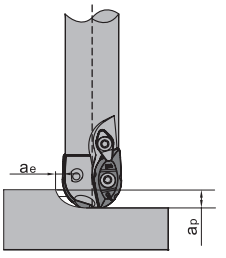
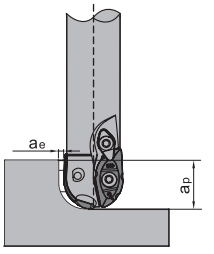
Operations						
Workpiece material	Cutting parameters	Machining of slot	Side milling (slight)		Side milling (deep)	Insert grade
Medium carbon steel Hardness 150~250HB	V(m/min)	150~220	150~220	150~220	150~220	YBG302
	F_z(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	a_p(mm)	12	10	20	35	
	a_e(mm)	--	8	12	8	
Alloy steel Hardness 150~280HB	V(m/min)	100~150	100~150	100~150	100~150	
	F_z(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	a_p(mm)	12	10	20	35	
	a_e(mm)	--	8	12	8	
Die steel Hardness 150~255HB	V(m/min)	80~120	80~120	80~120	80~120	
	F_z(mm/z)	0.1~0.3	0.1~0.3	0.1~0.3	0.1~0.3	
	a_p(mm)	12	10	20	35	
	a_e(mm)	--	8	12	8	
Hardened steel Hardness 40~50HRC	V(m/min)	80~100	80~100	80~100	--	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	--	
	a_p(mm)	12	10	20	--	
	a_e(mm)	--	8	12	--	
Gray cast iron Hardness 160~260HB	V(m/min)	250~300	250~300	250~300	250~300	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	a_p(mm)	12	10	20	35	
	a_e(mm)	--	8	12	8	
Nodular cast iron Hardness 170~300HB	V(m/min)	200~250	200~250	200~250	200~250	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	a_p(mm)	12	10	20	35	
	a_e(mm)	--	8	12	8	

Note: 1, Parameters in the table shall be adjusted according to the rigidity of the machine or workpiece.

2. Wind cooling to be preferred.



Recommended cutting parameters Diameter Ø50

Operations						
Workpiece material	Cutting parameters	Machining of slot	Side milling (slight)		Side milling (deep)	Insert grade
Medium carbon steel Hardness 150~250HB	V(m/min)	150~220	150~220	150~220	150~220	YBG302
	F_z(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	a_p(mm)	15	10	25	40	
	a_e(mm)	--	10	15	10	
Alloy steel Hardness 150~280HB	V(m/min)	100~150	100~150	100~150	100~150	
	F_z(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	a_p(mm)	15	10	25	40	
	a_e(mm)	--	10	15	10	
Die steel Hardness 150~255HB	V(m/min)	80~120	80~120	80~120	80~120	
	F_z(mm/z)	0.1~0.3	0.1~0.3	0.1~0.3	0.1~0.3	
	a_p(mm)	15	10	25	40	
	a_e(mm)	--	10	15	10	
Hardened steel Hardness 40~50HRC	V(m/min)	80~100	80~100	80~100	--	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	--	
	a_p(mm)	15	10	25	--	
	a_e(mm)	--	10	15	--	
Gray cast iron Hardness 160~260HB	V(m/min)	250~300	250~300	250~300	250~300	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	a_p(mm)	15	10	25	40	
	a_e(mm)	--	10	15	10	
Nodular cast iron Hardness 170~300HB	V(m/min)	200~250	200~250	200~250	200~250	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	a_p(mm)	15	10	25	40	
	a_e(mm)	--	10	15	10	

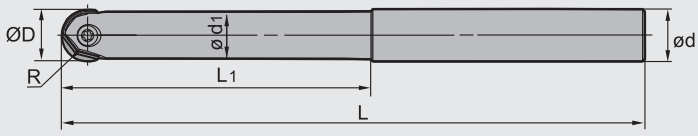
Note: 1, Parameters in the table shall be adjusted according to the rigidity of the machine or workpiece.

2. Wind cooling to be preferred.

Profile milling tools

BMR04 P M K

Straight shank with straight neck



Specification of tools

Type		Stock	Basic dimensions(mm)						Weight (kg)
			R	ØD	ød	ød1	L1	L	
BMR04	**-012-G12-M**	▲	6	12	12	11	35	125	0.1
	-012-G12-L	△	6	12	12	11	45	150	0.1
	-016-G16-M	▲	8	16	16	14	40	150	0.2
	-016-G16-L	△	8	16	16	14	55	180	0.3
	-020-G20-M	▲	10	20	20	18	65	180	0.4
	-020-G20-L	△	10	20	20	18	100	250	0.6
	-025-G25-M	▲	12.5	25	25	23	70	200	0.7
	-025-G25-L	△	12.5	25	25	23	100	250	0.9
	-030-G32-M	▲	15	30	32	27	130	250	1.2
	-030-G32-L	△	15	30	32	27	150	300	1.5
	-032-G32-M	▲	16	32	32	29	80	250	1.4
	-032-G32-L	△	16	32	32	29	109	300	1.7

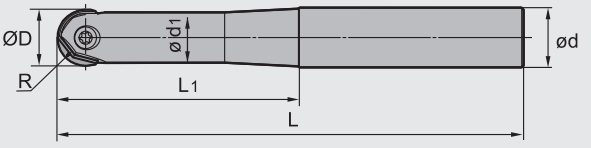
▲Stock available △Make-to-order

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Profile milling tools

BMR04 P M K

Straight shank with taper neck



Specification of tools

Type		Stock	Basic dimensions(mm)						Weight (kg)
			R	ØD	ød	ød1	L1	L	
BMR04	**-012-G16-M**	▲	6	12	16	11	50	125	0.2
	-012-G16-L	△	6	12	16	11	60	150	0.2
	-016-G20-M	▲	8	16	20	14	60	150	0.3
	-016-G20-L	△	8	16	20	14	80	180	0.3
	-020-G25-M	▲	10	20	25	18	75	180	0.6
	-020-G25-L	△	10	20	25	18	85	200	0.6
	-025-G32-M	▲	12.5	25	32	23	90	200	1.0
	-025-G32-L	△	12.5	25	32	23	110	250	1.3
	-030-G40-M	▲	15	30	40	27	110	250	2.0
	-030-G40-L	△	15	30	40	27	125	300	2.4
	-032-G40-M	▲	16	32	40	29	110	250	2.0
	-032-G40-L	△	16	32	40	29	125	300	2.4

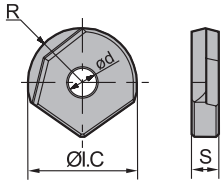
▲Stock available △Make-to-order

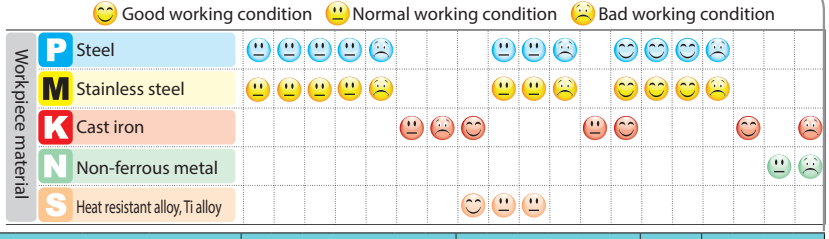
Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

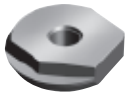
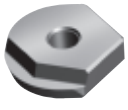
Spare parts

Diameter	Screw	Wrench	
Ø12	I70M4×10TT	WT15IP	--
Ø16	I70M5×12TT	WT20IP	--
Ø20	I70M5×16TT	WT20IP	--
Ø25	I70M6×20TT	WT20IP	--
Ø30	I70M8×25TT	--	WT30IT
Ø32	I70M8×25TT	--	WT30IT

Selection of inserts

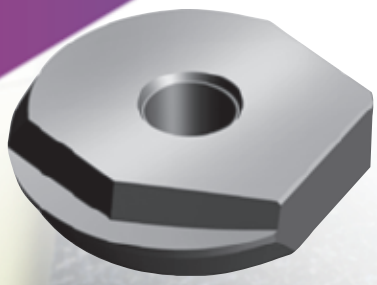




Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		R	ØI.C	S	ød	Applicable insert ØD	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**ZOHX1203-GF**	6	12	3	4	Φ12													★						
	ZOHX1604-GF	8	16	4	5	Φ16													★						
	ZOHX2005-GF	10	20	5	5	Φ20													★						
	ZOHX2506-GF	12.5	25	6	6	Φ25													○						
	ZOHX3007-GF	15	30	7	8	Φ30													○						
	ZOHX3207-GF	16	32	7	8	Φ32													○						
	**ZOHX1203-GM**	6	12	3	4	Φ12													★						
	ZOHX1604-GM	8	16	4	5	Φ16													★						
	ZOHX2005-GM	10	20	5	5	Φ20													★						
	ZOHX2506-GM	12.5	25	6	6	Φ25													★						
	ZOHX3007-GM	15	30	7	8	Φ30													★						
	ZOHX3207-GM	16	32	7	8	Φ32													★						

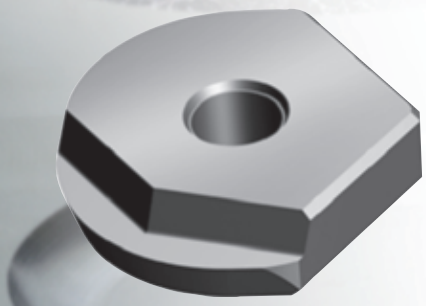
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

BMR04 Series ball nose finishing end milling tools



-GF

- With positive rake angle and double clearance angle, the design of curved cutting edge combines sharpness and strength. The edge with high precision is applicable under stable machining conditions and in conditions requiring high workpiece profile precision.



-GM

- 0° rake angle, only one clearance angle, high edge strength, suitable for conditions requiring high cutting efficiency.

The inserts are a combination of ultra-fine cemented carbide substrate and nano coating grade YBG252. With excellent cutting performance, they are suitable for semi-finish till finish machining.

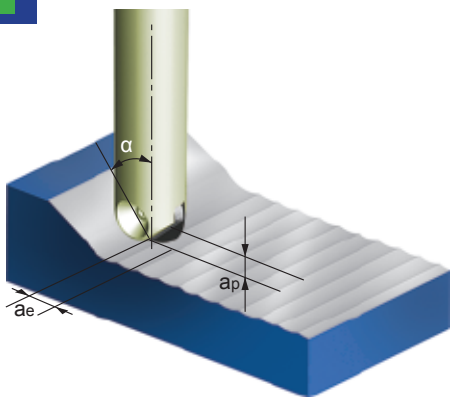
Calculation of cutting speed for BMR02/04 series ball nose end mills

1.When the tool axial line is vertical to the surface being machined,

$$N = \frac{1000Vc}{\pi Dc}(r/min)$$

$$Dc = 2\sqrt{a_p(D-a_p)}$$

N：rotating speed
Vc：actual cutting speed
Dc：effective cutting diameter
D：tool nominal diameter
a_p：axial cutting depth



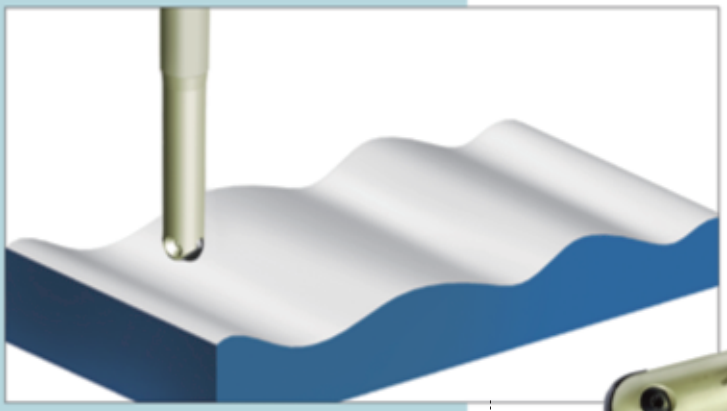
2.When there is an inclined angle between the tool axial line and the surface being machined, the recommended cutting speed should be multiplied by a factor in the table below to obtain the cutting speed used for programming.

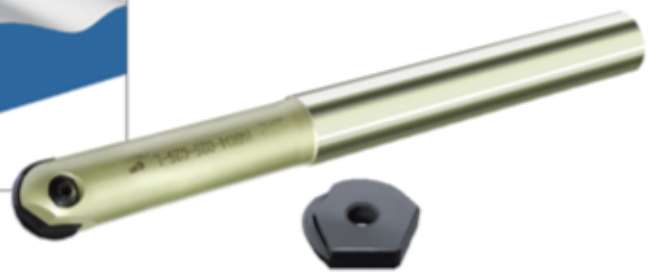
Diameter(mm)		Ø12		Ø16		Ø20		Ø25		Ø30		Ø32	
Cutting depth a_p(mm)		0.2	0.5	0.2	0.5	0.5	1	0.5	1	0.5	1.5	0.5	1.5
Inclined angle α	15°	1.00	1.00	1.00	1.00	1.00	1.02	1.00	1.01	1.00	1.00	1.00	1.00
	30°	1.04	1.01	1.05	1.01	1.02	1.04	1.03	1.04	1.04	1.01	1.04	1.00
	45°	1.16	1.07	1.18	1.10	1.12	1.06	1.14	1.08	1.16	1.06	1.16	1.06
	60°	1.42	1.24	1.47	1.30	1.34	1.21	1.38	1.25	1.42	1.21	1.43	1.22
	75°	2.02	1.60	2.14	1.73	1.83	1.53	1.93	1.62	2.01	1.53	2.04	1.55
	90°	3.92	2.50	4.48	2.87	3.20	2.29	3.57	2.55	3.9	2.29	4.03	2.37

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	Tool specification					
					Ø12	Ø16	Ø20	Ø25	Ø30	Ø32
P	Carbon steel	HB≤180	YBG252	V(m/min)	100~200	100~200	100~200	100~200	100~200	100~200
				f_z(mm/z)	0.15~0.25	0.2~0.3	0.2~0.3	0.25~0.35	0.25~0.35	0.25~0.35
				$a_p$max(mm)	0.8	1	1.25	1.5	2	2
				$a_e$max(mm)	0.8	1	1.25	1.5	2	2
	Alloy stee	HB180~280		V(m/min)	80~180	80~180	80~180	80~180	80~180	80~180
				f_z(mm/z)	0.15~0.25	0.2~0.3	0.2~0.3	0.25~0.35	0.25~0.35	0.25~0.35
				$a_p$max(mm)	0.8	1	1.25	1.5	2	2
				$a_e$max(mm)	0.8	1	1.25	1.5	2	2
	Hardened steel	HRC55~65		V(m/min)	60~100	60~100	60~100	60~100	60~100	60~100
				f_z(mm/z)	0.15~0.25	0.2~0.3	0.2~0.3	0.25~0.35	0.25~0.35	0.25~0.35
				$a_p$max(mm)	0.4	0.5	0.6	0.8	1	1
				$a_e$max(mm)	0.4	0.5	0.6	0.8	1	1
M	Stainless steel	HB≤270		V(m/min)	70~150	70~150	70~150	70~150	70~150	70~150
				f_z(mm/z)	0.1~0.2	0.1~0.25	0.1~0.25	0.2~0.3	0.2~0.3	0.2~0.3
				$a_p$max(mm)	0.6	0.8	1	1.25	1.5	1.5
				$a_e$max(mm)	0.6	0.8	1	1.25	1.5	1.5
K	Cast iron	HB180-250		V(m/min)	160~300	160~300	160~300	160~300	160~300	160~300
				f_z(mm/z)	0.2~0.3	0.25~0.35	0.25~0.35	0.3~0.4	0.3~0.4	0.3~0.4
				$a_p$max(mm)	1	1.5	1.8	2	2.5	2.5
				$a_e$max(mm)	1	1.5	1.8	2	2.5	2.5

Case for BMR04



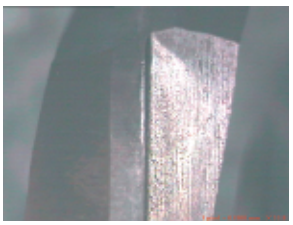
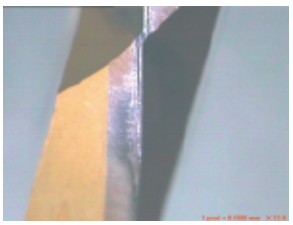
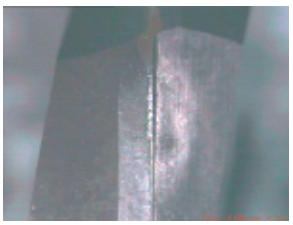
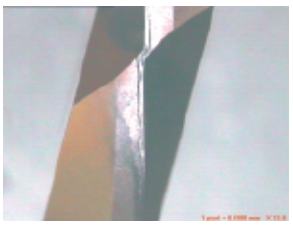


Workpiece material：42CrMo (HRC35)
Cooling system: Dry cutting
Machine: Vertical machining center
Cutting parameters：
Vc=150m/min
a_p=0.1mm
f_z=0.2mm/Z

Tool type：BMR04-020-G25-M

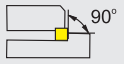
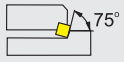
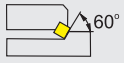
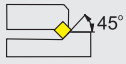
Insert type/grade：ZOHX2005-GM/YBG252

●Abrasion comparison of inserts after milling curved face

	ZCC-CT	Other company product
After 60 minutes of cutting	 Abrasion on the clearance face 0.08	 Abrasion on the clearance face 0.10
After 120 minutes of cutting	 Abrasion on the clearance face 0.12	 Abrasion on the clearance face 0.16

Side and face milling tools code key

Cutter style	
FM	Face milling
EM	Square shoulder milling
HM	Helical end milling
SM	Side and face milling
BM	Profile milling
CM	Chamfer milling
XM	Special milling

Approach angle		
P	90°	
E	75°	
D	60°	
A	45°	
R		

Sequence number of series

Cutting diameter ØD (mm)

Cutting width of milling tools

Coupling structure and demension			
A	A type of coupling	D	D type of coupling
B	B type of coupling	K	Mounting by keyway
C	C type of coupling		

SM P 03 - 160 × 16 - K40 - M P 12 - 12 L

Insert shape	
C	Diamond with 80°
D	Diamond with 55°
R	Round
S	Square
T	Regular triangle
V	Diamond with 35°
M	Diamond with 86°

Insert clearance angle	
N	0°
B	5°
C	7°
P	11°
D	15°
E	20°

Length of cutting edge						
Diameter of IC	Insert shape					
	C	D	R	S	T	V
5.556	—	—	—	—	09	—
6.350	06	07	—	—	11	—
9.525	09	11	09	09	16	16
12.700	12	15	12	12	22	22
15.875	16	19	15	15	27	—
19.050	19	—	19	19	33	—
25.400	25	—	25	25	44	—

Cutting direction

(R: Right L: Left)

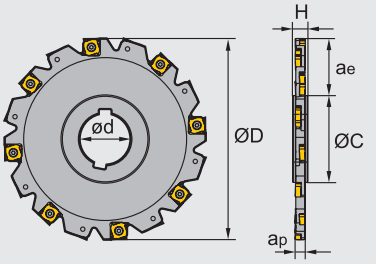
Number of teeth

Side and face milling tools

Machining of slot

SMP01 P M K

K-type coupling



Specification of tools

Type		Stock	Basic dimensions(mm)						Applicable inserts	Number of teeth Z	Type of coupling	Weight (kg)
			ØD	ød	øc	H	a_p	a_{emax}				
SMP01 Mounting by keyway	**-100×4-K27-SN12-10**	△	100	27	45	12	4	25	XSEQ1202	10	K	0.2
	-125×4-K40-SN12-12	△	125	40	56	12	4	32		12	K	0.3
	-160×4-K40-SN12-16	△	160	40	67	12	4	44		16	K	0.5
	-100×5-K27-SN12-10	△	100	27	45	12	5	25	XSEQ1203	10	K	0.2
	-125×5-K40-SN12-12	△	125	40	56	12	5	32		12	K	0.3
	-160×5-K40-SN12-16	△	160	40	67	12	5	44		16	K	0.6
	-100×6-K27-SN12-10	△	100	27	45	12	6	25	XSEQ12T3	10	K	0.3
	-125×6-K40-SN12-12	△	125	40	56	12	6	32		12	K	0.4
	-160×6-K40-SN12-16	△	160	40	67	12	6	44		16	K	0.7
	-200×6-K50-SN12-18	△	200	50	71	12	6	62		18	K	1.1
	-250×6-K50-SN12-24	△	250	50	71	12	6	87		24	K	1.7
	-100×7-K27-SN12-10	△	100	27	45	12	7	25	XSEQ1204	10	K	0.3
	-125×7-K40-SN12-12	△	125	40	56	12	7	32		12	K	0.4
	-160×7-K40-SN12-16	△	160	40	67	12	7	44		16	K	0.8
	-200×7-K50-SN12-18	△	200	50	71	12	7	62		18	K	1.2
	-250×7-K50-SN12-24	△	250	50	71	12	7	87		24	K	1.9
	-100×8-K27-SN12-10	△	100	27	45	12	8	25	XSEQ12T4	10	K	0.3
	-125×8-K40-SN12-12	△	125	40	56	12	8	32		12	K	0.5
	-160×8-K40-SN12-16	△	160	40	67	12	8	44		16	K	0.9
	-200×8-K50-SN12-18	△	200	50	71	12	8	62		18	K	1.4
	-250×8-K50-SN12-24	△	250	50	71	12	8	87		24	K	2.2

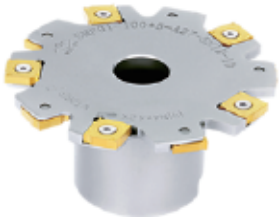
▲Stock available △Make-to-order

Tools code key B133
Grade selection guide B18–B21
Technical data B192–B198

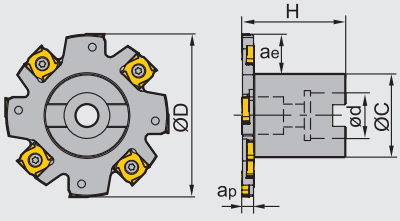
Side and face milling tools

Machining of slot

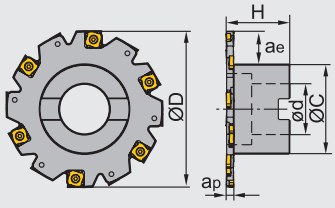
SMP01 P M K



A-type coupling



B-type coupling



Specification of tools

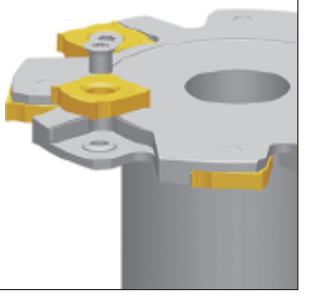
Type		Stock R	Stock L	Basic dimensions(mm) ØD	ød	øc	H	ap	aemax	Applicable inserts	Number of teeth Z	Type of coupling	Weight (kg)
SMP01 Arbor mounting	**-063×4-A22-SN12-06**	△	△	63	22	32	40	4	14	XSEQ1202	6	A	0.2
	-080×4-A22-SN12-08	△	△	80	22	40	50	4	18		8	A	0.4
	-100×4-A27-SN12-10	△	△	100	27	48	50	4	23		10	A	0.6
	-063×5-A22-SN12-06	△	△	63	22	32	40	5	14	XSEQ1203	6	A	0.2
	-080×5-A22-SN12-08	△	△	80	22	40	50	5	18		8	A	0.4
	-100×5-A27-SN12-10	△	△	100	27	48	50	5	23		10	A	0.7
	-063×6-A22-SN12-06	△	△	63	22	32	40	6	14	XSEQ12T3	6	A	0.2
	-080×6-A22-SN12-08	△	△	80	22	40	50	6	18		8	A	0.5
	-100×6-A27-SN12-10	△	△	100	27	48	50	6	23		10	A	0.7
	-125×6-B32-SN12-12	△	△	125	32	70	50	6	30		12	B	1.0
	-160×6-B40-SN12-16	△	△	160	40	70	50	6	41		16	B	1.3
	-063×7-A22-SN12-06	△	△	63	22	32	40	7	14	XSEQ1204	6	A	0.2
	-080×7-A22-SN12-08	△	△	80	22	40	50	7	18		8	A	0.5
	-100×7-A27-SN12-10	△	△	100	27	48	50	7	23		10	A	0.7
	-125×7-B32-SN12-12	△	△	125	32	70	50	7	30		12	B	1.1
	-160×7-B40-SN12-16	△	△	160	40	70	50	7	41		16	B	1.4
	-063×8-A22-SN12-06	△	△	63	22	32	40	8	14	XSEQ12T4	6	A	0.2
	-080×8-A22-SN12-08	△	△	80	22	40	50	8	18		8	A	0.5
	-100×8-A27-SN12-10	△	△	100	27	48	50	8	23		10	A	0.8
	-125×8-B32-SN12-12	△	△	125	32	70	50	8	30		12	B	1.1
	-160×8-B40-SN12-16	△	△	160	40	70	50	8	41		16	B	1.5

▲Stock available △Make-to-order

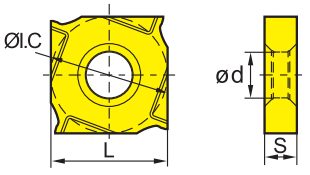
Tools code key B133
Grade selection guide B18–B21
Technical data B192–B198

Spare parts

Diameter ØD	Edge width a_p	Screw	Wrench
Ø63-Ø160	4	I91M4×3.2X	WT09S
Ø63-Ø160	5	I91M4×4.2X	
Ø63-Ø250	6	I91M4×5.1X	
Ø63-Ø250	7	I91M4×6.1X	
Ø63-Ø250	8	I91M4×7.1X	



Selection of inserts



😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Workpiece material		YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P	Steel	😐	😐	😐	😐	☹			😐	😐	☹		😊	😊	😊	☹				
M	Stainless steel	😐	😐	😐	😐	☹			😐	😐	☹		😊	😊	😊	☹				
K	Cast iron						😐	☹	😊			😐	😊				😊		☹	
N	Non-ferrous metal																	😐	☹	
S	Heat resistant alloy, Ti alloy								😊	😐	😐									

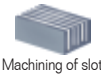
Insert shape	Type	Basic dimensions(mm) ØI.C	L	S	ød	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	XSEQ1202	12.7	12.7	2.3	5.0											★								
	XSEQ1203	12.7	12.7	3.0	5.0											★								
	XSEQ12T3	12.7	12.7	3.5	5.0											★								
	XSEQ1204	12.7	12.7	4.0	5.0											★								
	XSEQ12T4	12.7	12.7	4.5	5.0											★								

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Recommended cutting parameters

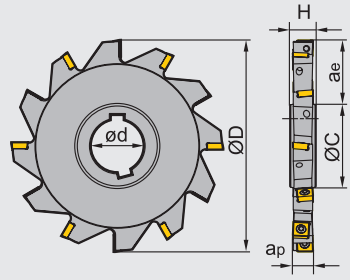
Workpiece material		Hardness HB	Insert grade	Cutting parameters V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	≤180	YBG202	180 (100-250)	0.1(0.08-0.25)
			YBG302	150 (100-200)	0.15(0.1-0.3)
	High-carbon steel、Alloy steel	180-280	YBG202	150 (80-250)	0.1(0.08-0.25)
			YBG302	120 (80-200)	0.15(0.1-0.3)
	Alloy tool steel	280-350	YBG202	120 (80-250)	0.1(0.08-0.25)
			YBG302	100 (80-200)	0.15(0.1-0.3)
M	Stainless steel	≤270	YBG202	120 (80-250)	0.1(0.05-0.15)
			YBG302	100 (80-200)	0.08(0.05-0.15)
K	Cast iron	180-250	YBG152	120 (80-250)	0.1(0.05-0.15)
			YBG302	150 (100-250)	0.08(0.05-0.15)

Side and face milling tools


Machining of slot

SMP03 P M K

K-type coupling



Specification of tools

Type		Stock	Basic dimensions(mm)						Applicable inserts	Number of teeth Z	Type of coupling	Weight (kg)
			ØD	øc	ød	a_{emax}	a_p	H				
SMP03 Mounting by keyway	**-080×8-K27-MP06-10**	△	80	43	27	17	8	12	MPHT060304-DM	10	K	0.2
	-100×8-K32-MP06-14	△	100	47	32	25	8	12		14	K	0.3
	-100×10-K32-MP06-14	△	100	47	32	25	10	14		14	K	0.4
	-125×10-K40-MP06-16	△	125	55	40	34	10	14		16	K	0.6
	-125×12-K40-MP08-12	△	125	55	40	34	12	16	MPHT080305-DM	12	K	0.7
	-160×12-K40-MP08-14	△	160	62	40	47	12	16		14	K	1.3
	-160×16-K40-MP12-12	△	160	62	40	49	16	20	MPHT120408-DM	12	K	1.6
	-160×18-K40-MP12-12	△	160	62	40	49	18	24		12	K	1.9
	-160×20-K40-MP12-12	△	160	62	40	49	20	26		12	K	2.1
	-200×16-K50-MP12-14	△	200	72	50	62	16	20		14	K	2.5
	-200×18-K50-MP12-14	△	200	72	50	62	18	24		14	K	2.9
	-200×20-K50-MP12-14	△	200	72	50	62	20	26		14	K	3.3

▲Stock available △Make-to-order

Spare parts

Diameter Ød	Inserts	Screw	Wrench	
Ø80-Ø125	MP06	I60M2.5x6.5	WT07IP	--
Ø125-Ø160	MP08	I60M3x7	WT09IP	--
Ø160-Ø200	MP12	I60M5x13	--	WT20IS

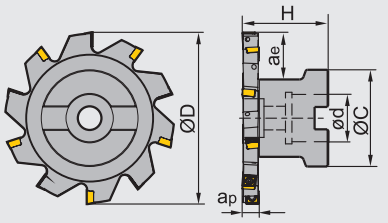
Tools code key B133
Grade selection guide B18–B21
Technical data B192–B198

Side and face milling tools

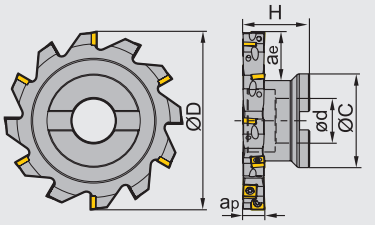
Machining of slot

SMP03 P M K

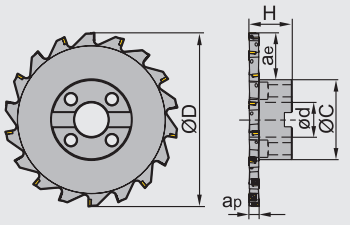
A-type coupling



B-type coupling



C-type coupling



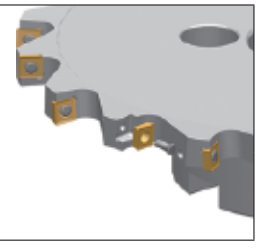
Specification of tools

Type		Stock		Basic dimensions(mm)						Applicable inserts	Number of teeth Z	Type of coupling	Weight (kg)
		R	L	ØD	øc	ød	$a_{e max}$	a_p	H				
SMP03 Arbor mounting	**-080×8-A22-MP06-10**	△	△	80	45	22	21	8	40	MPHT060304-DM	10	A	0.4
	-100×8-B27-MP06-14	△	△	100	55	27	24	8	40		14	B	0.6
	-100×10-B27-MP06-14	△	△	100	55	27	24	10	40		14	B	0.7
	-125×10-B32-MP06-16	△	△	125	65	32	33	10	45		16	B	1.1
	-125×12-B32-MP08-12	△	△	125	65	32	33	12	45	MPHT080305-DM	12	B	1.4
	-160×12-B40-MP08-14	△	△	160	80	40	45	12	50		14	B	1.9
	-200×12-C40-MP08-18	△	△	200	92	40	53	12	50		18	C	3.2
	-125×16-B32-MP12-10	△	△	125	65	32	33	16	50	MPHT120408-DM	10	B	2.3
	-160×16-B40-MP12-12	△	△	160	80	40	45	16	60		12	B	2.3
	-160×18-B40-MP12-12	△	△	160	80	40	45	18	60		12	B	2.4
	-200×16-C40-MP12-14	△	△	200	92	40	53	16	50		14	C	3.6
	-200×18-C40-MP12-14	△	△	200	92	40	53	18	50		14	C	3.9
	-200×20-C40-MP12-14	△	△	200	92	40	53	20	50		14	C	4.2

▲Stock available △Make-to-order

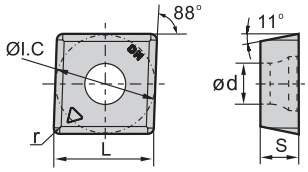
Spare parts

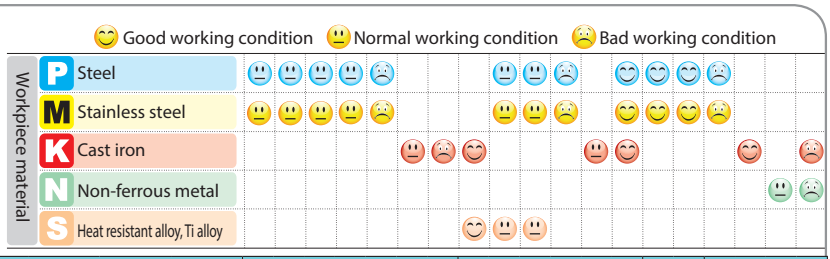
Diameter ØD	Inserts	Screw	Wrench	
Ø80-Ø125	MP06	I60M2.5×6.5	WT07IP	--
Ø125-Ø200	MP08	I60M3×7	WT09IP	--
Ø125-Ø200	MP12	I60M5×13	--	WT20IS



Tools code key B133
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts



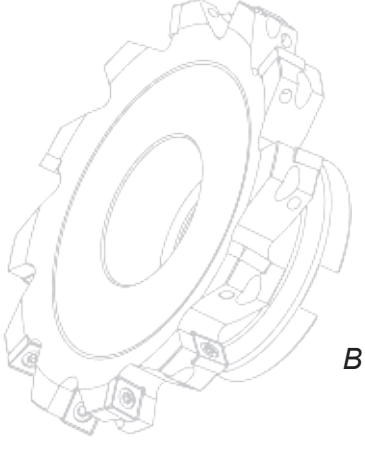


Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	L	S	ød	r	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	MPHT060304-DM	6.35	6.35	3.18	2.8	0.4											★								
	MPHT080305-DM	8.3	8.3	3.18	3.4	0.5											★								
	MPHT120408-DM	12.7	12.7	4.76	5.56	0.8											★								

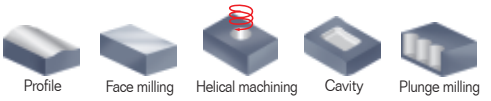
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	≤180	YBG202	180 (100-250)	0.1(0.08-0.25)
			YBG302	150 (100-200)	0.15(0.1-0.3)
	High-carbon steel、Alloy steel	180-280	YBG202	150 (80-250)	0.1(0.08-0.25)
			YBG302	120 (80-200)	0.15(0.1-0.3)
	Alloy tool steel	280-350	YBG202	120 (80-250)	0.1(0.08-0.25)
			YBG302	100 (80-200)	0.15(0.1-0.3)
M	Stainless steel	≤270	YBG202	120 (80-250)	0.1(0.05-0.15)
			YBG302	100 (80-200)	0.08(0.05-0.15)
K	Cast iron	180-250	YBG152	120 (80-250)	0.1(0.05-0.15)
			YBG302	150 (100-250)	0.08(0.05-0.15)

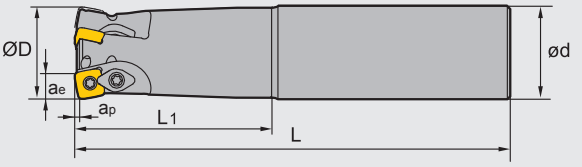


High feed milling cutters



XMR01 P M K

S-type insert, straight shank



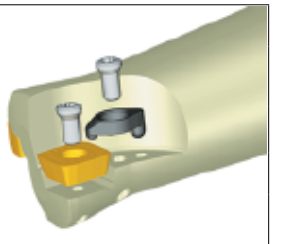
Specification of tools

Type		Stock	Basic dimensions(mm)						Number of teeth Z	Weight (kg)
			ØD	a_p	a_e	L_1	L	ød		
XMR01	**-020-G20-SD06-02**	▲	20	0.8	5.8	50	130	20	2	0.26
	-025-G25-SD06-03	▲	25	0.8	5.8	60	140	25	3	0.46
	-025-G25-SD09-02	▲	25	1.4	8.8	60	140	25	2	0.5
	-032-G32-SD09-03	▲	32	1.4	8.8	70	150	32	3	0.8
	-035-G32-SD09-03	▲	35	1.4	8.8	70	150	32	3	0.8
	-032-G32-SD12-02	▲	32	1.8	11.7	70	150	32	2	0.8
	-040-G40-SD12-03	▲	40	1.8	11.7	70	150	40	3	1.3
	-040-G40-SD15-02	▲	40	2.2	14	70	200	40	2	1.6

▲Stock available △Make-to-order

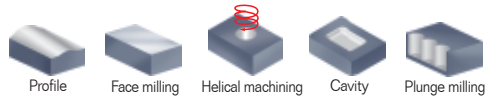
Spare parts

Tool type	Screw	Clamp Screw	Clamp	Wrench	
XMR01□□-SD06□□	I60M2.2×5.5	--	--	WT07IP	--
XMR01□□-SD09□□	I60M3.5×08TT	I60M4×8.4	WD-204	WT10IP	WT15IP
XMR01□□-SD12□□	I60M4×8.4			WT15IP	
XMR01□□-SD15□□	I60M5×13		WD-208	WT20IP	--

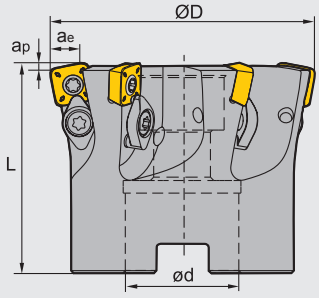


Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

High feed milling cutters



XMR01 P M K



Specification of tools

Type		Stock	Basic dimensions(mm)					Number of teeth Z	Type of coupling	Weight (kg)
			ØD	ap	ae	L	ød			
XMR01	**-050-A22-SD06-07**	▲	50	0.8	5.8	40	22	7	A	0.36
	-063-A22-SD06-10	▲	63	0.8	5.8	40	22	10	A	0.53
	-063-A27-SD06-10	▲	63	0.8	5.8	50	27	10	A	0.57
	-050-A22-SD09-04	▲	50	1.4	8.8	40	22	4	A	0.3
	-063-A22-SD09-06	▲	63	1.4	8.8	40	22	6	A	0.5
	-063-A27-SD09-06	▲	63	1.4	8.8	50	27	6	A	0.6
	-063-A22-SD12-05	▲	63	1.8	11.7	40	22	5	A	0.5
	-063-A27-SD12-05	▲	63	1.8	11.7	50	27	5	A	0.6
	-080-A27-SD12-05	▲	80	1.8	11.7	50	27	5	A	0.9
	-100-B32-SD12-06	▲	100	1.8	11.7	50	32	6	B	1.8
	-080-A27-SD15-05	▲	80	2.2	14	50	27	5	A	0.78
	-080-A32-SD15-05	▲	80	2.2	14	50	32	5	A	0.72
	-100-B32-SD15-07	▲	100	2.2	14	50	32	7	B	1.2
	-125-B40-SD15-09	▲	125	2.2	14	63	40	9	B	2.9
	-160-B40-SD15-12	▲	160	2.2	14	63	40	12	B	4.4

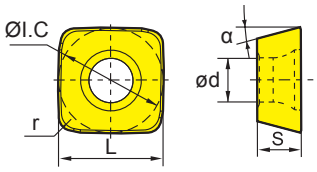
▲Stock available △Make-to-order

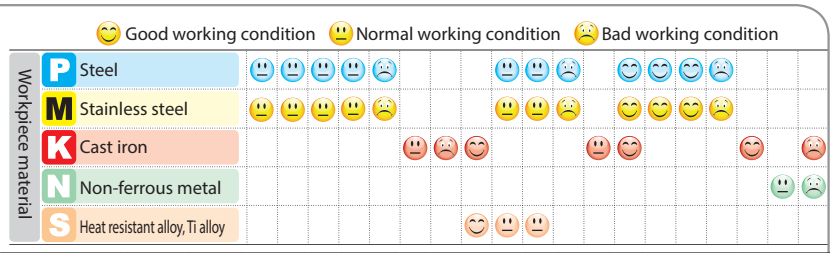
Spare parts

Tool type	Screw	Clamp Screw	Clamp	Wrench	
XMR01□□-SD06□□	I60M2.2×5.5	--	--	WT07IP	--
XMR01□□-SD09□□	I60M3.5×08TT	I60M4×8.4	WD-204	WT10IP	WT15IP
XMR01□□-SD12□□	I60M4×8.4			WT15IP	
XMR01□□-SD15□□	I60M5×13		WD-208	WT20IP	--

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts

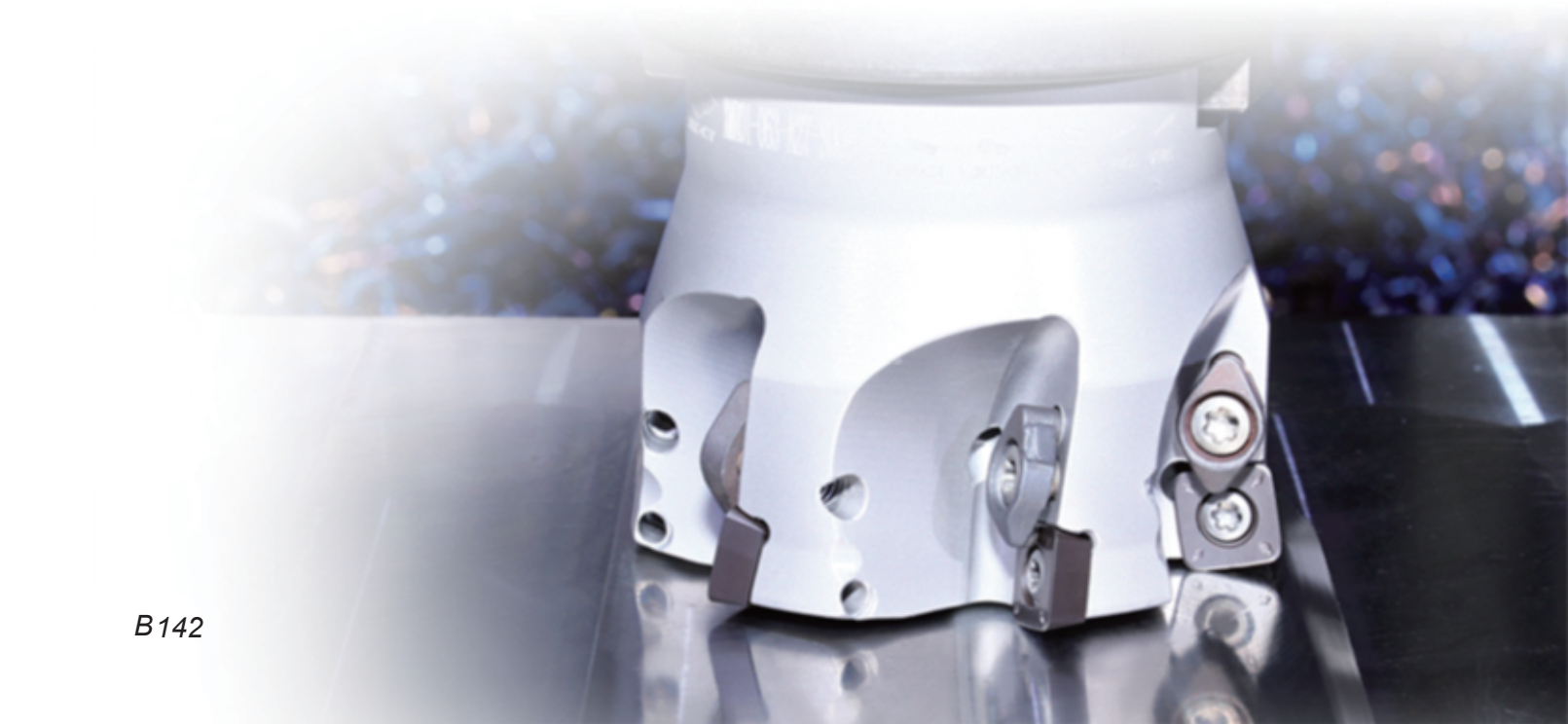




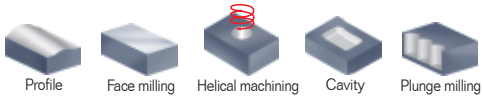
Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	L	r	S	ød	α	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	SDMT06T208-DM	6.35	6.35	0.8	2.58	2.5	15º		★			★						○								
	SDMT09T312-DM	9.525	9.525	1.2	3.97	4.0	15°		★			★						○								
	SDMT120412-DM	12.7	12.7	2.0	4.76	4.4	15°		★			★						○								
	SDMT150520-DM	15.875	15.875	2.0	5.56	5.5	15º		★			★						○								
	SDMT06T208-PM	6.35	6.35	0.8	2.58	2.5	15º		★		○						●									
	SDMT09T312-PM	9.525	9.525	1.2	3.97	4.0	15°		★		●						●									
	SDMT120412-PM	12.7	12.7	2.0	4.76	4.4	15°		★		●						●									
	SDMT150520-PM	15.875	15.875	2.0	5.56	5.5	15º		★		●						●									

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Chipbreaker introduction:
-PM chipbreaker has sharp cutting edge, it is more suitable for machining with power shortage and for relatively adhesive materials, such as stainless steel and Ti alloy, etc.
-DM chipbreaker has blunt cutting edge and is relatively suitable for machining of hard materials such as hardened steel and cast iron, etc.

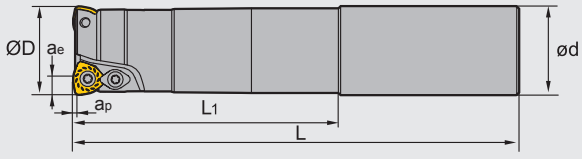


High feed milling cutters



XMR01 P M K

W-type insert, straight shank



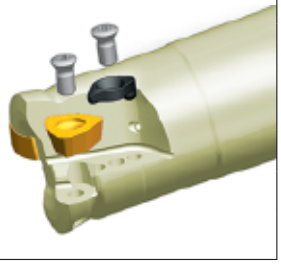
Specification of tools

Type		Stock	Basic dimensions(mm)						Number of teeth Z	Weight (kg)
			ØD	ap	ae	L1	L	ød		
XMR01	**-020-G20-WP05-02-M**	△	20	1.5	3.8	50	130	20	2	0.2
	-020-G20-WP05-02-L	△	20	1.5	3.8	100	180	20	2	0.3
	-020-G20-WP05-02-XL	△	20	1.5	3.8	130	250	20	2	0.8
	-025-G25-WP06-02-M	△	25	1.5	4.35	60	140	25	2	0.4
	-025-G25-WP06-02-L	△	25	1.5	4.35	120	200	25	2	0.6
	-025-G25-WP06-02-XL	△	25	1.5	4.35	180	300	25	2	1.0
	-032-G32-WP06-03-M	△	32	1.5	4.35	70	150	32	3	0.8
	-032-G32-WP06-03-L	△	32	1.5	4.35	120	200	32	3	1.0
	-032-G32-WP06-03-XL	△	32	1.5	4.35	180	300	32	3	1.6
	-040-G32-WP06-03-M	△	40	1.5	4.35	50	150	32	3	0.9
	-040-G32-WP06-03-L	△	40	1.5	4.35	50	250	32	3	1.5
	-040-G32-WP06-03-XL	△	40	1.5	4.35	50	300	32	3	1.8
	-040-G32-WP08-02-M	△	40	1.5	5.66	50	150	32	2	0.9
	-040-G32-WP08-02-L	△	40	1.5	5.66	50	250	32	2	1.5
	-040-G32-WP08-02-XL	△	40	1.5	5.66	50	300	32	2	1.9
	-050-G32-WP09-02-M	△	50	3.0	6.8	50	150	32	2	1.9
	-050-G32-WP09-02-L	△	50	3.0	6.8	50	250	32	2	2.5

▲Stock available △Make-to-order

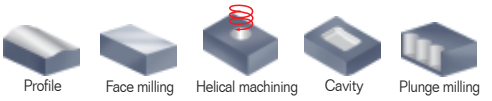
Spare parts

Tool type	Clamp/Insert screw	Clamp	Wrench	
XMR01□□-WP05□□	I60M3.5×08TT	--	WT10P	--
XMR01□□-WP06□□	I60M4×8.4		WT15P	
XMR01□□-WP08□□	I60M5×13	WD-208	--	WT20IT
XMR01□□-WP09□□				



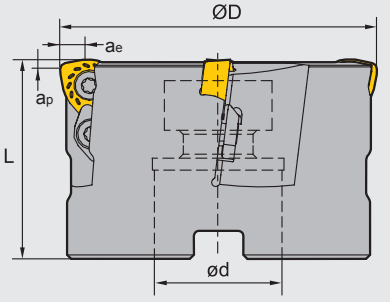
Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

High feed milling cutters



XMR01 P M K

W-type insert, arbor mounting



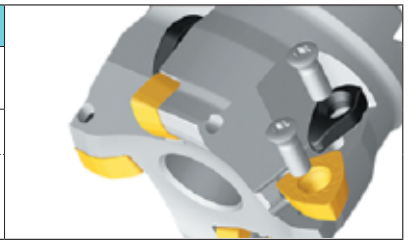
Specification of tools

Type		Stock	Basic dimensions(mm)					Number of teeth Z	Type of coupling	Weight (kg)
			ØD	a_p	a_e	L	ød			
XMR01	**-050-A22-WP06-04**	△	50	1.5	4.35	40	22	4	A	0.4
	-050-A22-WP08-03	△	50	1.5	5.66	50	22	3	A	0.4
	-063-A22-WP08-04	△	63	1.5	5.66	50	22	4	A	0.7
	-063-A27-WP08-04	△	63	1.5	5.66	50	27	4	A	0.7
	-080-A27-WP08-05	△	80	1.5	5.66	63	27	5	A	1.5
	-100-B32-WP08-06	△	100	1.5	5.66	63	32	6	B	2.2
	-125-B40-WP08-07	△	125	1.5	5.66	63	40	7	B	3.5
	-160-B40-WP08-08	△	160	1.5	5.66	63	40	8	B	6.0
	-063-A22-WP09-03	△	63	3.0	6.8	50	22	3	A	0.7
	-080-A27-WP09-04	△	80	3.0	6.8	63	27	4	A	1.4
	-100-B32-WP09-05	△	100	3.0	6.8	63	32	5	B	2.1
	-125-B40-WP09-06	△	125	3.0	6.8	63	40	6	B	3.7
	-160-B40-WP09-07	△	160	3.0	6.8	63	40	7	B	6.3

▲Stock available △Make-to-order

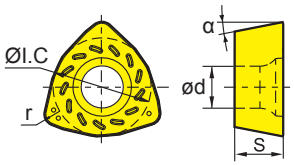
Spare parts

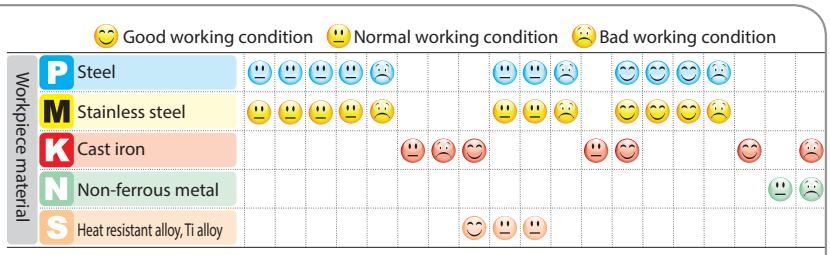
Tool type	Clamp/Insert screw	Clamp	Wrench	
XMR01□□-WP06□□	I60M4×8.4	--	WT15S	--
XMR01□□-WP08□□	I60M5×13	WD-208	--	WT20IT
XMR01□□-WP09□□	I60M5×13	WD-208	--	



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts

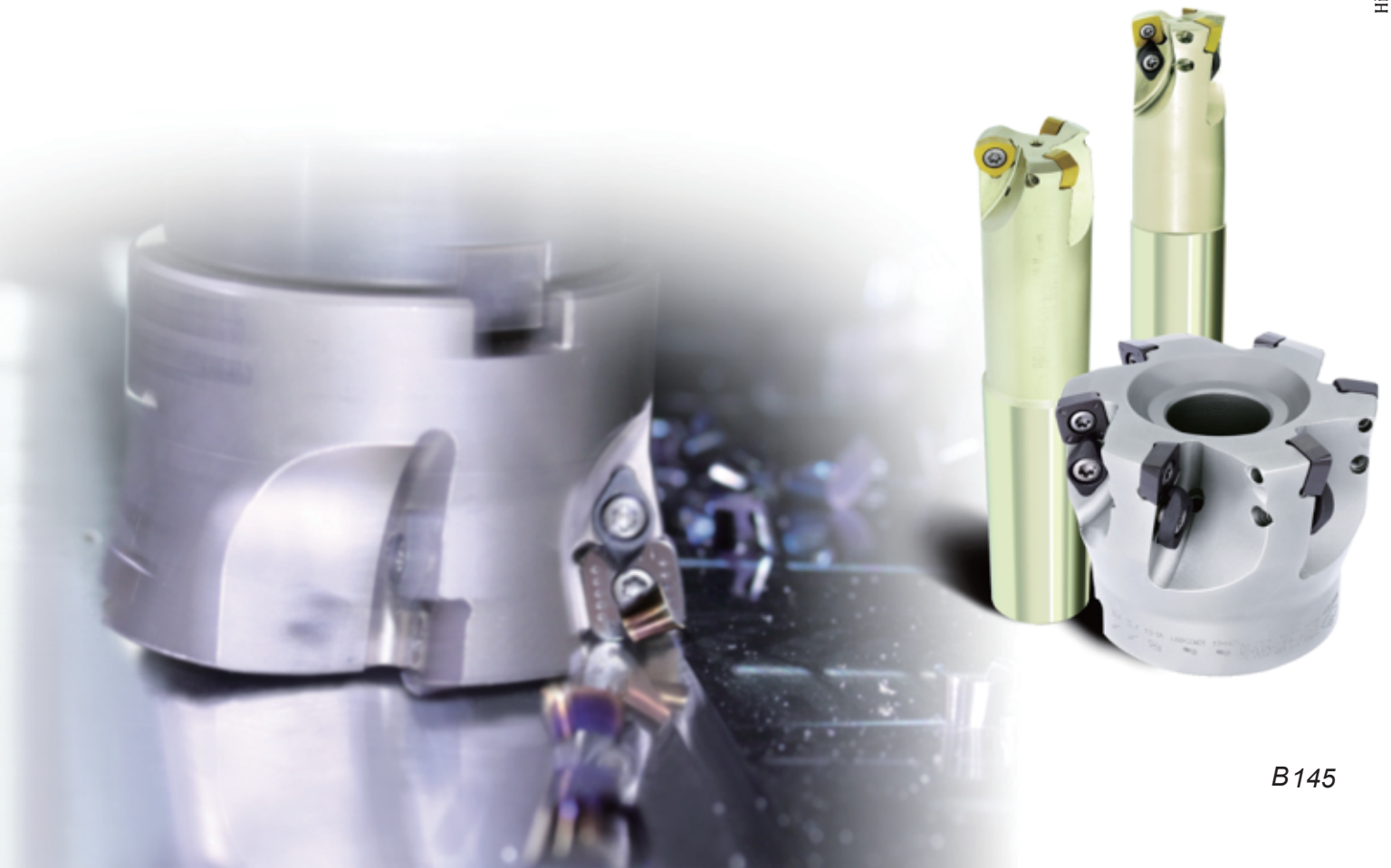




Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	r	S	ød	α	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	WPGT050315ZSR	7.94	1.5	3.5	4.0	11°		★			●														
	WPGT060415ZSR	9.525	1.5	4.2	4.4	11°		★			●														
	WPGT080615ZSR	12.85	1.5	6.35	5.5	11°		★			●														
	WPGT090725ZSR	15	2.5	7	5.5	11°		★			●														
	WPGT050315ZSR-PM	7.94	1.5	3.5	4.0	11°		★			●					●									
	WPGT060415ZSR-PM	9.525	1.5	4.2	4.4	11°		★			●					●									
	WPGT080615ZSR-PM	12.85	1.5	6.35	5.5	11°		★			●					●									
	WPGT090725ZSR-PM	15.00	2.5	7.00	5.5	11°		★			●					●									

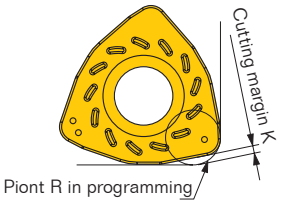
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

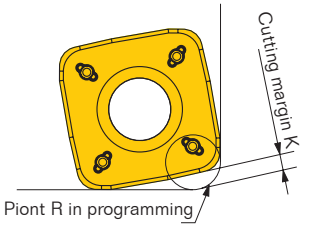
Chipbreaker introduction:
-PM chipbreaker has sharp cutting edge, it is more suitable for machining with power shortage and for relatively adhesive materials, such as stainless steel and Ti alloy, etc.
General chipbreaker has blunt cutting edge and is relatively suitable for machining of hard materials such as hardened steel and cast iron, etc.



Approximate R in machining program

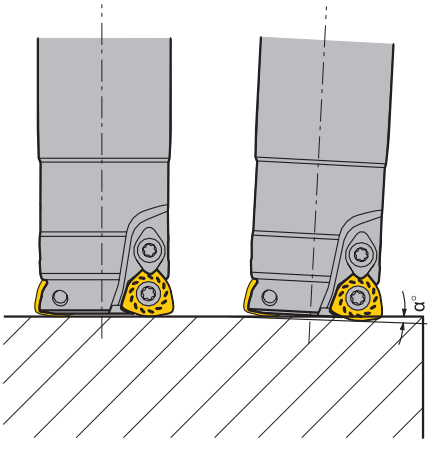
Applicable insert	Approximate R(mm)	Cutting margin K(mm)
WPGT050315ZSR/-PM	2	0.5
WPGT060415ZSR/-PM	2.5	0.7
WPGT080615ZSR/-PM	2.5	0.7
WPGT090725ZSR/-PM	4.5	1.2
SDMT06T208-DM/-PM	1.6	0.5
SDMT09T312-DM/-PM	2.5	0.87
SDMT120412-DM/-PM	4.0	0.93
SDMT150520-DM/-PM	4.0	1.38



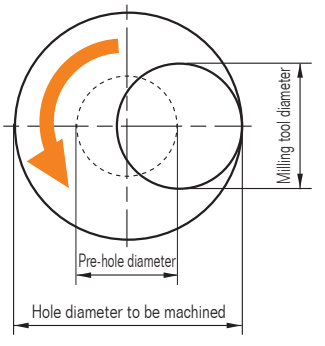


Different machining styles

■ Ramp machining



■ Helical interpolation milling



- Reduce the feed rate in ramp and helical machining operations.
- Set the axial feed rate below 0.2mm/rev in drilling operation.
- Be careful ! Long chippings may fly off in drilling operation.
- The cutting depth of each rotation must not exceed the maximum cutting depth (a_p).
- The S-type insert can be used for plunge milling in addition to the machining operations mentioned above.

Selection guide for XMR01 series

XMR01 series tools (with SD□□ inserts) have perfect edge strength and good economical efficiency, advantageous in face milling.

XMR01 series tools (with WP□□ inserts) possess good capability of chip removal, advantageous in cavity milling.

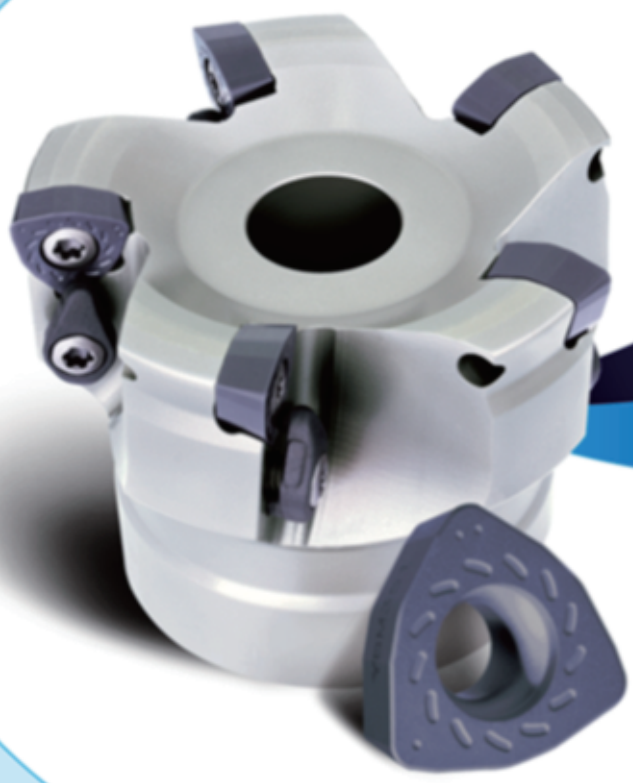
Recommended cutting parameters

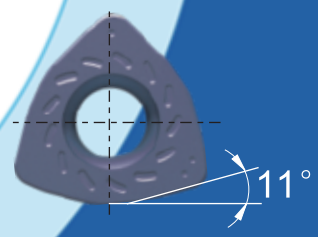
Workpiece material		Hardness HB	Insert grade	Cutting speed (m/min)	Ø25		Ø30/32/35	
					Axial cutting depth	Feed rate per tooth	Axial cutting depth	Feed rate per tooth
P	Soft steel Carbon Steel	⩽HB180 HB180-280	YBC302 YBM351 YBM253	170(120-220) 150(100-200)	0.6~1.0	0.8~1.2	0.8~1.2	1.0~1.4
P	Alloy steel Alloy tool steel	HB280-350	YBC302 YBM351 YBM253	130(80-180)	0.4~0.8	0.8~1.2	0.6~1.0	1.0~1.4
P	pre-hardened steel	⩽HRC35	YBC302 YBM351 YBM253	120(80-160)	0.4~0.8	0.6~1.0	0.6~1.0	0.8~1.2
M	Stainless steel	⩽HB270	YBM351 YBM253	120(80-160)	0.6~1.0	0.6~1.0	0.8~1.2	0.8~1.2
M	Stainless steel	⩽HB270	YBG205	120(80-190)	0.6~1.0	0.6~1.0	0.8~1.2	0.8~1.2
K	Common cast Iron	Tensile strength ⩽350MPa	YBG302	150(100-200)	0.6~1.0	1.0~1.4	0.8~1.2	1.2~1.6
K	Nodular cast iron	Tensile strength ⩽800MPa	YBG302	120(80-160)	0.4~0.8	0.8~1.2	0.6~1.0	1.0~1.4

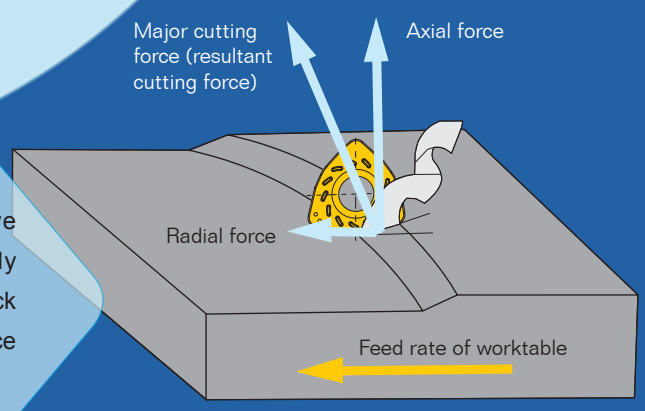
Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting speed (m/min)	Ø40		Ø50/63		Ø80/100	
					Axial cutting depth	Feed rate per tooth	Axial cutting depth	Feed rate per tooth	Axial cutting depth	Feed rate per tooth
P	Soft steel Carbon steel	⩽HB180 HB180-280	YBC302 YBM351 YBM253	170(120-220) 150(100-200)	0.8~1.2	1.0~1.4	1.1~1.5	1.1~1.5	1.0~1.5	1.0~1.5
P	Alloy steel Alloy tool steel	HB280-350	YBC302 YBM351 YBM253	130(80-180)	0.6~1.0	1.0~1.4	0.9~1.3	1.1~1.5	0.8~1.3	1.0~1.5
P	Pre-hardened steel	⩽HRC35	YBC302 YBM351 YBM253	120(80-160)	0.6~1.0	0.8~1.2	0.9~1.3	0.9~1.3	0.8~1.3	0.8~1.3
M	Stainless steel	⩽HB270	YBM351 YBM253	120(80-160)	0.8~1.2	0.8~1.2	1.1~1.5	0.9~1.3	1.0~1.5	0.8~1.3
M	Stainless steel	⩽HB270	YBG205	120(80-190)	0.8~1.2	0.8~1.2	1.1~1.5	0.9~1.3	1.0~1.5	0.8~1.3
K	Common cast iron	Tensile strength ⩽350MPa	YBG302	150(100-200)	0.8~1.2	1.2~1.6	1.1~1.5	1.3~1.7	1.0~1.5	1.2~1.7
K	Nodular cast iron	Tensile strength ⩽800MPa	YBG302	120(80-160)	0.6~1.0	1.0~1.4	0.9~1.3	1.1~1.5	0.8~1.3	1.0~1.5

XMR01 series milling tools

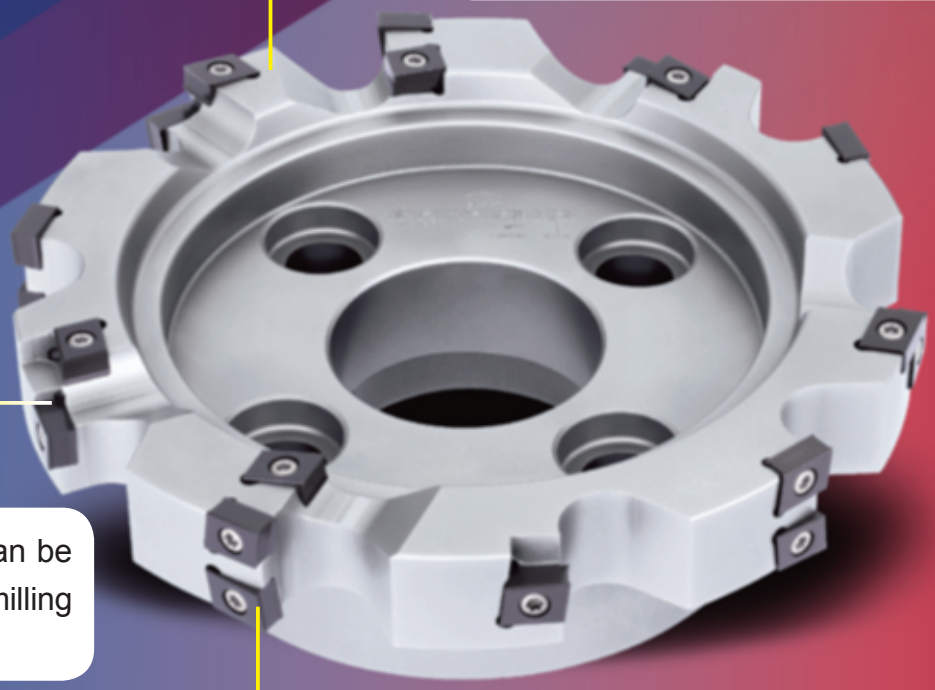






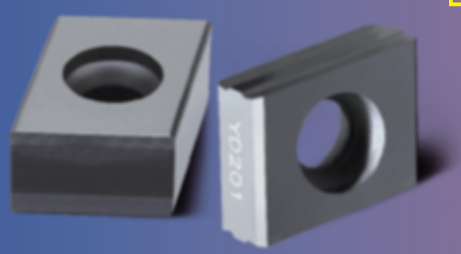
The main feature of high feed tools is to resolve the major cutting force to the axial direction, greatly reducing the radial cutting force, thus improve tool's shock resistance. In addition, this structure can effectively reduce vibration in long-overhang milling operation.

Complexed milling tools, which are mostly used in machining large diameter holes and boring milling cavities.



high versatility can be used for surface milling and side milling.

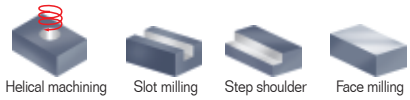
Inserts are vertically loaded. It provides two chipbreaker for you choose, while it fits to machining different cutting performance materials.



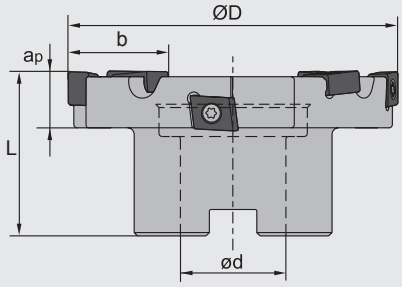
XMP01

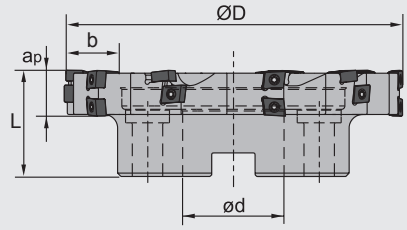
Boring millers

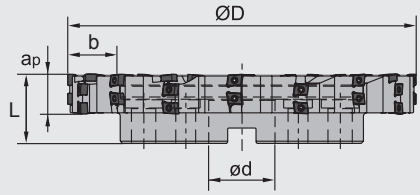
Boring millers



XMP01 P M K







Specification of tools

Type		Stock	Basic dimensions(mm)					Number of teeth Z	Zeff (Peripheral teeth/ end teeth)	Type of coupling	Weight (kg)
			ØD	ød	L	ap	b				
XMP01	**-080X18-B27-CNE1210-08**	△	80	27	50	19	18	8	2/2	B	0.67
	-100X18-B32-CNE1210-08	△	100	32	50	19	18	8	2/2	A	0.99
	-125X27-B40-CNE1210-15	△	125	40	63	27	27	15	3/2	B	2.46
	-160X27-C40-CNE1210-18	△	160	40	63	27	27	18	4/2	C	3.7
	-200X27-C60-CNE1210-21	△	200	60	63	27	27	21	5/2	C	5.46
	-250X36-C60-CNE1210-32	△	250	40	63	36	36	32	6/2	C	9.79
	-315X36-D60-CNE1210-42	△	315	60	63	45	36	42	8/2	D	17.65
	-400X36-D60-CNE1210-52	△	400	60	63	53	36	52	10/2	D	27.36

Notes: The values of ap, b and D could be customized by requirements in a certain range; Zeff stands for valid teeth.

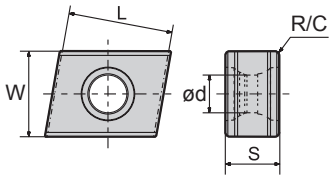
▲Stock available △Make-to-order

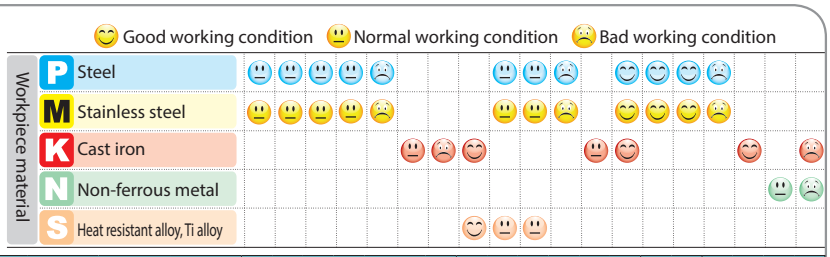
Spare parts

Diameter ØD	Inserts	Screw	Wrench
Ø80-Ø400	CNE121006*	I60M4X12	WT15IP

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

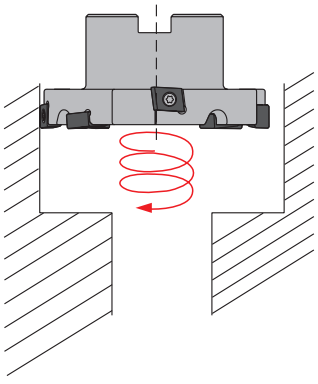
Selection of inserts





Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	W	S	R/C	ød	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	CNE121006A	12.8	10.0	6.35	0.4	4.4				●		○													
	CNE121006B	12.0	10.0	6.35	0.6	4.4				●		○													

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



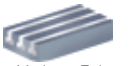
Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters			
				V(m/min)	f(mm/Zeff)	$a_p$max(mm)	
						CNE121006A	CNE121006B
P	Soft steel Carbon Steel	⩽180	YBM253	270 (220-350)	0.2 (0.15-0.3)	15-90	15-90
P	Alloy steel Alloy tool steel	180-280	YBM253	260 (200-320)	0.2 (0.15-0.3)	15-90	15-90
P	pre-hardened steel	280-350	YBM253	240 (180-300)	0.2 (0.15-0.3)	15-90	15-90
M	Stainless steel	⩽270	YBM253	230(180-300)	0.2(0.1-0.3)	15-90	15-90
K	Common cast Iron	180-250	YBD152	270 (150-300)	0.2(0.15-0.3)	15-90	15-90

Note: Zeff means effective tooth number.

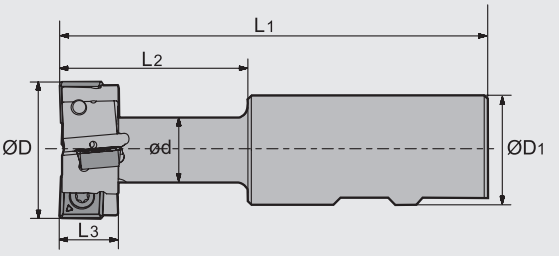
T-slot milling tools

Kr:90°


Machining T slot

TMP01 K

Weldon shank



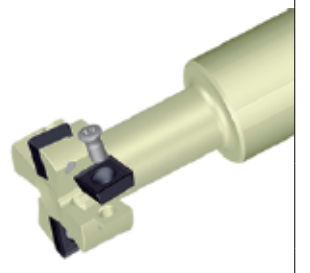
Specification of tools

Type		Stock	Basic dimensions(mm)						Number of teeth Z	Number of insert	T-slot specification
			ØD	ØD1	ød	L1	L2	L3			
TMP01	**-021-XP25-MP06-01**	▲	21	25	10	100	32	9	1	2	12
	-025-XP25-MP06-01	▲	25	25	12	100	35	11	1	2	14
	-032-XP32-MP08-02	▲	32	32	15	110	45	14	2	4	18
	-040-XP32-MP12-02	▲	40	32	19	125	55	18	2	4	22
	-050-XP40-MP12-02	▲	50	40	25	140	65	22	2	4	28
	-060-XP50-MP12-02	▲	60	50	32	160	80	28	2	6	36

▲Stock available △Make-to-order

Spare parts

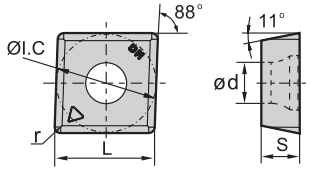
Tool type	Screw	Wrench	
TMP01-021-XP25-MP06-01	I60M2.5×5.5	WT07IP	--
TMP01-025-XP25-MP06-01	I60M2.5×5.5		
TMP01-032-XP32-MP08-02	I60M3×7	WT10IP	--
TMP01-040-XP32-MP12-02	I60M5×10	--	WT20IT
TMP01-050-XP40-MP12-02	I60M5×10		
TMP01-060-XP50-MP12-02	I60M5×10		

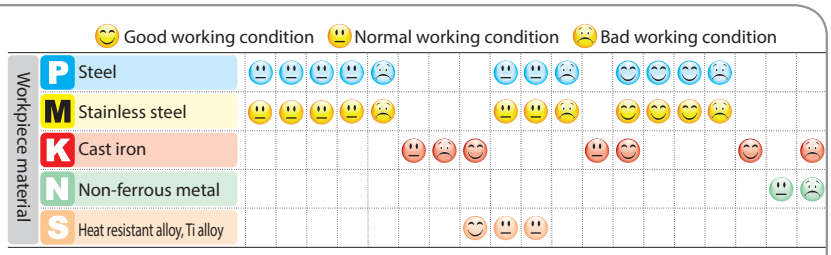


Caution: When installing inserts, make sure the insert nose marked with "DM" or "Δ" is pointing to the slot.

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

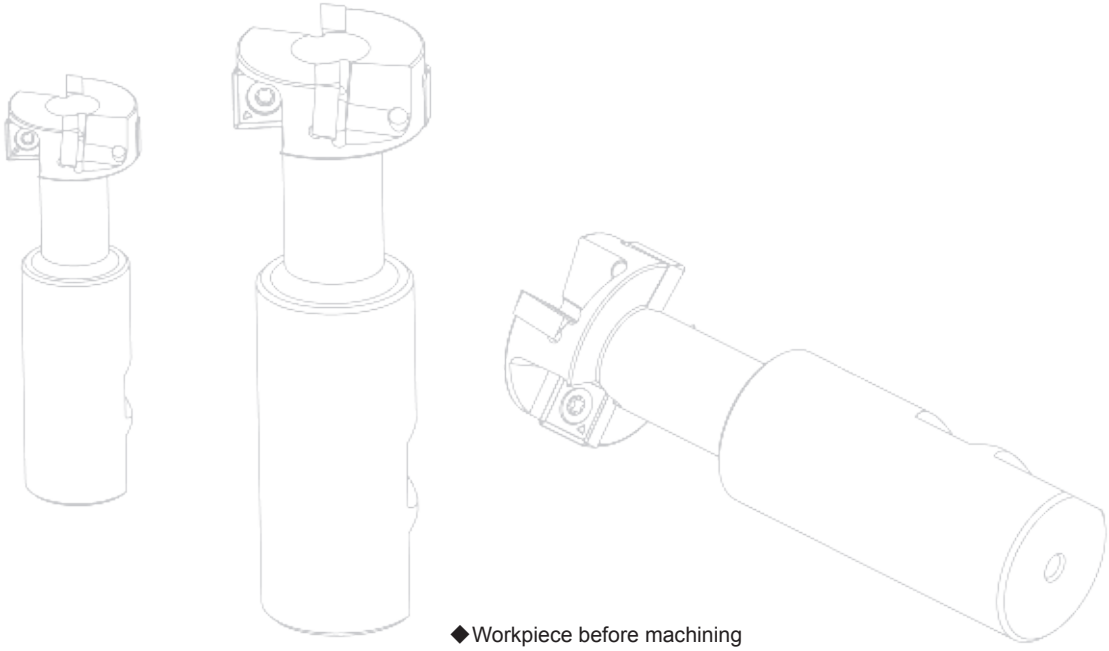
Selection of inserts



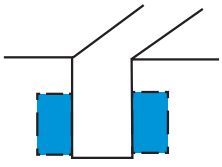


Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	L	s	ød	r	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	MPHT060304-DM	6.35	6.35	3.18	2.8	0.4											★								
	MPHT080305-DM	8.3	8.3	3.18	3.4	0.5											★								
	MPHT120408-DM	12.7	12.7	4.76	5.56	0.8											★								

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



◆Workpiece before machining



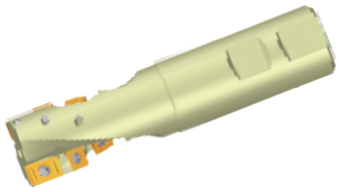
Recommended cutting parameters

Workpiece material	Insert grade	Cutting parameters		
		V(m/min)	f(mm/z)	Cooling
Grey cast iron	YBG302	80~160	0.05~0.2	Wet / Dry

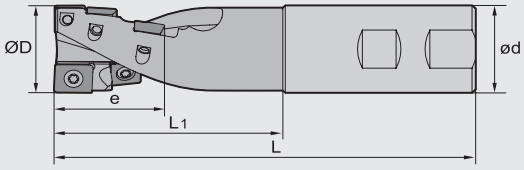
Helical end mill

Kr:90°

HMP01 P K



Weldon shank

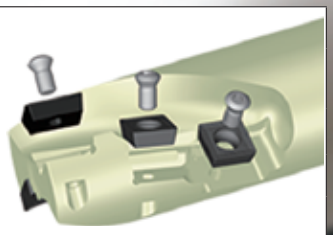


Specification of tools

Type		Stock		Basic dimensions(mm)					Number of flute	Number of inserts		Shank type
		R	L	ØD	ød	e	L1	L	Z	APKT 150412-PM/KM	SPMT 120408-PM/KM	
HMP01	-040×55-XP40-SP12-02	△	△	40	40	55	95	175	2	1	5	Weldon shank
	-050×55-XP40-SP12-04	△	△	50	40	55	95	175	4	2	10	Weldon shank

▲Stock available △Make-to-order

Diameter ØD	Screw	Wrench
Ø40	I60M5×10	WT20T
Ø50	I60M5×13	WT20T



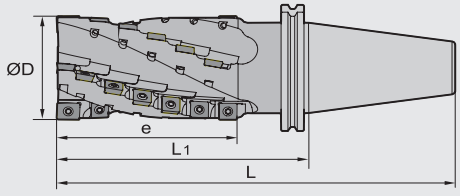
Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Helical end mill

Kr:90°

HMP01 P K

JT shank/ BT shank (JT shank shown)



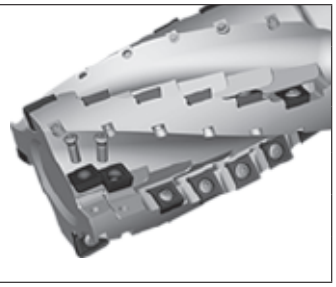
Specification of tools

Type		Stock		Basic dimensions(mm)				Number of flute	Number of inserts		Shank type
		R	L	ØD	e	L_1	L	Z	APKT 150412-PM/KM	SPMT 120408-PM/KM	
HMP01	**-050×84-JT50-SP12-04**	△	△	50	84	145	246.75	4	2	16	JT
	-063×74-JT50-SP12-04	△	△	63	74	135	236.75	4	2	14	JT
	-063×104-JT50-SP12-04	△	△	63	104	165	266.75	4	2	20	JT
	-063×134-JT50-SP12-04	△	△	63	134	195	296.75	4	2	26	JT
	-080×104-JT50-SP12-04	△	△	80	104	165	266.75	4	2	20	JT
	-080×144-JT50-SP12-04	△	△	80	144	205	306.75	4	2	28	JT
	-050×84-BT50-SP12-04	△	△	50	84	145	246.8	4	2	16	BT
	-063×74-BT50-SP12-04	△	△	63	74	135	236.8	4	2	14	BT
	-063×104-BT50-SP12-04	△	△	63	104	165	266.8	4	2	20	BT
	-063×134-BT50-SP12-04	△	△	63	134	195	296.8	4	2	26	BT
	-080×104-BT50-SP12-04	△	△	80	104	165	266.8	4	2	20	BT
	-080×144-BT50-SP12-04	△	△	80	144	205	306.8	4	2	28	BT

▲Stock available △Make-to-order

Spare parts

Diameter ØD	Screw	Wrench
Ø50	I60M5×13	WT20IS
Ø63	I60M5×13	WT20IS
Ø80	I60M5×13	WT20IS



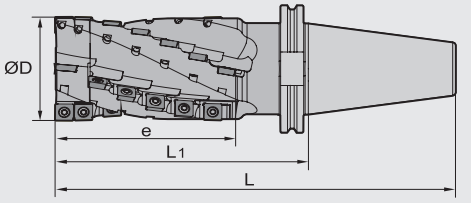
Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Helical end mills with interchangeable heads

Kr:90°

HMP01 EC P K

JT shank/ BT shank (JT shank shown)



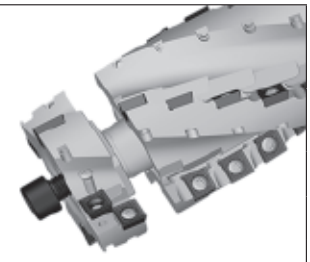
Specification of tools

Type		Stock		Basic dimensions(mm)				Number of flute	Number of inserts		Shank type
		R	L	ØD	e	L1	L	Z	APKT 150412-PM/KM	SPMT 120408-PM/KM	
HMP01	**-050×84EC-JT50-SP12-04**	△	△	50	84	145	246.75	4	2	16	JT
	-063×74EC-JT50-SP12-04	△	△	63	74	135	236.75	4	2	14	JT
	-063×104EC-JT50-SP12-04	△	△	63	104	165	266.75	4	2	20	JT
	-063×134EC-JT50-SP12-04	△	△	63	134	195	296.75	4	2	26	JT
	-080×104EC-JT50-SP12-04	△	△	80	104	165	266.75	4	2	20	JT
	-080×144EC-JT50-SP12-04	△	△	80	144	205	306.75	4	2	28	JT
	-050×84EC-BT50-SP12-04	△	△	50	84	145	246.8	4	2	16	BT
	-063×74EC-BT50-SP12-04	△	△	63	74	135	236.8	4	2	14	BT
	-063×104EC-BT50-SP12-04	△	△	63	104	165	266.8	4	2	20	BT
	-063×134EC-BT50-SP12-04	△	△	63	134	195	296.8	4	2	26	BT
	-080×104EC-BT50-SP12-04	△	△	80	104	165	266.8	4	2	20	BT
	-080×144EC-BT50-SP12-04	△	△	80	144	205	306.8	4	2	28	BT

▲Stock available △Make-to-order

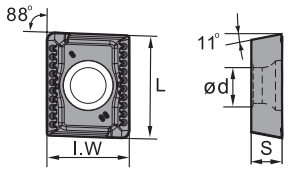
Spare parts

Diameter ØD	Insert screw	Screw of interchangeable head	Wrench of insert screw	Wrench of interchangeable head	Interchangeable head
Ø50	I60M5×13	M10×50	WT20IS	WH80L	050EC
Ø63	I60M5×13	M10×50	WT20IS	WH80L	063EC
Ø80	I60M5×13	M12×55	WT20IS	WH100L	080EC



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts



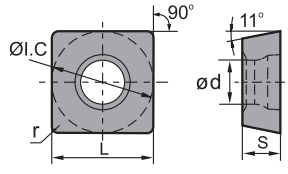
Good working condition · Normal working condition · Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹			😐	😐	☹				😊	😊	😊	☹		
M Stainless steel	😐	😐	😐	😐	☹			😐	😐	☹				😊	😊	😊	☹		
K Cast iron						😐	☹	😊				😐	😊				😊		☹
N Non-ferrous metal																		😐	☹
S Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) L	I.W	S	ød	r	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	APKT150412-PM	16.33	12.7	4.76	5.4	1.2				★							●	○							
	APKT150412-KM	16.33	12.7	4.76	5.4	1.2											●	○							

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Selection of inserts



Good working condition · Normal working condition · Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹			😐	😐	☹				😊	😊	😊	☹		
M Stainless steel	😐	😐	😐	😐	☹			😐	😐	☹				😊	😊	😊	☹		
K Cast iron						😐	☹	😊				😐	😊				😊		☹
N Non-ferrous metal																		😐	☹
S Heat resistant alloy, Ti alloy								😊	😐	😐									

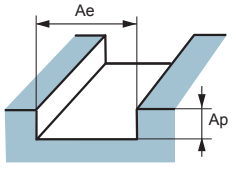
Insert shape	Type	Basic dimensions(mm) L	ØI.C	S	ød	r	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	SPMT120408-PM	12.7	12.7	4.76	5.5	0.8				★							●	○							
	SPMT120408-KM	12.7	12.7	4.76	5.5	0.8											●	○							

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Chipbreaker selection for HMP01 milling inserts

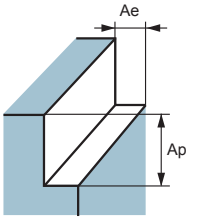
Classification \ Function	For semi-finishing	For roughing
P	-PM	-PM
K	-KM	-KM

A Slot milling



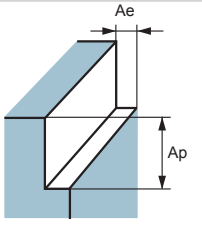
Ae=D
Ap=0.5D(cast iron)
Maximum 12mm(steel)

B Square shoulder milling



Ae=0.5D
Ap=1.5D(cast iron)
1.0D(steel)

C Narrow shoulder milling



Ae=0.1D
Ap≤Maximum cutting length

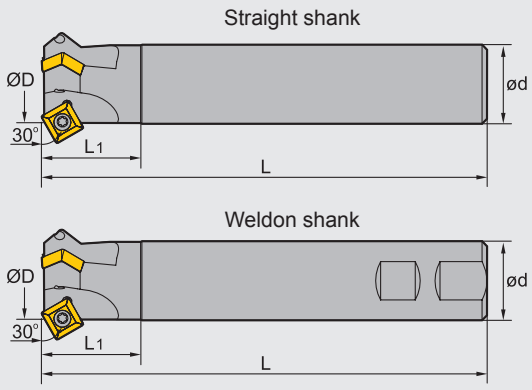
Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters		Operation (figure)
				Cutting speed(m/min)	Feed speed(mm/z)	
P	Low-carbon steel、Soft steel	≤180	YBM253 YBG302	80(60-90)	0.25(0.1-0.35)	A
				90(70-120)	0.3(0.15-0.4)	B
				90(70-120)	0.3(0.15-0.4)	C
	High-carbon steel、Alloy steel	180-280	YBM253 YBG302	70(60-100)	0.2(0.1-0.35)	A
				80(60-120)	0.25(0.15-0.35)	B
				90(70-120)	0.25(0.15-0.35)	C
	Alloy tool steel	280-350	YBM253 YBG302	50(40-80)	0.15(0.08-0.25)	A
				60(50-100)	0.2(0.1-0.35)	B
				70(50-100)	0.2(0.1-0.35)	C
K	Cast iron	180-250	YBG152 YBG302	70(50-100)	0.2(0.1-0.35)	A
				80(60-120)	0.25(0.15-0.35)	B
				90(80-120)	0.25(0.15-0.35)	C

Chamfer milling tools

Kr:30°

CMZ01 P M K



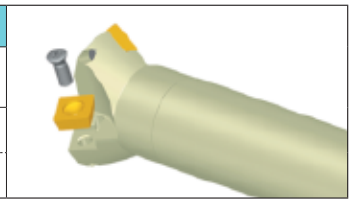
Specification of tools

Type		Stock	Basic dimensions(mm)				Number of teeth Z	Weight (kg)
			ØD	ød	L	L_1		
CMZ01 Straight shank	**-012-G20-SP12-01**	△	12	20	100	40	1	0.2
	-025-G25-SP12-02	△	25	25	120	40	2	0.8
	-032-G32-SP12-03	△	32	32	180	40	3	1.1
Weldon shank	**-012-XP20-SP12-01**	△	12	20	100	40	1	0.2
	-025-XP25-SP12-02	△	25	25	120	40	2	0.6
	-032-XP32-SP12-03	△	32	32	180	40	3	1.0

▲Stock available △Make-to-order

Spare parts

Diameter ØD	Screw	Wrench
Ø12-Ø32	I43M5×11	WT20IS

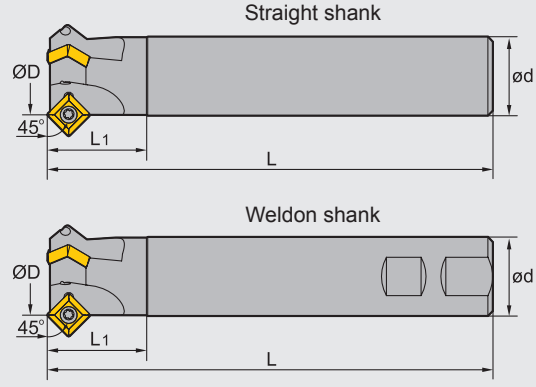


Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Chamfer milling tools

Kr:45°

CMA01 P M K



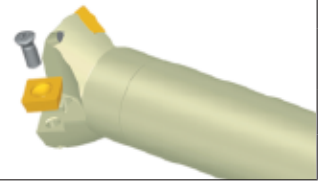
Specification of tools

Type		Stock	Basic dimensions(mm)				Number of teeth Z	Weight (kg)
			ØD	ød	L	L1		
CMA01 Straight shank	**-012-G20-SP12-01**	▲	12	20	100	40	1	0.2
	-025-G25-SP12-02	▲	25	25	120	40	2	0.8
	-032-G32-SP12-03	▲	32	32	180	40	3	1.1
Weldon shank	**-012-XP20-SP12-01**	▲	12	20	100	40	1	0.2
	-025-XP25-SP12-02	▲	25	25	120	40	2	0.6
	-032-XP32-SP12-03	▲	32	32	180	40	3	1.0

▲Stock available △Make-to-order

Spare parts

Diameter ØD	Screw	Wrench
Ø12-Ø32	I43M5×11	WT20IS

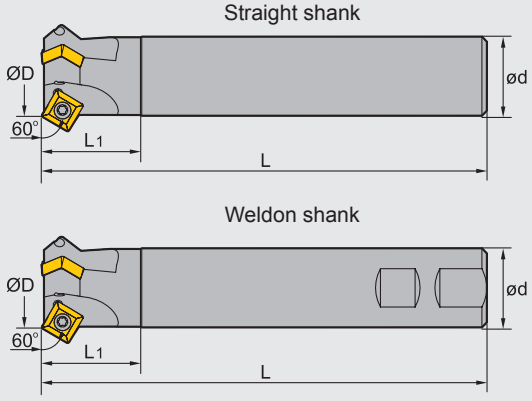


Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Chamfer milling tools

Kr:60°

CMD01 P M K



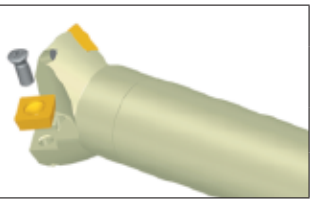
Specification of tools

Type		Stock	Basic dimensions(mm)				Number of teeth Z	Weight (kg)
			ØD	ød	L	L1		
CMD01 Straight shank	**-012-G20-SP12-01**	▲	12	20	100	40	1	0.2
	-025-G25-SP12-02	▲	25	25	120	40	2	0.8
	-036-G32-SP12-03	▲	36	32	180	40	3	1.0
Weldon shank	**-012-XP20-SP12-01**	▲	12	20	100	40	1	0.2
	-025-XP25-SP12-02	▲	25	25	120	40	2	0.6
	-036-XP32-SP12-03	▲	36	32	180	40	3	1.0

▲Stock available △Make-to-order

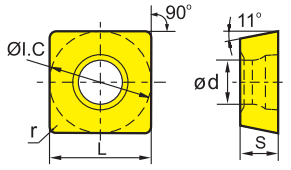
Spare parts

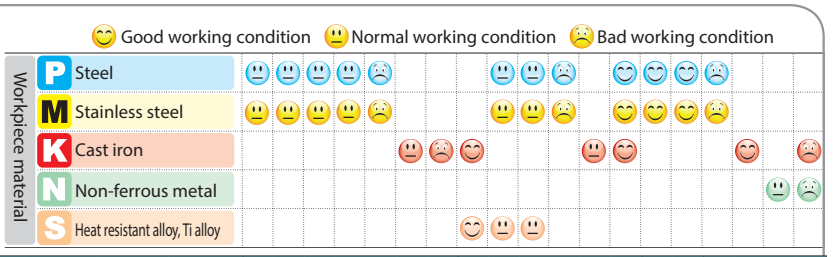
Diameter ØD	Screw	Wrench
Ø12-Ø36	I43M5×11	WT20IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	L	r	S	ød	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	SPMT120408	12.7	12.7	0.8	4.76	5.5	●		●		●						★					○			

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				Cutting speed(m/min)	Feed speed(mm/z)
P	Low-carbon steel、Soft steel	≤180	YBM251 YBC301	180(100—250)	0.25 (0.1-0.4)
			YBM351 YBG302	150(100—200)	0.3 (0.1-0.5)
			YC30S	120(80—150)	0.4 (0.1-0.5)
	High-carbon steel、Alloy steel	180-280	YBM251 YBC301	160(100—220)	0.3 (0.1-0.4)
			YBM351 YBG302	130(100—180)	0.3 (0.1-0.5)
			YC30S	100(60—150)	0.4 (0.1-0.5)
	Alloy tool steel	280-350	YBM251 YBC301	120(80—180)	0.3 (0.1-0.4)
			YBM351 YBG302	100(80—150)	0.3 (0.1-0.5)
			YC30S	80(60—120)	0.4 (0.1-0.5)
M	Stainless steel	≤270	YBM251 YBC301	120(80—180)	0.3 (0.1-0.4)
			YBM351 YBG302	100(80—150)	0.3 (0.1-0.5)
			YC30S	80(60—120)	0.4 (0.1-0.5)
K	Cast iron	180-250	YBG302	130(100—180)	0.4 (0.1-0.5)

Inserts for face milling

	SEET-CF	SEET-CM	SEET-CR	SEET-DF	SEET-DM	SEET-DR	SEET-EF	SEET-EM
Page	B179	B179	B179	B179	B179	B179	B179	B179

	SEET-LH	SEET-W	SEK(E)N	SEKR	OFKT-DF	OFKT-DM	OFKT-LH	OFKR-DF
Page	B179	B179	B180	B180	B172	B172	B172	B173

	OFKR-DM	ONHU-PF	ONHU-PM	ONHU-W	ONHU-GM	SNEG-GM/GR	HNEX-DF	HNEX-DM
Page	B173	B173	B173	B173	B174	B182	B171	B171

	HNEX-DR	PNEG-CF/CM/CR	PNEG-PF/PM/PR	LNKT-ZR	LNKT-ZR	LNKT-ZR	SPKW	SPKT
Page	B171	B174	B175	B171	B171	B171	B184	B182

	SP□N	SPKR-GM	SPEX	SPMR	SP□N	TPKN	TPGN	TPUN
Page	B183	B184	B185	B185	B186	B187	B187	B188

	TPMR	SEET□PER-PF	SEET□PER-PM	SEET□PER-PR	RCKT-DM	RCKT-DR	RCKT-ER	RDKW
Page	B188	B181	B181	B181	B176	B176	B176	B177

RCMW-PCBN	
Page	B176

Inserts for square shoulder milling

	APKT-PF	APKT-PM	APKT-PR	APKT-LH	APMT□PDR	APMT□PDER	ANGX□PNR-GM
Page	B168	B168	B168	B168	B169	B169	B170

Inserts for profile milling

	ZDET	ZPNT	SDMT/SPMT	ROHX	XPHT-GM	ZOHX-GF	ZOHX-GM
Page	B190	B191	B178/B182	B177	B189	B191	B191

Inserts for side and face milling

	XSEQ	MPHT
Page	B190	B172

Inserts for milling with high feed rate milling

	SDMT-DM	SDMT-PM	WPGT	WPGT-PM
Page	B178	B179	B189	B189

Inserts for boring millers

	CNE-A	CNE-B
Page	B170	B170

Inserts for T-slot milling

	MPHT
Page	B172

Inserts for helical end mills

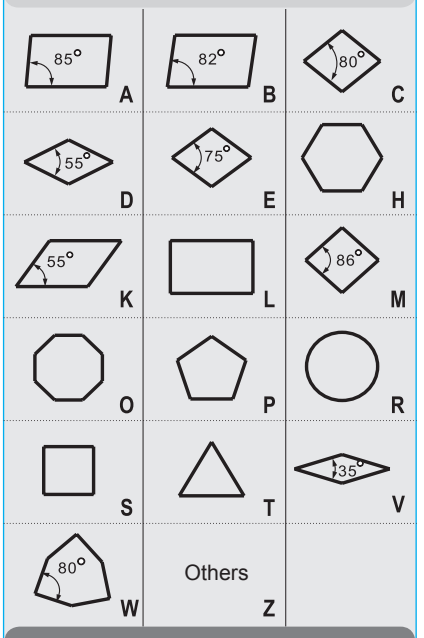
	APKT-PM/KM	SPMT-PM/KM
Page	B169	B182

Inserts for chamfer milling

	SPMT
Page	B182

Indexable milling inserts code key

Insert Shape / Code



Insert shape

Metric

Code	With/Without hole	With/Without chipbreaker	Section plane of Insert	Code	With/Without hole	With/Without chipbreaker	Section plane of Insert
B	With	Without	> 65°	N	Without	Without	
H	With	Single-side	> 65°	R	Without	Single-side	
C	With	Without	> 65°	F	Without	Double-side	
J	With	Double-side	> 65°	A	With	Without	
W	With	Without	≤ 65°	M	With	Single-side	
T	With	Single-side	≤ 65°	G	With	Double-side	
Q	With	Without	≤ 65°	X	---	---	Special
U	With	Double-side	≤ 65°				

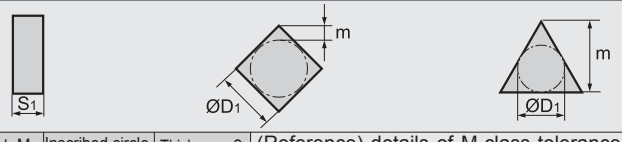
Chipbreaker and clamping system

S P K N

Clearance angle of main cutting edge

Code	Clearance angle	Code	Clearance angle
A	3°	B	5°
C	7°	D	15°
E	20°	F	25°
G	30°	N	0°
P	11°	O	Other clearance angle

Tolerance



Code	Nose height M Tolerance(mm)	Inscribed circle ØD1 Tolerance(mm)	Thickness S Tolerance(mm)
A	±0.005	±0.025	±0.025
F	±0.005	±0.013	±0.025
C	±0.013	±0.025	±0.025
H	±0.013	±0.013	±0.025
E	±0.025	±0.025	±0.025
G	±0.025	±0.025	±0.13
J	±0.005	±0.05-±0.13	±0.025
K	±0.013	±0.05-±0.13	±0.025
L	±0.025	±0.05-±0.13	±0.025
M	±0.08-±0.18	±0.05-±0.13	±0.13
N	±0.08-±0.18	±0.05-±0.13	±0.025
U	±0.13-±0.38	±0.08-±0.25	±0.13

(Reference) details of M-class tolerance (identified by shape and size)

● Nose height tolerance(mm)

Inscribed circle	Regular triangle	Square	Diamond with 80°	Diamond with 55°	Diamond with 35°	Round
6.35	±0.08	±0.08	±0.08	±0.11	±0.16	---
9.525	±0.08	±0.08	±0.08	±0.11	±0.16	---
12.7	±0.13	±0.13	±0.13	±0.15	---	---
15.875	±0.15	±0.15	±0.15	±0.18	---	---
19.05	±0.15	±0.15	±0.15	±0.18	---	---
25.4	---	±0.18	---	---	---	---

● Tolerance of Inscribed Circle ØD1(mm)

Inscribed circle	Regular triangle	Square	Diamond with 80°	Diamond with 55°	Diamond with 35°	Round
6.35	±0.05	±0.05	±0.05	±0.05	±0.05	---
9.525	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05
12.7	±0.08	±0.08	±0.08	±0.08	---	±0.08
15.875	±0.10	±0.10	±0.10	±0.10	---	±0.10
19.05	±0.10	±0.10	±0.10	±0.10	---	±0.10
25.4	---	±0.13	---	---	---	±0.13

Diameter of IC	Insert shape						
	C	D	R	S	T	V	W
3.97					06		
5.0			05				
5.56					09		
6.0			06				
6.35	06	07			11	11	
8.0			08				
9.525	09	11	09	09	16	16	06
10.0			10				
12.0			12				
12.7	12	15	12	12	22	22	08
15.875	16		15	15	27		
16.0		19	16				
19.05	19		19	19	33		
20.0			20				
25.0	25	25	25				
25.4			25	25			
31.75			31				
32			32				

Length of cutting edge

Thickness is defined as the height from the bottom of insert to the highest part of cutting edge

Code	Insert thickness(mm)
00	0.79
T0	0.99
01	1.59
T1	1.98
02	2.38
T2	2.58
03	3.18
T3	3.97
04	4.76
T4	4.96
05	5.96
T5	5.95
06	6.35
T6	6.75
07	7.94
09	9.52
T9	9.72
11	11.11
12	12.70

Insert thickness

12 04 ED T21 R -DM

Wiper

Kr		αn	
A	45°	A	3°
D	60°	B	5°
E	75°	C	7°
F	85°	D	15°
P	90°	E	20°
Z	Others	F	25°
		G	30°
		N	0°
		P	11°
		Z	Others

Chamfer (mm)

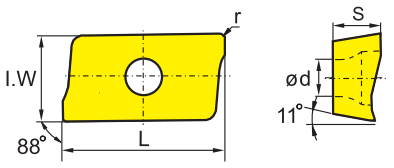
F	0-5°	0-0.10	K
E	1-10°	1-0.15	P
	2-15°	2-0.20	
	3-20°	3-0.25	
T	4-25°	4-0.30	W
	5-30°	5-0.35	
		6-0.40	
S		7-0.45	No mark

Chipbreaker code

Cutting direction

R	Right hand
L	Left hand
N	Neutral

AP□□



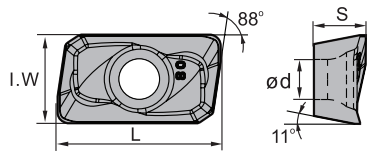
Workpiece material		YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P	Steel	😐	😐	😐	😐	☹			😐	😐	☹		😊	😊	😊	☹				
M	Stainless steel	😐	😐	😐	😐	☹			😐	😐	☹		😊	😊	😊	☹				
K	Cast iron						😐	☹	😊				😐	😊				😊		☹
N	Non-ferrous metal																		😐	☹
S	Heat resistant alloy, Ti alloy								😊	😐	😐									

😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	I.W	S	ød	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	APKT11T304-PF	12.24	6.5	3.6	2.8	0.4	●	★	○		○			○	○		○								
	APKT11T308-PF	12.24	6.5	3.6	2.8	0.8		★	○					○	○										
	APKT11T312-PF	12.24	6.5	3.6	2.8	1.2		★							○										
	APKT11T316-PF	12.24	6.5	3.6	2.8	1.6		★							○										
	APKT160408-PF	17.877	9.33	5.76	4.4	0.8	●	★	○		○				○		○								
	APKT11T304-PM	12.24	6.5	3.6	2.8	0.4	●	★	●		●			★	★		★								
	APKT11T308-PM	12.24	6.5	3.6	2.8	0.8	●	★	●		○		★	★	★		★								
	APKT11T312-PM	12.24	6.5	3.6	2.8	1.2		★	○					○	★		○								
	APKT11T316-PM	12.24	6.5	3.6	2.8	1.6		★	○					○	★		○								
	APKT160408-PM	17.877	9.33	5.76	4.4	0.8	●	★	●		●		○	★	★		★								
	APKT11T304-PR	12.24	6.5	3.6	2.8	0.4	●	★	●		●			○	○		○								
	APKT11T308-PR	12.24	6.5	3.6	2.8	0.8		★									○								
	APKT11T312-PR	12.24	6.5	3.6	2.8	1.2		★									○								
	APKT11T316-PR	12.24	6.5	3.6	2.8	1.6		★									○								
	APKT160408-PR	17.877	9.33	5.76	4.4	0.8		★									○								
	APKT11T304-LH	12.24	6.5	3.6	2.8	0.4																		★	★
	APKT11T308-LH	12.24	6.5	3.6	2.8	0.8																		★	○
	APKT160408-LH	17.877	9.33	5.76	4.4	0.8																		★	★

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

AP□□



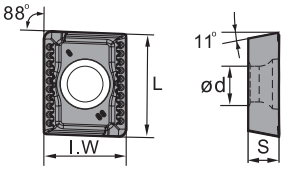
😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹		
M Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹		
K Cast iron						😐	☹	😊				😐	😊				😊		☹
N Non-ferrous metal																		😐	☹
S Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) L	I.W	S	ød	r	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	APMT1135PDR	11.25	6.2	3.5	2.8	0.8			○					○	●	★	○								
	APMT160408PDER	17.25	9.25	4.76	4.4	0.8									●	★	○								

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

AP□□



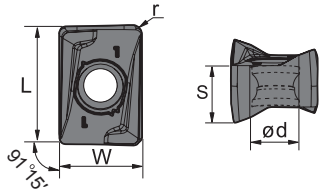
😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹		
M Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹		
K Cast iron						😐	☹	😊				😐	😊				😊		☹
N Non-ferrous metal																		😐	☹
S Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) L	I.W	S	ød	r	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	APKT150412-PM	16.33	12.7	4.76	5.4	1.2				★							●								
	APKT150412-KM	16.33	12.7	4.76	5.4	1.2											●	○							

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

AN□□



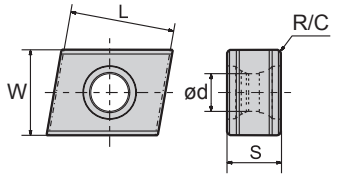
Good working condition | Normal working condition | Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	Normal	Normal	Normal	Normal	Bad			Normal	Normal	Bad		Good	Good	Good	Bad				
M Stainless steel	Normal	Normal	Normal	Normal	Bad			Normal	Normal	Bad		Good	Good	Good	Bad				
K Cast iron						Normal	Bad	Good			Normal	Good					Good		Bad
N Non-ferrous metal																		Normal	Bad
S Heat resistant alloy, Ti alloy								Good	Normal	Normal									

Insert shape	Type	Basic dimensions(mm) L	W	S	ød	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	ANGX110504PNR-GM	11.85	8.4	5.7	3.5	0.4				★		★				★									
	ANGX110508PNR-GM	11.85	8.4	5.7	3.5	0.8				★		★				★									
	ANGX150608PNR-GM	15.43	11.0	7.3	4.4	0.8				★		★				★									
	ANGX150616PNR-GM	15.43	11.0	7.3	4.4	1.6				★		★				★									

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

CN



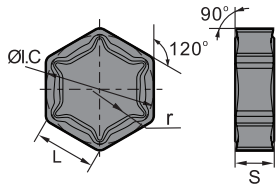
Good working condition | Normal working condition | Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	Normal	Normal	Normal	Normal	Bad			Normal	Normal	Bad		Good	Good	Good	Bad				
M Stainless steel	Normal	Normal	Normal	Normal	Bad			Normal	Normal	Bad		Good	Good	Good	Bad				
K Cast iron						Normal	Bad	Good			Normal	Good					Good		Bad
N Non-ferrous metal																		Normal	Bad
S Heat resistant alloy, Ti alloy								Good	Normal	Normal									

Insert shape	Type	Basic dimensions(mm) L	W	S	R/C	ød	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	CNE121006A	12.8	10.0	6.35	0.4	4.4				●		○													
	CNE121006B	12.0	10.0	6.35	0.6	4.4				●		○													

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

HN□□



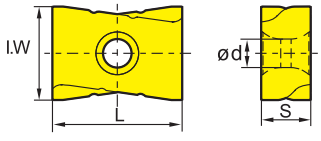
Good working condition · Normal working condition · Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	Normal	Normal	Normal	Normal	Bad			Normal	Normal	Bad		Good	Good	Good	Bad				
M Stainless steel	Normal	Normal	Normal	Normal	Bad			Normal	Normal	Bad		Good	Good	Good	Bad				
K Cast iron						Normal	Bad	Good			Normal	Good					Good		Bad
N Non-ferrous metal																		Normal	Bad
S Heat resistant alloy, Ti alloy								Good	Normal	Normal									

Insert shape	Type	Basic dimensions(mm) L	ØI.C	S	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	HNEX090512-DF	9.16	15.875	5.56	1.2						★													
	HNEX090512-DM	9.16	15.875	5.56	1.2						★													
	HNEX090512-DR	9.16	15.875	5.56	1.2						○	★												

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

LN□□



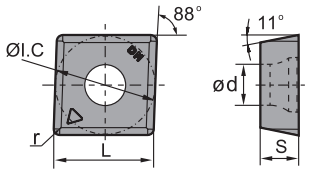
Good working condition · Normal working condition · Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	Normal	Normal	Normal	Normal	Bad			Normal	Normal	Bad		Good	Good	Good	Bad				
M Stainless steel	Normal	Normal	Normal	Normal	Bad			Normal	Normal	Bad		Good	Good	Good	Bad				
K Cast iron						Normal	Bad	Good			Normal	Good					Good		Bad
N Non-ferrous metal																		Normal	Bad
S Heat resistant alloy, Ti alloy								Good	Normal	Normal									

Insert shape	Type	Basic dimensions(mm) L	I.W	S	ød	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	LNKT1506EN-ZR	15.875	14	6.35	4.6					○	○					★								
	LNKT2007DN-ZR	20	17	7.94	4.6					○	○					★								
	LNKT2510-ZR	25	18	9.525	5.5					○		○				★								

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

MP□□



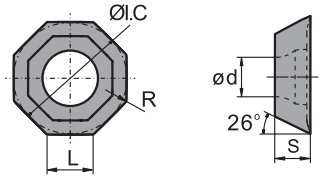
Good working condition · Normal working condition · Bad working condition

Workpiece material		YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P	Steel	😐	😐	😐	😐	☹			😐	😐	☹		😊	😊	😊	☹				
M	Stainless steel	😐	😐	😐	😐	☹			😐	😐	☹		😊	😊	😊	☹				
K	Cast iron						😐	☹	😊				😐	😊				😊		☹
N	Non-ferrous metal																		😐	☹
S	Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) ØI.C	L	S	ød	r	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	MPHT060304-DM	6.35	6.35	3.18	2.8	0.4											★								
	MPHT080305-DM	8.3	8.3	3.18	3.4	0.5											★								
	MPHT120408-DM	12.7	12.7	4.76	5.56	0.8											★								

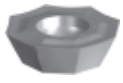
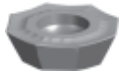
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

OF□□



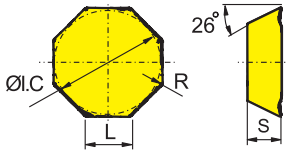
Good working condition · Normal working condition · Bad working condition

Workpiece material		YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P	Steel	😐	😐	😐	😐	☹			😐	😐	☹		😊	😊	😊	☹				
M	Stainless steel	😐	😐	😐	😐	☹			😐	😐	☹		😊	😊	😊	☹				
K	Cast iron						😐	☹	😊				😐	😊				😊		☹
N	Non-ferrous metal																		😐	☹
S	Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) L	ØI.C	S	ød	R	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	**OFKT05T3-DF**	5.26	12.7	3.97	4.4	0.5								○	★										
	**OFKT05T3-DM**	5.26	12.7	3.97	4.4	0.5			○					★	★		★								
	OFKT05T3-LH	5.26	12.7	3.97	4.4	0.5																		○	

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

OF□□



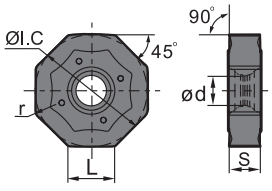
Good working condition · Normal working condition · Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	Normal	Normal	Normal	Normal	Bad			Normal	Normal	Bad		Good	Good	Good	Bad				
M Stainless steel	Normal	Normal	Normal	Normal	Bad			Normal	Normal	Bad		Good	Good	Good	Bad				
K Cast iron						Normal	Bad	Good				Normal	Good				Good		Bad
N Non-ferrous metal																		Normal	Bad
S Heat resistant alloy, Ti alloy								Good	Normal	Normal									

Insert shape	Type	Basic dimensions(mm) L	ØI.C	S	R	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	OFKR0704-DF	7.45	17.94	4.76	0.8			●	○					○										
	OFKR0704-DM	7.45	17.94	4.76	0.8	●		●	○	●		○	○	★		★								

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

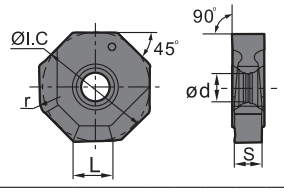
ON□□



Good working condition · Normal working condition · Bad working condition

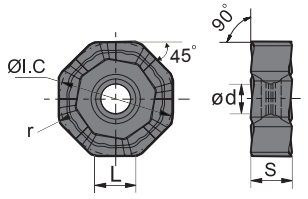
Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	Normal	Normal	Normal	Normal	Bad			Normal	Normal	Bad		Good	Good	Good	Bad				
M Stainless steel	Normal	Normal	Normal	Normal	Bad			Normal	Normal	Bad		Good	Good	Good	Bad				
K Cast iron						Normal	Bad	Good				Normal	Good				Good		Bad
N Non-ferrous metal																		Normal	Bad
S Heat resistant alloy, Ti alloy								Good	Normal	Normal									

Insert shape	Type	Basic dimensions(mm) L	ØI.C	S	ød	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	ONHU060408-PF	6.58	15.875	4.76	4.4	0.83		★				★			★										
	ONHU08T508-PF	8.37	20.2	5.77	5.3	0.83		★				★			★										
	ONHU060408-PM	6.58	15.875	4.76	4.4	0.83		★		★		★													
	ONHU08T508-PM	8.37	20.2	5.79	5.3	0.83		★		★		★													
	ONHU08T508-W	6.9	20.5	6.00	5.3	0.80		★				★		★											



★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

ON□□



Good working condition · Normal working condition · Bad working condition

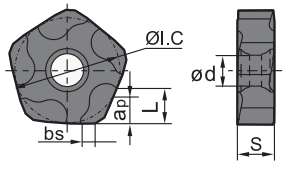
Workpiece material		YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P	Steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
M	Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
K	Cast iron						😐	☹	😊				😐	😊				😊		☹
N	Non-ferrous metal																		😐	☹
S	Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) L	ØI.C	S	ød	r	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	ONHU08T624R-GM	6.38	20.2	6.3	5.3	2.4				★		★				★									

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Note: FMA12 is compatible with our ONHU08T508-PF/ONHU08T508-PM inserts.

PN□□



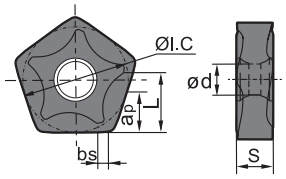
Good working condition · Normal working condition · Bad working condition

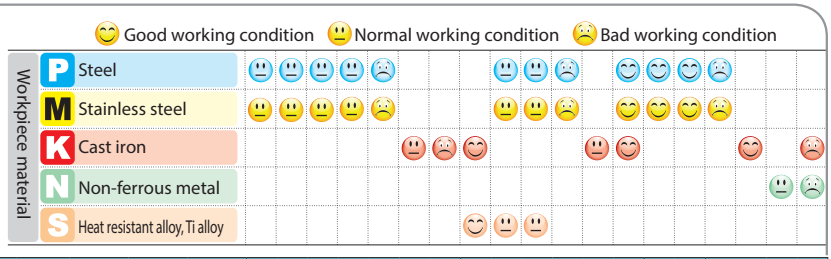
Workpiece material		YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P	Steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
M	Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
K	Cast iron						😐	☹	😊				😐	😊				😊		☹
N	Non-ferrous metal																		😐	☹
S	Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) L	ØI.C	S	ød	bs	a_{pmax}	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	PNEG110512R-CF	5.4	15.875	5.56	4.64	1.6	5						●													
	PNEG110512L-CF	5.4	15.875	5.56	4.64	1.6	5						●													
	PNEG110512R-CM	5.4	15.875	5.56	4.64	1.6	5						●													
	PNEG110512L-CM	5.4	15.875	5.56	4.64	1.6	5						●													
	PNEG110512R-CR	5.4	15.875	5.56	4.64	1.6	5						●													
	PNEG110512L-CR	5.4	15.875	5.56	4.64	1.6	5						●													

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

PN□□

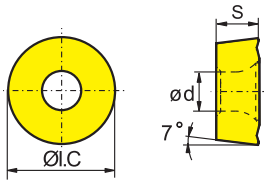




Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	ød	bs	a_{pmax}	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	PNEG110512R-PF	7.5	15.875	5.56	4.64	1.4	7.5		★		●															
	PNEG110512L-PF	7.5	15.875	5.56	4.64	1.4	7.5		★		●															
	PNEG110512R-PM	7.5	15.875	5.56	4.64	1.4	7.5		★		●															
	PNEG110512L-PM	7.5	15.875	5.56	4.64	1.4	7.5		★		●															
	PNEG110512R-PR	7.5	15.875	5.56	4.64	1.4	7.5		★		●															
	PNEG110512L-PR	7.5	15.875	5.56	4.64	1.4	7.5		★		●															

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

RC□□



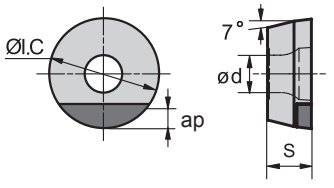
😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Workpiece material		YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P	Steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
M	Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
K	Cast iron						😐	☹	😊				😐	😊				😊		☹
N	Non-ferrous metal																		😐	☹
S	Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) ØI.C	S	ød	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	RCKT10T3MO-DM	10.0	3.97	4.4	●								●	★									
	RCKT1204MO-DM	12.0	4.76	4.0	●		●		●	○			●	★	●								
	RCKT1606MO-DM	16.0	6.35	5.56	●										●								
	RCKT1204MO-DR	12.0	4.76	4.0	○		○		○				●	★									
	RCKT1606MO-DR	16.0	6.35	5.56	●				●		○		●	★									
	RCKT2006MO-DR	20.0	6.35	6.55	●				●		○		○	★	●								
	RCKT1204MO-ER	12.0	4.76	4.0				★															
	RCKT1606MO-ER	16.0	6.35	5.56				★															
	RCKT2006MO-ER	20.0	6.35	6.55				★															

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

RC□□



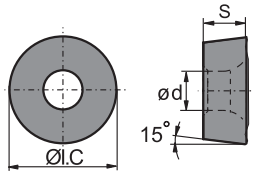
😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Workpiece material								
H	Super hard material		😐	😊				
K	Cast iron	😊			😊	😊		☹
N	Non-ferrous metal						😐	☹

Insert shape	Type	Basic dimensions(mm) ØI.C	S	ød	apmax	PCBN YCB011	YCB012	YCB121	YCB211	Cemented carbide YD051	YD101	YD201
	RCMW1204MO-PCBN	12.0	4.76	4.1	2.7	○	●		●			

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

RD□□



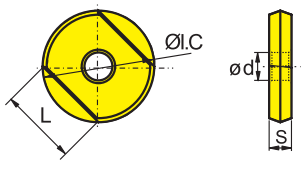
😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Workpiece material		YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P	Steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹		
M	Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹		
K	Cast iron						😐	☹	😊				😐	😊				😊		☹
N	Non-ferrous metal																		😐	☹
S	Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) ØI.C	S	ød	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	RDKW0702MO	7	2.38	2.8			○		●				●										
	RDKW0803MO	8	3.18	3.4	○				○				●	★	○								
	RDKW10T3MO	10	3.97	4.4	○				●				●	★									
	RDKW1204MO	12	4.76	4.4	●		●		●				●	★	●								
	RDKW1605MO	16	5.56	5.5	○				○				○	★	○								
	RDKW2006MO	20	6.35	6.5	○				○					○									

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

RO□□



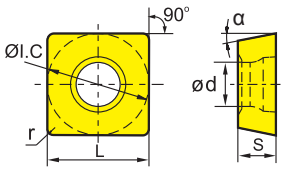
😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Workpiece material		YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P	Steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹		
M	Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹		
K	Cast iron						😐	☹	😊				😐	😊				😊		☹
N	Non-ferrous metal																		😐	☹
S	Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) ØI.C	L	S	ød	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	ROHX1203	12	8.5	3	4													○						
	ROHX1604	16	11.3	4	5													○						
	ROHX2005	20	14.1	5	5													○						

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

SD□□



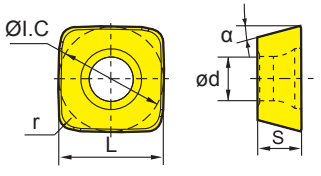
Good working condition · Normal working condition · Bad working condition

Workpiece material		YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P	Steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
M	Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
K	Cast iron						😐	☹	😊				😐	😊				😊		☹
N	Non-ferrous metal																		😐	☹
S	Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) r	L	ØI.C	S	ød	α	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	SDMT090308	0.8	9.525	9.525	3.18	4.4	15°			○								○								

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

SD□□



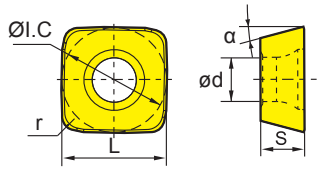
Good working condition · Normal working condition · Bad working condition

Workpiece material		YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P	Steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
M	Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
K	Cast iron						😐	☹	😊				😐	😊				😊		☹
N	Non-ferrous metal																		😐	☹
S	Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) ØI.C	L	r	S	ød	α	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	SDMT06T208-DM	6.35	6.35	0.8	2.58	2.5	15°		★			★						○								
	SDMT09T312-DM	9.525	9.525	1.2	3.97	4.0	15°		★			★						○								
	SDMT120412-DM	12.7	12.7	2.0	4.76	4.4	15°		★			★						○								
	SDMT150520-DM	15.875	15.875	2.0	5.56	5.5	15°		★			★						○								

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

SD□□



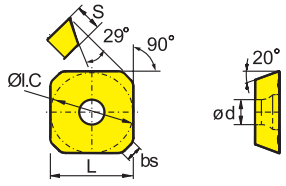
😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Workpiece material																							
P Steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹						
M Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹						
K Cast iron						😐	☹	😊					😐	😊					😊		☹		
N Non-ferrous metal																				😐	☹		
S Heat resistant alloy, Ti alloy								😊	😐	😐													

Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	L	r	S	ød	α	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	SDMT06T208-PM	6.35	6.35	0.8	2.58	2.5	15°		★		○						●									
	SDMT09T312-PM	9.525	9.525	1.2	3.97	4.0	15°		★		●						●									
	SDMT120412-PM	12.7	12.7	2.0	4.76	4.4	15°		★		●						●									
	SDMT150520-PM	15.875	15.875	2.0	5.56	5.5	15°		★		●						●									

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

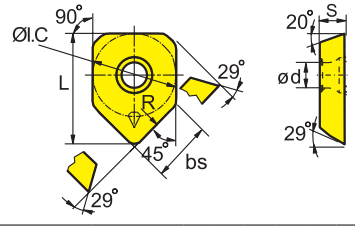
SE□□



😊 Good working condition 😐 Normal working condition ☹ Bad working condition

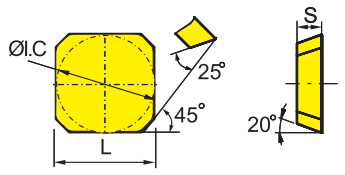
Workpiece material																							
P Steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹						
M Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹						
K Cast iron						😐	☹	😊					😐	😊					😊		☹		
N Non-ferrous metal																				😐	☹		
S Heat resistant alloy, Ti alloy								😊	😐	😐													

Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	ød	bs	R	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	SEET12T3-DF	13.40	13.40	3.97	4.1	2.55		●	★	●						★		○								
	SEET12T3-CF	13.40	13.40	3.97	4.1	2.55							○		★	○		○								
	SEET12T3-EF	13.40	13.40	3.97	4.1	2.55										○		○								
	SEET12T3-DM	13.40	13.40	3.97	4.1	2.55		●	★	●		○				★		★								
	SEET12T3-CM	13.40	13.40	3.97	4.1	2.55							★			★		○								
	SEET12T3-EM	13.40	13.40	3.97	4.1	2.55				●		●				○		★								
	SEET12T3-DR	13.40	13.40	3.97	4.1	2.55		●	★			●				★		★								
	SEET12T3-CR	13.40	13.40	3.97	4.1	2.55		●					★					★								
	SEET12T3-LH	13.40	13.40	3.97	4.1	2.55																			○	★
	SEET12T3-W	17.82	13.40	3.97	4.1	9.46	500		★	●			★			★					★					



★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

SE□□



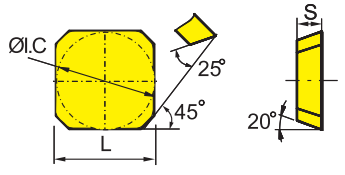
Good working condition | Normal working condition | Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
M Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
K Cast iron						😐	☹	😊				😐	😊				😊		☹
N Non-ferrous metal																		😐	☹
S Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) L	ØI.C	S	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	SEEN1203AFTN	12.7	12.7	3.18									○					●					
	SEKN1203AFFN	12.7	12.7	3.18								★											
	SEKN1203AFN	12.7	12.7	3.18	●								○							●			○
	SEKN1203AFTN	12.7	12.7	3.18	●		●		●				★		○					●			●
	SEKN1504AFN	15.875	15.875	4.76	●		●																●
	SEKN1504AFTN	15.875	15.875	4.76	○		●		●						○					●			●

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

SE□□



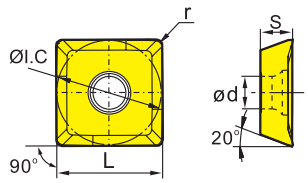
Good working condition | Normal working condition | Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
M Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
K Cast iron						😐	☹	😊				😐	😊				😊		☹
N Non-ferrous metal																		😐	☹
S Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) L	ØI.C	S	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	SEKR1203AFN	12.7	12.7	3.18	●								○		○								
	SEKR1504AFN	15.875	15.875	4.76							★				★					●			

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

SE□□

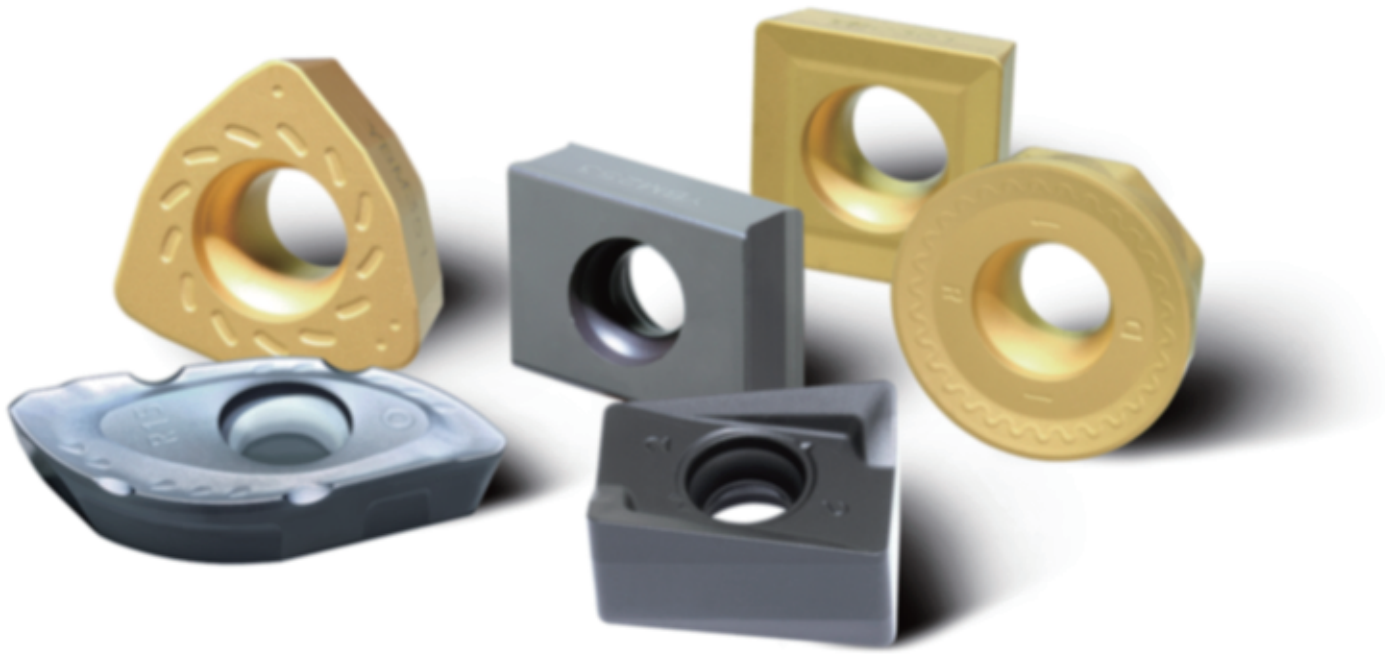


😊 Good working condition 😐 Normal working condition ☹️ Bad working condition

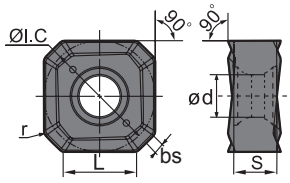
Workpiece material																									
P	Steel	😐	😐	😐	😐	☹️				😐	😐	☹️		😊	😊	😊	☹️								
M	Stainless steel	😐	😐	😐	😐	☹️				😐	😐	☹️		😊	😊	😊	☹️								
K	Cast iron						😐	☹️	😊				😐	😊					😊		☹️
N	Non-ferrous metal																			😐	☹️
S	Heat resistant alloy, Ti alloy								😊	😐	😐										

Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	ød	r	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	SEET09T308PER-PF	9.525	9.525	4.01	3.3	0.8									★										
	SEET09T308PER-PM	9.525	9.525	4.01	3.3	0.8						○			★										
	SEET09T308PER-PR	9.525	9.525	4.01	3.3	0.8						★			○										
	SEET120308PER-PF	13.308	13.308	4.04	4.1	0.8									○										
	SEET120308PER-PM	13.308	13.308	4.04	4.1	0.8			●				★	★	★		★								
	SEET120308PER-PR	13.308	13.308	4.04	4.1	0.8					○			★	★		★								

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



SN□□



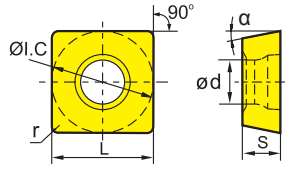
Good working condition / Normal working condition / Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	Normal	Normal	Normal	Normal	Bad			Normal	Normal	Bad		Good	Good	Good	Bad				
M Stainless steel	Normal	Normal	Normal	Normal	Bad			Normal	Normal	Bad		Good	Good	Good	Bad				
K Cast iron						Normal	Bad	Good			Normal	Good					Good		Bad
N Non-ferrous metal																		Normal	Bad
S Heat resistant alloy, Ti alloy								Good	Normal	Normal									

Insert shape	Type	Basic dimensions(mm) L	ØI.C	S	bs	ød	r	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	SNEG1205ANR-GM	7.6	12.0	4.76	1.05	4.6	0.8		★		★		★				★									
	SNEG1506ANR-GM	7.6	15.0	5.54	1.30	5.5	0.9		★		★		★				★									
	SNEG1506ANR-GR	9.4	15.0	5.54	1.30	5.5	0.9		★		★		★				★									
	SNEG1907ANR-GR	12.1	19.0	7.0	1.67	7.2	1.0		★		★		★				★									

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

SP□□



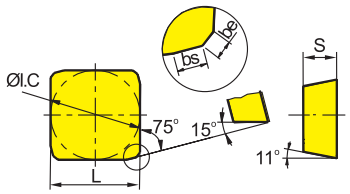
Good working condition / Normal working condition / Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	Normal	Normal	Normal	Normal	Bad			Normal	Normal	Bad		Good	Good	Good	Bad				
M Stainless steel	Normal	Normal	Normal	Normal	Bad			Normal	Normal	Bad		Good	Good	Good	Bad				
K Cast iron						Normal	Bad	Good			Normal	Good					Good		Bad
N Non-ferrous metal																		Normal	Bad
S Heat resistant alloy, Ti alloy								Good	Normal	Normal									

Insert shape	Type	Basic dimensions(mm) r	L	ØI.C	S	ød	α	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	SPMT060304	0.4	6.35	6.35	3.18	2.8	11°			○								○								
	SPMT120408	0.8	12.7	12.70	4.76	5.5	11°	●		●		●						★					○			
	SPMT120408-PM	0.8	12.7	12.70	4.76	5.5	11°				★							●								
	SPMT120408-KM	0.8	12.7	12.70	4.76	5.5	11°											●	○							
	SPKT1204EDR	--	12.7	12.7	4.76	5.56	11°									★										

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

SP□N



😊 Good working condition 😐 Normal working condition ☹️ Bad working condition

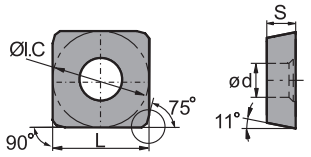
Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹️				😐	😐	☹️			😊	😊	😊	☹️		
M Stainless steel	😐	😐	😐	😐	☹️				😐	😐	☹️			😊	😊	😊	☹️		
K Cast iron						😐	☹️	😊				😐	😊					😊	☹️
N Non-ferrous metal																		😐	☹️
S Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	be	bs	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	SPKN1203EDER	12.7	12.7	3.18	1	1.4									○										
	SPKN1203EDEL	12.7	12.7	3.18	1	1.4									○										
	SPKN1203EDFR	12.7	12.7	3.18	1	1.4								★	○										●
	SPKN1203EDFL	12.7	12.7	3.18	1	1.4								○	○										○
	SPKN1203EDSKR	12.7	12.7	3.18	1	1.4											○					○			
	SPKN1203EDSKL	12.7	12.7	3.18	1	1.4											○					○			
	SPKN1203EDTKR	12.7	12.7	3.18	1	1.4	●				●				○		★					●			○
	SPKN1203EDTKL	12.7	12.7	3.18	1	1.4									○		○					○			○
	SPKN1203EDS31R	12.7	12.7	3.18	1	1.4											○					○			
	SPKN1203EDS31L	12.7	12.7	3.18	1	1.4											○					○			
	SPKN1203EDT31R	12.7	12.7	3.18	1	1.4	●				●				○		★					●			○
	SPKN1203EDT31L	12.7	12.7	3.18	1	1.4									○		○					○			○
	SPKN1504EDER	15.875	15.875	4.76	1	1.4									○										
	SPKN1504EDEL	15.875	15.875	4.76	1	1.4									○										
	SPKN1504EDFR	15.875	15.875	4.76	1	1.4								○	○										○
	SPKN1504EDFL	15.875	15.875	4.76	1	1.4								○	○										○
	SPKN1504EDSKR	15.875	15.875	4.76	1	1.4											○					○			
	SPKN1504EDSKL	15.875	15.875	4.76	1	1.4											○					○			
	SPKN1504EDTKR	15.875	15.875	4.76	1	1.4	●								★		○					●			●
	SPKN1504EDTKL	15.875	15.875	4.76	1	1.4									○		○					○			●
	SPKN1504EDS32R	15.875	15.875	4.76	1	1.4											○					○			
	SPKN1504EDS32L	15.875	15.875	4.76	1	1.4											○					○			
	SPKN1504EDT32R	15.875	15.875	4.76	1	1.4	●								★		○					●			●
	SPKN1504EDT32L	15.875	15.875	4.76	1	1.4									○		○					○			●

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Ordering guide: **SPKN1203EDT3 1 R** chamfering angle 20° , chamfering width 0.15mm. For other edge shapes, see inserts code key standard.

SP□W



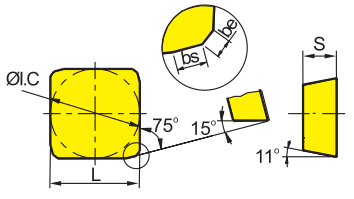
😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Workpiece material		YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P	Steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
M	Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
K	Cast iron						😐	☹	😊				😐	😊				😊		☹
N	Non-ferrous metal																		😐	☹
S	Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) r	L	ØI.C	S	ød	α	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	SPKW1204EDFR	---	12.7	12.7	4.76	5.56	11°									○										
	SPKW1204EDSR	---	12.7	12.7	4.76	5.56	11°									○										

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

SP□R



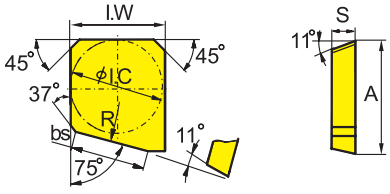
😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Workpiece material		YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P	Steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
M	Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
K	Cast iron						😐	☹	😊				😐	😊				😊		☹
N	Non-ferrous metal																		😐	☹
S	Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) L	ØI.C	S	be	bs	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	SPKR1203EDR-GM	12.7	12.7	3.18	1	1.4			●						★		★					●			●
	SPKR1203EDL-GM	12.7	12.7	3.18	1	1.4			●						★		★					●			●
	SPKR1504EDR-GM	15.875	15.875	4.76	1	1.4			●						★		★					●			●
	SPKR1504EDL-GM	15.875	15.875	4.76	1	1.4			●						★		★					●			●

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

SP□X



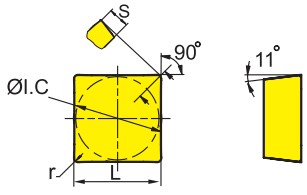
Good working condition / Normal working condition / Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	Normal	Normal	Normal	Normal	Bad				Normal	Normal	Bad		Good	Good	Good	Bad			
M Stainless steel	Normal	Normal	Normal	Normal	Bad				Normal	Normal	Bad		Good	Good	Good	Bad			
K Cast iron						Normal	Bad	Good				Normal	Good				Good		Bad
N Non-ferrous metal																		Normal	Bad
S Heat resistant alloy, Ti alloy								Good	Normal	Normal									

Insert shape	Type	Basic dimensions(mm) A	ØI.C	I.W	S	bs	R	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	SPEX1203EDL-1	15	12.7	12.7	3.18	10	500																			●
	SPEX1203EDR-1	15	12.7	12.7	3.18	10	500																			●
	SPEX1504EDL-1	18.2	15.875	15.875	4.76	10	500																	○		●
	SPEX1504EDR-1	18.2	15.875	15.875	4.76	10	500																	○		●

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

SP□□



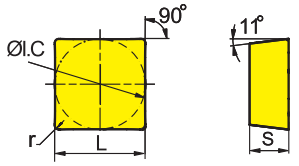
Good working condition / Normal working condition / Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	Normal	Normal	Normal	Normal	Bad				Normal	Normal	Bad		Good	Good	Good	Bad			
M Stainless steel	Normal	Normal	Normal	Normal	Bad				Normal	Normal	Bad		Good	Good	Good	Bad			
K Cast iron						Normal	Bad	Good				Normal	Good				Good		Bad
N Non-ferrous metal																		Normal	Bad
S Heat resistant alloy, Ti alloy								Good	Normal	Normal									

Insert shape	Type	Basic dimensions(mm) L	ØI.C	s	r	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	SPMR090304	9.525	9.525	3.18	0.4			○											○					
	SPMR09T304	9.525	9.525	3.97	0.4									○										
	SPMR090308	9.525	9.525	3.18	0.8			○																
	SPMR120304	12.7	12.7	3.18	0.4			○											○					
	SPMR120308	12.7	12.7	3.18	0.8			○																
	SPMR120312	12.7	12.7	3.18	1.2			○		○				○										

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

SP□□



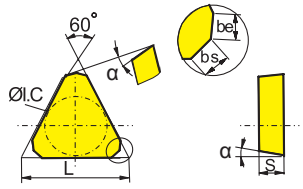
😊 Good working condition 😐 Normal working condition ☹️ Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹️				😐	😐	☹️		😊	😊	😊	☹️			
M Stainless steel	😐	😐	😐	😐	☹️				😐	😐	☹️		😊	😊	😊	☹️			
K Cast iron						😐	☹️	😊				😐	😊				😊		☹️
N Non-ferrous metal																		😐	☹️
S Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	s	r	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	SPUN090304	9.525	9.525	3.18	0.4																	○		
	SPUN090308	9.525	9.525	3.18	0.8																○		○	
	SPUN120304	12.7	12.7	3.18	0.4														○		○			○
	SPUN120308	12.7	12.7	3.18	0.8			○		○											●		○	○
	SPUN120312	12.7	12.7	3.18	1.2																○			
	SPUN150408	15.875	15.875	4.76	0.8																○			○
	SPUN150412	15.875	15.875	4.76	1.2																○		○	○
	SPUN190408	19.05	19.05	4.76	0.8																○		○	
	SPUN190412	19.05	19.05	4.76	1.2																○			
	SPUN190416	19.05	19.05	4.76	1.6																○			
	SPGN090304	9.525	9.525	3.18	0.4														●				●	
	SPGN090308	9.525	9.525	3.18	0.8																	○	○	○
	SPGN120308	12.7	12.7	3.18	0.8									○							●			●
	SPGN120404	12.7	12.7	4.76	0.4																○			○
	SPGN120408	12.7	12.7	4.76	0.8								○								○			
	SPGN120412	12.7	12.7	4.76	1.2																○			○
	SPGN150404	15.875	15.875	4.76	0.4																	●	○	
	SPGN150408	15.875	15.875	4.76	0.8																●			
	SPGN190408	19.05	19.05	4.76	0.8																		○	
	SPGN190416	19.05	19.05	4.76	1.6								○											

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

TP□□

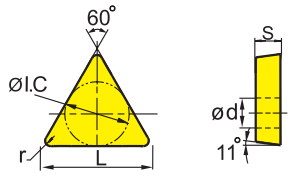


Workpiece material	Good working condition	Normal working condition	Bad working condition
P Steel	YBC301, YBC302, YBM251, YBM253, YBM351	YBD152, YBD252, YBG102, YBG202, YBG205, YBG302, YBG152, YBG252, YNG151, YNG151C	YC30S, YD051, YD101, YD201
M Stainless steel	YBC301, YBC302, YBM251, YBM253, YBM351	YBD152, YBD252, YBG102, YBG202, YBG205, YBG302, YBG152, YBG252, YNG151, YNG151C	YC30S, YD051, YD101, YD201
K Cast iron	YBD152, YBD252, YBG102	YBG202, YBG205, YBG302, YBG152, YBG252, YD051	YD101, YD201
N Non-ferrous metal	YD101	YD201	
S Heat resistant alloy, Ti alloy	YBG102	YBG202, YBG205	YBG302

Insert shape	Type	Basic dimensions(mm) L	ØI.C	S	be	bs	α	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	TPKN2204PDFR	22	12.7	4.76	1.4	0.7	11°								○											○
	TPKN2204PDFL	22	12.7	4.76	1.4	0.7	11°								○											○
	TPKN2204PDR	22	12.7	4.76	1.4	0.7	11°	●				●			★	★		★					●	○	○	●
	TPKN2204PDL	22	12.7	4.76	1.4	0.7	11°																●			
	TPKN2204PDTR	22	12.7	4.76	1.4	0.7	11°	●															●			
	TPKN2204PDTL	22	12.7	4.76	1.4	0.7	11°	○															○			

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

TP□□

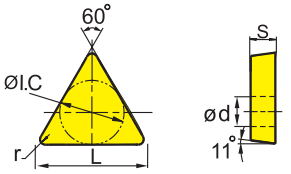


Workpiece material	Good working condition	Normal working condition	Bad working condition
P Steel	YBC301, YBC302, YBM251, YBM253, YBM351	YBD152, YBD252, YBG102, YBG202, YBG205, YBG302, YBG152, YBG252, YNG151, YNG151C	YC30S, YD051, YD101, YD201
M Stainless steel	YBC301, YBC302, YBM251, YBM253, YBM351	YBD152, YBD252, YBG102, YBG202, YBG205, YBG302, YBG152, YBG252, YNG151, YNG151C	YC30S, YD051, YD101, YD201
K Cast iron	YBD152, YBD252, YBG102	YBG202, YBG205, YBG302, YBG152, YBG252, YD051	YD101, YD201
N Non-ferrous metal	YD101	YD201	
S Heat resistant alloy, Ti alloy	YBG102	YBG202, YBG205	YBG302

Insert shape	Type	Basic dimensions(mm) L	ØI.C	s	r	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	TPGN090204	9.6	5.56	2.38	0.4																		○	
	TPGN090208	9.6	5.56	2.38	0.8																	○		
	TPGN110204	11	6.35	2.38	0.4																		○	
	TPGN110304	11	6.35	3.18	0.4																	○	●	○
	TPGN110308	11	6.35	3.18	0.8																	○		○
	TPGN160304	16.5	9.525	3.18	0.4																●	○	○	
	TPGN160308	16.5	9.525	3.18	0.8																	○		●
	TPGN160312	16.5	9.525	3.18	1.2																			○
	TPGN160316	16.5	9.525	3.18	1.6																			○
	TPGN220404	22	12.7	4.76	0.4																		○	
	TPGN220408	22	12.7	4.76	0.8																○			○
	TPGN220412	22	12.7	4.76	1.2																			○
	TPGN270408	27.5	15.875	4.76	0.8																			○

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

TP□□



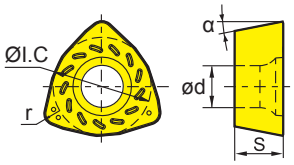
😊 Good working condition 😐 Normal working condition ☹️ Bad working condition

Workpiece material		YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P	Steel	😐	😐	😐	😐	☹️			😐	😐	☹️		😊	😊	😊	☹️				
M	Stainless steel	😐	😐	😐	😐	☹️			😐	😐	☹️		😊	😊	😊	☹️				
K	Cast iron						😐	☹️	😊				😐	😊				😊		☹️
N	Non-ferrous metal																		😐	☹️
S	Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	s	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	TPUN110208	11	6.35	2.38	0.8	○															○			
	TPUN110304	11	6.35	3.18	0.4																○			
	TPUN110308	11	6.35	3.18	0.8	○															●		○	○
	TPUN160304	16.5	9.525	3.18	0.4			○													○		○	○
	TPUN160308	16.5	9.525	3.18	0.8			○		○											●		●	○
	TPUN160312	16.5	9.525	3.18	1.2			○													●			
	TPUN160408	16.5	9.525	4.76	0.8																○			○
	TPUN160412	16.5	9.525	4.76	1.2																○			○
	TPUN220404	22	12.7	4.76	0.4																		○	
	TPUN220408	22	12.7	4.76	0.8	●		○													●		○	
	TPUN220412	22	12.7	4.76	1.2					○											●			○
	TPUN220416	22	12.7	4.76	1.6																			○
	TPMR090204	9.6	5.56	2.38	0.4			○																
	TPMR110304	11	6.35	3.18	0.4			●											○					
	TPMR110308	11	6.35	3.18	0.8			○											○					
	TPMR160304	16.5	9.525	3.18	0.4			●		○									○		○			
	TPMR160308	16.5	9.525	3.18	0.8			●		●											○			○
	TPMR160312	16.5	9.525	3.18	1.2					○														
	TPMR220412	22	12.7	4.76	1.2					○														
	TPMR330916	33	19.05	9.52	1.6											★								

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

WP□□



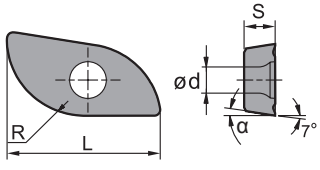
Good working condition · Normal working condition · Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹		
M Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹		
K Cast iron						😐	☹	😊				😐	😊				😊		☹
N Non-ferrous metal																		😐	☹
S Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) ØI.C	r	S	ød	α	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	WPGT050315ZSR	7.94	1.5	3.5	4.0	11°	★				●														
	WPGT060415ZSR	9.525	1.5	4.2	4.4	11°	★				●														
	WPGT080615ZSR	12.85	1.5	6.35	5.5	11°	★				●														
	WPGT090725ZSR	15	2.5	7	5.5	11°	★				●														
	WPGT050315ZSR-PM	7.94	1.5	3.5	4.0	11°	★				●					●									
	WPGT060415ZSR-PM	9.525	1.5	4.2	4.4	11°	★				●					●									
	WPGT080615ZSR-PM	12.85	1.5	6.35	5.5	11°	★				●					●									
	WPGT090725ZSR-PM	15.00	2.5	7.00	5.5	11°	★				●					●									

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

XP□□



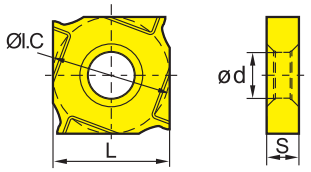
Good working condition · Normal working condition · Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹		
M Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹		
K Cast iron						😐	☹	😊				😐	😊				😊		☹
N Non-ferrous metal																		😐	☹
S Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) R	ød	S	α	L	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	XPHT16R0803-GM	8	3.1	3.18	9°	16											●								
	XPHT20R10T3-GM	10	4.0	3.97	9°	20											●								
	XPHT25R1204-GM	12.5	4.7	4.76	9°	25											●								
	XPHT30R1506-GM	15	5.8	6.35	11°	30											●								
	XPHT32R1606-GM	16	5.8	6.35	9°	32											●								
	XPHT40R2007-GM	20	6.7	7.94	9°	40											●								
	XPHT50R2507-GM	25	9.2	7.94	9°	50											●								

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

XS□□



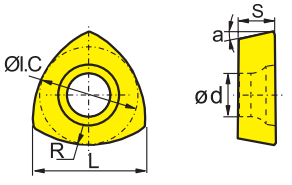
Good working condition · Normal working condition · Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
M Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
K Cast iron						😐	☹	😊				😐	😊				😊		☹
N Non-ferrous metal																		😐	☹
S Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) ØI.C	L	S	ød	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	XSEQ1202	12.7	12.7	2.3	5.0											★								
	XSEQ1203	12.7	12.7	3.0	5.0											★								
	XSEQ12T3	12.7	12.7	3.5	5.0											★								
	XSEQ1204	12.7	12.7	4.0	5.0											★								
	XSEQ12T4	12.7	12.7	4.5	5.0											★								

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

ZD□□



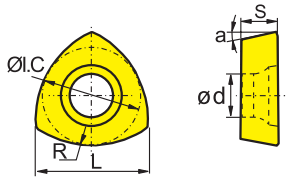
Good working condition · Normal working condition · Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
M Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
K Cast iron						😐	☹	😊				😐	😊				😊		☹
N Non-ferrous metal																		😐	☹
S Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) ØI.C	L	S	R	ød	α	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	ZDET08T2CYR10	6.75	8.4	2.78	10	2.8	14°			○								○								
	ZDET1103CYR12.5	8.5	10.6	3.18	12.5	2.8	14°			○								○								
	ZDET13T3CYR16	10.5	13.2	3.97	16	4.4	14°			○								○								

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

ZP□□



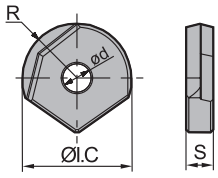
Good working condition · Normal working condition · Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹			😐	😐	☹			😊	😊	😊	☹			
M Stainless steel	😐	😐	😐	😐	☹			😐	😐	☹			😊	😊	😊	☹			
K Cast iron						😐	☹	😊				😐	😊				😊		☹
N Non-ferrous metal																		😐	☹
S Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) ØI.C	L	S	R	ød	α	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	ZPNT2204CY(R20)	12.7	16.1	4.76	20	5.56	11°			○								○								
	ZPNT2204CY(R25)	12.7	16.9	4.76	25	5.56	11°			○								○								
	ZPNT2204CY(R31)	12.7	17.6	4.76	31.5	5.56	11°			○								○								

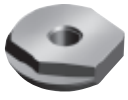
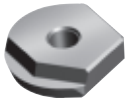
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

ZO□□



Good working condition · Normal working condition · Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹			😐	😐	☹			😊	😊	😊	☹			
M Stainless steel	😐	😐	😐	😐	☹			😐	😐	☹			😊	😊	😊	☹			
K Cast iron						😐	☹	😊				😐	😊				😊		☹
N Non-ferrous metal																		😐	☹
S Heat resistant alloy, Ti alloy								😊	😐	😐									

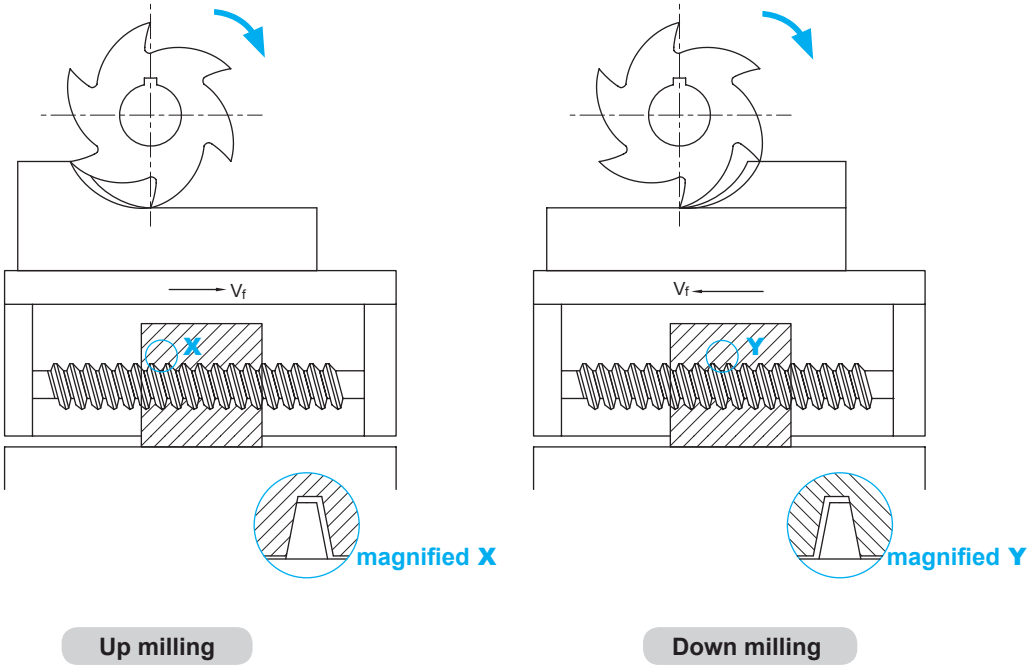
Insert shape	Type	Basic dimensions(mm) R	ØI.C	S	ød	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	ZOHX1203-GF	6	12	3	4													●						
	ZOHX1604-GF	8	16	4	5													●						
	ZOHX2005-GF	10	20	5	5													●						
	ZOHX2506-GF	12.5	25	6	6													○						
	ZOHX3007-GF	15	30	7	8													○						
	ZOHX3207-GF	16	32	7	8													○						
	ZOHX1203-GM	6	12	3	4													●						
	ZOHX1604-GM	8	16	4	5													●						
	ZOHX2005-GM	10	20	5	5													●						
	ZOHX2506-GM	12.5	25	6	6													●						
	ZOHX3007-GM	15	30	7	8													●						
	ZOHX3207-GM	16	32	7	8													★						

★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Common problems in milling and solutions

Failure			Selection of tool material		Cutting condition					Tool shape								Machine clamping system		
Main points of solution and inspection			Material with higher hardness	Material with perfect toughness	Cutting speed	Feed rate	Cutting depth	Change the diameter and width of milling tools	Cutting liquid	Rake angle	Approach angle	Strength of cutting edge	Number of teeth	Increase the width of chip pocket	Examine the geometry shape of Minor cutting edge.	check the end face run-out	Improve the rigidity of tool	Clamping system of workpiece	Overhang of tool	Power, gap
Fracture of tool nose	severe abrasion on clearance face	Improper cutting condition			↓				✓											
		Unsuitable geometry shape of cutting edge	✓							↑		↓								
	severe abrasion on rake face	Improper cutting condition			↓	↓	↓		✓											
		Unsuitable geometry shape of cutting edge	✓							↑	↓	↓								
	Fracture of cutting edge	Improper cutting condition				↓	↓													
		Unsuitable geometry shape of cutting edge		✓							↓	↑			✓	✓	✓	✓	✓	✓
	Thermal cracking	Improper cutting condition			↓	↓	↓		✓											
		Unsuitable geometry shape of cutting edge								↑		↓								
	Build-up edge	Improper cutting condition			↑	↑			✓											
		Unsuitable geometry shape of cutting edge								↑		↓								
Machining precision	Bad surface roughness	Abrasion of tool Great vibration of milling tool	✓		↑	↓	↓		✓			↓			Wiper	✓				
	Burrs occuring	Unsuitable geometry shape of cutting edge			↓	↓	↓	✓												
		Improper geometry shape of cutting edge								↑	↑	↓			✓					
	Side collapse	Unsuitable geometry shape of cutting edge				↓	↓													
		Unsuitable geometry shape of cutting edge								↑	↓	↓	↑		✓		✓			
	Planeness and parallelism deterioration	Improper geometry Improper technique				↓	↓			↑	↑		↓		✓	✓	✓	✓	✓	✓
Other	Vibration	Cutting condition Improper technology			↓	↓	↓	✓		↑	↑	↓					✓	✓	✓	✓
	Chips twisting and jamming	Improper cutting condition			↑	↑↓		✓	✓				↓							
		Unsuitable geometry shape of cutting edge								↑			↓	✓						

Difference and selection between down milling and up milling



Climb milling (also called down milling): the feed direction of workpiece is the same as that of the milling rotation at the connecting position.
Conventional milling (also called up milling): the feed direction of workpiece is opposite to that of the milling rotation at the connecting position.

In down milling, the major force of cutting edge is compressive stress, while in up milling the tensile stress. The compressive strength of cemented carbide material is much larger than its tensile strength. In down milling, as chips become thin from thick gradually, cutting edge and workpiece press against each other. The friction between edge and workpiece is small, thus reducing the abrasion of edge, the hardening of workpiece surface and the surface roughness (Ra). In up milling, chips become thick from thin gradually. When the insert is cutting into the workpiece, it produces strong friction and more heat than in down milling, and make workpiece surface hardened.

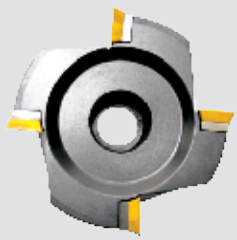
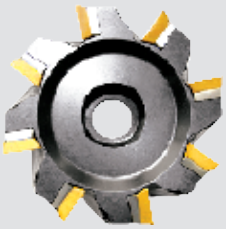
In up milling, because horizontal direction of cutting force milling cutter conducting on workpiece is opposite to the feed direction of workpiece, the lead screw of worktable joints closely with one side of the screw nut. In down milling, the direction of cutting force is the same as the feed direction. When edge's radial force on workpiece is large enough, the worktable will bounce left and right, thus make the gap fall behind. The gap will return to the front side with the continuing rotation of lead screw. At this moment the worktable stops motion, however, it will bounce left and right again when the radial cutting force is large enough again. The periodical bounce of worktable will cause poor surface quality of workpiece and tool breakage.

When using end mills for down milling, the edges always starts cutting at the workpiece surface, therefore end mills are not suitable for machining workpiece with hardened surface.

Up milling is recommended for milling thin-wall components or square milling with high requirement for precision.

Pitch selection

Pitch is the distance between one point on one cutting edge and the same point on the next edge. Milling cutters are mainly classified into coarse, close and extra close pitches.

optimized stability		
L (Low)	**M** (Medium)	**H** (High)
Coarse pitch Unequal pitch design 	**Close pitch**	**Extra close pitch** 
When the milling width is equal to diameter of cutter, the machining system is stable and main power of machine is sufficient, the use of coarse pitch can achieve high productive efficiency.	Used in general milling and multiple mixed productions.	When the milling width is less than diameter of cutter, cutting by maximum edges can achieve high productive efficiency.

Selection of approach angle

The approach angle is formed by insert and tool body. It affects chip thickness, cutting forces and tool-life. Decreasing the approach angle reduces chip thickness and expands the cutting area between cutting edge and workpiece at a given feed rate.

A smaller approach angle also ensures stable entry into or exiting workpiece, protecting the cutting edge and extending tool life. However, this will increase axial cutting forces on the workpiece, thus is not suitable for machining thin workpiece such as thin plate.

Approach angle	Feed rate per tooth	Real maximum cutting depth
90°	f_z	$h_{ex}=f_z \times sinkr$
75°	f_z	$h_{ex}=0.96 \times f_z$
60°	f_z	$h_{ex}=0.86 \times f_z$
45°	f_z	$h_{ex}=0.707 \times f_z$
Round insert	f_z	$h_{ex}=\frac{\sqrt{iC^2 \times (iC-2a_p)^2}}{iC} \times f_z$

General formula

V_c : cutting speed(m/min)
D_c : nominal diameter of milling tool(mm)
n : spindle speed(rev/min)
z_n : number of teeth
Q : metal removal rate(cm^3/min)
L : Actual working distance(mm)
V_f : feed rate of worktable (feed speed)(mm/min)
f_z : feed rate per tooth(mm/z)
π : circumference ratio≈3.14
T_c : machining time(min)
f_z : feed rate per revolution (mm/rev)

- Cutting speed

$$V_c = \frac{\pi \times D_c \times n}{1000} \text{ (m/min)}$$

- Spindle speed

$$n = \frac{1000 \times V_c}{\pi \times D_c} \text{ (rev/min)}$$

- Feed rate of worktable (feed speed)

$$V_f = f_z \times n \times z_n \text{ (mm/min)}$$

- Feed rate per tooth

$$f_z = \frac{V_f}{n \times Z_n} \text{ (mm/z)}$$

- Feed rate per revolution

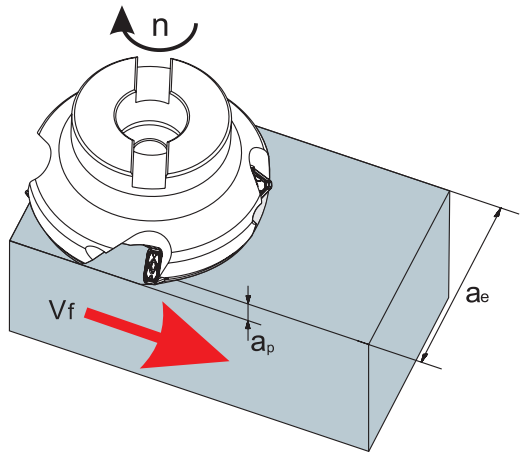
$$f_n = \frac{V_f}{n} \text{ (mm/rev)}$$

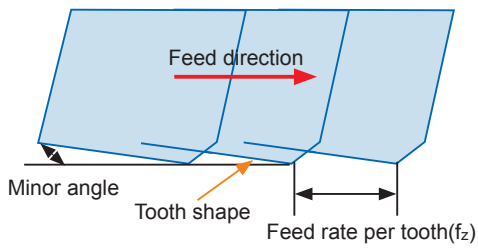
- Machining time

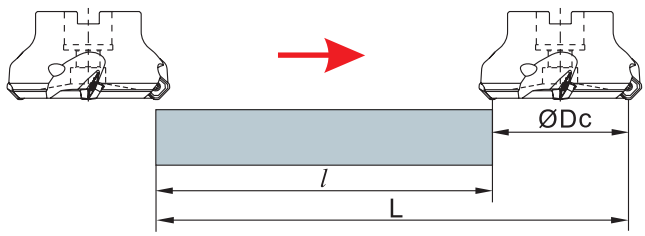
$$T_c = \frac{L}{V_f} \text{ (min)}$$

- Metal removal rate

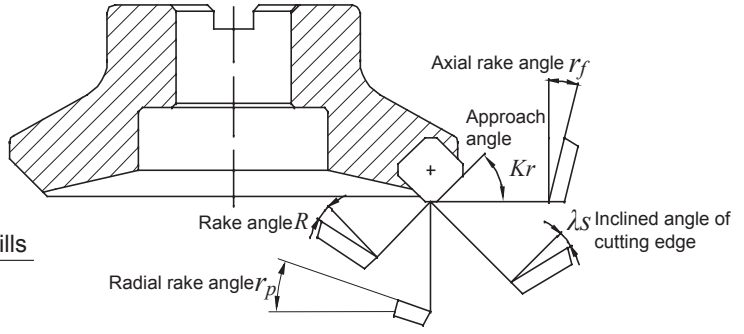
$$Q = \frac{a_p \times a_e \times V_f}{1000} \text{ (cm}^3\text{/min)}$$







Function of each part in face milling

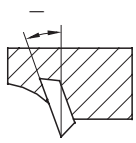
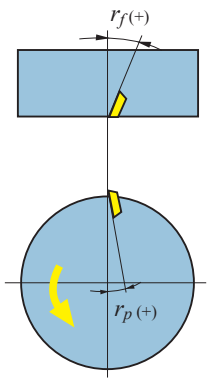
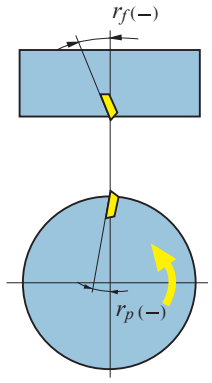
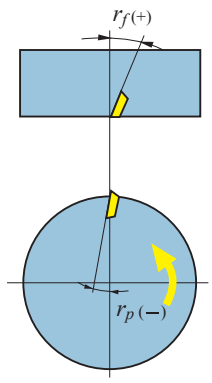
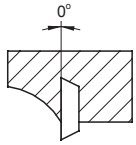
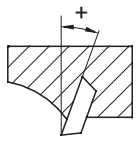


Main angles of face mills

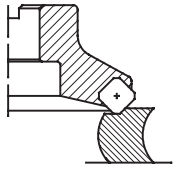
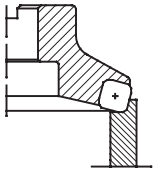
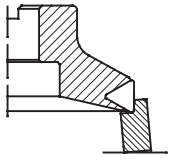
■Main angles of face mills

Designation	Function	Effect		
Axial rake angle r_f	Determining the chip direction	Negative angle, excellent capability of chip removal		
Radial rake angle r_p	Determining whether the cutting is easy and fast or not	Positive angle: good cutting performanc		
Approach angle Kr	Determining the chip thickness	Kr↑, chip thickness↑; Kr↓, chip thickness↓;		
Rake angle R	Determining whether easy and fast the cutting is or not	Poor cutting performance, High-strength cutting edge	(−)←0→(+)	Good cutting performance, Low-strength cutting edge
Inclined angle of cutting edge λs	Determining the chip flow direction	Poor capability of chip removal, High-strength cutting edge	(−)←0→(+)	Good performance of chip removal, Low-strength cutting edge

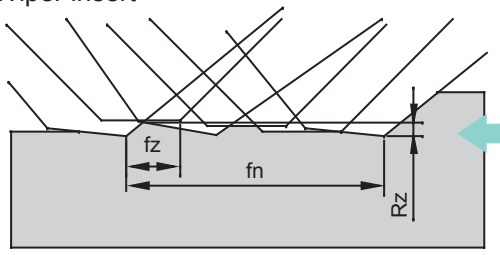
Characteristics of different rake angles combined

		Double positive rake angle	Double negative rake angle	Positive and negative rake angle
Negative rake angle				
0° rake angle				
Positive rake angle				
Axial rake angle r_f		+	−	+
Radial rake angle r_p		+	−	−
Applicable material machined	**P**	✓		✓
	M	✓		✓
	K		✓	✓
	N	✓		
	S	✓		✓

Cutting performances of different approach angles

Approach angle	**45°**	**75°**	**90°**
Schematic diagram			
Instruction	Axial force is the largest. It will bend when machining thin-wall workpiece, reducing the precision of workpiece. It can help avoid fringe breakage of workpiece when machining cast iron.	The main force is radial cutting force. It is often used in general face milling.	The axial force is zero in theory, suitable for milling thin plate workpiece.

Wiper insert

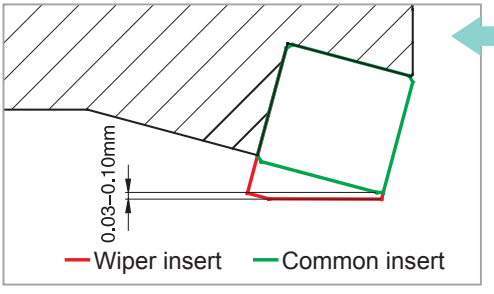


It has axial and radial run-out because tools and inserts have manufacturing tolerance. The axial run-out leads to poor surface roughness.

Solution

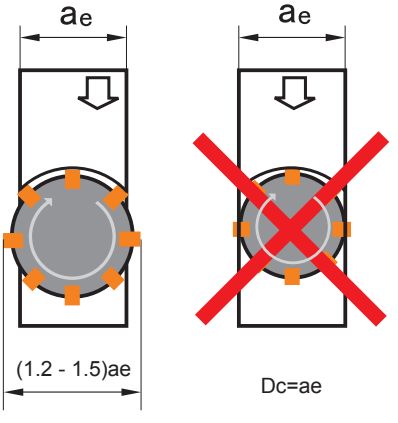
Mounting wiper inserts

usage



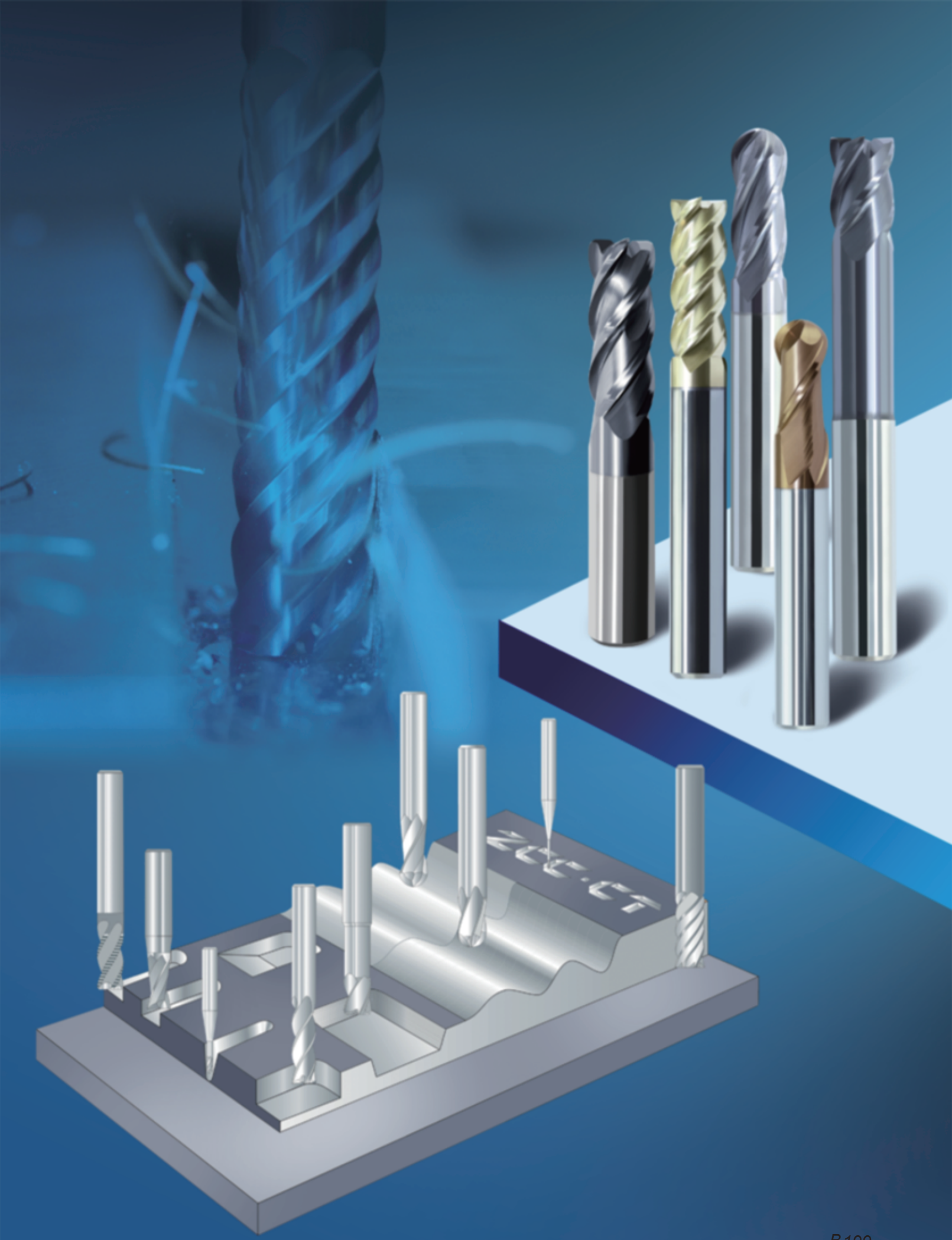
The wiper insert must protrude below the other inserts by 0.03-0.10 mm at axial direction, so that the wiping function can take effect. Generally speaking, a cutter just needs only one wiper insert. If the diameter of cutter is much larger or cutter's feed rate per revolution is higher than the length of wiper edge, 2 to 3 wiper inserts can be mounted.

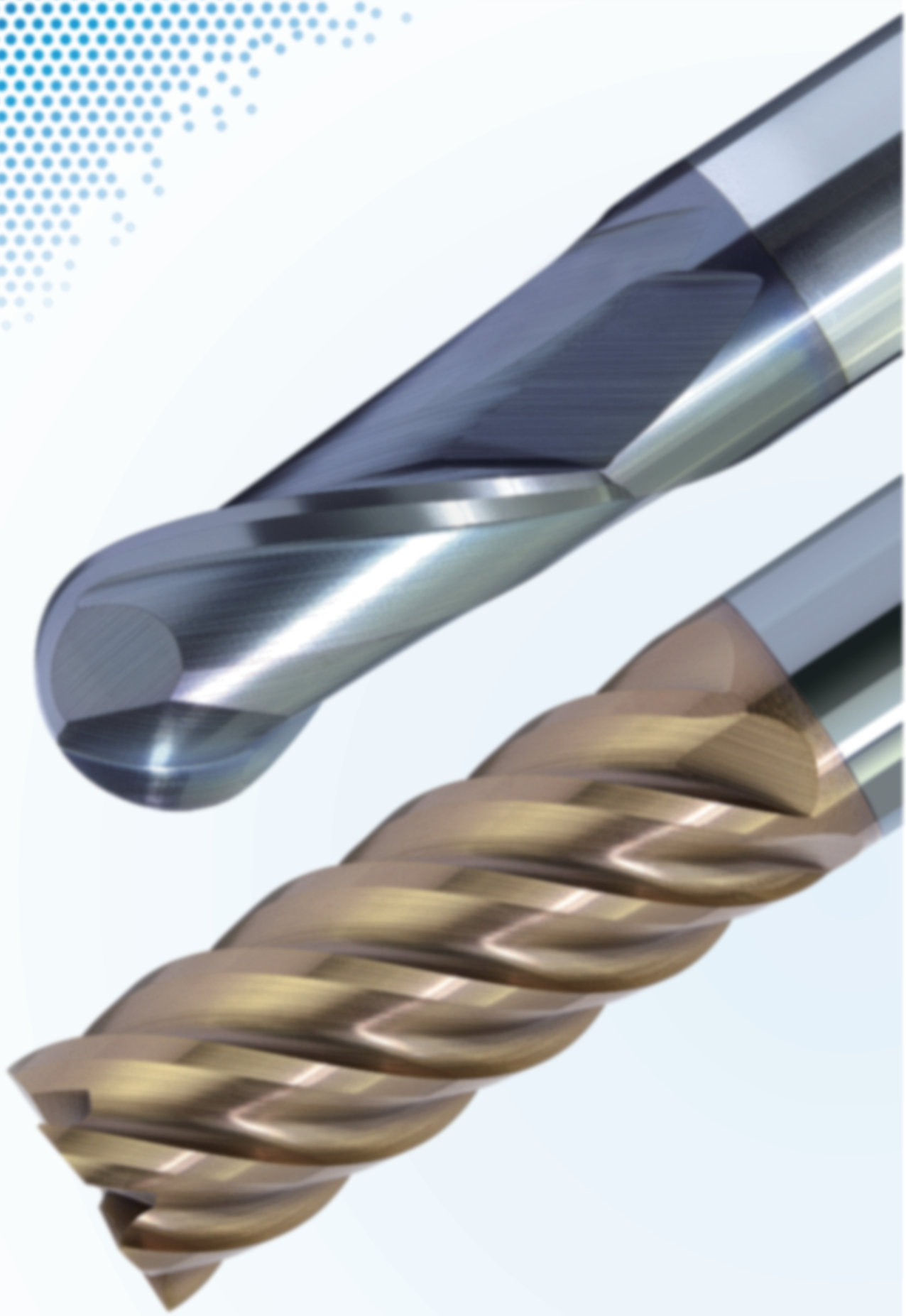
Selection of cutting width and tool cutting diameter in face milling



Dc: Tool cutting diameter
ae: Cutting width

Generally speaking, the relation between cutting width and tool cutting diameter is Dc=(1.2—1.5) ae.
In practical machining, same center line of tool center and work piece center should be avoided.


ZCC-CT



Milling Tools

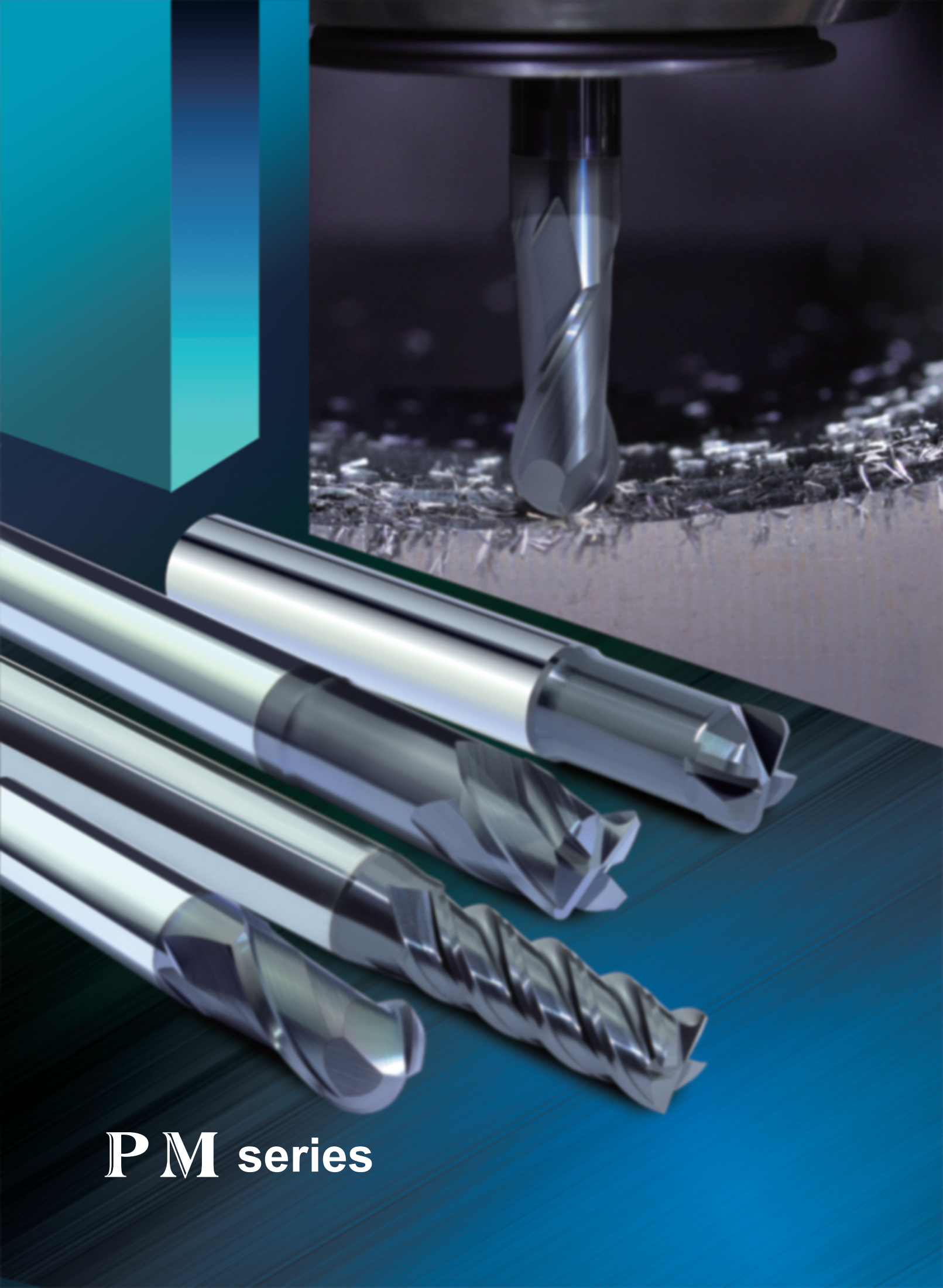
Solid carbide end mills

New product for milling

UM series

High performance machining with unequal pitch

New product for milling
PML series



PM series

New product for milling
HMX
High hardness machining series

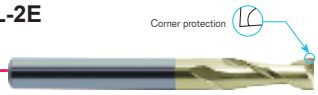
Selection guide for solid carbide end mills

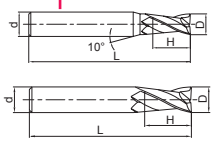
- Tool shape
- Tool type
- Series of tools
- Machining application
- shape and size

Solid Carbide End Mills
PM series

2-flute flattened end mills with straight shank

PML-2E





- Very suitable for slot milling.
- Wide application.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PML-2E-D1.0S	1.0	4	3	50	2	Picture 1	●
PML-2E-D1.5S	1.5	4	4	50	2	Picture 1	●
PML-2E-D2.0S	2.0	4	6	50	2	Picture 1	●
PML-2E-D2.5S	2.5	4	8	50	2	Picture 1	●
PML-2E-D3.0S	3.0	4	8	50	2	Picture 1	●
PML-2E-D4.0S	4.0	4	11	50	2	Picture 2	●
PML-2E-D1.0	1.0	6	3	50	2	Picture 1	●
PML-2E-D1.5	1.5	6	4	50	2	Picture 1	●
PML-2E-D2.0	2.0	6	6	50	2	Picture 1	●
PML-2E-D2.5	2.5	6	8	50	2	Picture 1	●
PML-2E-D3.0	3.0	6	8	50	2	Picture 1	●
PML-2E-D3.5	3.5	6	10	50	2	Picture 1	●
PML-2E-D4.0	4.0	6	11	50	2	Picture 1	●
PML-2E-D4.5	4.5	6	11	50	2	Picture 1	●
PML-2E-D5.0	5.0	6	13	50	2	Picture 1	●
PML-2E-D5.5	5.5	6	16	50	2	Picture 1	●
PML-2E-D6.0	6.0	6	16	50	2	Picture 2	●
PML-2E-D7.0	7.0	8	20	60	2	Picture 1	●
PML-2E-D8.0	8.0	8	20	60	2	Picture 2	●
PML-2E-D9.0	9.0	10	22	75	2	Picture 1	●
PML-2E-D10.0	10.0	10	25	75	2	Picture 2	●
PML-2E-D11.0	11.0	12	26	75	2	Picture 1	●
PML-2E-D12.0	12.0	12	30	75	2	Picture 2	●
PML-2E-D14.0	14.0	14	32	75	2	Picture 2	●
PML-2E-D16.0	16.0	16	45	100	2	Picture 2	●
PML-2E-D18.0	18.0	18	45	100	2	Picture 2	●
PML-2E-D20.0	20.0	20	45	100	2	Picture 2	●

● Stock available ○ Make-to-order

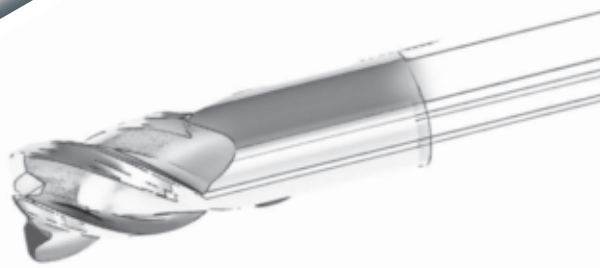
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

code key B213 | Graphics category and identification B214 | Cutting parameters B367

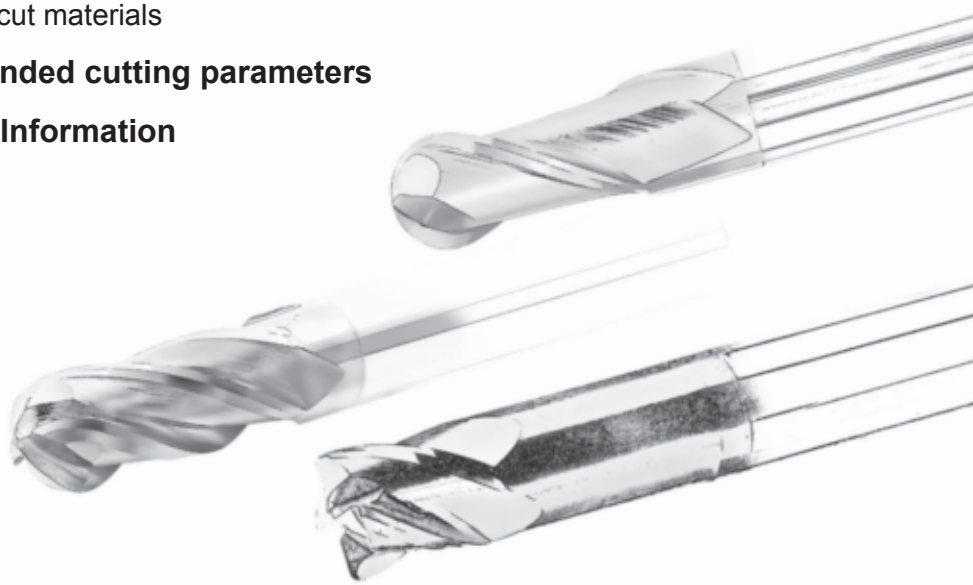
- Applicable workpiece material range
- Helical angle, coating and cutting diameter tolerance, etc
- Product features
- Specification
  Type, basic dimension, number of teeth and structure
- Code key, cutting parameters, graphics category and identification

MILLING



Solid Carbide End Mills

B208-B212	**Solid carbide end mills overview**
B213	**Solid carbide end mills code key**
B214	**Graphics category and identification**
B215-B359	**Detail information of solid carbide end mills**
B230-B235	High-performance UM series for general machining
B236-B263	High-performance PML Series for general machining
B264-B297	High-performance PM Series for general machining
B298-B325	GM series for general machining
B326-B348	HMX series for machining high hardness steel
B349-B356	AL series for machining aluminum
B357-B359	SM series for machining stainless steel, heat resistant alloy etc hard-to-cut materials
B360-B430	**Recommended cutting parameters**
B431-B434	**Technical Information**

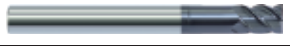


Solid carbide end mills overview

Machining application	Geometry	Number of teeth	Type	Shape	Size range	Workpiece material									Page	
						P		M	K	N		S	H			
						Carbon steel, alloy steel	Pre-hardened steel	Stainless steel	Cast iron	Copper alloy	Aluminum alloy	Heat resistant alloy, Titanium alloy	High hardness steel Below 55HRC	High hardness steel Above 55HRC	Specification	Cutting parameters
High-performance general milling	Flattened	4	**UM-4E** (Unequal pitch)		Ø4.0~Ø20.0	◎	◎	○	◎			○	◎		B230	B360 -361
			UM-4EL (Unequal pitch)		Ø4.0~Ø20.0	◎	◎	○	◎			○	◎		B231	B360 -361
			UM-4EFP (Unequal pitch)		Ø6.0~Ø20.0	◎	◎	○	◎			○	◎		B232	B362 -363
	Radius	4	**UM-4R** (Unequal pitch)		Ø4.0~Ø20.0	◎	◎	○	◎			○	◎		B233	B364 -365
			UM-4RL (Unequal pitch)		Ø6.0~Ø16.0	◎	◎	○	◎			○	◎		B234	B364 -365
			UM-4RFP (Unequal pitch)		Ø6.0~Ø16.0	◎	◎	○	◎			○	◎		B235	B366
	Flattened	2	**PML-2E** (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎			○			B236	B367
			PML-2F (Sharp)		Ø1.0~ Ø20.0	◎	◎	○	◎			○			B237	B368
			PML-2EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B238	B367
			PML-2FL (Sharp)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B239	B368
			PML-2EFP (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○			B240	B369
		3	**PML-3E-H** (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B241	B370
			PML-3EL-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B242	B370
		4	**PML-4E-G** (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎			○			B243	B371 -372
			PML-4F-G (Sharp)		Ø1.0~ Ø20.0	◎	◎	○	◎			○			B244	B373 -374
			PML-4EL-G (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B245	B371 -372
			PML-4FL-G (Sharp)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B246	B373 -374
			PML-4EX-G (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B247	B375
			PML-4E (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎			○			B248	B376 -377
			PML-4EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B249	B376 -377
			PML-4E-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B250	B371 -372
			PML-4EL-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B251	B371 -372
			PML-4EFP (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○			B252	B378 -379
		6	**PML-6E** (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○			B253	B380
			PML-6EL (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○			B254	B381
	Ball nose	2	**PML-2B**		R0.5~R10.0	◎	◎	○	◎			○			B255	B382 -383

◎Very suitable ○Suitable

Solid carbide end mills overview

Machining application	Geometry	Number of teeth	Type	Shape	Size range	Workpiece material									Page	
						P		M	K	N		S	H			
						Carbon steel, alloy steel	Pre-hardened steel	Stainless steel	Cast iron	Copper alloy	Aluminum alloy	Heat resistant alloy, Titanium alloy	High hardness steel: Below 55HRC	High hardness steel: Above 55HRC	Specification	Cutting parameters
High-performance general milling	Ball nose	2	PML-2BL		R1.0~R10.0	◎	◎	○	◎			○			B256	B382 -383
			PML-2BFP		R0.5~R10.0	◎	◎	○	◎			○			B257	B382 -383
		4	PML-4B		R1.5~R10.0	◎	◎	○	◎			○			B258	B384
			PML-4BL		R1.5~R10.0	◎	◎	○	◎			○			B259	B384
	Radius	2	PML-2R		Ø1.0~ Ø12.0	◎	◎	○	◎			○			B260	B388
		4	PML-4R		Ø3.0~ Ø12.0	◎	◎	○	◎			○			B261	B389
			PML-4R-H		Ø3.0~ Ø12.0	◎	◎	○	◎			○			B262	B389
			PML-4RFP		Ø6.0~ Ø16.0	◎	◎	○	◎			○			B263	B389
	Flattened	2	PM-2E (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎			○	◎		B264	B367
			PM-2F (Sharp)		Ø1.0~ Ø20.0	◎	◎	○	◎			○	◎		B265	B368
			PM-2EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B266	B367
			PM-2FL (Sharp)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B267	B368
			PM-2EFP (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○	◎		B268	B369
		3	PM-3E-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B269	B370
			PM-3EL-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B270	B370
		4	PM-4E-G (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎			○	◎		B271	B371 -372
			PM-4F-G (Sharp)		Ø1.0~ Ø20.0	◎	◎	○	◎			○	◎		B272	B373 -374
			PM-4EL-G (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B273	B371 -372
			PM-4FL-G (Sharp)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B274	B373 -374
			PM-4EX-G (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B275	B375
			PM-4E (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎			○	◎		B276	B376 -377
			PM-4EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B277	B376 -377
			PM-4E-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B278	B371 -372
			PM-4EL-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B279	B371 -372
			PM-4EFP (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○	◎		B280	B378 -379
		6	PM-6E (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○	◎		B281	B380

◎Very suitable ○Suitable

Solid carbide end mills overview

Machining application	Geometry	Number of teeth	Type	Shape	Size range	Workpiece material									Page	
						P		M	K	N		S	H			
						Carbon steel, alloy steel	Pre-hardened steel	Stainless steel	Cast iron	Copper alloy	Aluminum alloy	Heat resistant alloy, Titanium alloy	High hardness steel Below 55HRC	High hardness steel Above 55HRC	Specification	Cutting parameters
High-performance general milling	Flattened	6	PM-6EL (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○	◎		B282	B381
	Ball nose	2	PM-2B		R0.5~R10.0	◎	◎	○	◎			○	◎		B283	B382 -383
			PM-2BL		R1.0~R10.0	◎	◎	○	◎			○	◎		B284	B382 -383
		2	PM-2BFP		R0.5~R10.0	◎	◎	○	◎			○	◎		B285	B382 -383
		4	PM-4B		R1.5~R10.0	◎	◎	○	◎			○	◎		B286	B384
			PM-4BL		R1.5~R10.0	◎	◎	○	◎			○	◎		B287	B384
	Taper neck ball nose	2	PM-2BC		R0.25~R2.0	◎	◎	○	◎			○	◎		B288 -291	B385 -387
	Radius		PM-2R		Ø1.0~ Ø12.0	◎	◎	○	◎			○	◎		B292	B388
		4	PM-4R		Ø3.0~ Ø12.0	◎	◎	○	◎			○	◎		B293	B389
			PM-4R-H		Ø3.0~ Ø12.0	◎	◎	○	◎			○	◎		B294	B389
			PM-4RFP		Ø6.0~ Ø16.0	◎	◎	○	◎			○	◎		B295	B389
	High-feed-rate		PM-4H		Ø3.0~ Ø12.0	◎	◎	○	◎			○	◎		B296	B390 -391
			PM-4HL		Ø4.0~ Ø12.0	◎	◎	○	◎			○	◎		B297	B390 -391
General milling	Flattened	2	GM-2E (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎						B302	B392
			GM-2EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎						B303	B392
		3	GM-3E (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎						B304	B393
			GM-3EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎						B305	B393
		4	GM-4E-G (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎						B306	B394
			GM-4EL-G (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎						B307	B394
			GM-4E (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎						B308	B395
			GM-4EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎						B309	B395
			GM-6E (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎						B310	B396
			GM-6EL (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎						B311	B397
	Long neck flattened		GM-2EP		Ø0.5~ Ø5.0	◎	◎	○	◎						B312 -313	B398 -399
	Tiny head flattened		GM-2ES		Ø0.3~ Ø3.0	◎	◎	○	◎						B314	B400

◎Very suitable ○Suitable

Solid carbide end mills overview

Machining application	Geometry	Number of teeth	Type	Shape	Size range	Workpiece material									Page	
						P		M	K	N		S	H			
						Carbon steel, alloy steel	Pre-hardened steel	Stainless steel	Cast iron	Copper alloy	Aluminum alloy	Heat resistant alloy, Titanium alloy	High hardness steel Below 55HRC	High hardness steel Above 55HRC	Specification	Cutting parameters
General milling	Ball nose	2	GM-2B		R0.5~R10.0	◎	◎	○	◎						B315	B401
			GM-2BL		R1.0~R10.0	◎	◎	○	◎						B316	B401
		4	GM-4B		R1.5~R10.0	◎	◎	○	◎						B317	B402
			GM-4BL		R1.5~R10.0	◎	◎	○	◎						B318	B402
	Tiny ball nos	2	GM-2BS		R0.15~ R1.5	◎	◎	○	◎						B319	B403
	Long neck ball nose		GM-2BP		R0.25~R2.5	◎	◎	○	◎						B320 -321	B404 -405
	Radius		GM-2R		Ø1.0~Ø12.0	◎	◎	○	◎						B322	B406
		4	GM-4R		Ø3.0~Ø12.0	◎	◎	○	◎						B323	B407
			GM-4RL		Ø6.0~Ø16.0	◎	◎	○	◎						B324	B407
	Corrugated edge		GM-4W		Ø6.0~Ø20.0	◎	◎	○	◎						B325	B408 -409
Machining high hardness steel	Flattened	2	HMX-2E (Corner protection)		Ø1.0~Ø20.0				○				◎	◎	B328	B410
			HMX-2EFP (Corner protection)		Ø6.0~Ø20.0				○				◎	◎	B329	B411
		4	HMX-4E (Corner protection)		Ø1.0~Ø20.0				○				◎	◎	B330	B412
			HMX-4EL (Corner protection)		Ø3.0~Ø20.0				○				◎	◎	B331	B412
			HMX-4EFP (Corner protection)		Ø6.0~Ø20.0				○				◎	◎	B332	B413
		6	HMX-6E (Corner protection)		Ø6.0~Ø20.0				○				◎	◎	B333	B414
			HMX-6EL (Corner protection)		Ø6.0~Ø20.0				○				◎	◎	B334	B415
	Long neck flattened	2	HMX-2EP		Ø0.5~Ø5.0				○				◎	◎	B335 -336	B416 -417
	Tiny head flattened		HMX-2ES		Ø0.3~Ø3.0				○				◎	◎	B337	B418
	Ball nose		HMX-2B		R0.5~R10.0				○				◎	◎	B338	B419
			HMX-2BL		R1.0~R10.0				○				◎	◎	B339	B419
			HMX-2BFP		R0.5~R10.0				○				◎	◎	B340	B419
		4	HMX-4B		R1.5~R10.0				○				◎	◎	B341	B420
			HMX-4BL		R1.5~R10.0				○				◎	◎	B342	B420

◎Very suitable ○Suitable

Solid carbide end mills overview

Machining application	Geometry	Number of teeth	Type	Shape	Size range	Workpiece material									Page	
						P		M	K	N		S	H			
						Carbon steel, alloy steel	Pre-hardened steel	Stainless steel	Cast iron	Copper alloy	Aluminum alloy	Heat resistant alloy, Titanium alloy	High hardness steel Below 55HRC	High hardness steel Above 55HRC	Specification	Cutting parameters
Machining high hardness steel	Tiny ball nos	2	HMX-2BS		R0.15~R1.5				○				◎	◎	B343	B421
	Long neck ball nose	2	HMX-2BP		R0.25~R2.5				○				◎	◎	B344 -345	B422 -423
	Radius	4	HMX-4R		Ø3.0~Ø12.0				○				◎	◎	B346	B424
		4	HMX-4RF		Ø6.0~Ø12.0				○				◎	◎	B347	B424
		4	HMX-4RP		Ø6.0~Ø16.0				○				◎	◎	B348	B424
Machining aluminum	Flattened		AL-2E		Ø1.0~Ø20.0						◎				B351	B425
			AL-2EL		Ø3.0~Ø20.0						◎				B352	B425
			AL-3E		Ø1.0~Ø20.0						◎				B353	B426
		3	AL-3EL		Ø3.0~Ø20.0						◎				B354	B426
	Ball nose	2	AL-2B		R1.0~R6.0						◎				B355	B427
	Corrugated edge	3	AL-3W		Ø6.0~Ø20.0						◎				B356	B428
Machining of hard-to-cut materials	Flattened	3	SM-3E		Ø3.0~Ø20.0	◎		◎				○			B358	B429
	Radius	4	SM-4R		Ø6.0~Ø12.0	◎		◎				○			B359	B430

◎Very suitable ○Suitable

Solid carbide end mills code key

UM	High performance general machining with unequal pitch
PML/PM	High-performance general milling
GM	General milling
HMX	Machining hardened material
AL	Machining aluminum
SM	Machining of hard-to-cut materials

End mill category

E	Corner protection flattened
F	Sharp flattened
B	Ball nose
R	Radius
W	Corrugated edge
H	High-feed-rate

End mill type

S	Tiny diameter
P	Straight neck
C	Taper neck
Default	Standard

Structure type

Radius of nose arc or radius of ball nose

GM - 2 E L P - D12 R0.5 - M08

Number of teeth

Length category

L	Long cutting edge
X	Extra long cutting edge
F	Short cutting edge
Default	Standard

Tool diameter

Other

G	30° taper 4-flute flattened end mills
H	38° helical angle
M	Neck length
S	Slim shank:Ø4mm

- For unequal pitch end mills, letter "V" is added before category code.
- 2-flute end face mill with taper shank PM-2BC05-R0.25-M03.
  Taper

Graphics category and identification

Coating of mills

Coated NaNo TiAlCrN	Super nanometer crystal TiAlCrN coating
Coated NaNo TiAlXN	Super crystal nano heat resistant TiAlN coatings
Coated NaNo TiAlN	Nano TiAlN coating
Coated TiAlN	TiAlN coating
Coated AlTiN	AlTiN coating

End tooth type of mills

	2-flute flattened end mills
	2-flute ball nose end mills
	2-flute R end mills
	3-flute flattened end mills
	3-flute R end mills
	4-flute flattened end mills
	4-flute ball nose end mills
	4-flute R end mills
	6-flute flattened end mills

Helical angle

β	β is helical angle: 30° ,35° ,38° ,45° ,55°

Cutting diameter tolerance

D D≤12 0~-0.020 12<D 0~-0.030	Cutting diameter tolerance

Radius tolerance of ball nose end mills

R R±0.01	Radius tolerance

Nose type

	Corner protection
	Sharp

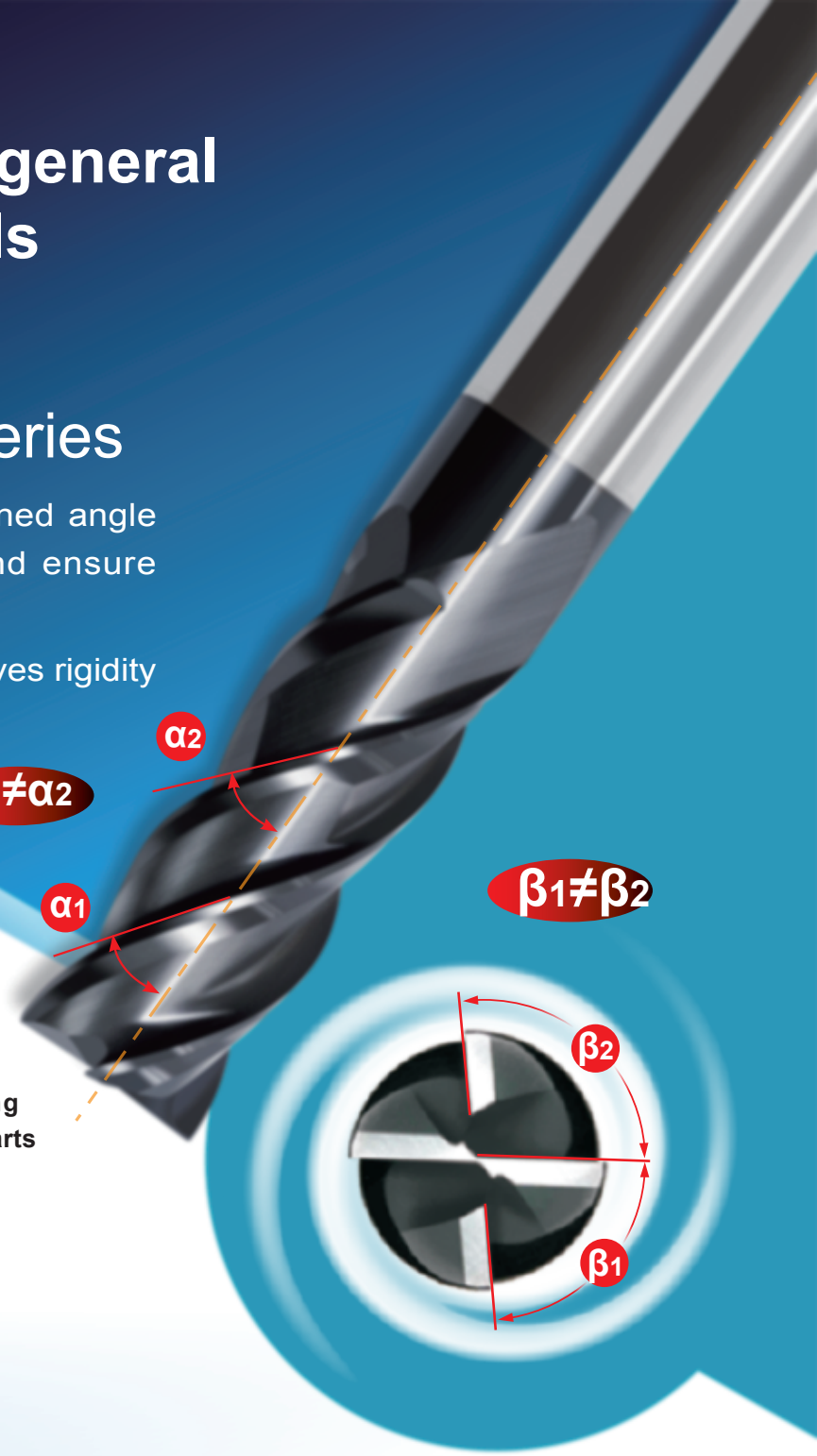
Machining operation

Side face	Flattened end mills for side machining
Step shoulder	Flattened end mills for shoulder machining
Straight slot	Flattened end mills for straight slot machining
Deep flattened slot	Flattened end mills for deep slot machining
Profile	Ball nose end mills for profile machining
Cavity	Ball nose end mills for cavity machining
Ball nose slot	Ball nose end mills for slot machining
Deep ball nose slot	Ball nose end mills for deep slot machining
Radius shoulder	R end mills for side machining
Radius corner slot	R end mills for slot machining
Profile	R end mills for profile machining

High-performance general machining end mills

UM Series

- Unequal pitch and variable inclined angle design reduce vibration risk and ensure better machining stability.
- Variable flute depth design improves rigidity for higher chip removal capacity.



Application range:

Suitable for high effectively machining of cast iron, carbon, alloy steel, pre-hardened steel, quenched and tempered steel, hardened steel under HRC55, ect. Excellent machining stability under weak rigidity working condition such as thin-walled parts, parts corner, large overhang, etc.

Machining case:

Work piece material: 42CrMo (HRC35)

Cutting style: side milling

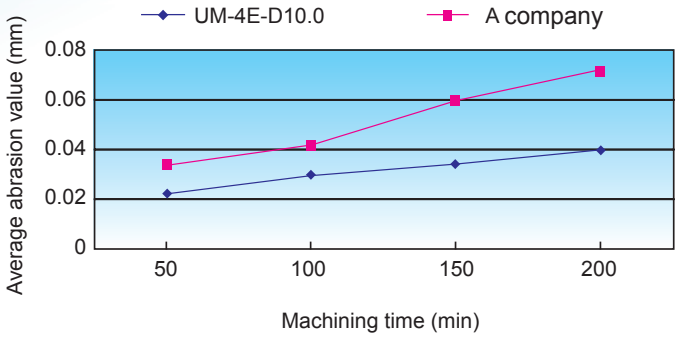
Tool type: UM-4E-D10.0

Cutting parameters: n=6000r/min,

f_z=0.16mm/z,

a_p=10mm, a_e=1mm

Comparison of tool wear

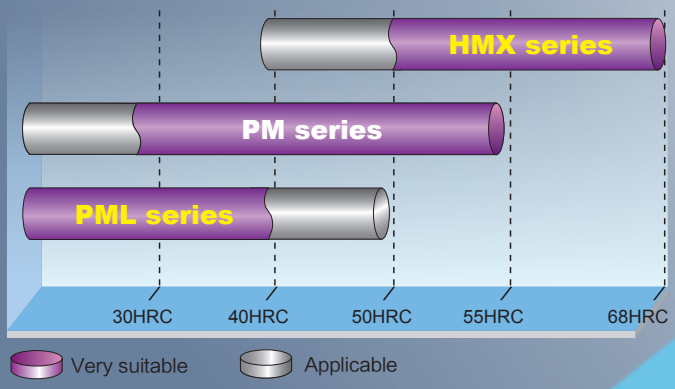


High performance universal machining

PML series

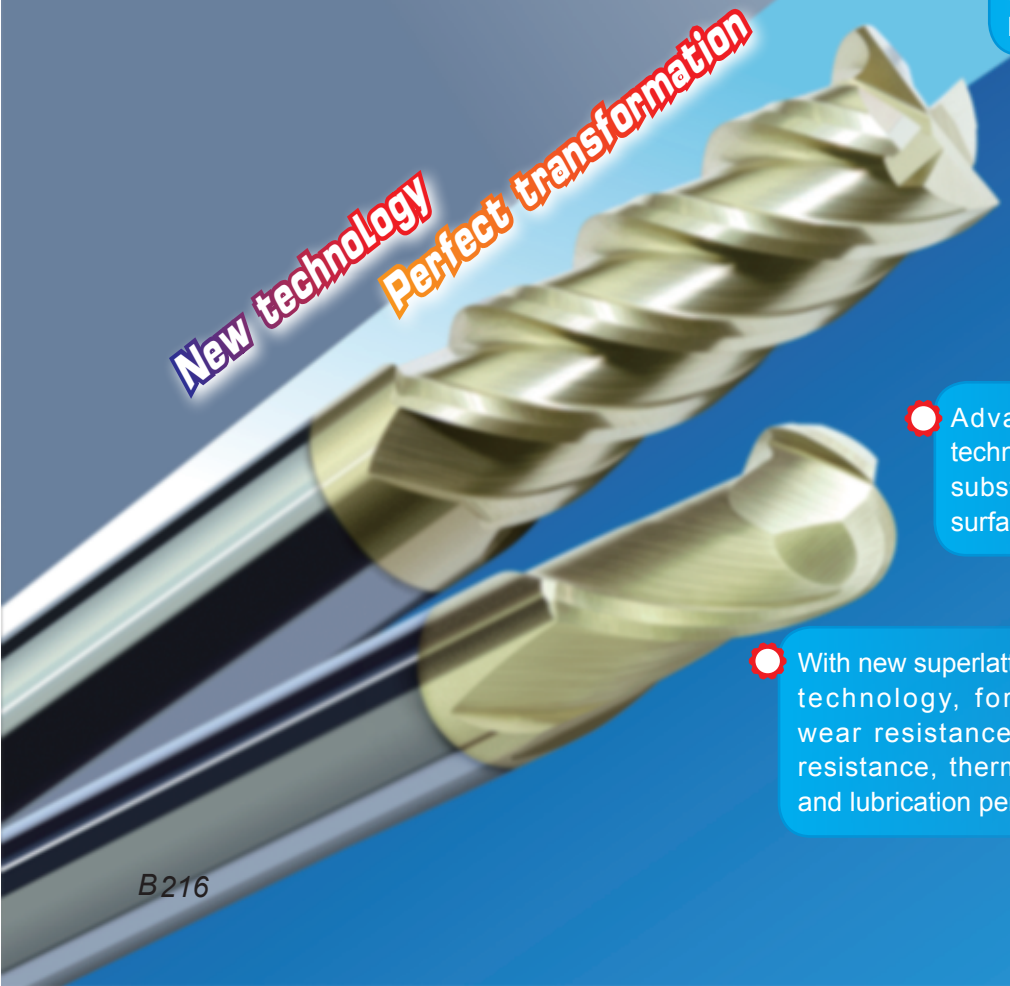
Applicable of high efficiency machining in a variety of materials under HRC50, while significantly promoting machinability of soft materials such as carbon steel, low carbon alloy steel underHRC40!

PML, PM, HMX high performance solid carbide endmills series
Recommendation for steel materials machining application



Application range:

Applicable to high-efficiency machining in a variety of materials under HRC50, e.g. non-ferrous alloy, steel, pre-hardened steel, stainless steel, especially suitable for soft materials such as carbon steel, low carbon alloy steel under HRC40. With excellent cutting performance in both dry and wet cutting.

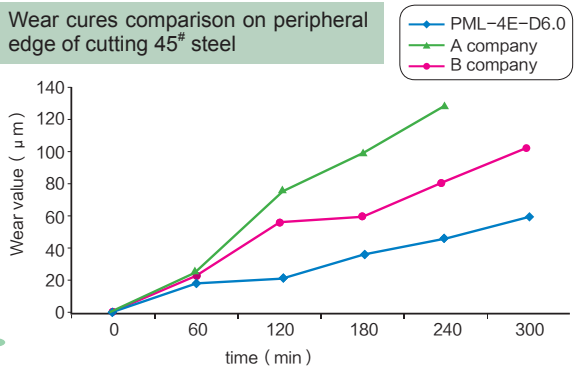


- Unique cutting edge design, balancing edges strength and sharpness, with low cutting force.
- Light yellow coating allows for better wear observation.
- Advanced coating after-treatment technology, for closer combination with substrate, lower friction and superior surface quality.
- With new superlattice coatings technology, for excellent wear resistance, oxidation resistance, thermal stability and lubrication performance.

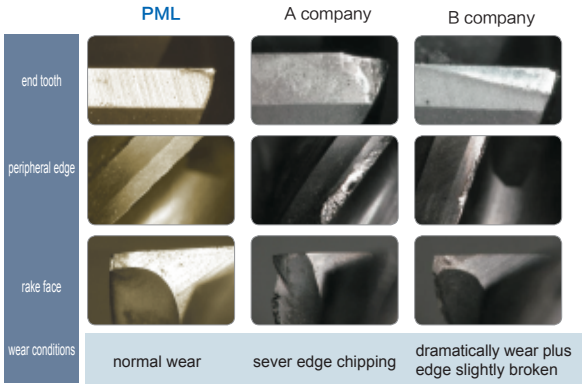
PML-4E-D6.0 Application of machining 45# steel

tool: PML-4E-D6.0
workipiece material: 45# steel(HB180)
cutting data: Vc=150m/min, f_z=0.05mm/z,
a_p=6mm, a_e=0.5mm
Machine: machining center
cooling system: air cooling

Wear cures comparison on peripheral edge of cutting 45# steel



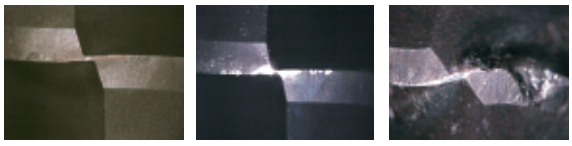
Wear comparison after 240min machining



PML-2B-R2.5 Application of machining grey cast iron HT250

workpiece: brake disc
workpiece material: HT250(HB200)
machining parts: slot milling
tool: PML-2B-R2.5
cutting data: V_c=150m/min, f_r=0.15mm/r,
a_p=0.25mm
machine: machining center
cooling system: air cooling

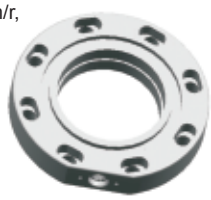
wear comparison after machining 1000pcs



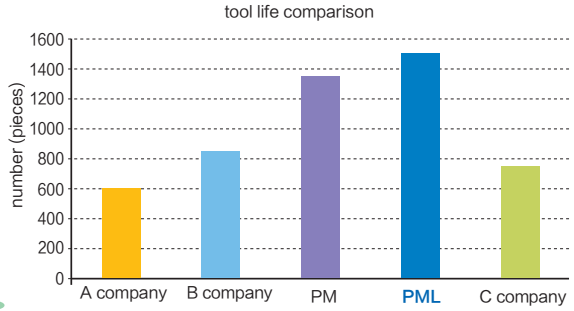
PML−2B−R2.5 A company B company

PML-2E-D20.0 Application of machining carbon steel

workpiece: valve
workipiece material: carbon steel (HB220)
machining parts: kidney slots(Ø24mm×40mm×20mm)
tool: PML-2E-D20.0
cutting data: V_c=130m/min, f_r=0.15mm/r,
a_p=10mm
machine: machining center
cooling system: water soluble cooling



number of slots comparison



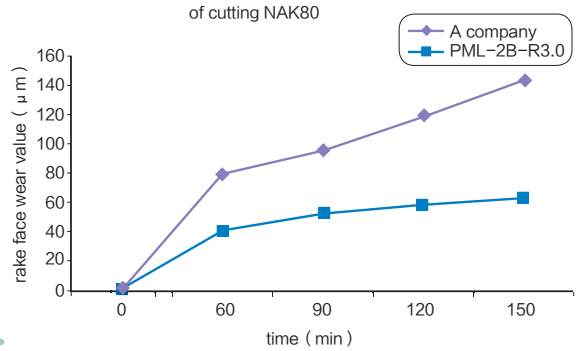
PML-2B-R3.0 Application of machining pre-hardened steel NAK80

milling method: profile milling
workpiece material: NAK80(HRC36)
tool: PML-2B-R3.0
cutting data: V_c=100m/min, f_r=0.3mm/r, a_p=1mm, a_e=1mm
machine: machining center
cooling system: water soluble cooling

rake face wear comparison after150min machining

PML−2B−R3.0 A company

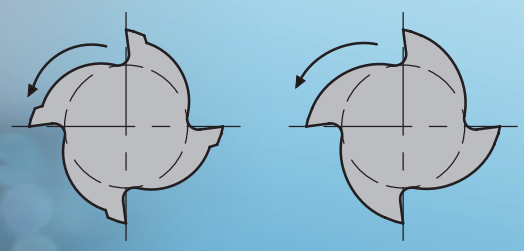
wear curves



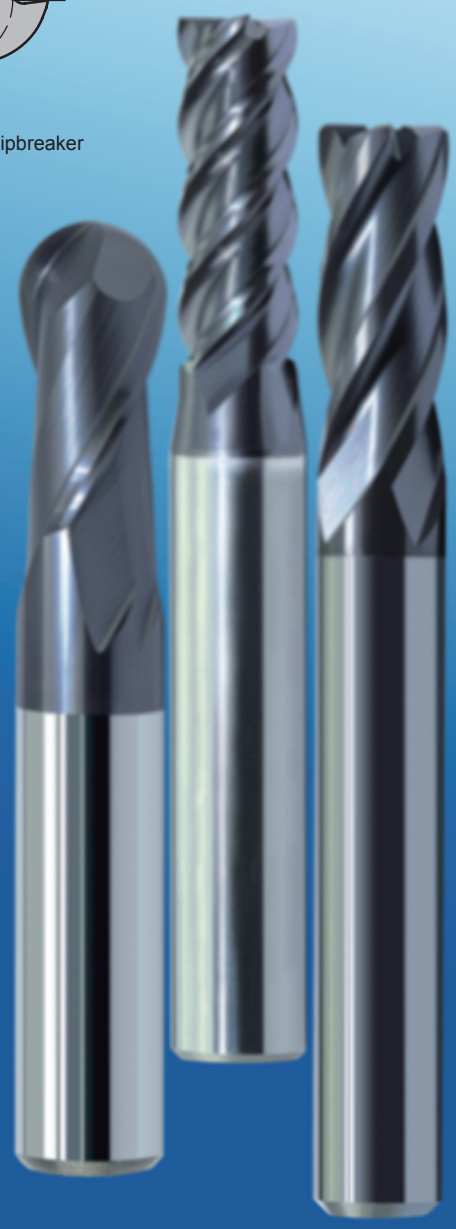
High performance universal machining

PM series

Optimized geometry, improves chip removal and chip forming with reduced cutting force.

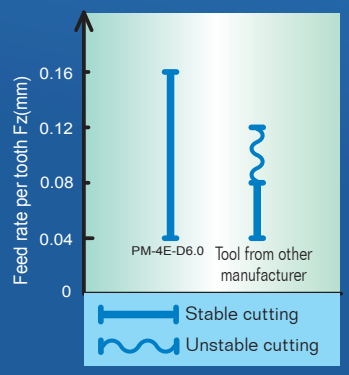


a) PM chipbreaker b) Conventional chipbreaker



Higher feed rates and improved metal removal rate for efficient machining, due to high stability of cutting edge and rigid tool structure.

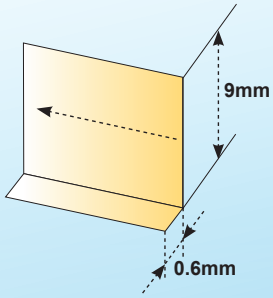
Tool diameter: Ø6.0mm
Tool type: a) PM-4E-D6.0
b) Tool from overseas manufacturer
Mmachine tool: Mikron UCP1000
Workpiece material: NAK80(40HRC)
Cooling system: air blow
Machining operation: side milling (down milling)
Cutting parameters: V_c=100m/min,
a_p=9mm, a_e=0.6mm,
F_z=0.04mm~0.16mm



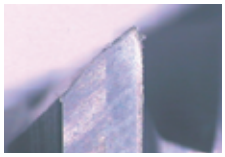
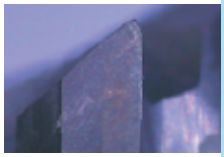
With excellent wear resistance and toughness, high wear resistance and breakage resistance is achieved even during high performance milling.

Tool type: PM-4E-D6.0
Diameter: Ø6.0mm
Workpiece material: NAK80(40HRC)
Rotating speed: 5300r/min (100m/min)
Feed speed: 1696mm/min (0.32mm/r)
Axial cutting depth: a_p=9mm

Radial cutting depth: a_e=0.6mm
Cutting style: side milling (down milling)
Cooling system: air blow
Mmachine tool: MIKRON UCP1000
Tool overhang: 22mm



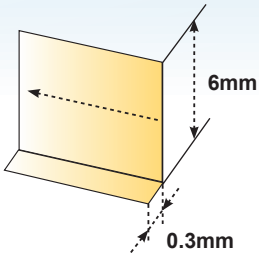
Machining results

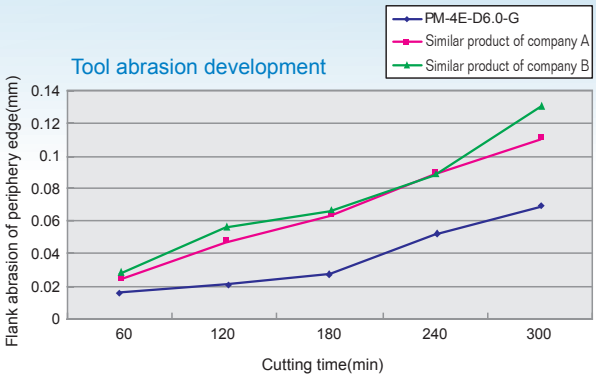
Machining time	50min			
Tool abrasion				
Tool type	PM–4E–D6.0	Similar product of company A	Similar product of company B	PM–4E–D6.0

Conclusion: compared with other tools manufacturer, PM series has better breakage resistance.

The application status of PM-4E-D6.0-G in high speed milling.

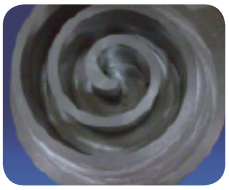
Tool type: PM-4E-D6.0-G
Diameter: Ø6.0mm
Workpiece material: NAK80(40HRC)
Rotating speed: 13260r/min(250m/min)
Feed speed: 2652mm/min(0.2mm/r)
Axial cutting depth: a_p=6mm
Radial cutting depth: a_e=0.3mm
Cutting style: side milling (down milling)
Cooling system: air blow
Mmachine tool: MIKRON HSM800
Tool overhang: 22mm

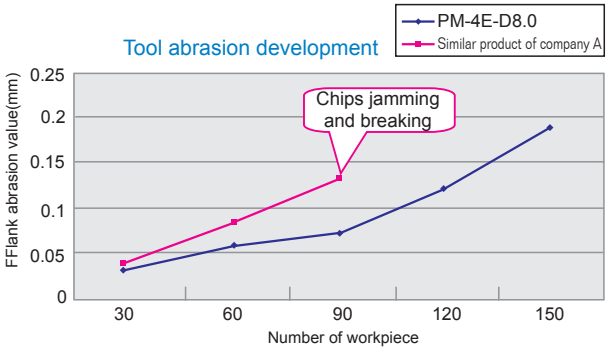




High efficiency machining alloy steel of PM-4E-D8.0.

Machine tool: MIKRON UCP1000
Tool holder: HSK63-A
Workpiece material: alloy steel
Cutting speed: 100(m/min)
Feed rate per tooth: 0.04(mm/tooth)
Axial cutting depth: 8(mm)
Radial cutting width(mm): changing, Maximum at full cutting
Cooling system: Emulsified liquid
Milling style: Contour following
Tool overhang: 30mm



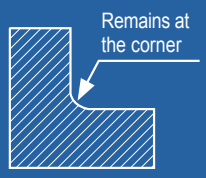


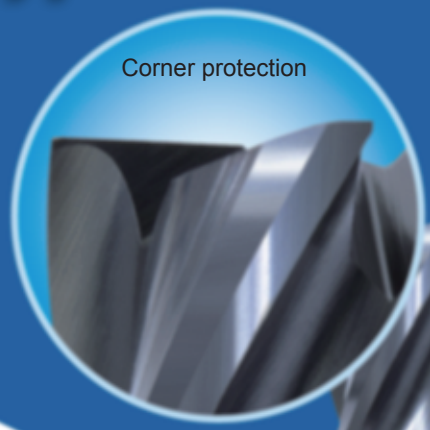
End mills series of sharp and corner protection type

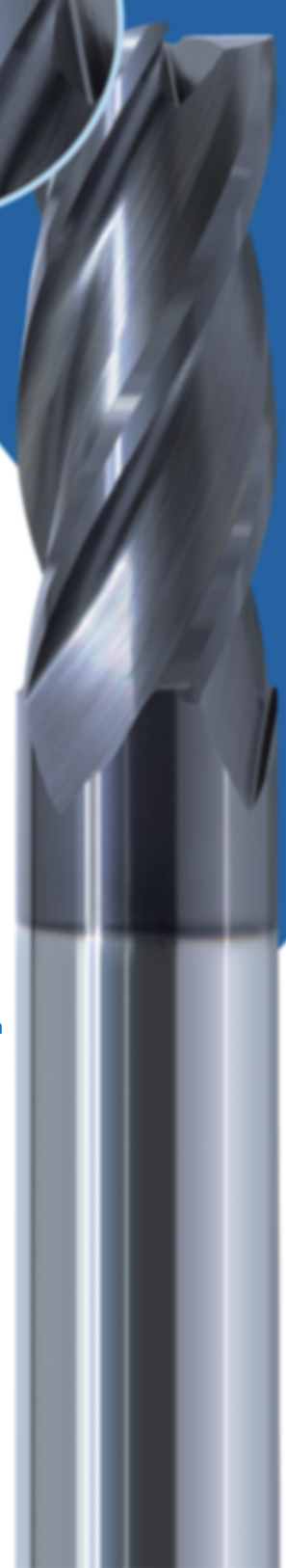
The characteristic of corner protection end mill:

It's suitalbe for bad cutting condition or hardness material machining.

- **High cutting edge strength and breakage resistance.**
- **The degree of nose sharpness is reduced.**

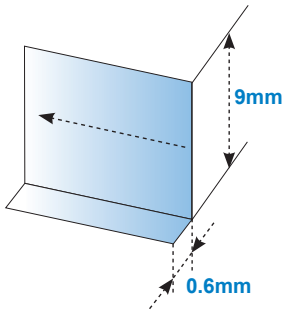






Two kind of cutting nose being used in side face milling of NAK80(40HRC)

Machine tool: MIKRON UCP1000
Tool holder: HSK63-A
Workpiece material: NAK80(40HRC)
Cutting speed: 100(m/min)(5300r/min)
Feed rate per tooth: 0.04-0.16(mm/tooth)
Axial cutting depth: 9(mm)
Radial cutting width: 0.6(mm)
Cooling system: air blow
Milling style: side milling (down milling)
Tool overhang: 22(mm)



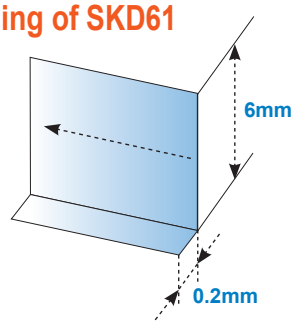
Tool abrasion when machining NAK80(HRC40)

Machining length	50m		100m		150m	
Feed rate per tooth(mm/z)	Corner protection	Sharp	Corner protection	Sharp	Corner protection	Sharp
0.04	✓	✓	✓	✓	✓	✓
0.08	✓	✓	✓	×	✓	×
0.12	✓	×	✓	×	✓	×
0.16	✓	×	✓	×	✓	×

"✓" Nose is intact "×" Nose severely flakes

Two kind of cutting nose being used in side face milling of SKD61

Machine tool: MIKRON HSM800
Tool holder: HSK A40
Workpiece material: SKD61(55HRC)
Cutting speed: 150(m/min)(7960r/min)
Feed rate per tooth: 0.03-0.09(mm/tooth)
Axial cutting depth: 6(mm)
Radial cutting width: 0.2(mm)
Cooling system: air blow
Milling style: side milling (down milling)
Tool overhang: 22(mm)

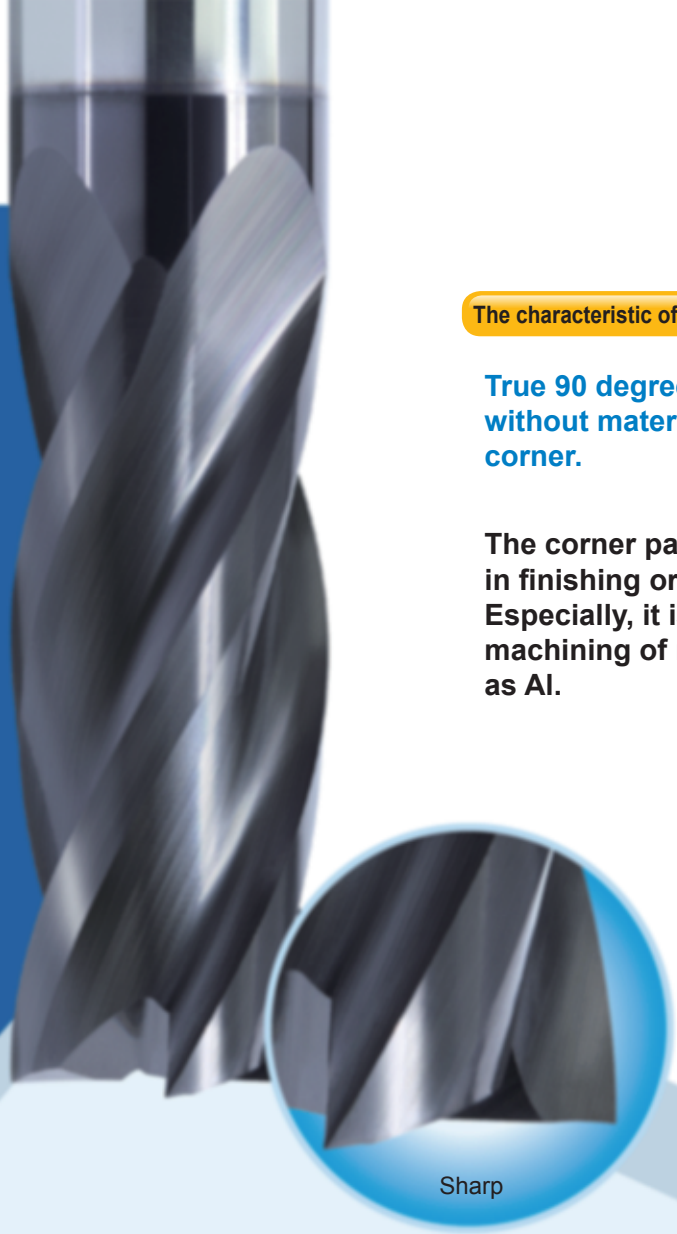


Tool abrasion when machining SKD61(HRC55)

Cutting time	90m		180m		270m		360m	
Feed rate per tooth(mm/z)	Corner protection	Sharp	Corner protection	Sharp	Corner protection	Sharp	Corner protection	Sharp
0.03	✓	✓	✓	✓	✓	✓	✓	×
0.06	✓	✓	✓	×	✓	×	✓	×
0.09	✓	×	✓	×	✓	×	×	×

"✓" Nose is intact "×" Nose severely flakes

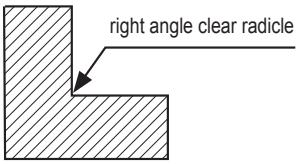
Sharp



The characteristic of sharp end mill:

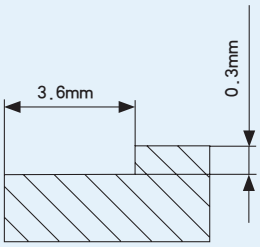
True 90 degree angle is obtained without material remaining in the corner.

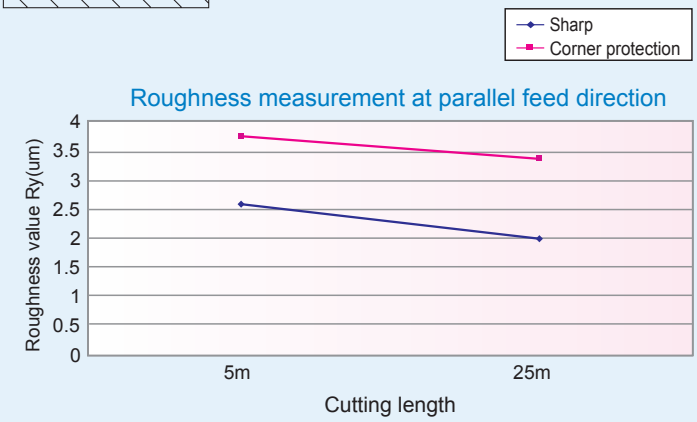
The corner part is sharp; it is applicable in finishing or soft material machining. Especially, it is usually used in machining of non-ferrous material such as Al.



Bottom face finishing of NAK80(HRC40) by tools with the two corner structures roughness measurement parallel with feed direction

Machine tool: MIKRON UCP1000
Diameter: Ø6.0mm
Tool holder: HSK63-A
Workpiece material: NAK80(40HRC)
Cutting speed: 200(m/min)
Feed rate per tooth: 0.03(mm/tooth)
Axial cutting depth: 0.3(mm)
Radial cutting width: 3.6(mm)
Cooling system: air blow
Milling style: end milling (down milling)
Tool overhang: 22(mm)



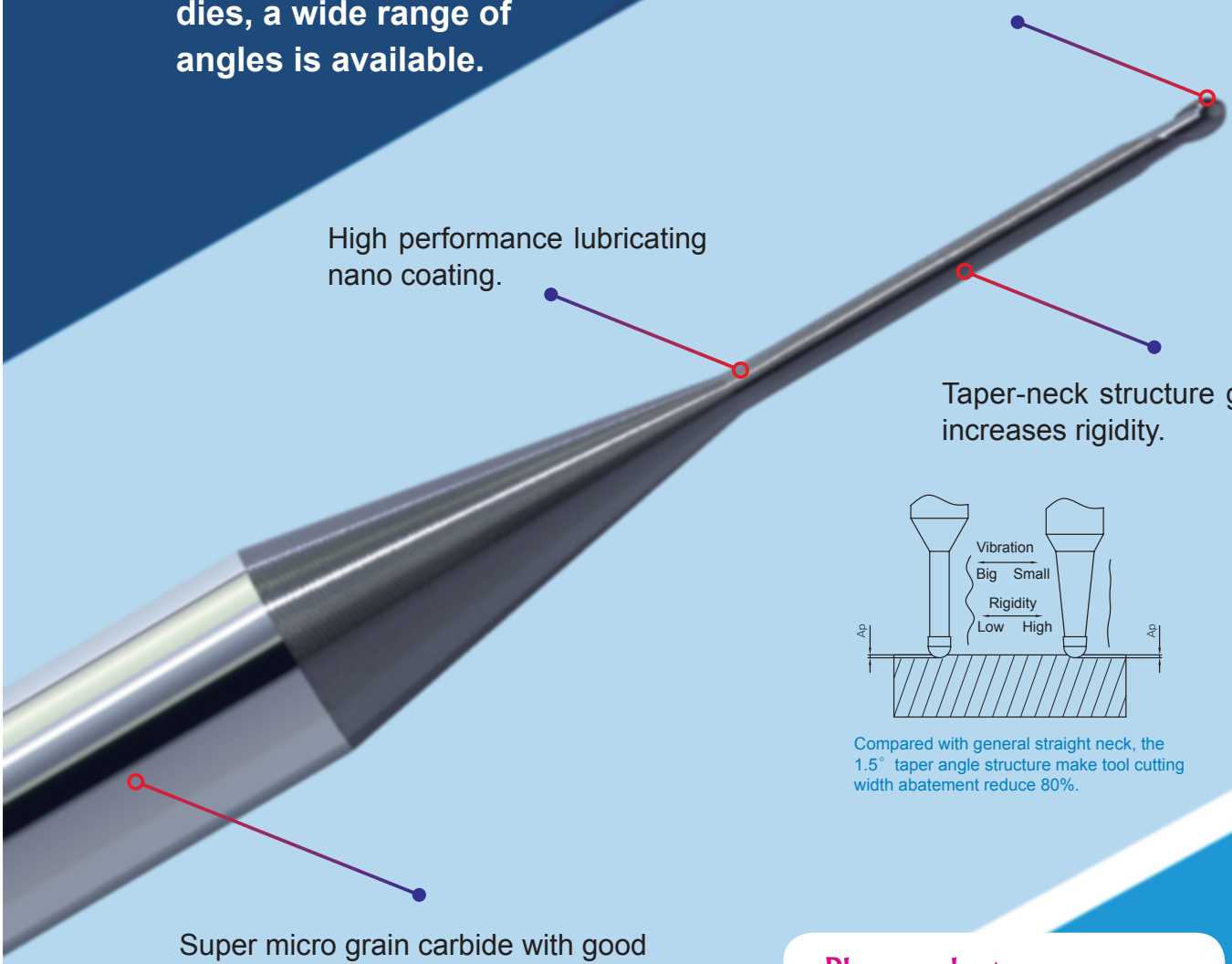


The best choice for finish milling of molds

PM-2BC

Taper neck type ball nose end mills:

- **Suitable for high precision and high performance machining of molds.**
- **In accordance with draft of dies, a wide range of angles is available.**

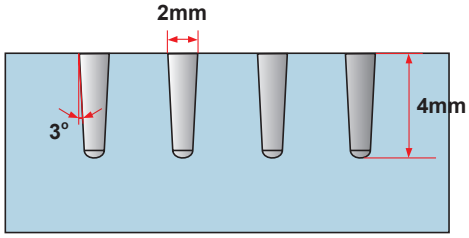


Compared with general straight neck, the 1.5° taper angle structure make tool cutting width abatement reduce 80%.

Please select proper taper angle according to workpiece shape!

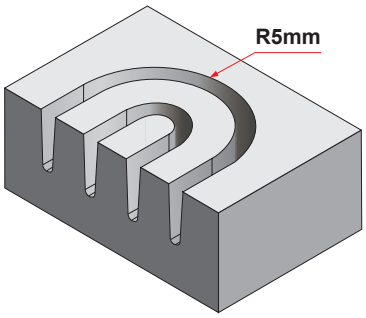
Application of PM-2BC15-R0.25-M05 in machining mold slot

Workpiece material: NAK80(40HRC)
Rotating speed: 30000r/min
Feed speed: 300mm/min
Axial cutting depth: a_p=0.03mm
Radial cutting depth: a_e=0.03mm
Cutting style: contour line machining
Cooling system: water cooling
Machine tool: MIKRON UCP1000



Front view

Tool	PM-2BC15-R0.25-M05(taper neck) R0.25×1.5° ×5	(parallel neck) R0.25×5
Machining results	Taper neck ball nose end mill completed slot machining successfully. Machining time is 160min. Tool abrasion is acceptable and tool is still usable.	Parallel neck ball nose end mill failed to complete machining. The tool breaks after 90 minutes of operating.



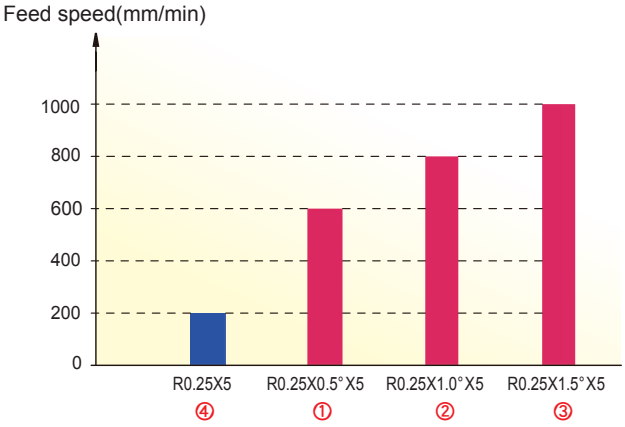
Isometric drawing

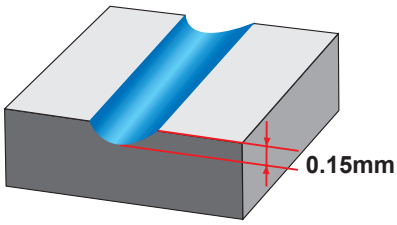
Effect of taper neck angle on feed speed

Tool type and size:

① PM-2BC05-R0.25-M05(taper neck) R0.25×0.5° ×5
② P M - 2BC1 0 - R 0 . 2 5 - M 0 5(taper neck) R0.25×1.0° ×5
③ P M - 2BC1 5 - R 0 . 2 5 - M 0 5 (taper neck) R0.25×1.5° ×5
④ (parallel neck) R0.25×5

Workpiece material: NAK80(37HRC)
Rotating speed: 30000r/min
Axial cutting depth: a_p=0.15mm
Cutting style: linear cutting
Cooling system: air blow
Machine tool: MIKRON UCP1000



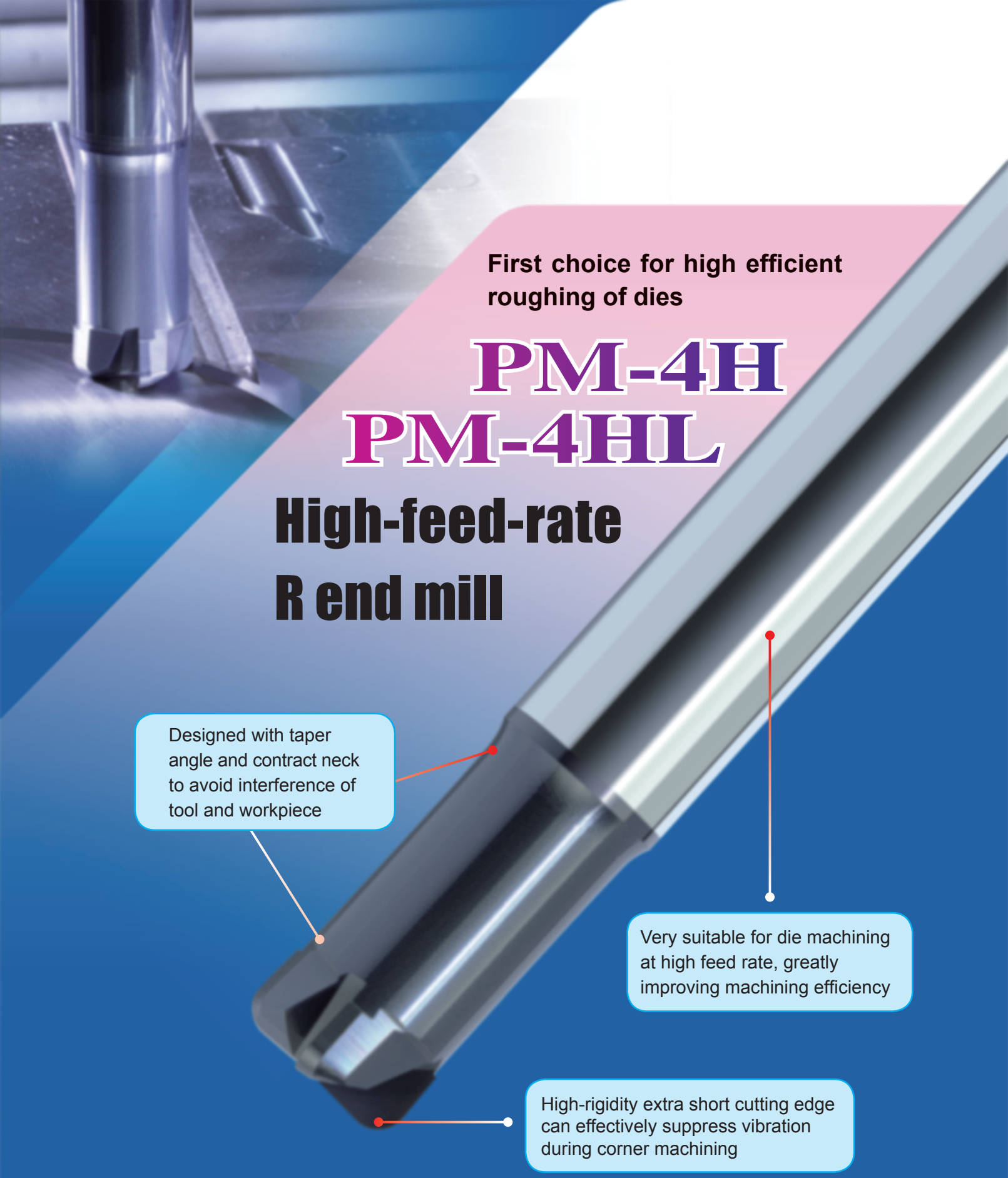


○ Feed rate range applicable to tools with different tapers is shown in the graph.
○ Feed rate of parallel neck tools is lower than that of all taper neck tools.
○ The larger the taper angle, the higher the feed rate.

First choice for high efficient roughing of dies

PM-4H
PM-4HL

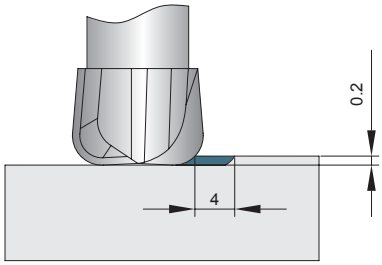
High-feed-rate R end mill



Improve metal removal rate as much as possible and reduce machining cost!

Application of PM-4H-D8.0R2.0 milling NAK80: Feed rate per tooth Fz up to 0.6mm

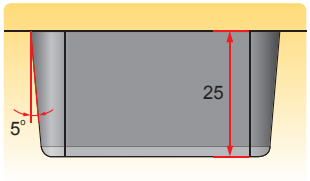
Tool type: PM-4H-D8.0R2.0
Diameter: Ø8.0mm
Workpiece material: NAK80(40HRC)
Rotating speed: 3980r/min
Cutting speed: 100m/min
Feed speed: 9550mm/min
Feed rate per tooth: 0.6mm/z
Axial cutting depth: a_p=0.2mm
Radial cutting depth: a_e=4mm
Cutting style: Linear end milling (down milling)
Cooling system: air blow
Machine tool: MIKRON UCP1000
Tool overhang: 32mm



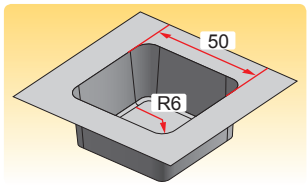
Note: The tool is still usable when cutting length reaches 800m.

Application of PM-4H-D8.0R2.0 in die cavity milling

Tool type: PM-4H-D8.0R2.0
Diameter: Ø8.0mm
Workpiece material: NAK80(40HRC)
Rotating speed: 5970r/min
Cutting speed: 150m/min
Feed speed: 7160mm/min
Feed rate per tooth: 0.3mm/z
Axial cutting depth: a_p=0.2mm
Radial cutting depth: a_e=4mm
Cutting style: cavity milling(down milling)
Cooling system: air blow
Machine tool: MIKRON UCP1000
Tool overhang: 32mm



Front view

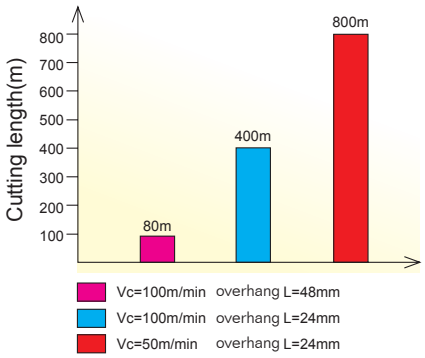


Isometric drawing

Note: It takes just 13min to machine a complete cavity. The tool is almost intact and still usable.

Cutting performance of high-feed-rate end mills under different cutting conditions

Tool type and overhang:
①PM-4H-D6.0R1.5 overhang:24mm
②PM-4HL-D6.0R1.5 overhang:48mm
Diameter: Ø6.0mm
Workpiece material: NAK80(40HRC)
Cutting speed: 50~100m/min
Feed rate per tooth: 0.25mm/z
Axial cutting depth: a_p=0.2mm
Radial cutting depth: a_e=2mm
Cutting style: Linear end milling (down milling)
Cooling system: air blow
Machine tool: MIKRON UCP1000



Note: Other cutting conditions being the same:
①When the cutting speed is reduced to half, the cutting length would be doubled before reaching the same grinding standard.
②When the overhang of tool is doubled, the tool life would be one fifth of the original.

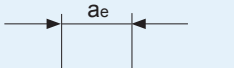
High precision profile milling

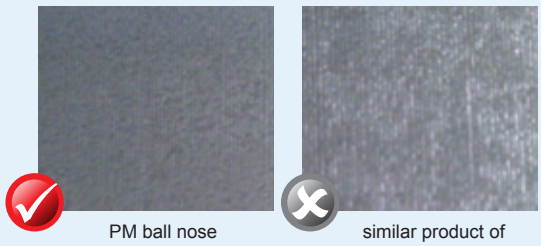
PM series 2-flute ball nose end mill

PM-2B PM-2BL PM-2BFP

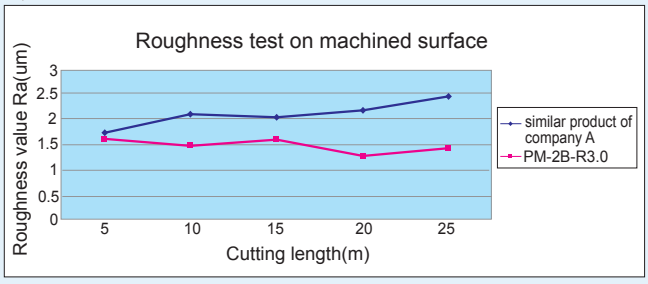
Application of high-performance 2-flute ball nose end mill milling NAK80

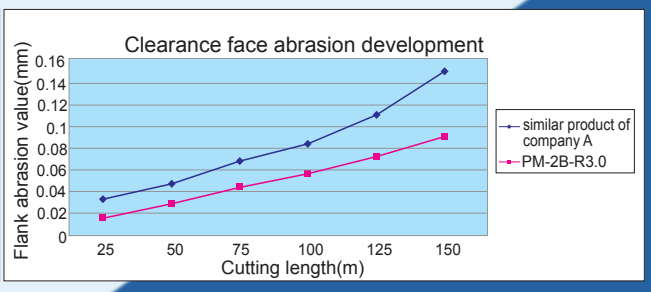
Tool type: PM-2B-R3.0
Diameter: Ø6.0mm
Workpiece material: NAK80(40HRC)
Rotating speed: 10600r/min (200m/min)
Feed speed: 2120mm/min (0.2mm/r)
Axial cutting depth: a_p=0.2mm
Radial cutting depth: a_e=0.3mm
Cutting style: single direction linear milling Zig
Cooling system: air blow
Mmachine tool: MIKRON UCP1000
Tool overhang: 20mm
Roughness measure: TM2000





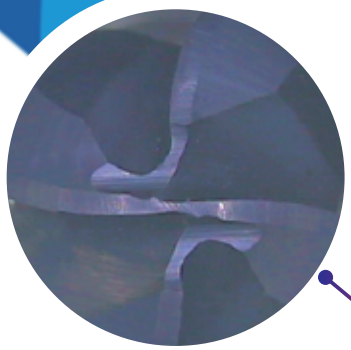
PM ball nose end mills can achieve distinct grooves with low roughness and high surface quality.



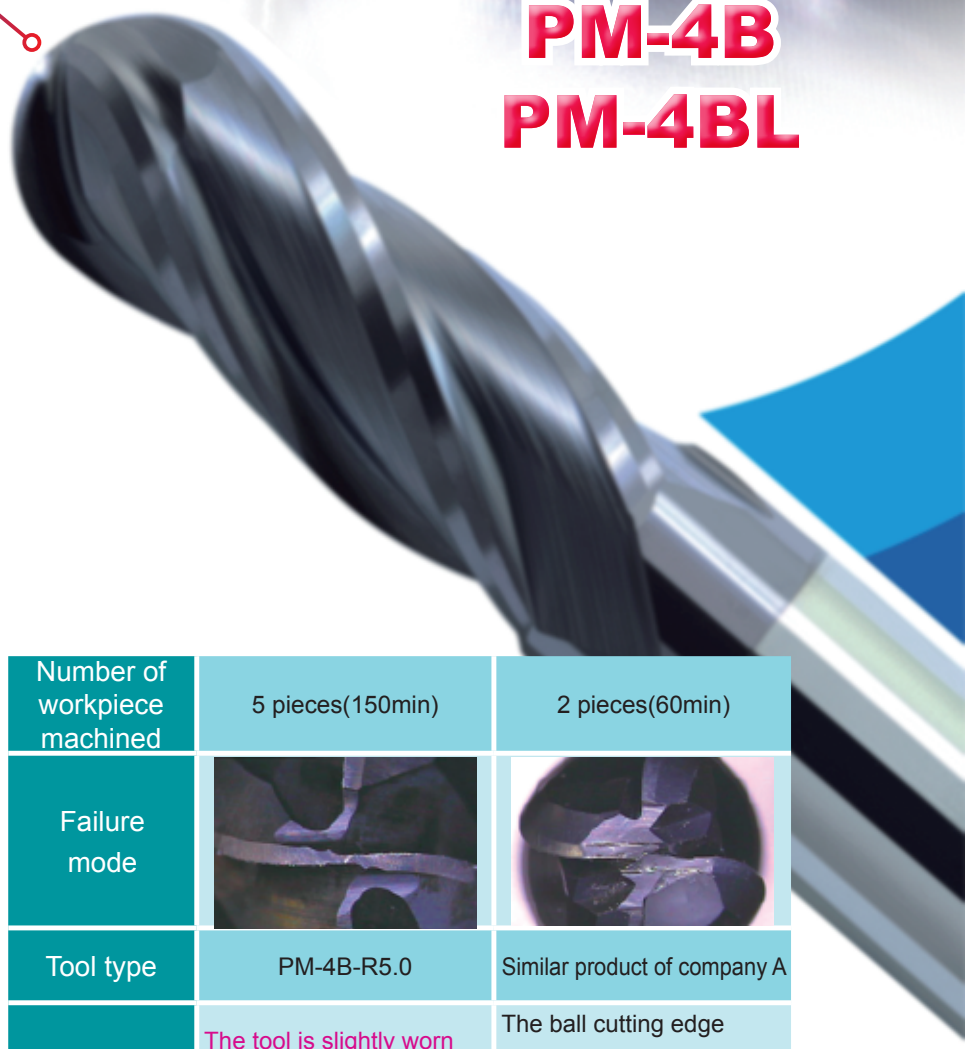


High efficient profile milling tools

PM series 4-flute ball nose end mills

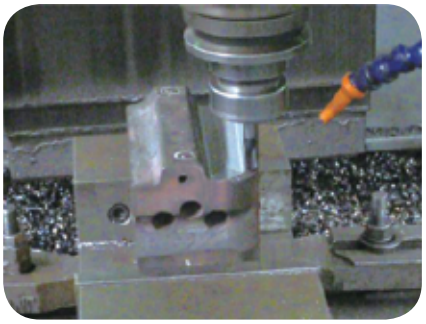


The center design of ball cutting edge combines high strength and sharpness, and properly manages the chips generated during machining.



PM-4B
PM-4BL

Application of high-performance 4-flute ball nose end mill milling Cr12



Tool type: PM-4B-R5.0
Diameter: Ø10.0mm
Workpiece material: Cr12(36HRC)
Rotating speed: 2800r/min (88m/min)
Feed speed: 3000 mm/min
Axial cutting depth: a_p=1mm
Radial cutting depth: a_e=0.6mm
Cutting style: profile milling
Cooling system: air blow
Machine tool: Xiehong CNC-1600
Tool overhang: 45mm
Workpiece clamp: SafeWay CV-200V
Tooling systems: BT50-ER40-100

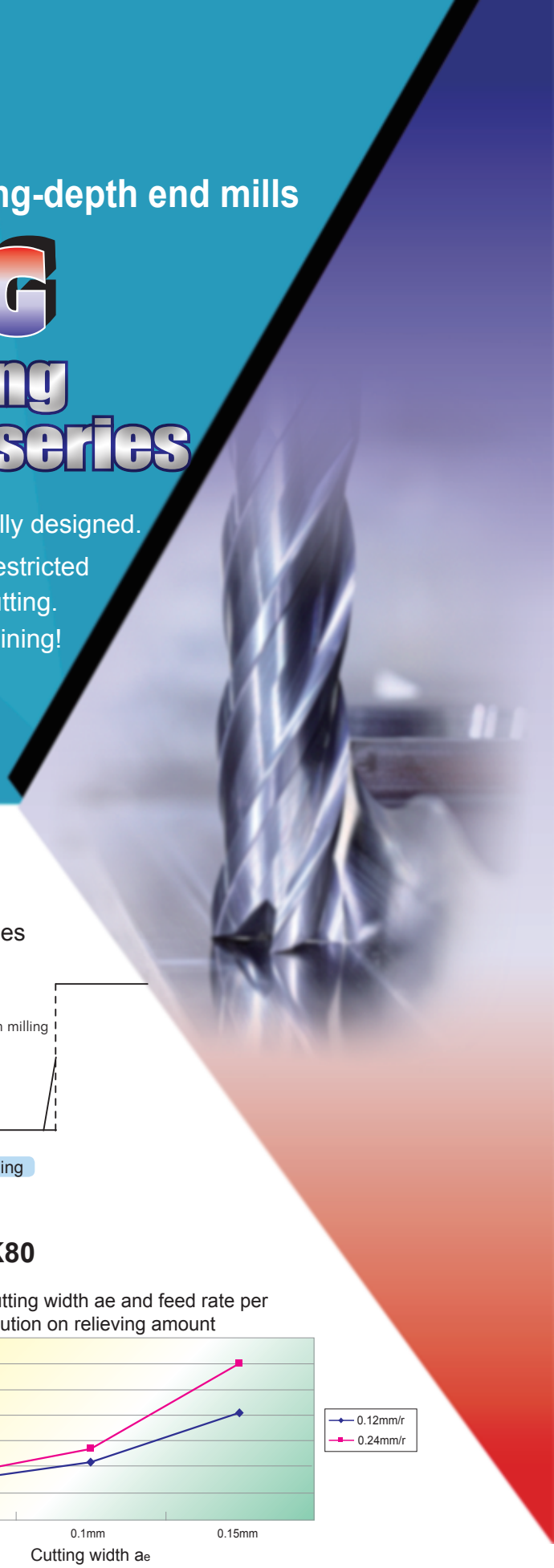
Number of workpiece machined	5 pieces(150min)	2 pieces(60min)
Failure mode		
Tool type	PM-4B-R5.0	Similar product of company A
Explanation	The tool is slightly worn and still usable even after machining 5 workpieces.	The ball cutting edge center suffers severe breakage after machining 2 workpieces.

High-efficiency and high-cutting-depth end mills

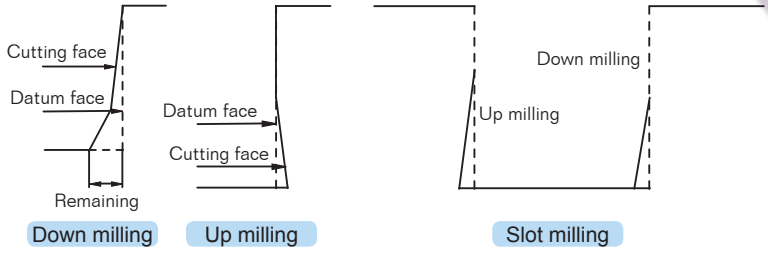
PM-4EX-G

Extra long cutting edge end mills series

- Chipbreaker and cutting edge are optimally designed. The relieving amount of the side wall is restricted within a small range even in full length cutting.
- Very suitable for high-cutting-depth machining!



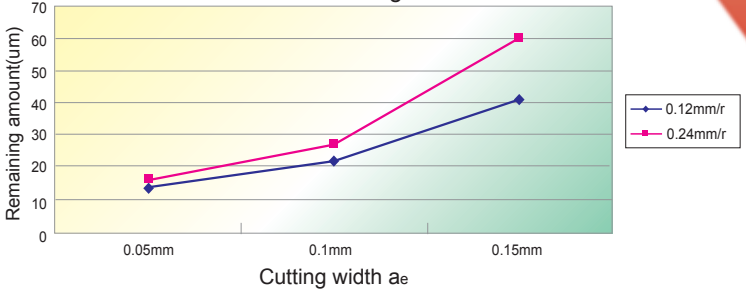
Remaining amount in different cutting styles



Application of PM-4EX-D6.0-G milling NAK80

Tool type: PM-4EX-D6.0-G
Diameter: Ø6.0mm
Workpiece material: NAK80(40HRC)
Cutting speed: 80 m/min
Feed speed: 0.12 mm/r，0.24 mm/r
Axial cutting depth: a_p=28mm
Radial cutting depth: a_e=0.05~0.15mm
cutting style: side milling (down milling)
cooling system: air blow
machine tool: MIKRON UCP1000

Effect of cutting width ae and feed rate per revolution on relieving amount



Conclusion: Reduced remaining amount with optimized cutting conditions.

High efficiency milling tools PML-H/PM-H series endmills

- 38°helical angle
- Optimized geometry for smooth chip evacuation
- Strengthened nose and tooth with greatly improved vibration resistance
- More suitable for slot milling

Case:

machine: vertical machining center
tool: PML-4E-D12.0-H
workpiece material: 45# steel
machining parts: slot milling
cooling system: air cooling
cutting speed: 200m/min
feed per tooth: 0.06mm/z
depth of cut: 6mm

machined surface quality comparison

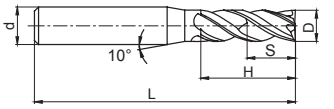
A company

PML-4E-D12.0-H

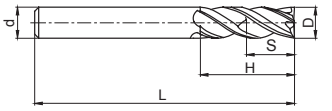
Result: with excellent vibration resistance, PML-H series demonstrate outstanding machinablity performance in cutting operation and the machined surface quality is superior to that of company A.

4-flute unequal pitch flattened end mill with straight shan

UM-4E



Picture 1



Picture 2

38°,41° | Coated AlTiN | D: D≤6 -0.020~-0.038 6<D≤10 -0.025~-0.047 10<D≤18 -0.032~-0.059 18<D -0.04~-0.073

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	d	H	S	L			
UM-4E-D4.0S	4.0	4	11	6.00	50	4	Picture 2	○
UM-4E-D4.0	4.0	6	11	6.00	50	4	Picture 1	○
UM-4E-D4.5	4.5	6	11	6.75	50	4	Picture 1	○
UM-4E-D5.0	5.0	6	13	7.50	50	4	Picture 1	○
UM-4E-D5.5	5.5	6	16	8.25	50	4	Picture 1	○
UM-4E-D6.0	6.0	6	16	9.00	50	4	Picture 2	○
UM-4E-D7.0	7.0	8	20	10.5	60	4	Picture 1	○
UM-4E-D8.0	8.0	8	20	12.0	60	4	Picture 2	○
UM-4E-D9.0	9.0	10	22	13.5	75	4	Picture 1	○
UM-4E-D10.0	10.0	10	25	15.0	75	4	Picture 2	○
UM-4E-D11.0	11.0	12	26	16.5	75	4	Picture 1	○
UM-4E-D12.0	12.0	12	30	18.0	75	4	Picture 2	○
UM-4E-D14.0	14.0	14	32	21.0	75	4	Picture 2	○
UM-4E-D16.0	16.0	16	45	24.0	100	4	Picture 2	○
UM-4E-D18.0	18.0	18	45	27.0	100	4	Picture 2	○
UM-4E-D20.0	20.0	20	45	30.0	100	4	Picture 2	○

● Stock available ○ Make-to-order

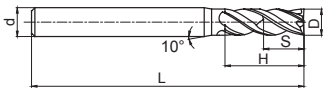
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

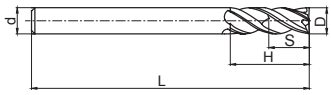
Code key B213
Graphics category and identification B214
Cutting parameters B360–B361

4-flute long cutting edge and unequal pitch flattened end mill with straight shank

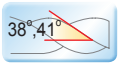
UM-4EL

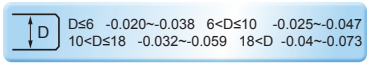


Picture 1



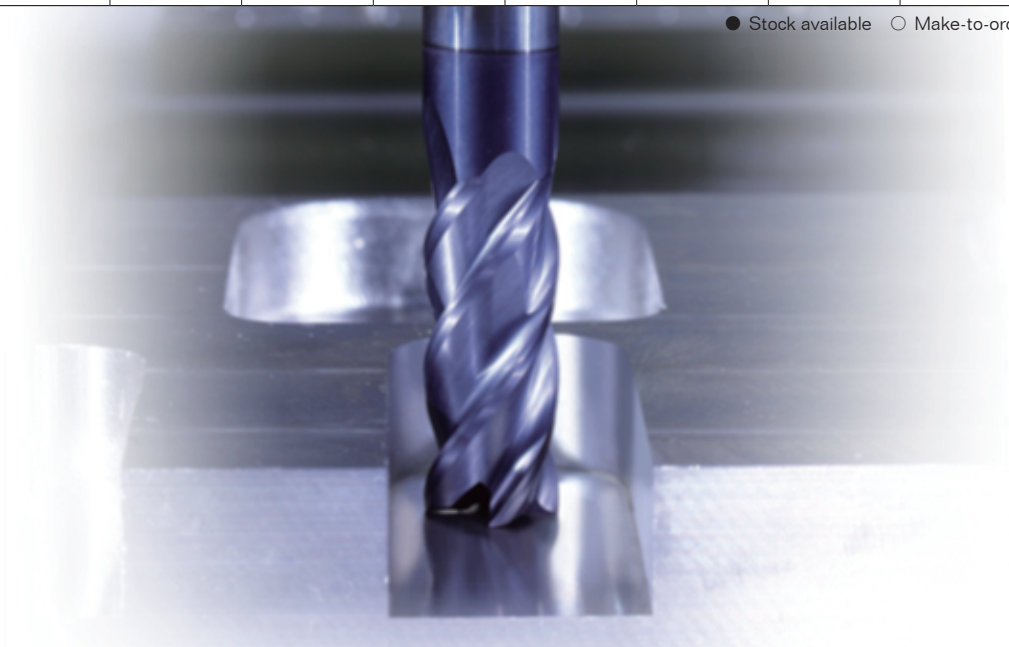
Picture 2





Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	d	H	S	L			
UM-4EL-D4.0	4.0	6	15	6.00	75	4	Picture 1	○
UM-4EL-D5.0	5.0	6	20	7.50	75	4	Picture 1	○
UM-4EL-D6.0	6.0	6	20	9.00	75	4	Picture 2	○
UM-4EL-D8.0	8.0	8	25	12.0	100	4	Picture 2	○
UM-4EL-D10.0	10.0	10	30	15.0	100	4	Picture 2	○
UM-4EL-D12.0	12.0	12	35	18.0	100	4	Picture 2	○
UM-4EL-D14.0	14.0	14	40	21.0	100	4	Picture 2	○
UM-4EL-D16.0	16.0	16	50	24.0	150	4	Picture 2	○
UM-4EL-D20.0	20.0	20	55	30.0	150	4	Picture 2	○

● Stock available ○ Make-to-order



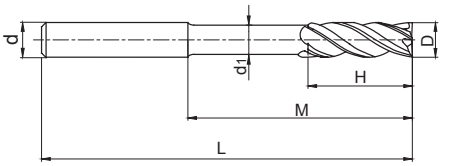
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B360–B361

4-flute unequal pitch flattened end mill with long neck, short cutting edge and straight shank

UM-4EFP



38°,41° | Coated AlTiN | D: D≤6 -0.020~-0.038, 6<D≤10 -0.025~-0.047, 10<D≤18 -0.032~-0.059, 18<D -0.04~-0.073

Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
UM-4EFP-D6.0	6.0	6	9	30	5.8	75	4	○
UM-4EFP-D8.0	8.0	8	12	40	7.8	100	4	○
UM-4EFP-D10.0	10.0	10	15	50	9.6	100	4	○
UM-4EFP-D12.0	12.0	12	18	50	11.5	100	4	○
UM-4EFP-D16.0	16.0	16	24	50	15.5	150	4	○
UM-4EFP-D20.0	20.0	20	30	60	19.5	150	4	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

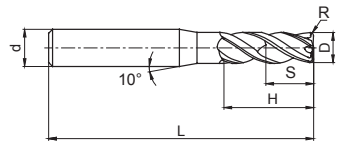
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B362–B363

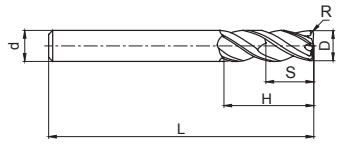
4-flute unequal pitch R end mill with straight shank

Radius shoulder Profile Radius corner slot

UM-4R



Picture 1



Picture 2

38°,41° Coated AlTiN

D	D≤6 -0.020~-0.038	6<D≤10 -0.025~-0.047
	10<D≤18 -0.032~-0.059	18<D -0.04~-0.073

Ordering number	Basic dimension(mm)						Number of teeth Z	Geometry	Stock
	D	S	d	H	S	L			
UM-4R-D4.0R0.3	4.0	0.3	6	10	6.0	50	4	Picture 1	○
UM-4R-D4.0R0.5	4.0	0.5	6	10	6.0	50	4	Picture 1	○
UM-4R-D5.0R0.5	5.0	0.5	6	13	7.5	50	4	Picture 1	○
UM-4R-D5.0R1.0	5.0	1.0	6	13	7.5	50	4	Picture 1	○
UM-4R-D6.0R0.5	6.0	0.5	6	16	9.0	50	4	Picture 2	○
UM-4R-D6.0R1.0	6.0	1.0	6	16	9.0	50	4	Picture 2	○
UM-4R-D8.0R0.5	8.0	0.5	8	20	12	60	4	Picture 2	○
UM-4R-D8.0R1.0	8.0	1.0	8	20	12	60	4	Picture 2	○
UM-4R-D10.0R0.5	10.0	0.5	10	25	15	75	4	Picture 2	○
UM-4R-D10.0R1.0	10.0	1.0	10	25	15	75	4	Picture 2	○
UM-4R-D10.0R2.0	10.0	2.0	10	25	15	75	4	Picture 2	○
UM-4R-D10.0R3.0	10.0	3.0	10	25	15	75	4	Picture 2	○
UM-4R-D12.0R0.5	12.0	0.5	12	30	18	75	4	Picture 2	○
UM-4R-D12.0R1.0	12.0	1.0	12	30	18	75	4	Picture 2	○
UM-4R-D12.0R2.0	12.0	2.0	12	30	18	75	4	Picture 2	○
UM-4R-D12.0R3.0	12.0	3.0	12	30	18	75	4	Picture 2	○
UM-4R-D16.0R1.0	16.0	1.0	16	45	24	100	4	Picture 2	○
UM-4R-D16.0R2.0	16.0	2.0	16	45	24	100	4	Picture 2	○
UM-4R-D16.0R3.0	16.0	3.0	16	45	24	100	4	Picture 2	○
UM-4R-D20.0R1.0	20.0	1.0	20	45	30	100	4	Picture 2	○
UM-4R-D20.0R2.0	20.0	2.0	20	45	30	100	4	Picture 2	○
UM-4R-D20.0R3.0	20.0	3.0	20	45	30	100	4	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

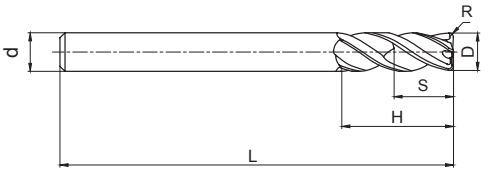
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213 Graphics category and identification B214 Cutting parameters B364–B365

4-flute long cutting edge and unequal pitch R end mill with straight shank

Radius shoulder Profile Radius corner slot

UM-4RL



38°,41° | Coated AlTiN | D: D≤6 -0.020~-0.038 6<D≤10 -0.025~-0.047 10<D≤18 -0.032~-0.059 18<D -0.04~-0.073

Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	R	d	H	S	L		
UM-4RL-D6.0R0.5	6.0	0.5	6	16	9	75	4	○
UM-4RL-D6.0R1.0	6.0	1.0	6	16	9	75	4	○
UM-4RL-D8.0R0.5	8.0	0.5	8	20	12	100	4	○
UM-4RL-D8.0R1.0	8.0	1.0	8	20	12	100	4	○
UM-4RL-D10.0R0.5	10.0	0.5	10	25	15	100	4	○
UM-4RL-D10.0R1.0	10.0	1.0	10	25	15	100	4	○
UM-4RL-D10.0R2.0	10.0	2.0	10	25	15	100	4	○
UM-4RL-D12.0R0.5	12.0	0.5	12	30	18	100	4	○
UM-4RL-D12.0R1.0	12.0	1.0	12	30	18	100	4	○
UM-4RL-D12.0R2.0	12.0	2.0	12	30	18	100	4	○
UM-4RL-D16.0R1.0	16.0	1.0	16	45	24	150	4	○
UM-4RL-D16.0R2.0	16.0	2.0	16	45	24	150	4	○

● Stock available ○ Make-to-order

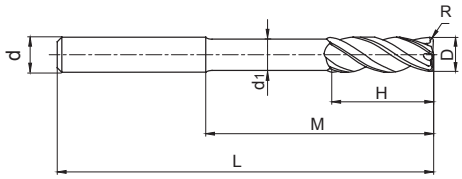
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213 Graphics category and identification B214 Cutting parameters B364–B365

4-flute long neck and short cutting edge unequal pitch R end mill with straight shank

UM-4RFP



38°,41° | Coated AlTiN | D: D≤6 -0.020~-0.038 6<D≤10 -0.025~-0.047 10<D≤18 -0.032~-0.059 18<D -0.04~-0.073

Ordering number	Basic dimension(mm)							Number of teeth	Stock
	D	R	d	d_1	H	M	L	Z	
UM-4RFP-D6.0R0.5	6.0	0.5	6	5.8	6	18	75	4	○
UM-4RFP-D6.0R1.0	6.0	1.0	6	5.8	6	18	75	4	○
UM-4RFP-D8.0R0.5	8.0	0.5	8	7.7	8	24	100	4	○
UM-4RFP-D8.0R1.0	8.0	1.0	8	7.7	8	24	100	4	○
UM-4RFP-D10.0R0.5	10.0	0.5	10	9.6	10	30	100	4	○
UM-4RFP-D10.0R1.0	10.0	1.0	10	9.6	10	30	100	4	○
UM-4RFP-D10.0R2.0	10.0	2.0	10	9.6	10	30	100	4	○
UM-4RFP-D12.0R0.5	12.0	0.5	12	11.5	12	36	100	4	○
UM-4RFP-D12.0R1.0	12.0	1.0	12	11.5	12	36	100	4	○
UM-4RFP-D12.0R2.0	12.0	2.0	12	11.5	12	36	100	4	○
UM-4RFP-D16.0R1.0	16.0	1.0	16	15.5	16	40	150	4	○
UM-4RFP-D16.0R2.0	16.0	2.0	16	15.5	16	40	150	4	○

● Stock available ○ Make-to-order

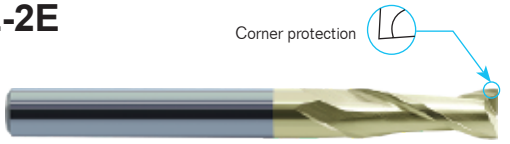
Applicable workpiece material table ◎Very suitable ○Suitable

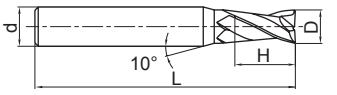
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213 Graphics category and identification B214 Cutting parameters B366

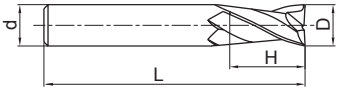
2-flute flattened end mills with straight shank

PML-2E





Picture 1



Picture 2

- Very suitable for slot milling.
- Wide application.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PML-2E-D1.0S	1.0	4	3	50	2	Picture 1	●
PML-2E-D1.5S	1.5	4	4	50	2	Picture 1	●
PML-2E-D2.0S	2.0	4	6	50	2	Picture 1	●
PML-2E-D2.5S	2.5	4	8	50	2	Picture 1	●
PML-2E-D3.0S	3.0	4	8	50	2	Picture 1	●
PML-2E-D4.0S	4.0	4	11	50	2	Picture 2	●
PML-2E-D1.0	1.0	6	3	50	2	Picture 1	●
PML-2E-D1.5	1.5	6	4	50	2	Picture 1	●
PML-2E-D2.0	2.0	6	6	50	2	Picture 1	●
PML-2E-D2.5	2.5	6	8	50	2	Picture 1	●
PML-2E-D3.0	3.0	6	8	50	2	Picture 1	●
PML-2E-D3.5	3.5	6	10	50	2	Picture 1	●
PML-2E-D4.0	4.0	6	11	50	2	Picture 1	●
PML-2E-D4.5	4.5	6	11	50	2	Picture 1	●
PML-2E-D5.0	5.0	6	13	50	2	Picture 1	●
PML-2E-D5.5	5.5	6	16	50	2	Picture 1	●
PML-2E-D6.0	6.0	6	16	50	2	Picture 2	●
PML-2E-D7.0	7.0	8	20	60	2	Picture 1	●
PML-2E-D8.0	8.0	8	20	60	2	Picture 2	●
PML-2E-D9.0	9.0	10	22	75	2	Picture 1	●
PML-2E-D10.0	10.0	10	25	75	2	Picture 2	●
PML-2E-D11.0	11.0	12	26	75	2	Picture 1	●
PML-2E-D12.0	12.0	12	30	75	2	Picture 2	●
PML-2E-D14.0	14.0	14	32	75	2	Picture 2	●
PML-2E-D16.0	16.0	16	45	100	2	Picture 2	●
PML-2E-D18.0	18.0	18	45	100	2	Picture 2	●
PML-2E-D20.0	20.0	20	45	100	2	Picture 2	●

● Stock available ○ Make-to-order

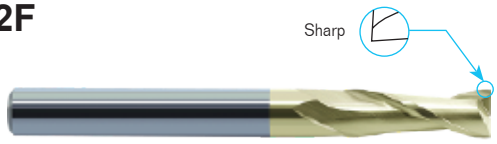
Applicable workpiece material table ◎Very suitable ○Suitable

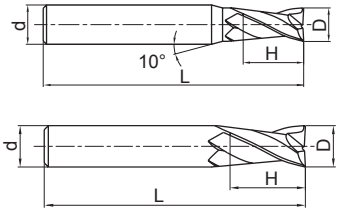
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B367

2-flute flattened end mills with straight shank

PML-2F





- Very suitable for slot milling.
- Wide application.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PML-2F-D1.0S	1.0	4	3	50	2	Picture 1	○
PML-2F-D1.5S	1.5	4	4	50	2	Picture 1	○
PML-2F-D2.0S	2.0	4	6	50	2	Picture 1	○
PML-2F-D2.5S	2.5	4	8	50	2	Picture 1	○
PML-2F-D3.0S	3.0	4	8	50	2	Picture 1	○
PML-2F-D4.0S	4.0	4	11	50	2	Picture 2	○
PML-2F-D1.0	1.0	6	3	50	2	Picture 1	○
PML-2F-D1.5	1.5	6	4	50	2	Picture 1	○
PML-2F-D2.0	2.0	6	6	50	2	Picture 1	○
PML-2F-D2.5	2.5	6	8	50	2	Picture 1	○
PML-2F-D3.0	3.0	6	8	50	2	Picture 1	○
PML-2F-D3.5	3.5	6	10	50	2	Picture 1	○
PML-2F-D4.0	4.0	6	11	50	2	Picture 1	○
PML-2F-D4.5	4.5	6	11	50	2	Picture 1	○
PML-2F-D5.0	5.0	6	13	50	2	Picture 1	○
PML-2F-D5.5	5.5	6	16	50	2	Picture 1	○
PML-2F-D6.0	6.0	6	16	50	2	Picture 2	○
PML-2F-D7.0	7.0	8	20	60	2	Picture 1	○
PML-2F-D8.0	8.0	8	20	60	2	Picture 2	○
PML-2F-D9.0	9.0	10	22	75	2	Picture 1	○
PML-2F-D10.0	10.0	10	25	75	2	Picture 2	○
PML-2F-D11.0	11.0	12	26	75	2	Picture 1	○
PML-2F-D12.0	12.0	12	30	75	2	Picture 2	○
PML-2F-D14.0	14.0	14	32	75	2	Picture 2	○
PML-2F-D16.0	16.0	16	45	100	2	Picture 2	○
PML-2F-D18.0	18.0	18	45	100	2	Picture 2	○
PML-2F-D20.0	20.0	20	45	100	2	Picture 2	○

● Stock available ○ Make-to-order

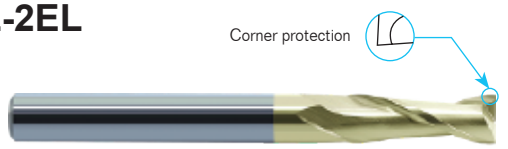
Applicable workpiece material table ◎Very suitable ○Suitable

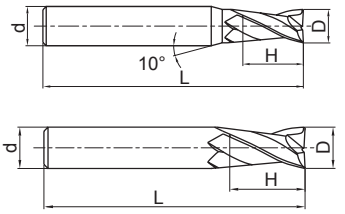
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B368

2-flute flattened end mills with straight shank and long cutting edge

PML-2EL





- PML-2E series with long cutting edge.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PML-2EL-D3.0	3.0	6	12	75	2	Picture 1	○
PML-2EL-D4.0	4.0	6	15	75	2	Picture 1	○
PML-2EL-D5.0	5.0	6	20	75	2	Picture 1	○
PML-2EL-D6.0	6.0	6	20	75	2	Picture 2	○
PML-2EL-D8.0	8.0	8	25	100	2	Picture 2	○
PML-2EL-D10.0	10.0	10	30	100	2	Picture 2	○
PML-2EL-D12.0	12.0	12	35	100	2	Picture 2	○
PML-2EL-D14.0	14.0	14	40	100	2	Picture 2	○
PML-2EL-D16.0	16.0	16	50	150	2	Picture 2	○
PML-2EL-D20.0	20.0	20	55	150	2	Picture 2	○

● Stock available ○ Make-to-order

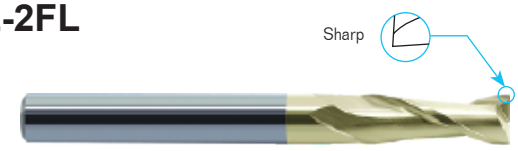
Applicable workpiece material table ◎Very suitable ○Suitable

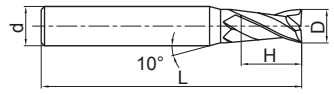
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B367

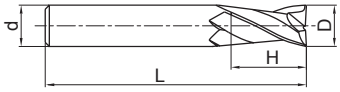
2-flute flattened end mills with straight shank and long cutting edge

PML-2FL





Picture 1



Picture 2

- PML-2F series with long cutting edge.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PML-2FL-D3.0	3.0	6	12	75	2	Picture 1	○
PM-L2FL-D4.0	4.0	6	15	75	2	Picture 1	○
PML-2FL-D5.0	5.0	6	20	75	2	Picture 1	○
PML-2FL-D6.0	6.0	6	20	75	2	Picture 2	○
PML-2FL-D8.0	8.0	8	25	100	2	Picture 2	○
PML-2FL-D10.0	10.0	10	30	100	2	Picture 2	○
PML-2FL-D12.0	12.0	12	35	100	2	Picture 2	○
PML-2FL-D14.0	14.0	14	40	100	2	Picture 2	○
PML-2FL-D16.0	16.0	16	50	150	2	Picture 2	○
PML-2FL-D20.0	20.0	20	55	150	2	Picture 2	○

● Stock available ○ Make-to-order

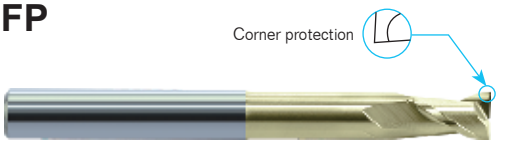
Applicable workpiece material table ◎Very suitable ○Suitable

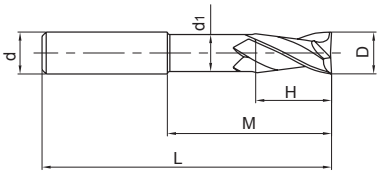
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B368

2-flute flattened end mills with straight shank, long neck and short cutting edge

PML-2EFP





● High-rigidity short cutting edge, suitable for heavy cutting and also deep cavity milling.

Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
PML-2EFP-D6.0	6.0	6	9	30	5.8	75	2	○
PML-2EFP-D8.0	8.0	8	12	40	7.8	100	2	○
PML-2EFP-D10.0	10.0	10	15	50	9.6	100	2	○
PML-2EFP-D12.0	12.0	12	18	50	11.5	100	2	○
PML-2EFP-D16.0	16.0	16	24	50	15.5	150	2	○
PML-2EFP-D20.0	20.0	20	30	60	19.5	150	2	○

● Stock available ○ Make-to-order

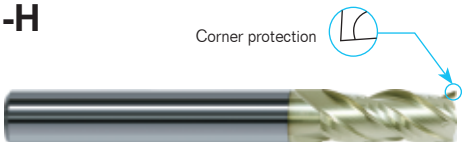
Applicable workpiece material table ◎Very suitable ○Suitable

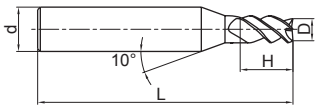
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B369

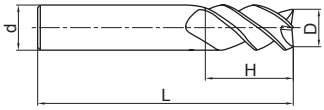
3-flute flattened end mills with straight shank

PML-3E-H





Picture 1



Picture 2

- Especially suitable for slot milling.
- Wide application.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PML-3E-D3.0S-H	3.0	4	8	50	3	Picture 1	○
PML-3E-D4.0S-H	4.0	4	11	50	3	Picture 2	○
PML-3E-D3.0-H	3.0	6	8	50	3	Picture 1	○
PML-3E-D3.5-H	3.5	6	10	50	3	Picture 1	○
PML-3E-D4.0-H	4.0	6	11	50	3	Picture 1	○
PML-3E-D4.5-H	4.5	6	11	50	3	Picture 1	○
PML-3E-D5.0-H	5.0	6	13	50	3	Picture 1	○
PML-3E-D5.5-H	5.5	6	16	50	3	Picture 1	○
PML-3E-D6.0-H	6.0	6	16	50	3	Picture 2	○
PML-3E-D7.0-H	7.0	8	20	60	3	Picture 1	○
PML-3E-D8.0-H	8.0	8	20	60	3	Picture 2	○
PML-3E-D9.0-H	9.0	10	22	75	3	Picture 1	○
PML-3E-D10.0-H	10.0	10	25	75	3	Picture 2	○
PML-3E-D11.0-H	11.0	12	26	75	3	Picture 1	○
PML-3E-D12.0-H	12.0	12	30	75	3	Picture 2	○
PML-3E-D14.0-H	14.0	14	32	75	3	Picture 2	○
PML-3E-D16.0-H	16.0	16	45	100	3	Picture 2	○
PML-3E-D18.0-H	18.0	18	45	100	3	Picture 2	○
PML-3E-D20.0-H	20.0	20	45	100	3	Picture 2	○

● Stock available ○ Make-to-order

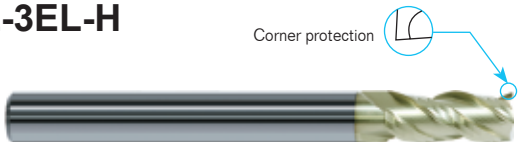
Applicable workpiece material table ◎Very suitable ○Suitable

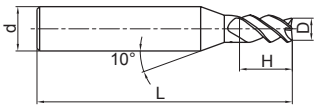
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B370

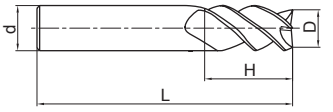
3-flute flattened end mills with straight shank and long cutting edge

PML-3EL-H





Picture 1



Picture 2

- PML-3E-H series with long shank.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PML-3EL-D3.0-H	3.0	6	12	75	3	Picture 1	○
PML-3EL-D4.0-H	4.0	6	15	75	3	Picture 1	○
PML-3EL-D5.0-H	5.0	6	20	75	3	Picture 1	○
PML-3EL-D6.0-H	6.0	6	20	75	3	Picture 2	○
PML-3EL-D8.0-H	8.0	8	25	100	3	Picture 2	○
PML-3EL-D10.0-H	10.0	10	30	100	3	Picture 2	○
PML-3EL-D12.0-H	12.0	12	35	100	3	Picture 2	○
PML-3EL-D14.0-H	14.0	14	40	100	3	Picture 2	○
PML-3EL-D16.0-H	16.0	16	50	150	3	Picture 2	○
PML-3EL-D20.0-H	20.0	20	55	150	3	Picture 2	○

● Stock available ○ Make-to-order

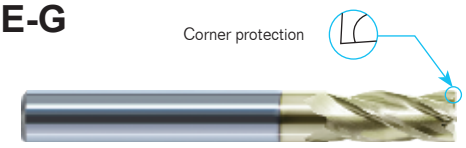
Applicable workpiece material table ◎Very suitable ○Suitable

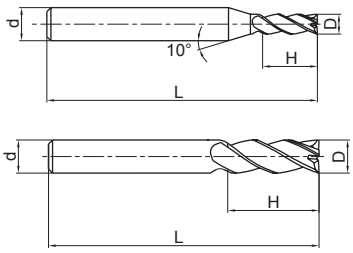
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B370

4-flute flattened end mills with straight shank

PML-4E-G





- Very suitable for side milling.
- Wide application.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PML-4E-D1.0S-G	1.0	4	3	50	4	Picture 1	●
PML-4E-D1.5S-G	1.5	4	4	50	4	Picture 1	●
PML-4E-D2.0S-G	2.0	4	6	50	4	Picture 1	●
PML-4E-D2.5S-G	2.5	4	8	50	4	Picture 1	●
PML-4E-D3.0S-G	3.0	4	8	50	4	Picture 1	●
PML-4E-D4.0S-G	4.0	4	11	50	4	Picture 2	●
PML-4E-D1.0-G	1.0	6	3	50	4	Picture 1	●
PML-4E-D1.5-G	1.5	6	4	50	4	Picture 1	●
PML-4E-D2.0-G	2.0	6	6	50	4	Picture 1	●
PML-4E-D2.5-G	2.5	6	8	50	4	Picture 1	●
PML-4E-D3.0-G	3.0	6	8	50	4	Picture 1	●
PML-4E-D3.5-G	3.5	6	10	50	4	Picture 1	●
PML-4E-D4.0-G	4.0	6	11	50	4	Picture 1	●
PML-4E-D4.5-G	4.5	6	11	50	4	Picture 1	●
PML-4E-D5.0-G	5.0	6	13	50	4	Picture 1	●
PML-4E-D5.5-G	5.5	6	16	50	4	Picture 1	●
PML-4E-D6.0-G	6.0	6	16	50	4	Picture 2	●
PML-4E-D7.0-G	7.0	8	20	60	4	Picture 1	●
PML-4E-D8.0-G	8.0	8	20	60	4	Picture 2	●
PML-4E-D9.0-G	9.0	10	22	75	4	Picture 1	●
PML-4E-D10.0-G	10.0	10	25	75	4	Picture 2	●
PML-4E-D11.0-G	11.0	12	26	75	4	Picture 1	●
PML-4E-D12.0-G	12.0	12	30	75	4	Picture 2	●
PML-4E-D14.0-G	14.0	14	32	75	4	Picture 2	●
PML-4E-D16.0-G	16.0	16	45	100	4	Picture 2	●
PML-4E-D18.0-G	18.0	18	45	100	4	Picture 2	●
PML-4E-D20.0-G	20.0	20	45	100	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

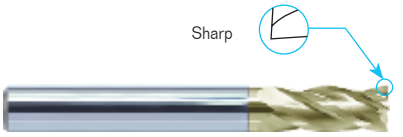
◎Very suitable ○Suitable

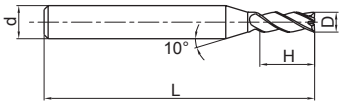
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B371–B372

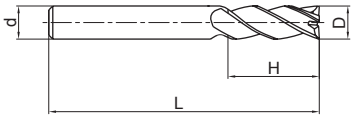
4-flute flattened end mills with straight shank

PML-4F-G





Picture 1



Picture 2

- Very suitable for side milling.
- Wide application.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PML-4F-D1.0S-G	1.0	4	3	50	4	Picture 1	○
PML-4F-D1.5S-G	1.5	4	4	50	4	Picture 1	○
PML-4F-D2.0S-G	2.0	4	6	50	4	Picture 1	○
PML-4F-D2.5S-G	2.5	4	8	50	4	Picture 1	○
PML-4F-D3.0S-G	3.0	4	8	50	4	Picture 1	○
PML-4F-D4.0S-G	4.0	4	11	50	4	Picture 2	○
PML-4F-D1.0-G	1.0	6	3	50	4	Picture 1	○
PML-4F-D1.5-G	1.5	6	4	50	4	Picture 1	○
PML-4F-D2.0-G	2.0	6	6	50	4	Picture 1	○
PML-4F-D2.5-G	2.5	6	8	50	4	Picture 1	○
PML-4F-D3.0-G	3.0	6	8	50	4	Picture 1	○
PML-4F-D3.5-G	3.5	6	10	50	4	Picture 1	○
PML-4F-D4.0-G	4.0	6	11	50	4	Picture 1	○
PML-4F-D4.5-G	4.5	6	11	50	4	Picture 1	○
PML-4F-D5.0-G	5.0	6	13	50	4	Picture 1	○
PML-4F-D5.5-G	5.5	6	16	50	4	Picture 1	○
PML-4F-D6.0-G	6.0	6	16	50	4	Picture 2	○
PML-4F-D7.0-G	7.0	8	20	60	4	Picture 1	○
PML-4F-D8.0-G	8.0	8	20	60	4	Picture 2	○
PML-4F-D9.0-G	9.0	10	22	75	4	Picture 1	○
PML-4F-D10.0-G	10.0	10	25	75	4	Picture 2	○
PML-4F-D11.0-G	11.0	12	26	75	4	Picture 1	○
PML-4F-D12.0-G	12.0	12	30	75	4	Picture 2	○
PML-4F-D14.0-G	14.0	14	32	75	4	Picture 2	○
PML-4F-D16.0-G	16.0	16	45	100	4	Picture 2	○
PML-4F-D18.0-G	18.0	18	45	100	4	Picture 2	○
PML-4F-D20.0-G	20.0	20	45	100	4	Picture 2	○

● Stock available ○ Make-to-order

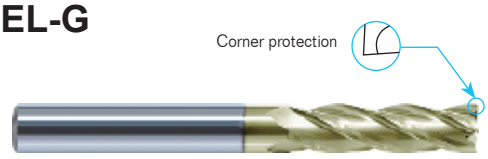
Applicable workpiece material table ◎Very suitable ○Suitable

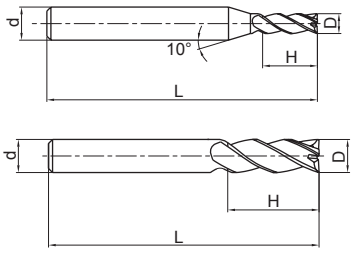
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B373–B374

4-flute flattened end mills with straight shank and long cutting edge

PML-4EL-G





- PML-4E-G series with long cutting edge.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PML-4EL-D3.0-G	3.0	6	12	75	4	Picture 1	○
PML-4EL-D4.0-G	4.0	6	15	75	4	Picture 1	○
PML-4EL-D5.0-G	5.0	6	20	75	4	Picture 1	○
PML-4EL-D6.0-G	6.0	6	20	75	4	Picture 2	○
PML-4EL-D8.0-G	8.0	8	25	100	4	Picture 2	○
PML-4EL-D10.0-G	10.0	10	30	100	4	Picture 2	○
PML-4EL-D12.0-G	12.0	12	35	100	4	Picture 2	○
PML-4EL-D14.0-G	14.0	14	40	100	4	Picture 2	○
PML-4EL-D16.0-G	16.0	16	50	150	4	Picture 2	○
PML-4EL-D20.0-G	20.0	20	55	150	4	Picture 2	○

● Stock available ○ Make-to-order

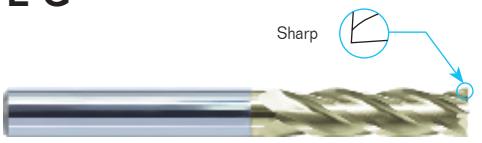
Applicable workpiece material table ◎Very suitable ○Suitable

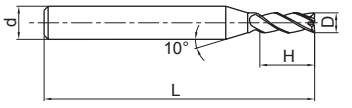
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B371–B372

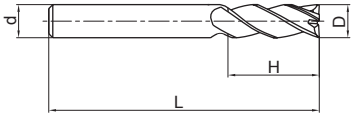
4-flute flattened end mills with straight shank and long cutting edge

PML-4FL-G





Picture 1



Picture 2

● PML-4F-G series with long cutting edge.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PML-4FL-D3.0-G	3.0	6	12	75	4	Picture 1	○
PML-4FL-D4.0-G	4.0	6	15	75	4	Picture 1	○
PML-4FL-D5.0-G	5.0	6	20	75	4	Picture 1	○
PML-4FL-D6.0-G	6.0	6	20	75	4	Picture 2	○
PML-4FL-D8.0-G	8.0	8	25	100	4	Picture 2	○
PML-4FL-D10.0-G	10.0	10	30	100	4	Picture 2	○
PML-4FL-D12.0-G	12.0	12	35	100	4	Picture 2	○
PML-4FL-D14.0-G	14.0	14	40	100	4	Picture 2	○
PML-4FL-D16.0-G	16.0	16	50	150	4	Picture 2	○
PML-4FL-D20.0-G	20.0	20	55	150	4	Picture 2	○

● Stock available ○ Make-to-order

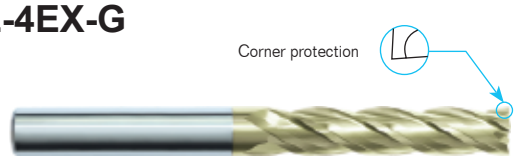
Applicable workpiece material table ◎Very suitable ○Suitable

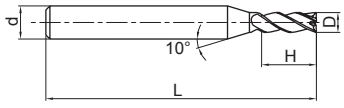
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B373–B374

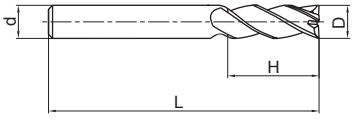
4-flute flattened end mills with straight shank and extra long cutting edge

PML-4EX-G





Picture 1



Picture 2

- Extra long cutting edge, for deep side wall machining.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PML-4EX-D3.0-G	3.0	6	20	75	4	Picture 1	○
PML-4EX-D4.0-G	4.0	6	25	75	4	Picture 1	○
PML-4EX-D5.0-G	5.0	6	30	75	4	Picture 1	○
PML-4EX-D6.0-G	6.0	6	30	75	4	Picture 2	○
PML-4EX-D8.0-G	8.0	8	40	100	4	Picture 2	○
PML-4EX-D10.0-G	10.0	10	50	110	4	Picture 2	○
PML-4EX-D12.0-G	12.0	12	50	110	4	Picture 2	○
PML-4EX-D16.0-G	16.0	16	70	150	4	Picture 2	○
PML-4EX-D20.0-G	20.0	20	75	150	4	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

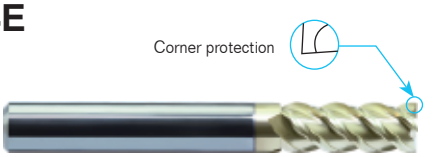
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

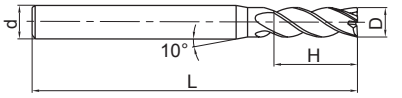
Code key B213
Graphics category and identification B214
Cutting parameters B375

High-performance general milling PML series

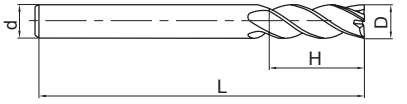
4-flute flattened end mills with straight shank

PML-4E





Picture 1



Picture 2

- Very suitable for side milling and shallow slot machining.
- Wide application.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PML-4E-D1.0S	1.0	4	3	50	4	Picture 1	○
PML-4E-D1.5S	1.5	4	4	50	4	Picture 1	○
PML-4E-D2.0S	2.0	4	6	50	4	Picture 1	○
PML-4E-D2.5S	2.5	4	8	50	4	Picture 1	○
PML-4E-D3.0S	3.0	4	8	50	4	Picture 1	○
PML-4E-D4.0S	4.0	4	11	50	4	Picture 2	○
PML-4E-D1.0	1.0	6	3	50	4	Picture 1	○
PML-4E-D1.5	1.5	6	4	50	4	Picture 1	○
PML-4E-D2.0	2.0	6	6	50	4	Picture 1	○
PML-4E-D2.5	2.5	6	8	50	4	Picture 1	○
PML-4E-D3.0	3.0	6	8	50	4	Picture 1	○
PML-4E-D3.5	3.5	6	10	50	4	Picture 1	○
PML-4E-D4.0	4.0	6	11	50	4	Picture 1	○
PML-4E-D4.5	4.5	6	11	50	4	Picture 1	○
PML-4E-D5.0	5.0	6	13	50	4	Picture 1	○
PML-4E-D5.5	5.5	6	16	50	4	Picture 1	○
PML-4E-D6.0	6.0	6	16	50	4	Picture 2	○
PML-4E-D7.0	7.0	8	20	60	4	Picture 1	○
PML-4E-D8.0	8.0	8	20	60	4	Picture 2	○
PML-4E-D9.0	9.0	10	22	75	4	Picture 1	○
PML-4E-D10.0	10.0	10	25	75	4	Picture 2	○
PML-4E-D11.0	11.0	12	26	75	4	Picture 1	○
PML-4E-D12.0	12.0	12	30	75	4	Picture 2	○
PML-4E-D14.0	14.0	14	32	75	4	Picture 2	○
PML-4E-D16.0	16.0	16	45	100	4	Picture 2	○
PML-4E-D18.0	18.0	18	45	100	4	Picture 2	○
PML-4E-D20.0	20.0	20	45	100	4	Picture 2	○

● Stock available ○ Make-to-order

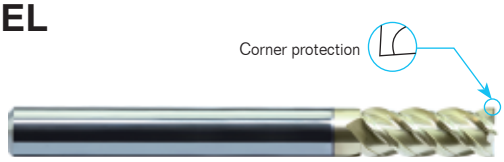
Applicable workpiece material table ◎Very suitable ○Suitable

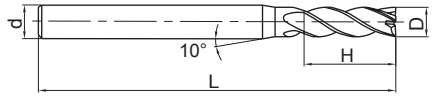
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B376–B377

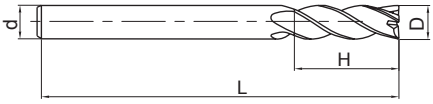
4-flute flattened end mills with straight shank and long cutting edge

PML-4EL





Picture 1



Picture 2

- PML-4E series with long cutting edge.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PML-4EL-D3.0	3.0	6	12	75	4	Picture 1	○
PML-4EL-D4.0	4.0	6	15	75	4	Picture 1	○
PML-4EL-D5.0	5.0	6	20	75	4	Picture 1	○
PML-4EL-D6.0	6.0	6	20	75	4	Picture 2	○
PML-4EL-D8.0	8.0	8	25	100	4	Picture 2	○
PML-4EL-D10.0	10.0	10	30	100	4	Picture 2	○
PML-4EL-D12.0	12.0	12	35	100	4	Picture 2	○
PML-4EL-D14.0	14.0	14	40	100	4	Picture 2	○
PML-4EL-D16.0	16.0	16	50	150	4	Picture 2	○
PML-4EL-D20.0	20.0	20	55	150	4	Picture 2	○

● Stock available ○ Make-to-order

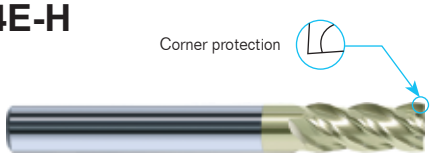
Applicable workpiece material table ◎Very suitable ○Suitable

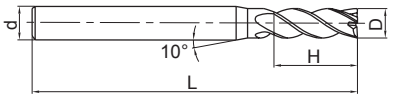
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B376–B377

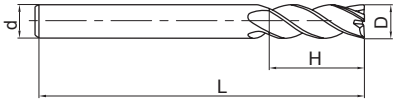
4-flute flattened end mills with straight shank

PML-4E-H





Picture 1



Picture 2

● Most suitable for slot milling. ● Wide application.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PML-4E-D3.0S-H	3.0	4	8	50	4	Picture 1	○
PML-4E-D4.0S-H	4.0	4	11	50	4	Picture 2	○
PML-4E-D3.0-H	3.0	6	8	50	4	Picture 1	○
PML-4E-D3.5-H	3.5	6	10	50	4	Picture 1	○
PML-4E-D4.0-H	4.0	6	11	50	4	Picture 1	○
PML-4E-D4.5-H	4.5	6	11	50	4	Picture 1	○
PML-4E-D5.0-H	5.0	6	13	50	4	Picture 1	○
PML-4E-D5.5-H	5.5	6	16	50	4	Picture 1	○
PML-4E-D6.0-H	6.0	6	16	50	4	Picture 2	○
PML-4E-D7.0-H	7.0	8	20	60	4	Picture 1	○
PML-4E-D8.0-H	8.0	8	20	60	4	Picture 2	○
PML-4E-D9.0-H	9.0	10	22	75	4	Picture 1	○
PML-4E-D10.0-H	10.0	10	25	75	4	Picture 2	○
PML-4E-D11.0-H	11.0	12	26	75	4	Picture 1	○
PML-4E-D12.0-H	12.0	12	30	75	4	Picture 2	○
PML-4E-D14.0-H	14.0	14	32	75	4	Picture 2	○
PML-4E-D16.0-H	16.0	16	45	100	4	Picture 2	○
PML-4E-D18.0-H	18.0	18	45	100	4	Picture 2	○
PML-4E-D20.0-H	20.0	20	45	100	4	Picture 2	○

● Stock available ○ Make-to-order

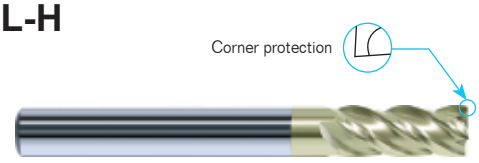
Applicable workpiece material table ◎Very suitable ○Suitable

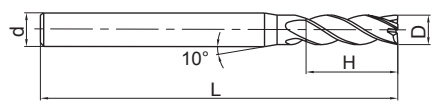
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B376–B377

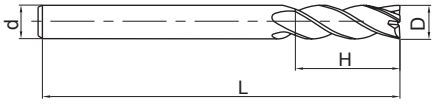
4-flute flattened end mills with straight shank and long cutting edge

PML-4EL-H





Picture 1



Picture 2

- PML-4E-H series with long shank.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PML-4EL-D3.0-H	3.0	6	12	75	4	Picture 1	○
PML-4EL-D4.0-H	4.0	6	15	75	4	Picture 1	○
PML-4EL-D5.0-H	5.0	6	20	75	4	Picture 1	○
PML-4EL-D6.0-H	6.0	6	20	75	4	Picture 2	○
PML-4EL-D8.0-H	8.0	8	25	100	4	Picture 2	○
PML-4EL-D10.0-H	10.0	10	30	100	4	Picture 2	○
PML-4EL-D12.0-H	12.0	12	35	100	4	Picture 2	○
PML-4EL-D14.0-H	14.0	14	40	100	4	Picture 2	○
PML-4EL-D16.0-H	16.0	16	50	150	4	Picture 2	○
PML-4EL-D20.0-H	20.0	20	55	150	4	Picture 2	○

● Stock available ○ Make-to-order

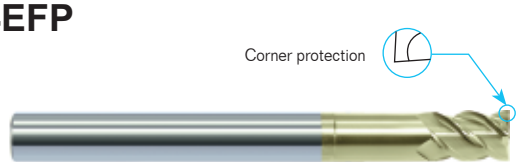
Applicable workpiece material table ◎Very suitable ○Suitable

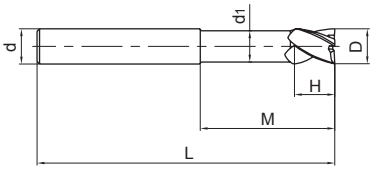
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B376–B377

4-flute flattened end mills with straight shank, long neck and short cutting edge

PML-4EFP





● High-rigidity short cutting edge, suitable for heavy cutting and also deep cavity milling.

Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
PML-4EFP-D6.0	6.0	6	9	30	5.8	75	4	○
PML-4EFP-D8.0	8.0	8	12	40	7.8	100	4	○
PML-4EFP-D10.0	10.0	10	15	50	9.6	100	4	○
PML-4EFP-D12.0	12.0	12	18	50	11.5	100	4	○
PML-4EFP-D16.0	16.0	16	24	50	15.5	150	4	○
PML-4EFP-D20.0	20.0	20	30	60	19.5	150	4	○

● Stock available ○ Make-to-order

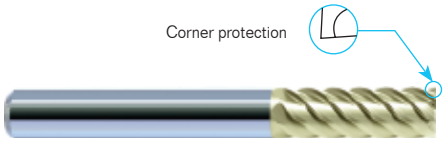
Applicable workpiece material table ◎Very suitable ○Suitable

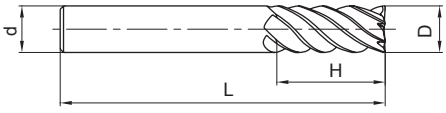
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B378–B379

6-flute flattened end mills with straight shank

PML-6E





- Perfect rigidity, very suitable for side finish machining.
- High speed, high feed rate machining applicable.

Ordering number	Basic dimension(mm)				Number of teeth Z	Stock
	D	d	H	L		
PML-6E-D6.0	6.0	6	18	60	6	○
PML-6E-D8.0	8.0	8	20	60	6	○
PML-6E-D10.0	10.0	10	30	75	6	○
PML-6E-D12.0	12.0	12	32	75	6	○
PML-6E-D16.0	16.0	16	40	100	6	○
PML-6E-D20.0	20.0	20	45	100	6	○

● Stock available ○ Make-to-order

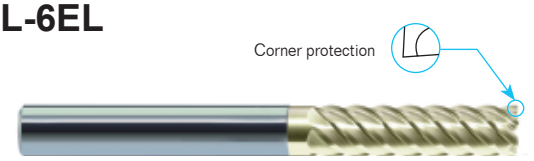
Applicable workpiece material table ◎Very suitable ○Suitable

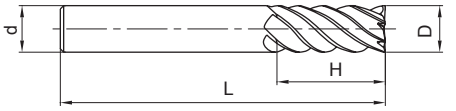
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B380

6-flute flattened end mills with straight shank and long cutting edge

PML-6EL





● PML-6E series with long cutting edge.

Ordering number	Basic dimension(mm)				Number of teeth Z	Stock
	D	d	H	L		
PML-6EL-D6.0	6.0	6	24	75	6	○
PML-6EL-D8.0	8.0	8	32	75	6	○
PML-6EL-D10.0	10.0	10	40	100	6	○
PML-6EL-D12.0	12.0	12	45	100	6	○
PML-6EL-D16.0	16.0	16	64	150	6	○
PML-6EL-D20.0	20.0	20	75	150	6	○

● Stock available ○ Make-to-order

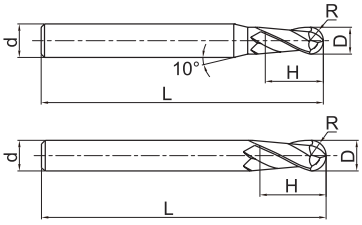
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B381

2-flute ball nose end mills with straight shank

PML-2B



- For profile milling, high speed machining applicable.
- Wide application.

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PML-2B-R0.5S	1.0	0.5	4	2	50	2	Picture 1	●
PML-2B-R0.75S	1.5	0.75	4	3	50	2	Picture 1	●
PML-2B-R1.0S	2.0	1.0	4	4	50	2	Picture 1	●
PML-2B-R1.25S	2.5	1.25	4	5	50	2	Picture 1	●
PML-2B-R1.5S	3.0	1.5	4	6	50	2	Picture 1	●
PML-2B-R2.0S	4.0	2.0	4	8	50	2	Picture 2	●
PML-2B-R0.5	1.0	0.5	6	2	50	2	Picture 1	●
PML-2B-R0.75	1.5	0.75	6	3	50	2	Picture 1	●
PML-2B-R1.0	2.0	1.0	6	4	50	2	Picture 1	●
PML-2B-R1.25	2.5	1.25	6	5	50	2	Picture 1	●
PML-2B-R1.5	3.0	1.5	6	6	50	2	Picture 1	●
PML-2B-R1.75	3.5	1.75	6	8	50	2	Picture 1	●
PML-2B-R2.0	4.0	2.0	6	8	50	2	Picture 1	●
PML-2B-R2.5	5.0	2.5	6	10	50	2	Picture 1	●
PML-2B-R2.75	5.5	2.75	6	12	50	2	Picture 1	●
PML-2B-R3.0	6.0	3.0	6	12	50	2	Picture 2	●
PML-2B-R3.5	7.0	3.5	8	14	60	2	Picture 1	●
PML-2B-R4.0	8.0	4.0	8	16	60	2	Picture 2	●
PML-2B-R4.5	9.0	4.5	10	18	75	2	Picture 1	●
PML-2B-R5.0	10.0	5.0	10	20	75	2	Picture 2	●
PML-2B-R6.0	12.0	6.0	12	24	75	2	Picture 2	●
PML-2B-R7.0	14.0	7.0	14	28	75	2	Picture 2	●
PML-2B-R8.0	16.0	8.0	16	32	100	2	Picture 2	●
PML-2B-R10.0	20.0	10.0	20	40	100	2	Picture 2	●

● Stock available ○ Make-to-order

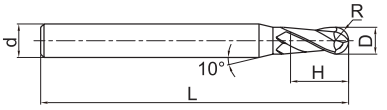
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

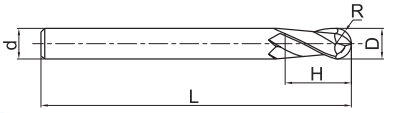
Code key B213
Graphics category and identification B214
Cutting parameters B382–B383

2-flute ball nose end mills with straight shank

PML-2BL



Picture 1



Picture 2

- PML-2B series with long shank.

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PML-2BL-R1.0	2.0	1.0	6	4	75	2	Picture 1	○
PML-2BL-R1.25	2.5	1.25	6	5	75	2	Picture 1	○
PML-2BL-R1.5	3.0	1.5	6	6	75	2	Picture 1	○
PML-2BL-R1.75	3.5	1.75	6	8	75	2	Picture 1	○
PML-2BL-R2.0	4.0	2.0	6	8	75	2	Picture 1	○
PML-2BL-R2.5	5.0	2.5	6	10	75	2	Picture 1	○
PML-2BL-R2.75	5.5	2.75	6	12	75	2	Picture 1	○
PML-2BL-R3.0	6.0	3.0	6	12	75	2	Picture 2	○
PML-2BL-R3.5	7.0	3.5	8	14	75	2	Picture 1	○
PML-2BL-R4.0	8.0	4.0	8	16	100	2	Picture 2	○
PML-2BL-R4.5	9.0	4.5	10	18	100	2	Picture 1	○
PML-2BL-R5.0	10.0	5.0	10	20	100	2	Picture 2	○
PML-2BL-R6.0	12.0	6.0	12	24	100	2	Picture 2	○
PML-2BL-R7.0	14.0	7.0	14	28	100	2	Picture 2	○
PML-2BL-R8.0	16.0	8.0	16	32	150	2	Picture 2	○
PML-2BL-R10.0	20.0	10.0	20	40	150	2	Picture 2	○

● Stock available ○ Make-to-order

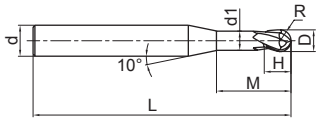
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

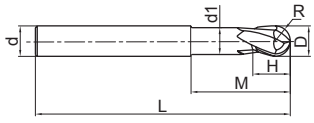
Code key B213
Graphics category and identification B214
Cutting parameters B382–B383

2-flute ball nose end mills with straight shank, long neck and short cutting edge

PML-2BFP



Picture 1



Picture 2

- High-rigidity short cutting edge, suitable for heavy cutting.

Ordering number	Basic dimension(mm)							Number of teeth Z	Geometry	Stock
	D	R	H	d_1	M	d	L			
PML-2BFP-R0.5	1.0	0.5	1	0.95	2.5	6	75	2	Picture 1	○
PML-2BFP-R0.75	1.5	0.75	1.5	1.45	3	6	75	2	Picture 1	○
PML-2BFP-R1.0	2.0	1.0	2	1.95	4	6	75	2	Picture 1	○
PML-2BFP-R1.5	3.0	1.5	3	2.85	6	6	75	2	Picture 1	○
PML-2BFP-R2.0	4.0	2.0	4	3.85	8	6	75	2	Picture 1	○
PML-2BFP-R2.5	5.0	2.5	5	4.85	10	6	75	2	Picture 1	○
PML-2BFP-R3.0	6.0	3.0	6	5.8	12	6	75	2	Picture 2	○
PML-2BFP-R4.0	8.0	4.0	8	7.8	16	8	100	2	Picture 2	○
PML-2BFP-R5.0	10.0	5.0	10	9.6	20	10	100	2	Picture 2	○
PML-2BFP-R6.0	12.0	6.0	12	11.5	24	12	100	2	Picture 2	○
PML-2BFP-R8.0	16.0	8.0	16	15.5	32	16	150	2	Picture 2	○
PML-2BFP-R10.0	20.0	10.0	20	19.5	40	20	150	2	Picture 2	○

● Stock available ○ Make-to-order

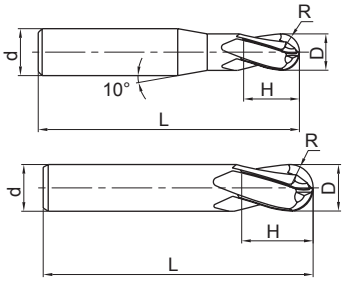
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

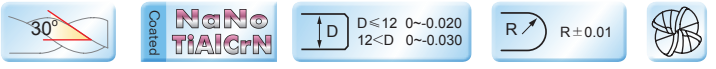
Code key B213
Graphics category and identification B214
Cutting parameters B382–B383

4-flute ball nose end mills with straight shank

PML-4B



- 4-flute ball nose end mill can operate with higher feed speed and machining efficiency, extending too life in machining high-hardness workpiece



Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PML-4B-R1.5	3.0	1.5	6	6	50	4	Picture 1	○
PML-4B-R2.0	4.0	2.0	6	8	50	4	Picture 1	○
PML-4B-R2.5	5.0	2.5	6	10	50	4	Picture 1	○
PML-4B-R3.0	6.0	3.0	6	12	50	4	Picture 2	○
PML-4B-R4.0	8.0	4.0	8	16	60	4	Picture 2	○
PML-4B-R5.0	10.0	5.0	10	20	75	4	Picture 2	○
PML-4B-R6.0	12.0	6.0	12	24	75	4	Picture 2	○
PML-4B-R7.0	14.0	7.0	14	28	75	4	Picture 2	○
PML-4B-R8.0	16.0	8.0	16	32	100	4	Picture 2	○
PML-4B-R9.0	18.0	9.0	18	36	100	4	Picture 2	○
PML-4B-R10.0	20.0	10.0	20	40	100	4	Picture 2	○

● Stock available ○ Make-to-order

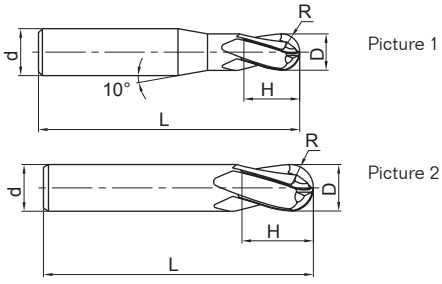
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

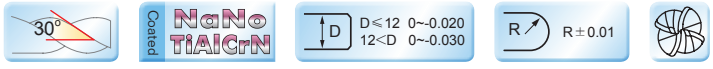
Code key B213
Graphics category and identification B214
Cutting parameters B384

4-flute ball nose end mills with straight and long shank

PML-4BL



- PML-4B series with long shank.



Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PML-4BL-R1.5	3.0	1.5	6	6	75	4	Picture 1	○
PML-4BL-R2.0	4.0	2.0	6	8	75	4	Picture 1	○
PML-4BL-R2.5	5.0	2.5	6	10	75	4	Picture 1	○
PML-4BL-R3.0	6.0	3.0	6	12	75	4	Picture 2	○
PML-4BL-R4.0	8.0	4.0	8	16	100	4	Picture 2	○
PML-4BL-R5.0	10.0	5.0	10	20	100	4	Picture 2	○
PML-4BL-R6.0	12.0	6.0	12	24	100	4	Picture 2	○
PML-4BL-R7.0	14.0	7.0	14	28	100	4	Picture 2	○
PML-4BL-R8.0	16.0	8.0	16	32	150	4	Picture 2	○
PML-4BL-R9.0	18.0	9.0	18	36	150	4	Picture 2	○
PML-4BL-R10.0	20.0	10.0	20	40	150	4	Picture 2	○

● Stock available ○ Make-to-order

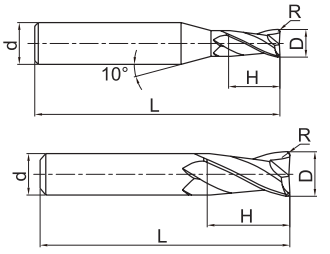
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B384

2-flute R end mills with straight shank

PML-2R



Picture 1

Picture 2

- Wide applications, applicable for several machining styles.

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PML-2R-D1.0R0.2	1.0	0.2	4	3	50	2	Picture 1	○
PML-2R-D1.5R0.2	1.5	0.2	4	4	50	2	Picture 1	○
PML-2R-D2.0R0.2	2.0	0.2	4	6	50	2	Picture 1	○
PML-2R-D2.0R0.5	2.0	0.5	4	6	50	2	Picture 1	○
PML-2R-D2.5R0.2	2.5	0.2	4	8	50	2	Picture 1	○
PML-2R-D2.5R0.5	2.5	0.5	4	8	50	2	Picture 1	○
PML-2R-D3.0R0.2	3.0	0.2	4	8	50	2	Picture 1	○
PML-2R-D3.0R0.3	3.0	0.3	4	8	50	2	Picture 1	○
PML-2R-D3.0R0.5	3.0	0.5	4	8	50	2	Picture 1	○
PML-2R-D4.0R0.2	4.0	0.2	4	11	50	2	Picture 2	○
PML-2R-D4.0R0.3	4.0	0.3	4	11	50	2	Picture 2	○
PML-2R-D4.0R0.5	4.0	0.5	4	11	50	2	Picture 2	○
PML-2R-D4.0R1.0	4.0	1.0	4	11	50	2	Picture 2	○
PML-2R-D5.0R0.3	5.0	0.3	6	13	50	2	Picture 1	○
PML-2R-D5.0R0.5	5.0	0.5	6	13	50	2	Picture 1	○
PML-2R-D5.0R1.0	5.0	1.0	6	13	50	2	Picture 1	○
PML-2R-D6.0R0.3	6.0	0.3	6	16	50	2	Picture 2	○
PML-2R-D6.0R0.5	6.0	0.5	6	16	50	2	Picture 2	○
PML-2R-D6.0R1.0	6.0	1.0	6	16	50	2	Picture 2	○
PML-2R-D8.0R0.3	8.0	0.3	8	20	60	2	Picture 2	○
PML-2R-D8.0R0.5	8.0	0.5	8	20	60	2	Picture 2	○
PML-2R-D8.0R1.0	8.0	1.0	8	20	60	2	Picture 2	○
PML-2R-D10.0R0.5	10.0	0.5	10	25	75	2	Picture 2	○
PML-2R-D10.0R1.0	10.0	1.0	10	25	75	2	Picture 2	○
PML-2R-D10.0R1.5	10.0	1.5	10	25	75	2	Picture 2	○
PML-2R-D10.0R2.0	10.0	2.0	10	25	75	2	Picture 2	○
PML-2R-D12.0R0.5	12.0	0.5	12	30	75	2	Picture 2	○
PML-2R-D12.0R1.0	12.0	1.0	12	30	75	2	Picture 2	○
PML-2R-D12.0R1.5	12.0	1.5	12	30	75	2	Picture 2	○
PML-2R-D12.0R2.0	12.0	2.0	12	30	75	2	Picture 2	○

● Stock available ○ Make-to-order

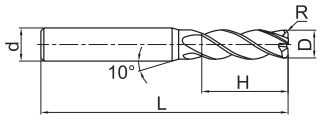
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

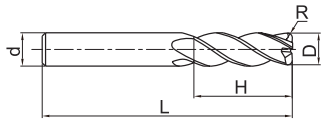
Code key B213
Graphics category and identification B214
Cutting parameters B388

4-flute R end mills with straight shank

PML-4R



Picture 1



Picture 2

- Wide applications, applicable for several machining styles.

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PML-4R-D3.0R0.2	3.0	0.2	6	8	50	4	Picture 1	●
PML-4R-D4.0R0.3	4.0	0.3	6	10	50	4	Picture 2	●
PML-4R-D4.0R0.5	4.0	0.5	6	10	50	4	Picture 2	●
PML-4R-D5.0R0.5	5.0	0.5	6	13	50	4	Picture 1	●
PML-4R-D5.0R1.0	5.0	1.0	6	13	50	4	Picture 1	●
PML-4R-D6.0R0.5	6.0	0.5	6	16	50	4	Picture 2	●
PML-4R-D6.0R1.0	6.0	1.0	6	16	50	4	Picture 2	●
PML-4R-D8.0R0.5	8.0	0.5	8	20	60	4	Picture 2	●
PML-4R-D8.0R1.0	8.0	1.0	8	20	60	4	Picture 2	●
PML-4R-D10.0R0.5	10.0	0.5	10	25	75	4	Picture 2	●
PML-4R-D10.0R1.0	10.0	1.0	10	25	75	4	Picture 2	●
PML-4R-D10.0R2.0	10.0	2.0	10	25	75	4	Picture 2	●
PML-4R-D10.0R3.0	10.0	3.0	10	25	75	4	Picture 2	●
PML-4R-D12.0R0.5	12.0	0.5	12	30	75	4	Picture 2	●
PML-4R-D12.0R1.0	12.0	1.0	12	30	75	4	Picture 2	●
PML-4R-D12.0R2.0	12.0	2.0	12	30	75	4	Picture 2	●
PML-4R-D12.0R3.0	12.0	3.0	12	30	75	4	Picture 2	●

● Stock available ○ Make-to-order

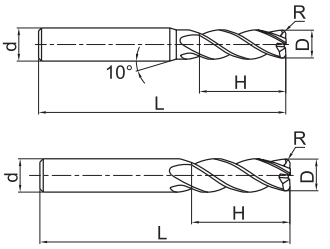
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B389

4-flute R end mills with straight shank

PML-4R-H



- Wide applications, applicable for several machining styles.

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PML-4R-D3.0R0.2-H	3.0	0.2	6	8	50	4	Picture 1	●
PML-4R-D4.0R0.3-H	4.0	0.3	6	10	50	4	Picture 1	●
PML-4R-D4.0R0.5-H	4.0	0.5	6	10	50	4	Picture 1	●
PML-4R-D5.0R0.5-H	5.0	0.5	6	13	50	4	Picture 1	●
PML-4R-D5.0R1.0-H	5.0	1.0	6	13	50	4	Picture 1	●
PML-4R-D6.0R0.5-H	6.0	0.5	6	16	50	4	Picture 2	●
PML-4R-D6.0R1.0-H	6.0	1.0	6	16	50	4	Picture 2	●
PML-4R-D8.0R0.5-H	8.0	0.5	8	20	60	4	Picture 2	●
PML-4R-D8.0R1.0-H	8.0	1.0	8	20	60	4	Picture 2	●
PML-4R-D10R0.5-H	10.0	0.5	10	25	75	4	Picture 2	●
PML-4R-D10R1.0-H	10.0	1.0	10	25	75	4	Picture 2	●
PML-4R-D10R2.0-H	10.0	2.0	10	25	75	4	Picture 2	●
PML-4R-D10R3.0-H	10.0	3.0	10	25	75	4	Picture 2	●
PML-4R-D12R0.5-H	12.0	0.5	12	30	75	4	Picture 2	●
PML-4R-D12R1.0-H	12.0	1.0	12	30	75	4	Picture 2	●
PML-4R-D12R2.0-H	12.0	2.0	12	30	75	4	Picture 2	●
PML-4R-D12R3.0-H	12.0	3.0	12	30	75	4	Picture 2	●

● Stock available ○ Make-to-order

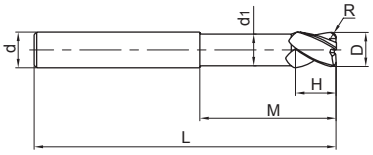
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B389

4-flute R end mills with straight shank, long neck and short cutting edge

PML-4RFP



● Long shank and short cutting edge designed for deep cavity milling.

Ordering number	Basic dimension(mm)							Number of teeth	Stock
	D	R	d	d_1	H	M	L	Z	
PML-4RFP-D6.0R0.5	6.0	0.5	6	5.8	6	18	75	4	○
PML-4RFP-D6.0R1.0	6.0	1.0	6	5.8	6	18	75	4	○
PML-4RFP-D8.0R0.5	8.0	0.5	8	7.8	8	24	100	4	○
PML-4RFP-D8.0R1.0	8.0	1.0	8	7.8	8	24	100	4	○
PML-4RFP-D10.0R0.5	10.0	0.5	10	9.6	10	30	100	4	○
PML-4RFP-D10.0R1.0	10.0	1.0	10	9.6	10	30	100	4	○
PML-4RFP-D10.0R2.0	10.0	2.0	10	9.6	10	30	100	4	○
PML-4RFP-D12.0R0.5	12.0	0.5	12	11.5	12	36	100	4	○
PML-4RFP-D12.0R1.0	12.0	1.0	12	11.5	12	36	100	4	○
PML-4RFP-D12.0R2.0	12.0	2.0	12	11.5	12	36	100	4	○
PML-4RFP-D16.0R1.0	16.0	1.0	16	15.5	16	40	150	4	○
PML-4RFP-D16.0R2.0	16.0	2.0	16	15.5	16	40	150	4	○

● Stock available ○ Make-to-order

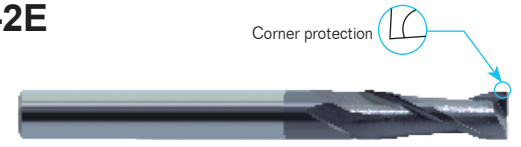
Applicable workpiece material table ◎Very suitable ○Suitable

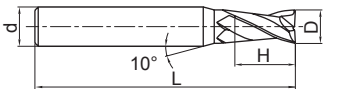
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B389

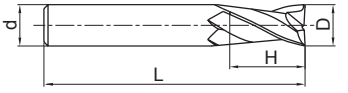
2-flute flattened end mills with straight shank

PM-2E





Picture 1



Picture 2

- Very suitable for slot milling.
- Wide application.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-2E-D1.0S	1.0	4	3	50	2	Picture 1	●
PM-2E-D1.5S	1.5	4	4	50	2	Picture 1	●
PM-2E-D2.0S	2.0	4	6	50	2	Picture 1	●
PM-2E-D2.5S	2.5	4	8	50	2	Picture 1	●
PM-2E-D3.0S	3.0	4	8	50	2	Picture 1	●
PM-2E-D4.0S	4.0	4	11	50	2	Picture 2	●
PM-2E-D1.0	1.0	6	3	50	2	Picture 1	●
PM-2E-D1.5	1.5	6	4	50	2	Picture 1	●
PM-2E-D2.0	2.0	6	6	50	2	Picture 1	●
PM-2E-D2.5	2.5	6	8	50	2	Picture 1	●
PM-2E-D3.0	3.0	6	8	50	2	Picture 1	●
PM-2E-D3.5	3.5	6	10	50	2	Picture 1	●
PM-2E-D4.0	4.0	6	11	50	2	Picture 1	●
PM-2E-D4.5	4.5	6	11	50	2	Picture 1	●
PM-2E-D5.0	5.0	6	13	50	2	Picture 1	●
PM-2E-D5.5	5.5	6	16	50	2	Picture 1	●
PM-2E-D6.0	6.0	6	16	50	2	Picture 2	●
PM-2E-D7.0	7.0	8	20	60	2	Picture 1	●
PM-2E-D8.0	8.0	8	20	60	2	Picture 2	●
PM-2E-D9.0	9.0	10	22	75	2	Picture 1	●
PM-2E-D10.0	10.0	10	25	75	2	Picture 2	●
PM-2E-D11.0	11.0	12	26	75	2	Picture 1	●
PM-2E-D12.0	12.0	12	30	75	2	Picture 2	●
PM-2E-D14.0	14.0	14	32	75	2	Picture 2	●
PM-2E-D16.0	16.0	16	45	100	2	Picture 2	●
PM-2E-D18.0	18.0	18	45	100	2	Picture 2	●
PM-2E-D20.0	20.0	20	45	100	2	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

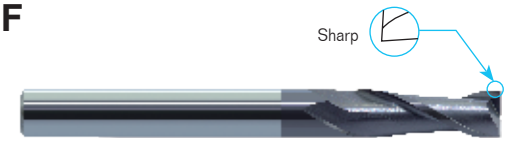
◎Very suitable ○Suitable

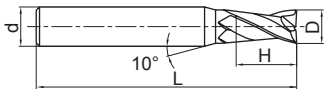
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B367

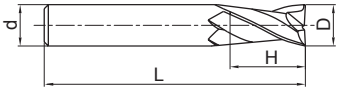
2-flute flattened end mills with straight shank

PM-2F





Picture 1



Picture 2

- Very suitable for slot milling.
- Wide application.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-2F-D1.0S	1.0	4	3	50	2	Picture 1	○
PM-2F-D1.5S	1.5	4	4	50	2	Picture 1	○
PM-2F-D2.0S	2.0	4	6	50	2	Picture 1	○
PM-2F-D2.5S	2.5	4	8	50	2	Picture 1	○
PM-2F-D3.0S	3.0	4	8	50	2	Picture 1	○
PM-2F-D4.0S	4.0	4	11	50	2	Picture 2	○
PM-2F-D1.0	1.0	6	3	50	2	Picture 1	○
PM-2F-D1.5	1.5	6	4	50	2	Picture 1	○
PM-2F-D2.0	2.0	6	6	50	2	Picture 1	○
PM-2F-D2.5	2.5	6	8	50	2	Picture 1	○
PM-2F-D3.0	3.0	6	8	50	2	Picture 1	○
PM-2F-D3.5	3.5	6	10	50	2	Picture 1	○
PM-2F-D4.0	4.0	6	11	50	2	Picture 1	○
PM-2F-D4.5	4.5	6	11	50	2	Picture 1	○
PM-2F-D5.0	5.0	6	13	50	2	Picture 1	○
PM-2F-D5.5	5.5	6	16	50	2	Picture 1	○
PM-2F-D6.0	6.0	6	16	50	2	Picture 2	○
PM-2F-D7.0	7.0	8	20	60	2	Picture 1	○
PM-2F-D8.0	8.0	8	20	60	2	Picture 2	○
PM-2F-D9.0	9.0	10	22	75	2	Picture 1	○
PM-2F-D10.0	10.0	10	25	75	2	Picture 2	○
PM-2F-D11.0	11.0	12	26	75	2	Picture 1	○
PM-2F-D12.0	12.0	12	30	75	2	Picture 2	○
PM-2F-D14.0	14.0	14	32	75	2	Picture 2	○
PM-2F-D16.0	16.0	16	45	100	2	Picture 2	○
PM-2F-D18.0	18.0	18	45	100	2	Picture 2	○
PM-2F-D20.0	20.0	20	45	100	2	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table

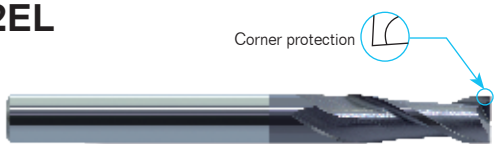
◎Very suitable ○Suitable

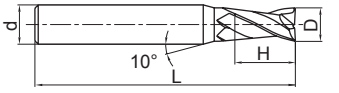
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B368

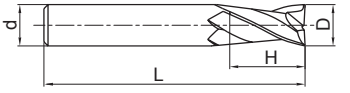
2-flute flattened end mills with straight shank and long cutting edge

PM-2EL





Picture 1



Picture 2

● PM-2E series with long cutting edge.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-2EL-D3.0	3.0	6	12	75	2	Picture 1	○
PM-2EL-D4.0	4.0	6	15	75	2	Picture 1	○
PM-2EL-D5.0	5.0	6	20	75	2	Picture 1	○
PM-2EL-D6.0	6.0	6	20	75	2	Picture 2	○
PM-2EL-D8.0	8.0	8	25	100	2	Picture 2	○
PM-2EL-D10.0	10.0	10	30	100	2	Picture 2	○
PM-2EL-D12.0	12.0	12	35	100	2	Picture 2	○
PM-2EL-D14.0	14.0	14	40	100	2	Picture 2	○
PM-2EL-D16.0	16.0	16	50	150	2	Picture 2	○
PM-2EL-D20.0	20.0	20	55	150	2	Picture 2	○

● Stock available ○ Make-to-order

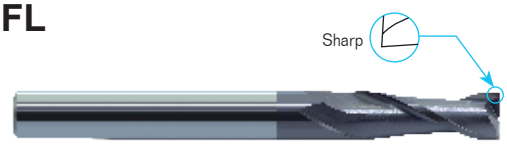
Applicable workpiece material table ◎Very suitable ○Suitable

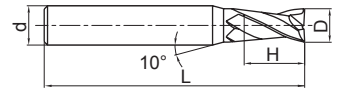
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B367

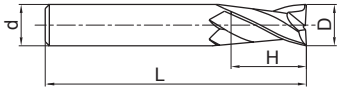
2-flute flattened end mills with straight shank and long cutting edge

PM-2FL





Picture 1



Picture 2

● PM-2F series with long cutting edge.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-2FL-D3.0	3.0	6	12	75	2	Picture 1	○
PM-2FL-D4.0	4.0	6	15	75	2	Picture 1	○
PM-2FL-D5.0	5.0	6	20	75	2	Picture 1	○
PM-2FL-D6.0	6.0	6	20	75	2	Picture 2	○
PM-2FL-D8.0	8.0	8	25	100	2	Picture 2	○
PM-2FL-D10.0	10.0	10	30	100	2	Picture 2	○
PM-2FL-D12.0	12.0	12	35	100	2	Picture 2	○
PM-2FL-D14.0	14.0	14	40	100	2	Picture 2	○
PM-2FL-D16.0	16.0	16	50	150	2	Picture 2	○
PM-2FL-D20.0	20.0	20	55	150	2	Picture 2	○

● Stock available ○ Make-to-order

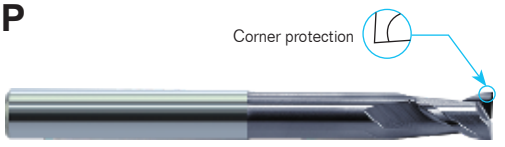
Applicable workpiece material table ◎Very suitable ○Suitable

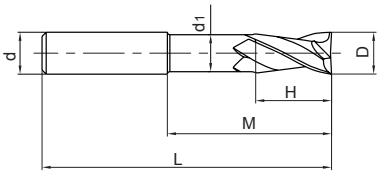
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B368

2-flute flattened end mills with straight shank, long neck and short cutting edge

PM-2EFP





● High-rigidity short cutting edge, suitable for heavy cutting and also deep cavity milling.

Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
PM-2EFP-D6.0	6.0	6	9	30	5.8	75	2	○
PM-2EFP-D8.0	8.0	8	12	40	7.8	100	2	○
PM-2EFP-D10.0	10.0	10	15	50	9.6	100	2	○
PM-2EFP-D12.0	12.0	12	18	50	11.5	100	2	○
PM-2EFP-D16.0	16.0	16	24	50	15.5	150	2	○
PM-2EFP-D20.0	20.0	20	30	60	19.5	150	2	○

● Stock available ○ Make-to-order

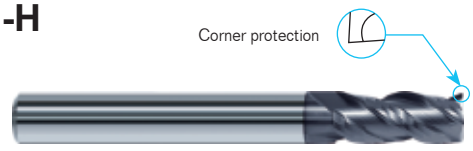
Applicable workpiece material table ◎Very suitable ○Suitable

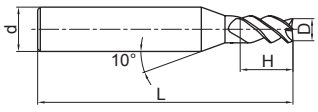
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B369

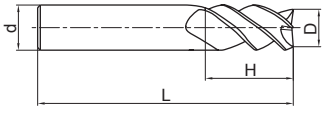
3-flute flattened end mills with straight shank

PM-3E-H





Picture 1



Picture 2

- Especially suitable for slot milling.
- Wide application.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-3E-D3.0S-H	3.0	4	8	50	3	Picture 1	○
PM-3E-D4.0S-H	4.0	4	11	50	3	Picture 2	○
PM-3E-D3.0-H	3.0	6	8	50	3	Picture 1	○
PM-3E-D3.5-H	3.5	6	10	50	3	Picture 1	○
PM-3E-D4.0-H	4.0	6	11	50	3	Picture 1	○
PM-3E-D4.5-H	4.5	6	11	50	3	Picture 1	○
PM-3E-D5.0-H	5.0	6	13	50	3	Picture 1	○
PM-3E-D5.5-H	5.5	6	16	50	3	Picture 1	○
PM-3E-D6.0-H	6.0	6	16	50	3	Picture 2	○
PM-3E-D7.0-H	7.0	8	20	60	3	Picture 1	○
PM-3E-D8.0-H	8.0	8	20	60	3	Picture 2	○
PM-3E-D9.0-H	9.0	10	22	75	3	Picture 1	○
PM-3E-D10.0-H	10.0	10	25	75	3	Picture 2	○
PM-3E-D11.0-H	11.0	12	26	75	3	Picture 1	○
PM-3E-D12.0-H	12.0	12	30	75	3	Picture 2	○
PM-3E-D14.0-H	14.0	14	32	75	3	Picture 2	○
PM-3E-D16.0-H	16.0	16	45	100	3	Picture 2	○
PM-3E-D18.0-H	18.0	18	45	100	3	Picture 2	○
PM-3E-D20.0-H	20.0	20	45	100	3	Picture 2	○

● Stock available ○ Make-to-order

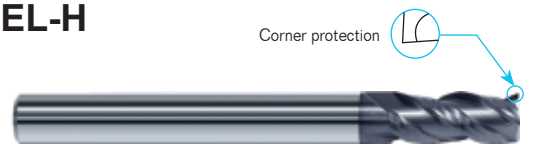
Applicable workpiece material table ◎Very suitable ○Suitable

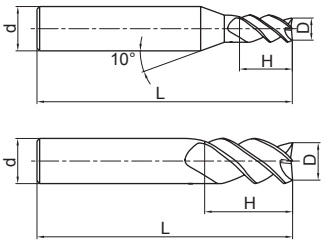
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B370

3-flute flattened end mills with straight shank and long cutting edge

PM-3EL-H





- PM-3E-H series with long shank.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-3EL-D3.0-H	3.0	6	12	75	3	Picture 1	○
PM-3EL-D4.0-H	4.0	6	15	75	3	Picture 1	○
PM-3EL-D5.0-H	5.0	6	20	75	3	Picture 1	○
PM-3EL-D6.0-H	6.0	6	20	75	3	Picture 2	○
PM-3EL-D8.0-H	8.0	8	25	100	3	Picture 2	○
PM-3EL-D10.0-H	10.0	10	30	100	3	Picture 2	○
PM-3EL-D12.0-H	12.0	12	35	100	3	Picture 2	○
PM-3EL-D14.0-H	14.0	14	40	100	3	Picture 2	○
PM-3EL-D16.0-H	16.0	16	50	150	3	Picture 2	○
PM-3EL-D20.0-H	20.0	20	55	150	3	Picture 2	○

● Stock available ○ Make-to-order

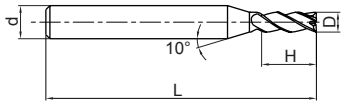
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

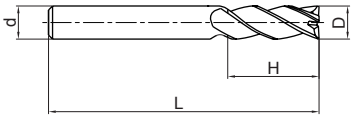
Code key B213
Graphics category and identification B214
Cutting parameters B370

4-flute flattened end mills with straight shank

PM-4E-G



Picture 1



Picture 2

- Very suitable for side milling.
- Wide application.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-4E-D1.0S-G	1.0	4	3	50	4	Picture 1	●
PM-4E-D1.5S-G	1.5	4	4	50	4	Picture 1	●
PM-4E-D2.0S-G	2.0	4	6	50	4	Picture 1	●
PM-4E-D2.5S-G	2.5	4	8	50	4	Picture 1	●
PM-4E-D3.0S-G	3.0	4	8	50	4	Picture 1	●
PM-4E-D4.0S-G	4.0	4	11	50	4	Picture 2	●
PM-4E-D1.0-G	1.0	6	3	50	4	Picture 1	●
PM-4E-D1.5-G	1.5	6	4	50	4	Picture 1	●
PM-4E-D2.0-G	2.0	6	6	50	4	Picture 1	●
PM-4E-D2.5-G	2.5	6	8	50	4	Picture 1	●
PM-4E-D3.0-G	3.0	6	8	50	4	Picture 1	●
PM-4E-D3.5-G	3.5	6	10	50	4	Picture 1	●
PM-4E-D4.0-G	4.0	6	11	50	4	Picture 1	●
PM-4E-D4.5-G	4.5	6	11	50	4	Picture 1	●
PM-4E-D5.0-G	5.0	6	13	50	4	Picture 1	●
PM-4E-D5.5-G	5.5	6	16	50	4	Picture 1	●
PM-4E-D6.0-G	6.0	6	16	50	4	Picture 2	●
PM-4E-D7.0-G	7.0	8	20	60	4	Picture 1	●
PM-4E-D8.0-G	8.0	8	20	60	4	Picture 2	●
PM-4E-D9.0-G	9.0	10	22	75	4	Picture 1	●
PM-4E-D10.0-G	10.0	10	25	75	4	Picture 2	●
PM-4E-D11.0-G	11.0	12	26	75	4	Picture 1	●
PM-4E-D12.0-G	12.0	12	30	75	4	Picture 2	●
PM-4E-D14.0-G	14.0	14	32	75	4	Picture 2	●
PM-4E-D16.0-G	16.0	16	45	100	4	Picture 2	●
PM-4E-D18.0-G	18.0	18	45	100	4	Picture 2	●
PM-4E-D20.0-G	20.0	20	45	100	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

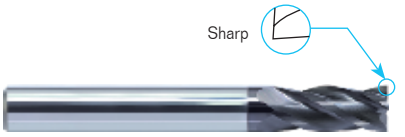
◎Very suitable ○Suitable

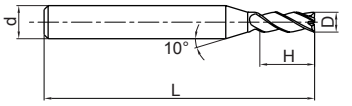
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B371–B372

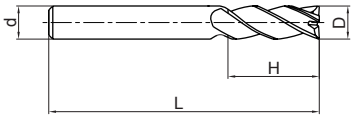
4-flute flattened end mills with straight shank

PM-4F-G





Picture 1



Picture 2

- Very suitable for side milling.
- Wide application.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-4F-D1.0S-G	1.0	4	3	50	4	Picture 1	○
PM-4F-D1.5S-G	1.5	4	4	50	4	Picture 1	○
PM-4F-D2.0S-G	2.0	4	6	50	4	Picture 1	○
PM-4F-D2.5S-G	2.5	4	8	50	4	Picture 1	○
PM-4F-D3.0S-G	3.0	4	8	50	4	Picture 1	○
PM-4F-D4.0S-G	4.0	4	11	50	4	Picture 2	○
PM-4F-D1.0-G	1.0	6	3	50	4	Picture 1	○
PM-4F-D1.5-G	1.5	6	4	50	4	Picture 1	○
PM-4F-D2.0-G	2.0	6	6	50	4	Picture 1	○
PM-4F-D2.5-G	2.5	6	8	50	4	Picture 1	○
PM-4F-D3.0-G	3.0	6	8	50	4	Picture 1	○
PM-4F-D3.5-G	3.5	6	10	50	4	Picture 1	○
PM-4F-D4.0-G	4.0	6	11	50	4	Picture 1	○
PM-4F-D4.5-G	4.5	6	11	50	4	Picture 1	○
PM-4F-D5.0-G	5.0	6	13	50	4	Picture 1	○
PM-4F-D5.5-G	5.5	6	16	50	4	Picture 1	○
PM-4F-D6.0-G	6.0	6	16	50	4	Picture 2	○
PM-4F-D7.0-G	7.0	8	20	60	4	Picture 1	○
PM-4F-D8.0-G	8.0	8	20	60	4	Picture 2	○
PM-4F-D9.0-G	9.0	10	22	75	4	Picture 1	○
PM-4F-D10.0-G	10.0	10	25	75	4	Picture 2	○
PM-4F-D11.0-G	11.0	12	26	75	4	Picture 1	○
PM-4F-D12.0-G	12.0	12	30	75	4	Picture 2	○
PM-4F-D14.0-G	14.0	14	32	75	4	Picture 2	○
PM-4F-D16.0-G	16.0	16	45	100	4	Picture 2	○
PM-4F-D18.0-G	18.0	18	45	100	4	Picture 2	○
PM-4F-D20.0-G	20.0	20	45	100	4	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table

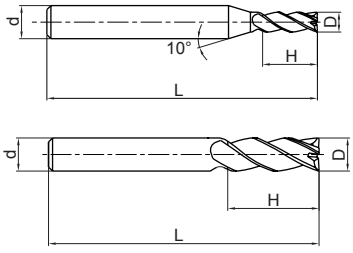
◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B373–B374

4-flute flattened end mills with straight shank and long cutting edge

PM-4EL-G



- PM-4E-G series with long cutting edge.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-4EL-D3.0-G	3.0	6	12	75	4	Picture 1	○
PM-4EL-D4.0-G	4.0	6	15	75	4	Picture 1	○
PM-4EL-D5.0-G	5.0	6	20	75	4	Picture 1	○
PM-4EL-D6.0-G	6.0	6	20	75	4	Picture 2	○
PM-4EL-D8.0-G	8.0	8	25	100	4	Picture 2	○
PM-4EL-D10.0-G	10.0	10	30	100	4	Picture 2	○
PM-4EL-D12.0-G	12.0	12	35	100	4	Picture 2	○
PM-4EL-D14.0-G	14.0	14	40	100	4	Picture 2	○
PM-4EL-D16.0-G	16.0	16	50	150	4	Picture 2	○
PM-4EL-D20.0-G	20.0	20	55	150	4	Picture 2	○

● Stock available ○ Make-to-order

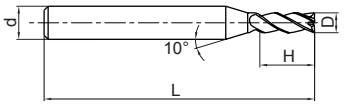
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

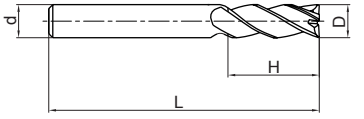
Code key B213
Graphics category and identification B214
Cutting parameters B371–B372

4-flute flattened end mills with straight shank and long cutting edge

PM-4FL-G



Picture 1



Picture 2

- PM-4F-G series with long cutting edge.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-4FL-D3.0-G	3.0	6	12	75	4	Picture 1	○
PM-4FL-D4.0-G	4.0	6	15	75	4	Picture 1	○
PM-4FL-D5.0-G	5.0	6	20	75	4	Picture 1	○
PM-4FL-D6.0-G	6.0	6	20	75	4	Picture 2	○
PM-4FL-D8.0-G	8.0	8	25	100	4	Picture 2	○
PM-4FL-D10.0-G	10.0	10	30	100	4	Picture 2	○
PM-4FL-D12.0-G	12.0	12	35	100	4	Picture 2	○
PM-4FL-D14.0-G	14.0	14	40	100	4	Picture 2	○
PM-4FL-D16.0-G	16.0	16	50	150	4	Picture 2	○
PM-4FL-D20.0-G	20.0	20	55	150	4	Picture 2	○

● Stock available ○ Make-to-order

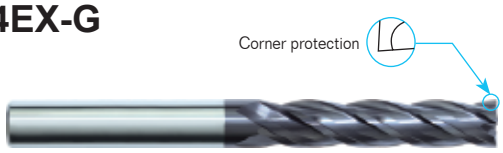
Applicable workpiece material table ◎Very suitable ○Suitable

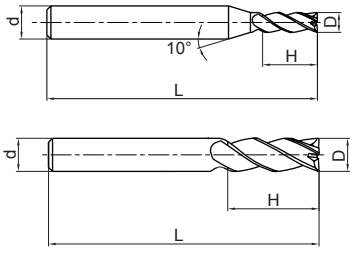
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B373–B374

4-flute flattened end mills with straight shank and extra long cutting edge

PM-4EX-G





- Extra long cutting edge, for deep side wall machining.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-4EX-D3.0-G	3.0	6	20	75	4	Picture 1	○
PM-4EX-D4.0-G	4.0	6	25	75	4	Picture 1	○
PM-4EX-D5.0-G	5.0	6	30	75	4	Picture 1	○
PM-4EX-D6.0-G	6.0	6	30	75	4	Picture 2	○
PM-4EX-D8.0-G	8.0	8	40	100	4	Picture 2	○
PM-4EX-D10.0-G	10.0	10	50	110	4	Picture 2	○
PM-4EX-D12.0-G	12.0	12	50	110	4	Picture 2	○
PM-4EX-D16.0-G	16.0	16	70	150	4	Picture 2	○
PM-4EX-D20.0-G	20.0	20	75	150	4	Picture 2	○

● Stock available ○ Make-to-order

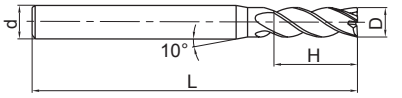
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

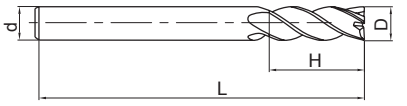
Code key B213
Graphics category and identification B214
Cutting parameters B375

4-flute flattened end mills with straight shank

PM-4E



Picture 1



Picture 2

- Very suitable for side milling and shallow slot machining.
- Wide application.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-4E-D1.0S	1.0	4	3	50	4	Picture 1	○
PM-4E-D1.5S	1.5	4	4	50	4	Picture 1	○
PM-4E-D2.0S	2.0	4	6	50	4	Picture 1	○
PM-4E-D2.5S	2.5	4	8	50	4	Picture 1	○
PM-4E-D3.0S	3.0	4	8	50	4	Picture 1	○
PM-4E-D4.0S	4.0	4	11	50	4	Picture 2	○
PM-4E-D1.0	1.0	6	3	50	4	Picture 1	○
PM-4E-D1.5	1.5	6	4	50	4	Picture 1	○
PM-4E-D2.0	2.0	6	6	50	4	Picture 1	○
PM-4E-D2.5	2.5	6	8	50	4	Picture 1	○
PM-4E-D3.0	3.0	6	8	50	4	Picture 1	○
PM-4E-D3.5	3.5	6	10	50	4	Picture 1	○
PM-4E-D4.0	4.0	6	11	50	4	Picture 1	○
PM-4E-D4.5	4.5	6	11	50	4	Picture 1	○
PM-4E-D5.0	5.0	6	13	50	4	Picture 1	○
PM-4E-D5.5	5.5	6	16	50	4	Picture 1	○
PM-4E-D6.0	6.0	6	16	50	4	Picture 2	○
PM-4E-D7.0	7.0	8	20	60	4	Picture 1	○
PM-4E-D8.0	8.0	8	20	60	4	Picture 2	○
PM-4E-D9.0	9.0	10	22	75	4	Picture 1	○
PM-4E-D10.0	10.0	10	25	75	4	Picture 2	○
PM-4E-D11.0	11.0	12	26	75	4	Picture 1	○
PM-4E-D12.0	12.0	12	30	75	4	Picture 2	○
PM-4E-D14.0	14.0	14	32	75	4	Picture 2	○
PM-4E-D16.0	16.0	16	45	100	4	Picture 2	○
PM-4E-D18.0	18.0	18	45	100	4	Picture 2	○
PM-4E-D20.0	20.0	20	45	100	4	Picture 2	○

● Stock available ○ Make-to-order

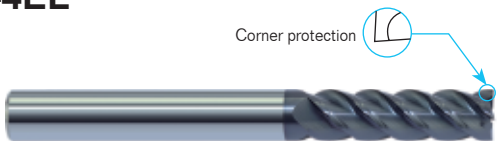
Applicable workpiece material table ◎Very suitable ○Suitable

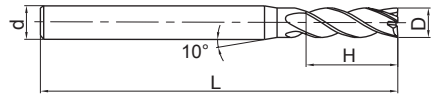
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B376–B377

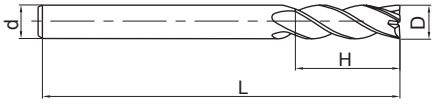
4-flute flattened end mills with straight shank and long cutting edge

PM-4EL





Picture 1



Picture 2

- PM-4E series with long cutting edge.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-4EL-D3.0	3.0	6	12	75	4	Picture 1	○
PM-4EL-D4.0	4.0	6	15	75	4	Picture 1	○
PM-4EL-D5.0	5.0	6	20	75	4	Picture 1	○
PM-4EL-D6.0	6.0	6	20	75	4	Picture 2	○
PM-4EL-D8.0	8.0	8	25	100	4	Picture 2	○
PM-4EL-D10.0	10.0	10	30	100	4	Picture 2	○
PM-4EL-D12.0	12.0	12	35	100	4	Picture 2	○
PM-4EL-D14.0	14.0	14	40	100	4	Picture 2	○
PM-4EL-D16.0	16.0	16	50	150	4	Picture 2	○
PM-4EL-D20.0	20.0	20	55	150	4	Picture 2	○

● Stock available ○ Make-to-order

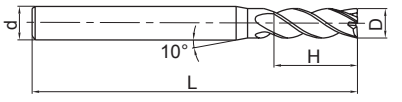
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

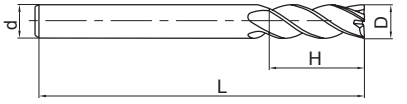
Code key B213
Graphics category and identification B214
Cutting parameters B376–B377

4-flute flattened end mills with straight shank

PM-4E-H



Picture 1



Picture 2

● Most suitable for slot milling. ● Wide application.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-4E-D3.0S-H	3.0	4	8	50	4	Picture 1	○
PM-4E-D4.0S-H	4.0	4	11	50	4	Picture 2	○
PM-4E-D3.0-H	3.0	6	8	50	4	Picture 1	○
PM-4E-D3.5-H	3.5	6	10	50	4	Picture 1	○
PM-4E-D4.0-H	4.0	6	11	50	4	Picture 1	○
PM-4E-D4.5-H	4.5	6	11	50	4	Picture 1	○
PM-4E-D5.0-H	5.0	6	13	50	4	Picture 1	○
PM-4E-D5.5-H	5.5	6	16	50	4	Picture 1	○
PM-4E-D6.0-H	6.0	6	16	50	4	Picture 2	○
PM-4E-D7.0-H	7.0	8	20	60	4	Picture 1	○
PM-4E-D8.0-H	8.0	8	20	60	4	Picture 2	○
PM-4E-D9.0-H	9.0	10	22	75	4	Picture 1	○
PM-4E-D10.0-H	10.0	10	25	75	4	Picture 2	○
PM-4E-D11.0-H	11.0	12	26	75	4	Picture 1	○
PM-4E-D12.0-H	12.0	12	30	75	4	Picture 2	○
PM-4E-D14.0-H	14.0	14	32	75	4	Picture 2	○
PM-4E-D16.0-H	16.0	16	45	100	4	Picture 2	○
PM-4E-D18.0-H	18.0	18	45	100	4	Picture 2	○
PM-4E-D20.0-H	20.0	20	45	100	4	Picture 2	○

● Stock available ○ Make-to-order

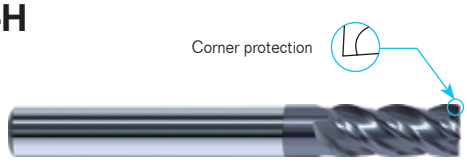
Applicable workpiece material table ◎Very suitable ○Suitable

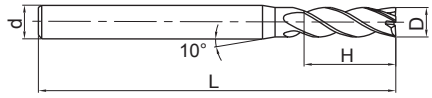
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B376–B377

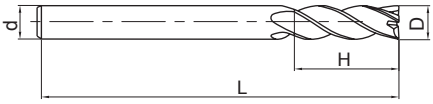
4-flute flattened end mills with straight shank and long cutting edge

PM-4EL-H





Picture 1



Picture 2

- PM-4E-H series with long shank.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-4EL-D3.0-H	3.0	6	12	75	4	Picture 1	○
PM-4EL-D4.0-H	4.0	6	15	75	4	Picture 1	○
PM-4EL-D5.0-H	5.0	6	20	75	4	Picture 1	○
PM-4EL-D6.0-H	6.0	6	20	75	4	Picture 2	○
PM-4EL-D8.0-H	8.0	8	25	100	4	Picture 2	○
PM-4EL-D10.0-H	10.0	10	30	100	4	Picture 2	○
PM-4EL-D12.0-H	12.0	12	35	100	4	Picture 2	○
PM-4EL-D14.0-H	14.0	14	40	100	4	Picture 2	○
PM-4EL-D16.0-H	16.0	16	50	150	4	Picture 2	○
PM-4EL-D20.0-H	20.0	20	55	150	4	Picture 2	○

● Stock available ○ Make-to-order

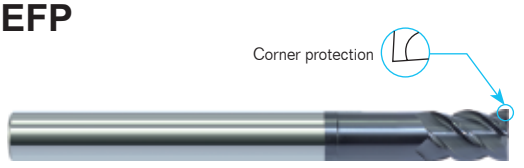
Applicable workpiece material table ◎Very suitable ○Suitable

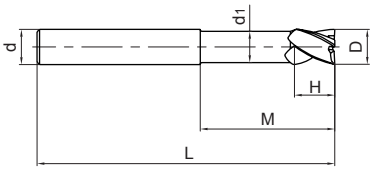
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B376–B377

4-flute flattened end mills with straight shank, long neck and short cutting edge

PM-4EFP





● High-rigidity short cutting edge, suitable for heavy cutting and also deep cavity milling.

Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
PM-4EFP-D6.0	6.0	6	9	30	5.8	75	4	○
PM-4EFP-D8.0	8.0	8	12	40	7.8	100	4	○
PM-4EFP-D10.0	10.0	10	15	50	9.6	100	4	○
PM-4EFP-D12.0	12.0	12	18	50	11.5	100	4	○
PM-4EFP-D16.0	16.0	16	24	50	15.5	150	4	○
PM-4EFP-D20.0	20.0	20	30	60	19.5	150	4	○

● Stock available ○ Make-to-order

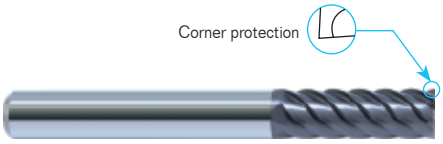
Applicable workpiece material table ◎Very suitable ○Suitable

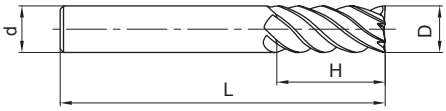
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B378–B379

6-flute flattened end mills with straight shank

PM-6E





- Perfect rigidity, very suitable for side finish machining.
- High speed, high feed rate machining applicable.

Ordering number	Basic dimension(mm)				Number of teeth Z	Stock
	D	d	H	L		
PM-6E-D6.0	6.0	6	18	60	6	○
PM-6E-D8.0	8.0	8	20	60	6	○
PM-6E-D10.0	10.0	10	30	75	6	○
PM-6E-D12.0	12.0	12	32	75	6	○
PM-6E-D16.0	16.0	16	40	100	6	○
PM-6E-D20.0	20.0	20	45	100	6	○

● Stock available ○ Make-to-order

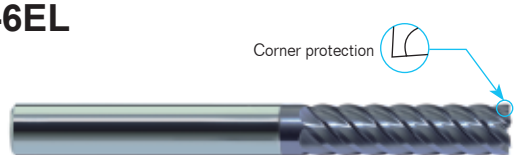
Applicable workpiece material table ◎Very suitable ○Suitable

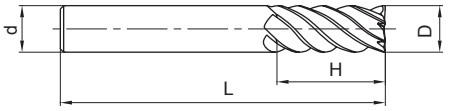
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B380

6-flute flattened end mills with straight shank and long cutting edge

PM-6EL





- PM-6E series with long cutting edge.

Ordering number	Basic dimension(mm)				Number of teeth Z	Stock
	D	d	H	L		
PM-6EL-D6.0	6.0	6	24	75	6	○
PM-6EL-D8.0	8.0	8	32	75	6	○
PM-6EL-D10.0	10.0	10	40	100	6	○
PM-6EL-D12.0	12.0	12	45	100	6	○
PM-6EL-D16.0	16.0	16	64	150	6	○
PM-6EL-D20.0	20.0	20	75	150	6	○

● Stock available ○ Make-to-order

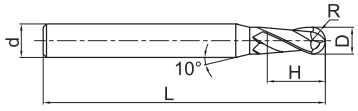
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

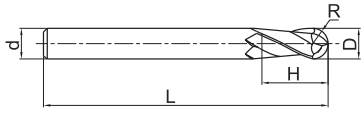
Code key B213
Graphics category and identification B214
Cutting parameters B381

2-flute ball nose end mills with straight shank

PM-2B



Picture 1



Picture 2

- For profile milling, high speed machining applicable.
- Wide application.

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PM-2B-R0.5S	1.0	0.5	4	2	50	2	Picture 1	●
PM-2B-R0.75S	1.5	0.75	4	3	50	2	Picture 1	●
PM-2B-R1.0S	2.0	1.0	4	4	50	2	Picture 1	●
PM-2B-R1.25S	2.5	1.25	4	5	50	2	Picture 1	●
PM-2B-R1.5S	3.0	1.5	4	6	50	2	Picture 1	●
PM-2B-R2.0S	4.0	2.0	4	8	50	2	Picture 2	●
PM-2B-R0.5	1.0	0.5	6	2	50	2	Picture 1	●
PM-2B-R0.75	1.5	0.75	6	3	50	2	Picture 1	●
PM-2B-R1.0	2.0	1.0	6	4	50	2	Picture 1	●
PM-2B-R1.25	2.5	1.25	6	5	50	2	Picture 1	●
PM-2B-R1.5	3.0	1.5	6	6	50	2	Picture 1	●
PM-2B-R1.75	3.5	1.75	6	8	50	2	Picture 1	●
PM-2B-R2.0	4.0	2.0	6	8	50	2	Picture 1	●
PM-2B-R2.5	5.0	2.5	6	10	50	2	Picture 1	●
PM-2B-R2.75	5.5	2.75	6	12	50	2	Picture 1	●
PM-2B-R3.0	6.0	3.0	6	12	50	2	Picture 2	●
PM-2B-R3.5	7.0	3.5	8	14	60	2	Picture 1	●
PM-2B-R4.0	8.0	4.0	8	16	60	2	Picture 2	●
PM-2B-R4.5	9.0	4.5	10	18	75	2	Picture 1	●
PM-2B-R5.0	10.0	5.0	10	20	75	2	Picture 2	●
PM-2B-R6.0	12.0	6.0	12	24	75	2	Picture 2	●
PM-2B-R7.0	14.0	7.0	14	28	75	2	Picture 2	●
PM-2B-R8.0	16.0	8.0	16	32	100	2	Picture 2	●
PM-2B-R10.0	20.0	10.0	20	40	100	2	Picture 2	●

● Stock available ○ Make-to-order

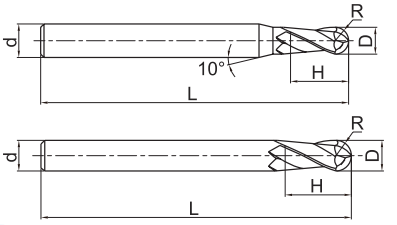
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B382–B383

2-flute ball nose end mills with straight shank

PM-2BL



- PM-2B series with long shank.

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PM-2BL-R1.0	2.0	1.0	6	4	75	2	Picture 1	○
PM-2BL-R1.25	2.5	1.25	6	5	75	2	Picture 1	○
PM-2BL-R1.5	3.0	1.5	6	6	75	2	Picture 1	○
PM-2BL-R1.75	3.5	1.75	6	8	75	2	Picture 1	○
PM-2BL-R2.0	4.0	2.0	6	8	75	2	Picture 1	○
PM-2BL-R2.5	5.0	2.5	6	10	75	2	Picture 1	○
PM-2BL-R2.75	5.5	2.75	6	12	75	2	Picture 1	○
PM-2BL-R3.0	6.0	3.0	6	12	75	2	Picture 2	○
PM-2BL-R3.5	7.0	3.5	8	14	75	2	Picture 1	○
PM-2BL-R4.0	8.0	4.0	8	16	100	2	Picture 2	○
PM-2BL-R4.5	9.0	4.5	10	18	100	2	Picture 1	○
PM-2BL-R5.0	10.0	5.0	10	20	100	2	Picture 2	○
PM-2BL-R6.0	12.0	6.0	12	24	100	2	Picture 2	○
PM-2BL-R7.0	14.0	7.0	14	28	100	2	Picture 2	○
PM-2BL-R8.0	16.0	8.0	16	32	150	2	Picture 2	○
PM-2BL-R10.0	20.0	10.0	20	40	150	2	Picture 2	○

● Stock available ○ Make-to-order

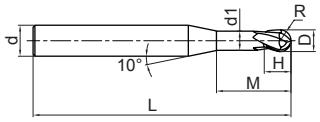
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

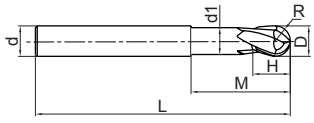
Code key B213
Graphics category and identification B214
Cutting parameters B382–B383

2-flute ball nose end mills with straight shank, long neck and short cutting edge

PM-2BFP



Picture 1



Picture 2

- High-rigidity short cutting edge, suitable for heavy cutting.

Ordering number	Basic dimension(mm)							Number of teeth Z	Geometry	Stock
	D	R	H	d_1	M	d	L			
PM-2BFP-R0.5	1.0	0.5	1	0.95	2.5	6	75	2	Picture 1	○
PM-2BFP-R0.75	1.5	0.75	1.5	1.45	3	6	75	2	Picture 1	○
PM-2BFP-R1.0	2.0	1.0	2	1.95	4	6	75	2	Picture 1	○
PM-2BFP-R1.5	3.0	1.5	3	2.85	6	6	75	2	Picture 1	○
PM-2BFP-R2.0	4.0	2.0	4	3.85	8	6	75	2	Picture 1	○
PM-2BFP-R2.5	5.0	2.5	5	4.85	10	6	75	2	Picture 1	○
PM-2BFP-R3.0	6.0	3.0	6	5.8	12	6	75	2	Picture 2	○
PM-2BFP-R4.0	8.0	4.0	8	7.8	16	8	100	2	Picture 2	○
PM-2BFP-R5.0	10.0	5.0	10	9.6	20	10	100	2	Picture 2	○
PM-2BFP-R6.0	12.0	6.0	12	11.5	24	12	100	2	Picture 2	○
PM-2BFP-R8.0	16.0	8.0	16	15.5	32	16	150	2	Picture 2	○
PM-2BFP-R10.0	20.0	10.0	20	19.5	40	20	150	2	Picture 2	○

● Stock available ○ Make-to-order

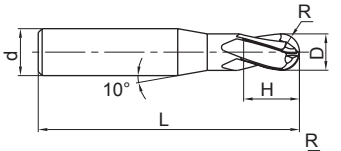
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

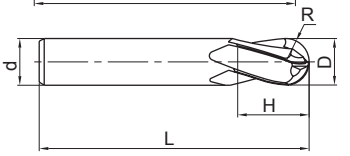
Code key B213
Graphics category and identification B214
Cutting parameters B382–B383

4-flute ball nose end mills with straight shank

PM-4B



Picture 1



Picture 2

● 4-flute ball nose end mill can operate with higher feed speed and machining efficiency, extending too life in machining high-hardness workpiece.

30° | Coated NaNo TiAlN | D: D≤12 0~-0.020, 12<D 0~-0.030 | R: R±0.01

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PM-4B-R1.5	3.0	1.5	6	6	50	4	Picture 1	○
PM-4B-R2.0	4.0	2.0	6	8	50	4	Picture 1	○
PM-4B-R2.5	5.0	2.5	6	10	50	4	Picture 1	○
PM-4B-R3.0	6.0	3.0	6	12	50	4	Picture 2	○
PM-4B-R4.0	8.0	4.0	8	16	60	4	Picture 2	○
PM-4B-R5.0	10.0	5.0	10	20	75	4	Picture 2	○
PM-4B-R6.0	12.0	6.0	12	24	75	4	Picture 2	○
PM-4B-R7.0	14.0	7.0	14	28	75	4	Picture 2	○
PM-4B-R8.0	16.0	8.0	16	32	100	4	Picture 2	○
PM-4B-R9.0	18.0	9.0	18	36	100	4	Picture 2	○
PM-4B-R10.0	20.0	10.0	20	40	100	4	Picture 2	○

● Stock available ○ Make-to-order

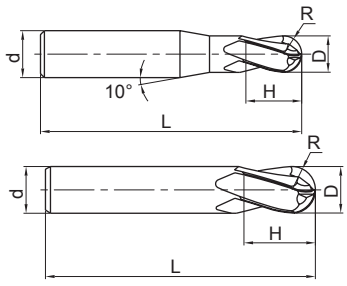
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

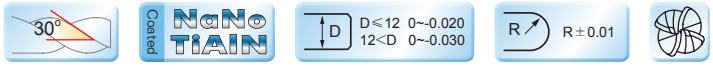
Code key B213
Graphics category and identification B214
Cutting parameters B384

4-flute ball nose end mills with straight and long shank

PM-4BL



- PM-4B series with long shank.



Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PM-4BL-R1.5	3.0	1.5	6	6	75	4	Picture 1	○
PM-4BL-R2.0	4.0	2.0	6	8	75	4	Picture 1	○
PM-4BL-R2.5	5.0	2.5	6	10	75	4	Picture 1	○
PM-4BL-R3.0	6.0	3.0	6	12	75	4	Picture 2	○
PM-4BL-R4.0	8.0	4.0	8	16	100	4	Picture 2	○
PM-4BL-R5.0	10.0	5.0	10	20	100	4	Picture 2	○
PM-4BL-R6.0	12.0	6.0	12	24	100	4	Picture 2	○
PM-4BL-R7.0	14.0	7.0	14	28	100	4	Picture 2	○
PM-4BL-R8.0	16.0	8.0	16	32	150	4	Picture 2	○
PM-4BL-R9.0	18.0	9.0	18	36	150	4	Picture 2	○
PM-4BL-R10.0	20.0	10.0	20	40	150	4	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

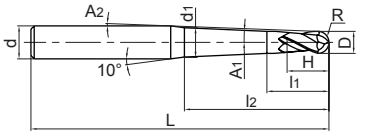
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

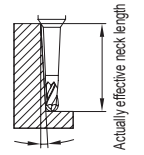
Code key B213
Graphics category and identification B214
Cutting parameters B384

2-flute ball nose end mills with taper neck

Deep ball nose slot

PM-2BC





Degree of workpiece declining

- High-rigidity taper neck structure.

Ordering number	Basic dimension(mm)										Number of teeth Z	Degree of workpiece declining corresponding actually effective neck length				Stock
	D	R	A_1	H	l_2	l_1	A_2	d_1	L	d		0.5°	1°	2°	3°	
PM-2BC05-R0.25-M03	0.5	0.25	0.5°	0.5	3	1.5	7.8°	0.49	50	4	2	3.3	3.5	3.9	4.4	○
PM-2BC05-R0.25-M05					5		6.8°	0.53			2	5.3	5.6	6.2	7.1	○
PM-2BC10-R0.25-M03			1.0°		3		7.8°	0.52			2	-	3.4	3.8	4.3	○
PM-2BC10-R0.25-M05					5		6.9°	0.59			2	-	5.4	6.0	6.8	○
PM-2BC15-R0.25-M03			1.5°		3		7.9°	0.54			2	-	-	3.7	4.1	○
PM-2BC15-R0.25-M05					5		7.0°	0.65			2	-	-	5.8	6.6	○
PM-2BC05-R0.30-M05	0.6	0.30	0.5°	0.6	5	1.6	6.8°	0.62	50	4	2	5.3	5.6	6.2	7.1	○
PM-2BC05-R0.30-M08					8		5.7°	0.68			2	8.3	8.7	9.8	11.1	○
PM-2BC10-R0.30-M05			1.0°		5		6.8°	0.68			2	-	5.4	6.0	6.8	○
PM-2BC10-R0.30-M08					8		5.8°	0.79			2	-	8.4	9.4	10.7	○
PM-2BC10-R0.30-M10					10		5.2°	0.86			2	-	10.4	11.6	13.2	○
PM-2BC10-R0.30-M12					12		4.8°	0.93			2	-	12.4	13.9	15.8	○
PM-2BC10-R0.30-M15					15		4.2°	1.03			2	-	15.4	17.2	19.6	○
PM-2BC15-R0.30-M05			1.5°		5		6.9°	0.74			2	-	-	5.8	6.6	○
PM-2BC15-R0.30-M08					8		5.9°	0.90			2	-	-	9.0	10.2	○
PM-2BC05-R0.40-M08	0.8	0.40	0.5°	0.8	8	1.8	5.5°	0.87	50	4	2	8.3	8.7	9.8	11.1	○
PM-2BC05-R0.40-M12					12		4.5°	0.94	60		2	12.3	13.0	14.5	16.5	○
PM-2BC10-R0.40-M08			1.0°		8		5.6°	0.98	50		2	-	8.4	9.4	10.7	○
PM-2BC10-R0.40-M12					12		4.6°	1.12	60		2	-	12.4	13.9	15.8	○
PM-2BC15-R0.40-M08			1.5°		8		5.8°	1.09	50		2	-	-	9.0	10.2	○
PM-2BC15-R0.40-M12					12		4.8°	1.30	60		2	-	-	13.2	15.0	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

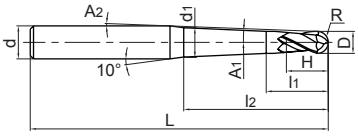
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

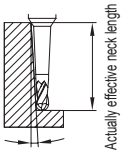
Code key B213
Graphics category and identification B214
Cutting parameters B386–B387

2-flute ball nose end mills with taper neck

Deep ball nose slot

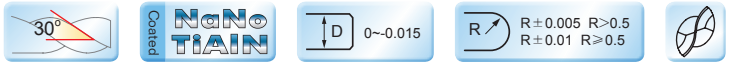
PM-2BC





Degree of workpiece declining

- High-rigidity taper neck structure.



Ordering number	Basic dimension(mm)										Number of teeth Z	Degree of workpiece declining corresponding actually effective neck length				Stock
	D	R	A1	H	l2	l1	A2	d1	L	d		0.5°	1°	2°	3°	
PM-2BC05-R0.50-M10	1.0	0.50	0.5°	1.0	10	2.5	6.1°	1.08	60	6	2	10.4	10.9	12.2	13.9	○
PM-2BC05-R0.50-M15					15		5.1°	1.16	60		2	15.4	16.2	18.2	20.7	○
PM-2BC05-R0.50-M20					20		4.4°	1.25	70		2	20.4	21.5	24.1	27.4	○
PM-2BC05-R0.50-M25					25		3.8°	1.34	70		2	25.4	26.8	30.0	34.2	○
PM-2BC05-R0.50-M30					30		3.4°	1.42	70		2	30.4	32.0	35.9	41.0	○
PM-2BC10-R0.50-M10			1.0°		10		6.2°	1.21	60		2	-	10.5	11.8	13.4	○
PM-2BC10-R0.50-M15					15		5.2°	1.38	60		2	-	15.5	17.4	19.8	○
PM-2BC10-R0.50-M20					20		4.5°	1.56	70		2	-	20.5	23.0	26.2	○
PM-2BC10-R0.50-M25					25		3.9°	1.73	70		2	-	25.5	28.6	32.6	○
PM-2BC10-R0.50-M30					30		3.5°	1.91	70		2	-	30.5	34.2	39.0	○
PM-2BC10-R0.50-M35					35		3.2°	2.08	80		2	-	35.5	39.8	45.4	○
PM-2BC15-R0.50-M10			1.5°		10		6.3°	1.34	60		2	-	-	11.3	12.8	○
PM-2BC15-R0.50-M15					15		5.3°	1.60	60		2	-	-	16.6	18.9	○
PM-2BC15-R0.50-M20					20		4.6°	1.86	70		2	-	-	21.9	24.9	○
PM-2BC20-R0.50-M15			2°		15		5.4°	1.82	60		2	-	-	15.8	18.0	○
PM-2BC20-R0.50-M20					20		4.7°	2.17	70		2	-	-	20.8	23.7	○
PM-2BC30-R0.50-M20			3°		20		5.0°	2.78	70		2	-	-	-	21.2	○
PM-2BC50-R0.50-M20			5°		20		5.7°	4.01	70		2	-	-	-	-	○
PM-2BC05-R0.60-M12	1.2	0.60	0.5°	1.2	12	2.7	5.6°	1.31	60	6	2	12.4	13.1	14.6	16.6	○
PM-2BC05-R0.60-M24					24		3.8°	1.52	70		2	24.4	25.7	28.8	32.8	○
PM-2BC10-R0.60-M12			1.0°		12		5.7°	1.47	60		2	-	12.5	14.0	15.9	○
PM-2BC10-R0.60-M24					24		3.9°	1.89	70		2	-	24.5	27.5	31.3	○
PM-2BC15-R0.60-M12			1.5°		12		5.8°	1.63	60		2	-	-	13.4	15.2	○
PM-2BC15-R0.60-M24					24		4.1°	2.26	70		2	-	-	26.2	29.8	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

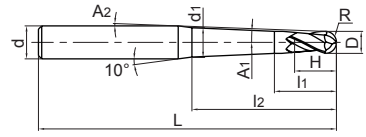
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

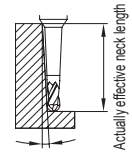
Code key B213
Graphics category and identification B214
Cutting parameters B386–B387

2-flute ball nose end mills with taper neck

Deep ball nose slot

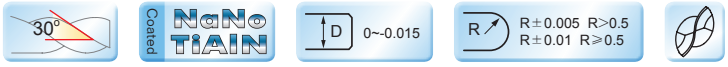
PM-2BC





Degree of workpiece declining

- High-rigidity taper neck structure.



Ordering number	Basic dimension(mm)										Number of teeth Z	Degree of workpiece declining corresponding actually effective neck length				Stock
	D	R	A1	H	l2	l1	A2	d1	L	d		0.5°	1°	2°	3°	
PM-2BC05-R0.75-M10	1.5	0.75	0.5°	1.5	10	3	5.9°	1.57	60	6	2	10.4	10.9	12.2	13.8	○
PM-2BC05-R0.75-M15					15		4.9°	1.65	60		2	15.4	16.2	18.1	20.6	○
PM-2BC05-R0.75-M30					30		3.2°	1.92	70		2	30.4	32.0	35.9	40.9	○
PM-2BC10-R0.75-M10			1.0°		10		6.0°	1.69	60		2	-	10.5	11.8	13.3	○
PM-2BC10-R0.75-M15					15		5.0°	1.86	60		2	-	15.5	17.4	19.7	○
PM-2BC10-R0.75-M20	1.5	0.75	1.0°	1.5	20	3	4.2°	2.04	70	6	2	-	20.5	23.0	26.1	○
PM-2BC10-R0.75-M30					30		3.3°	2.39	70		2	-	30.5	34.2	39.0	○
PM-2BC15-R0.75-M10			1.5°		10		6.1°	1.81	60		2	-	-	11.3	12.8	○
PM-2BC15-R0.75-M15					15		5.1°	2.07	60		2	-	-	16.6	18.9	○
PM-2BC15-R0.75-M30					30		3.4°	2.86	70		2	-	-	32.5	37.0	○
PM-2BC05-R1.0-M20	2.0	1.0	0.5°	2.0	20	4	3.9°	2.18	60	6	2	20.7	21.7	24.3	27.6	○
PM-2BC05-R1.0-M30					30		2.9°	2.36	70		2	30.7	32.3	36.2	non-interference	○
PM-2BC05-R1.0-M40					40		2.4°	2.53	80		2	40.7	42.8	48.0	non-interference	○
PM-2BC10-R1.0-M20			1.0°		20		4.0°	2.46	60		2	-	20.8	23.3	26.4	○
PM-2BC10-R1.0-M25					25		3.4°	2.64	60		2	-	25.8	28.9	32.9	○
PM-2BC10-R1.0-M30					30		3.0°	2.81	70		2	-	30.8	34.5	39.3	○
PM-2BC10-R1.0-M35					35		2.7°	2.99	80		2	-	35.8	40.1	non-interference	○
PM-2BC10-R1.0-M40					40		2.5°	3.16	80		2	-	40.8	45.8	non-interference	○
PM-2BC10-R1.0-M50					50		2.1°	3.51	90		2	-	50.8	57.0	non-interference	○
PM-2BC15-R1.0-M20	2.0	1.0	1.5°	2	20	4	4.1°	2.74	60	6	2	-	-	22.3	25.3	○
PM-2BC15-R1.0-M30					30		3.1°	3.27	70		2	-	-	32.9	37.4	○
PM-2BC15-R1.0-M40					40		2.6°	3.79	80		2	-	-	43.5	non-interference	○
PM-2BC20-R1.0-M30			2°		30		3.3°	3.72	70		2	-	-	31.3	35.5	○
PM-2BC20-R1.0-M40					40		2.7°	4.42	80		2	-	-	41.3	non-interference	○
PM-2BC30-R1.0-M30			3°		30		3.5°	4.63	70		2	-	-	-	31.8	○
PM-2BC30-R1.0-M40					40		2.9°	5.68	80		2	-	-	-	non-interference	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

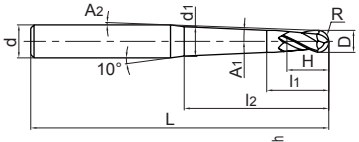
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

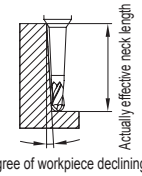
Code key B213
Graphics category and identification B214
Cutting parameters B386–B387

2-flute ball nose end mills with taper neck

Deep ball nose slot

PM-2BC





Degree of workpiece declining

- High-rigidity taper neck structure.

Ordering number	Basic dimension(mm)										Number of teeth Z	Degree of workpiece declining corresponding actually effective neck length				Stock
	D	R	A1	H	l2	l1	A2	d1	L	d		0.5°	1°	2°	3°	
PM-2BC05-R1.5-M30	3.0	1.5	0.5°	3	30	6	2.4°	3.32	70	6	2	30.7	32.3	36.2	non-interference	○
PM-2BC05-R1.5-M40					40		1.9°	3.50	80		2	40.7	42.9	non-interference	non-interference	○
PM-2BC05-R1.5-M50					50		1.6°	3.67	90		2	50.7	53.4	non-interference	non-interference	○
PM-2BC10-R1.5-M30			1.0°		30		2.5°	3.74	70		2	-	31.0	34.7	non-interference	○
PM-2BC10-R1.5-M40					40		2.0°	4.09	80		2	-	41.0	45.9	non-interference	○
PM-2BC10-R1.5-M50					50		1.7°	4.44	90		2	-	51.0	non-interference	non-interference	○
PM-2BC15-R1.5-M30			1.5°		30		2.6°	4.16	70		2	-	-	33.1	non-interference	○
PM-2BC15-R1.5-M40					40		2.1°	4.69	80		2	-	-	43.8	non-interference	○
PM-2BC15-R1.5-M50					50		1.7°	5.21	90		2	-	-	non-interference	non-interference	○
PM-2BC05-R2.0-M60	4.0	2.0	0.5°	4	60	7	1.0°	4.83	110	6	2	60.8	64.0	non-interference	non-interference	○
PM-2BC10-R2.0-M60			1.0°		60		1.0°	5.76	110		2	-	61.1	non-interference	non-interference	○

● Stock available ○ Make-to-order

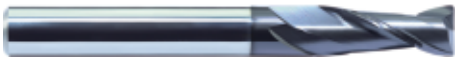
Applicable workpiece material table ◎Very suitable ○Suitable

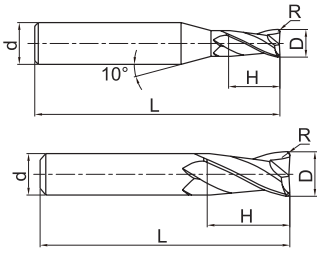
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B386–B387

2-flute R end mills with straight shank

PM-2R





Picture 1

Picture 2

- Wide applications, applicable for several machining styles.

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PM-2R-D1.0R0.2	1.0	0.2	4	3	50	2	Picture 1	○
PM-2R-D1.5R0.2	1.5	0.2	4	4	50	2	Picture 1	○
PM-2R-D2.0R0.2	2.0	0.2	4	6	50	2	Picture 1	○
PM-2R-D2.0R0.5	2.0	0.5	4	6	50	2	Picture 1	○
PM-2R-D2.5R0.2	2.5	0.2	4	8	50	2	Picture 1	○
PM-2R-D2.5R0.5	2.5	0.5	4	8	50	2	Picture 1	○
PM-2R-D3.0R0.2	3.0	0.2	4	8	50	2	Picture 1	○
PM-2R-D3.0R0.3	3.0	0.3	4	8	50	2	Picture 1	○
PM-2R-D3.0R0.5	3.0	0.5	4	8	50	2	Picture 1	○
PM-2R-D4.0R0.2	4.0	0.2	4	11	50	2	Picture 2	○
PM-2R-D4.0R0.3	4.0	0.3	4	11	50	2	Picture 2	○
PM-2R-D4.0R0.5	4.0	0.5	4	11	50	2	Picture 2	○
PM-2R-D4.0R1.0	4.0	1.0	4	11	50	2	Picture 2	○
PM-2R-D5.0R0.3	5.0	0.3	6	13	50	2	Picture 1	○
PM-2R-D5.0R0.5	5.0	0.5	6	13	50	2	Picture 1	○
PM-2R-D5.0R1.0	5.0	1.0	6	13	50	2	Picture 1	○
PM-2R-D6.0R0.3	6.0	0.3	6	16	50	2	Picture 2	○
PM-2R-D6.0R0.5	6.0	0.5	6	16	50	2	Picture 2	○
PM-2R-D6.0R1.0	6.0	1.0	6	16	50	2	Picture 2	○
PM-2R-D8.0R0.3	8.0	0.3	8	20	60	2	Picture 2	○
PM-2R-D8.0R0.5	8.0	0.5	8	20	60	2	Picture 2	○
PM-2R-D8.0R1.0	8.0	1.0	8	20	60	2	Picture 2	○
PM-2R-D10.0R0.5	10.0	0.5	10	25	75	2	Picture 2	○
PM-2R-D10.0R1.0	10.0	1.0	10	25	75	2	Picture 2	○
PM-2R-D10.0R1.5	10.0	1.5	10	25	75	2	Picture 2	○
PM-2R-D10.0R2.0	10.0	2.0	10	25	75	2	Picture 2	○
PM-2R-D12.0R0.5	12.0	0.5	12	30	75	2	Picture 2	○
PM-2R-D12.0R1.0	12.0	1.0	12	30	75	2	Picture 2	○
PM-2R-D12.0R1.5	12.0	1.5	12	30	75	2	Picture 2	○
PM-2R-D12.0R2.0	12.0	2.0	12	30	75	2	Picture 2	○

● Stock available ○ Make-to-order

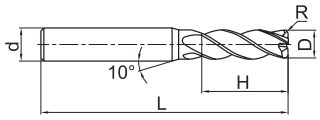
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

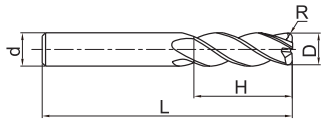
Code key B213
Graphics category and identification B214
Cutting parameters B388

4-flute R end mills with straight shank

PM-4R



Picture 1



Picture 2

- Wide applications, applicable for several machining styles.

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PM-4R-D3.0R0.2	3.0	0.2	6	8	50	4	Picture 1	●
PM-4R-D4.0R0.3	4.0	0.3	6	10	50	4	Picture 2	●
PM-4R-D4.0R0.5	4.0	0.5	6	10	50	4	Picture 2	●
PM-4R-D5.0R0.5	5.0	0.5	6	13	50	4	Picture 1	●
PM-4R-D5.0R1.0	5.0	1.0	6	13	50	4	Picture 1	●
PM-4R-D6.0R0.5	6.0	0.5	6	16	50	4	Picture 2	●
PM-4R-D6.0R1.0	6.0	1.0	6	16	50	4	Picture 2	●
PM-4R-D8.0R0.5	8.0	0.5	8	20	60	4	Picture 2	●
PM-4R-D8.0R1.0	8.0	1.0	8	20	60	4	Picture 2	●
PM-4R-D10.0R0.5	10.0	0.5	10	25	75	4	Picture 2	●
PM-4R-D10.0R1.0	10.0	1.0	10	25	75	4	Picture 2	●
PM-4R-D10.0R2.0	10.0	2.0	10	25	75	4	Picture 2	●
PM-4R-D10.0R3.0	10.0	3.0	10	25	75	4	Picture 2	●
PM-4R-D12.0R0.5	12.0	0.5	12	30	75	4	Picture 2	●
PM-4R-D12.0R1.0	12.0	1.0	12	30	75	4	Picture 2	●
PM-4R-D12.0R2.0	12.0	2.0	12	30	75	4	Picture 2	●
PM-4R-D12.0R3.0	12.0	3.0	12	30	75	4	Picture 2	●

● Stock available ○ Make-to-order

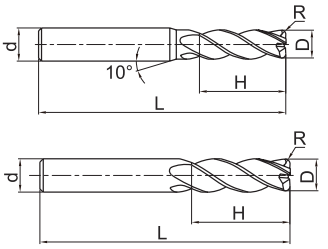
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B389

4-flute R end mills with straight shank

PM-4R-H



- Wide applications, applicable for several machining styles.

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PM-4R-D3.0R0.2-H	3.0	0.2	6	8	50	4	Picture 1	●
PM-4R-D4.0R0.3-H	4.0	0.3	6	10	50	4	Picture 1	●
PM-4R-D4.0R0.5-H	4.0	0.5	6	10	50	4	Picture 1	●
PM-4R-D5.0R0.5-H	5.0	0.5	6	13	50	4	Picture 1	●
PM-4R-D5.0R1.0-H	5.0	1.0	6	13	50	4	Picture 1	●
PM-4R-D6.0R0.5-H	6.0	0.5	6	16	50	4	Picture 2	●
PM-4R-D6.0R1.0-H	6.0	1.0	6	16	50	4	Picture 2	●
PM-4R-D8.0R0.5-H	8.0	0.5	8	20	60	4	Picture 2	●
PM-4R-D8.0R1.0-H	8.0	1.0	8	20	60	4	Picture 2	●
PM-4R-D10R0.5-H	10.0	0.5	10	25	75	4	Picture 2	●
PM-4R-D10R1.0-H	10.0	1.0	10	25	75	4	Picture 2	●
PM-4R-D10R2.0-H	10.0	2.0	10	25	75	4	Picture 2	●
PM-4R-D10R3.0-H	10.0	3.0	10	25	75	4	Picture 2	●
PM-4R-D12R0.5-H	12.0	0.5	12	30	75	4	Picture 2	●
PM-4R-D12R1.0-H	12.0	1.0	12	30	75	4	Picture 2	●
PM-4R-D12R2.0-H	12.0	2.0	12	30	75	4	Picture 2	●
PM-4R-D12R3.0-H	12.0	3.0	12	30	75	4	Picture 2	●

● Stock available ○ Make-to-order

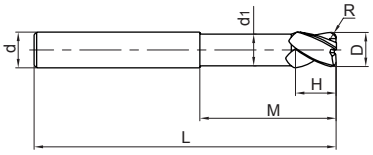
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B389

4-flute R end mills with straight shank, long neck and short cutting edge

PM-4RFP



- Long shank and short cutting edge designed for deep cavity milling.

Ordering number	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	d	d1	H	M	L		
PM-4RFP-D6.0R0.5	6.0	0.5	6	5.8	6	18	75	4	○
PM-4RFP-D6.0R1.0	6.0	1.0	6	5.8	6	18	75	4	○
PM-4RFP-D8.0R0.5	8.0	0.5	8	7.8	8	24	100	4	○
PM-4RFP-D8.0R1.0	8.0	1.0	8	7.8	8	24	100	4	○
PM-4RFP-D10.0R0.5	10.0	0.5	10	9.6	10	30	100	4	○
PM-4RFP-D10.0R1.0	10.0	1.0	10	9.6	10	30	100	4	○
PM-4RFP-D10.0R2.0	10.0	2.0	10	9.6	10	30	100	4	○
PM-4RFP-D12.0R0.5	12.0	0.5	12	11.5	12	36	100	4	○
PM-4RFP-D12.0R1.0	12.0	1.0	12	11.5	12	36	100	4	○
PM-4RFP-D12.0R2.0	12.0	2.0	12	11.5	12	36	100	4	○
PM-4RFP-D16.0R1.0	16.0	1.0	16	15.5	16	40	150	4	○
PM-4RFP-D16.0R2.0	16.0	2.0	16	15.5	16	40	150	4	○

● Stock available ○ Make-to-order

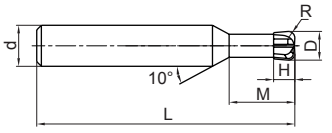
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

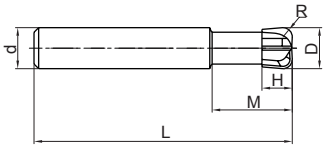
Code key B213
Graphics category and identification B214
Cutting parameters B389

4-flute end mills with high feed rate

PM-4H



Picture 1



Picture 2

- High-rigidity short cutting edge, suitable for machining with high feed rate.

Coated NaNo TiAlN | D D~-0.030

Ordering number	Basic dimension(mm)							Number of teeth Z	Geometry	Stock
	D	R	d	d_1	H	M	L			
PM-4H-D3.0R0.8	3.0	0.8	6	2.7	1.2	8	50	4	Picture 1	○
PM-4H-D4.0R1.0	4.0	1.0	6	3.6	1.6	10	50	4	Picture 1	○
PM-4H-D5.0R1.2	5.0	1.2	6	4.5	2	12.5	50	4	Picture 1	○
PM-4H-D6.0R1.0	6.0	1.0	6	5.4	2.5	12	50	4	Picture 2	○
PM-4H-D6.0R1.5	6.0	1.5	6	5.4	2.5	12	50	4	Picture 2	○
PM-4H-D8.0R1.0	8.0	1.0	8	7.0	3.5	16	60	4	Picture 2	○
PM-4H-D8.0R2.0	8.0	2.0	8	7.0	3.5	16	60	4	Picture 2	○
PM-4H-D10.0R1.0	10.0	1.0	10	9.0	4	20	75	4	Picture 2	○
PM-4H-D10.0R2.0	10.0	2.0	10	9.0	4	20	75	4	Picture 2	○
PM-4H-D12.0R2.0	12.0	2.0	12	11.0	5	24	75	4	Picture 2	○
PM-4H-D12.0R3.0	12.0	3.0	12	11.0	5	24	75	4	Picture 2	○

● Stock available ○ Make-to-order

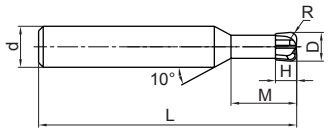
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

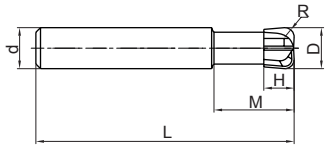
Code key B213
Graphics category and identification B214
Cutting parameters B390–B391

4-flute end mills with high feed rate

PM-4HL



Picture 1



Picture 2

- PM-4H series with long shank.

Coated NaNo TiAlN | D D~-0.030

Ordering number	Basic dimension(mm)							Number of teeth Z	Geometry	Stock
	D	R	d	d_1	H	M	L			
PM-4HL-D4.0R1.0	4.0	1.0	6	3.6	1.6	10	75	4	Picture 1	○
PM-4HL-D5.0R1.2	5.0	1.2	6	4.5	2	12.5	75	4	Picture 1	○
PM-4HL-D6.0R1.0	6.0	1.0	6	5.4	2.5	12	75	4	Picture 2	○
PM-4HL-D6.0R1.5	6.0	1.5	6	5.4	2.5	12	75	4	Picture 2	○
PM-4HL-D8.0R1.0	8.0	1.0	8	7.0	3.5	16	100	4	Picture 2	○
PM-4HL-D8.0R2.0	8.0	2.0	8	7.0	3.5	16	100	4	Picture 2	○
PM-4HL-D10.0R1.0	10.0	1.0	10	9.0	4	20	100	4	Picture 2	○
PM-4HL-D10.0R2.0	10.0	2.0	10	9.0	4	20	100	4	Picture 2	○
PM-4HL-D12.0R2.0	12.0	2.0	12	11.0	5	24	100	4	Picture 2	○
PM-4HL-D12.0R3.0	12.0	3.0	12	11.0	5	24	100	4	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B390–B391

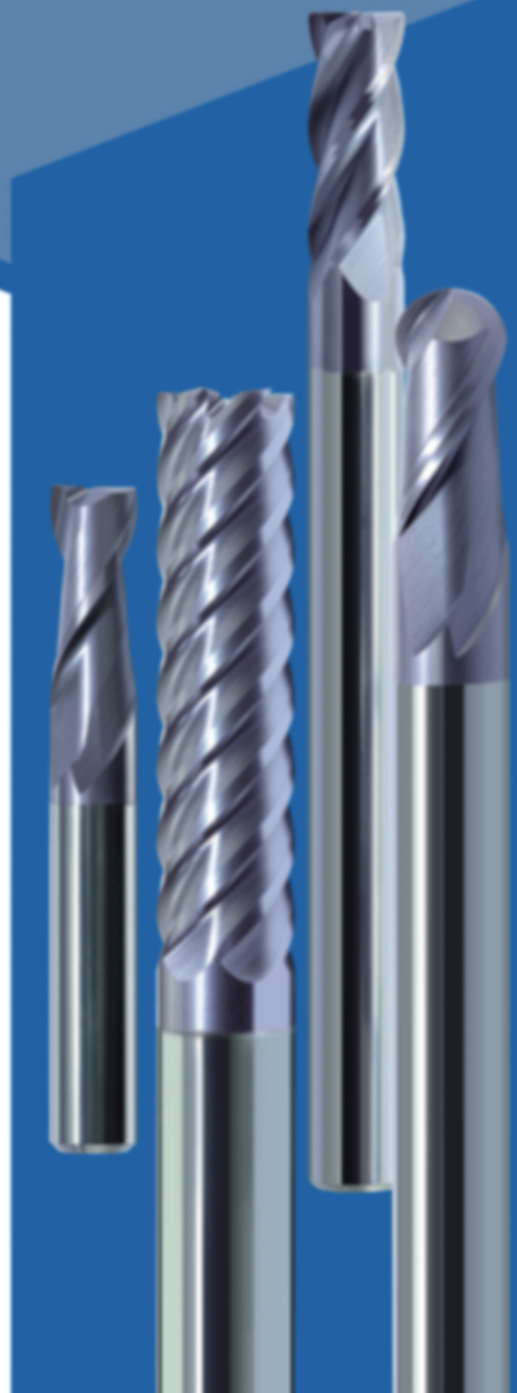
GM series general end mills

Wide application High efficiency machining can be achieved ranging from common steel to pre-hardened steel machining.

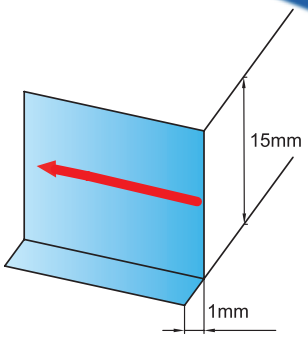
Optimized structure Appropriate combination of sharp cutting edge and tool strength makes cutting easier and faster, extending tool life.

Versatile product series Suitable for rough machining with high metal removal rate to finish machining with high surface quality.

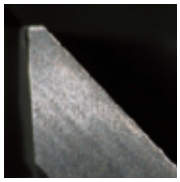
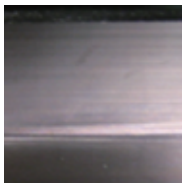
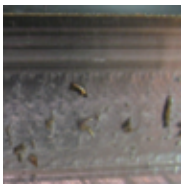
Complete diameter range Minimum diameter of 0.3mm for machining of the smallest parts.



Tool type: GM-4E-D10.0
Dimensions: Ø10.0mm
Workpiece material: NAK80(40HRC)
Rotating speed: 3200r/min (100m/min)
Feed rate: 640mm/min(0.2mm/r)
Axial cutting depth: a_p=15mm
Radial cutting depth: a_e=1.0mm
Cutting style: side milling (down milling)
Cooling system: air blow
Machine tool: MIKRON UCP 1000



Cutting edge abrasion and workpiece surface quality

End mill	GM-4E-D10.0	Similar product of company A	Similar product of company B
Cutting length	60m	20m	60m
Cutting edge abrasion			
Workpiece surface quality			

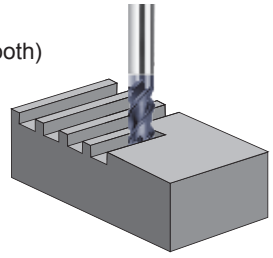
Multipurpose 3-flute end mills

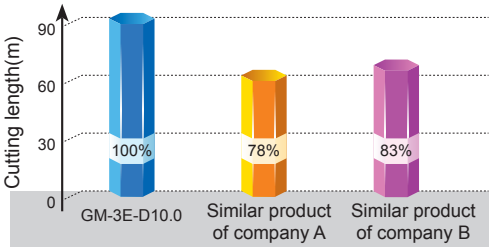
GM-3E GM-3EL

Excellent vibration resistance, able to achieve various machining operations such as slot milling, side milling, drilling, etc.!

GM-3E-D10.0 slot milling 718H(32HRC)

Machine tool: MIKRON UCP1000
Tool holder: HSK63-A
Workpiece material: 718H(32HRC)
Cutting speed: 80(m/min)
Feed rate per tooth: 0.06(mm/tooth)
Axial cutting depth: 5(mm)
Radial cutting depth: 10(mm)
Cooling system: air blow
Milling style: slot milling
Overhang: 35mm
Failure identification:
(A)Severe breakage occurs with a breakage value above 0.2mm.
(B)Even abrasion value of flank reaches 0.1mm.
Either situation is regarded as tool failure.



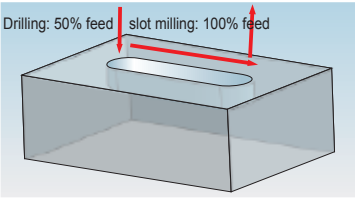


Slot milling cutting length comparison

GM-3E-D10.0 combined machining 718H(32HRC)

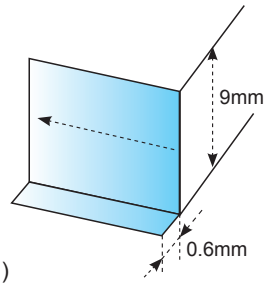
Machine tool: MIKRON UCP1000
Tool holder: HSK63-A
Workpiece material: 718H(32HRC)
Cutting speed: 80(m/min)
Feed rate per tooth: 0.06(mm/tooth)
Axial cutting depth: 5(mm)
Radial cutting depth: 10(mm)
Cooling system: air blow
Milling style: combined cutting
Overhang: 35mm

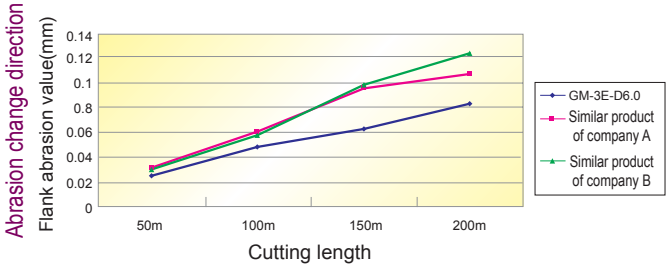
Overhang: 35mm



GM-3E-D6.0 side milling NAK80(37HRC)

Machine tool: MIKRON UCP1000
Tool holder: HSK63-A
Workpiece material: NAK80(37HRC)
Cutting speed: 100(m/min)
Feed rate per tooth: 0.06(mm/tooth)
Axial cutting depth: 9(mm)
Radial cutting depth: 0.6(mm)
Cooling system: air blow
Milling style: side milling (down milling)
Overhang: 22mm





High-efficiency roughing of steel

GM-4W

Corrugated edge end mills

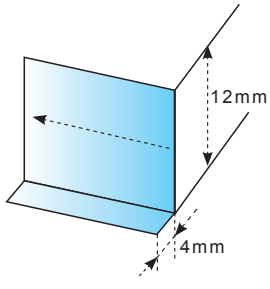
Optimized corrugation specially designed for P-type material with proper control of chips size, improving tool life and stability.

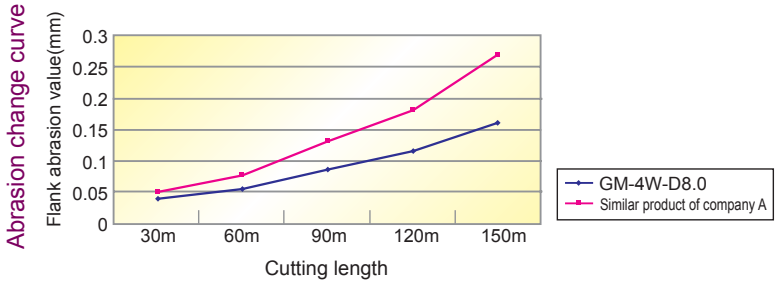
Nano coating with excellent lubrication property can reduce vibration as well as resist wear.

Ultra fine cemented carbide substrate with high toughness can easily achieve heavy roughing.

End mills for high-efficiency roughingGM-4W-D8.0 cutting die steel NAK55(33HRC)

Machine tool: MIKRON UCP1000
Tool holder: HSK63-A
Workpiece material: NAK55(33HRC)
Cutting speed: 100(m/min)
Feed rate per tooth: 0.06(mm/tooth)
Axial cutting depth: 12(mm)
Radial cutting depth: 4(mm)
Cooling system: air blow
Milling style: side milling (down milling)
Overhang: 30mm

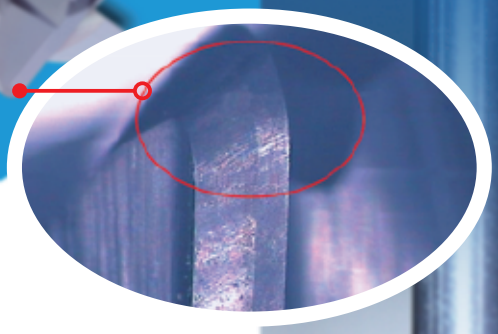




High-precision R end mill series

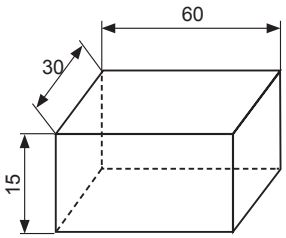
GM-4R
GM-4RL
GM-2R

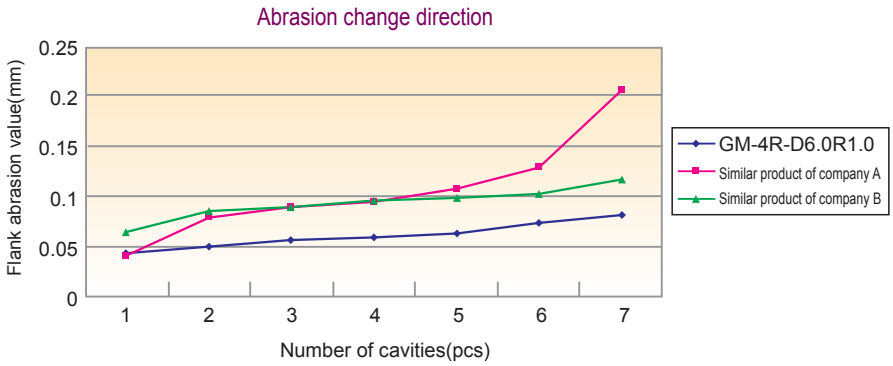
High-precision seamless connection of nose and peripheral cutting edge reduces the abrasion at the juncture and improves tool life.



GM-4R-D6.0R1.0 cavity milling 42CrMo(35HRC)

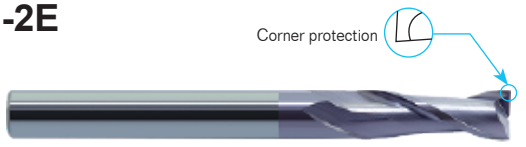
Machine tool: MIKRON UCP1000
Tool holder: HSK63-A
Workpiece material: 42CrMo(35HRC)
Cutting speed: 100(m/min)
Feed rate per tooth: 0.06(mm/tooth)
Axial cutting depth: 0.3(mm)
Radial cutting depth: 2(mm)
Cooling system: air blow
Milling style: cavity milling
Overhang: 30mm

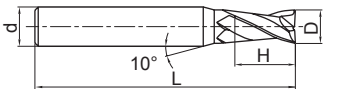




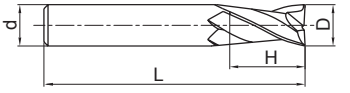
2-flute flattened end mills with straight shank

GM-2E





Picture 1



Picture 2

- Very suitable for slot milling.
- Wide application.

35° | Coated TiAlN | D: D≤12 0~-0.020; 12<D 0~-0.030

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-2E-D1.0S	1.0	4	3	50	2	Picture 1	●
GM-2E-D1.5S	1.5	4	4	50	2	Picture 1	●
GM-2E-D2.0S	2.0	4	6	50	2	Picture 1	●
GM-2E-D2.5S	2.5	4	8	50	2	Picture 1	●
GM-2E-D3.0S	3.0	4	8	50	2	Picture 1	●
GM-2E-D4.0S	4.0	4	11	50	2	Picture 2	●
GM-2E-D1.0	1.0	6	3	50	2	Picture 1	●
GM-2E-D1.5	1.5	6	4	50	2	Picture 1	●
GM-2E-D2.0	2.0	6	6	50	2	Picture 1	●
GM-2E-D2.5	2.5	6	8	50	2	Picture 1	●
GM-2E-D3.0	3.0	6	8	50	2	Picture 1	●
GM-2E-D3.5	3.5	6	10	50	2	Picture 1	●
GM-2E-D4.0	4.0	6	11	50	2	Picture 1	●
GM-2E-D4.5	4.5	6	11	50	2	Picture 1	●
GM-2E-D5.0	5.0	6	13	50	2	Picture 1	●
GM-2E-D5.5	5.5	6	16	50	2	Picture 1	●
GM-2E-D6.0	6.0	6	16	50	2	Picture 2	●
GM-2E-D7.0	7.0	8	20	60	2	Picture 1	●
GM-2E-D8.0	8.0	8	20	60	2	Picture 2	●
GM-2E-D9.0	9.0	10	22	75	2	Picture 1	●
GM-2E-D10.0	10.0	10	25	75	2	Picture 2	●
GM-2E-D11.0	11.0	12	26	75	2	Picture 1	●
GM-2E-D12.0	12.0	12	30	75	2	Picture 2	●
GM-2E-D14.0	14.0	14	32	75	2	Picture 2	●
GM-2E-D16.0	16.0	16	45	100	2	Picture 2	●
GM-2E-D18.0	18.0	18	45	100	2	Picture 2	●
GM-2E-D20.0	20.0	20	45	100	2	Picture 2	●

● Stock available ○ Make-to-order

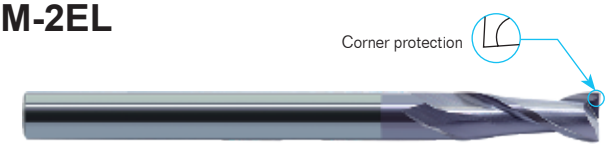
Applicable workpiece material table ◎Very suitable ○Suitable

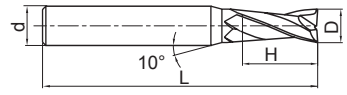
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B392

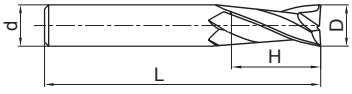
2-flute flattened end mills with straight shank and long cutting edge

GM-2EL





Picture 1



Picture 2

- GM-2E series with long cutting edge.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-2EL-D3.0	3.0	6	12	75	2	Picture 1	●
GM-2EL-D4.0	4.0	6	15	75	2	Picture 1	●
GM-2EL-D5.0	5.0	6	20	75	2	Picture 1	●
GM-2EL-D6.0	6.0	6	20	75	2	Picture 2	●
GM-2EL-D8.0	8.0	8	25	100	2	Picture 2	●
GM-2EL-D10.0	10.0	10	30	100	2	Picture 2	●
GM-2EL-D12.0	12.0	12	35	100	2	Picture 2	●
GM-2EL-D14.0	14.0	14	40	100	2	Picture 2	●
GM-2EL-D16.0	16.0	16	50	150	2	Picture 2	●
GM-2EL-D20.0	20.0	20	55	150	2	Picture 2	●

● Stock available ○ Make-to-order

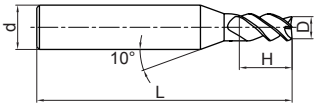
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

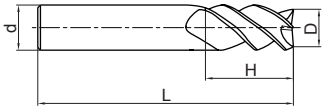
Code key B213
Graphics category and identification B214
Cutting parameters B392

3-flute flattened end mills with straight shank

GM-3E



Picture 1



Picture 2

● Excellent vibration resistance, able to achieve various machining operations such as slot milling, side milling, drilling, etc.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-3E-D1.0S	1.0	4	3	50	3	Picture 1	○
GM-3E-D1.5S	1.5	4	4	50	3	Picture 1	○
GM-3E-D2.0S	2.0	4	6	50	3	Picture 1	○
GM-3E-D2.5S	2.5	4	8	50	3	Picture 1	○
GM-3E-D3.0S	3.0	4	8	50	3	Picture 1	○
GM-3E-D4.0S	4.0	4	11	50	3	Picture 2	○
GM-3E-D1.0	1.0	6	3	50	3	Picture 1	○
GM-3E-D1.5	1.5	6	4	50	3	Picture 1	○
GM-3E-D2.0	2.0	6	6	50	3	Picture 1	○
GM-3E-D2.5	2.5	6	8	50	3	Picture 1	○
GM-3E-D3.0	3.0	6	8	50	3	Picture 1	○
GM-3E-D3.5	3.5	6	10	50	3	Picture 1	○
GM-3E-D4.0	4.0	6	11	50	3	Picture 1	○
GM-3E-D4.5	4.5	6	11	50	3	Picture 1	○
GM-3E-D5.0	5.0	6	13	50	3	Picture 1	○
GM-3E-D5.5	5.5	6	16	50	3	Picture 1	○
GM-3E-D6.0	6.0	6	16	50	3	Picture 2	○
GM-3E-D7.0	7.0	8	20	60	3	Picture 1	○
GM-3E-D8.0	8.0	8	20	60	3	Picture 2	○
GM-3E-D9.0	9.0	10	22	75	3	Picture 1	○
GM-3E-D10.0	10.0	10	25	75	3	Picture 2	○
GM-3E-D11.0	11.0	12	26	75	3	Picture 1	○
GM-3E-D12.0	12.0	12	30	75	3	Picture 2	○
GM-3E-D14.0	14.0	14	32	75	3	Picture 2	○
GM-3E-D16.0	16.0	16	45	100	3	Picture 2	○
GM-3E-D18.0	18.0	18	45	100	3	Picture 2	○
GM-3E-D20.0	20.0	20	45	100	3	Picture 2	○

● Stock available ○ Make-to-order

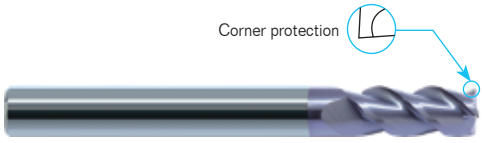
Applicable workpiece material table ◎Very suitable ○Suitable

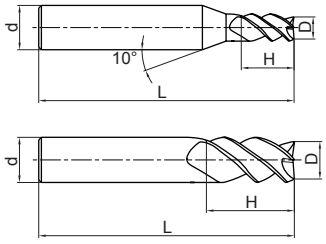
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B393

3-flute flattened end mills with straight shank and long cutting edge

GM-3EL





- GM-3E series with long cutting edge.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-3EL-D3.0	3.0	6	12	75	3	Picture 1	○
GM-3EL-D4.0	4.0	6	15	75	3	Picture 1	○
GM-3EL-D5.0	5.0	6	20	75	3	Picture 1	○
GM-3EL-D6.0	6.0	6	20	75	3	Picture 2	○
GM-3EL-D8.0	8.0	8	25	100	3	Picture 2	○
GM-3EL-D10.0	10.0	10	30	100	3	Picture 2	○
GM-3EL-D12.0	12.0	12	35	100	3	Picture 2	○
GM-3EL-D14.0	14.0	14	40	100	3	Picture 2	○
GM-3EL-D16.0	16.0	16	50	150	3	Picture 2	○
GM-3EL-D20.0	20.0	20	55	150	3	Picture 2	○

● Stock available ○ Make-to-order

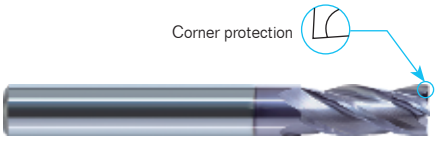
Applicable workpiece material table ◎Very suitable ○Suitable

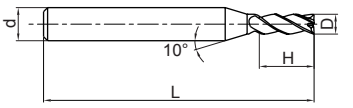
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B393

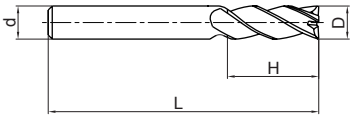
4-flute flattened end mills with straight shank

GM-4E-G





Picture 1



Picture 2

- Very suitable for side milling.
- Wide application.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-4E-D1.0S-G	1.0	4	3	50	4	Picture 1	●
GM-4E-D1.5S-G	1.5	4	4	50	4	Picture 1	●
GM-4E-D2.0S-G	2.0	4	6	50	4	Picture 1	●
GM-4E-D2.5S-G	2.5	4	8	50	4	Picture 1	●
GM-4E-D3.0S-G	3.0	4	8	50	4	Picture 1	●
GM-4E-D4.0S-G	4.0	4	11	50	4	Picture 2	●
GM-4E-D1.0-G	1.0	6	3	50	4	Picture 1	●
GM-4E-D1.5-G	1.5	6	4	50	4	Picture 1	●
GM-4E-D2.0-G	2.0	6	6	50	4	Picture 1	●
GM-4E-D2.5-G	2.5	6	8	50	4	Picture 1	●
GM-4E-D3.0-G	3.0	6	8	50	4	Picture 1	●
GM-4E-D3.5-G	3.5	6	10	50	4	Picture 1	●
GM-4E-D4.0-G	4.0	6	11	50	4	Picture 1	●
GM-4E-D4.5-G	4.5	6	11	50	4	Picture 1	●
GM-4E-D5.0-G	5.0	6	13	50	4	Picture 1	●
GM-4E-D5.5-G	5.5	6	16	50	4	Picture 1	●
GM-4E-D6.0-G	6.0	6	16	50	4	Picture 2	●
GM-4E-D7.0-G	7.0	8	20	60	4	Picture 1	●
GM-4E-D8.0-G	8.0	8	20	60	4	Picture 2	●
GM-4E-D9.0-G	9.0	10	22	75	4	Picture 1	●
GM-4E-D10.0-G	10.0	10	25	75	4	Picture 2	●
GM-4E-D11.0-G	11.0	12	26	75	4	Picture 1	●
GM-4E-D12.0-G	12.0	12	30	75	4	Picture 2	●
GM-4E-D14.0-G	14.0	14	32	75	4	Picture 2	●
GM-4E-D16.0-G	16.0	16	45	100	4	Picture 2	●
GM-4E-D18.0-G	18.0	18	45	100	4	Picture 2	●
GM-4E-D20.0-G	20.0	20	45	100	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

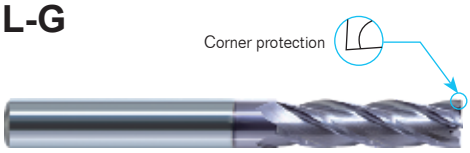
◎Very suitable ○Suitable

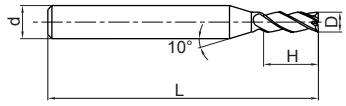
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B394

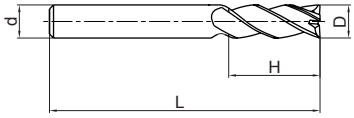
4-flute flattened end mills with straight shank and long cutting edge

GM-4EL-G





Picture 1



Picture 2

- GM-4E-G series with long cutting edge.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-4EL-D3.0-G	3.0	6	12	75	4	Picture 1	○
GM-4EL-D4.0-G	4.0	6	15	75	4	Picture 1	○
GM-4EL-D5.0-G	5.0	6	20	75	4	Picture 1	○
GM-4EL-D6.0-G	6.0	6	20	75	4	Picture 2	○
GM-4EL-D8.0-G	8.0	8	25	100	4	Picture 2	○
GM-4EL-D10.0-G	10.0	10	30	100	4	Picture 2	○
GM-4EL-D12.0-G	12.0	12	35	100	4	Picture 2	○
GM-4EL-D14.0-G	14.0	14	40	100	4	Picture 2	○
GM-4EL-D16.0-G	16.0	16	50	150	4	Picture 2	○
GM-4EL-D20.0-G	20.0	20	55	150	4	Picture 2	○

● Stock available ○ Make-to-order

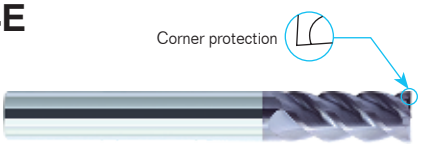
Applicable workpiece material table ◎Very suitable ○Suitable

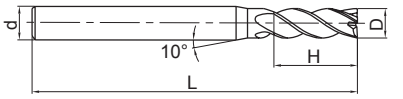
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B394

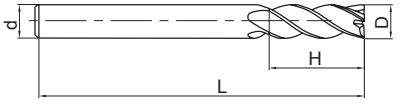
4-flute flattened end mills with straight shank

GM-4E





Picture 1



Picture 2

- Very suitable for side milling and shallow slot machining.
- Wide application.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-4E-D1.0S	1.0	4	3	50	4	Picture 1	●
GM-4E-D1.5S	1.5	4	4	50	4	Picture 1	●
GM-4E-D2.0S	2.0	4	6	50	4	Picture 1	●
GM-4E-D2.5S	2.5	4	8	50	4	Picture 1	●
GM-4E-D3.0S	3.0	4	8	50	4	Picture 1	●
GM-4E-D4.0S	4.0	4	11	50	4	Picture 2	●
GM-4E-D1.0	1.0	6	3	50	4	Picture 1	●
GM-4E-D1.5	1.5	6	4	50	4	Picture 1	●
GM-4E-D2.0	2.0	6	6	50	4	Picture 1	●
GM-4E-D2.5	2.5	6	8	50	4	Picture 1	●
GM-4E-D3.0	3.0	6	8	50	4	Picture 1	●
GM-4E-D3.5	3.5	6	10	50	4	Picture 1	●
GM-4E-D4.0	4.0	6	11	50	4	Picture 1	●
GM-4E-D4.5	4.5	6	11	50	4	Picture 1	●
GM-4E-D5.0	5.0	6	13	50	4	Picture 1	●
GM-4E-D5.5	5.5	6	16	50	4	Picture 1	●
GM-4E-D6.0	6.0	6	16	50	4	Picture 2	●
GM-4E-D7.0	7.0	8	20	60	4	Picture 1	●
GM-4E-D8.0	8.0	8	20	60	4	Picture 2	●
GM-4E-D9.0	9.0	10	22	75	4	Picture 1	●
GM-4E-D10.0	10.0	10	25	75	4	Picture 2	●
GM-4E-D11.0	11.0	12	26	75	4	Picture 1	●
GM-4E-D12.0	12.0	12	30	75	4	Picture 2	●
GM-4E-D14.0	14.0	14	32	75	4	Picture 2	●
GM-4E-D16.0	16.0	16	45	100	4	Picture 2	●
GM-4E-D18.0	18.0	18	45	100	4	Picture 2	●
GM-4E-D20.0	20.0	20	45	100	4	Picture 2	●

● Stock available ○ Make-to-order

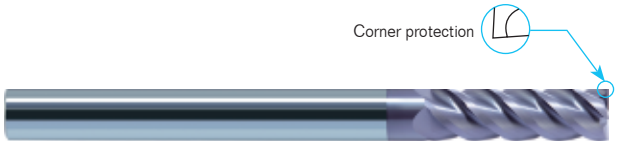
Applicable workpiece material table ◎Very suitable ○Suitable

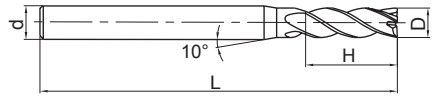
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B395

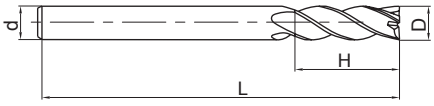
4-flute flattened end mills with straight shank and long cutting edge

GM-4EL





Picture 1



Picture 2

- GM-4E series with long cutting edge.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-4EL-D3.0	3.0	6	12	75	4	Picture 1	●
GM-4EL-D4.0	4.0	6	15	75	4	Picture 1	●
GM-4EL-D5.0	5.0	6	20	75	4	Picture 1	●
GM-4EL-D6.0	6.0	6	20	75	4	Picture 2	●
GM-4EL-D8.0	8.0	8	25	100	4	Picture 2	●
GM-4EL-D10.0	10.0	10	30	100	4	Picture 2	●
GM-4EL-D12.0	12.0	12	35	100	4	Picture 2	●
GM-4EL-D14.0	14.0	14	40	100	4	Picture 2	●
GM-4EL-D16.0	16.0	16	50	150	4	Picture 2	●
GM-4EL-D20.0	20.0	20	55	150	4	Picture 2	●

● Stock available ○ Make-to-order

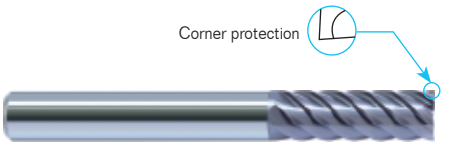
Applicable workpiece material table ◎Very suitable ○Suitable

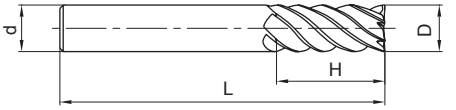
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B395

6-flute flattened end mills with straight shank

GM-6E





- Perfect rigidity, very suitable for side finish machining.
- High speed, high feed rate machining applicable.

Ordering number	Basic dimension(mm)				Number of teeth Z	Stock
	D	d	H	L		
GM-6E-D6.0	6.0	6	18	60	6	●
GM-6E-D8.0	8.0	8	20	60	6	●
GM-6E-D10.0	10.0	10	30	75	6	●
GM-6E-D12.0	12.0	12	32	75	6	●
GM-6E-D16.0	16.0	16	40	100	6	●
GM-6E-D20.0	20.0	20	45	100	6	●

● Stock available ○ Make-to-order

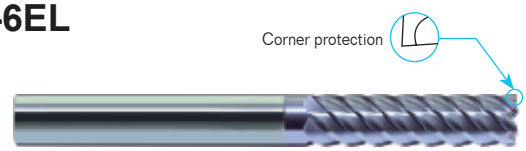
Applicable workpiece material table ◎Very suitable ○Suitable

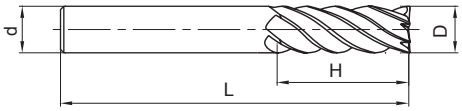
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B396

6-flute flattened end mills with straight shank and long cutting edge

GM-6EL





- GM-6E series with long cutting edge.

Ordering number	Basic dimension(mm)				Number of teeth Z	Stock
	D	d	H	L		
GM-6EL-D6.0	6.0	6	24	75	6	●
GM-6EL-D8.0	8.0	8	32	75	6	●
GM-6EL-D10.0	10.0	10	40	100	6	●
GM-6EL-D12.0	12.0	12	45	100	6	●
GM-6EL-D16.0	16.0	16	64	150	6	●
GM-6EL-D20.0	20.0	20	75	150	6	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

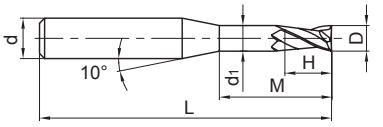
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B397

2-flute flattened end mills with straight shank, long neck and short cutting edge

Deep flattened slot

GM-2EP



● Suitable for narrow slot milling or milling of fine parts that could generate interference.

35° | Coated TiAlN | D 0~-0.015 | D<1mm | 1mm≤D

Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d1	L		
GM-2EP-D0.5-M04	0.5	4	0.7	4	0.45	50	2	●
GM-2EP-D0.5-M06	0.5	4	0.7	6	0.45	50	2	●
GM-2EP-D0.5-M08	0.5	4	0.7	8	0.45	50	2	●
GM-2EP-D0.8-M04	0.8	4	1.2	4	0.75	50	2	●
GM-2EP-D0.8-M06	0.8	4	1.2	6	0.75	50	2	●
GM-2EP-D0.8-M08	0.8	4	1.2	8	0.75	50	2	●
GM-2EP-D0.8-M10	0.8	4	1.2	10	0.75	50	2	●
GM-2EP-D1.0-M04	1.0	4	1.5	4	0.95	50	2	●
GM-2EP-D1.0-M06	1.0	4	1.5	6	0.95	50	2	●
GM-2EP-D1.0-M08	1.0	4	1.5	8	0.95	50	2	●
GM-2EP-D1.0-M10	1.0	4	1.5	10	0.95	50	2	●
GM-2EP-D1.0-M12	1.0	4	1.5	12	0.95	50	2	●
GM-2EP-D1.0-M14	1.0	4	1.5	14	0.95	50	2	●
GM-2EP-D1.2-M06	1.2	4	1.8	6	1.15	50	2	●
GM-2EP-D1.2-M08	1.2	4	1.8	8	1.15	50	2	●
GM-2EP-D1.2-M10	1.2	4	1.8	10	1.15	50	2	●
GM-2EP-D1.2-M12	1.2	4	1.8	12	1.15	50	2	●
GM-2EP-D1.5-M06	1.5	4	2.3	6	1.45	50	2	●
GM-2EP-D1.5-M08	1.5	4	2.3	8	1.45	50	2	●
GM-2EP-D1.5-M10	1.5	4	2.3	10	1.45	50	2	●
GM-2EP-D1.5-M12	1.5	4	2.3	12	1.45	50	2	●
GM-2EP-D1.5-M14	1.5	4	2.3	14	1.45	50	2	●
GM-2EP-D2.0-M06	2.0	4	3.0	6	1.95	50	2	●
GM-2EP-D2.0-M08	2.0	4	3.0	8	1.95	50	2	●
GM-2EP-D2.0-M10	2.0	4	3.0	10	1.95	50	2	●
GM-2EP-D2.0-M12	2.0	4	3.0	12	1.95	50	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

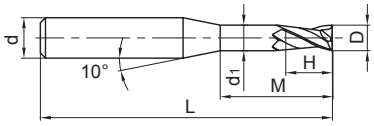
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B398–B399

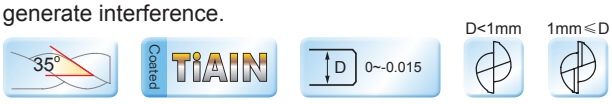
2-flute flattened end mills with straight shank, long neck and short cutting edge

Deep flattened slot

GM-2EP



● Suitable for narrow slot milling or milling of fine parts that could generate interference.



Ordering number	Basic dimension(mm)						Number of teeth	Stock
	D	d	H	M	d_1	L	Z	
GM-2EP-D2.0-M14	2.0	4	3.0	14	1.95	50	2	●
GM-2EP-D2.0-M16	2.0	4	3.0	16	1.95	50	2	●
GM-2EP-D2.5-M08	2.5	4	3.7	8	2.4	50	2	●
GM-2EP-D2.5-M10	2.5	4	3.7	10	2.4	50	2	●
GM-2EP-D2.5-M12	2.5	4	3.7	12	2.4	50	2	●
GM-2EP-D2.5-M14	2.5	4	3.7	14	2.4	50	2	●
GM-2EP-D2.5-M16	2.5	4	3.7	16	2.4	60	2	●
GM-2EP-D2.5-M18	2.5	4	3.7	18	2.4	60	2	●
GM-2EP-D2.5-M20	2.5	4	3.7	20	2.4	60	2	●
GM-2EP-D3.0-M06	3.0	6	4.5	6	2.85	50	2	●
GM-2EP-D3.0-M08	3.0	6	4.5	8	2.85	50	2	●
GM-2EP-D3.0-M10	3.0	6	4.5	10	2.85	50	2	●
GM-2EP-D3.0-M12	3.0	6	4.5	12	2.85	50	2	●
GM-2EP-D3.0-M14	3.0	6	4.5	14	2.85	60	2	●
GM-2EP-D3.0-M16	3.0	6	4.5	16	2.85	60	2	●
GM-2EP-D3.0-M18	3.0	6	4.5	18	2.85	60	2	●
GM-2EP-D3.0-M20	3.0	6	4.5	20	2.85	60	2	●
GM-2EP-D4.0-M12	4.0	6	6.0	12	3.85	50	2	●
GM-2EP-D4.0-M16	4.0	6	6.0	16	3.85	60	2	●
GM-2EP-D4.0-M20	4.0	6	6.0	20	3.85	60	2	●
GM-2EP-D4.0-M25	4.0	6	6.0	25	3.85	60	2	●
GM-2EP-D5.0-M16	5.0	6	7.5	16	4.85	60	2	●
GM-2EP-D5.0-M25	5.0	6	7.5	25	4.85	70	2	●

● Stock available ○ Make-to-order

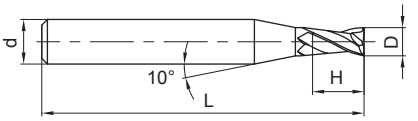
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

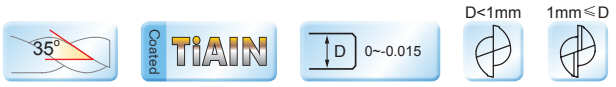
Code key B213
Graphics category and identification B214
Cutting parameters B398–B399

2-flute flattened end mills with straight shank and tiny diameter

GM-2ES



- Tiny diameter end mills can fully display high speed and high precision performances of machining center, often used for machining of precision components such as electronic part etc.



Ordering number	Basic dimension(mm)				Number of teeth Z	Stock
	D	d	H	L		
GM-2ES-D0.3	0.3	4	0.6	50	2	●
GM-2ES-D0.4	0.4	4	0.8	50	2	●
GM-2ES-D0.5	0.5	4	1.0	50	2	●
GM-2ES-D0.6	0.6	4	1.2	50	2	●
GM-2ES-D0.7	0.7	4	1.4	50	2	●
GM-2ES-D0.8	0.8	4	1.6	50	2	●
GM-2ES-D0.9	0.9	4	1.8	50	2	●
GM-2ES-D1.0	1.0	4	2.0	50	2	●
GM-2ES-D1.1	1.1	4	2.0	50	2	●
GM-2ES-D1.2	1.2	4	2.5	50	2	●
GM-2ES-D1.3	1.3	4	2.5	50	2	●
GM-2ES-D1.4	1.4	4	3.0	50	2	●
GM-2ES-D1.5	1.5	4	3.0	50	2	●
GM-2ES-D1.6	1.6	4	3.5	50	2	●
GM-2ES-D1.7	1.7	4	3.5	50	2	●
GM-2ES-D1.8	1.8	4	4.0	50	2	●
GM-2ES-D1.9	1.9	4	4.0	50	2	●
GM-2ES-D2.0	2.0	4	4.0	50	2	●
GM-2ES-D2.1	2.1	4	4.0	50	2	●
GM-2ES-D2.2	2.2	4	4.5	50	2	●
GM-2ES-D2.3	2.3	4	4.5	50	2	●
GM-2ES-D2.4	2.4	4	5.0	50	2	●
GM-2ES-D2.5	2.5	4	5.0	50	2	●
GM-2ES-D2.6	2.6	4	5.0	50	2	●
GM-2ES-D2.7	2.7	4	5.5	50	2	●
GM-2ES-D2.8	2.8	4	5.5	50	2	●
GM-2ES-D2.9	2.9	4	6.0	50	2	●
GM-2ES-D3.0	3.0	4	6.0	50	2	●

● Stock available ○ Make-to-order

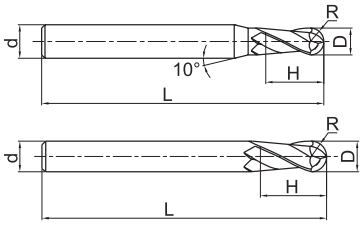
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B400

2-flute ball nose end mills with straight shank

GM-2B



- For profile milling, high speed machining applicable.
- Wide application.

35° | Coated TiAlN | D: D≤12 0~-0.020, 12<D 0~-0.030 | R: R±0.01

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
GM-2B-R0.5S	1.0	0.5	4	2	50	2	Picture 1	●
GM-2B-R0.75S	1.5	0.75	4	3	50	2	Picture 1	●
GM-2B-R1.0S	2.0	1.0	4	4	50	2	Picture 1	●
GM-2B-R1.25S	2.5	1.25	4	5	50	2	Picture 1	●
GM-2B-R1.5S	3.0	1.5	4	6	50	2	Picture 1	●
GM-2B-R2.0S	4.0	2.0	4	8	50	2	Picture 2	●
GM-2B-R0.5	1.0	0.5	6	2	50	2	Picture 1	●
GM-2B-R0.75	1.5	0.75	6	3	50	2	Picture 1	●
GM-2B-R1.0	2.0	1.0	6	4	50	2	Picture 1	●
GM-2B-R1.25	2.5	1.25	6	5	50	2	Picture 1	●
GM-2B-R1.5	3.0	1.5	6	6	50	2	Picture 1	●
GM-2B-R1.75	3.5	1.75	6	8	50	2	Picture 1	●
GM-2B-R2.0	4.0	2.0	6	8	50	2	Picture 1	●
GM-2B-R2.5	5.0	2.5	6	10	50	2	Picture 1	●
GM-2B-R2.75	5.5	2.75	6	12	50	2	Picture 1	●
GM-2B-R3.0	6.0	3.0	6	12	50	2	Picture 2	●
GM-2B-R3.5	7.0	3.5	8	14	60	2	Picture 1	●
GM-2B-R4.0	8.0	4.0	8	16	60	2	Picture 2	●
GM-2B-R4.5	9.0	4.5	10	18	75	2	Picture 1	●
GM-2B-R5.0	10	5.0	10	20	75	2	Picture 2	●
GM-2B-R6.0	12	6.0	12	24	75	2	Picture 2	●
GM-2B-R7.0	14	7.0	14	28	75	2	Picture 2	●
GM-2B-R8.0	16	8.0	16	32	100	2	Picture 2	●
GM-2B-R10.0	20	10.0	20	40	100	2	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

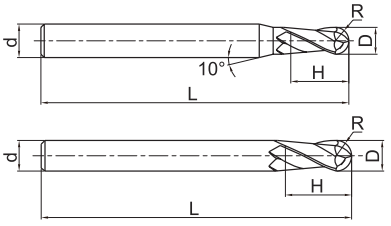
◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

Code key B213 Graphics category and identification B214 Cutting parameters B401

2-flute ball nose end mills with straight shank

GM-2BL



- GM-2B series with long shank.

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
GM-2BL-R1.0	2.0	1.0	6	4	75	2	Picture 1	●
GM-2BL-R1.25	2.5	1.25	6	5	75	2	Picture 1	●
GM-2BL-R1.5	3.0	1.5	6	6	75	2	Picture 1	●
GM-2BL-R1.75	3.5	1.75	6	8	75	2	Picture 1	●
GM-2BL-R2.0	4.0	2.0	6	8	75	2	Picture 1	●
GM-2BL-R2.5	5.0	2.5	6	10	75	2	Picture 1	●
GM-2BL-R2.75	5.5	2.75	6	12	75	2	Picture 1	●
GM-2BL-R3.0	6.0	3.0	6	12	75	2	Picture 2	●
GM-2BL-R3.5	7.0	3.5	8	14	75	2	Picture 1	●
GM-2BL-R4.0	8.0	4.0	8	16	100	2	Picture 2	●
GM-2BL-R4.5	9.0	4.5	10	18	100	2	Picture 1	●
GM-2BL-R5.0	10.0	5.0	10	20	100	2	Picture 2	●
GM-2BL-R6.0	12.0	6.0	12	24	100	2	Picture 2	●
GM-2BL-R7.0	14.0	7.0	14	28	100	2	Picture 2	●
GM-2BL-R8.0	16.0	8.0	16	32	150	2	Picture 2	●
GM-2BL-R10.0	20.0	10.0	20	40	150	2	Picture 2	●

● Stock available ○ Make-to-order

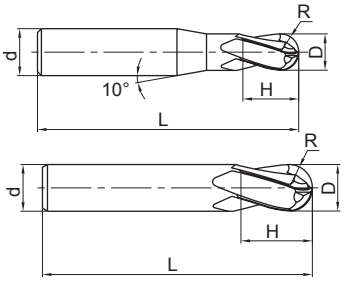
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B401

4-flute ball nose end mills with straight shank

GM-4B



● 4-flute ball nose end mill can operate with higher feed speed and machining efficiency, extending too life in machining high-hardness workpiece.

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
GM-4B-R1.5	3.0	1.5	6	6	50	4	Picture 1	●
GM-4B-R2.0	4.0	2.0	6	8	50	4	Picture 1	●
GM-4B-R2.5	5.0	2.5	6	10	50	4	Picture 1	●
GM-4B-R3.0	6.0	3.0	6	12	50	4	Picture 2	●
GM-4B-R4.0	8.0	4.0	8	16	60	4	Picture 2	●
GM-4B-R5.0	10.0	5.0	10	20	75	4	Picture 2	●
GM-4B-R6.0	12.0	6.0	12	24	75	4	Picture 2	●
GM-4B-R7.0	14.0	7.0	14	28	75	4	Picture 2	●
GM-4B-R8.0	16.0	8.0	16	32	100	4	Picture 2	●
GM-4B-R9.0	18.0	9.0	18	36	100	4	Picture 2	●
GM-4B-R10.0	20.0	10.0	20	40	100	4	Picture 2	●

● Stock available ○ Make-to-order

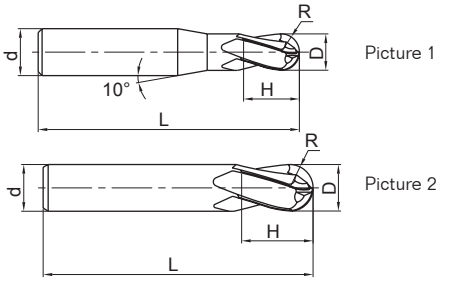
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

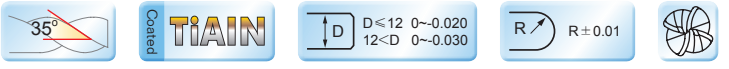
Code key B213
Graphics category and identification B214
Cutting parameters B402

4-flute ball nose end mills with straight and long shank

GM-4BL



- GM-4B series with long shank.



Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
GM-4BL-R1.5	3.0	1.5	6	6	75	4	Picture 1	○
GM-4BL-R2.0	4.0	2.0	6	8	75	4	Picture 1	○
GM-4BL-R2.5	5.0	2.5	6	10	75	4	Picture 1	○
GM-4BL-R3.0	6.0	3.0	6	12	75	4	Picture 2	○
GM-4BL-R4.0	8.0	4.0	8	16	100	4	Picture 2	○
GM-4BL-R5.0	10.0	5.0	10	20	100	4	Picture 2	○
GM-4BL-R6.0	12.0	6.0	12	24	100	4	Picture 2	○
GM-4BL-R7.0	14.0	7.0	14	28	100	4	Picture 2	○
GM-4BL-R8.0	16.0	8.0	16	32	150	4	Picture 2	○
GM-4BL-R9.0	18.0	9.0	18	36	150	4	Picture 2	○
GM-4BL-R10.0	20.0	10.0	20	40	150	4	Picture 2	○

● Stock available ○ Make-to-order

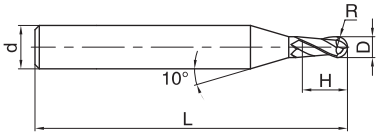
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

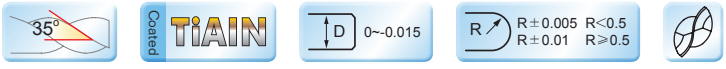
Code key B213
Graphics category and identification B214
Cutting parameters B402

2-flute tiny ball nose end mills with straight shank

GM-2BS



● Tiny diameter end mills can fully display high speed and high precision performances of machining center, often used for machining of precision components such as electronic part etc.



Ordering number	Basic dimension(mm)					Number of teeth Z	Stock
	D	R	d	H	L		
GM-2BS-R0.15	0.30	0.15	4	0.5	50	2	●
GM-2BS-R0.20	0.40	0.20	4	0.6	50	2	●
GM-2BS-R0.25	0.50	0.25	4	0.8	50	2	●
GM-2BS-R0.30	0.60	0.30	4	0.9	50	2	●
GM-2BS-R0.35	0.70	0.35	4	1.0	50	2	●
GM-2BS-R0.40	0.80	0.40	4	1.2	50	2	●
GM-2BS-R0.45	0.90	0.45	4	1.3	50	2	●
GM-2BS-R0.50	1.00	0.50	4	1.5	50	2	●
GM-2BS-R0.60	1.20	0.60	4	1.8	50	2	●
GM-2BS-R0.70	1.40	0.70	4	2.0	50	2	●
GM-2BS-R0.75	1.50	0.75	4	2.3	50	2	●
GM-2BS-R0.80	1.60	0.80	4	2.5	50	2	●
GM-2BS-R0.90	1.80	0.90	4	2.7	50	2	●
GM-2BS-R1.00	2.00	1.00	4	3.0	50	2	●
GM-2BS-R1.25	2.50	1.25	4	3.7	50	2	●
GM-2BS-R1.50	3.00	1.50	4	4.5	50	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

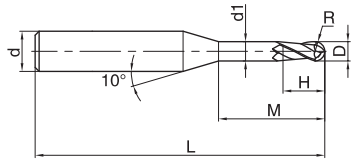
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B403

2-flute ball nose end mills with straight shank, long neck and short cutting edge

Deep ball nose slot

GM-2BP



- Suitable for machining narrow slot and free-form surface.

Ordering number	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	H	d_1	M	d	L		
GM-2BP-R0.25-M04	0.5	0.25	0.7	0.45	4	4	50	2	●
GM-2BP-R0.25-M06	0.5	0.25	0.7	0.45	6	4	50	2	●
GM-2BP-R0.3-M04	0.6	0.3	0.9	0.55	4	4	50	2	●
GM-2BP-R0.3-M06	0.6	0.3	0.9	0.55	6	4	50	2	●
GM-2BP-R0.3-M08	0.6	0.3	0.9	0.55	8	4	50	2	●
GM-2BP-R0.4-M04	0.8	0.4	1.2	0.75	4	4	50	2	●
GM-2BP-R0.4-M06	0.8	0.4	1.2	0.75	6	4	50	2	●
GM-2BP-R0.4-M08	0.8	0.4	1.2	0.75	8	4	50	2	●
GM-2BP-R0.4-M10	0.8	0.4	1.2	0.75	10	4	50	2	●
GM-2BP-R0.5-M04	1.0	0.5	1.5	0.95	4	4	50	2	●
GM-2BP-R0.5-M06	1.0	0.5	1.5	0.95	6	4	50	2	●
GM-2BP-R0.5-M08	1.0	0.5	1.5	0.95	8	4	50	2	●
GM-2BP-R0.5-M10	1.0	0.5	1.5	0.95	10	4	50	2	●
GM-2BP-R0.5-M12	1.0	0.5	1.5	0.95	12	4	50	2	●
GM-2BP-R0.6-M06	1.2	0.6	1.8	1.15	6	4	50	2	●
GM-2BP-R0.6-M08	1.2	0.6	1.8	1.15	8	4	50	2	●
GM-2BP-R0.6-M12	1.2	0.6	1.8	1.15	12	4	50	2	●
GM-2BP-R0.6-M16	1.2	0.6	1.8	1.15	16	4	50	2	●
GM-2BP-R0.75-M08	1.5	0.75	2.3	1.45	8	4	50	2	●
GM-2BP-R0.75-M12	1.5	0.75	2.3	1.45	12	4	50	2	●
GM-2BP-R0.75-M16	1.5	0.75	2.3	1.45	16	4	50	2	●
GM-2BP-R1.0-M06	2.0	1.0	3.0	1.95	6	4	50	2	●
GM-2BP-R1.0-M08	2.0	1.0	3.0	1.95	8	4	50	2	●
GM-2BP-R1.0-M10	2.0	1.0	3.0	1.95	10	4	50	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

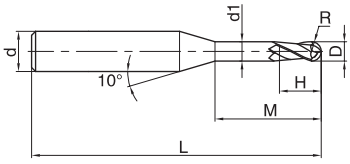
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B404–B405

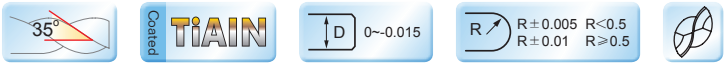
2-flute ball nose end mills with straight shank, long neck and short cutting edge

Deep ball nose slot

GM-2BP



- Suitable for machining narrow slot and free-form surface.



Ordering number	Basic dimension(mm)							Number of teeth	Stock
	D	R	H	d_1	M	d	L	Z	
GM-2BP-R1.0-M12	2.0	1.0	3.0	1.95	12	4	50	2	●
GM-2BP-R1.0-M16	2.0	1.0	3.0	1.95	16	4	50	2	●
GM-2BP-R1.0-M20	2.0	1.0	3.0	1.95	20	4	50	2	●
GM-2BP-R1.25-M08	2.5	1.25	3.7	2.4	8	4	50	2	●
GM-2BP-R1.25-M12	2.5	1.25	3.7	2.4	12	4	50	2	●
GM-2BP-R1.25-M16	2.5	1.25	3.7	2.4	16	4	60	2	●
GM-2BP-R1.25-M20	2.5	1.25	3.7	2.4	20	4	60	2	●
GM-2BP-R1.5-M08	3.0	1.5	4.5	2.85	8	6	50	2	●
GM-2BP-R1.5-M10	3.0	1.5	4.5	2.85	10	6	50	2	●
GM-2BP-R1.5-M12	3.0	1.5	4.5	2.85	12	6	50	2	●
GM-2BP-R1.5-M16	3.0	1.5	4.5	2.85	16	6	60	2	●
GM-2BP-R1.5-M20	3.0	1.5	4.5	2.85	20	6	60	2	●
GM-2BP-R2.0-M10	4.0	2.0	6.0	3.85	10	6	60	2	●
GM-2BP-R2.0-M16	4.0	2.0	6.0	3.85	16	6	60	2	●
GM-2BP-R2.0-M20	4.0	2.0	6.0	3.85	20	6	60	2	●
GM-2BP-R2.0-M25	4.0	2.0	6.0	3.85	25	6	60	2	●
GM-2BP-R2.5-M16	5.0	2.5	7.5	4.85	16	6	60	2	●
GM-2BP-R2.5-M25	5.0	2.5	7.5	4.85	25	6	70	2	●

● Stock available ○ Make-to-order

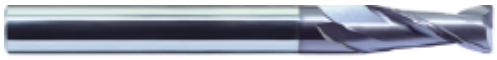
Applicable workpiece material table ◎Very suitable ○Suitable

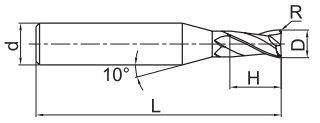
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B404–B405

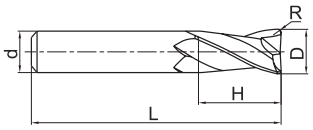
2-flute R end mills with straight shank

GM-2R





Picture 1



Picture 2

- Wide applications, applicable for several machining styles.

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
GM-2R-D1.0R0.2	1.0	0.2	4	3	50	2	Picture 1	●
GM-2R-D1.5R0.2	1.5	0.2	4	4	50	2	Picture 1	●
GM-2R-D2.0R0.2	2.0	0.2	4	6	50	2	Picture 1	●
GM-2R-D2.0R0.5	2.0	0.5	4	6	50	2	Picture 1	●
GM-2R-D2.5R0.2	2.5	0.2	4	8	50	2	Picture 1	●
GM-2R-D2.5R0.5	2.5	0.5	4	8	50	2	Picture 1	●
GM-2R-D3.0R0.2	3.0	0.2	4	8	50	2	Picture 1	●
GM-2R-D3.0R0.3	3.0	0.3	4	8	50	2	Picture 1	●
GM-2R-D3.0R0.5	3.0	0.5	4	8	50	2	Picture 1	●
GM-2R-D4.0R0.2	4.0	0.2	4	11	50	2	Picture 2	●
GM-2R-D4.0R0.3	4.0	0.3	4	11	50	2	Picture 2	●
GM-2R-D4.0R0.5	4.0	0.5	4	11	50	2	Picture 2	●
GM-2R-D4.0R1.0	4.0	1.0	4	11	50	2	Picture 2	●
GM-2R-D5.0R0.3	5.0	0.3	6	13	50	2	Picture 1	●
GM-2R-D5.0R0.5	5.0	0.5	6	13	50	2	Picture 1	●
GM-2R-D5.0R1.0	5.0	1.0	6	13	50	2	Picture 1	●
GM-2R-D6.0R0.3	6.0	0.3	6	16	50	2	Picture 2	●
GM-2R-D6.0R0.5	6.0	0.5	6	16	50	2	Picture 2	●
GM-2R-D6.0R1.0	6.0	1.0	6	16	50	2	Picture 2	●
GM-2R-D8.0R0.3	8.0	0.3	8	20	60	2	Picture 2	●
GM-2R-D8.0R0.5	8.0	0.5	8	20	60	2	Picture 2	●
GM-2R-D8.0R1.0	8.0	1.0	8	20	60	2	Picture 2	●
GM-2R-D10.0R0.5	10.0	0.5	10	25	75	2	Picture 2	●
GM-2R-D10.0R1.0	10.0	1.0	10	25	75	2	Picture 2	●
GM-2R-D10.0R1.5	10.0	1.5	10	25	75	2	Picture 2	●
GM-2R-D10.0R2.0	10.0	2.0	10	25	75	2	Picture 2	●
GM-2R-D12.0R0.5	12.0	0.5	12	30	75	2	Picture 2	●
GM-2R-D12.0R1.0	12.0	1.0	12	30	75	2	Picture 2	●
GM-2R-D12.0R1.5	12.0	1.5	12	30	75	2	Picture 2	●
GM-2R-D12.0R2.0	12.0	2.0	12	30	75	2	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

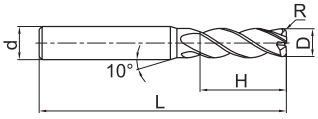
◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

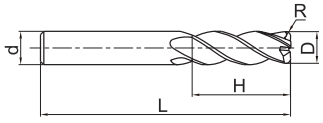
Code key B213
Graphics category and identification B214
Cutting parameters B406

4-flute R end mills with straight shank

GM-4R



Picture 1



Picture 2

- Wide applications, applicable for several machining styles.

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
GM-4R-D3.0R0.2	3.0	0.2	4	8	50	4	Picture 1	●
GM-4R-D4.0R0.3	4.0	0.3	4	10	50	4	Picture 2	●
GM-4R-D4.0R0.5	4.0	0.5	4	10	50	4	Picture 2	●
GM-4R-D5.0R0.5	5.0	0.5	6	13	50	4	Picture 1	●
GM-4R-D5.0R1.0	5.0	1.0	6	13	50	4	Picture 1	●
GM-4R-D6.0R0.5	6.0	0.5	6	16	50	4	Picture 2	●
GM-4R-D6.0R1.0	6.0	1.0	6	16	50	4	Picture 2	●
GM-4R-D8.0R0.5	8.0	0.5	8	20	60	4	Picture 2	●
GM-4R-D8.0R1.0	8.0	1.0	8	20	60	4	Picture 2	●
GM-4R-D10.0R0.5	10.0	0.5	10	25	75	4	Picture 2	●
GM-4R-D10.0R1.0	10.0	1.0	10	25	75	4	Picture 2	●
GM-4R-D10.0R2.0	10.0	2.0	10	25	75	4	Picture 2	●
GM-4R-D10.0R3.0	10.0	3.0	10	25	75	4	Picture 2	●
GM-4R-D12.0R0.5	12.0	0.5	12	30	75	4	Picture 2	●
GM-4R-D12.0R1.0	12.0	1.0	12	30	75	4	Picture 2	●
GM-4R-D12.0R2.0	12.0	2.0	12	30	75	4	Picture 2	●
GM-4R-D12.0R3.0	12.0	3.0	12	30	75	4	Picture 2	●

● Stock available ○ Make-to-order

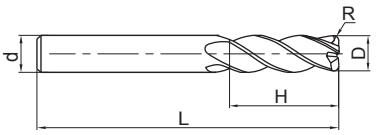
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B407

4-flute R end mills with straight and long shank

GM-4RL



- GM-4R series with long shank.

Ordering number	Basic dimension(mm)					Number of teeth Z	Stock
	D	R	d	H	L		
GM-4RL-D6.0R0.5	6.0	0.5	6	16	75	4	●
GM-4RL-D6.0R1.0	6.0	1.0	6	16	75	4	●
GM-4RL-D8.0R0.5	8.0	0.5	8	20	100	4	●
GM-4RL-D8.0R1.0	8.0	1.0	8	20	100	4	●
GM-4RL-D10.0R0.5	10.0	0.5	10	25	100	4	●
GM-4RL-D10.0R1.0	10.0	1.0	10	25	100	4	●
GM-4RL-D10.0R2.0	10.0	2.0	10	25	100	4	●
GM-4RL-D12.0R0.5	12.0	0.5	12	30	100	4	●
GM-4RL-D12.0R1.0	12.0	1.0	12	30	100	4	●
GM-4RL-D12.0R2.0	12.0	2.0	12	30	100	4	●
GM-4RL-D16.0R1.0	16.0	1.0	16	45	150	4	●
GM-4RL-D16.0R2.0	16.0	2.0	16	45	150	4	●

● Stock available ○ Make-to-order

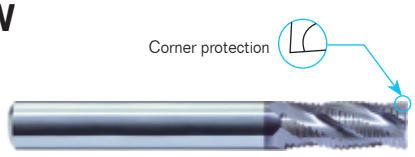
Applicable workpiece material table ◎Very suitable ○Suitable

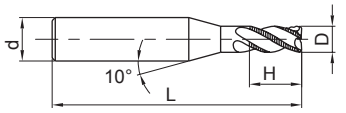
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B407

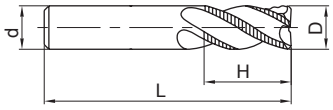
4-flute flattened end mills with straight shank and corrugated edges

GM-4W



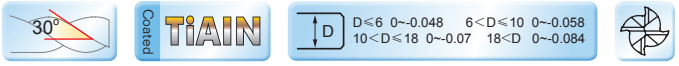


Picture 1



Picture 2

- Very suitable for high-efficiency rough machining.



Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-4W-D6.0	6.0	6	16	50	4	Picture 2	●
GM-4W-D7.0	7.0	8	20	60	4	Picture 1	●
GM-4W-D8.0	8.0	8	20	60	4	Picture 2	●
GM-4W-D9.0	9.0	10	22	75	4	Picture 1	●
GM-4W-D10.0	10.0	10	25	75	4	Picture 2	●
GM-4W-D11.0	11.0	12	26	75	4	Picture 1	●
GM-4W-D12.0	12.0	12	30	75	4	Picture 2	●
GM-4W-D16.0	16.0	16	45	100	4	Picture 2	●
GM-4W-D20.0	20.0	20	45	100	4	Picture 2	●

● Stock available ○ Make-to-order

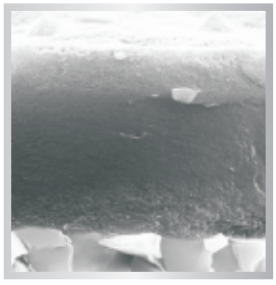
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B408–B409

HMX series

end mills for high-hardness steel machining



Lattice heterogeneous coating

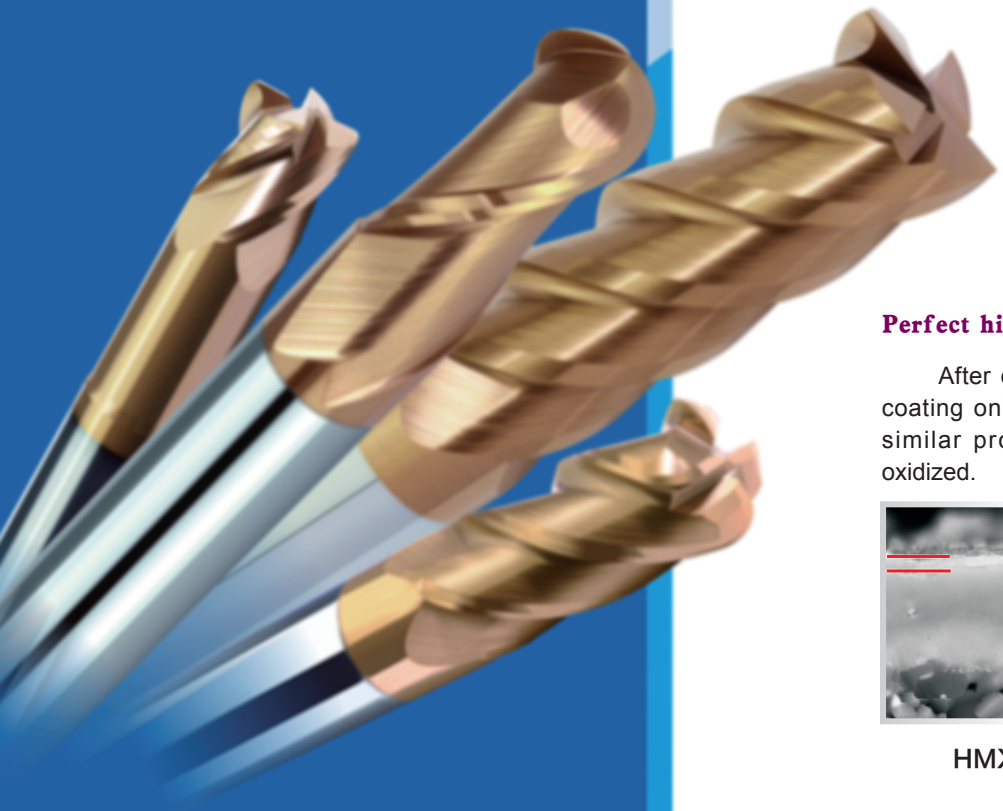
Lattice heterogeneous coating added with special elements, with high hardness and excellent high temperature oxidation resistance, more suitable for high hardness materials and high speed machining

Excellent coating processing technology, more closely combined with substrate

- unique cutter structure, properly designed chipbreaker, for outstanding cutting performance.
- Orange red coating allows for better wear observation.
- Special after treatment greatly reduces friction, for smoother chip evacuation and superior surface quality.

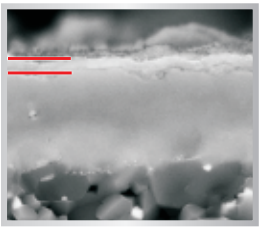
New technology

Breakthrough upgrading

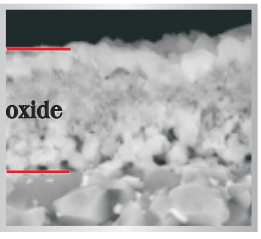


Perfect high temperature oxidation resistance:

After oxidation at 1100 ° C, HMX series cutter coating only has a very thin oxide layer, while the similar products of Company A has completely oxidized.



HMX series



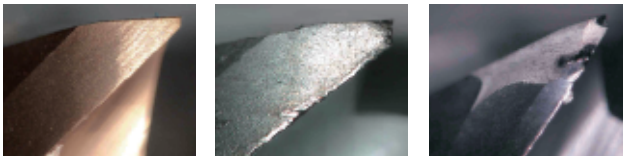
A company

HMX series end mills for high-hardness steel machining

Longer tool life

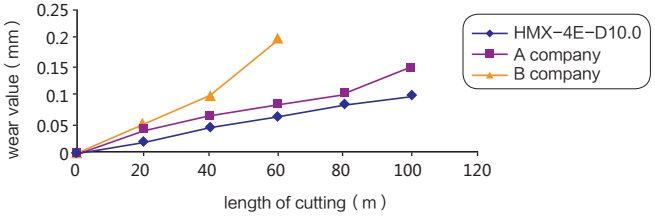
tool: HMX-4E-D10.0
workpiece material: SKD11(62HRC)
cutting speed: 100m/min
feed per tooth: 0.2mm/r
axial depth of cut: a_p=10mm
radial depth of cut: ae=0.3mm
cooling system: air cooling

wear comparison after machining 60min



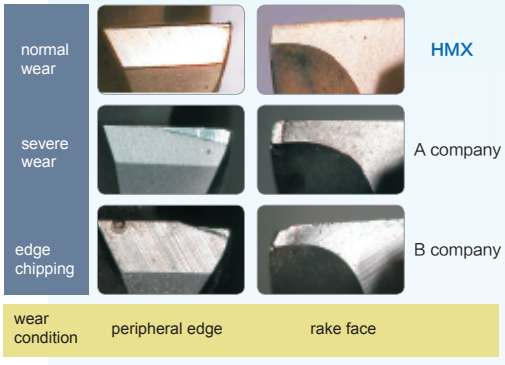
HMX series | A company | B company

peripheral edges wear curves



tool: HMX-4EL-D8.0
milling method: end milling
workpiece material: quenched steel(HRC65)
cutting speed: 100m/min
feed per revolution: 0.15mm/r
depth of cut: 0.3mm
cutting width: 5mm
cooling system: air cooling

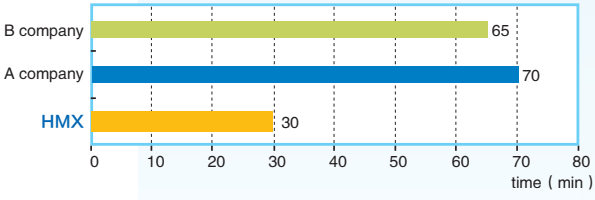
wear comparison after machining 40min



high machining efficient

tool: HMX-4R-D6.0R1.0
machininig parts: cavity machining
(30mm×30mm×10mm)
workpiece material: quenched steel(HRC55)
cutting speed: 200m/min
feed per revolution: 0.2mm/r
cutting width: 0.3mm
cutting depth: 5mm
cooling system: air cooling

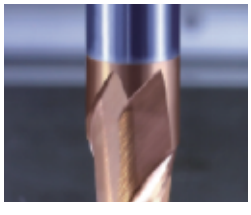
time comparison for complete one cavity



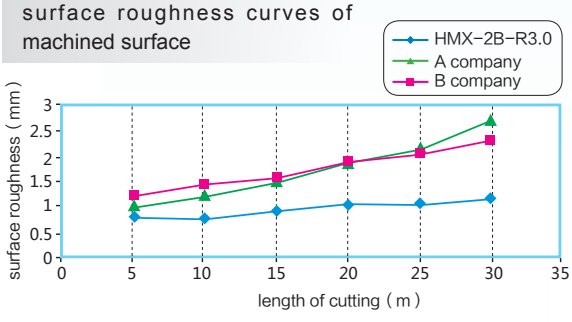
100% improvement of machining efficient on HMX than others!

Good machining quality

tool: HMX-2B-R3.0
workpiece material: SKD11(HRC62)
cutting speed : 200m/min
feed per revolution: 0.2mm/r
cutting width: 0.2mm
cutting depth: 0.3mm
cooling system: air cooling



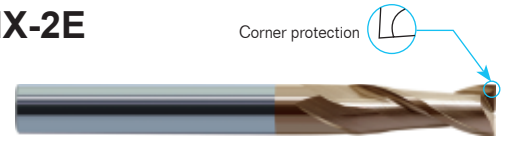
surface roughness curves of machined surface

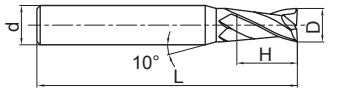


HMX series for machining high hardness steel

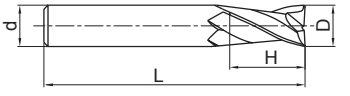
2-flute flattened end mills with straight shank

HMX-2E





Picture 1



Picture 2

- For slot milling.
- Very suitable for high speed cutting and dry cutting.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
HMX-2E-D1.0S	1.0	4	3	50	2	Picture 1	●
HMX-2E-D1.5S	1.5	4	4	50	2	Picture 1	●
HMX-2E-D2.0S	2.0	4	6	50	2	Picture 1	●
HMX-2E-D2.5S	2.5	4	8	50	2	Picture 1	●
HMX-2E-D3.0S	3.0	4	8	50	2	Picture 1	●
HMX-2E-D4.0S	4.0	4	11	50	2	Picture 2	●
HMX-2E-D1.0	1.0	6	3	50	2	Picture 1	●
HMX-2E-D1.5	1.5	6	4	50	2	Picture 1	●
HMX-2E-D2.0	2.0	6	6	50	2	Picture 1	●
HMX-2E-D2.5	2.5	6	8	50	2	Picture 1	●
HMX-2E-D3.0	3.0	6	8	50	2	Picture 1	●
HMX-2E-D3.5	3.5	6	10	50	2	Picture 1	●
HMX-2E-D4.0	4.0	6	11	50	2	Picture 1	●
HMX-2E-D4.5	4.5	6	11	50	2	Picture 1	●
HMX-2E-D5.0	5.0	6	13	50	2	Picture 1	●
HMX-2E-D5.5	5.5	6	16	50	2	Picture 1	●
HMX-2E-D6.0	6.0	6	16	50	2	Picture 2	●
HMX-2E-D7.0	7.0	8	20	60	2	Picture 1	●
HMX-2E-D8.0	8.0	8	20	60	2	Picture 2	●
HMX-2E-D9.0	9.0	10	22	75	2	Picture 1	●
HMX-2E-D10.0	10.0	10	25	75	2	Picture 2	●
HMX-2E-D11.0	11.0	12	26	75	2	Picture 1	●
HMX-2E-D12.0	12.0	12	30	75	2	Picture 2	●
HMX-2E-D14.0	14.0	14	32	100	2	Picture 2	●
HMX-2E-D16.0	16.0	16	45	100	2	Picture 2	●
HMX-2E-D18.0	18.0	18	45	100	2	Picture 2	●
HMX-2E-D20.0	20.0	20	45	100	2	Picture 2	●

● Stock available ○ Make-to-order

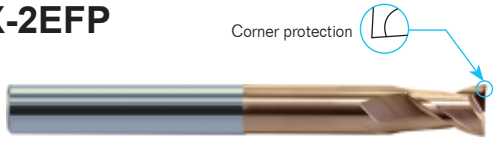
Applicable workpiece material table ◎Very suitable ○Suitable

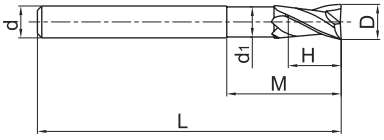
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B213
Graphics category and identification B214
Cutting parameters B410

2-flute flattened end mills with long straight shank and short cutting edge

HMX-2EFP





● High-rigidity short cutting edge, suitable for heavy cutting and deep cavity milling.

Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
HMX-2EFP-D6.0	6.0	6	9	30	5.8	75	2	●
HMX-2EFP-D8.0	8.0	8	12	40	7.8	100	2	●
HMX-2EFP-D10.0	10.0	10	15	50	9.6	100	2	●
HMX-2EFP-D12.0	12.0	12	18	50	11.5	100	2	●
HMX-2EFP-D16.0	16.0	16	24	50	15.5	150	2	●
HMX-2EFP-D20.0	20.0	20	30	60	19.5	150	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

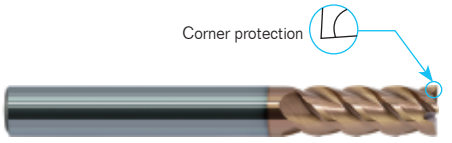
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

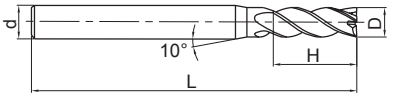
Code key B213
Graphics category and identification B214
Cutting parameters B411

HMX series for machining high hardness steel

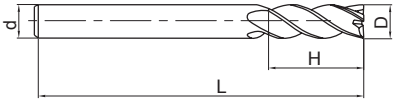
4-flute flattened end mills with straight shank

HMX-4E





Picture 1



Picture 2

- For side milling and shallow slot milling.
- Very suitable for high speed cutting and dry cutting.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
HMX-4E-D1.0S	1.0	4	3	50	4	Picture 1	●
HMX-4E-D1.5S	1.5	4	4	50	4	Picture 1	●
HMX-4E-D2.0S	2.0	4	6	50	4	Picture 1	●
HMX-4E-D2.5S	2.5	4	8	50	4	Picture 1	●
HMX-4E-D3.0S	3.0	4	8	50	4	Picture 1	●
HMX-4E-D4.0S	4.0	4	11	50	4	Picture 2	●
HMX-4E-D1.0	1.0	6	3	50	4	Picture 1	●
HMX-4E-D1.5	1.5	6	4	50	4	Picture 1	●
HMX-4E-D2.0	2.0	6	6	50	4	Picture 1	●
HMX-4E-D2.5	2.5	6	8	50	4	Picture 1	●
HMX-4E-D3.0	3.0	6	8	50	4	Picture 1	●
HMX-4E-D3.5	3.5	6	10	50	4	Picture 1	●
HMX-4E-D4.0	4.0	6	11	50	4	Picture 1	●
HMX-4E-D4.5	4.5	6	11	50	4	Picture 1	●
HMX-4E-D5.0	5.0	6	13	50	4	Picture 1	●
HMX-4E-D5.5	5.5	6	16	50	4	Picture 1	●
HMX-4E-D6.0	6.0	6	16	50	4	Picture 2	●
HMX-4E-D7.0	7.0	8	20	60	4	Picture 1	●
HMX-4E-D8.0	8.0	8	20	60	4	Picture 2	●
HMX-4E-D9.0	9.0	10	22	75	4	Picture 1	●
HMX-4E-D10.0	10.0	10	25	75	4	Picture 2	●
HMX-4E-D11.0	11.0	12	26	75	4	Picture 1	●
HMX-4E-D12.0	12.0	12	30	75	4	Picture 2	●
HMX-4E-D14.0	14.0	14	32	75	4	Picture 2	●
HMX-4E-D16.0	16.0	16	45	100	4	Picture 2	●
HMX-4E-D18.0	18.0	18	45	100	4	Picture 2	●
HMX-4E-D20.0	20.0	20	45	100	4	Picture 2	●

● Stock available ○ Make-to-order

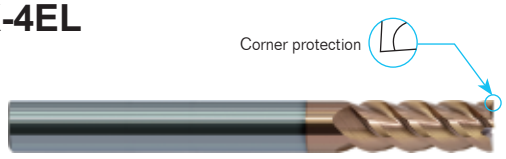
Applicable workpiece material table ◎Very suitable ○Suitable

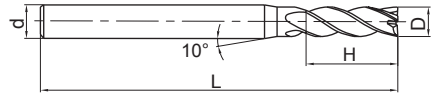
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B213
Graphics category and identification B214
Cutting parameters B412

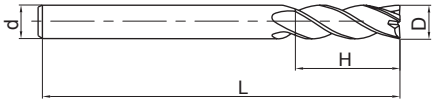
4-flute flattened end mills with straight shank and long cutting edge

HMX-4EL





Picture 1

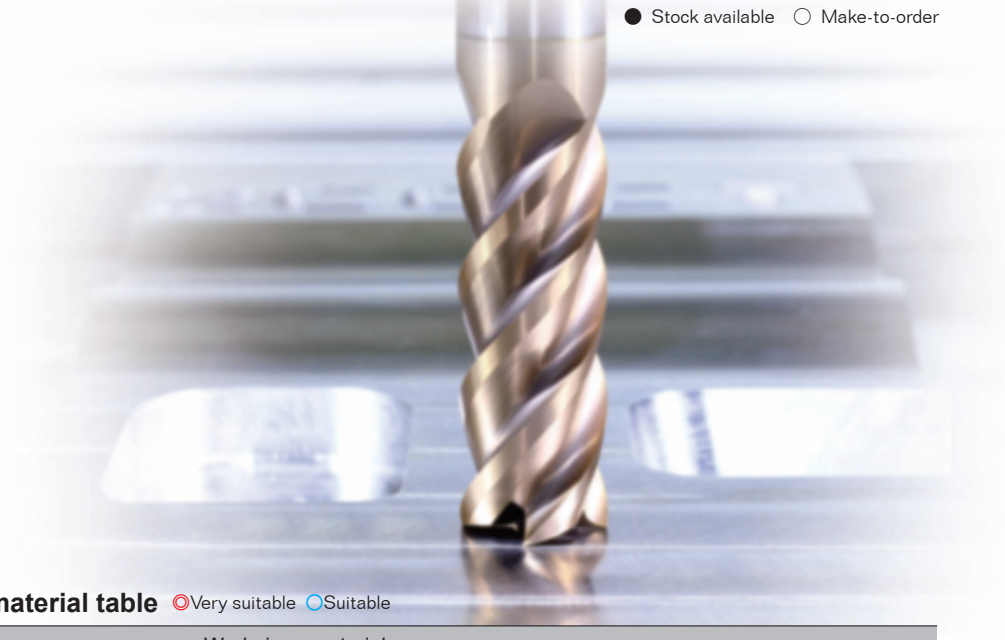


Picture 2

- HM-4E series with long cutting edge.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
HMX-4EL-D3.0	3.0	6	12	75	4	Picture 1	●
HMX-4EL-D4.0	4.0	6	15	75	4	Picture 1	●
HMX-4EL-D5.0	5.0	6	20	75	4	Picture 1	●
HMX-4EL-D6.0	6.0	6	20	75	4	Picture 2	●
HMX-4EL-D8.0	8.0	8	25	100	4	Picture 2	●
HMX-4EL-D10.0	10.0	10	30	100	4	Picture 2	●
HMX-4EL-D12.0	12.0	12	35	100	4	Picture 2	●
HMX-4EL-D14.0	14.0	14	40	100	4	Picture 2	●
HMX-4EL-D16.0	16.0	16	50	150	4	Picture 2	●
HMX-4EL-D20.0	20.0	20	55	150	4	Picture 2	●

● Stock available ○ Make-to-order



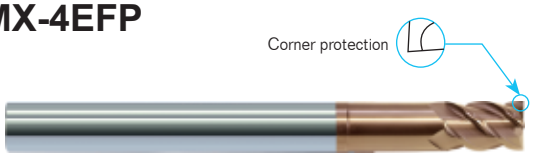
Applicable workpiece material table ◎Very suitable ○Suitable

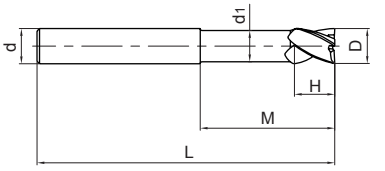
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B213
Graphics category and identification B214
Cutting parameters B412

4-flute flattened end mills with straight shank, long neck and short cutting edge

HMX-4EFP





● High-rigidity short cutting edge, suitable for heavy cutting and deep cavity milling.

Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
HMX-4EFP-D6.0	6.0	6	9	30	5.8	75	4	●
HMX-4EFP-D8.0	8.0	8	12	40	7.8	100	4	●
HMX-4EFP-D10.0	10.0	10	15	50	9.6	100	4	●
HMX-4EFP-D12.0	12.0	12	18	50	11.5	100	4	●
HMX-4EFP-D16.0	16.0	16	24	50	15.5	150	4	●
HMX-4EFP-D20.0	20.0	20	30	60	19.5	150	4	●

● Stock available ○ Make-to-order

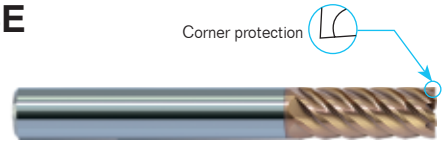
Applicable workpiece material table ◎Very suitable ○Suitable

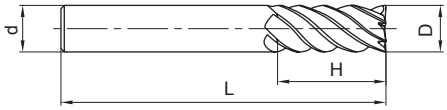
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B213
Graphics category and identification B214
Cutting parameters B413

6-flute flattened end mills with straight shank

HMX-6E





- High tool rigidity reduce tool deflection in side milling.
- Very suitable for high speed cutting and dry cutting.

Ordering number	Basic dimension(mm)				Number of teeth Z	Stock
	D	d	H	L		
HMX-6E-D6.0	6.0	6	18	60	6	●
HMX-6E-D8.0	8.0	8	20	60	6	●
HMX-6E-D10.0	10.0	10	30	75	6	●
HMX-6E-D12.0	12.0	12	32	75	6	●
HMX-6E-D16.0	16.0	16	40	100	6	●
HMX-6E-D20.0	20.0	20	45	100	6	●

● Stock available ○ Make-to-order

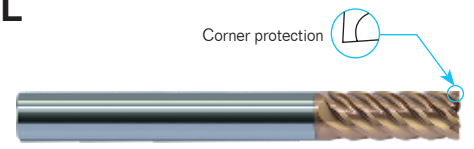
Applicable workpiece material table ◎Very suitable ○Suitable

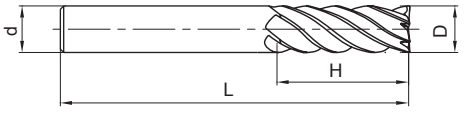
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B213
Graphics category and identification B214
Cutting parameters B414

6-flute flattened end mills with straight shank and long cutting edge

HMX-6EL





- HM-6E series with long cutting edge.

Ordering number	Basic dimension(mm)				Number of teeth Z	Stock
	D	d	H	L		
HMX-6EL-D6.0	6.0	6	24	75	6	●
HMX-6EL-D8.0	8.0	8	32	75	6	●
HMX-6EL-D10.0	10.0	10	40	100	6	●
HMX-6EL-D12.0	12.0	12	45	100	6	●
HMX-6EL-D16.0	16.0	16	64	150	6	●
HMX-6EL-D20.0	20.0	20	75	150	6	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

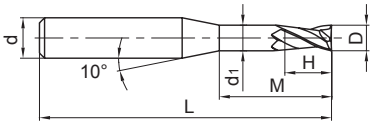
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B213
Graphics category and identification B214
Cutting parameters B415

2-flute flattened end mills with straight shank, long neck and short cutting edge

Deep flattened slot

HMX-2EP



- Suitable for narrow slot milling or milling of fine parts that could generate interference.

35° | Coated NaNo TiAlXN | D 0~-0.015 | D<1mm | 1mm≤D

Ordering number	Basic dimension(mm)						Number of teeth	Stock
	D	d	H	M	d_1	L	Z	
HMX-2EP-D0.5-M04	0.5	4	0.7	4	0.45	50	2	●
HMX-2EP-D0.5-M06	0.5	4	0.7	6	0.45	50	2	●
HMX-2EP-D0.5-M08	0.5	4	0.7	8	0.45	50	2	●
HMX-2EP-D0.8-M04	0.8	4	1.2	4	0.75	50	2	●
HMX-2EP-D0.8-M06	0.8	4	1.2	6	0.75	50	2	●
HMX-2EP-D0.8-M08	0.8	4	1.2	8	0.75	50	2	●
HMX-2EP-D0.8-M10	0.8	4	1.2	10	0.75	50	2	●
HMX-2EP-D1.0-M04	1.0	4	1.5	4	0.95	50	2	●
HMX-2EP-D1.0-M06	1.0	4	1.5	6	0.95	50	2	●
HMX-2EP-D1.0-M08	1.0	4	1.5	8	0.95	50	2	●
HMX-2EP-D1.0-M10	1.0	4	1.5	10	0.95	50	2	●
HMX-2EP-D1.0-M12	1.0	4	1.5	12	0.95	50	2	●
HMX-2EP-D1.0-M14	1.0	4	1.5	14	0.95	50	2	●
HMX-2EP-D1.2-M06	1.2	4	1.8	6	1.15	50	2	●
HMX-2EP-D1.2-M08	1.2	4	1.8	8	1.15	50	2	●
HMX-2EP-D1.2-M10	1.2	4	1.8	10	1.15	50	2	●
HMX-2EP-D1.2-M12	1.2	4	1.8	12	1.15	50	2	●
HMX-2EP-D1.5-M06	1.5	4	2.3	6	1.45	50	2	●
HMX-2EP-D1.5-M08	1.5	4	2.3	8	1.45	50	2	●
HMX-2EP-D1.5-M10	1.5	4	2.3	10	1.45	50	2	●
HMX-2EP-D1.5-M12	1.5	4	2.3	12	1.45	50	2	●
HMX-2EP-D1.5-M14	1.5	4	2.3	14	1.45	50	2	●
HMX-2EP-D2.0-M06	2.0	4	3.0	6	1.95	50	2	●
HMX-2EP-D2.0-M08	2.0	4	3.0	8	1.95	50	2	●
HMX-2EP-D2.0-M10	2.0	4	3.0	10	1.95	50	2	●
HMX-2EP-D2.0-M12	2.0	4	3.0	12	1.95	50	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

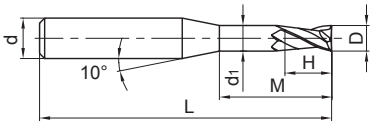
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B213
Graphics category and identification B214
Cutting parameters B416–B417

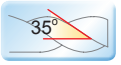
2-flute flattened end mills with straight shank, long neck and short cutting edge

Deep flattened slot

HMX-2EP



● Suitable for narrow slot milling or milling of fine parts that could generate interference.



D<1mm

1mm≤D

Ordering number	Basic dimension(mm)						Number of teeth	Stock
	D	d	H	M	d_1	L	Z	
HMX-2EP-D2.0-M14	2.0	4	3.0	14	1.95	50	2	●
HMX-2EP-D2.0-M16	2.0	4	3.0	16	1.95	50	2	●
HMX-2EP-D2.5-M08	2.5	4	3.7	8	2.4	50	2	●
HMX-2EP-D2.5-M10	2.5	4	3.7	10	2.4	50	2	●
HMX-2EP-D2.5-M12	2.5	4	3.7	12	2.4	50	2	●
HMX-2EP-D2.5-M14	2.5	4	3.7	14	2.4	50	2	●
HMX-2EP-D2.5-M16	2.5	4	3.7	16	2.4	60	2	●
HMX-2EP-D2.5-M18	2.5	4	3.7	18	2.4	60	2	●
HMX-2EP-D2.5-M20	2.5	4	3.7	20	2.4	60	2	●
HMX-2EP-D3.0-M06	3.0	6	4.5	6	2.85	50	2	●
HMX-2EP-D3.0-M08	3.0	6	4.5	8	2.85	50	2	●
HMX-2EP-D3.0-M10	3.0	6	4.5	10	2.85	50	2	●
HMX-2EP-D3.0-M12	3.0	6	4.5	12	2.85	50	2	●
HMX-2EP-D3.0-M14	3.0	6	4.5	14	2.85	60	2	●
HMX-2EP-D3.0-M16	3.0	6	4.5	16	2.85	60	2	●
HMX-2EP-D3.0-M18	3.0	6	4.5	18	2.85	60	2	●
HMX-2EP-D3.0-M20	3.0	6	4.5	20	2.85	60	2	●
HMX-2EP-D4.0-M12	4.0	6	6.0	12	3.85	60	2	●
HMX-2EP-D4.0-M16	4.0	6	6.0	16	3.85	60	2	●
HMX-2EP-D4.0-M20	4.0	6	6.0	20	3.85	60	2	●
HMX-2EP-D4.0-M25	4.0	6	6.0	25	3.85	60	2	●
HMX-2EP-D5.0-M16	5.0	6	7.5	16	4.85	60	2	●
HMX-2EP-D5.0-M25	5.0	6	7.5	25	4.85	70	2	●

● Stock available ○ Make-to-order

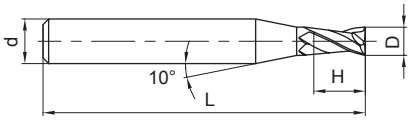
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

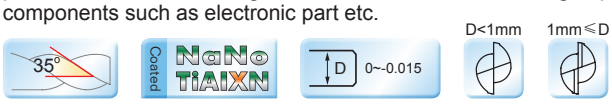
Code key B213
Graphics category and identification B214
Cutting parameters B416–B417

2-flute flattened end mills with straight shank and tiny diameter

HMX-2ES



● Tiny diameter end mills can fully display high speed and high precision performances of machining center, often used for machining of precision components such as electronic part etc.



Ordering number	Basic dimension(mm)				Number of teeth Z	Stock
	D	d	H	L		
HMX-2ES-D0.3	0.3	4	0.6	50	2	●
HMX-2ES-D0.4	0.4	4	0.8	50	2	●
HMX-2ES-D0.5	0.5	4	1.0	50	2	●
HMX-2ES-D0.6	0.6	4	1.2	50	2	●
HMX-2ES-D0.7	0.7	4	1.4	50	2	●
HMX-2ES-D0.8	0.8	4	1.6	50	2	●
HMX-2ES-D0.9	0.9	4	1.8	50	2	●
HMX-2ES-D1.0	1.0	4	2.0	50	2	●
HMX-2ES-D1.1	1.1	4	2.0	50	2	●
HMX-2ES-D1.2	1.2	4	2.5	50	2	●
HMX-2ES-D1.3	1.3	4	2.5	50	2	●
HMX-2ES-D1.4	1.4	4	3.0	50	2	●
HMX-2ES-D1.5	1.5	4	3.0	50	2	●
HMX-2ES-D1.6	1.6	4	3.5	50	2	●
HMX-2ES-D1.7	1.7	4	3.5	50	2	●
HMX-2ES-D1.8	1.8	4	4.0	50	2	●
HMX-2ES-D1.9	1.9	4	4.0	50	2	●
HMX-2ES-D2.0	2.0	4	4.0	50	2	●
HMX-2ES-D2.1	2.1	4	4.0	50	2	●
HMX-2ES-D2.2	2.2	4	4.5	50	2	●
HMX-2ES-D2.3	2.3	4	4.5	50	2	●
HMX-2ES-D2.4	2.4	4	5.0	50	2	●
HMX-2ES-D2.5	2.5	4	5.0	50	2	●
HMX-2ES-D2.6	2.6	4	5.0	50	2	●
HMX-2ES-D2.7	2.7	4	5.5	50	2	●
HMX-2ES-D2.8	2.8	4	5.5	50	2	●
HMX-2ES-D2.9	2.9	4	6.0	50	2	●
HMX-2ES-D3.0	3.0	4	6.0	50	2	●

● Stock available ○ Make-to-order

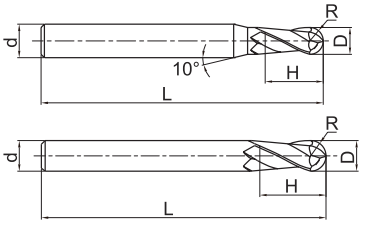
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

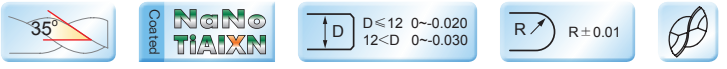
Code key B213
Graphics category and identification B214
Cutting parameters B418

2-flute ball nose end mills with straight shank

HMX-2B



- For profile milling.
- Very suitable for high speed cutting and dry cutting.



Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
HMX-2B-R0.5S	1.0	0.5	4	2	50	2	Picture 1	●
HMX-2B-R0.75S	1.5	0.75	4	3	50	2	Picture 1	●
HMX-2B-R1.0S	2.0	1.0	4	4	50	2	Picture 1	●
HMX-2B-R1.25S	2.5	1.25	4	5	50	2	Picture 1	●
HMX-2B-R1.5S	3.0	1.5	4	6	50	2	Picture 1	●
HMX-2B-R2.0S	4.0	2.0	4	8	50	2	Picture 2	●
HMX-2B-R0.5	1.0	0.5	6	2	50	2	Picture 1	●
HMX-2B-R0.75	1.5	0.75	6	3	50	2	Picture 1	●
HMX-2B-R1.0	2.0	1.0	6	4	50	2	Picture 1	●
HMX-2B-R1.25	2.5	1.25	6	5	50	2	Picture 1	●
HMX-2B-R1.5	3.0	1.5	6	6	50	2	Picture 1	●
HMX-2B-R1.75	3.5	1.75	6	8	50	2	Picture 1	●
HMX-2B-R2.0	4.0	2.0	6	8	50	2	Picture 1	●
HMX-2B-R2.5	5.0	2.5	6	10	50	2	Picture 1	●
HMX-2B-R2.75	5.5	2.75	6	12	50	2	Picture 1	●
HMX-2B-R3.0	6.0	3.0	6	12	50	2	Picture 2	●
HMX-2B-R3.5	7.0	3.5	8	14	60	2	Picture 1	●
HMX-2B-R4.0	8.0	4.0	8	16	60	2	Picture 2	●
HMX-2B-R4.5	9.0	4.5	10	18	75	2	Picture 1	●
HMX-2B-R5.0	10.0	5.0	10	20	75	2	Picture 2	●
HMX-2B-R6.0	12.0	6.0	12	24	75	2	Picture 2	●
HMX-2B-R7.0	14.0	7.0	14	28	75	2	Picture 2	●
HMX-2B-R8.0	16.0	8.0	16	32	100	2	Picture 2	●
HMX-2B-R10.0	20.0	10.0	20	40	100	2	Picture 2	●

● Stock available ○ Make-to-order

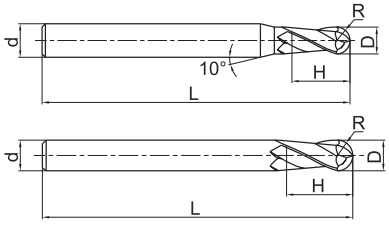
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B213
Graphics category and identification B214
Cutting parameters B419

2-flute ball nose end mills with straight shank

HMX-2BL



●HM-2B series with long shank.

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
HMX-2BL-R1.0	2.0	1.0	6	4	75	2	Picture 1	●
HMX-2BL-R1.25	2.5	1.25	6	6	75	2	Picture 1	●
HMX-2BL-R1.5	3.0	1.5	6	6	75	2	Picture 1	●
HMX-2BL-R1.75	3.5	1.75	6	8	75	2	Picture 1	●
HMX-2BL-R2.0	4.0	2.0	6	8	75	2	Picture 1	●
HMX-2BL-R2.5	5.0	2.5	6	10	75	2	Picture 1	●
HMX-2BL-R2.75	5.5	2.75	6	12	75	2	Picture 1	●
HMX-2BL-R3.0	6.0	3.0	6	12	75	2	Picture 2	●
HMX-2BL-R3.5	7.0	3.5	8	14	75	2	Picture 1	●
HMX-2BL-R4.0	8.0	4.0	8	16	100	2	Picture 2	●
HMX-2BL-R4.5	9.0	4.5	10	18	100	2	Picture 1	●
HMX-2BL-R5.0	10.0	5.0	10	20	100	2	Picture 2	●
HMX-2BL-R6.0	12.0	6.0	12	24	100	2	Picture 2	●
HMX-2BL-R7.0	14.0	7.0	14	28	100	2	Picture 2	●
HMX-2BL-R8.0	16.0	8.0	16	32	150	2	Picture 2	●
HMX-2BL-R10.0	20.0	10.0	20	40	150	2	Picture 2	●

● Stock available ○ Make-to-order

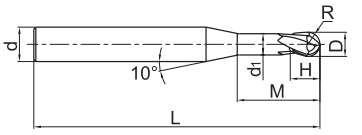
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

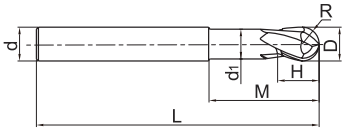
Code key B213
Graphics category and identification B214
Cutting parameters B419

2-flute ball nose end mills with straight shank, long neck and short cutting edge

HMX-2BFP



Picture 1



Picture 2

- Short cutting edge and high rigidity designed, applicable for heavy cutting.

Ordering number	Basic dimension(mm)							Number of teeth Z	Geometry	Stock
	D	R	H	d_1	M	d	L			
HMX-2BFP-R0.5	1.0	0.5	1	0.95	2.5	6	75	2	Picture 1	●
HMX-2BFP-R0.75	1.5	0.75	1.5	1.45	3	6	75	2	Picture 1	●
HMX-2BFP-R1.0	2.0	1.0	2	1.95	4	6	75	2	Picture 1	●
HMX-2BFP-R1.5	3.0	1.5	3	2.85	6	6	75	2	Picture 1	●
HMX-2BFP-R2.0	4.0	2.0	4	3.85	8	6	75	2	Picture 1	●
HMX-2BFP-R2.5	5.0	2.5	5	4.85	10	6	75	2	Picture 1	●
HMX-2BFP-R3.0	6.0	3.0	6	5.8	12	6	75	2	Picture 2	●
HMX-2BFP-R4.0	8.0	4.0	8	7.8	16	8	100	2	Picture 2	●
HMX-2BFP-R5.0	10.0	5.0	10	9.6	20	10	100	2	Picture 2	●
HMX-2BFP-R6.0	12.0	6.0	12	11.5	24	12	100	2	Picture 2	●
HMX-2BFP-R8.0	16.0	8.0	16	15.5	32	16	150	2	Picture 2	●
HMX-2BFP-R10.0	20.0	10.0	20	19.5	40	20	150	2	Picture 2	●

● Stock available ○ Make-to-order

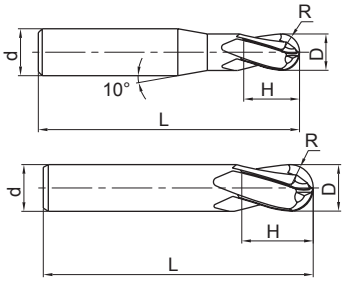
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B213
Graphics category and identification B214
Cutting parameters B419

4-flute ball nose end mills with straight shank

HMX-4B



- 4-flute ball nose end mill can operate with higher feed speed and machining efficiency, extending too life in machining high-hardness workpiece.

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
HMX-4B-R1.5	3.0	1.5	6	6	50	4	Picture 1	●
HMX-4B-R2.0	4.0	2.0	6	8	50	4	Picture 1	●
HMX-4B-R2.5	5.0	2.5	6	10	50	4	Picture 1	●
HMX-4B-R3.0	6.0	3.0	6	12	50	4	Picture 2	●
HMX-4B-R4.0	8.0	4.0	8	16	60	4	Picture 2	●
HMX-4B-R5.0	10.0	5.0	10	20	75	4	Picture 2	●
HMX-4B-R6.0	12.0	6.0	12	24	75	4	Picture 2	●
HMX-4B-R7.0	14.0	7.0	14	28	75	4	Picture 2	●
HMX-4B-R8.0	16.0	8.0	16	32	100	4	Picture 2	●
HMX-4B-R9.0	18.0	9.0	18	36	100	4	Picture 2	●
HMX-4B-R10.0	20.0	10.0	20	40	100	4	Picture 2	●

● Stock available ○ Make-to-order

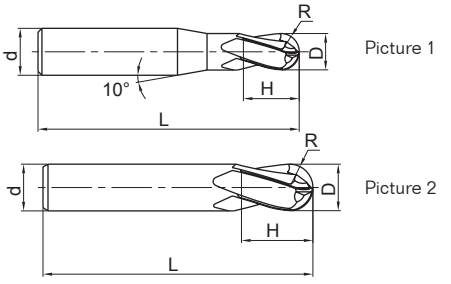
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B213
Graphics category and identification B214
Cutting parameters B420

4-flute ball nose end mills with straight and long shank

HMX-4BL



- HM-4B series with long shank.

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
HMX-4BL-R1.5	3.0	1.5	6	6	75	4	Picture 1	○
HMX-4BL-R2.0	4.0	2.0	6	8	75	4	Picture 1	○
HMX-4BL-R2.5	5.0	2.5	6	10	75	4	Picture 1	○
HMX-4BL-R3.0	6.0	3.0	6	12	75	4	Picture 2	○
HMX-4BL-R4.0	8.0	4.0	8	16	100	4	Picture 2	○
HMX-4BL-R5.0	10.0	5.0	10	20	100	4	Picture 2	○
HMX-4BL-R6.0	12.0	6.0	12	24	100	4	Picture 2	○
HMX-4BL-R7.0	14.0	7.0	14	28	100	4	Picture 2	○
HMX-4BL-R8.0	16.0	8.0	16	32	150	4	Picture 2	○
HMX-4BL-R9.0	18.0	9.0	18	36	150	4	Picture 2	○
HMX-4BL-R10.0	20.0	10.0	20	40	150	4	Picture 2	○

● Stock available ○ Make-to-order

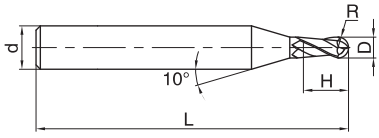
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

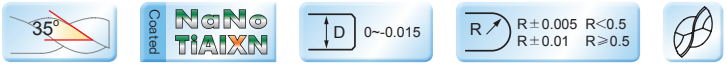
Code key B213
Graphics category and identification B214
Cutting parameters B420

2-flute tiny ball nose end mills with straight shank

HMX-2BS



● Tiny diameter end mills can fully display high speed and high precision performances of machining center, often used for machining of precision components such as electronic part etc..



Ordering number	Basic dimension(mm)					Number of teeth	Stock
	D	R	d	H	L	Z	
HMX-2BS-R0.15	0.30	0.15	4	0.5	50	2	●
HMX-2BS-R0.20	0.40	0.20	4	0.6	50	2	●
HMX-2BS-R0.25	0.50	0.25	4	0.8	50	2	●
HMX-2BS-R0.30	0.60	0.30	4	0.9	50	2	●
HMX-2BS-R0.35	0.70	0.35	4	1.0	50	2	●
HMX-2BS-R0.40	0.80	0.40	4	1.2	50	2	●
HMX-2BS-R0.45	0.90	0.45	4	1.3	50	2	●
HMX-2BS-R0.50	1.00	0.50	4	1.5	50	2	●
HMX-2BS-R0.60	1.20	0.60	4	1.8	50	2	●
HMX-2BS-R0.70	1.40	0.70	4	2.0	50	2	●
HMX-2BS-R0.75	1.50	0.75	4	2.3	50	2	●
HMX-2BS-R0.80	1.60	0.80	4	2.5	50	2	●
HMX-2BS-R0.90	1.80	0.90	4	2.7	50	2	●
HMX-2BS-R1.00	2.00	1.00	4	3.0	50	2	●
HMX-2BS-R1.25	2.50	1.25	4	3.7	50	2	●
HMX-2BS-R1.50	3.00	1.50	4	4.5	50	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

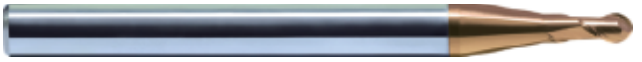
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

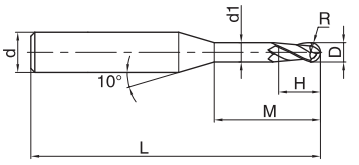
Code key B213
Graphics category and identification B214
Cutting parameters B421

2-flute ball nose end mills with straight shank, long neck and short cutting edge

Deep ball nose slot

HMX-2BP





- Applicable for machining narrow slot and free-form surface.

35° | Coated NaNo TiAlXN | D 0~-0.015 | R R±0.005 R<0.5 R±0.01 R≥0.5

Ordering number	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	H	d_1	M	d	L		
HMX-2BP-R0.25-M04	0.5	0.25	0.7	0.45	4	4	50	2	●
HMX-2BP-R0.25-M06	0.5	0.25	0.7	0.45	6	4	50	2	●
HMX-2BP-R0.3-M04	0.6	0.3	0.9	0.55	4	4	50	2	●
HMX-2BP-R0.3-M06	0.6	0.3	0.9	0.55	6	4	50	2	●
HMX-2BP-R0.3-M08	0.6	0.3	0.9	0.55	8	4	50	2	●
HMX-2BP-R0.4-M04	0.8	0.4	1.2	0.75	4	4	50	2	●
HMX-2BP-R0.4-M06	0.8	0.4	1.2	0.75	6	4	50	2	●
HMX-2BP-R0.4-M08	0.8	0.4	1.2	0.75	8	4	50	2	●
HMX-2BP-R0.4-M10	0.8	0.4	1.2	0.75	10	4	50	2	●
HMX-2BP-R0.5-M04	1.0	0.5	1.5	0.95	4	4	50	2	●
HMX-2BP-R0.5-M06	1.0	0.5	1.5	0.95	6	4	50	2	●
HMX-2BP-R0.5-M08	1.0	0.5	1.5	0.95	8	4	50	2	●
HMX-2BP-R0.5-M10	1.0	0.5	1.5	0.95	10	4	50	2	●
HMX-2BP-R0.5-M12	1.0	0.5	1.5	0.95	12	4	50	2	●
HMX-2BP-R0.6-M06	1.2	0.6	1.8	1.15	6	4	50	2	●
HMX-2BP-R0.6-M08	1.2	0.6	1.8	1.15	8	4	50	2	●
HMX-2BP-R0.6-M12	1.2	0.6	1.8	1.15	12	4	50	2	●
HMX-2BP-R0.6-M16	1.2	0.6	1.8	1.15	16	4	50	2	●
HMX-2BP-R0.75-M08	1.5	0.75	2.3	1.45	8	4	50	2	●
HMX-2BP-R0.75-M12	1.5	0.75	2.3	1.45	12	4	50	2	●
HMX-2BP-R0.75-M16	1.5	0.75	2.3	1.45	16	4	50	2	●
HMX-2BP-R1.0-M06	2.0	1.0	3.0	1.95	6	4	50	2	●
HMX-2BP-R1.0-M08	2.0	1.0	3.0	1.95	8	4	50	2	●
HMX-2BP-R1.0-M10	2.0	1.0	3.0	1.95	10	4	50	2	●
HMX-2BP-R1.0-M12	2.0	1.0	3.0	1.95	12	4	50	2	●
HMX-2BP-R1.0-M16	2.0	1.0	3.0	1.95	16	4	50	2	●
HMX-2BP-R1.0-M20	2.0	1.0	3.0	1.95	20	4	50	2	●
HMX-2BP-R1.25-M08	2.5	1.25	3.7	2.4	8	4	50	2	●
HMX-2BP-R1.25-M12	2.5	1.25	3.7	2.4	12	4	50	2	●
HMX-2BP-R1.25-M16	2.5	1.25	3.7	2.4	16	4	60	2	●
HMX-2BP-R1.25-M20	2.5	1.25	3.7	2.4	20	4	60	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

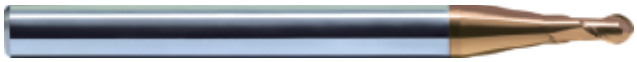
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

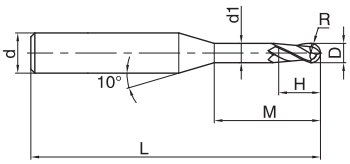
Code key B213
Graphics category and identification B214
Cutting parameters B422–B423

2-flute ball nose end mills with straight shank, long neck and short cutting edge

Deep ball nose slot

HMX-2BP





- Applicable for machining narrow slot and free-form surface

35° | Coated NaNo TiAlXN | D 0~-0.015 | R R±0.005 R<0.5 R±0.01 R≥0.5

Ordering number	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	H	d_1	M	d	L		
HMX-2BP-R1.5-M08	3.0	1.5	4.5	2.85	8	6	50	2	●
HMX-2BP-R1.5-M10	3.0	1.5	4.5	2.85	10	6	50	2	●
HMX-2BP-R1.5-M12	3.0	1.5	4.5	2.85	12	6	50	2	●
HMX-2BP-R1.5-M16	3.0	1.5	4.5	2.85	16	6	60	2	●
HMX-2BP-R1.5-M20	3.0	1.5	4.5	2.85	20	6	60	2	●
HMX-2BP-R2.0-M10	4.0	2.0	6.0	3.85	10	6	60	2	●
HMX-2BP-R2.0-M16	4.0	2.0	6.0	3.85	16	6	60	2	●
HMX-2BP-R2.0-M20	4.0	2.0	6.0	3.85	20	6	60	2	●
HMX-2BP-R2.0-M25	4.0	2.0	6.0	3.85	25	6	60	2	●
HMX-2BP-R2.5-M16	5.0	2.5	7.5	4.85	16	6	60	2	●
HMX-2BP-R2.5-M25	5.0	2.5	7.5	4.85	25	6	70	2	●

● Stock available ○ Make-to-order

Tool type：HM-2BP-R0.3-M08
Dimensions：R0.3mm
Workpiece material：S136(52HRC)
Rotating speed：30000r/min
Feed speed：200mm/min
Axial cutting depth：a_p=0.02mm
Radial cutting depth：a_e=0.04mm
Cutting style: contour machining (mould of car light)
Cooling system: air blow
Machine tool：MIKRON HSM 800

End mill	HM-2BP-R0.3-M08	Similar product of company A
Cutting time	300min	180min
Abrasion value	0.025mm	0.048mm

Abrasion condition

Applicable workpiece material table ◎Very suitable ○Suitable

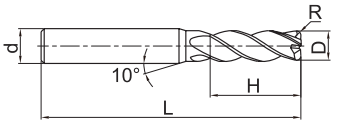
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B213 | Graphics category and identification B214 | Cutting parameters B422–B423

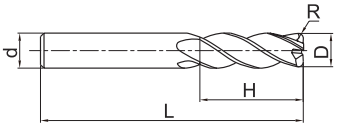
HMX series for machining high hardness steel

4-flute R end mills with straight shank

HMX-4R



Picture 1



Picture 2

- Wide applications, applicable for several machining conditions.

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
HMX-4R-D3.0R0.2	3.0	0.2	4	8	50	4	Picture 1	●
HMX-4R-D4.0R0.3	4.0	0.3	4	10	50	4	Picture 2	●
HMX-4R-D4.0R0.5	4.0	0.5	4	10	50	4	Picture 2	●
HMX-4R-D5.0R0.5	5.0	0.5	6	13	50	4	Picture 1	●
HMX-4R-D5.0R1.0	5.0	1.0	6	13	50	4	Picture 1	●
HMX-4R-D6.0R0.5	6.0	0.5	6	16	50	4	Picture 2	●
HMX-4R-D6.0R1.0	6.0	1.0	6	16	50	4	Picture 2	●
HMX-4R-D8.0R0.5	8.0	0.5	8	20	60	4	Picture 2	●
HMX-4R-D8.0R1.0	8.0	1.0	8	20	60	4	Picture 2	●
HMX-4R-D10.0R0.5	10.0	0.5	10	25	75	4	Picture 2	●
HMX-4R-D10.0R1.0	10.0	1.0	10	25	75	4	Picture 2	●
HMX-4R-D10.0R2.0	10.0	2.0	10	25	75	4	Picture 2	●
HMX-4R-D10.0R3.0	10.0	3.0	10	25	75	4	Picture 2	●
HMX-4R-D12.0R0.5	12.0	0.5	12	30	75	4	Picture 2	●
HMX-4R-D12.0R1.0	12.0	1.0	12	30	75	4	Picture 2	●
HMX-4R-D12.0R2.0	12.0	2.0	12	30	75	4	Picture 2	●
HMX-4R-D12.0R3.0	12.0	3.0	12	30	75	4	Picture 2	●

● Stock available ○ Make-to-order

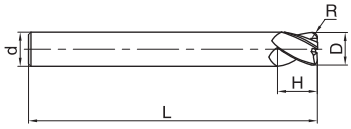
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B213
Graphics category and identification B214
Cutting parameters B424

4-flute R end mills with straight shank and short cutting edge

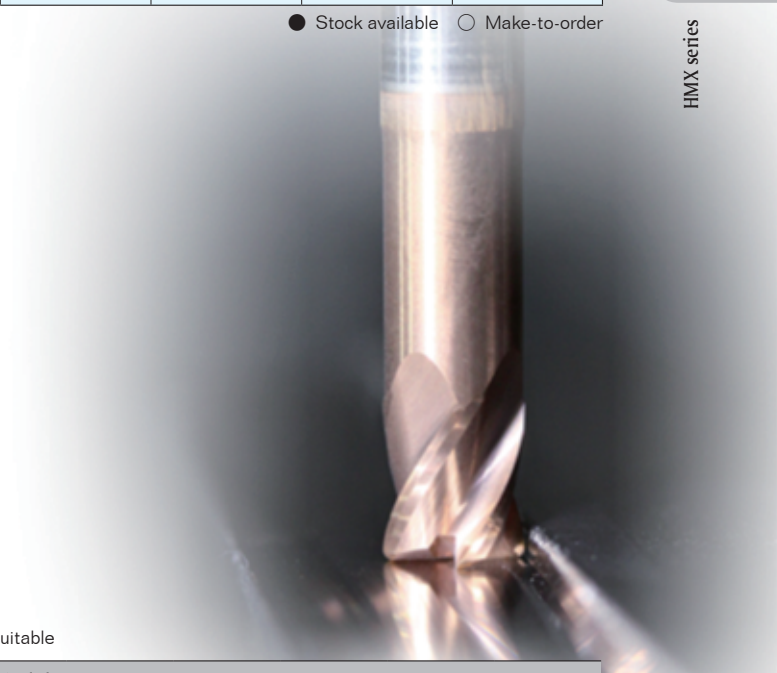
HMX-4RF



- High-rigidity short edge design, for cutting with high feed rate at high speed.

Ordering number	Basic dimension(mm)					Number of teeth Z	Stock
	D	R	d	H	L		
HMX-4RF-D6.0R0.5	6.0	0.5	6	6	50	4	●
HMX-4RF-D6.0R1.0	6.0	1.0	6	6	50	4	●
HMX-4RF-D8.0R0.5	8.0	0.5	8	8	60	4	●
HMX-4RF-D8.0R1.0	8.0	1.0	8	8	60	4	●
HMX-4RF-10.0R0.5	10.0	0.5	10	10	75	4	●
HMX-4RF-D10.0R1.0	10.0	1.0	10	10	75	4	●
HMX-4RF-D10.0R2.0	10.0	2.0	10	10	75	4	●
HMX-4RF-D12.0R0.5	12.0	0.5	12	12	75	4	●
HMX-4RF-D12.0R1.0	12.0	1.0	12	12	75	4	●
HMX-4RF-D12.0R2.0	12.0	2.0	12	12	75	4	●

● Stock available ○ Make-to-order



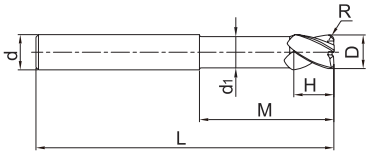
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B213
Graphics category and identification B214
Cutting parameters B424

4-flute R end mills with straight shank, long neck and short cutting edge

HMX-4RP



- Long shank and short cutting edge designed for deep cavity milling.

Ordering number	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	d	d_1	H	M	L		
HMX-4RP-D6.0R0.5	6.0	0.5	6	5.8	6	18	75	4	●
HMX-4RP-D6.0R1.0	6.0	1.0	6	5.8	6	18	75	4	●
HMX-4RP-D8.0R0.5	8.0	0.5	8	7.8	8	24	100	4	●
HMX-4RP-D8.0R1.0	8.0	1.0	8	7.8	8	24	100	4	●
HMX-4RP-10.0R0.5	10.0	0.5	10	9.6	10	30	100	4	●
HMX-4RP-10.0R1.0	10.0	1.0	10	9.6	10	30	100	4	●
HMX-4RP-10.0R2.0	10.0	2.0	10	9.6	10	30	100	4	●
HMX-4RP-12.0R0.5	12.0	0.5	12	11.5	12	36	100	4	●
HMX-4RP-12.0R1.0	12.0	1.0	12	11.5	12	36	100	4	●
HMX-4RP-12.0R2.0	12.0	2.0	12	11.5	12	36	100	4	●
HMX-4RP-D16.0R1.0	16.0	1.0	16	15.5	16	40	150	4	●
HMX-4RP-D16.0R2.0	16.0	2.0	16	15.5	16	40	150	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

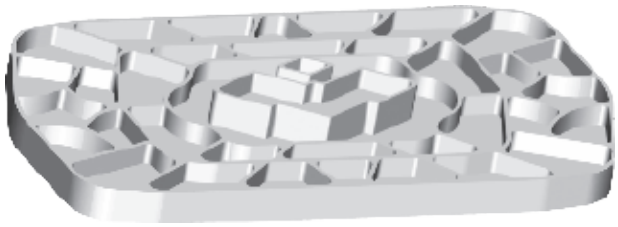
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B213
Graphics category and identification B214
Cutting parameters B424

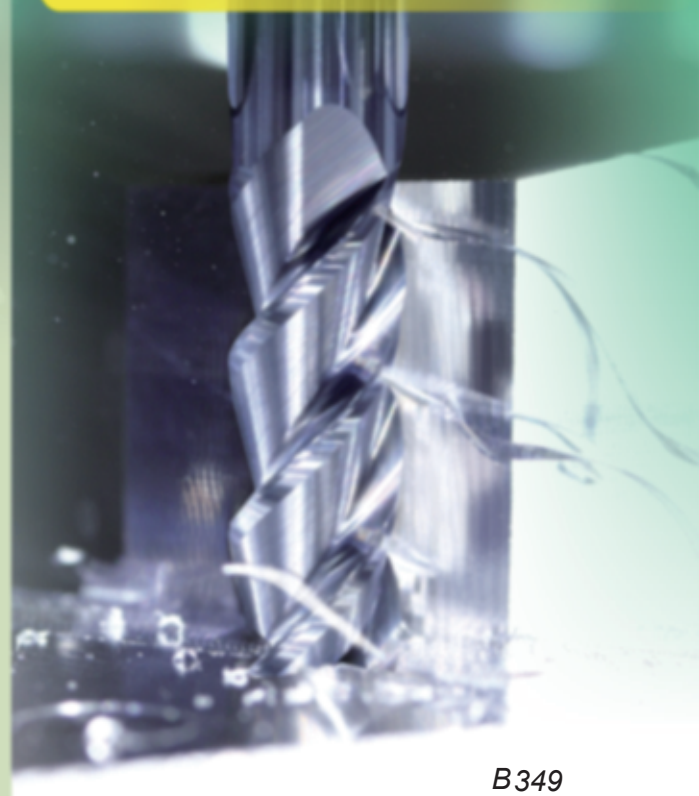
AL series end mills for Al machining

- Chip pocket with unique shape exerts excellent performances even in slot and cavity machining.
- Sharp cutting edge and large helical angle design effectively prevent built-up edge.
- Anti-vibration design of whole edge can suppress the chattering during machining and improve surface quality.

Tool type：AL-3E-D6.0
Dimensions：Ø6.0mm
Workpiece material：LC4
Rotating speed：13000r/min (250m/min)
Feed speed：1950mm/min (0.15mm/r)
Axial cutting depth：a_p=9.0mm
Radial cutting depth：a_e=1.0mm
Cutting style：Complicated cavity machining
Cooling system：air blow
Machine tool： MIKRON UCP 1000



Even the complicated machining of thin-wall cavity parts can be achieved easily.



High-efficiency rough machining of Al alloy

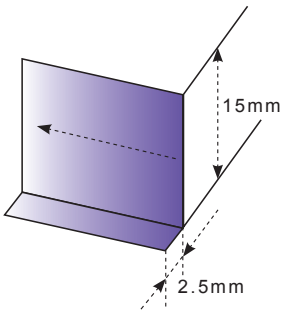
Corrugated edge endmills AL-3W

Excellent tool surface quality and good chips evacuation improve the cutting conditions and greatly extend tool life.

Unique design of corrugated edge reduces cutting forces during cutting and improves tool rigidity.

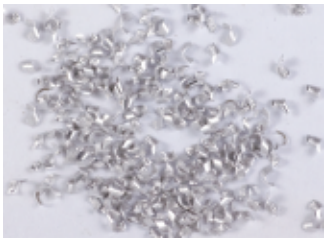
Cutting force and chips during high-efficiency roughing of AL-3W-D10.0

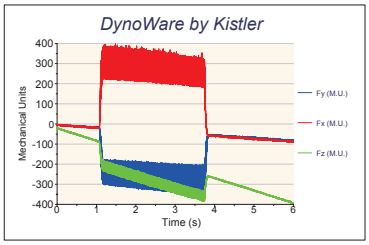
Tool type：AL-3W-D10.0
Diameter：Ø10.0mm
Workpiece material：LC4
Cutting speed：250m/min
Feed rate：9550mm/min
Amount of feed per tooth：f_z=0.12mm/z
Axial cutting depth：a_p=15mm
Radial cutting depth：a_e=2.5mm
Cutting style：Linear side milling (down milling)
Cooling system：air blow
Machine tool：MIKRON UCP1000



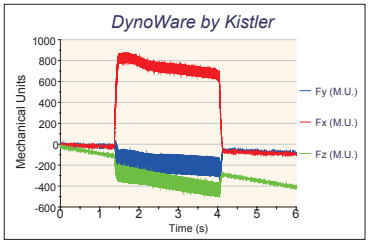
Comparison of AL-3W end mills with general end mills

AL-3W-D10.0





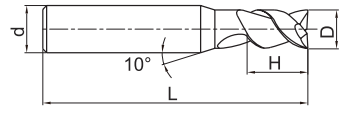
General end mills



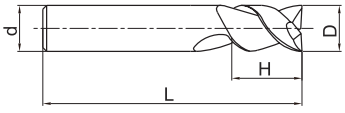
Chips shape　　Cutting force

2-flute flattened end mills with straight shank

AL-2E



Picture 1



Picture 2

- Good chip removal performance, high machining efficiency.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
AL-2E-D1.0	1.0	4	3	50	2	Picture 1	●
AL-2E-D1.5	1.5	4	4	50	2	Picture 1	●
AL-2E-D2.0	2.0	4	6	50	2	Picture 1	●
AL-2E-D2.5	2.5	4	7	50	2	Picture 1	●
AL-2E-D3.0	3.0	6	9	50	2	Picture 1	●
AL-2E-D4.0	4.0	6	12	50	2	Picture 1	●
AL-2E-D5.0	5.0	6	15	50	2	Picture 1	●
AL-2E-D6.0	6.0	6	18	60	2	Picture 2	●
AL-2E-D8.0	8.0	8	20	60	2	Picture 2	●
AL-2E-D10.0	10.0	10	30	75	2	Picture 2	●
AL-2E-D12.0	12.0	12	32	75	2	Picture 2	●
AL-2E-D16.0	16.0	16	45	100	2	Picture 2	●
AL-2E-D20.0	20.0	20	45	100	2	Picture 2	●

● Stock available ○ Make-to-order

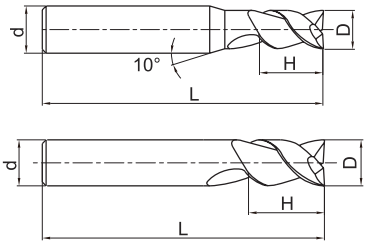
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									◎		

Code key B213
Graphics category and identification B214
Cutting parameters B425

2-flute flattened end mills with straight shank and long cutting edge

AL-2EL



- AL-2E series with long cutting edge.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
AL-2EL-D3.0	3.0	6	12	60	2	Picture 1	●
AL-2EL-D4.0	4.0	6	16	60	2	Picture 1	●
AL-2EL-D5.0	5.0	6	20	60	2	Picture 1	●
AL-2EL-D6.0	6.0	6	25	75	2	Picture 2	●
AL-2EL-D8.0	8.0	8	32	75	2	Picture 2	●
AL-2EL-D10.0	10.0	10	45	100	2	Picture 2	●
AL-2EL-D12.0	12.0	12	45	100	2	Picture 2	●
AL-2EL-D16.0	16.0	16	65	150	2	Picture 2	●
AL-2EL-D20.0	20.0	20	75	150	2	Picture 2	●

● Stock available ○ Make-to-order

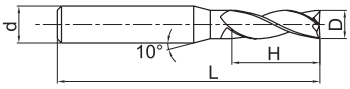
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									◎		

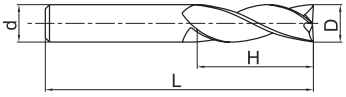
Code key B213
Graphics category and identification B214
Cutting parameters B425

3-flute flattened end mills with straight shank

AL-3E

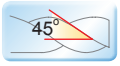


Picture 1



Picture 2

- Outstanding cutting performance with no chattering, achieving high-precision machining.



Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
AL-3E-D1.0	1.0	4	3	50	3	Picture 1	●
AL-3E-D1.5	1.5	4	4	50	3	Picture 1	●
AL-3E-D2.0	2.0	4	6	50	3	Picture 1	●
AL-3E-D2.5	2.5	4	7	50	3	Picture 1	●
AL-3E-D3.0	3.0	6	9	50	3	Picture 1	●
AL-3E-D4.0	4.0	6	12	50	3	Picture 1	●
AL-3E-D5.0	5.0	6	15	50	3	Picture 1	●
AL-3E-D6.0	6.0	6	18	60	3	Picture 2	●
AL-3E-D8.0	8.0	8	20	60	3	Picture 2	●
AL-3E-D10.0	10.0	10	30	75	3	Picture 2	●
AL-3E-D12.0	12.0	12	32	75	3	Picture 2	●
AL-3E-D16.0	16.0	16	45	100	3	Picture 2	●
AL-3E-D20.0	20.0	20	45	100	3	Picture 2	●

● Stock available ○ Make-to-order

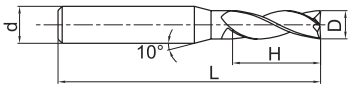
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									◎		

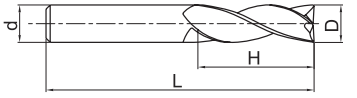
Code key B213
Graphics category and identification B214
Cutting parameters B426

3-flute flattened end mills with straight shank and long cutting edge

AL-3EL

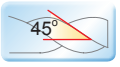


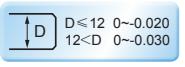
Picture 1



Picture 2

- AL-3E series with long cutting edge.





Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
AL-3EL-D3.0	3.0	6	12	60	3	Picture 1	●
AL-3EL-D4.0	4.0	6	16	60	3	Picture 1	●
AL-3EL-D5.0	5.0	6	20	60	3	Picture 1	●
AL-3EL-D6.0	6.0	6	25	75	3	Picture 2	●
AL-3EL-D8.0	8.0	8	32	75	3	Picture 2	●
AL-3EL-D10.0	10.0	10	45	100	3	Picture 2	●
AL-3EL-D12.0	12.0	12	45	100	3	Picture 2	●
AL-3EL-D16.0	16.0	16	65	150	3	Picture 2	●
AL-3EL-D20.0	20.0	20	75	150	3	Picture 2	●

● Stock available ○ Make-to-order

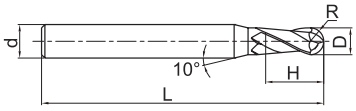
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									◎		

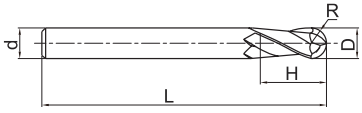
Code key B213
Graphics category and identification B214
Cutting parameters B426

2-flute ball nose end mills with straight shank

AL-2B



Picture 1



Picture 2

- For profile milling of Al alloy.

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
AL-2B-R1.0	2.0	1.0	6	4	60	2	Picture 1	●
AL-2B-R1.5	3.0	1.5	6	6	60	2	Picture 1	●
AL-2B-R2.0	4.0	2.0	6	8	60	2	Picture 1	●
AL-2B-R2.5	5.0	2.5	6	10	60	2	Picture 1	●
AL-2B-R3.0	6.0	3.0	6	12	60	2	Picture 2	●
AL-2B-R4.0	8.0	4.0	8	16	75	2	Picture 2	●
AL-2B-R5.0	10.0	5.0	10	20	75	2	Picture 2	●
AL-2B-R6.0	12.0	6.0	12	24	75	2	Picture 2	●

● Stock available ○ Make-to-order

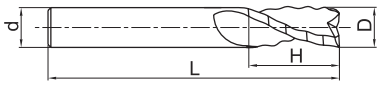
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									◎		

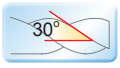
Code key B213
Graphics category and identification B214
Cutting parameters B427

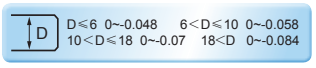
3-flute flattened end mills with straight shank and corrugated edges

AL-3W



- For rough machining of Al alloy.





Ordering number	Basic dimension(mm)				Number of teeth Z	Stock
	D	d	H	L		
AL-3W-D6.0	6.0	6	16	50	3	●
AL-3W-D8.0	8.0	8	20	60	3	●
AL-3W-D10.0	10.0	10	25	75	3	●
AL-3W-D12.0	12.0	12	30	75	3	●
AL-3W-D16.0	16.0	16	45	100	3	●
AL-3W-D20.0	20.0	20	45	100	3	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

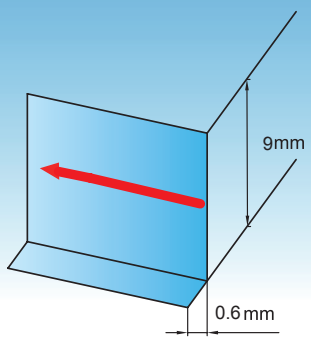
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									◎		

Code key B213
Graphics category and identification B214
Cutting parameters B428

SM series end mills for machining of hard-to-cut materials such as stainless steel, heat-resistant alloy, etc.

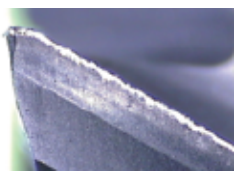
- Large helical and rake angle, sharp cutting edge, unique edge geometry can retrain cutting-heat's influence on tool nose, and greatly improve wear resistance and heat resistance.
- The coating with good heat resistance can achieve stable machining even at high temperature.
- Very suitable for machining of hard-to-cut materials such as stainless steel, Ni substrate high temperature alloy, etc.

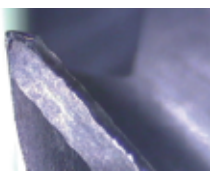
Tool type：SM-3E-D6.0
Dimensions：Ø6mm
Workpiece material：1Cr18Ni9Ti
Rotating speed：3700r/min (70m/min)
Feed speed 555mm/min(0.15mm/r)
Axial cutting depth：a_p=9mm
Radial cutting depth：a_e=0.6mm
Cutting style：side milling (down milling)
Cooling system：oil water emulsion
Machine tool： MIKRON UCP 1000



End mills	SM-3E-D6.0	Similar product of company A
Cutting length	100m	100m
Abrasion of peripheral edge	Even abrasion on cutting edge, value is 0.08 mm	Cutting edge is flaked fully, value is 0.135mm

Abrasion condition of peripheral edge

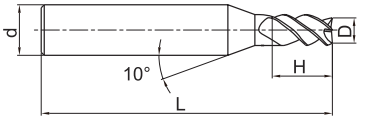




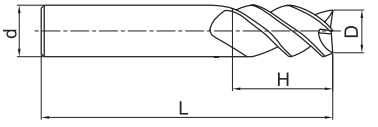
SM series for machining materials hard to cut

3-flute flattened end mills with straight shank

SM-3E



Picture 1



Picture 2

● Large helical angle, for machining of hard-to-cut materials such as Austenite stainless steel, heat-resistant alloy, etc.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
SM-3E-D3.0	3.0	6	8	50	3	Picture 1	○
SM-3E-D4.0	4.0	6	11	50	3	Picture 1	○
SM-3E-D5.0	5.0	6	13	50	3	Picture 1	○
SM-3E-D6.0	6.0	6	16	50	3	Picture 2	○
SM-3E-D7.0	7.0	8	20	60	3	Picture 1	○
SM-3E-D8.0	8.0	8	20	60	3	Picture 2	○
SM-3E-D9.0	9.0	10	22	75	3	Picture 1	○
SM-3E-D10.0	10.0	10	25	75	3	Picture 2	○
SM-3E-D11.0	11.0	12	26	75	3	Picture 1	○
SM-3E-D12.0	12.0	12	30	75	3	Picture 2	○
SM-3E-D16.0	16.0	16	45	100	3	Picture 2	○
SM-3E-D20.0	20.0	20	45	100	3	Picture 2	○

● Stock available ○ Make-to-order

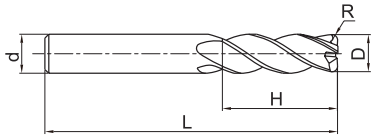
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎					◎					

Code key B213
Graphics category and identification B214
Cutting parameters B429

4-flute R end mills with straight shank

SM-4R



● Large helical angle and strong nose, for machining of hard-to-cut materials such as austenitic stainless steel, heat-resistant alloy, etc.

Ordering number	Basic dimension(mm)					Number of teeth Z	Stock
	D	R	d	H	L		
SM-4R-D6.0R0.5	6.0	0.5	6	16	50	4	○
SM-4R-D6.0R1.0	6.0	1.0	6	16	50	4	○
SM-4R-D8.0R0.5	8.0	0.5	8	20	60	4	○
SM-4R-D8.0R1.0	8.0	1.0	8	20	60	4	○
SM-4R-D10.0R0.5	10.0	0.5	10	25	75	4	○
SM-4R-D10.0R1.0	10.0	1.0	10	25	75	4	○
SM-4R-D12.0R0.5	12.0	0.5	12	30	75	4	○
SM-4R-D12.0R1.0	12.0	1.0	12	30	75	4	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎					◎					

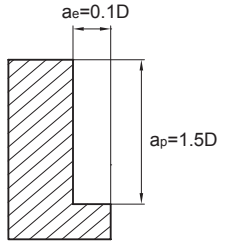
Code key B213
Graphics category and identification B214
Cutting parameters B430

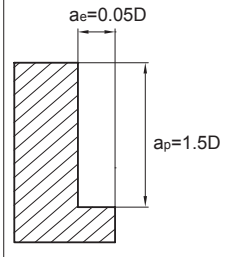
Cutting parameters for UM series end mills

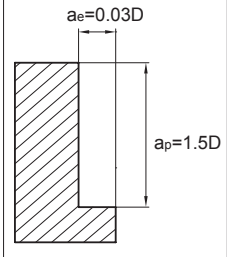
UM-4E★UM-4EL(general cutting)

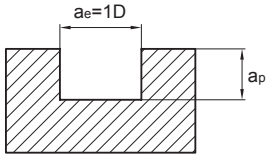
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
4	10800	1000	5500	180	8000	770	6500	605	5570	440
5	8200	1050	4500	180	6400	810	5000	635	4460	465
6	7000	1080	3700	195	5300	825	4200	645	3710	465
8	5200	1065	2800	195	4000	815	3200	665	2785	485
10	4200	1050	2200	195	3200	810	2500	630	2230	450
12	3500	1050	1850	195	2650	810	2100	630	1855	450
14	3000	975	1600	180	2300	755	1800	595	1590	430
16	2600	975	1400	170	2000	755	1600	595	1390	430
18	2300	960	1250	150	1800	745	1400	580	1240	420
20	2050	960	1100	150	1600	745	1250	580	1115	420

Maximum cutting depth







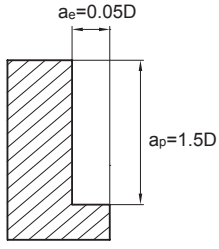
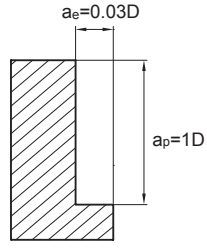


Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
4.Down milling is recommended in the case of side milling.
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6.Make overhang of tool as short as possible in conditions of non-interference.

UM-4E★UM-4EL(high speed side milling)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Cutting speed	300m/min		250 m/min		200 m/min		150 m/min		100 m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	15915	2045	13260	1700	10600	1360	7960	1020	5300	680
8	11935	2040	9950	1680	7960	1355	5970	1020	3980	680
10	9550	1990	7960	1655	6370	1330	4775	995	3180	660
12	7960	1990	6630	1655	5300	1330	3980	995	2650	660
14	6820	1850	5685	1545	4550	1235	3410	1080	2275	615
16	5970	1850	4975	1545	3980	1235	2985	1080	1990	615
18	5305	1850	4420	1545	3540	1235	2650	1080	1770	615
20	4775	1850	3980	1545	3180	1235	2390	1080	1590	615
Maximum cutting depth	 Maximum ae=1.0mm						 Maximum ae=0.5mm			

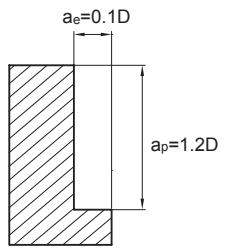
1.Please select high-precision machine and tool holder.
2.Please use air blow or MQL(minimum oil mist cooling).
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

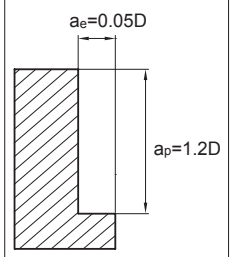
Cutting parameters for UM series end mills

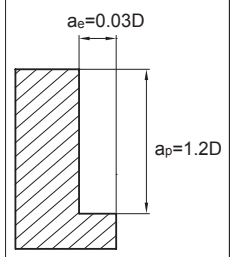
UM-4EFP(general cutting)

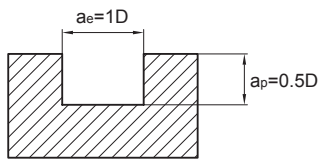
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	7000	1400	3700	250	5300	1080	4200	845	3710	610
8	5200	1385	2800	250	4000	1060	3200	865	2785	630
10	4200	1365	2200	250	3200	1050	2500	815	2230	585
12	3500	1365	1850	250	2650	1050	2100	815	1855	585
16	2600	1270	1400	220	2000	975	1600	770	1390	560
20	2050	1255	1100	195	1600	965	1250	755	1115	545

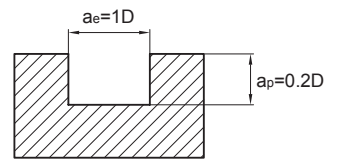
Maximum cutting depth





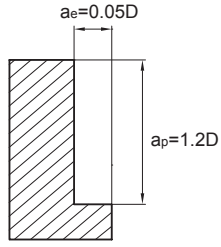
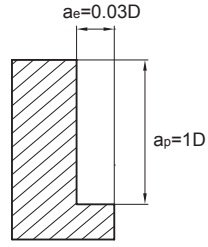






1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
4.Down milling is recommended in the case of side milling.
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6.Make overhang of tool as short as possible in conditions of non-interference.

UM-4EFP(high speed side milling)

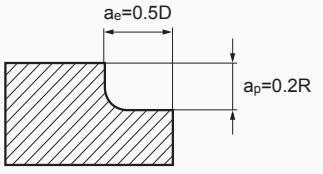
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Cutting speed	300m/min		250 m/min		200 m/min		150 m/min		100 m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	15915	2655	13260	2210	10600	1770	7960	1325	5300	885
8	11935	2650	9950	2180	7960	1760	5970	1295	3980	885
10	9550	2590	7960	2150	6370	1730	4775	1295	3180	855
12	7960	2590	6630	2150	5300	1730	3980	1400	2650	855
16	5970	2410	4975	2015	3980	1605	2985	1400	1990	800
20	4775	2410	3980	2375	3180	1605	2390	1325	1590	800
Maximum cutting depth	 Maximum ae=1.0mm						 Maximum ae=0.5mm			

1.Please select high-precision machine and tool holder.
2.Please use air blow or MQL(minimum oil mist cooling).
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

Cutting parameters for UM series end mills

UM-4R★UM-4RL(Standard)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Quenched and tempered steel ~40HRC		Quenched and tempered steel ~45HRC		Quenched and tempered steel ~50HRC		Quenched and tempered steel ~55HRC	
Diameter× Corner radius	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
4.0×R0.3 **4.0×R0.5**	7950	3960	6350	2880	5550	2520	4000	1650	2400	755
5.0×R0.5 **5.0×R1.0**	6350	4200	5100	3060	4450	2670	3200	1710	1900	690
6.0×R0.5 **6.0×R1.0**	5300	4200	4250	3060	3700	2670	2650	1710	1600	690
8.0×R0.5 **8.0×R1.0**	4550	4200	3200	3060	2800	2670	2000	1710	1200	690
10.0×R0.5 **10.0×R1.0** **10.0×R2.0** **10.0×R3.0**	3200	4200	2550	3060	2250	2670	1600	1710	955	690
12.0×R0.5 **12.0×R1.0** **12.0×R2.0** **12.0×R3.0**	2650	4200	2100	3060	1850	2670	1350	1710	795	690
16.0×R1.0 **16.0×R2.0** **16.0×R3.0**	2200	3485	1745	2540	1535	2215	1140	1420	660	570
20.0×R1.0 **20.0×R2.0** **20.0×R3.0**	1825	2895	1450	2110	1275	1840	960	1180	550	475
Maximum cutting depth	Maximum a_p=0.5mm						Maximum a_p=0.4mm		Maximum a_p=0.2mm	



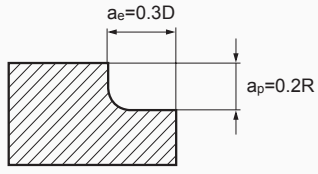
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.
6.The above cutting parameters are based on contour machining when overhang L/D≤4. Please make adjustments according to the table below when overhang is different.

Different cutting parameters under different overhang of tool:

Overhang	Cutting speed(m/min)	Axial cutting depth (mm)	Feed speed (mm/min)
L/D⩽4	100%	100%	100%
L/D=5	60%~80%	60%~80%	60%~80%
L/D=6	40%~60%	40%~60%	40%~60%

UM-4R★UM-4RL(High speed)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Quenched and tempered steel ~40HRC		Quenched and tempered steel ~45HRC		Quenched and tempered steel ~50HRC		Quenched and tempered steel ~55HRC	
Diameter× Corner radius	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
4.0×R0.3 **4.0×R0.5**	16000	7800	16000	7200	12000	5400	12000	4920	7950	2130
5.0×R0.5 **5.0×R1.0**	12500	8400	12500	7500	9550	5730	9550	5160	6350	2280
6.0×R0.5 **6.0×R1.0**	10600	8400	10600	7620	7950	5730	7950	5160	5300	2280
8.0×R0.5 **8.0×R1.0**	7950	8400	7950	7620	5950	5730	5950	5160	4000	2280
10.0×R0.5 **10.0×R1.0** **10.0×R2.0** **10.0×R3.0**	6350	8400	6350	7620	4750	5730	4750	5160	3200	2280
12.0×R0.5 **12.0×R1.0** **12.0×R2.0** **12.0×R3.0**	5300	8400	5300	7620	4000	5730	4000	5160	2650	2280
16.0×R1.0 **16.0×R2.0** **16.0×R3.0**	3980	6970	3980	6320	2985	4755	2985	4280	1990	1890
20.0×R1.0 **20.0×R2.0** **20.0×R3.0**	3185	5785	3185	5245	2385	3945	2385	3550	1590	1570
Maximum cutting depth	Maximum a_p=0.4mm						Maximum a_p=0.2mm		Maximum a_p=0.1mm	



1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.
6.The above cutting parameters are based on contour machining when overhang L/D≤4. Please make adjustments according to the table below when overhang is different.

Different cutting parameters under different overhang of tool:

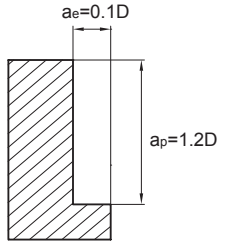
Ratio of neck length to diameter	Cutting speed(m/min)	Axial cutting depth(mm)	Feed speed (mm/min)
L/D⩽4	100%	100%	100%
L/D=5	60%~80%	60%~80%	60%~80%
L/D=6	40%~60%	40%~60%	40%~60%

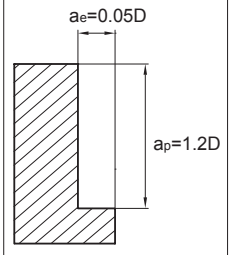
Cutting parameters for UM series end mills

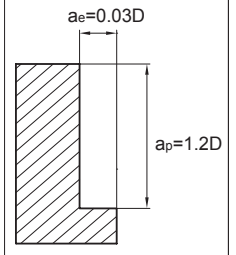
UM-4RFP

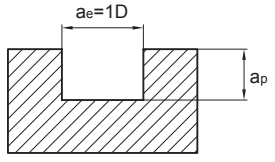
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
4	10800	1210	5500	210	8000	925	6500	720	5570	530
5	8200	1265	4500	210	6400	965	5000	765	4460	560
6	7000	1295	3700	235	5300	995	4200	780	3710	560
8	5200	1285	2800	235	4000	975	3200	790	2785	580
10	4200	1265	2200	235	3200	965	2500	750	2230	540
12	3500	1265	1850	235	2650	965	2100	750	1855	540
16	2600	1180	1400	210	2000	925	1600	705	1390	520

Maximum cutting depth









Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

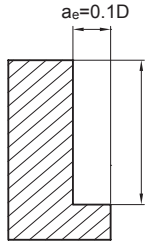
Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

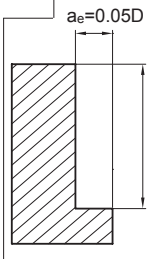
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
4.Down milling is recommended in the case of side milling.
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6.Make overhang of tool as short as possible in conditions of non-interference.

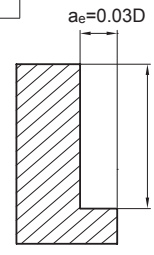
PML-2E★PM-2E★PML-2EL★PM-2EL

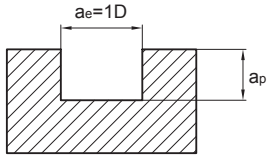
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	200	20000	60	20000	165	20000	120	20000	90
2	15000	320	11150	85	15000	285	13000	180	11140	130
3	14000	545	7500	120	10600	420	8500	330	7430	240
4	10800	560	5500	135	8000	425	6500	335	5570	245
5	8200	585	4500	135	6400	445	5000	355	4460	260
6	7000	600	3700	140	5300	465	4200	360	3710	260
8	5200	595	2800	140	4000	455	3200	365	2785	270
10	4200	585	2200	140	3200	445	2500	350	2230	250
12	3500	585	1850	140	2650	445	2100	350	1855	250
14	3000	545	1600	135	2300	420	1800	330	1590	240
16	2600	545	1400	120	2000	420	1600	330	1390	240
18	2300	535	1250	120	1800	415	1400	325	1240	235
20	2050	535	1100	120	1600	415	1250	325	1115	235

Maximum cutting depth









Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

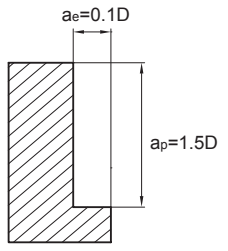
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
4.Down milling is recommended in the case of side milling.
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6.Make overhang of tool as short as possible in conditions of non-interference.

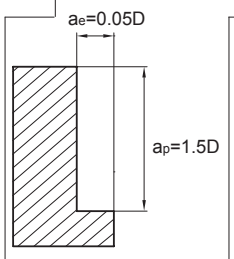
Cutting parameters for PML/PM series end mills

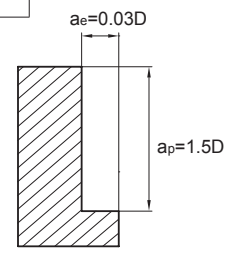
PML-2F★PM-2F★PML-2FL★PM-2FL

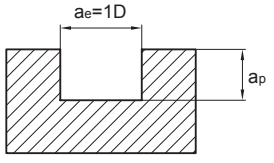
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	140	20000	45	20000	115	20000	85	20000	65
2	15000	225	11150	60	15000	200	13000	125	11140	90
3	14000	385	7500	85	10600	295	8500	230	7430	170
4	10800	390	5500	95	8000	300	6500	235	5570	170
5	8200	410	4500	95	6400	315	5000	245	4460	180
6	7000	420	3700	95	5300	325	4200	255	3710	180
8	5200	415	2800	95	4000	320	3200	255	2785	190
10	4200	410	2200	95	3200	315	2500	240	2230	175
12	3500	410	1850	95	2650	315	2100	240	1855	175
14	3000	385	1600	95	2300	295	1800	230	1590	170
16	2600	385	1400	85	2000	295	1600	230	1390	170
18	2300	375	1250	85	1800	290	1400	230	1240	165
20	2050	375	1100	85	1600	290	1250	230	1115	165

Maximum cutting depth









Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

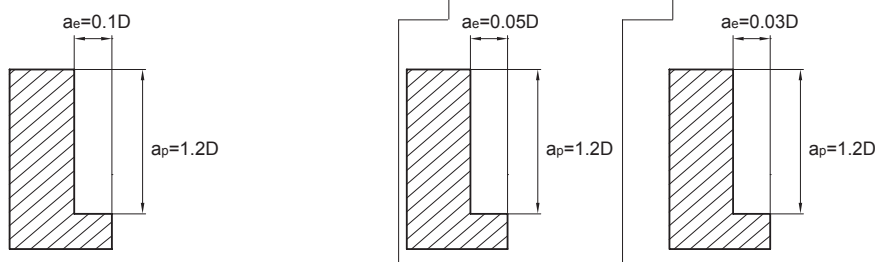
Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

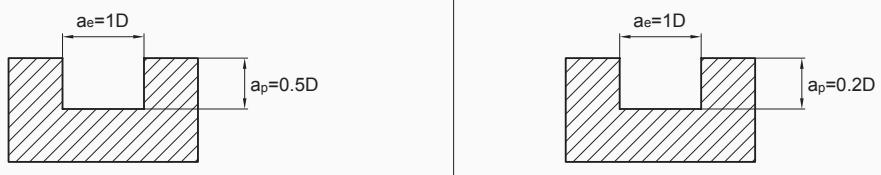
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
4.Down milling is recommended in the case of side milling.
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6.Make overhang of tool as short as possible in conditions of non-interference.

PML-2EFP★PM-2EFP

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	7000	780	3700	180	5300	600	4200	470	3710	340
8	5200	775	2800	180	4000	595	3200	475	2785	350
10	4200	755	2200	180	3200	575	2500	455	2230	325
12	3500	755	1850	180	2650	575	2100	455	1855	325
16	2600	710	1400	155	2000	545	1600	425	1390	310
20	2050	700	1100	155	1600	540	1250	420	1115	305

Maximum cutting depth





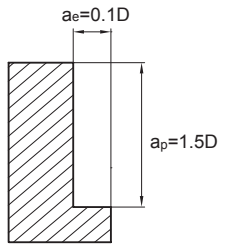
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
4.Down milling is recommended in the case of side milling.
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6.Make overhang of tool as short as possible in conditions of non-interference.

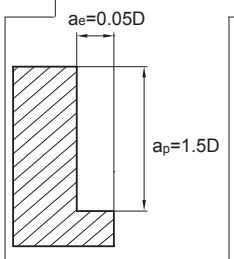
Cutting parameters for PML/PM series end mills

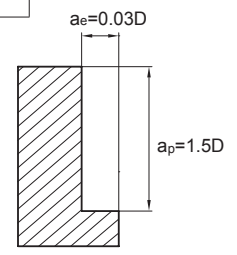
PML-3E-H★PM-3E-H★PML-3EL-H★PM-3EL-H

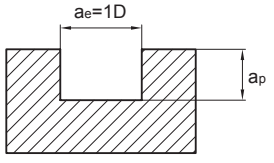
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	200	20000	75	20000	160	20000	100	20000	90
2	15000	325	11150	80	15000	285	13000	150	11140	130
3	14000	550	7500	100	10600	425	8500	280	7430	245
4	10800	565	5500	105	8000	430	6500	285	5570	250
5	8200	600	4500	105	6400	455	5000	300	4460	260
6	7000	605	3700	110	5300	465	4200	305	3710	260
8	5200	600	2800	110	4000	460	3200	310	2785	275
10	4200	600	2200	110	3200	455	2500	290	2230	255
12	3500	600	1850	110	2650	455	2100	290	1855	255
14	3000	550	1600	105	2300	425	1800	280	1590	245
16	2600	550	1400	100	2000	425	1600	280	1390	245
18	2300	540	1250	85	1800	415	1400	275	1240	240
20	2050	540	1100	85	1600	415	1250	275	1115	240

Maximum cutting depth









Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

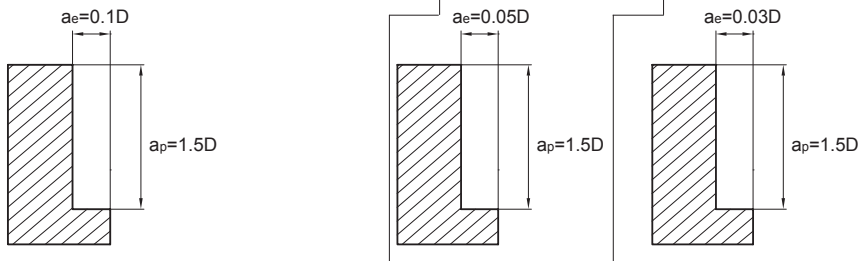
Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

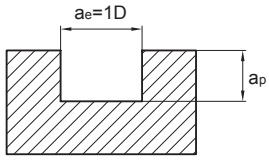
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
4.Down milling is recommended in the case of side milling.
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6.Make overhang of tool as short as possible in conditions of non-interference.

PML-4E-G★PM-4E-G★PML-4EL-G★PM-4EL-G
PML-4E-H★PM-4E-H★PML-4EL-H★PM-4EL-H(general cutting)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	270	20000	95	20000	215	20000	135	20000	120
2	15000	435	11150	110	15000	380	13000	200	11140	175
3	14000	735	7500	135	10600	565	8500	370	7430	325
4	10800	755	5500	140	8000	575	6500	380	5570	335
5	8200	795	4500	140	6400	605	5000	400	4460	350
6	7000	810	3700	145	5300	620	4200	405	3710	350
8	5200	800	2800	145	4000	615	3200	415	2785	365
10	4200	795	2200	145	3200	605	2500	390	2230	340
12	3500	795	1850	145	2650	605	2100	390	1855	340
14	3000	735	1600	140	2300	565	1800	370	1590	325
16	2600	735	1400	135	2000	565	1600	370	1390	325
18	2300	720	1250	115	1800	555	1400	365	1240	315
20	2050	720	1100	115	1600	555	1250	365	1115	315

Maximum cutting depth





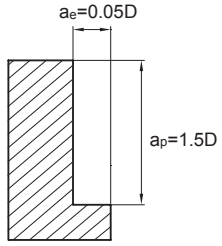
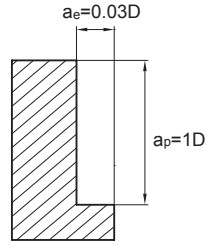
Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

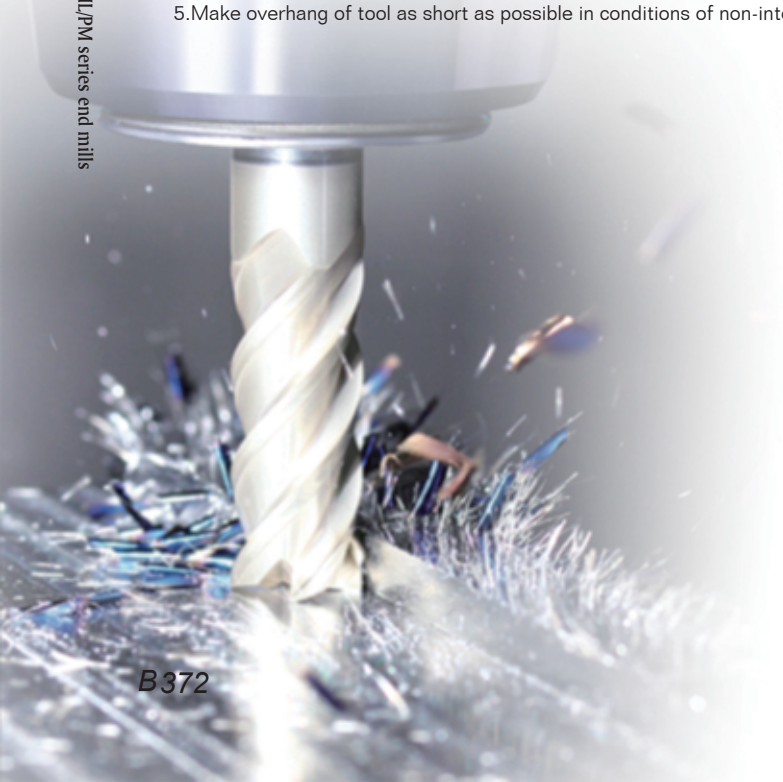
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
4.Down milling is recommended in the case of side milling.
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6.Make overhang of tool as short as possible in conditions of non-interference.

Cutting parameters for PML/PM series end mills

PML-4E-G★PM-4E-G★PML-4EL-G★PM-4EL-G★PML-4E-H PM-4E-H★PML-4EL-H★PM-4EL-H(high speed side milling)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Cutting speed	300m/min		250 m/min		200 m/min		150 m/min		100 m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	15915	1535	13260	1280	10600	1020	7960	765	5300	515
8	11935	1530	9950	1260	7960	1020	5970	765	3980	515
10	9550	1450	7960	1245	6370	1000	4775	750	3180	495
12	7960	1450	6630	1245	5300	1000	3980	750	2650	495
14	6820	1390	5685	1160	4550	930	3410	810	2275	465
16	5970	1390	4975	1160	3980	930	2985	810	1990	465
18	5305	1390	4420	1160	3540	930	2650	810	1770	465
20	4775	1390	3980	1160	3180	930	2390	810	1590	465
Maximum cutting depth	 Maximum ae=1.0mm						 Maximum ae=0.5mm			

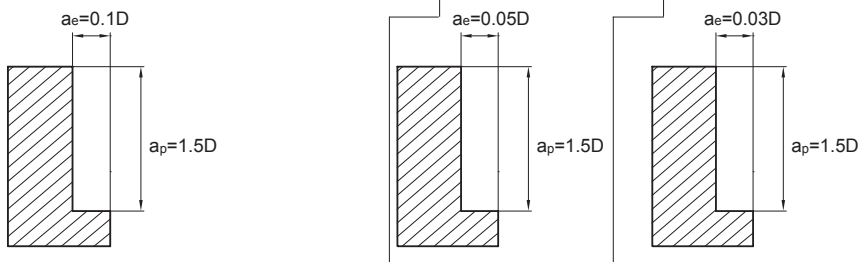
1.Please select high-precision machine and tool holder.
2.Please use air blow or MQL(minimum oil mist cooling).
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

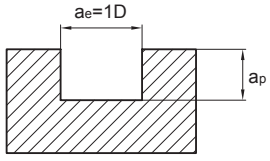


PML-4F-G★PM-4F-G★PML-4FL-G★PM-4FL-G(general cutting)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	190	20000	70	20000	150	20000	95	20000	85
2	15000	305	11150	80	15000	265	13000	140	11140	125
3	14000	515	7500	95	10600	395	8500	260	7430	230
4	10800	530	5500	100	8000	4055	6500	265	5570	235
5	8200	555	4500	100	6400	425	5000	280	4460	245
6	7000	570	3700	100	5300	435	4200	283	3710	245
8	5200	560	2800	100	4000	430	3200	290	2785	255
10	4200	555	2200	100	3200	425	2500	275	2230	240
12	3500	555	1850	100	2650	425	2100	275	1855	240
14	3000	515	1600	100	2300	395	1800	260	1590	230
16	2600	515	1400	95	2000	395	1600	260	1390	230
18	2300	505	1250	80	1800	390	1400	255	1240	220
20	2050	505	1100	80	1600	390	1250	255	1115	220

Maximum cutting depth





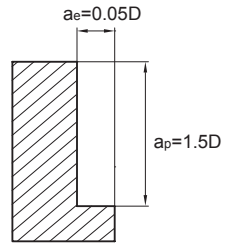
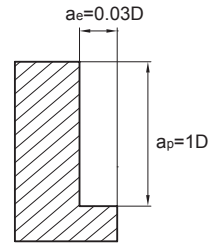
Diameter range	Cutting depth a_p
Ø1≤D<Ø3	0.15D
Ø3≤D<Ø6	0.3D
Ø6≤D<Ø20	0.5D

Diameter range	Cutting depth a_p
Ø1≤D<Ø3	0.1D
Ø3≤D	0.2D

1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
4.Down milling is recommended in the case of side milling.
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6.Make overhang of tool as short as possible in conditions of non-interference.

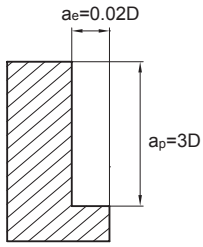
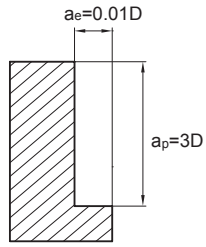
Cutting parameters for PML/PM series end mills

PML-4F-G★PM-4F-G★PML-4FL-G★PM-4FL-G(high speed side milling)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Cutting speed	300m/min		250 m/min		200 m/min		150 m/min		100 m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	15915	1075	13260	900	10600	715	7960	535	5300	360
8	11935	1070	9950	885	7960	715	5970	535	3980	360
10	9550	1015	7960	870	6370	700	4775	525	3180	345
12	7960	1015	6630	870	5300	700	3980	525	2650	345
14	6820	975	5685	815	4550	650	3410	570	2275	325
16	5970	975	4975	815	3980	650	2985	570	1990	325
18	5305	975	4420	815	3540	650	2650	570	1770	325
20	4775	975	3980	815	3180	650	2390	570	1590	325
Maximum cutting depth	 Maximum ae=1.0mm						 Maximum ae=0.5mm			

1.Please select high-precision machine and tool holder.
2.Please use air blow or MQL(minimum oil mist cooling).
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

PML-4EX-G★PM-4EX-G

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	5800	570	2650	85	4250	410	3600	345	3180	305
8	4400	570	2000	85	3180	410	2700	350	2390	310
10	3500	555	1600	85	2550	400	2150	340	1910	300
12	2900	555	1350	85	2120	400	1800	340	1590	300
16	2200	520	1000	80	1590	380	1350	315	1195	280
20	1750	510	800	75	1270	375	1050	310	955	280
Maximum cutting depth										

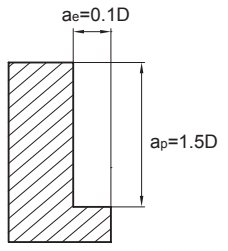
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

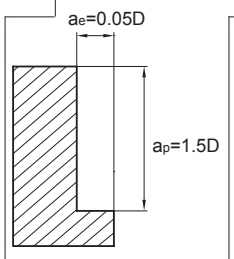
Cutting parameters for PML/PM series end mills

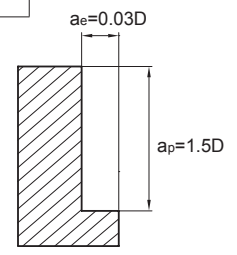
PML-4E★PM-4E★PML-4EL★PM-4EL(general cutting)

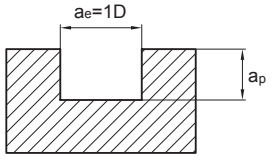
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	300	20000	108	20000	240	20000	180	20000	135
2	15000	480	11150	120	15000	420	13000	270	11140	195
3	14000	815	7500	145	10600	630	8500	495	7430	360
4	10800	840	5500	150	8000	645	6500	505	5570	370
5	8200	875	4500	150	6400	675	5000	530	4460	390
6	7000	900	3700	165	5300	690	4200	540	3710	390
8	5200	890	2800	165	4000	680	3200	555	2785	405
10	4200	875	2200	165	3200	675	2500	525	2230	375
12	3500	875	1850	165	2650	675	2100	525	1855	375
14	3000	815	1600	150	2300	630	1800	495	1590	360
16	2600	815	1400	145	2000	630	1600	495	1390	360
18	2300	805	1250	125	1800	620	1400	485	1240	350
20	2050	805	1100	125	1600	620	1250	485	1115	350

Maximum cutting depth







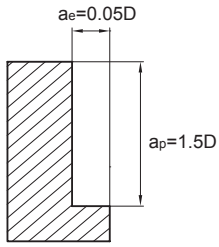
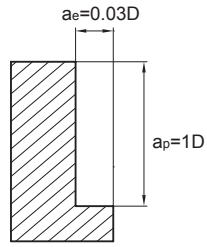


Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
4.Down milling is recommended in the case of side milling.
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6.Make overhang of tool as short as possible in conditions of non-interference.

PML-4E★PM-4E★PML-4EL★PM-4EL(high speed side milling)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Cutting speed	300m/min		250 m/min		200 m/min		150 m/min		100 m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	15915	1705	13260	1420	10600	1135	7960	850	5300	570
8	11935	1700	9950	1400	7960	1130	5970	850	3980	570
10	9550	1660	7960	1380	6370	1110	4775	830	3180	550
12	7960	1660	6630	1380	5300	1110	3980	830	2650	550
14	6820	1545	5685	1290	4550	1030	3410	900	2275	515
16	5970	1545	4975	1290	3980	1030	2985	900	1990	515
18	5305	1545	4420	1290	3540	1030	2650	900	1770	515
20	4775	1545	3980	1290	3180	1030	2390	900	1590	515
Maximum cutting depth	 Maximum ae=1.0mm						 Maximum ae=0.5mm			

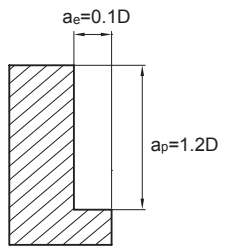
1.Please select high-precision machine and tool holder.
2.Please use air blow or MQL(minimum oil mist cooling).
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

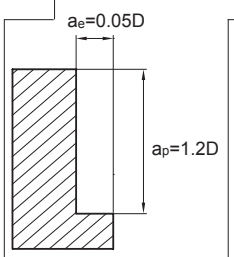
Cutting parameters for PML/PM series end mills

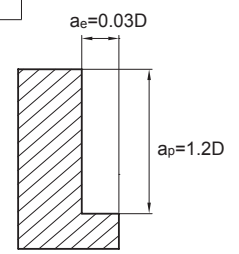
PML-4EFP★PM-4EFP(general cutting)

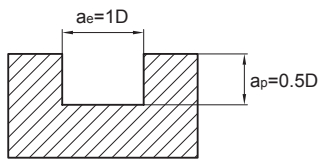
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	7000	1170	3700	210	5300	900	4200	705	3710	510
8	5200	1155	2800	210	4000	885	3200	720	2785	525
10	4200	1140	2200	210	3200	875	2500	680	2230	490
12	3500	1140	1850	210	2650	875	2100	680	1855	490
16	2600	1065	1400	185	2000	815	1600	645	1390	470
20	2050	1045	1100	165	1600	805	1250	630	1115	455

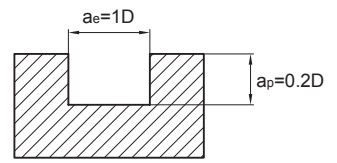
Maximum cutting depth





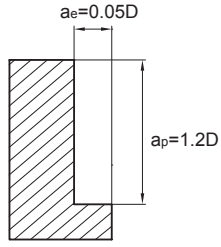
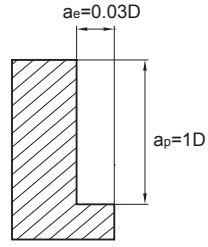






1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
4.Down milling is recommended in the case of side milling.
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6.Make overhang of tool as short as possible in conditions of non-interference.

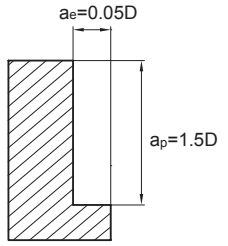
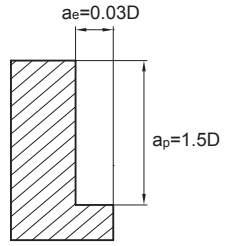
PML-4EFP★PM-4EFP(high speed side milling)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Cutting speed	300m/min		250 m/min		200 m/min		150 m/min		100 m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	15915	2215	13260	1845	10600	1475	7960	1105	5300	740
8	11935	2210	9950	1820	7960	1470	5970	1080	3980	740
10	9550	2160	7960	1795	6370	1445	4775	1080	3180	715
12	7960	2160	6630	1795	5300	1445	3980	1170	2650	715
16	5970	2010	4975	1680	3980	1340	2985	1170	1990	670
20	4775	2010	3980	1980	3180	1340	2390	1105	1590	670
Maximum cutting depth	 Maximum ae=1.0mm						 Maximum ae=0.5mm			

1.Please select high-precision machine and tool holder.
2.Please use air blow or MQL(minimum oil mist cooling).
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

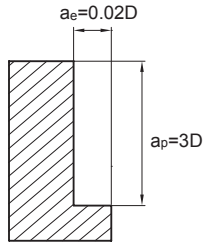
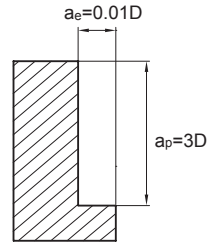
Cutting parameters for PML/PM series end mills

PML-6E★PM-6E

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	7000	1070	3700	195	5300	815	4200	650	3710	470
8	5200	1070	2800	195	4000	815	3200	660	2785	485
10	4200	1035	2200	195	3200	800	2500	630	2230	450
12	3500	1035	1850	195	2650	800	2100	630	1855	450
16	2600	975	1400	180	2000	750	1600	590	1390	435
20	2050	960	1100	150	1600	740	1250	580	1115	420
Maximum cutting depth	 Maximum ae=1.0mm						 Maximum ae=0.5mm			

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

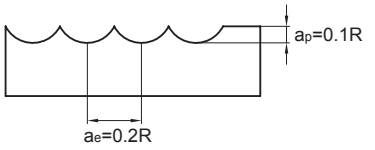
PML-6EL★PM-6EL

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	5800	900	2650	140	4250	655	3600	555	3180	490
8	4400	900	2000	140	3180	655	2700	560	2390	495
10	3500	875	1600	140	2550	635	2150	530	1910	470
12	2900	875	1350	140	2120	635	1800	530	1590	470
16	2200	825	1000	125	1590	600	1350	500	1195	445
20	1750	810	800	110	1270	590	1050	495	955	440
Maximum cutting depth										

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

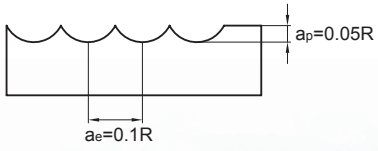
Cutting parameters for PML/PM series end mills

PML-2B★PM-2B★PML-2BL★PM-2BL PML-2BFP★PM-2BFP(general cutting)

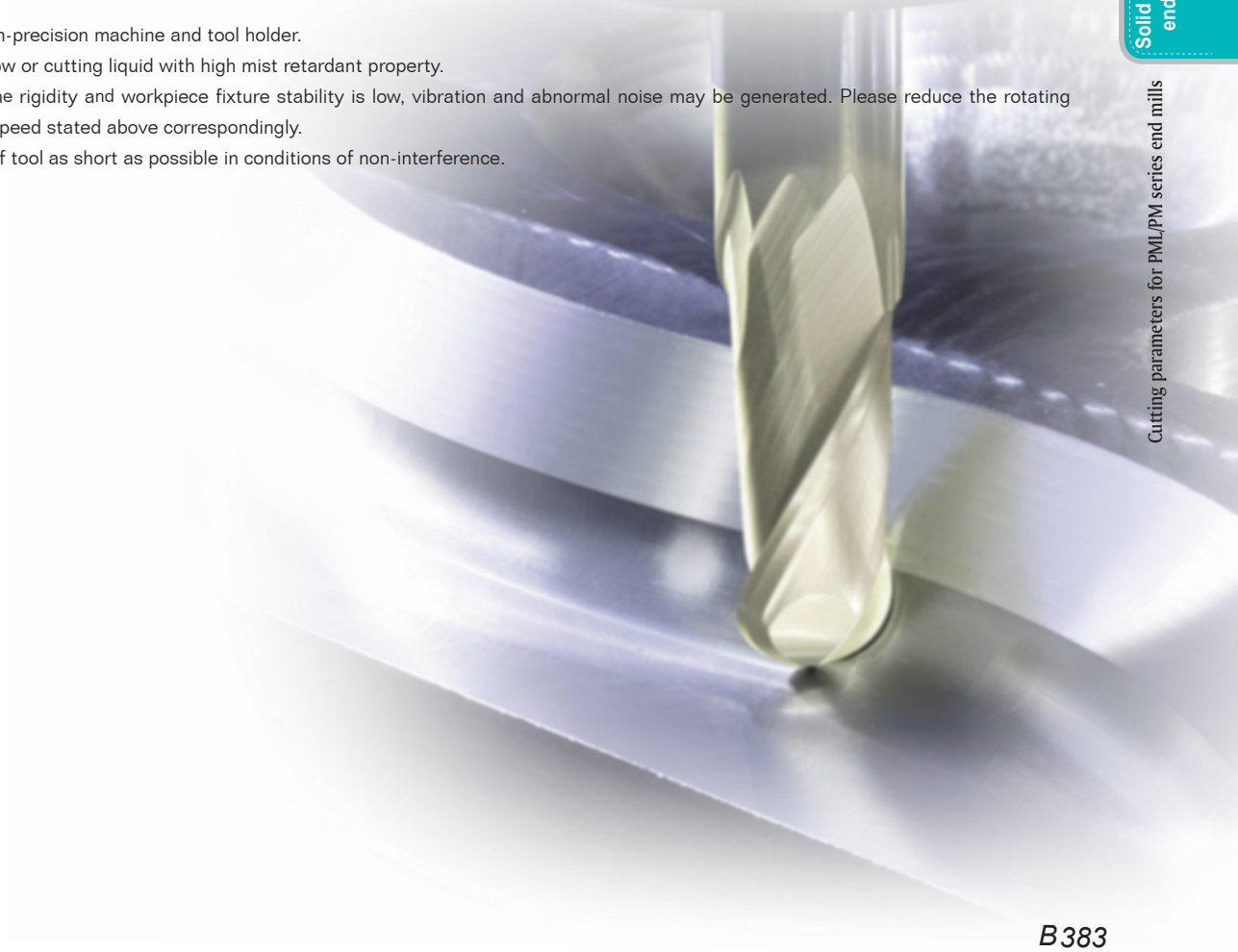
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
R0.5	40000	960	22300	240	32000	385	25000	330	22280	295
R1.0	24000	1080	11150	275	16000	480	13000	330	11140	295
R1.5	15500	1150	7400	350	10600	545	8500	335	7430	295
R2.0	11500	1150	5550	445	8000	665	6500	450	5570	385
R2.5	9500	1270	4450	445	6400	665	5000	455	4455	405
R3.0	8000	1270	3700	470	5300	700	4200	470	3715	420
R4.0	6000	1575	2750	550	4000	850	3200	535	2785	465
R5.0	4800	1455	2200	520	3200	785	2500	535	2230	465
R6.0	4000	1330	1850	520	2650	740	2100	505	1855	450
R8.0	3000	1270	1350	455	2000	725	1600	455	1395	395
R10.0	2400	1150	1100	445	1600	675	1250	400	1115	360
Maximum cutting depth										

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
4.Make overhang of tool as short as possible in conditions of non-interference.

PML-2B★PM-2B★PML-2BL★PM-2BL PML-2BFP★PM-2BFP(high speed cutting)

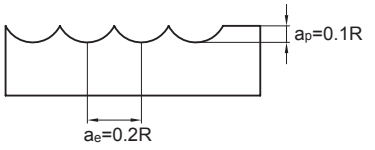
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~400HRC		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
R3.0	15000	4800	11500	2750	9500	2250	7960	1885	6370	1510
R4.0	11500	3650	8950	2100	7150	1700	5970	1420	4775	1135
R5.0	9500	3000	7150	1700	5700	1350	4775	1130	3820	905
R6.0	7950	2500	5950	1400	4750	1100	3980	920	3180	735
R8.0	5950	1900	4450	1050	3550	850	2985	760	2390	610
R10.0	4750	1500	3550	850	2850	680	2390	570	1910	455
Maximum cutting depth										

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
4.Make overhang of tool as short as possible in conditions of non-interference.



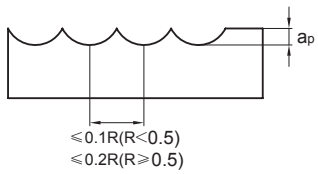
Cutting parameters for PML/PM series end mills

PML-4B★PM-4B★PML-4BL★PM-4BL

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
R1.5	15500	2055	7400	625	10600	975	8500	600	7430	525
R2.0	11500	2055	5550	795	8000	1190	6500	800	5570	685
R2.5	9500	2270	4450	795	6400	1190	5000	810	4455	720
R3.0	8000	2270	3700	840	5300	1245	4200	840	3715	745
R4.0	6000	2810	2750	985	4000	1515	3200	950	2785	825
R5.0	4800	2595	2200	925	3200	1405	2500	950	2230	825
R6.0	4000	2375	1850	925	2650	1320	2100	905	1855	800
R8.0	3000	2270	1350	815	2000	1295	1600	810	1395	705
R10.0	2400	2055	1100	795	1600	1200	1250	715	1115	640
Maximum cutting depth										

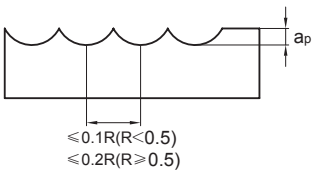
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
4.Make overhang of tool as short as possible in conditions of non-interference.

PM-2BC

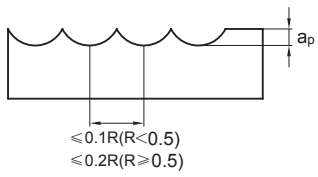
Workpiece material			Pre-hardened steel, quenched and tempered steel ~40HRC			Pre-hardened steel, quenched and tempered steel ~50HRC			Hardened steel ~55HRC		
Diameter (mm)	Taper half angle (°)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)
R0.25	0.5°	3	30000	300	0.03	30000	270	0.03	30000	240	0.03
		5	30000	250	0.02	30000	225	0.02	30000	200	0.02
	1.0°	3	30000	330	0.03	30000	300	0.03	30000	265	0.03
		5	30000	270	0.02	30000	245	0.02	30000	215	0.02
	1.5°	3	30000	350	0.03	30000	315	0.03	30000	280	0.03
		5	30000	300	0.02	30000	270	0.02	30000	240	0.02
R0.30	0.5°	5	30000	300	0.03	30000	270	0.03	30000	240	0.03
		8	30000	250	0.02	30000	225	0.02	30000	200	0.02
	1.0°	5	30000	350	0.03	30000	315	0.03	30000	280	0.03
		8	30000	300	0.02	30000	270	0.02	30000	240	0.02
		10	30000	270	0.02	30000	245	0.02	30000	215	0.02
		12	30000	250	0.015	30000	225	0.015	30000	200	0.015
		15	30000	250	0.01	30000	225	0.01	30000	200	0.01
	1.5°	8	30000	350	0.03	30000	315	0.03	30000	280	0.03
		15	30000	300	0.01	30000	270	0.01	30000	240	0.01
R0.40	0.5°	8	30000	350	0.05	30000	315	0.05	30000	280	0.05
		12	30000	300	0.04	30000	270	0.04	30000	240	0.04
	1.0°	8	30000	400	0.05	30000	360	0.05	30000	320	0.05
		12	30000	350	0.04	30000	315	0.04	30000	280	0.04
	1.5°	8	30000	450	0.05	30000	405	0.05	30000	360	0.05
		12	30000	400	0.04	30000	360	0.04	30000	320	0.04
R0.50	0.5°	10	22000	450	0.05	22000	405	0.05	22000	360	0.05
		15	22000	400	0.04	22000	360	0.04	22000	320	0.04
		20	22000	370	0.03	22000	335	0.03	22000	295	0.03
		25	22000	350	0.01	22000	315	0.01	22000	280	0.01
		30	22000	320	0.005	22000	290	0.005	22000	255	0.005
	1.0°	10	22000	500	0.05	22000	450	0.05	22000	400	0.05
		15	22000	450	0.04	22000	405	0.04	22000	360	0.04
		20	22000	430	0.02	22000	390	0.02	22000	345	0.02
		25	22000	400	0.015	22000	360	0.015	22000	320	0.015
		30	22000	360	0.01	22000	325	0.01	22000	290	0.01
		35	22000	320	0.005	22000	290	0.005	22000	255	0.005
Maximum cutting depth											

Cutting parameters for PML/PM series end mills

PM-2BC

Workpiece material			Pre-hardened steel, quenched and tempered steel ~40HRC			Pre-hardened steel, quenched and tempered steel ~50HRC			Hardened steel ~55HRC		
Diameter (mm)	Taper half angle (°)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)
R0.50	1.5°	10	22000	530	0.05	22000	475	0.05	22000	425	0.05
		15	22000	500	0.04	22000	450	0.04	22000	400	0.04
		20	22000	460	0.02	22000	415	0.02	22000	370	0.02
	2°	15	22000	600	0.04	22000	540	0.04	22000	480	0.04
		20	22000	500	0.02	22000	450	0.02	22000	400	0.02
	3°	20	22000	550	0.03	22000	495	0.03	22000	440	0.03
	5°	20	22000	600	0.03	22000	540	0.03	22000	480	0.03
R0.60	0.5°	12	22000	500	0.05	22000	450	0.05	22000	400	0.05
		24	22000	400	0.02	22000	360	0.02	22000	320	0.02
	1.0°	12	22000	550	0.05	22000	495	0.05	22000	440	0.05
		24	22000	450	0.02	22000	405	0.02	22000	360	0.02
	1.5°	12	22000	600	0.05	22000	540	0.05	22000	480	0.05
		24	22000	550	0.02	22000	495	0.02	22000	440	0.02
R0.75	0.5°	10	20000	600	0.1	20000	540	0.1	20000	480	0.1
		15	20000	550	0.08	20000	495	0.08	20000	440	0.08
		30	20000	500	0.02	20000	450	0.02	20000	400	0.02
	1.0°	10	20000	650	0.1	20000	585	0.1	20000	520	0.1
		15	20000	600	0.08	20000	540	0.08	20000	480	0.08
		20	20000	550	0.05	20000	495	0.05	20000	440	0.05
		30	20000	530	0.02	20000	480	0.02	20000	425	0.02
	1.5°	10	20000	700	0.1	20000	630	0.1	20000	560	0.1
		15	20000	650	0.08	20000	585	0.08	20000	520	0.08
		30	20000	600	0.02	20000	540	0.02	20000	480	0.02
R1.0	0.5°	20	18000	800	0.05	18000	720	0.05	18000	640	0.05
		30	18000	650	0.03	18000	585	0.03	18000	520	0.03
		40	18000	500	0.02	18000	450	0.02	18000	400	0.02
	1.0°	20	18000	900	0.05	18000	810	0.05	18000	720	0.05
		25	18000	850	0.04	18000	765	0.04	18000	680	0.04
		30	18000	800	0.03	18000	720	0.03	18000	640	0.03
		35	18000	750	0.03	18000	675	0.03	18000	600	0.03
		40	18000	600	0.02	18000	540	0.02	18000	480	0.02
		50	18000	550	0.02	18000	495	0.02	18000	440	0.02
Maximum cutting depth											

PM-2BC

Workpiece material			Pre-hardened steel, quenched and tempered steel ~40HRC			Pre-hardened steel, quenched and tempered steel ~50HRC			Hardened steel ~55HRC		
Diameter (mm)	Taper half angle (°)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)
R1.0	1.5°	20	18000	1000	0.05	18000	900	0.05	18000	800	0.05
		30	18000	900	0.03	18000	810	0.03	18000	720	0.03
		40	18000	750	0.03	18000	675	0.03	18000	600	0.03
	2°	30	18000	900	0.04	18000	810	0.04	18000	720	0.04
		40	18000	850	0.03	18000	765	0.03	18000	680	0.03
	3°	30	18000	1000	0.04	18000	900	0.04	18000	800	0.04
		40	18000	900	0.03	18000	810	0.03	18000	720	0.03
R1.5	0.5°	30	16000	1100	0.1	16000	990	0.1	16000	880	0.1
		40	16000	950	0.06	16000	855	0.06	16000	760	0.06
		50	16000	800	0.03	16000	720	0.03	16000	640	0.03
	1.0°	30	16000	1200	0.1	16000	1080	0.1	16000	960	0.1
		40	16000	1000	0.06	16000	900	0.06	16000	800	0.06
		50	16000	850	0.03	16000	765	0.03	16000	680	0.03
R1.5	1.5°	30	16000	1300	0.1	16000	1170	0.1	16000	1040	0.1
		40	16000	1100	0.06	16000	990	0.06	16000	880	0.06
		50	16000	950	0.03	16000	855	0.03	16000	760	0.03
R2.0	0.5°	60	14000	1100	0.1	14000	990	0.1	14000	880	0.1
	1.0°	60	14000	1100	0.1	14000	990	0.1	14000	880	0.1
Maximum cutting depth											

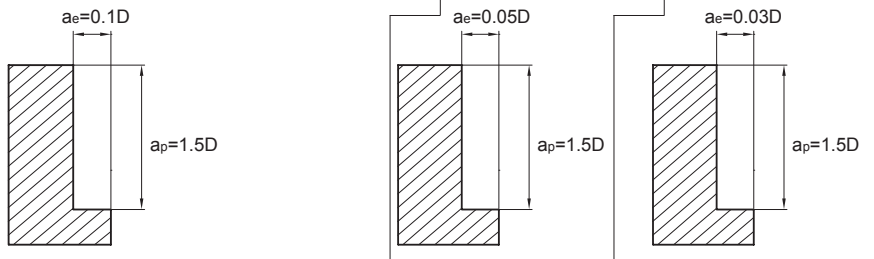
1.Please select high-precision machine and tool holder. When vibration and abnormal noise occur during machining, please reduce axial cutting depth ap.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Reduce feed speed correspondingly when rotating speed is low.
4.Because machining conditions such as machine and allowance for machining may vary, please adjust the parameters based on actual requirements.

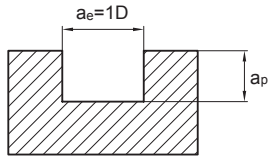
Cutting parameters for PML/PM series end mills

PML-2R★PM-2R

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	240	20000	75	20000	195	20000	145	20000	95
2	15000	385	11150	100	15000	335	13000	215	11140	130
3	14000	655	7500	145	10600	505	8500	395	7430	245
4	10800	675	5500	155	8000	515	6500	405	5570	245
5	8200	695	4500	155	6400	540	5000	425	4460	260
6	7000	720	3700	170	5300	555	4200	435	3710	260
8	5200	720	2800	170	4000	555	3200	440	2785	275
10	4200	695	2200	170	3200	535	2500	420	2230	255
12	3500	695	1850	170	2650	535	2100	420	1855	255

Maximum cutting depth





Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

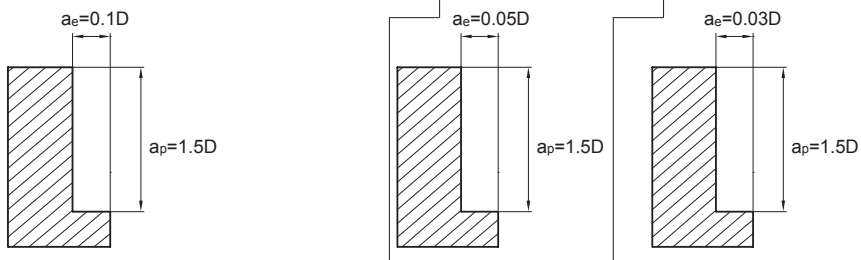
Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

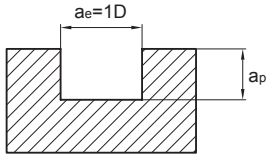
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
4.Down milling is recommended in the case of side milling.
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6.Make overhang of tool as short as possible in conditions of non-interference.

PML-4R★PML-4R-H★PM-4R★PM-4R-H★PML-4RFP★PM-4RFP

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
3	14000	985	7500	175	10600	755	8500	590	7430	435
4	10800	1010	5500	175	8000	770	6500	600	5570	445
5	8200	1055	4500	175	6400	805	5000	640	4460	470
6	7000	1080	3700	195	5300	830	4200	650	3710	470
8	5200	1070	2800	195	4000	815	3200	660	2785	485
10	4200	1055	2200	195	3200	805	2500	625	2230	450
12	3500	1055	1850	195	2650	805	2100	625	1855	450
16	2600	985	1400	175	2000	755	1600	590	1390	435

Maximum cutting depth





Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

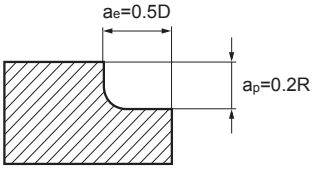
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
4.Down milling is recommended in the case of side milling.
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6.Make overhang of tool as short as possible in conditions of non-interference.

Cutting parameters for PML/PM series end mills

PM-4H★PM-4HL

Standard:

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Quenched and tempered steel ~40HRC		Quenched and tempered steel ~45HRC		Quenched and tempered steel ~50HRC		Quenched and tempered steel ~55HRC	
Diameter× Corner radius	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
3.0×R0.8	10500	6250	8500	4500	7450	3900	5300	2600	3200	995
4.0×R1.0	7950	6600	6350	4800	5550	4200	4000	2750	2400	1050
5.0×R1.2	6350	7000	5100	5100	4450	4450	3200	2850	1900	1150
6.0×R1.0 **6.0×R1.5**	5300	7000	4250	5100	3700	4450	2650	2850	1600	1150
8.0×R1.0 **8.0×R2.0**	4550	7000	3200	5100	2800	4450	2000	2850	1200	1150
10.0×R1.0 **10.0×R2.0**	3200	7000	2550	5100	2250	4450	1600	2850	955	1150
12.0×R2.0 **12.0×R3.0**	2650	7000	2100	5100	1850	4450	1350	2850	795	1150
Maximum cutting depth	Maximum a_p=0.5mm						Maximum a_p=0.4mm		Maximum a_p=0.2mm	



1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.
6.The above cutting parameters are based on contour machining when overhang L/D≤4. Please make adjustments according to the table below when overhang is different.

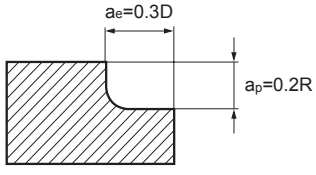
Different cutting parameters under different overhang of tool:

Overhang	Cutting speed(m/min)	Axial cutting depth (mm)	Feed speed (mm/min)
L/D⩽4	100%	100%	100%
L/D=5	80%~90%	70%~90%	80%~90%
L/D=6	60%~80%	50%~70%	60%~80%

PM-4H★PM-4HL

High speed:

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Quenched and tempered steel ~40HRC		Quenched and tempered steel ~45HRC		Quenched and tempered steel ~50HRC		Quenched and tempered steel ~55HRC	
Diameter× Corner radius	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
3.0×R0.8	21000	12500	21000	12000	16000	8400	16000	7850	10500	3300
4.0×R1.0	16000	13000	16000	12000	12000	9000	12000	8200	7950	3550
5.0×R1.2	12500	14000	12500	12500	9550	9550	9550	8600	6350	3800
6.0×R1.0 **6.0×R1.5**	10600	14000	10600	12700	7950	9550	7950	8600	5300	3800
8.0×R1.0 **8.0×R2.0**	7950	14000	7950	12700	5950	9550	5950	8600	4000	3800
10.0×R1.0 **10.0×R2.0**	6350	14000	6350	12700	4750	9550	4750	8600	3200	3800
12.0×R2.0 **12.0×R3.0**	5300	14000	5300	12700	4000	9550	4000	8600	2650	3800
Maximum cutting depth	Maximum a_p=0.4mm						Maximum a_p=0.2mm		Maximum a_p=0.1mm	



1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.
6.The above cutting parameters are based on contour machining when overhang L/D≤4. Please make adjustments according to the table below when overhang is different.

Different cutting parameters under different overhang of tool:

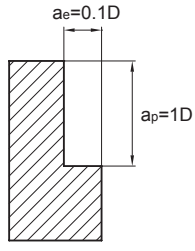
Ratio of neck length to diameter	Cutting speed(m/min)	Axial cutting depth(mm)	Feed speed (mm/min)
L/D⩽4	100%	100%	100%
L/D=5	60%~80%	60%~80%	60%~80%
L/D=6	40%~60%	40%~60%	40%~60%

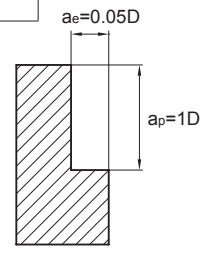
Cutting parameters for GM series end mills

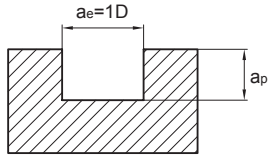
GM-2E★GM-2EL

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	165	20000	165	20000	135	20000	135	20000	50	20000	100
2	15000	265	15000	265	15000	240	15000	235	11150	70	13000	150
3	14000	455	14000	455	13000	420	10600	350	7500	100	8500	275
4	10800	465	10800	465	10000	430	8000	355	5500	110	6500	280
5	8200	485	8200	485	7600	450	6400	370	4500	110	5000	295
6	7000	500	7000	500	6400	460	5300	385	3700	115	4200	300
8	5200	495	5200	495	4800	455	4000	380	2800	115	3200	305
10	4200	485	4200	485	3800	450	3200	370	2200	115	2500	290
12	3500	485	3500	485	3200	450	2650	370	1850	115	2100	290
14	3000	455	3000	455	2700	420	2300	350	1600	110	1800	275
16	2600	455	2600	455	2400	420	2000	350	1400	100	1600	275
18	2300	445	2300	445	2100	410	1800	345	1250	100	1400	270
20	2050	445	2050	445	1900	410	1600	345	1100	100	1250	270

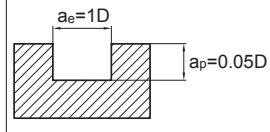
Maximum cutting depth







Diameter range	Cutting depth a_p
Ø1≤D<Ø3	0.15D
Ø3≤D	0.3D



1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.

2.Please select high-precision machine and tool holder.

3.Please use air blow or cutting liquid with high mist retardant property.

4.Down milling is recommended in the case of side milling.

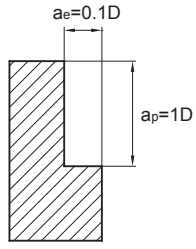
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

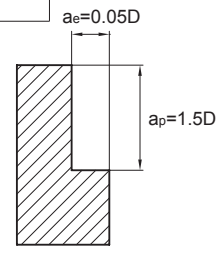
6.Make overhang of tool as short as possible in conditions of non-interference.

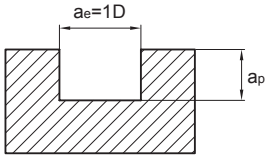
GM-3E★GM-3EL

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm^2		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	215	20000	215	20000	175	20000	175	20000	65	20000	130
2	15000	345	15000	345	15000	310	15000	305	11150	90	13000	195
3	14000	590	14000	590	13000	546	10600	455	7500	130	8500	360
4	10800	600	10800	605	10000	560	8000	460	5500	145	6500	365
5	8200	630	8200	630	7600	585	6400	480	4500	145	5000	380
6	7000	650	7000	650	6400	600	5300	500	3700	150	4200	390
8	5200	645	5200	645	4800	590	4000	495	2800	150	3200	400
10	4200	630	4200	630	3800	585	3200	480	2200	150	2500	380
12	3500	630	3500	630	3200	585	2650	480	1850	150	2100	380
14	3000	590	3000	590	2700	545	2300	455	1600	145	1800	360
16	2600	590	2600	590	2400	545	2000	455	1400	130	1600	360
18	2300	580	2300	580	2100	530	1800	450	1250	130	1400	350
20	2050	580	2050	580	1900	530	1600	450	1100	130	1250	350

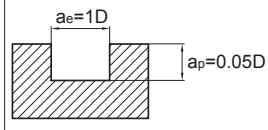
Maximum cutting depth







Diameter range	Cutting depth a_p
Ø1≤D<Ø3	0.15D
Ø3≤D	0.3D



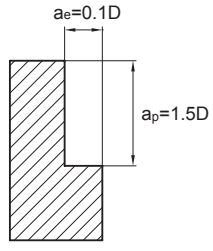
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
4.Down milling is recommended in the case of side milling.
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6.Make overhang of tool as short as possible in conditions of non-interference.

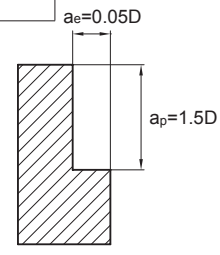
Cutting parameters for GM series end mills

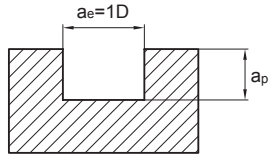
GM-4E-G★GM-4EL-G

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	225	20000	225	20000	180	20000	180	20000	80	20000	135
2	15000	360	15000	360	15000	325	15000	315	11150	90	13000	200
3	14000	610	14000	610	13000	570	10600	470	7500	110	8500	370
4	10800	630	10800	630	10000	575	8000	480	5500	115	6500	380
5	8200	660	8200	660	7600	600	6400	505	4500	115	5000	400
6	7000	675	7000	675	6400	620	5300	515	3700	120	4200	405
8	5200	665	5200	665	4800	610	4000	510	2800	120	3200	415
10	4200	660	4200	660	3800	600	3200	505	2200	120	2500	390
12	3500	660	3500	660	3200	600	2650	505	1850	120	2100	390
14	3000	610	3000	610	2700	570	2300	470	1600	115	1800	370
16	2600	610	2600	610	2400	570	2000	470	1400	110	1600	370
18	2300	600	2300	600	2100	560	1800	460	1250	95	1400	365
20	2050	600	2050	600	1900	560	1600	460	1100	95	1250	365

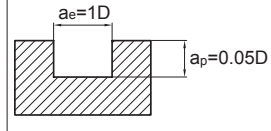
Maximum cutting depth







Diameter range	Cutting depth a_p
Ø1≤D<Ø3	0.15D
Ø3≤D	0.3D

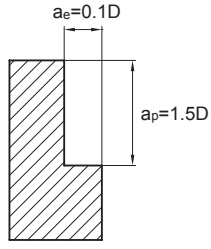


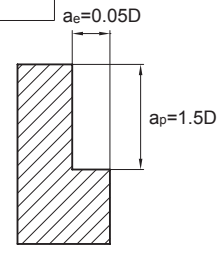
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
4.Down milling is recommended in the case of side milling.
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6.Make overhang of tool as short as possible in conditions of non-interference.

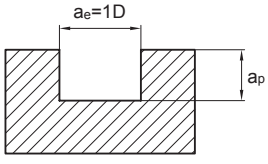
GM-4E★GM-4EL

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	250	20000	250	20000	200	20000	200	20000	90	20000	150
2	15000	400	15000	400	15000	360	15000	350	11150	100	13000	225
3	14000	680	14000	680	13000	630	10600	525	7500	120	8500	410
4	10800	700	10800	700	10000	640	8000	535	5500	125	6500	420
5	8200	730	8200	730	7600	670	6400	560	4500	125	5000	440
6	7000	750	7000	750	6400	690	5300	575	3700	135	4200	450
8	5200	740	5200	740	4800	680	4000	565	2800	135	3200	460
10	4200	730	4200	730	3800	670	3200	560	2200	135	2500	435
12	3500	730	3500	730	3200	670	2650	560	1850	135	2100	435
14	3000	680	3000	680	2700	630	2300	525	1600	125	1800	410
16	2600	680	2600	680	2400	630	2000	525	1400	120	1600	410
18	2300	670	2300	670	2100	620	1800	515	1250	105	1400	405
20	2050	670	2050	670	1900	620	1600	515	1100	105	1250	405

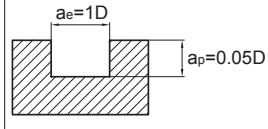
Maximum cutting depth







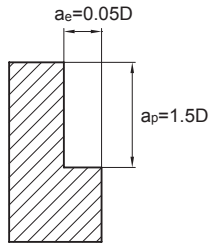
Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D	0.3D



1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
4.Down milling is recommended in the case of side milling.
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6.Make overhang of tool as short as possible in conditions of non-interference.

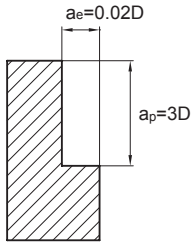
Cutting parameters for GM series end mills

GM-6E

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm^2		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	7000	890	7000	890	6400	820	5300	680	3700	160	4200	540
8	5200	890	5200	890	4800	820	4000	680	2800	160	3200	550
10	4200	860	4200	860	3800	800	3200	665	2200	160	2500	520
12	3500	860	3500	860	3200	800	2650	665	1850	160	2100	520
14	3000	810	3000	810	2700	750	2300	625	1600	150	1800	490
16	2600	810	2600	810	2400	750	2000	625	1400	150	1600	490
18	2300	800	2300	800	2100	740	1800	615	1250	125	1400	485
20	2050	800	2050	800	1900	740	1600	615	1100	125	1250	485
Maximum cutting depth												

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

GM-6EL

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm^2		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	5800	750	5800	750	5300	685	4250	545	2650	115	3600	460
8	4400	750	4400	750	4000	685	3180	545	2000	115	2700	465
10	3500	730	3500	730	3200	665	2550	530	1600	115	2150	440
12	2900	730	2900	730	2650	665	2120	530	1350	115	1800	440
14	2500	685	2500	685	2300	625	1820	500	1150	105	1550	415
16	2200	685	2200	685	2000	625	1590	500	1000	105	1350	415
18	1950	675	1950	675	1800	615	1420	490	900	90	1200	410
20	1750	675	1750	675	1600	615	1270	490	800	90	1050	410
Maximum cutting depth												

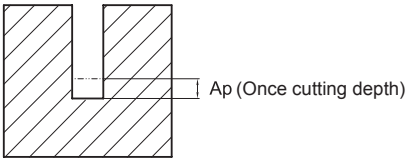
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

Cutting parameters for GM series end mills

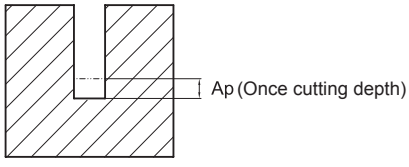
GM-2EP

Workpiece material		Cast iron, Carbon steel, Alloy steel ~750N/mm²			Carbon steel, Alloy steel ~30HRC			Pre-hardened steel, quenched and tempered steel ~40HRC			Stainless steel		
Diameter (mm)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)
0.5	4	28000	500	0.023	28000	400	0.021	28000	250	0.018	25000	200	0.014
	6	22000	400	0.007	22000	350	0.06	22000	150	0.005	20000	150	0.004
	8	18000	300	0.005	18000	300	0.005	18000	150	0.004	20000	150	0.003
0.8	4	32000	900	0.057	32000	600	0.053	32000	600	0.044	25000	400	0.035
	6	26000	700	0.036	26000	450	0.034	26000	400	0.028	21000	300	0.022
	8	22000	500	0.026	22000	350	0.024	22000	300	0.02	18000	200	0.016
	10	22000	500	0.01	22000	350	0.01	22000	300	0.008	18000	200	0.006
1.0	4	2900	1300	0.08	27000	1000	0.08	26000	900	0.07	20000	600	0.05
	6	29000	1300	0.07	27000	1000	0.07	26000	900	0.06	20000	600	0.04
	8	24000	900	0.05	23000	800	0.04	22000	700	0.04	18000	400	0.03
	10	20000	700	0.03	19000	600	0.03	18000	500	0.03	15000	300	0.02
	12	20000	700	0.02	19000	600	0.02	18000	500	0.02	15000	300	0.01
	14	18000	500	0.015	15000	400	0.01	15000	360	0.01	12000	200	0.008
1.2	6	25000	1100	0.09	23000	1000	0.08	22000	900	0.07	17000	600	0.05
	8	21000	900	0.07	20000	700	0.07	19000	700	0.05	14000	400	0.04
	10	21000	900	0.06	20000	700	0.05	19000	700	0.04	14000	400	0.03
	12	18000	700	0.04	17000	600	0.04	16000	500	0.03	11000	300	0.02
1.5	6	20000	1200	0.15	18000	1000	0.14	18000	900	0.11	14000	600	0.09
	8	19000	900	0.11	16000	800	0.1	15000	700	0.08	12000	400	0.07
	10	19000	900	0.09	16000	800	0.08	15000	700	0.06	12000	400	0.05
	12	19000	900	0.07	16000	800	0.06	15000	700	0.05	12000	400	0.04
	14	19000	700	0.06	16000	650	0.05	15000	630	0.04	12000	360	0.03
2.0	6	16000	1300	0.34	15000	1100	0.31	14000	1000	0.26	11000	700	0.21
	8	16000	1300	0.29	15000	1100	0.26	14000	1000	0.22	11000	700	0.18
	10	14000	900	0.26	1300	800	0.24	12000	700	0.20	9000	500	0.16
	12	14000	900	0.14	13000	800	0.13	12000	700	0.11	9000	500	0.09
	14	14000	900	0.10	13000	800	0.11	12000	700	0.09	9000	500	0.07
	16	14000	900	0.08	13000	800	0.08	12000	700	0.07	9000	500	0.06

Maximum cutting depth



GM-2EP

Workpiece material		Cast iron, Carbon steel, Alloy steel ~750N/mm^2			Carbon steel, Alloy steel ~30HRC			Pre-hardened steel, quenched and tempered steel ~40HRC			Stainless steel		
Diameter (mm)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)
2.5	8	13000	1300	0.42	12000	1100	0.39	11000	1000	0.33	9000	700	0.26
	10	13000	1300	0.36	12000	1100	0.33	11000	1000	0.28	9000	700	0.22
	12	13000	1300	0.24	12000	1100	0.23	11000	1000	0.19	9000	700	0.15
	14	12000	900	0.18	10000	800	0.17	9000	700	0.14	7000	500	0.11
	16	12000	900	0.13	10000	800	0.12	9000	700	0.09	7000	500	0.08
	18	12000	800	0.11	10000	720	0.10	9000	630	0.07	7000	450	0.07
	20	12000	800	0.09	10000	720	0.08	9000	630	0.05	7000	450	0.05
3.0	6	11000	1300	0.42	10000	1100	0.39	10000	1000	0.32	8000	700	0.27
	8	11000	1300	0.39	10000	1100	0.36	10000	1000	0.30	8000	700	0.24
	10	11000	1300	0.31	10000	1100	0.29	10000	1000	0.24	8000	700	0.19
	12	11000	1100	0.29	10000	1000	0.27	10000	900	0.22	8000	650	0.16
	14	11000	1100	0.27	10000	1000	0.25	10000	900	0.20	8000	650	0.15
	16	10000	850	0.22	10000	750	0.20	9000	650	0.17	6000	450	0.13
	18	10000	850	0.16	10000	750	0.14	9000	650	0.12	6000	450	0.10
	20	10000	850	0.12	10000	750	0.10	9000	650	0.08	6000	450	0.07
4.0	12	8000	1300	0.42	7000	1100	0.38	7000	1000	0.32	6000	700	0.26
	16	8000	1100	0.39	7000	1000	0.35	7000	900	0.30	6000	650	0.24
	20	7000	900	0.34	7000	800	0.30	6000	700	0.27	5000	500	0.20
	25	7000	900	0.30	7000	800	0.27	6000	700	0.24	5000	500	0.15
5.0	16	6000	1200	0.49	6000	1000	0.45	5000	1000	0.38	5000	600	0.30
	25	5000	800	0.45	5000	720	0.42	5000	700	0.35	5000	600	0.25
Maximum cutting depth													

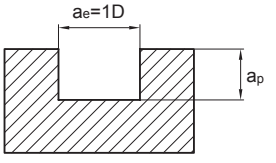
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Make overhang of tool as short as possible in conditions of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

Cutting parameters for GM series end mills

GM-2ES

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm^2		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
0.3	32000	115	32000	115	32000	115	32000	80	32000	40
0.4	32000	125	32000	125	32000	125	32000	90	27500	50
0.5	32000	125	32000	125	29500	125	25000	90	22000	50
0.6	32000	125	32000	125	24500	125	21000	90	18500	50
0.7	32000	125	32000	125	24500	125	21000	90	18500	50
0.8	24500	125	24500	125	18500	125	15500	90	13500	50
0.9	24500	125	24500	125	18500	125	15500	90	13500	50
1.0	21000	140	25000	165	16800	130	14500	90	10000	50
1.5	13000	140	15000	165	11800	130	10000	90	7000	50
2.0	13000	160	15000	185	11800	145	10000	100	7000	60
2.5	8700	200	10000	240	8200	185	6600	100	4700	60
3.0	8700	235	10000	270	8200	220	6600	100	4700	75

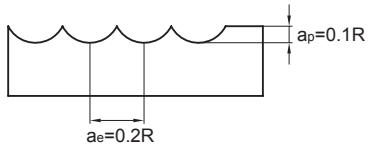
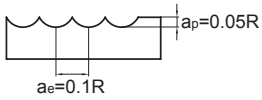
Maximum cutting depth



Diameter range	Cutting depth a_p
D<Ø1	0.05D
Ø1⩽D⩽Ø3	0.15D

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
4.Make overhang of tool as short as possible in conditions of non-interference.

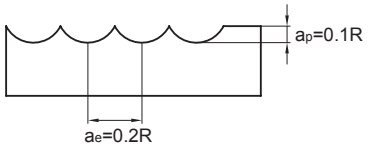
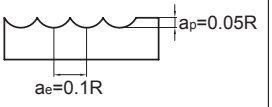
GM-2B★GM-2BL

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm^2		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
R0.5	40000	800	40000	800	38000	700	32000	320	22300	200	25000	275
R1.0	24000	900	24000	900	19000	760	16000	400	11150	230	13000	275
R1.5	15500	950	15500	950	12750	760	10600	450	7400	290	8500	280
R2.0	11500	950	11500	950	9550	760	8000	550	5550	370	6500	370
R2.5	9500	1050	9500	1050	7650	800	6400	550	4450	370	5000	375
R3.0	8000	1050	8000	1050	6400	800	5300	580	3700	390	4200	390
R4.0	6000	1300	6000	1300	4800	950	4000	700	2750	455	3200	440
R5.0	4800	1200	4800	1200	3800	900	3200	650	2200	430	2500	440
R6.0	4000	1100	4000	1100	3200	840	2650	610	1850	430	2100	420
R8.0	3000	1050	3000	1050	2400	800	2000	600	1350	380	1600	375
R10.0	2400	950	2400	950	1900	680	1600	560	1100	370	1250	330
Maximum cutting depth												

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
4.Make overhang of tool as short as possible in conditions of non-interference.

Cutting parameters for GM series end mills

GM-4B★GM-4BL

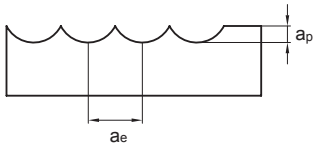
Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm^2		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Cutting speed	150 m/min		150m/min		120m/min		100m/min		70m/min		80m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
R1.5	15500	1710	15500	1710	12750	1340	10600	810	7400	520	8500	500
R2.0	11500	1710	11500	1710	9550	1340	8000	990	5550	660	6500	665
R2.5	9500	1890	9500	1890	7650	1440	6400	990	4450	660	5000	675
R3.0	8000	1890	8000	1890	6400	1440	5300	1040	3700	700	4200	700
R4.0	6000	2340	6000	2340	4800	1710	4000	1260	2750	820	3200	790
R5.0	4800	2160	4800	2160	3800	1620	3200	1170	2200	770	2500	790
R6.0	4000	1980	4000	1980	3200	1510	2650	1100	1850	770	2100	755
R8.0	3000	1890	3000	1890	2400	1440	2000	1080	1350	680	1600	675
R10.0	2400	1710	2400	1710	1900	1220	1600	1000	1100	660	1250	595
Maximum cutting depth												

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
4.Make overhang of tool as short as possible in conditions of non-interference.

GM-2BS

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm^2		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
R0.15	32000	300	32000	300	32000	270	32000	250	32000	150
R0.2	32000	380	32000	380	32000	320	32000	300	32000	175
R0.25	32000	460	32000	460	32000	410	32000	330	32000	205
R0.3	32000	535	32000	535	32000	500	32000	420	32000	265
R0.35	32000	550	32000	550	32000	520	32000	440	32000	270
R0.4	32000	610	32000	610	32000	560	32000	460	27500	285
R0.45	32000	700	32000	700	32000	600	25000	400	27500	285
R0.5	32000	765	32000	765	32000	640	25000	400	22000	285
R1.0	24000	900	24000	900	19000	760	16000	400	11150	230
R1.5	15500	950	15500	950	12750	760	10600	450	7400	290

Maximum cutting depth

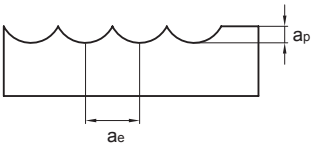


Diameter range	Cutting depth a_p	Cutting width a_e
D<Ø1	0.05R	0.2R
Ø1≤D≤Ø3	0.1R	0.2R

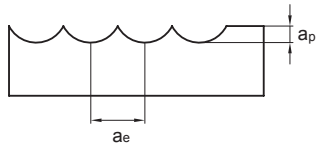
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Make overhang of tool as short as possible in conditions of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

Cutting parameters for GM series end mills

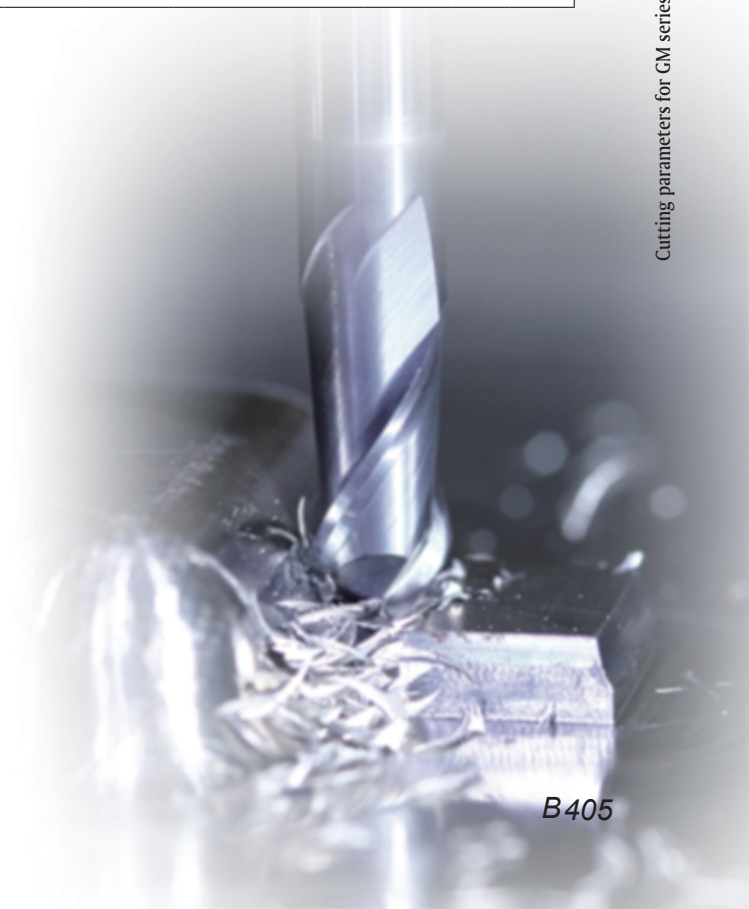
GM-2BP

Workpiece material		Cast iron, Carbon steel, Alloy steel ~750N/mm²				Carbon steel, Alloy steel ~30HRC				Pre-hardened steel, quenched and tempered steel ~40HRC				Stainless steel			
Diameter (mm)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)
R0.25	4	27000	400	0.02	0.025	27000	380	0.02	0.025	27000	300	0.02	0.025	27000	200	0.02	0.025
	6	21000	200	0.01	0.015	21000	180	0.01	0.015	21000	160	0.01	0.015	21000	150	0.01	0.015
R0.3	4	27000	400	0.03	0.12	27000	380	0.03	0.12	25000	250	0.03	012	24000	200	0.03	0.12
	6	25000	300	0.03	0.12	25000	280	0.03	0.12	20000	150	0.03	0.12	20000	140	0.03	0.12
	8	25000	240	0.03	0.12	25000	225	0.03	0.12	20000	120	0.03	0.12	20000	110	0.03	0.12
R0.4	4	27000	600	0.04	0.16	27000	550	0.04	0.16	23000	450	0.04	0.16	21000	300	0.04	0.16
	6	24000	400	0.04	0.12	24000	360	0.04	0.12	21000	250	0.04	0.12	19000	200	0.04	0.12
	8	22000	300	0.04	0.12	22000	270	0.04	0.12	19000	150	0.04	0.12	19000	140	0.04	0.12
	10	22000	270	0.03	0.09	22000	250	0.03	0.09	19000	135	0.03	0.09	19000	120	0.03	0.09
R0.5	4	28000	600	0.05	0.20	28000	550	0.05	0.20	25000	500	0.05	0.20	21000	300	0.05	0.20
	6	21000	400	0.05	0.20	21000	360	0.05	0.20	19000	300	0.05	0.20	16000	200	0.05	0.2
	8	21000	360	0.05	0.15	21000	320	0.05	0.15	19000	270	0.05	0.15	16000	180	0.05	0.15
	10	18000	300	0.03	0.10	18000	270	0.03	0.10	17000	200	0.03	0.10	14000	150	0.03	0.10
	12	18000	270	0.03	0.10	18000	250	0.03	0.10	17000	180	0.03	0.10	14000	135	0.03	0.10
R0.6	6	20000	600	0.06	0.24	20000	540	0.06	0.24	17000	300	0.06	0.24	14000	200	0.06	0.24
	8	20000	540	0.06	0.24	20000	500	0.06	0.24	17000	270	0.06	0.24	14000	170	0.06	0.24
	12	16000	300	0.06	0.18	16000	270	0.06	0.18	14000	200	0.06	0.18	11000	150	0.06	0.18
	16	16000	270	0.03	0.12	16000	230	0.03	0.12	14000	175	0.03	0.12	11000	135	0.03	0.12
R0.75	8	17000	600	0.08	0.30	17000	540	0.08	0.30	15000	300	0.08	0.30	12000	250	0.08	0.30
	12	17000	540	0.06	0.24	17000	500	0.06	0.24	15000	275	0.06	0.24	12000	225	0.06	0.24
	16	13000	300	0.04	0.16	13000	275	0.04	0.16	12000	200	0.04	0.16	9500	150	0.04	0.16
R1.0	6	16500	800	0.10	0.40	16500	750	0.10	0.40	16500	560	0.10	0.40	13500	450	0.10	0.40
	8	16500	800	0.10	0.32	16500	750	0.10	0.32	16500	560	0.10	0.32	13500	450	0.10	0.32
	10	14000	630	0.08	0.30	14000	600	0.08	0.30	13000	450	0.08	0.30	10000	270	0.08	0.30
	12	14000	630	0.06	0.30	14000	600	0.06	0.30	13000	450	0.06	0.30	10000	270	0.06	0.30
	16	14000	550	0.06	0.24	14000	530	0.06	0.24	13000	400	0.06	0.24	10000	270	0.06	0.24
	20	11000	360	0.06	0.16	11000	330	0.06	0.16	10000	225	0.06	0.16	8000	175	0.06	0.16
Maximum cutting depth																	

GM-2BP

Workpiece material		Cast iron, Carbon steel, Alloy steel ~750N/mm^2				Carbon steel, Alloy steel ~30HRC				Pre-hardened steel, quenched and tempered steel ~40HRC				Stainless steel			
Diameter (mm)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)
R1.25	8	14000	800	0.10	0.32	14000	750	0.10	0.32	14000	560	0.10	0.32	12500	450	0.10	0.32
	12	13000	630	0.06	0.30	13000	600	0.06	0.30	12000	450	0.06	0.30	10000	270	0.06	0.30
	16	13000	550	0.06	0.24	13000	530	0.06	0.24	12000	400	0.06	0.24	10000	270	0.06	0.24
	20	10000	360	0.06	0.16	10000	330	0.06	0.16	8000	225	0.06	0.16	7000	175	0.06	0.16
R1.5	10	12000	800	0.15	0.40	12000	720	0.15	0.40	9500	600	0.15	0.40	7500	400	0.15	0.40
	12	12000	720	0.15	0.40	12000	650	0.15	0.40	9500	540	0.15	0.40	7500	360	0.15	0.40
	16	10000	600	0.15	0.40	10000	540	0.15	0.40	8500	300	0.15	0.40	6500	250	0.15	0.40
	20	10000	600	0.10	0.32	10000	540	0.10	0.32	8500	300	0.10	0.32	6500	250	0.10	0.32
R2.0	10	9000	800	0.20	0.80	9000	720	0.20	0.80	7500	600	0.20	0.80	6000	400	0.20	0.80
	16	9000	800	0.20	0.60	9000	720	0.20	0.60	7500	600	0.20	0.60	6000	400	0.20	0.60
	20	7000	600	0.20	0.40	7000	540	0.20	0.40	6000	400	0.20	0.40	5000	250	0.20	0.40
	25	7000	600	0.15	0.40	7000	540	0.15	0.40	6000	400	0.15	0.40	5000	250	0.15	0.40
R2.5	16	7000	600	0.25	1.00	7000	540	0.25	0.10	6500	500	0.25	1.0	5000	400	0.25	1.00
	25	6000	500	0.25	1.00	6000	450	0.25	1.00	5000	500	0.25	1.00	4000	250	0.25	1.00
Maximum cutting depth																	

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Make overhang of tool as short as possible in conditions of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

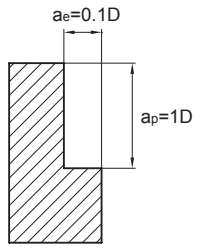


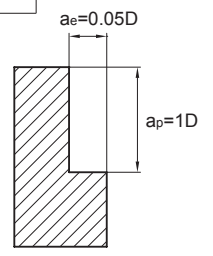
Cutting parameters for GM series end mills

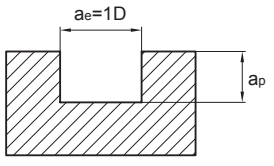
GM-2R

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm^2		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	200	20000	200	20000	160	20000	160	20000	60	20000	120
2	15000	320	15000	320	15000	290	15000	280	11150	84	13000	180
3	14000	545	14000	545	13000	510	10600	420	7500	120	8500	330
4	10800	560	10800	560	10000	520	8000	430	5500	130	6500	335
5	8200	580	8200	580	7600	540	6400	450	4500	130	5000	355
6	7000	600	7000	600	6400	550	5300	460	3700	140	4200	360
8	5200	600	5200	600	4800	550	4000	460	2800	140	3200	365
10	4200	580	4200	580	3800	540	3200	445	2200	140	2500	350
12	3500	580	3500	580	3200	540	2650	445	1850	140	2100	350

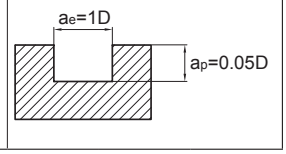
Maximum cutting depth







Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D	0.3D

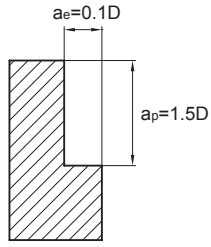


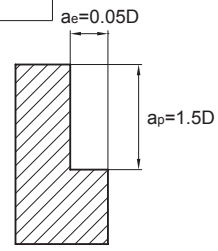
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
4.Down milling is recommended in the case of side milling.
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6.Make overhang of tool as short as possible in conditions of non-interference.

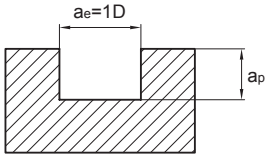
GM-4R★GM-4RL

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm^2		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
3	14000	820	14000	820	13000	755	10600	630	7500	145	8500	490
4	10800	840	10800	840	10000	770	8000	640	5500	145	6500	500
5	8200	880	8200	880	7600	810	6400	670	4500	145	5000	530
6	7000	900	7000	900	6400	830	5300	690	3700	160	4200	540
8	5200	890	5200	890	4800	815	4000	680	2800	160	3200	550
10	4200	880	4200	880	3800	810	3200	670	2200	160	2500	520
12	3500	880	3500	880	3200	810	2650	670	1850	160	2100	520
16	2600	680	2600	680	2400	630	2000	525	1400	120	1600	490

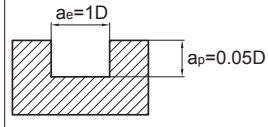
Maximum cutting depth







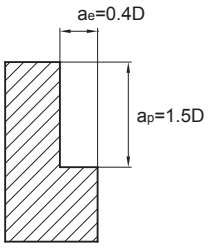
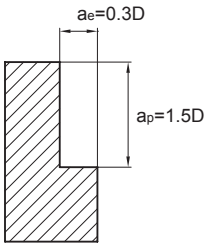
Diameter range	Cutting depth a_p
Ø1≤D<Ø3	0.15D
Ø3≤D	0.3D



1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
4.Down milling is recommended in the case of side milling.
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6.Make overhang of tool as short as possible in conditions of non-interference.

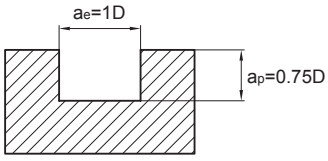
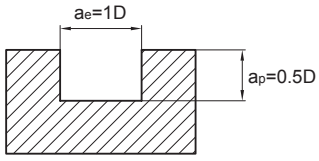
Cutting parameters for GM series end mills

GM-4W——side cutting

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm^2		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	6350	760	5300	640	4500	360	3450	280	2650	210
7	5460	760	4550	640	3650	360	3000	280	2250	310
8	4750	760	4000	640	3400	410	2650	310	2000	240
9	4250	760	3540	640	2850	410	2300	310	1750	240
10	3800	760	3200	640	2700	430	2050	330	1600	260
11	3470	760	2900	640	2400	430	1850	330	1450	260
12	3200	770	2250	650	1950	470	1500	360	1150	280
16	2400	770	2000	640	1700	480	1300	360	1000	280
20	1900	760	1600	610	1350	470	1050	350	800	260
Maximum cutting depth										

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

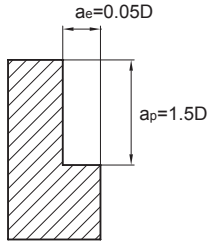
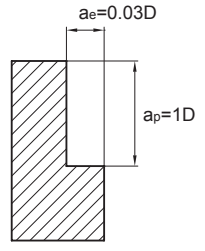
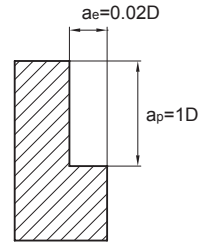
GM-4W——slot cutting

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm^2		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel	
Cutting speed	80~120 m/min		70~100m/min		60~90m/min		40~70m/min		30~60m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	5300	640	4500	540	3700	300	2900	230	2400	190
7	4500	630	3800	540	3200	300	2500	230	2050	190
8	4000	640	3400	540	2800	340	2200	260	1800	220
9	3500	630	3000	540	2450	340	1950	260	1600	220
10	3200	640	2700	540	2250	360	1750	280	1450	230
11	3000	630	2450	540	2050	360	1600	280	1300	230
12	2650	640	2250	540	1850	370	1450	290	1200	240
16	2000	640	1700	540	1400	390	1100	310	900	250
20	1600	640	1350	510	1100	390	900	300	700	230
Maximum cutting depth	 Maximum ap=12mm									

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
4.Make overhang of tool as short as possible in conditions of non-interference.

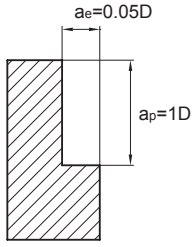
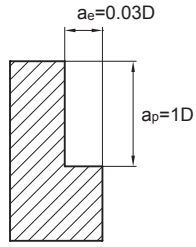
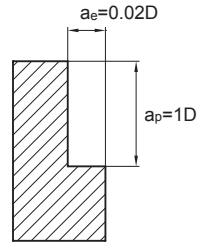
Cutting parameters for HMX series end mills

HMX-2E

Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~68HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	40000	160	40000	160	32000	130
2	40000	400	24000	240	16000	160
3	32000	510	16000	255	11000	175
4	24000	625	12000	310	8000	210
5	19000	685	9500	340	6400	230
6	16000	770	8000	385	5300	255
8	12000	770	6000	385	4000	255
10	9600	770	4800	385	3200	255
12	8000	800	4000	400	2700	270
14	6800	680	3400	340	2300	230
16	6000	600	3000	300	2000	200
18	5300	530	2700	270	1800	180
20	4800	480	2400	240	1600	160
Maximum cutting depth	 Maximum ae=1.0mm		 Maximum ae=0.5mm		 Maximum ae=0.3mm	

1.Please select high-precision and rigidity machine and tool holder.
2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
3.Please use air blow or MQL(minimum oil mist cooling).
4.Down milling is recommended in the case of side milling.
5.Make overhang of tool as short as possible in conditions of non-interference.

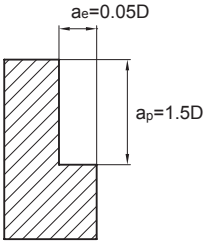
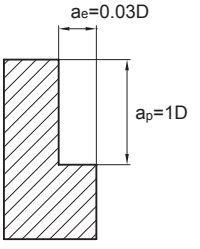
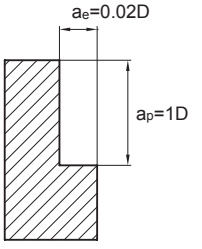
HMX-2EFP

Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~68HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	16000	1155	8000	460	5300	305
8	12000	1155	6000	460	4000	305
10	9600	1155	4800	460	3200	305
12	8000	1200	4000	480	2700	325
16	6000	900	3000	360	2000	240
20	4800	720	2400	285	1600	195
Maximum cutting depth	 Maximum a_e=1.0mm		 Maximum a_e=0.5mm		 Maximum a_e=0.3mm	

1.Please select high-precision and rigidity machine and tool holder.
2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
3.Please use air blow or MQL(minimum oil mist cooling).
4.Down milling is recommended in the case of side milling.
5.Make overhang of tool as short as possible in conditions of non-interference.

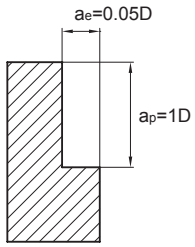
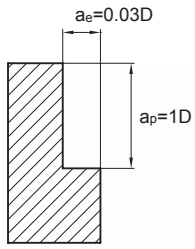
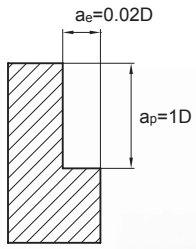
Cutting parameters for HMX series end mills

HMX-4E★HMX-4EL

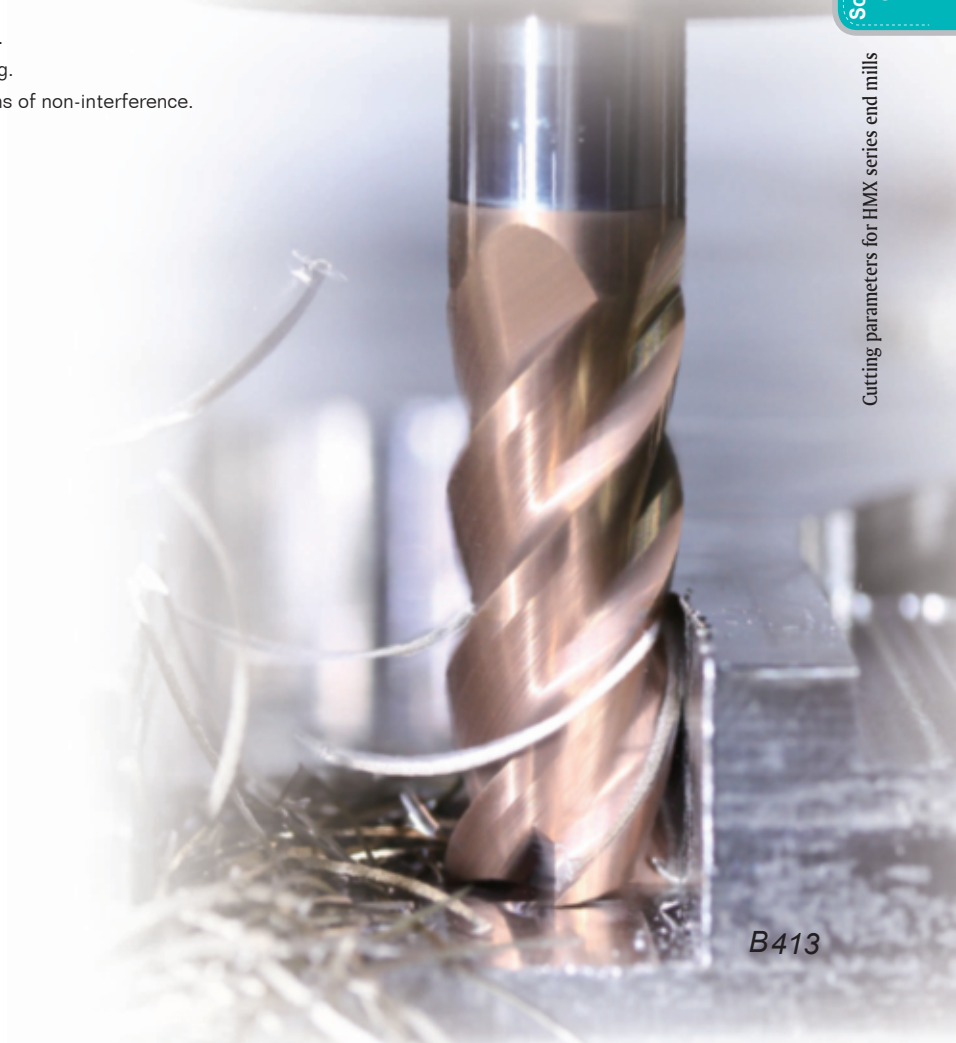
Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~68HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	40000	320	40000	320	32000	260
2	40000	800	24000	480	16000	320
3	32000	1020	16000	510	11000	350
4	24000	1250	12000	620	8000	420
5	19000	1360	9500	680	6400	460
6	16000	1540	8000	770	5300	510
8	12000	1540	6000	770	4000	510
10	9600	1540	4800	770	3200	510
12	8000	1600	4000	800	2700	540
14	6800	1340	3400	680	2300	460
16	6000	1200	3000	600	2000	400
18	5300	1060	2700	530	1800	360
20	4800	960	2400	480	1600	320
Maximum cutting depth	 Maximum ae=1.0mm		 Maximum ae=0.5mm		 Maximum ae=0.3mm	

1.Please select high-precision and rigidity machine and tool holder.
2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
3.Please use air blow or MQL(minimum oil mist cooling).
4.Down milling is recommended in the case of side milling.
5.Make overhang of tool as short as possible in conditions of non-interference.

HMX-4EFP

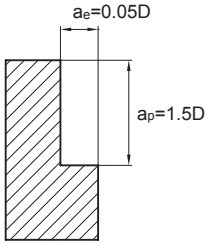
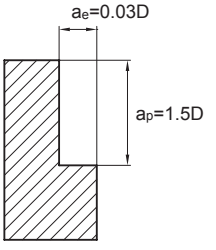
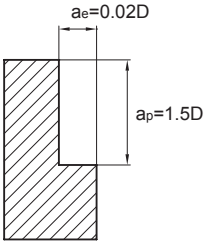
Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~68HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	16000	1730	8000	920	5300	610
8	12000	1730	6000	920	4000	610
10	9600	1730	4800	920	3200	610
12	8000	1800	4000	960	2700	650
16	6000	1350	3000	720	2000	480
20	4800	1080	2400	570	1600	390
Maximum cutting depth	 Maximum ae=1.0mm		 Maximum ae=0.5mm		 Maximum ae=0.3mm	

1.Please select high-precision and rigidity machine and tool holder.
2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
3.Please use air blow or MQL(minimum oil mist cooling).
4.Down milling is recommended in the case of side milling.
5.Make overhang of tool as short as possible in conditions of non-interference.



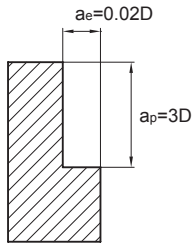
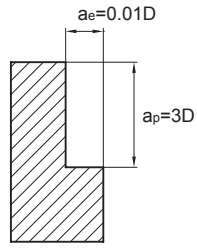
Cutting parameters for HMX series end mills

HMX-6E

Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~68HRC	
Cutting speed	300m/min		150m/min		100m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	16000	1850	8000	925	5300	610
8	12000	1850	6000	925	4000	610
10	9600	1850	4800	925	3200	610
12	8000	1920	4000	960	2700	650
14	6800	1600	3400	815	2300	550
16	6000	1440	3000	720	2000	480
18	5300	1270	2700	635	1800	430
20	4800	1150	2400	575	1600	385
Maximum cutting depth	 Maximum ae=1.0mm		 Maximum ae=0.5mm		 Maximum ae=0.3mm	

1.Please select high-precision and rigidity machine and tool holder.
2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
3.Please use air blow or MQL(minimum oil mist cooling).
4.Down milling is recommended in the case of side milling.
5.Make overhang of tool as short as possible in conditions of non-interference.

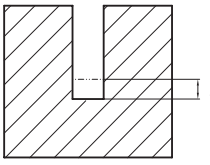
HMX-6EL

Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~68HRC	
Cutting speed	300m/min		150m/min		100m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	16000	1300	8000	650	5300	430
8	12000	1300	6000	650	4000	430
10	9600	1300	4800	650	3200	430
12	8000	1350	4000	670	2700	460
14	6800	1150	3400	570	2300	380
16	6000	1000	3000	500	2000	340
18	5300	890	2700	450	1800	300
20	4800	800	2400	400	1600	270
Maximum cutting depth	 Maximum ae=0.3mm					

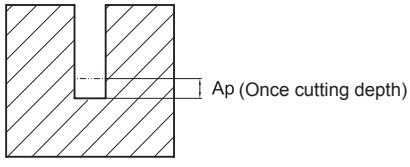
1.Please select high-precision and rigidity machine and tool holder.
2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
3.Please use air blow or MQL(minimum oil mist cooling).
4.Down milling is recommended in the case of side milling.
5.Make overhang of tool as short as possible in conditions of non-interference.

Cutting parameters for HMX series end mills

HMX-2EP

Workpiece material		Pre-hardened steel, Hardened steel 40~50HRC			Hardened steel 50~60HRC		
Diameter (mm)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)
0.5	4	21000	100	0.009	17000	50	0.009
	6	20000	75	0.006	15000	35	0.007
	8	20000	50	0.002	15000	20	0.003
0.8	4	20000	200	0.022	14000	100	0.011
	6	18000	150	0.014	14000	75	0.009
	8	18000	100	0.01	14000	50	0.006
	10	18000	75	0.007	14000	30	0.004
1.0	4	17000	400	0.035	12000	100	0.016
	6	17000	400	0.03	12000	100	0.014
	8	15000	300	0.02	10000	75	0.01
	10	15000	250	0.015	10000	50	0.008
	12	12000	150	0.01	10000	50	0.006
	14	12000	100	0.007	10000	30	0.004
1.2	6	14000	400	0.03	10000	100	0.017
	8	12000	300	0.03	10000	100	0.014
	10	12000	300	0.02	10000	75	0.01
	12	10000	200	0.01	10000	50	0.00
1.5	6	12000	400	0.06	8000	200	0.028
	8	10000	300	0.04	7000	150	0.021
	10	10000	300	0.03	7000	150	0.017
	12	10000	300	0.025	7000	100	0.01
	14	10000	250	0.02	7000	75	0.005
2.0	6	9000	400	0.13	6000	300	0.07
	8	9000	400	0.11	6000	300	0.06
	10	7000	300	0.10	6000	200	0.05
	12	7000	300	0.06	6000	200	0.03
	14	7000	250	0.04	6000	150	0.015
	16	7000	200	0.02	6000	100	0.008
Maximum cutting depth		 Ap (Once cutting depth)					

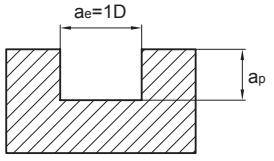
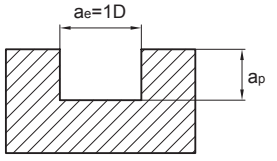
HMX-2EP

Workpiece material		Pre-hardened steel, Hardened steel 40~50HRC			Hardened steel 50~60HRC		
Diameter (mm)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)
2.5	8	8000	400	0.16	5000	300	0.08
	10	8000	400	0.14	5000	300	0.07
	12	8000	400	0.09	5000	300	0.05
	14	6000	300	0.07	5000	200	0.03
	16	6000	300	0.05	5000	200	0.025
	18	6000	300	0.04	5000	150	0.02
	20	6000	300	0.02	5000	100	0.01
3.0	6	7000	400	0.18	5000	300	0.10
	8	7000	400	0.15	5000	300	0.08
	10	7000	400	0.12	5000	300	0.06
	12	7000	400	0.10	5000	300	0.05
	14	6000	300	0.08	5000	200	0.04
	16	6000	300	0.06	5000	200	0.03
	18	6000	300	0.05	5000	200	0.025
	20	6000	250	0.04	5000	150	0.01
4.0	12	4500	400	0.16	4000	300	0.08
	16	4500	400	0.14	4000	300	0.06
	20	4500	300	0.10	4000	300	0.04
	25	4500	300	0.08	4000	300	0.03
5.0	16	4000	400	0.19	3000	300	0.09
	25	4000	400	0.15	3000	300	0.06
Maximum cutting depth							

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Make overhang of tool as short as possible in conditions of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

Cutting parameters for HMX series end mills

HMX-2ES

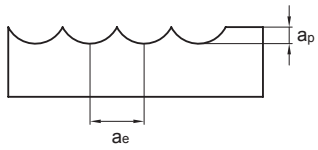
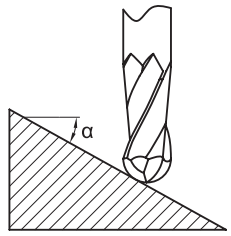
Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
0.3	23000	30	16500	25
0.4	17500	30	12500	25
0.5	14000	30	10000	25
0.6	11500	30	8450	25
0.7	10000	30	7500	25
0.8	8750	30	6350	25
0.9	8000	30	5500	25
1.0	7000	30	5050	25
1.5	5050	40	3550	25
2.0	3950	40	2750	25
2.5	3500	45	2500	30
3.0	2750	45	2000	30
Maximum cutting depth				

Diameter range	Cutting depth a_p
D<Ø1	0.02D
Ø1≤D≤Ø3	0.05D

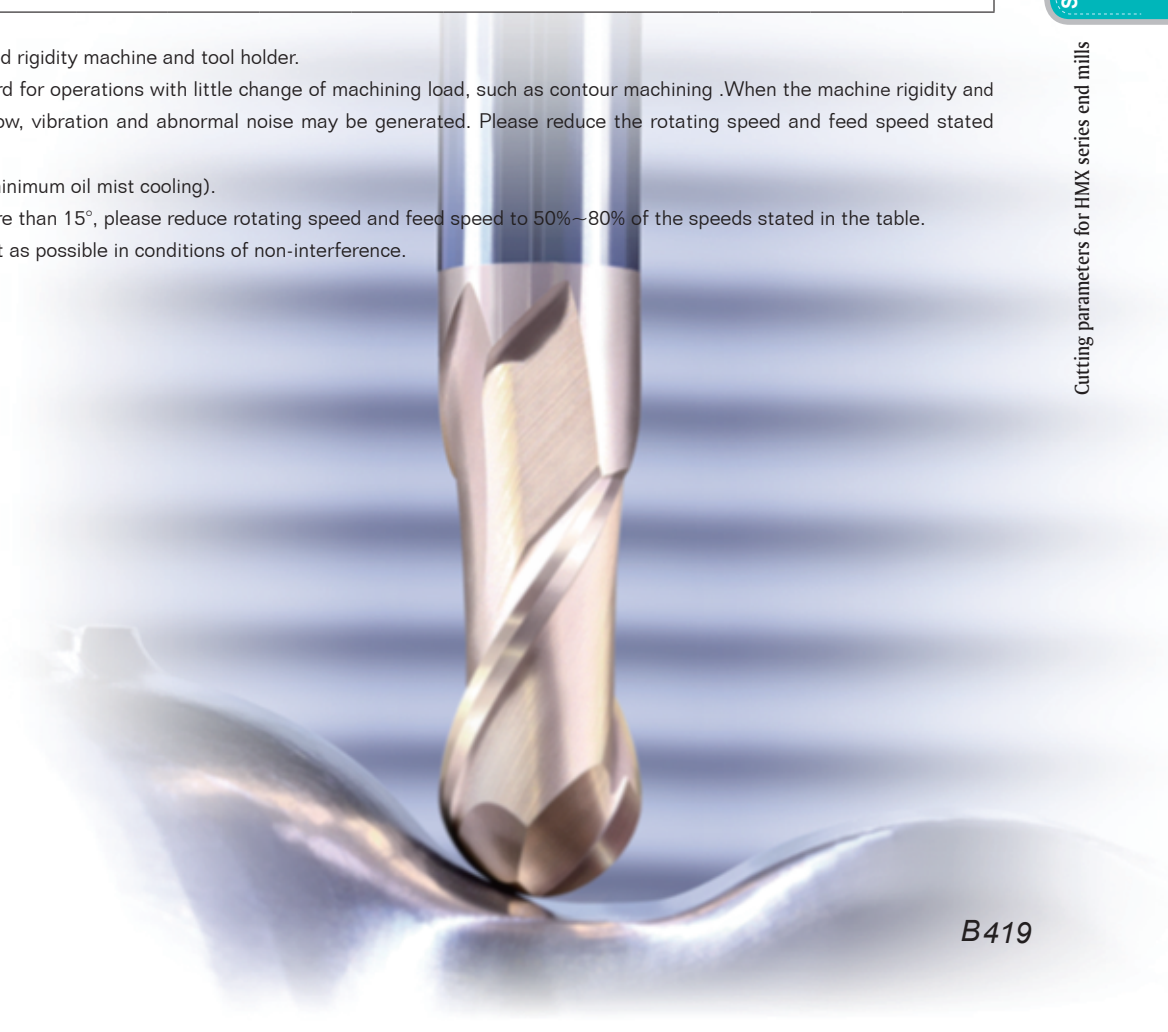
Diameter range	Cutting depth a_p
D<Ø1	0.01D
Ø1≤D≤Ø3	0.02D

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Make overhang of tool as short as possible in conditions of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

HMX-2B★HMX-2BL★HMX-2BFP

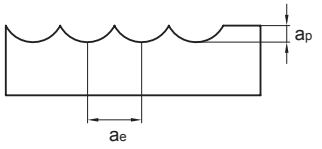
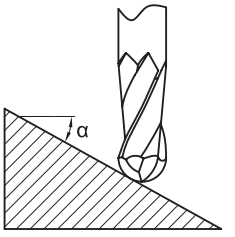
Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC				Hardened steel 50~60HRC				Hardened steel 60~68HRC			
Radius of ball nose (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)
R0.5	40000	1900	0.01	0.05	36000	1500	0.01	0.05	32000	1400	0.01	0.05
R1.0	33000	3100	0.02	0.075	26000	2100	0.02	0.075	24000	2000	0.02	0.075
R1.5	29000	4100	0.03	0.1	23000	2900	0.03	0.1	21000	2600	0.03	0.1
R2.0	22000	3900	0.04	0.15	17000	2500	0.04	0.15	15500	2100	0.04	0.15
R2.5	17500	3500	0.05	0.15	13500	2200	0.05	0.15	13000	2000	0.05	0.15
R3.0	15000	3100	0.06	0.2	11500	1700	0.06	0.2	10500	1500	0.06	0.2
R4.0	11000	2500	0.08	0.25	8600	1600	0.08	0.25	8000	1400	0.08	0.25
R5.0	9000	2000	0.1	0.3	7000	1400	0.1	0.3	6000	1200	0.1	0.3
R6.0	7500	1800	0.1	0.35	5700	1300	0.1	0.35	5300	1200	0.1	0.35
R8.0	5500	1800	0.1	0.4	4300	1300	0.1	0.4	4000	1200	0.1	0.4
R10.0	4500	1800	0.1	0.5	3500	1300	0.1	0.5	3200	1200	0.1	0.5
Maximum cutting depth												

1.Please select high-precision and rigidity machine and tool holder.
2.Above table shows the standard for operations with little change of machining load, such as contour machining .When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
3.Please use air blow or MQL(minimum oil mist cooling).
4.When inclination angle α is more than 15°, please reduce rotating speed and feed speed to 50%~80% of the speeds stated in the table.
5.Make overhang of tool as short as possible in conditions of non-interference.



Cutting parameters for HMX series end mills

HMX-4B★HMX-4BL

Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC				Hardened steel 50~60HRC				Hardened steel 60~68HRC			
Radius of ball nose (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)
R1.5	29000	6560	0.03	0.1	22800	4560	0.03	0.1	21100	4240	0.03	0.1
R2.0	22000	6250	0.04	0.15	17100	4000	0.04	0.15	15800	3520	0.04	0.15
R2.5	17400	5600	0.05	0.15	13600	3520	0.05	0.15	12700	3200	0.05	0.15
R3.0	14500	5000	0.06	0.2	11400	3000	0.06	0.2	10600	2500	0.06	0.2
R4.0	10900	4200	0.08	0.25	8550	2500	0.08	0.25	7950	2250	0.08	0.25
R5.0	8700	3500	0.1	0.3	6850	2200	0.1	0.3	6350	2000	0.1	0.3
R6.0	7250	3000	0.1	0.35	5700	2000	0.1	0.35	5300	1900	0.1	0.35
R8.0	5450	3000	0.1	0.4	4280	2000	0.1	0.4	4000	1900	0.1	0.4
R10.0	4350	3000	0.1	0.5	3425	2000	0.1	0.5	3200	1900	0.1	0.5
Maximum cutting depth	 											

1.Please select high-precision and rigidity machine and tool holder.

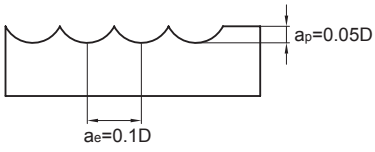
2.Above table shows the standard for operations with little change of machining load, such as contour machining .When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

3.Please use air blow or MQL(minimum oil mist cooling).

4.When inclination angle α is more than 15°, please reduce rotating speed and feed speed to 50%~80% of the speeds stated in the table.

5.Make overhang of tool as short as possible in conditions of non-interference.

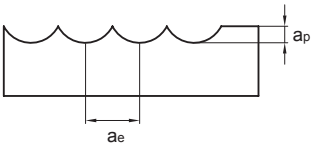
HMX-2BS

Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
R0.15	25000	135	25000	115
R0.2	25000	140	25000	120
R0.25	25000	150	25000	130
R0.3	25000	175	24000	150
R0.35	25000	190	24000	150
R0.4	24000	210	18000	140
R0.45	21000	210	15000	140
R0.5	19000	210	14000	140
R1.0	9500	210	7200	140
R1.5	6400	210	4800	140
Maximum cutting depth				

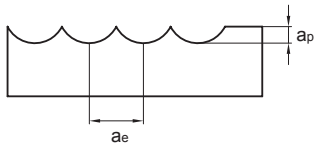
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Make overhang of tool as short as possible in conditions of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

Cutting parameters for HMX series end mills

HMX-2BP

Workpiece material		Pre-hardened steel, Hardened steel 40~50HRC				Hardened steel 50~60HRC			
Diameter (mm)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)
R0.25	4	27000	200	0.01	0.01	27000	100	0.01	0.01
	6	20000	150	0.005	0.01	20000	75	0.005	0.005
R0.3	4	24000	200	0.03	0.06	17000	150	0.02	0.04
	6	20000	150	0.02	0.03	17000	150	0.01	0.02
	8	20000	120	0.02	0.03	17000	120	0.01	0.02
R0.4	4	21000	300	0.04	0.08	14500	200	0.03	0.08
	6	19000	200	0.02	0.04	12000	150	0.02	0.04
	8	17000	150	0.02	0.04	12000	100	0.02	0.04
	10	17000	135	0.02	0.03	12000	75	0.01	0.02
R0.5	4	21000	300	0.05	0.10	14500	200	0.05	0.10
	6	16000	200	0.05	0.10	11500	150	0.05	0.10
	8	16000	180	0.03	0.05	11500	135	0.03	0.05
	10	14000	150	0.01	0.03	9800	100	0.01	0.03
	12	14000	135	0.01	0.03	9800	75	0.01	0.03
R0.6	6	14000	200	0.06	0.12	9500	175	0.06	0.12
	8	14000	180	0.06	0.12	9500	150	0.06	0.12
	12	11000	150	0.04	0.06	7500	100	0.03	0.06
	16	11000	135	0.02	0.04	7500	75	0.02	0.03
R0.75	8	12000	250	0.08	0.15	8000	200	0.08	0.15
	12	12000	225	0.06	0.15	8000	175	0.06	0.15
	16	9500	150	0.01	0.05	6500	100	0.01	0.03
R1.0	6	13500	400	0.10	0.20	7500	225	0.10	0.20
	8	13500	400	0.10	0.16	7500	225	0.10	0.16
	10	10000	275	0.08	0.16	5500	175	0.08	0.16
	12	10000	275	0.06	0.16	5500	175	0.06	0.16
	16	10000	250	0.02	0.10	5500	150	0.02	0.10
	20	8000	175	0.02	0.05	5500	125	0.01	0.05
Maximum cutting depth									

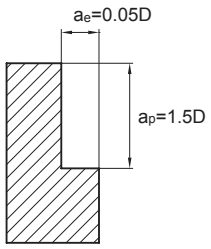
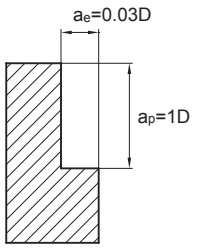
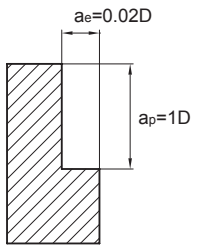
HMX-2BP

Workpiece material		Pre-hardened steel, Hardened steel 40~50HRC				Hardened steel 50~60HRC			
Diameter (mm)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)
R1.25	8	12500	400	0.10	0.16	7000	225	0.10	0.16
	12	9000	275	0.06	0.16	5000	175	0.06	0.16
	16	9000	250	0.02	0.10	5000	150	0.02	0.10
	20	5500	175	0.02	0.05	5000	125	0.01	0.05
R1.5	10	7500	400	0.10	0.30	4000	200	0.10	0.30
	12	7500	360	0.10	0.30	4000	180	0.10	0.30
	16	6500	250	0.05	0.20	3000	150	0.05	0.20
	20	6500	250	0.02	0.10	3000	150	0.02	0.05
R2.0	10	6000	400	0.20	0.40	3000	200	0.20	0.40
	16	6000	400	0.10	0.32	3000	200	0.20	0.20
	20	5000	250	0.10	0.20	2500	100	0.10	0.20
	25	5000	250	0.10	0.20	2500	100	0.10	0.10
R2.5	16	5000	400	0.25	0.50	3000	200	0.2	0.2
	25	4000	250	0.25	0.50	3000	100	0.20	0.2
Maximum cutting depth									

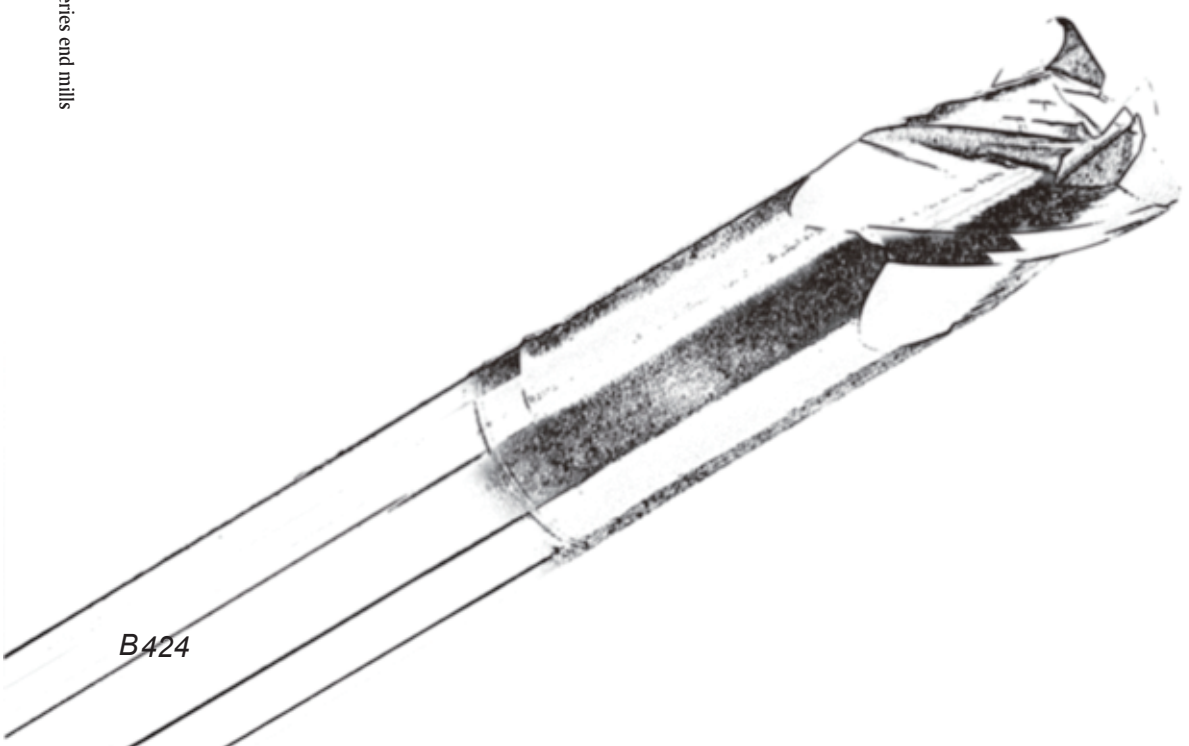
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Make overhang of tool as short as possible in conditions of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

Cutting parameters for HMX series end mills

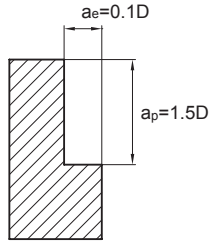
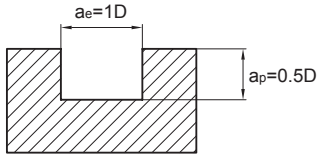
HMX-4R★HMX-4RP★HMX-4RF

Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~68HRC	
Cutting speed	300m/min		150m/min		100m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
3	32000	1225	16000	610	11000	420
4	24000	1500	12000	745	8000	500
5	19000	1630	9500	815	6400	550
6	16000	1850	8000	925	5300	610
8	12000	1850	6000	925	4000	610
10	9600	1850	4800	925	3200	610
12	8000	1920	4000	960	2700	648
16	6000	1440	3000	720	2000	480
Maximum cutting depth	 Maximum ae=1.0mm		 Maximum ae=0.5mm		 Maximum ae=0.3mm	

1.Please select high-precision and rigidity machine and tool holder.
2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
3.Please use air blow or MQL(minimum oil mist cooling).
4.Down milling is recommended in the case of side milling.
5.Make overhang of tool as short as possible in conditions of non-interference.



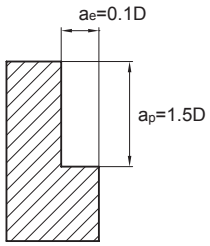
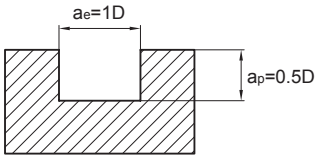
AL-2E★AL-2EL

Workpiece material	Aluminum alloy		Silicon aluminum alloy Si≤10%	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	40000	650	40000	500
2	40000	950	32000	750
3	26500	1500	21000	1100
4	20000	1600	16000	1250
5	16000	1500	13000	1100
6	13000	1250	10600	1000
8	10000	1400	8000	1100
10	8000	1600	6500	1250
12	6600	1650	5300	1300
14	5700	1700	4600	1350
16	5000	1700	4000	1350
18	4400	1700	3500	1350
20	4000	1700	3200	1350
Maximum cutting depth				

1.The above table shows the reference value of side milling. The feed speed in slot milling is 70% of the reference value stated in the table.
2.Please select high rigidity and precision machine and tool holder. Vibration and abnormal noise may be generated if the machine rigidity and workpiece fixture stability is low. Please reduce the rotating speed and feed speed stated above correspondingly.
3.It is possible to increase the rotating speed and feed speed correspondingly if the cutting depth is low.
4.Please use water-soluble cutting liquid.
5.Down milling is recommended in the case of side milling.
6.Make overhang of tool as short as possible in conditions of non-interference.

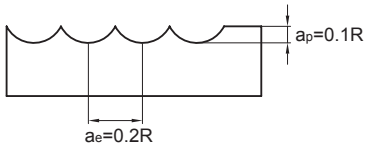
Cutting parameters for AL series end mills

AL-3E★AL-3EL

Workpiece material	Aluminum alloy		Silicon aluminum alloy Si≤10%	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	40000	800	40000	600
2	40000	1200	32000	900
3	26500	1800	21000	1300
4	20000	2000	16000	1500
5	16000	1750	13000	1300
6	13000	1500	10600	1200
8	10000	1650	8000	1300
10	8000	1900	6500	1500
12	6600	1950	5300	1550
14	5700	2000	4600	1600
16	5000	2000	4000	1600
18	4400	2000	3500	1600
20	4000	2000	3200	1600
Maximum cutting depth				

1.The above table shows the reference value of side milling. The feed speed in slot milling is 70% of the reference value stated in the table.
2.Please select high rigidity and precision machine and tool holder. Vibration and abnormal noise may be generated if the machine rigidity and workpiece fixture stability is low. Please reduce the rotating speed and feed speed stated above correspondingly.
3.It is possible to increase the rotating speed and feed speed correspondingly if the cutting depth is low.
4.Please use water-soluble cutting liquid.
5.Down milling is recommended in the case of side milling.
6.Make overhang of tool as short as possible in conditions of non-interference.

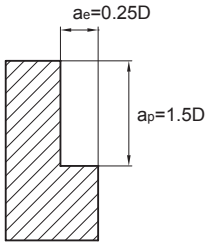
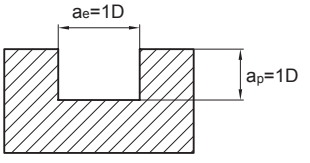
AL-2B

Workpiece material	Aluminum alloy		Silicon aluminum alloy Si≤10%	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
R1.0	40000	2000	32000	1600
R1.5	26500	1950	21000	1550
R2.0	20000	1950	16000	1550
R2.5	16000	1950	13000	1550
R3.0	13000	2000	10600	1600
R4.0	10000	2450	8000	2000
R5.0	8000	2200	6500	1750
R6.0	6600	2050	5300	1650
Maximum cutting depth				

1.Please select high rigidity and precision machine and tool holder. Vibration and abnormal noise may be generated if the machine rigidity and workpiece fixture stability is low. Please reduce the rotating speed and feed speed stated above correspondingly.
2.If the cutting depth is low, it is possible to increase the rotating speed and feed speed correspondingly.
3.Please use water-soluble cutting liquid.
4.Make overhang of tool as short as possible in conditions of non-interference.

Cutting parameters for AL series end mills

AL-3W

Workpiece material	Aluminum alloy		Silicon aluminum alloy Si≤10%	
Cutting speed	250m/min		200m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	13000	3000	10600	1900
8	10000	3000	8000	1900
10	8000	2900	6500	1850
12	6600	2700	5300	1700
14	5700	2600	4600	1650
16	5000	2550	4000	1600
18	4400	2500	3500	1550
20	4000	2400	3200	1500
Maximum cutting depth				

1.The above table shows the reference value of side milling. The feed speed in slot milling is 70% of the reference value stated in the table, and feed rate 50%.

2.Please select high rigidity and precision machine and tool holder. Vibration and abnormal noise may be generated if the machine rigidity and workpiece fixture stability is low. Please reduce the rotating speed and feed speed stated above correspondingly.

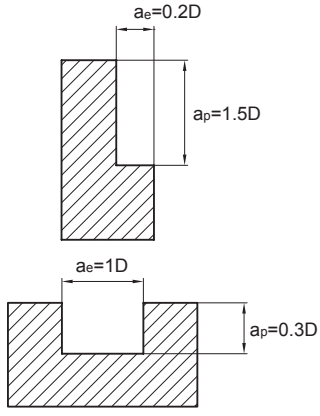
3.It is possible to increase the rotating speed and feed speed correspondingly if the cutting depth is low.

4.Please use water-soluble cutting liquid.

5.Down milling is recommended in the case of side milling.

6.Make overhang of tool as short as possible in conditions of non-interference.

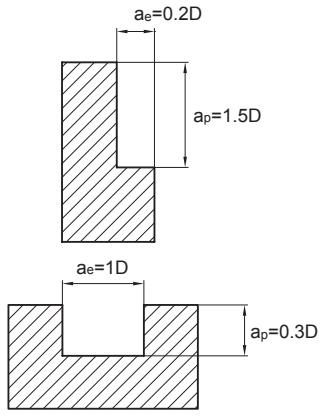
SM-3E

Workpiece material	Carbon steel、Alloy steel		Stainless steel	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
3	8500	660	4400	100
4	6400	690	3700	160
5	5800	710	3000	190
6	5300	750	2700	200
8	3900	700	2000	210
10	3100	640	1600	210
12	2600	600	1300	170
16	1900	520	1000	130
20	1500	445	800	140
Maximum cutting depth				

1.The above table shows the standard value of side milling. When milling slot, rotating speed is around 80%~100% of the stated value, and feed speed around 60%~80%.
2.Non water-soluble cutting liquid is recommended in machining of stainless steel and heat-resistant alloy.
3.Please select high rigid and precise machine and tool holder.
4.Adjust rotating speed and feed speed according to cutting depth and machine rigidity.
5.Down milling is recommended in the case of side milling.
6.Make overhang of tool as short as possible in conditions of non-interference.

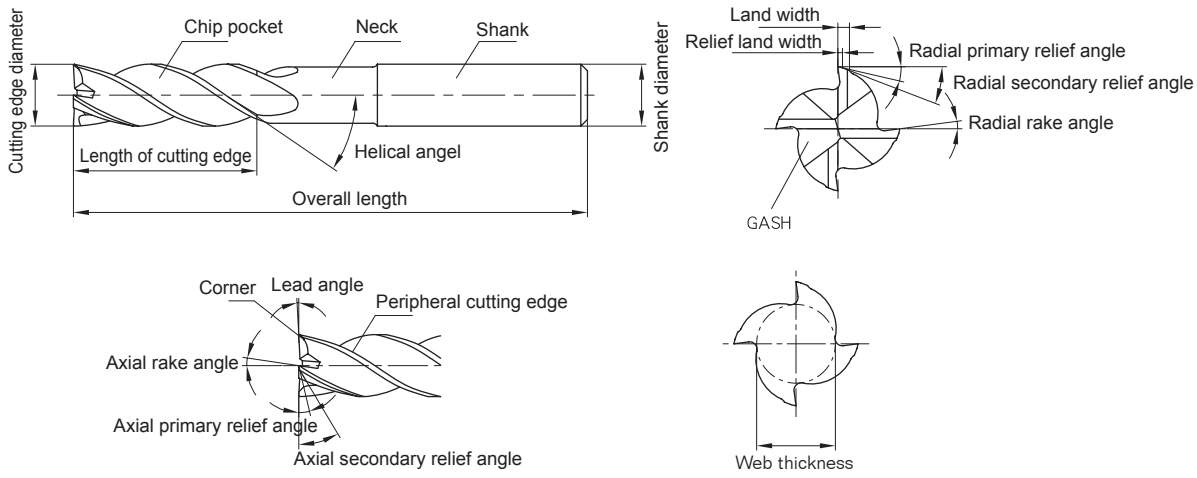
Cutting parameters for SM series end mills

SM-4R

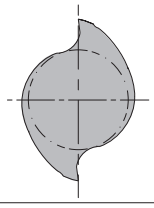
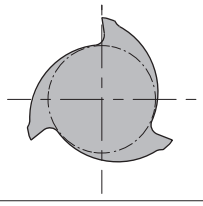
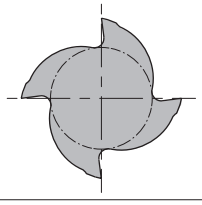
Workpiece material	Carbon steel、Alloy steel		Stainless steel	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	5300	900	2700	240
8	3900	840	2000	255
10	3100	770	1600	255
12	2600	720	1300	205
Maximum cutting depth				

1.The above table shows the standard value of side milling. When milling slot, rotating speed is around 80%~100% of the stated value, and feed speed around 60%~80%.
2.Non water-soluble cutting liquid is recommended in machining of stainless steel and heat-resistant alloy.
3.Please select high rigid and precise machine and tool holder.
4.Adjust rotating speed and feed speed according to cutting depth and machine rigidity.
5.Down milling is recommended in the case of side milling.
6.Make overhang of tool as short as possible in conditions of non-interference.

Parts terminology of end mill

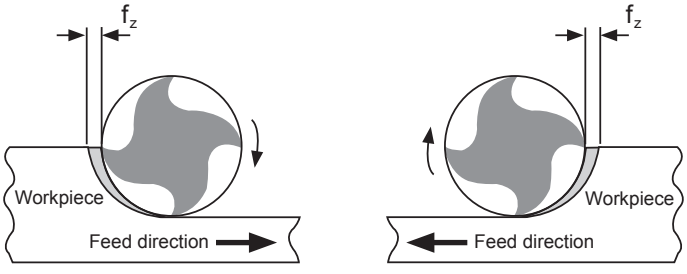


Number of teeth, chip pocket and tool rigidity

Number of teeth		2 Flutes	3 Flutes	4 Flutes
Profile of cross section				
Proportion of cross section		54%	56%	60%
Features	Advantages	● Large chip pocket ● Easy chip removal	● Easy chip removal ● Perfect surface finish	● Good rigidity ● Perfect surface finish
	Disadvantages	Low rigidity	Difficult to measure external diameter	Chip removal is not smooth
Functions		1. Slot machining 2. Side face machining 3. Hole machining	1. Slot machining 2. Side face machining 3. Heavy cutting 4. For finishing	1. Shallow slot machining 2. Side face machining 3. For finishing

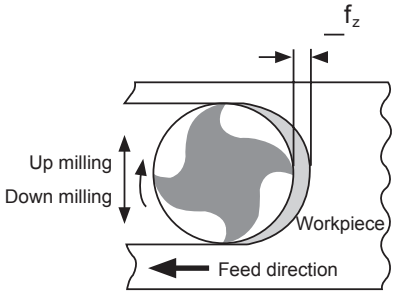
Down milling and up milling

● Side milling



(a) up milling (b) Down milling

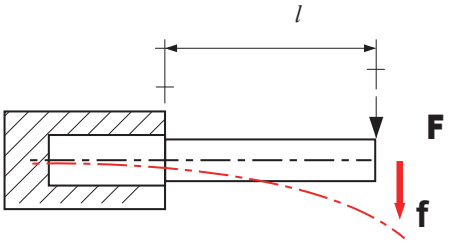
● Slot milling



Length of cutting edge (overhang) and cutting edge diameter

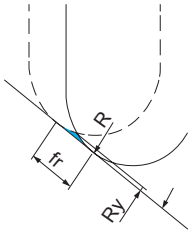
The shorter of overhang is, the higher the rigidity is. Thus it is not easy to bend or vibrate in the cutting process, and machining precision is improved. When length of cutting edge (overhang) doubles, the Deflection degree (f) will be 8 times of the original.

When the overhang is reduced by 20%, the Deflection degree (f) will decrease by 50%.
When the diameter increases by 20%, the Deflection degree (f) will decrease by 50%.



$$f=\frac{F\cdot l^3}{3\cdot E\cdot I}=\frac{F\cdot l^3\cdot 64}{3\cdot E\cdot d^4\cdot \pi}$$

Feed rate selection table in profile machining by ball nose and R end mills



Ry=R×{1-cos[arc sin(fr/2R)]}

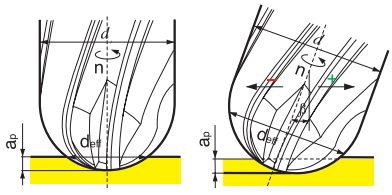
Ry：Theoretical value of surface roughness
fr：Feed rate
R：Ball nose radius or corner radius

Table of theoretical roughness formed by ball nose of end mill (corner radius of R end mill) and feed rate(mm)

R \ Ry	Feed rate fr									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.5	0.003	0.010	0.023	0.042	0.067	0.100				
1.0	0.001	0.005	0.011	0.020	0.032	0.046	0.063	0.083	0.107	
1.5	0.001	0.003	0.008	0.013	0.021	0.030	0.041	0.054	0.069	0.086
2.0	0.001	0.003	0.006	0.010	0.015	0.023	0.031	0.040	0.051	0.064
2.5	0.001	0.002	0.005	0.008	0.013	0.018	0.025	0.032	0.041	0.051
3.0		0.001	0.004	0.007	0.010	0.015	0.020	0.027	0.034	0.042
4.0		0.001	0.003	0.005	0.008	0.011	0.015	0.020	0.025	0.031
5.0		0.001	0.002	0.004	0.006	0.009	0.012	0.016	0.020	0.025
6.0			0.002	0.003	0.005	0.008	0.010	0.013	0.017	0.021
8.0			0.001	0.003	0.004	0.006	0.008	0.010	0.013	0.016
10.0			0.001	0.002	0.003	0.005	0.006	0.008	0.010	0.013
12.5			0.001	0.002	0.003	0.004	0.005	0.006	0.008	0.010

R \ Ry	Feed rate fr									
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
0.5										
1.0										
1.5	0.104									
2.0	0.077	0.092	0.109							
2.5	0.061	0.073	0.086	0.100						
3.0	0.051	0.061	0.071	0.083	0.095	0.109				
4.0	0.038	0.045	0.053	0.062	0.071	0.081	0.091	0.103		
5.0	0.030	0.036	0.042	0.049	0.057	0.064	0.073	0.082	0.091	0.101
6.0	0.025	0.030	0.035	0.041	0.047	0.054	0.061	0.068	0.076	0.084
8.0	0.019	0.023	0.026	0.031	0.035	0.040	0.045	0.051	0.057	0.063
10.0	0.015	0.018	0.021	0.025	0.028	0.032	0.036	0.041	0.045	0.050
12.5	0.012	0.014	0.017	0.020	0.023	0.026	0.029	0.032	0.036	0.040

Cutting parameters calculation

Symbol	Description	Formula
n	Rotating speed per minute n[min^{-1}]r/min	$n=\frac{v_c \cdot 1000}{d \cdot \pi}$
v_c	Cutting speed V_c[m/min]	$v_c=\frac{d \cdot \pi \cdot n}{1000}$
f_z	Amount of feed per tooth f_z[mm/tooth]	$f_z=\frac{V_f}{z \cdot n}$
f	Amount of feed per rotation f_z[mm/rev.]	$f=f_z \cdot z$
V_f	Feed rate V_f[mm/min]	$V_f=f_z \cdot z \cdot n=f \cdot n$
Q	Removal rate Q[cm^3/min]	$Q=\frac{a_e \cdot a_p \cdot v_f}{1000}$
d_{eff}	Effective diameter of ball nose end mill d_{eff}[mm] 	$\beta=0$ $d_{eff}=2 \cdot \sqrt{d \cdot a_p - a_p^2}$ $\beta \neq 0$ $d_{eff}=d \cdot sin[\beta \pm arccos(\frac{d-2a_p}{d})]$
V_{eff}	Effective cutting speed of end mill V_{eff}[m/min]	$V_{eff}=\frac{d_{eff} \cdot \pi \cdot n}{1000}$
a_e	Radial cutting width a_e[mm]	
a_p	Axial cutting depth a_p[mm]	
d	Milling diameter[mm]	
z	Number of teeth	
β	Inclined angle	

Common problems and solutions for end mill

Solutions / Common problems		Tool material	Cutting condition							Tool shape			Machine clamping				
		Select coated end mill	Cutting speed	Feed rate	Cutting depth	Cutting direction (down / up milling)	Cutting liquid: Increase the amount of cutting liquid	Cutting liquid: Water-insoluble cutting liquid	Cutting liquid: Dry or wet machining	Helical angle	Number of tooth	Milling diameter	Reduce the overhang length	Improve tool clamping precision	Change collet	Increase clamping force	Improve workpiece clamping rigidity
Tool fracture	Fracture of end mill			↓	↓						↓	↑	✓		✓	✓	
Damage of cutting edge	Rapid wear of cutting edge	✓	↓	↑		down		✓				↑					
	Breakage		↓	↓	↓	down			dry				✓		✓		✓
	Severe chips bond	✓					✓		wet	↑							
Machining precision	Poor surface quality		↑	↓	↓			✓	wet					✓			
	Uneven			↓	↓					↓	↑	↑		✓	✓		
	Uneven side face of workpiece			↓	↓	up		✓		↑	↑	↑	✓				
	Burrs, breakage and slice frittering			↓	↓					↓							
	Large vibration		↓	↑						↑	↓	↑	✓		✓	✓	✓
Chip control	obstructed chip removal			↓	↓		✓				↓						
Others		1.Large abrasion of cutting edge is easy to cause fracture of end mill or poor surface quality, so it is recommended to regrind the end mills. 2.Make overhang of tool as short as possible.															