Frezeleme yenilikleri

Takma uçlu sistemler ve solid karbür frezeler

ZCC Cutting Tools Europe resmî yenilik yayınlarından operasyona göre seçilmiş teknik sayfalar.

Dönemler en yeniden eskiye sıralanmıştır. Üreticinin ölçü tabloları, ürün kodları ve teknik çizimleri özgün biçimleriyle korunmuştur.

Bu belge Toksan tarafından hazırlanmış bir derlemedir; üreticinin tek bir döneme ait resmî ana kataloğu değildir. Eski yayınlar güncel stok veya ürünün devam ettiğine ilişkin taahhüt sayılmaz.

NASIL KULLANILIR?

Sonraki sayfadan dönemi seçin. PDF yer imleriyle bölümler arasında geçiş yapabilirsiniz. Teknik içerik İngilizcedir.

İhtiyacınız olan döneme geçin

Sayfa numaraları bu derlemeye aittir. “Kaynak yayın” bağlantısı üreticinin özgün PDF dosyasını açar.

Eylül 2026 3 - 25

PANGU PG9005, PG9020 / PG9025, EMP11, PGMS
Kaynak yayın □ | Özgün PDF sayfaları: 84-106

Eylül 2025 / 2026 güncellemesi 26 - 70

PG8020 / PG8030, EMP08, EMP10, XMR13, PGMS, XM-2C
Kaynak yayın □ | Özgün PDF sayfaları: 42-86

Mart 2025 71 - 97

XMR12 yüksek ilerleme sistemi ve XM-2C başlıklar
Kaynak yayın □ | Özgün PDF sayfaları: 8-34

Eylül 2024 98 - 111

SMP09 kanal frezeleme sistemi
Kaynak yayın □ | Özgün PDF sayfaları: 16-29

Mart 2023 112 - 142

FME17, EMP05, FMR06, CSX1000 ve APL
Kaynak yayın □ | Özgün PDF sayfaları: 24-54

Eylül 2022 143 - 195

FMA12, EMP14, FMR11 ve VPM serisi
Kaynak yayın □ | Özgün PDF sayfaları: 26-78

Mayıs 2022 196 - 262

YBG205H, FMP06, FMA17, FMP17, FMR04, TM ve VPM
Kaynak yayın □ | Özgün PDF sayfaları: 10-76

Teknik seçim, tutucu uyumu ve güncel bulunabilirlik için Toksan ile görüşün. Üretici telif ve iletişim sayfaları derlemenin sonundadır.

Indexable milling ISO code – inserts

S	P	K	N	12	04	ED	T21K	R	–	DM
1	2	3	4	5	6	7	8	9		10

Insert shape

A		C	
H		L	
M		O	
P		R	
S		T	
W		X	Special
Z	Special		

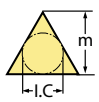
1

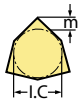
Clearance angle

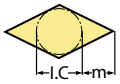
B		C	
D		E	
F		N	
P		O	Special

2

Tolerance class









Code	I.C [mm]	m [mm]	S [mm]
A	±0,025	±0,005	±0,025
C	±0,025	±0,013	±0,025
E	±0,025	±0,025	±0,025
F	±0,013	±0,005	±0,025
G	±0,025	±0,025	±0,130
H	±0,013	±0,013	±0,025
J	±0,05–0,13	±0,005	±0,025
K	±0,05–0,13	±0,013	±0,025
L	±0,05–0,13	±0,025	±0,025
M	±0,05–0,13	±0,08–0,18	±0,130
N	±0,05–0,13	±0,08–0,18	±0,025
U	±0,08–0,25	±0,13–0,38	±0,130

3

Fastening features (metric)

Insert shape

A		B	
C		F	
G		H	
J		M	
N		Q	
R		T	
U		W	
X	Special		

4

Cutting edge length l [mm]

Insert shape

	
A	C, M
	
H, O, P	L
R	S
	W

5

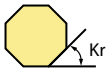
Insert thickness S [mm]



Code	S	Code	S
00	0,79	**05**	5,56
T0	0,99	**T5**	5,95
01	1,59	**06**	6,35
T1	1,98	**T6**	6,75
02	2,38	**07**	7,94
T2	2,58	**09**	9,52
03	3,18	**T9**	9,72
T3	3,97	**11**	11,11
04	4,76	**12**	12,70
T4	4,96		

6

Angle





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

7

Chamfer

Code	Type	Code	Angle	Code	Width [mm]	Code	Position
F		**0**	5°	**0**	0,10	**K**	
E		**1**	10°	**1**	0,15		
T		**2**	15°	**2**	0,20	**P**	
S		**3**	20°	**3**	0,25		
		4	25°	**4**	0,30	**W**	
		5	30°	**5**	0,35		
				6	0,40		
				7	0,45	**–**	

8

Cutting direction

Code	Description
R	Right
L	Left
N	Right and left

9

Chip breaker overview
(on page B26)

10

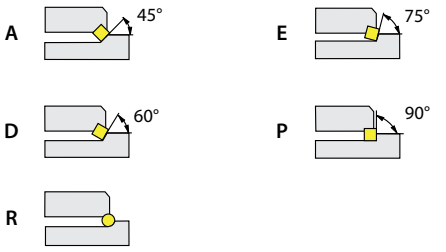
Indexable milling System code – milling bodies

FM	A	12	050	–	A22	O	–	N	06	–	04	(L)	(C)
1	2	3	4		5	6		7	8		9	10	11

Type	
Code	Description
BM	Profile milling
CM	Chamfer milling
EM	Square shoulder milling
FM	Face milling
HM	Helical milling
SM	Slot milling
TM	T-slot milling
XM	Special

1

Entering angle



2

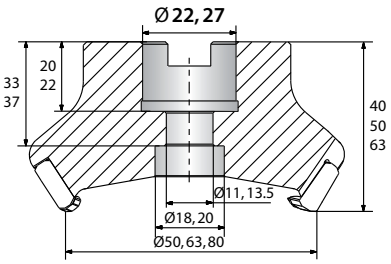
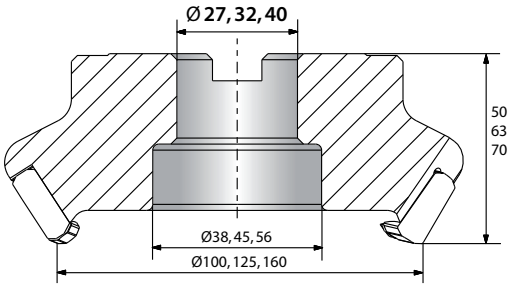
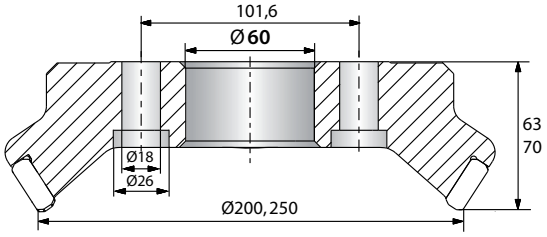
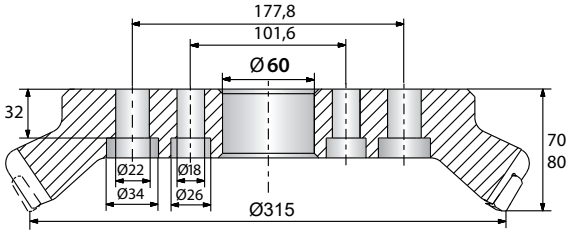
Serial number

3

Nominal diameter [mm]	
Code	Description
025	25
050	50
160	160
315	315
...	

4

Type and size of tool holders

Code	Type	Code	Type
A	Nominal diameter Ø50 – 80 mm 	**B**	Nominal diameter Ø100 – 160 mm 
C	Nominal diameter Ø200 – 250 mm 	**D**	Nominal diameter Ø315 mm 
G	Straight shank	**XP**	Weldon shank
K	Bore with keyway		

5

With respect to mounting please adhere to the information provided by the tool holder manufacturer.

Insert shape			
A		C	
H		L	
M		O	
P		R	
S		T	
W		X	Special
Z	Special		

6

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

7

Cutting edge length l [mm]	
Insert shape	
A	C, M
H, O, P	L
R	S
T	W

8

Number of teeth

9

Cutting direction	
Code	Description
L	Left

10

With inner cooling

11

Tools with B coupling and inner coolant supply require the following spare parts:



Coolant clamp screw



Coolant shower plate



Spare parts (B coupling with inner coolant supply)

		B27	B32	B40	B40
	Ø	**80**	**100**	**125**	**160**
	**Coolant clamp screw**	LDB27C	LDB32C	LDB40C	LDB40C
	**Coolant shower plate**	B27-002-CP	B32-002-CP	B40-002-CP	B40-003-CP

When purchasing tools with inner coolant supply and B coupling these spare parts are included in delivery.

PG9005 grade

Premium PVD grade for finishing and for hardened materials

YOUR BENEFITS

– **Specially developed** for finishing operations and the machining of hard materials
– An ultra-fine, homogeneous substrate for **high wear resistance** and **longTool life**
– Suitable for milling materials up to **58 HRC**
– High dimensional accuracy for **excellent surface quality**



Fig.: ZOHX2005-HM PG9005

Articles available with the new PG9005 grade:

Article	Stock	Milling system
APKT070204-APF PG9005	●	EMP01/02
APKT070204-APM PG9005	●	EMP01/02
APKT11T304-APF PG9005	●	EMP01/02
APKT11T304-APM PG9005	●	EMP01/02
APKT11T308-APF PG9005	●	EMP01/02
APKT11T308-APM PG9005	●	EMP01/02
APKT11T312-APM PG9005	●	EMP01/02
APKT11T316-APM PG9005	●	EMP01/02
APKT11T320-APM PG9005	●	EMP01/02
APKT160408-APF PG9005	●	EMP01/02

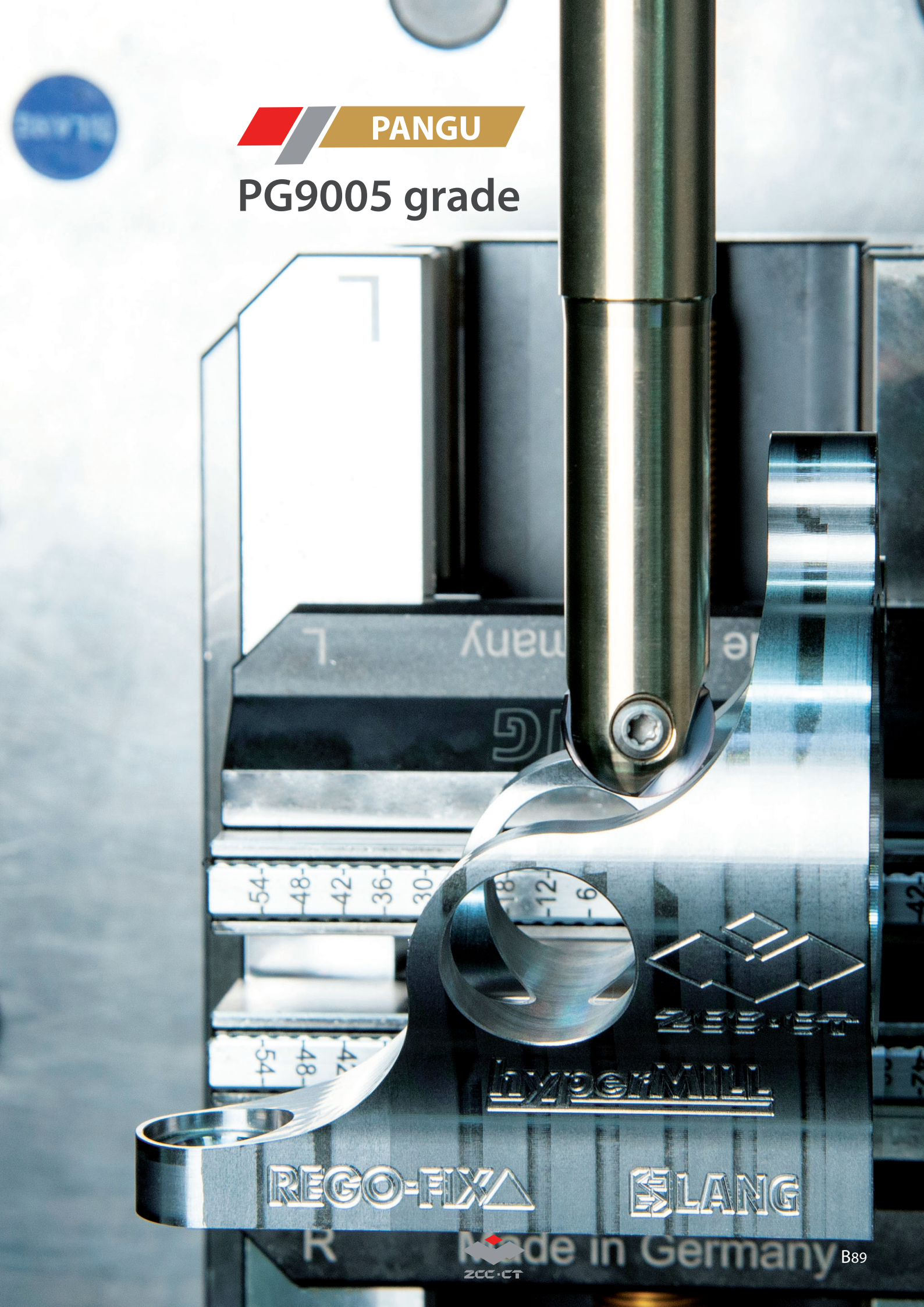
● Ex stock ○ On demand

Article	Stock	Milling system
APKT160408-APM PG9005	●	EMP01/02
APKT160416-APM PG9005	●	EMP01/02
APKT160420-APM PG9005	●	EMP01/02
APKT160424-APM PG9005	●	EMP01/02
APKT160430-APM PG9005	●	EMP01/02
RCKT1204MO-NM PG9005	●	FMR02
ZOHX1203-HM PG9005	●	BMR04
ZOHX1604-HM PG9005	●	BMR04
ZOHX2005-HM PG9005	●	BMR04
ZOHX2506-HM PG9005	●	BMR04
ZOHX3007-HM PG9005	●	BMR04

● Ex stock ○ On demand

PANGU

PG9005 grade



PG9020/PG9025 grades

PANGU

Two high-performance milling grades

YOUR BENEFITS

– High-performance coating for **reduction of diffusion wear** and **crater formation**
– Enables **high cutting speeds** even with materials that are difficult to machine
– Low internal coating stress for **greater edge stability**

PG9020
– High process reliability during roughing and finishing
– Supports higher cutting speeds

PG9025
– With **high toughness**, particularly suitable for machining involving interrupted cuts
– Optimised for the cost-effective machining of stainless steel materials

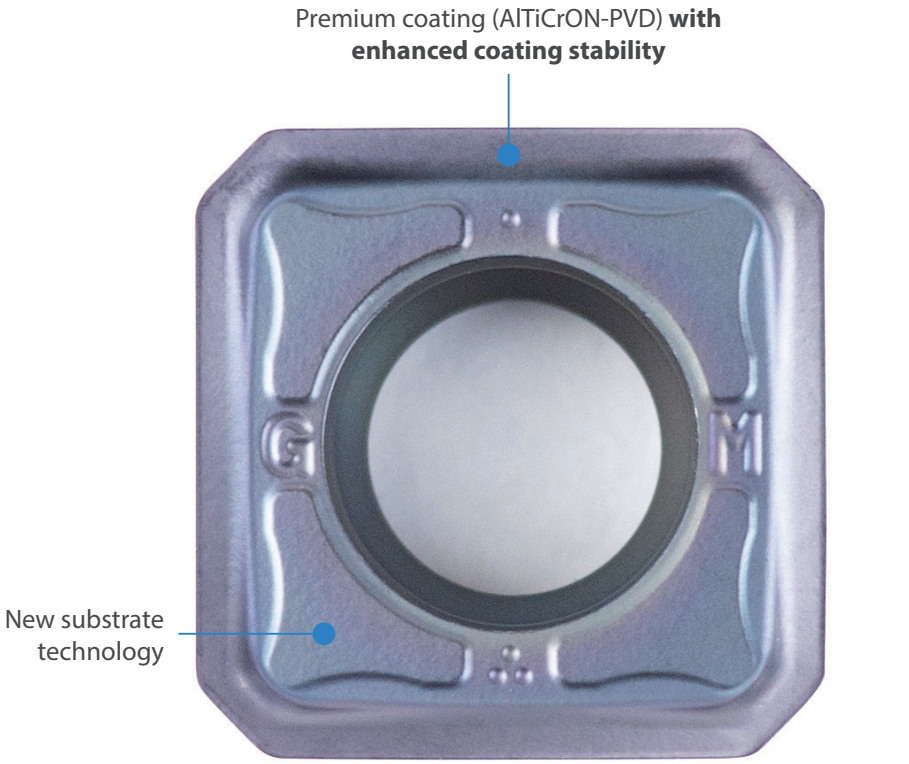


Fig.: SNMX1205ANN-GM PG9025

Items available with the new **PG9020 and PG9025 grades:**

Article	Stock	Milling system
APKT11T304-APM PG9020	●	EMP01/02
APKT11T308-APM PG9020	●	EMP01/02
APKT11T312-APM PG9020	●	EMP01/02
APKT11T316-APM PG9020	●	EMP01/02
APKT11T320-APM PG9020	●	EMP01/02
APKT160408-APM PG9020	●	EMP01/02
APKT160412-APM PG9020	●	EMP01/02
APKT160416-APM PG9020	●	EMP01/02
APKT160420-APM PG9020	●	EMP01/02
APKT160424-APM PG9020	●	EMP01/02
APKT160430-APM PG9020	●	EMP01/02
ONMU060408-GM PG9020	●	FMA12
ONMU09T512-GM PG9020	○	FMA12
RDMT10T3MO-MM PG9020	●	FMR11
RDMT1204MO-MM PG9020	●	FMR11
RPMT10T3MO-MM PG9020	●	FMR11
RPMT1204MO-MM PG9020	●	FMR11
SDMT06T208-NL PG9020	●	XMR01
SDMT06T208-NM PG9020	●	XMR01
SDMT09T312-NL PG9020	●	XMR01
SDMT09T312-NM PG9020	●	XMR01
SDMT120412-NL PG9020	●	XMR01
SDMT120412-NM PG9020	●	XMR01
SNGX1205ANN-GM PG9020	●	FMA17
SNGX1205ENN-GM PG9020	●	FME17
SNGX1205PNN-GM PG9020	●	FMP17
SNMX120512-GH PG9020	●	FM*17
SNMX120512-GM PG9020	●	FM*17
SNMX120512-GR PG9020	●	FM*17
SNMX1205ANN-GM PG9020	●	FMA17
SNMX1205ANN-GR PG9020	○	FMA17
SNMX1205ENN-GR PG9020	○	FME17
SNMX1205PNN-GR PG9020	○	FMP17

● Ex stock ○ On demand

Article	Stock	Milling system
APKT11T304-APM PG9025	●	EMP01/02
APKT11T308-APM PG9025	●	EMP01/02
APKT11T312-APM PG9025	●	EMP01/02
APKT11T316-APM PG9025	●	EMP01/02
APKT11T320-APM PG9025	●	EMP01/02
APKT160408-APM PG9025	●	EMP01/02
APKT160412-APM PG9025	●	EMP01/02
APKT160416-APM PG9025	●	EMP01/02
APKT160420-APM PG9025	●	EMP01/02
APKT160424-APM PG9025	●	EMP01/02
APKT160430-ANL PG9025	●	EMP01/02
APKT160430-APM PG9025	●	EMP01/02
ONMU060408-GM PG9025	○	FMA12
ONMU060408-GR PG9025	○	FMA12
ONMU09T512-GM PG9025	●	FMA12
RDMT10T3MO-MM PG9025	●	FMR11
RDMT1204MO-MM PG9025	●	FMR11
RPMT10T3MO-MM PG9025	○	FMR11
RPMT1204MO-MM PG9025	○	FMR11
RPMT1605MO-MM PG9025	○	FMR11
SDMT06T208-NL PG9025	●	XMR01
SDMT06T208-NM PG9025	●	XMR01
SDMT09T312-NL PG9025	●	XMR01
SDMT09T312-NM PG9025	●	XMR01
SDMT120412-NL PG9025	●	XMR01
SDMT120412-NM PG9025	●	XMR01
SNGX1205ANN-GM PG9025	●	FMA17
SNGX1205ENN-GM PG9025	●	FME17
SNGX1205PNN-GM PG9025	●	FMP17
SNMX120512-GH PG9025	●	FM*17
SNMX120512-GM PG9025	●	FM*17
SNMX120512-GR PG9025	●	FM*17
SNMX1205ANN-GM PG9025	●	FMA17
SNMX1205ANN-GR PG9025	●	FMA17
SNMX1205ENN-GR PG9025	●	FME17
SNMX1205PNN-GR PG9025	●	FMP17

● Ex stock ○ On demand

EMP11 square shoulder milling system

A cost-effective all-rounder for small parts production

YOUR BENEFITS

– An ideal alternative to solid carbide end mills due to the small size of the indexable inserts
– V-shaped insert underside for **optimum self-alignment and stability**
– A larger core diameter **improves the tool's rigidity and stability**
– Various chip breaker designs for precise shoulder machining or high-feed strategies
– Wide range of applications for steel, stainless materials and cast materials



Fig.: EMP11-014-G14-CV06-05-40-90

Insert grades

YBG205H	YBD252
PVD	*CVD*
P10 – P30	*K20 – K35*
M20 – M40	

Chip breaker

CVMX-PNR-GM	CVMX-XR-GM
	
General machining (Square shoulder milling)	General machining (High-feed milling)

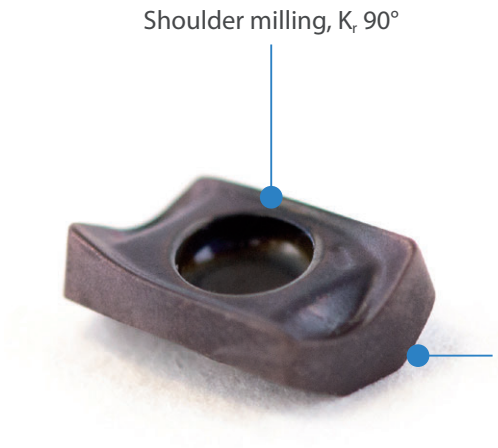


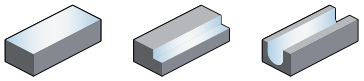
Fig.: CVMX060204PNR-GM YBG205H



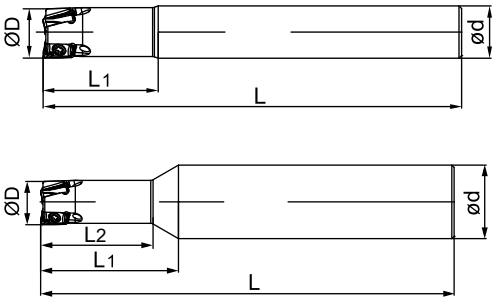
Fig.: CVMX0602-XR-GM YBG205H

Square shoulder milling

EMP11 Kr: 90°







Article	✻	Stock	Dimensions [mm]						Teeth	kg	Insert
			ØD	ød	L_1	L_2	L	$a_{p\,max}$			
EMP11-006-G06-CV06-01C-S	✻	●	6	6	12		60	5,00	1		CVMX0602**
EMP11-008-G08-CV06-02C-S	✻	○	8	8	12		60	5,00	2		
EMP11-008-G08-CV06-02C-M	✻	●	8	8	22		75	5,00	2		
EMP11-008-G12-CV06-02C-L	✻	○	8	12	27	20	80	5,00	2		
EMP11-010-G10-CV06-02C-S	✻	●	10	10	15		75	5,00	2		
EMP11-010-G10-CV06-03C-S	✻	○	10	10	15		75	5,00	3		
EMP11-010-G10-CV06-03C-M	✻	●	10	10	22		80	5,00	3		
EMP11-010-G16-CV06-03C-L	✻	●	10	16	30	24	90	5,00	3		
EMP11-012-G12-CV06-03C-S	✻	○	12	12	15		75	5,00	3		
EMP11-012-G12-CV06-04C-S	✻	○	12	12	15		75	5,00	4		
EMP11-012-G12-CV06-04C-M	✻	●	12	12	22		80	5,00	4		
EMP11-012-G12-CV06-04C-L	✻	○	12	12	30		100	5,00	4		
EMP11-014-G14-CV06-04C-S	✻	●	14	14	15		75	5,00	4		
EMP11-014-G14-CV06-05C-S	✻	○	14	14	15		75	5,00	5		
EMP11-014-G14-CV06-05C-M	✻	●	14	14	22		90	5,00	5		
EMP11-014-G14-CV06-05C-L	✻	●	14	14	35		120	5,00	5		
EMP11-016-G16-CV06-05C-S	✻	○	16	16	25		100	5,00	5		
EMP11-016-G16-CV06-06C-S	✻	○	16	16	25		100	5,00	6		
EMP11-016-G16-CV06-06C-M	✻	●	16	16	30		120	5,00	6		
EMP11-016-G16-CV06-06C-L	✻	○	16	16	40		140	5,00	6		

● Ex stock ○ On demand

✻ With internal cooling

Spare parts

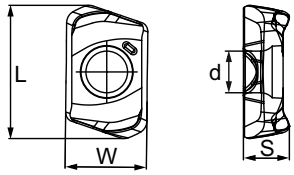
	Insert	**CVMX0602****
	ØD	**6–16**
	Screw	I60M1.8*3.3TT (0,4 Nm)
	Wrench (Insert)	WT06IP



Ideal machining conditions
Normal machining conditions
Unfavourable machining conditions

CVMX	L	W	S	d
06 02	6,70	4,10	2,30	2,00

Milling Insert

CV** milling insert			HC¹ (CVD)	HC¹ (PVD)	HT	HC²	HW
	P			⊛			
	M			⊛			
	K		⊛				
	N			⊛			
	S			⊛			
	H						
ISO	bs	r	YBD252	YBG205H			
CVMX0602XR-GM			●	●			

● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

Programming radius

Insert	approx. R [mm]	Residual material
CVMX0602XR-GM	1.0 mm	0.12
CVMX0602XR-GM	1.2 mm	0.07

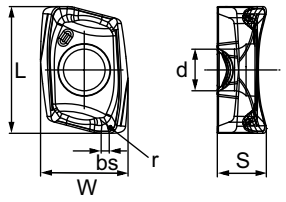
Application range

a_p [mm]	f_z [mm]
0.5	0.5–1.2

Ideal machining conditions
Normal machining conditions
Unfavourable machining conditions

CVMX	L	W	S	d
06 02	6,40	4,40	2,50	2,00

Milling Insert

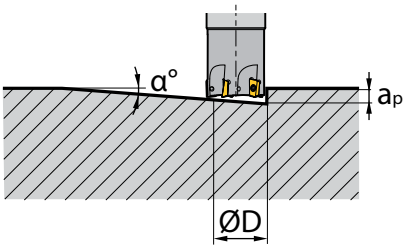
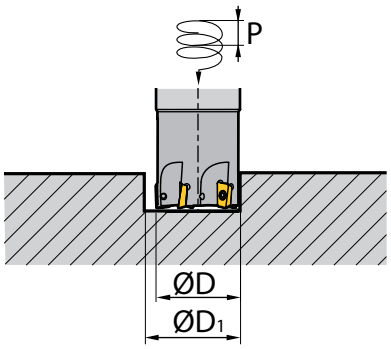
CV** milling insert			HC¹ (CVD)	HC¹ (PVD)	HT	HC²	HW
	P			⊛			
	M			⊛			
	K		⊛				
	N			⊛			
	S			⊛			
	H						
ISO	bs	r	YBD252	YBG205H			
CVMX060204PNR-GM	0,5	0,4	●	●			

● Ex stock ○ On demand

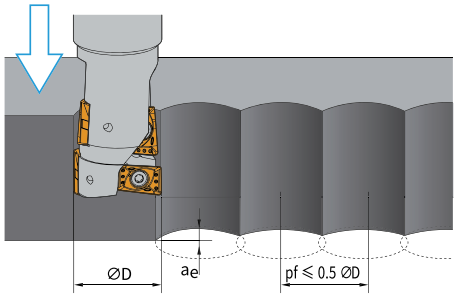
HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

Technical information

Insert CVMX

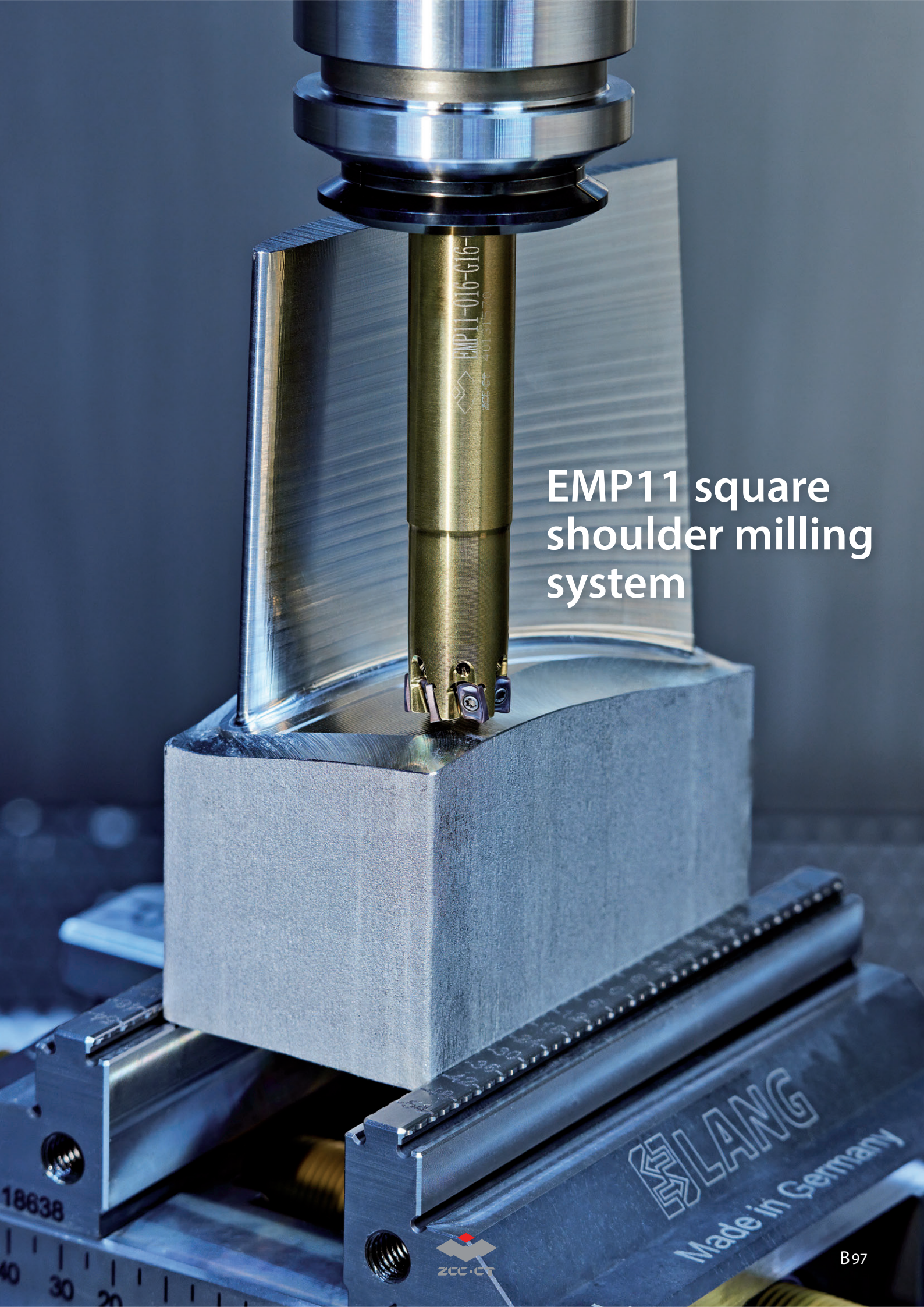
		Plunging / Ramping		Circular milling	
		 $L_m = \frac{a_p}{\tan_\alpha}$ α : Ramp angle		 $P = \tan_\alpha \times \pi \times D_1$ α : Helix angle	
Insert	Diameter ØD [mm]	Max. cutting depth a_p [mm]	Max. ramp angle α°	Min. diameter $ØD_1$ [mm]	Max. diameter [mm]
CVMX0602 XR-GM	8	0,5	1,0	12	14
	10	0,5	0,7	16	18
	12	0,5	0,55	20	22
	14	0,5	0,45	24	26
	16	0.6	0,5	28	30
CVMX060204 PNR-GM	8	5	2,0	14	15
	10	5	1,6	18	19
	12	5	1,3	22	23
	14	5	1,1	26	27
	16	5	0,9	30	31

Plunging



a_e max 1,5 mm

Reduce the feed rate when plunging and circular milling.
For drilling operations (axial) set the feed rate under 0.2 mm.
„Attention" – drilling can form long chips.



EMP11 square shoulder milling system

Indexable milling – group 2 (FMA01/02/03/04, FME02/03/17, FMP01/02, EMP01/02/03/04/05/11/14)

Material group		Composition / structure / heat treatment		Brinell hardness HB	Machining group	Starting values for cutting speed v_c [m/min]							
						HC (CVD)							
						YBC302		YBC401		YBD152		YBD252	
						a_e / D		a_e / D		a_e / D		a_e / D	
						1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	245	285	210	245				
		approx. 0,45 % C	annealed	190	2	210	245	180	210				
		approx. 0,45 % C	tempered	250	3	200	230	170	200				
		approx. 0,75 % C	annealed	270	4	175	200	150	175				
		approx. 0,75 % C	tempered	300	5	160	190	140	160				
	Low-alloyed steel		annealed	180	6	210	245	180	210				
			tempered	275	7	175	200	150	175				
			tempered	300	8	160	190	140	160				
			tempered	350	9	135	160	120	135				
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	125	145	105	125				
			hardened and tempered	325	11	90	100	75	90				
M	Stainless steel	ferritic/martensitic	annealed	200	12								
		martensitic	tempered	240	13								
		austenitic	quench hardened	180	14								
		austenitic-ferritic		230	15								
K	Grey cast iron	perlitic/ferritic		180	16					315	365	270	315
		perlitic (martensitic)		260	17					185	215	160	190
	Cast iron with spheroidal graphite	ferritic		160	18					215	250	185	215
		perlitic		250	19					145	170	125	145
	Malleable cast iron	ferritic		130	20					260	300	225	260
		perlitic		230	21					175	205	150	175
N	Aluminium wrought alloys	cannot be hardened		60	22								
		hardenable	hardened	100	23								
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24								
		≤ 12 % Si, hardenable	hardened	90	25								
		> 12 % Si, cannot be hardened		130	26								
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27								
		CuZn, CuSnZn		90	28								
		CuSn, Pb-free copper, electrolytic copper		100	29								
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30								
			hardened	280	31								
		Ni or Co bass	annealed	250	32								
			hardened	350	33								
			cast	320	34								
	Titanium alloys	pure titanium		R_m 400	35								
		α and β alloys	hardened	R_m 1050	36								
H	Hardened steel		hardened and tempered	55 HRC	37								
			hardened and tempered	60 HRC	38								
	Hard cast iron		cast	400	39								
	Hardened cast iron		hardened and tempered	55 HRC	40								
X	Non-metallic materials	Thermoplasts			41								
		Thermosetting plastics			42								
		Plastic, glass-fibre reinforced GFRP			43								
		Plastic, carbon fibre reinforced CFRP			44								
		Graphite			45								
		Wood			46								

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B338.
For examples of material for cutting tool groups view page D11.

	Starting values for cutting speed v_c [m/min]																							
	HC (CVD)		HC (PVD)														HW				HT			
	YBM253		YBG101		YBG102		YBG152		YB9320		YBG205(H)		YBG252		YBG302		YD101		YD201		YNG151			
	a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D			
	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	
	245	285			255	295	240	280	230	265	220	255	215	250	210	245					270	315		
	210	245			220	255	205	240	200	230	190	220	185	215	180	210					235	270		
	200	230			205	240	195	225	185	215	180	205	175	200	170	200					220	255		
	175	200			180	210	170	200	165	190	155	180	155	175	150	175					195	220		
	160	190			170	195	160	185	150	175	145	170	140	165	140	160					180	210		
	210	245			220	255	205	240	200	230	190	220	185	215	180	210					235	270		
	175	200			180	210	170	200	165	190	155	180	155	175	150	175					195	220		
	160	190			170	195	160	185	150	175	145	170	140	165	140	160					180	210		
	135	160			145	165	135	155	130	150	125	145	120	140	120	135					150	180		
	125	145			130	150	120	140	115	135	110	130	110	125	105	125					140	160		
	90	100			90	105	85	100	85	95	80	90	80	90	75	90					100	110		
	125	145			130	150	120	140	115	135	110	130	110	125	105	125					135	160		
	105	120			110	125	105	120	100	115	95	110	95	105	90	105					115	135		
	130	155			140	160	130	150	125	145	120	140	115	135	115	130					145	170		
	105	120			110	125	105	120	100	115	95	110	95	105	90	105					115	135		
					285	330	265	305	255	295	245	285	240	280	235	275								
					170	195	160	185	150	175	145	170	140	165	140	160								
					195	225	180	210	175	200	165	195	165	190	160	185								
					130	150	120	140	115	135	110	130	110	125	105	125								
					230	270	220	255	210	240	200	230	195	225	190	225								
					155	180	145	170	140	160	135	155	130	150	130	150								
			1505	1735													1205	1390	1040	1200				
			1225	1420													980	1140	850	980				
			540	620													435	500	375	435				
			435	505													350	405	300	350				
			220	255													180	205	155	180				
			170	195													140	160	120	140				
			210	245													170	200	150	170				
			385	445													310	360	265	310				
					75	85	70	80	65	75	65	75	65	75	60	70								
					50	55	50	55	45	50	45	50	45	50	40	45								
					60	70	55	65	55	65	50	55	50	55	50	55								
					35	40	35	40	30	35	30	35	30	35	30	35								
					45	50	45	50	40	45	40	45	40	45	40	45								
					75	85	70	80	65	75	65	75	65	75	60	70								
					75	85	70	80	65	75	65	75	65	75	60	70								

HC Coated carbide
HT Uncoated carbide, primary component (TiC) or (TiN), cermet
HW Uncoated carbide, primary component (WC)
BL Cubic boron nitride with low BN content
BH Cubic boron nitride with high BN content
CN Si3N4 ceramic
CM Mixed ceramic
HC_1 Coated cermet
BC CBN with coating
CC Coated cutting ceramic
CR Cutting ceramic, primary component aluminium oxide (Al_2O_3), reinforced
DP Polycrystalline diamond

Recommended feed rate

Indexable milling – group 2 (FMA01/02/03/04, FME02/03/17, FMP01/02, EMP01/02/03/04/05/11/14)

Material group		Feed rate per cutting edge [mm]																	
		FMA01 | FMA02			FMA03			FMA03			FMA04			FMA04			FMA04		
		SEET12			SEKN12			SEKN15			OFKT05			OFKR07			ODHT06		
		Application																	
		F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R
P	Unalloyed steel	0,15	0,20	0,25		0,18			0,20		0,20	0,25		0,20	0,25		0,20	0,25	
	Low-alloyed steel	0,14	0,19	0,23		0,17			0,19		0,19	0,23		0,19	0,23		0,19	0,23	
	High-alloyed steel and high-alloyed tool steel	0,13	0,18	0,22		0,16			0,18		0,18	0,22		0,18	0,22		0,18	0,22	
M	Stainless steel	0,11	0,14	0,18		0,13			0,14		0,14	0,18		0,14	0,18		0,14	0,18	
K	Grey cast iron	0,17	0,22	0,28		0,20			0,22		0,22	0,28		0,22	0,28		0,22	0,28	
	Cast iron with spheroidal graphite	0,15	0,20	0,25		0,18			0,20		0,20	0,25		0,20	0,25		0,20	0,25	
	Malleable cast iron	0,15	0,20	0,25		0,18			0,20		0,20	0,25		0,20	0,25		0,20	0,25	
N	Aluminium wrought alloys	0,13	0,17	0,21							0,17	0,21		0,17	0,21		0,17	0,21	
	Aluminum cast alloys	0,13	0,17	0,21							0,17	0,21		0,17	0,21		0,17	0,21	
	Copper and copper alloys (bronze/brass)	0,11	0,15	0,19							0,15	0,19		0,15	0,19		0,15	0,19	
S	Heat-resistant alloys	0,11	0,14	0,18							0,14	0,18		0,14	0,18		0,14	0,18	
	Titanium alloys	0,11	0,14	0,18							0,14	0,18		0,14	0,18		0,14	0,18	
H	Hardened steel																		
	Hard cast iron																		
	Hardened cast iron																		
X	Non-metallic materials																		

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

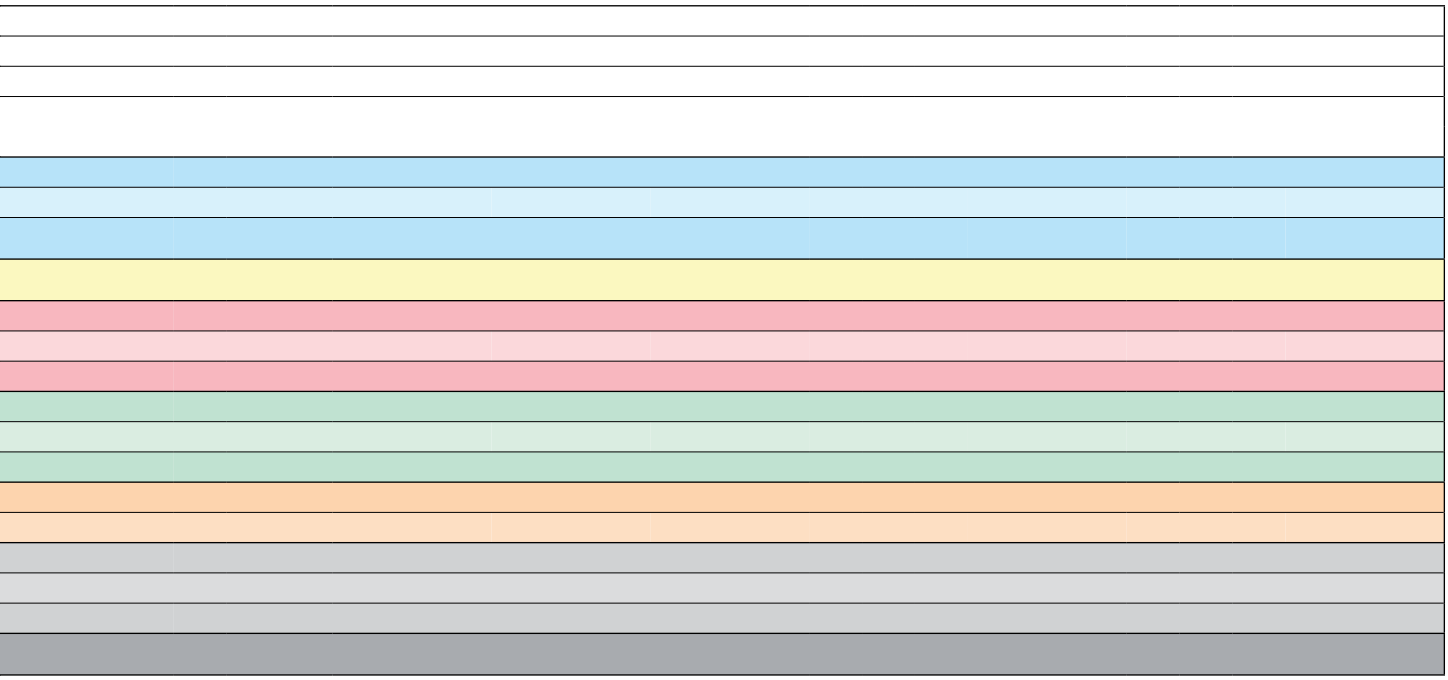
Indexable milling – group 2 (FMA01/02/03/04, FME02/03/17, FMP01/02, EMP01/02/03/04/05/11/14)

Material group		Feed rate per cutting edge [mm]																	
		EMP03 | EMP04			EMP05			EMP11			EMP14								
		APKT11			ADKT**			CVMX060204-PNR			VPGT22								
		Application																	
		F	M	R	F	M	R	F	M	R	F	M	R						
P	Unalloyed steel	0,12	0,17	0,23	0,10	0,15	0,20		0,12										
	Low-alloyed steel	0,11	0,16	0,21	0,09	0,14	0,19		0,11										
	High-alloyed steel and high-alloyed tool steel	0,10	0,15	0,20	0,09	0,13	0,18		0,10										
M	Stainless steel	0,08	0,12	0,16	0,07	0,11	0,14		0,08										
K	Grey cast iron	0,13	0,19	0,25	0,11	0,17	0,22		0,13										
	Cast iron with spheroidal graphite	0,12	0,17	0,23	0,10	0,15	0,20		0,12										
	Malleable cast iron	0,12	0,17	0,23	0,10	0,15	0,20		0,12										
N	Aluminium wrought alloys	0,10	0,15	0,20	0,09	0,13	0,17		0,10		0,05	0,2	0,3						
	Aluminum cast alloys	0,10	0,15	0,20	0,09	0,13	0,17		0,10		0,05	0,2	0,3						
	Copper and copper alloys (bronze/brass)	0,09	0,13	0,18	0,08	0,11	0,15		0,09		0,05	0,2	0,3						
S	Heat-resistant alloys																		
	Titanium alloys																		
H	Hardened steel																		
	Hard cast iron																		
	Hardened cast iron																		
X	Non-metallic materials																		

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

	Feed rate per cutting edge [mm]																							
	FME02			FME03			FME03			FME17			FMP01			FMP02			EMP01 | EMP02			EMP01 | EMP02		
	SPK*12			SPK*12			SPK*15			SNGX1205ENN**			TPKN22			SEET12			APKT11			APKT16		
	Application																							
	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R
		0,20			0,19			0,20		0,20	0,25			0,20		0,15	0,20	0,25	0,10	0,15	0,20	0,12	0,17	0,23
		0,19			0,17			0,19		0,19	0,23			0,19		0,14	0,19	0,23	0,09	0,14	0,19	0,11	0,16	0,21
		0,18			0,16			0,18		0,18	0,22			0,18		0,13	0,18	0,22	0,09	0,13	0,18	0,10	0,15	0,20
		0,14			0,13			0,14		0,14	0,18			0,14		0,11	0,14	0,18	0,07	0,11	0,14	0,08	0,12	0,16
		0,22			0,20			0,22		0,22	0,28			0,22		0,17	0,22	0,28	0,11	0,17	0,22	0,13	0,19	0,25
		0,20			0,19			0,20		0,20	0,25			0,20		0,15	0,20	0,25	0,10	0,15	0,20	0,12	0,17	0,23
		0,20			0,19			0,20		0,20	0,25			0,20		0,15	0,20	0,25	0,10	0,15	0,20	0,12	0,17	0,23
										0,17	0,21					0,13	0,17	0,21	0,09	0,13	0,17	0,10	0,15	0,20
										0,17	0,21					0,13	0,17	0,21	0,09	0,13	0,17	0,10	0,15	0,20
										0,15	0,19					0,11	0,15	0,19	0,08	0,11	0,15	0,09	0,13	0,18
										0,14	0,18													
										0,14	0,18													

F Finishing
M Medium machining
R Roughing



F Finishing
M Medium machining
R Roughing


PANGU
PGMS series

Solid carbide milling

System code – PGMS series **B104**

PANGU PGMS series **B105–B106**

B

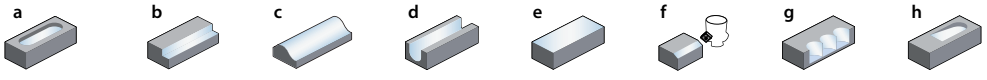
Solid carbide milling

System code – PGMS series

PGMS	–	4	BC	15	–	(D12.0)	R150
1		2	3	4		5	6

Series	Number of teeth	Cutting edge type	
		Code	Description
		BT	Tapered ball end mill
		BC	Conical barrel cutter
1	2	3	

Cutting angle	Shank diametre [mm]	Radius [mm]
4	5	6



a Groove milling b Square shoulder milling c Profile milling d Slot milling e Face milling f Chamfer milling g Plunge milling h Circular milling/Ramping

PGMS series

The ideal choice for complex contours

Now also available as a barrel cutter New

YOUR BENEFITS

– **Greater flexibility** thanks to conical barrel cutters
– Curved cutting edge for time savings of **up to 90 % compared with ball nose cutters**
– **Flawless surface quality** made possible by low-vibration machining
– **Shorter process times** thanks to enhanced tool geometry
– **Extremely long tool life** when machining HRSA and titanium thanks to customised cutting edge geometry

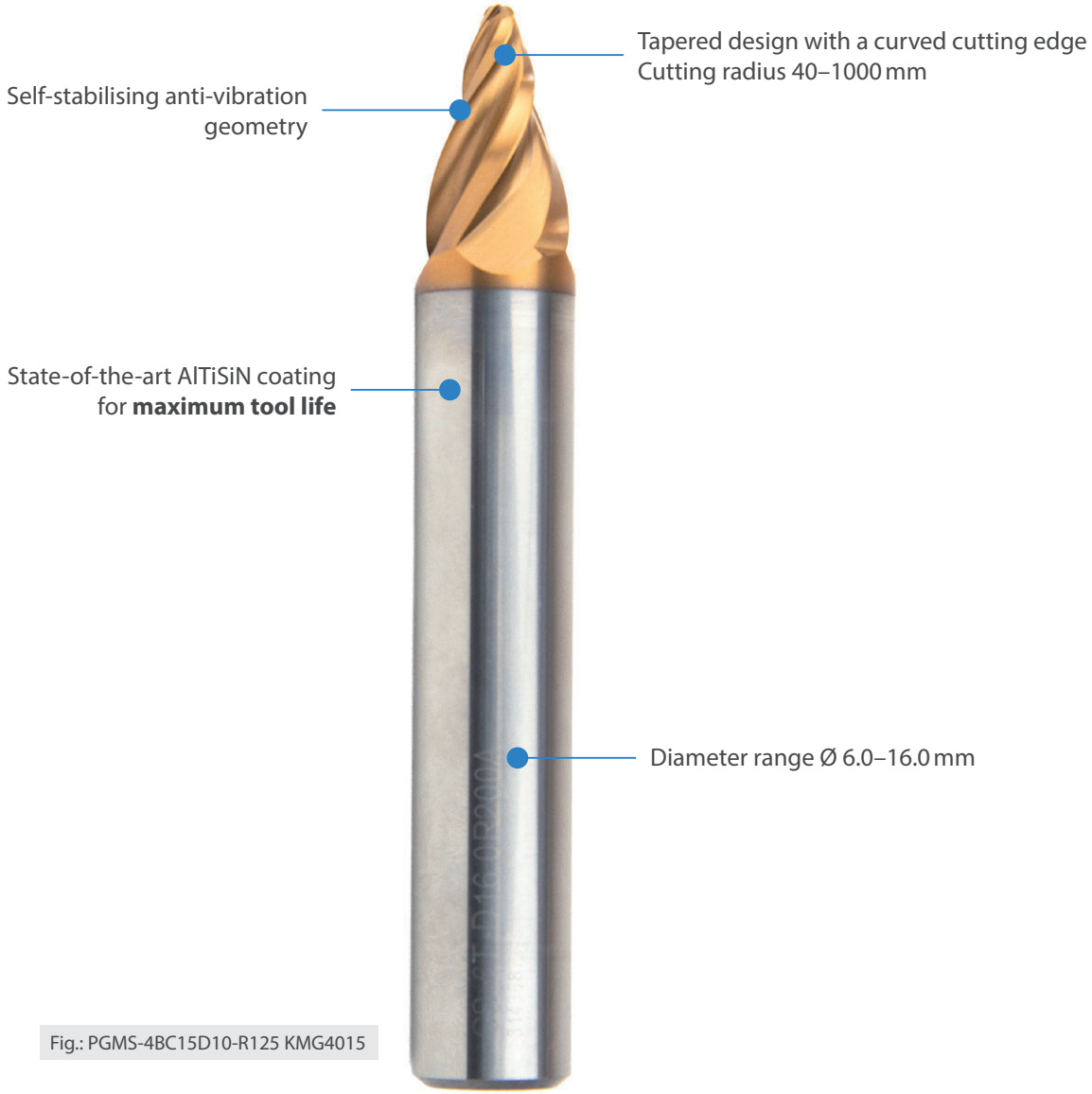
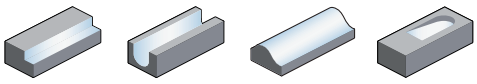


Fig.: PGMS-4BC15D10-R125 KMG4015

Barrel cutters

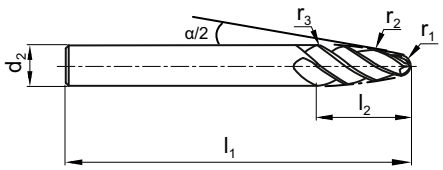
High-performance machining



PGMS-4BC

– Straight shank
– Centre cutting
– Conical cutter





Article	✻	Dimensions [mm]								Grade
		d_2 (h_5)	α/2	r_1	r_2	r_3	l_1	l_2	z	KMG4015
PGMS-4BC15D6-R40		6	15°	1,0	40	3	55	8	4	●
PGMS-4BC15D6-R80		6	15°	1,0	80	3	55	8	4	○
PGMS-4BC15D6-R150		6	15°	1,0	150	3	55	8	4	●
PGMS-4BC15D8-R50		8	15°	1,0	50	4	64	12	4	●
PGMS-4BC15D8-R100		8	15°	1,0	100	4	64	12	4	○
PGMS-4BC15D8-R250		8	15°	1,0	250	4	64	12	4	●
PGMS-4BC15D10-R65		10	15°	1,0	65	5	80	16	4	●
PGMS-4BC15D10-R125		10	15°	1,0	125	5	80	16	4	○
PGMS-4BC15D10-R300		10	15°	1,0	300	5	80	16	4	●
PGMS-4BC15D12-R70		12	15°	1,5	70	6	90	18	4	●
PGMS-4BC15D12-R150		12	15°	1,5	150	6	90	18	4	○
PGMS-4BC15D12-R300		12	15°	1,5	300	6	90	18	4	●
PGMS-4BC15D16-R75		16	15°	2,0	75	8	108	24	4	●
PGMS-4BC15D16-R200		16	15°	2,0	200	8	108	25	4	○
PGMS-4BC15D16-R500		16	15°	2,0	500	8	108	25	4	●
PGMS-4BC15D16-R1000		16	15°	2,0	1000	8	108	25	4	●

● Ex stock ○ On demand
✻ With inner cooling

Application fields

P	M	K	N	S	H
✔	✔	✔	✔	✔	

✔ Very suitable
✔ Suitable

Indexable milling ISO code – inserts

S	P	K	N	12	04	ED	T21K	R	–	DM
1	2	3	4	5	6	7	8	9		10

Insert shape

A		C	
H		L	
M		O	
P		R	
S		T	
W		X	Special
Z	Special		

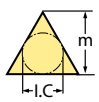
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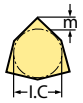
Clearance angle

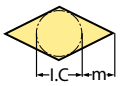
B		C	
D		E	
F		N	
P			

2

Tolerance class









Code	I.C [mm]	m [mm]	S [mm]
A	±0,025	±0,005	±0,025
C	±0,025	±0,013	±0,025
E	±0,025	±0,025	±0,025
F	±0,013	±0,005	±0,025
G	±0,025	±0,025	±0,130
H	±0,013	±0,013	±0,025
J	±0,05–0,13	±0,005	±0,025
K	±0,05–0,13	±0,013	±0,025
L	±0,05–0,13	±0,025	±0,025
M	±0,05–0,13	±0,08–0,18	±0,130
N	±0,05–0,13	±0,08–0,18	±0,025
U	±0,08–0,25	±0,13–0,38	±0,130

3

Fastening features (metric)

Insert shape

A		B	
C		F	
G		H	
J		M	
N		Q	
R		T	
U		W	
X	Special		

4

Cutting edge length l [mm]

Insert shape

	
A	C, M
	
H, O, P	L
R	S
T	W

5

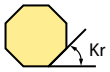
Insert thickness S [mm]



Code	S	Code	S
00	0,79	**05**	5,56
T0	0,99	**T5**	5,95
01	1,59	**06**	6,35
T1	1,98	**T6**	6,75
02	2,38	**07**	7,94
T2	2,58	**09**	9,52
03	3,18	**T9**	9,72
T3	3,97	**11**	11,11
04	4,76	**12**	12,70
T4	4,96		

6

Angle





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

7

Chamfer

Code	Type	Code	Angle	Code	Width [mm]	Code	Position
F		**0**	5°	**0**	0,10	**K**	
E		**1**	10°	**1**	0,15		
T		**2**	15°	**2**	0,20	**P**	
S		**3**	20°	**3**	0,25		
		4	25°	**4**	0,30	**W**	
		5	30°	**5**	0,35		
				6	0,40		
				7	0,45	**–**	

8

Cutting direction

Code	Description
R	Right
L	Left
N	Right and left

9

Chip breakers

10

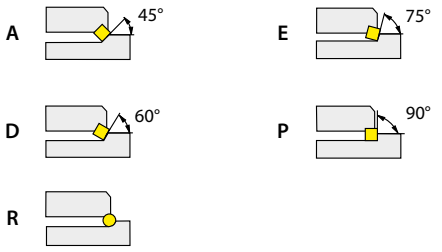
FM A 12 050 – A22 O – N 06 – 04 (L) (AC)

1	2	3	4	5	6	7	8	9	10	11

Type	
Code	Description
BM	Profile milling
CM	Chamfer milling
EM	Square shoulder milling
FM	Face milling
HM	Helical milling
SM	Slot milling
TM	T-slot milling
XM	Special

1

Entering angle



2

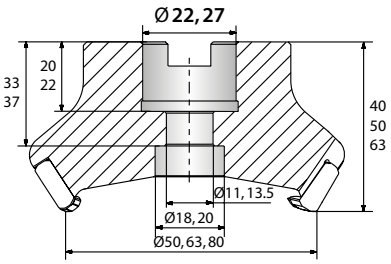
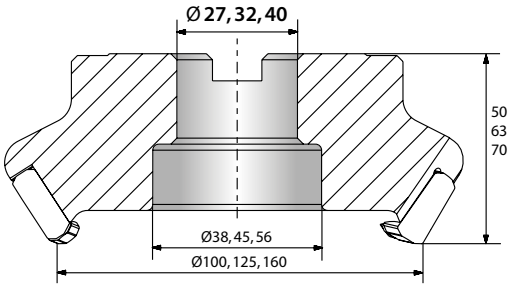
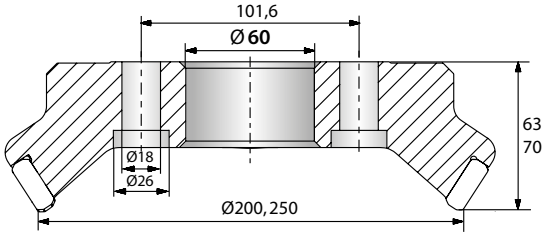
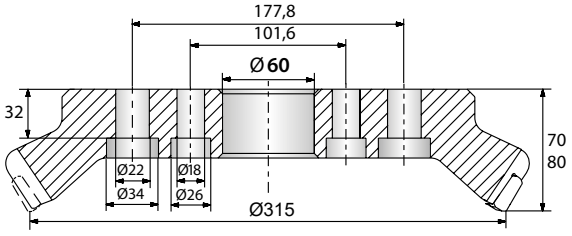
Serial number

3

Nominal diameter [mm]	
Code	Description
025	25
050	50
160	160
315	315
...	

4

Type and size of tool holders

Code	Type	Code	Type
A	Nominal diameter Ø50 – 80 mm 	**B**	Nominal diameter Ø100 – 160 mm 
C	Nominal diameter Ø200 – 250 mm 	**D**	Nominal diameter Ø315 mm 
G	Straight shank	**XP**	Weldon shank
K	Bore with keyway		

5

With respect to mounting please adhere to the information provided by the tool holder manufacturer.

Insert shape			
A		C	
H		L	
M		O	
P		R	
S		T	
W		X	Special
Z	Special		

6

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

7

Cutting edge length l [mm]	
Insert shape	
A	C, M
H, O, P	L
R	S
T	W

8

Number of teeth

9

Cutting direction	
Code	Description
L	Left

10

Cooling	
Code	Description
C	Inner cooling
AC	Air cooling

11

Tools with B coupling and inner coolant supply require the following spare parts:



Coolant clamp screw



Coolant shower plate



Spare parts (B coupling with inner coolant supply)

		B27	B32	B40	B40
	Ø	**80**	**100**	**125**	**160**
	**Coolant clamp screw**	LDB27C	LDB32C	LDB40C	LDB40C
	**Coolant shower plate**	B27-002-CP	B32-002-CP	B40-002-CP	B40-003-CP

When purchasing tools with inner coolant supply and B coupling these spare parts are included in delivery.

PG8020 grade

For high-performance finishing applications involving heat-resistant cast steel

YOUR BENEFITS

– **High-performance finish milling grade** for difficult-to-machine materials such as heat-resistant cast steel
– **Reduced wear and tear** and longer **tool life**
– High mechanical stability
– Ultra, thermally stable coating

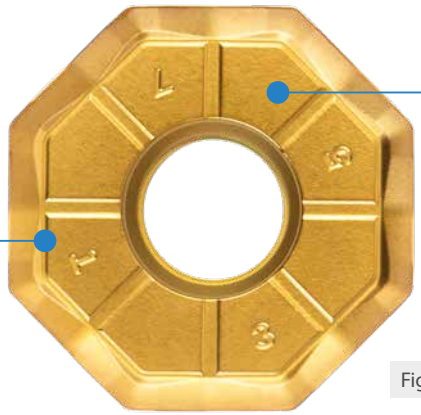


Fig.: ONHU09T508ANN-GM PG8020

Update

Articles available with the new PG8020 grade:

Article	Stock	Milling system
APKT11T304-APL PG8020 ■	●	EMP01/EMP02
APKT11T308-APL PG8020 ■	●	EMP01/EMP02
APKT11T312-ANL PG8020 ■	●	EMP01/EMP02
APKT11T320-ANL PG8020 ■	●	EMP01/EMP02
APKT11T330-ANL PG8020 ■	●	EMP01/EMP02
APKT160408-APL PG8020 ■	●	EMP01/EMP02
APKT160420-ANL PG8020 ■	●	EMP01/EMP02
APKT160430-ANL PG8020 ■	●	EMP01/EMP02
APKT160440-ANL PG8020 ■	●	EMP01/EMP02
APKT160450-ANL PG8020 ■	●	EMP01/EMP02
LNKT080404PNR-GL PG8020 ■	●	EMP09
LNKT080404PNR-GM PG8020 ■	●	EMP09
LNKT080408PNR-GM PG8020 ■	●	EMP09
LNKT080412PNR-GM PG8020 ■	●	EMP09
LNKT120608PNR-GL PG8020 ■	●	EMP09
LNKT120608PNR-GM PG8020 ■	●	EMP09
LNKT120612PNR-GM PG8020 ■	●	EMP09
LNKT120616PNR-GM PG8020 ■	●	EMP09
LNKT120620PNR-GM PG8020 ■	●	EMP09
LNKT120624PNR-GM PG8020	●	EMP09
LNKT120632PNR-GM PG8020	●	EMP09
LNKT160708PNR-GL PG8020 ■	●	EMP09
LNKT160708PNR-GM PG8020 ■	●	EMP09
LNKT160712PNR-GM PG8020 ■	●	EMP09
LNKT160716PNR-GM PG8020 ■	●	EMP09
LNKT160732PNR-GM PG8020 ■	●	EMP09

● Ex stock ○ On demand

Article	Stock	Milling system
ONHU060404ANN-GL PG8020 ■	●	FMA12
ONHU060408ANN-GH PG8020 ■	●	FMA12
ONHU060408ANN-GM PG8020 ■	●	FMA12
ONHU09T508ANN-GH PG8020 ■	●	FMA12
ONHU09T508ANN-GL PG8020 ■	●	FMA12
ONHU09T508ANN-GM PG8020 ■	●	FMA12
ONMU060408-GH PG8020	●	FMA12
ONMU060408-GM PG8020	●	FMA12
ONMU09T512-GH PG8020	●	FMA12
ONMU09T512-GM PG8020	●	FMA12
RDMT10T3MO-MM PG8020 ■	●	FMR11
RDMT1204MO-MM PG8020 ■	●	FMR11
RPMT10T3MO-MM PG8020 ■	●	FMR11
RPMT1204MO-MM PG8020 ■	●	FMR11
SDMT06T208-DM PG8020	●	XMR01
SDMT06T208-NM PG8020	●	XMR01
SDMT09T312-DM PG8020	●	XMR01
SDMT09T312-NM PG8020	●	XMR01
SDMT120412-DM PG8020	●	XMR01
SDMT120412-NM PG8020	●	XMR01
SNGX1205PNN-GH PG8020	●	FMP17
SNGX1205PNN-GL PG8020	●	FMP17
SNGX1205PNN-GM PG8020	●	FMP17
SNGY12T508PNR-GM PG8020 ■	●	EMP08
SNMX120512-GH PG8020	●	FMA17/FMP17/FME17
SNMX120512-GL PG8020	●	FMA17/FMP17/FME17
SNMX120512-GM PG8020	●	FMA17/FMP17/FME17

● Ex stock ○ On demand

PG8030 grade

Ultra-efficient milling grade for HRSA materials

YOUR BENEFITS

– **Ultra-efficient milling grade** for difficult-to-machine materials
– Ideal for materials such as heat-resistant cast steel and duplex Materials
– **Heat-resistant anti-peeling coating**, even under variable thermal loads
– **Maximum process reliability** thanks to improved impact and wear resistance

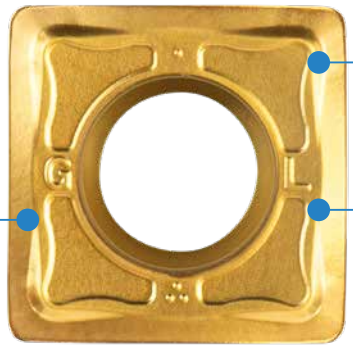


Fig.: SNGX1205PNN-GL PG8030

Update

Articles available with the new PG8030 grade:

Article	Stock	Milling system
APKT11T304-APL PG8030 ■	●	EMP01/EMP02
APKT11T308-APL PG8030 ■	●	EMP01/EMP02
APKT11T312-ANL PG8030 ■	●	EMP01/EMP02
APKT11T320-ANL PG8030 ■	●	EMP01/EMP02
APKT11T324-ANL PG8030 ■	●	EMP01/EMP02
APKT11T330-ANL PG8030 ■	●	EMP01/EMP02
APKT160408-APL PG8030 ■	●	EMP01/EMP02
APKT160420-ANL PG8030 ■	●	EMP01/EMP02
APKT160430-ANL PG8030 ■	●	EMP01/EMP02
APKT160440-ANL PG8030 ■	●	EMP01/EMP02
APKT160450-ANL PG8030 ■	●	EMP01/EMP02
LNKT080404PNR-GL PG8030 ■	●	EMP09
LNKT080404PNR-GM PG8030 ■	●	EMP09
LNKT080408PNR-GM PG8030 ■	●	EMP09
LNKT080412PNR-GM PG8030 ■	●	EMP09
LNKT120608PNR-GL PG8030 ■	●	EMP09
LNKT120608PNR-GM PG8030 ■	○	EMP09
LNKT120612PNR-GM PG8030 ■	●	EMP09
LNKT120616PNR-GM PG8030 ■	●	EMP09
LNKT120620PNR-GM PG8030 ■	●	EMP09
LNKT120624PNR-GM PG8030 ■	●	EMP09
LNKT120632PNR-GM PG8030 ■	●	EMP09
LNKT160708PNR-GL PG8030 ■	○	EMP09
LNKT160708PNR-GM PG8030 ■	○	EMP09
LNKT160712PNR-GM PG8030 ■	○	EMP09
LNKT160716PNR-GM PG8030 ■	○	EMP09
LNKT160732PNR-GM PG8030 ■	○	EMP09

● Ex stock ○ On demand

Article	Stock	Milling system
ONHU060404ANN-GL PG8030 ■	●	FMA12
ONHU060408ANN-GH PG8030 ■	●	FMA12
ONHU060408ANN-GM PG8030 ■	●	FMA12
ONHU09T508ANN-GH PG8030 ■	○	FMA12
ONHU09T508ANN-GL PG8030 ■	○	FMA12
ONHU09T508ANN-GM PG8030 ■	○	FMA12
ONMU060408-GH PG8030	●	FMA12
ONMU060408-GM PG8030	●	FMA12
ONMU09T512-GH PG8030	○	FMA12
ONMU09T512-GM PG8030	○	FMA12
RDMT10T3MO-MM PG8030 ■	●	FMR11
RDMT1204MO-MM PG8030 ■	●	FMR11
RPMT10T3MO-MM PG8030 ■	●	FMR11
RPMT1204MO-MM PG8030 ■	●	FMR11
RPMT1204MO-M PG8030 ■	●	FMR11
SDMT06T208-DM PG8030	●	XMR01
SDMT06T208-NM PG8030	●	XMR01
SDMT09T312-DM PG8030	●	XMR01
SDMT09T312-NM PG8030	●	XMR01
SDMT120412-DM PG8030	●	XMR01
SDMT120412-NM PG8030	●	XMR01
SNGX1205PNN-GH PG8030	●	FMP17
SNGX1205PNN-GL PG8030	●	FMP17
SNGX1205PNN-GM PG8030	●	FMP17
SNMX120512-GH PG8030	●	FMA17/FMP17/FME17
SNMX120512-GL PG8030	●	FMA17/FMP17/FME17
SNMX120512-GM PG8030	●	FMA17/FMP17/FME17

● Ex stock ○ On demand

EMP08 square shoulder milling system

Efficient and reliable 90° shoulder milling

YOUR BENEFITS

– **Maximum efficiency** thanks to eight-edged, double-sided inserts
– **Real 90° machining** thanks to complex contoured main cutting edge
– **Reliable results even when working** under difficult conditions thanks to optimised insert seat design
– **Universal tool** for large components with focus on **surface quality**, **reduction in cutting forces** and **process reliability**; ideal for **mass production applications**



Fig.: EMP08-063-A22-SN12-06C

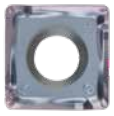
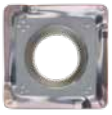
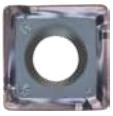
The **maximum cutting depth** in 90° shoulder machining operations with EMP08-SNGY12** is **8.3 mm**. For **lower width of cuts**, a **radial offset** of at least **0.4 mm** is required to ensure flawless shoulder formation.

Insert grades

PANGU

PG8020	YBM253	YBD152	YBG205H	YB9320	YBS303
CVD *S10 – S20* *M15 – M35*	*CVD* *P20 – P40* *M15 – M35*	*CVD* *K10 – K25*	*PVD* *P10 – P30* *M20 – M40*	*PVD* *P10 – P30* *M20 – M40*	*PVD* *S20 – S30* *M20 – M40*

Chip breaker

SN*Y-GL	SN*Y-GM	SN*Y-GH
		
Finishing	General machining	High-feed machining

Complex chip former for **controlled chip removal protects unused cutting edges**



high-quality surface finish thanks to a large radius wiper

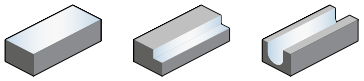
Low cutting forces thanks to positive cutting edge design



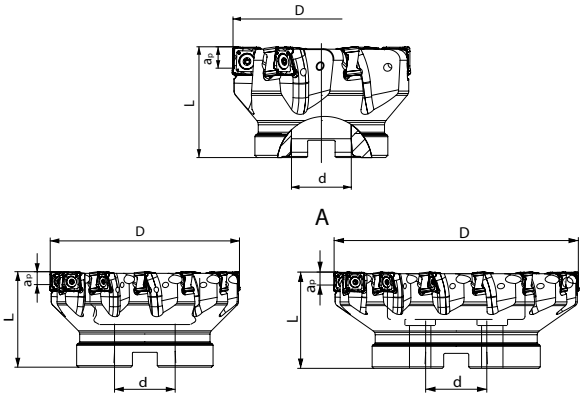
Fig.: SNGY12T508PNR-GM YBG205H

Square shoulder milling

EMP08 Kr: 90°







Article	✲	Stock	Dimensions [mm] ØD	ØD$_1$	ød	L$_1$	a$_{p\ max}$	Teeth	kg	Insert
EMP08-050-A22-SN12-04C	✲	●	50	40	22	40	8	4	0,25	SNGY12T508PNR**
EMP08-050-A22-SN12-05C	✲	●	50	40	22	40	8	5	0,24	
EMP08-063-A22-SN12-05C	✲	●	63	50	22	50	8	5	0,46	
EMP08-063-A22-SN12-06C	✲	●	63	50	22	50	8	6	0,48	
EMP08-080-A27-SN12-06C	✲	●	80	60	27	50	8	6	1,01	
EMP08-080-A27-SN12-08C	✲	●	80	60	27	50	8	8	1,01	
EMP08-100-B32-SN12-08C	✲	●	100	70	32	50	8	8	1,16	
EMP08-100-B32-SN12-10C	✲	●	100	70	32	50	8	10	1,11	
EMP08-125-B40-SN12-10C	✲	●	125	90	40	63	8	10	2,52	
EMP08-125-B40-SN12-12C	✲	●	125	90	40	63	8	12	2,45	
EMP08-160-C40-SN12-12		●	160	110	40	63	8	12	4,14	
EMP08-160-C40-SN12-14		●	160	110	40	63	8	14	4,07	
EMP08-200-C60-SN12-14		●	200	137	60	63	8	14	6,04	
EMP08-200-C60-SN12-16		●	200	137	60	63	8	16	6,03	

● Ex stock ○ On demand

✲ With internal cooling

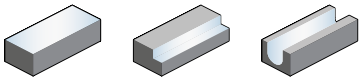
Spare parts

	Insert	**SNGY12T5**
	ØD	**32–200**
	Screw	IRM4x10 (3,4Nm)
	Wrench (Insert)	WT15IP/ WT15IS

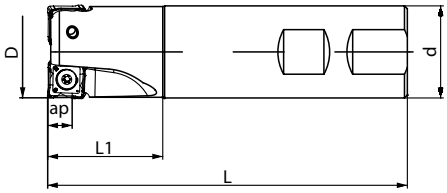


Square shoulder milling

EMP08 Kr: 90°







Article	✻	Stock	Dimensions [mm]					Teeth	kg	Insert
			ØD	ød	L_1	L	$a_{p\ max}$			
EMP08-032-XP32-SN12-02C	✻	○	32	32	40	125	8	2	0,617	
EMP08-040-XP32-SN12-03C	✻	●	40	32	45	125	8	3	0,678	SNGY12T508PNR**
EMP08-040-XP32-SN12-04C	✻	●	40	32	45	125	8	4	0,776	

● Ex stock ○ On demand

✻ With internal cooling

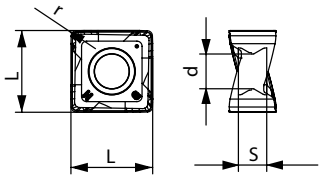
Spare parts

	Insert	**SNGY12T5**	
	ØD	**32–200**	
	Screw	IRM4x10 (3,4Nm)	
	Wrench (Insert)	WT15IP/ WT15IS	

Ideal machining conditions
Normal machining conditions
Unfavourable machining conditions

SNGY	L	I.C	S	d
12 T5	8,00	12,70	7,36	4,7

Milling Insert



SN** milling insert				HC¹ (CVD)			HC¹ (PVD)			HT	HC²	HW
				PG8020	YBM253	YBD152	YBG205H	YB9320	YBS303			
P				⊛			⊛	⊛				
M				⊛	⊛		⊛	⊛	⊛			
K					⊛							
N												
S				⊛				⊛				
H												
ISO		bs	r									
	SNGY12T508PNR-GL	1,2	0,8	●	●	●	●	●	●			
	SNGY12T508PNR-GM	1,2	0,8				●	●				
	SNGY12T508PNR-GH	1,2	0,8				●	●				

● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide



Square shoulder milling system EMP08

EMP10 square shoulder milling system

Maximum feed rates to boost your production

YOUR BENEFITS

– Eight-edged, tangentially mounted inserts for **maximum efficiency** and **cutting force absorption**
– **Real 90° shoulder machining** thanks to complex contoured main cutting edge
– **High per-tooth feed rates** thanks to tangentially mounted insert
– Smooth, easy cuts; ideal for interrupted cuts and variable cutting conditions
– **Maximum reliability** thanks to enhanced insert seat geometry
– For any application involving steel, cast iron, stainless steel and difficult-to-machine materials; ideal choice for **low-cost mass production applications**

High cutting performance thanks to tangentially mounted inserts

Enhanced insert seat design for **superior load distribution**



Heavy-duty milling body for **maximum cutting rates** coupled with **High Performance reliability**

Fig.: EMP10-050-A22-S013-05C

Diameter range 40 – 160 mm

Insert grades

YBM253	YBG205H	YB9320
CVD	*PVD*	*PVD*
P20 – P40	*P10 – P30*	*P10 – P30*
M15 – M35	*M20 – M40*	*M20 – M40*

Chip breaker

SOKX-GM



General machining

Eight usable cutting edges for **maximum efficiency**



Dual rake angle design for **smooth cuts** with **high cutting edge stability**

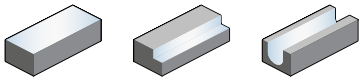
Complex contoured main cutting edge for **high-precision 90° shoulder machining operations**



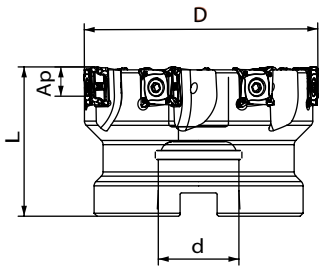
Fig.: SOKX130608PNR-GM YGB205H

Square shouler milling

EMP10 Kr: 90°







Article	✻	Stock	Dimensions [mm]				Teeth	kg	Insert
			ØD	ød	L_1	$a_{p\,max}$			
EMP10-040-A16-SO13-03C	✻	○	40	16	40	8	3	0,25	
EMP10-040-A16-SO13-04C	✻	●	40	16	40	8	4	0,21	
EMP10-040-A16-SO13-05C	✻	○	40	16	40	8	5	0,20	
EMP10-050-A22-SO13-04C	✻	●	50	22	40	8	4	0,35	
EMP10-050-A22-SO13-05C	✻	●	50	22	40	8	5	0,32	
EMP10-050-A22-SO13-06C	✻	●	50	22	40	8	6	0,32	
EMP10-063-A22-SO13-06C	✻	●	63	22	40	8	6	0,56	
EMP10-063-A22-SO13-07C	✻	○	63	22	40	8	7	0,56	
EMP10-063-A22-SO13-08C	✻	○	63	22	40	8	8	0,57	
EMP10-080-A27-SO13-06C	✻	○	80	27	50	8	6	1,17	SOKX130608PNR-GM
EMP10-080-A27-SO13-07C	✻	●	80	27	50	8	7	1,19	
EMP10-080-A27-SO13-09C	✻	○	80	27	50	8	9	1,18	
EMP10-100-B32-SO13-08C	✻	○	100	32	50	8	8	1,64	
EMP10-100-B32-SO13-12C	✻	○	100	32	50	8	12	1,66	
EMP10-125-B40-SO13-10C	✻	○	125	40	63	8	10	3,21	
EMP10-125-B40-SO13-15C	✻	○	125	40	63	8	15	3,23	
EMP10-160-B40-SO13-12C	✻	○	160	40	63	8	12	6,2	
EMP10-160-B40-SO13-18C	✻	○	160	40	63	8	18	6,21	

● Ex stock ○ On demand

✻ With internal cooling

Spare parts

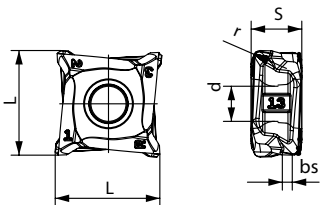
	Insert	**SOKX1306**
	ØD	**40–160**
	Screw	l60M4*12 (3,4Nm)
	Wrench (insert)	WT15IS



Ideal machining conditions
Normal machining conditions
Unfavourable machining conditions

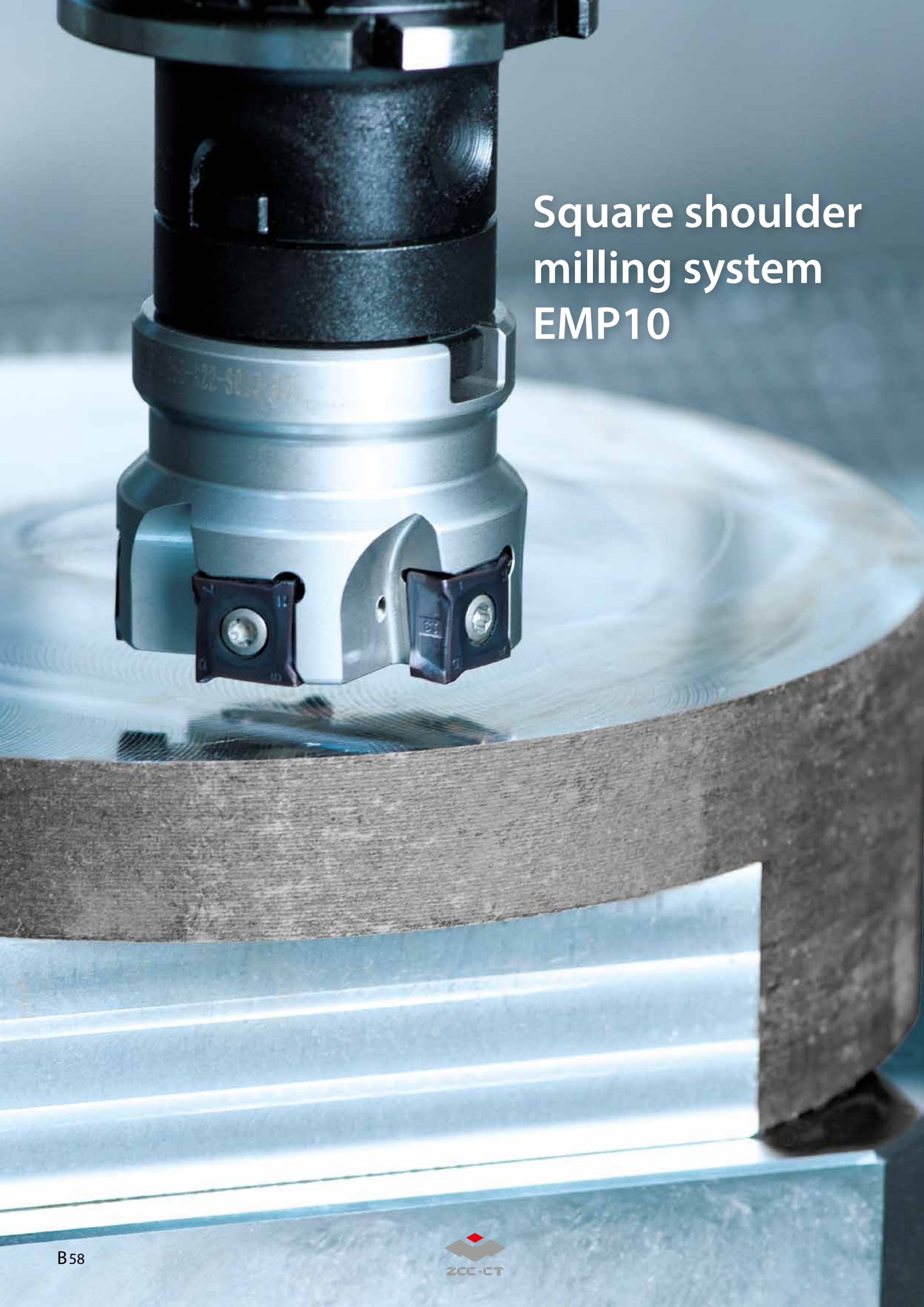
SOKX	L	I.W	S	d
13 06	8,00	12,70	7,36	4,7

Milling insert

SO** milling insert				HC[1] (CVD)	HC[1] (PVD)		HT	HC[2]	HW
			P						
			M						
			K						
			N						
			S						
			H						
ISO		bs	r	YBM253	YBG205H	YB9320			
	**SOKX130608PNR-GM**	1,35	0,8	●	●	●			

● Ex stock ○ On demand

HC[1] Coated carbide
HT Uncoated cermet
HC[2] Coated cermet
HW Uncoated carbide



Square shoulder milling system EMP10

Notes

XMR13 high-feed milling system

For maximum performance in terms of feed rate and efficiency

YOUR BENEFITS

– Eight-edged, double-sided inserts for **maximum efficiency**
– Enhanced 3D contour of the cutting edge **decreases cutting forces** and **increases process reliability**
– Steady, even increase in cutting force when entering the material serves **to protect the cutting edge**
– Constant cutting forces during operation for **smooth** and **reliable machining**
– **High quality chip control** in steel, tool steel and cast iron

Available in coarse and fine pitch for **feed rate optimisation to match varied application**

Double-sided insert for **maximum cutting stability**



Heavy-duty milling body for **maximum cutting force absorption**

Fig.: XMR13-063-A22-SN13-06C

Diameter range 50 – 160 mm

Insert grades

YBM253	YBC302	YBG205H	YB9320	YBS303
CVD *P20 – P40* *M15 – M35*	*CVD* *P20 – P40*	*PVD* *P10 – P30* *M20 – M40*	*PVD* *P10 – P30* *M20 – M40*	*PVD* *S20 – S30* *M20 – M40*

Chip breaker

SNMU-GL



Universal geometry

SNMU-GM



General machining

Eight usable cutting edges for **maximum efficiency**



Wiper geometry designed to deliver **high quality surface quality**

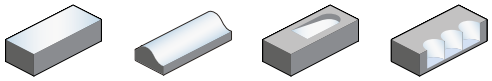
Enhanced 3D contour



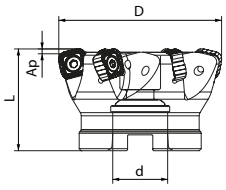
Fig.: SNMU130520-GL YBG205H

High-feed milling

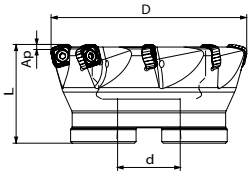
XMR13 Kr: 15°



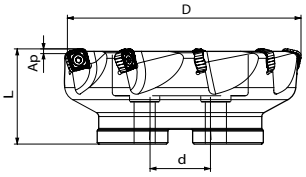




A



B



C

Article	✻	Stock	Dimensions [mm]				Teeth	Coupling	kg	Insert
			ØD	ød	L	$a_{p\ max}$				
XMR13-050-A22-SN13-04C	✻	●	50	22	40	1,9	4	A	0,5	
XMR13-063-A22-SN13-05C	✻	●	63	22	40	1,9	5	A	0,8	
XMR13-063-A22-SN13-07C	✻	●	63	22	40	1,9	7	A	1,0	
XMR13-080-A27-SN13-06C	✻	●	80	27	50	1,9	6	A	1,0	
XMR13-080-A27-SN13-08C	✻	●	80	27	50	1,9	8	A	1,5	SNMU130520**
XMR13-100-B32-SN13-07C	✻	●	100	32	50	1,9	7	B	1,5	
XMR13-100-B32-SN13-10C	✻	●	100	32	50	1,9	10	B	2,0	
XMR13-125-B32-SN13-08C	✻	●	125	32	63	1,9	8	B	3,0	
XMR13-160-C40-SN13-09	✻	●	160	40	63	1,9	9	C	5,0	

● Ex stock ○ On demand

✻ With internal cooling

Spare parts

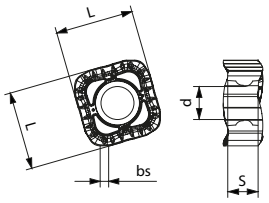
	Insert	**SNMU1305**
	ØD	**50–160**
	Screw	I60M5X13 (3,5Nm)
	Wrench (insert)	WT20IT



Ideal machining conditions
Normal machining conditions
Unfavourable machining conditions

SNMU	L	I.C	S	d
13 05	13,50	13,50	5,28	5,7

Milling insert



SN** milling insert				HC¹ (CVD)		HC¹ (PVD)			HT	HC²	HW
			P								
			M								
			K								
			N								
			S								
			H								
ISO		bs	r	YBM253	YBC302	YBG205H	YB9320	YBS303			
	**SNMU130520-GL**	1,5	2,0			●	●	○			
	SNMU130520-GM	1,5	2,0	●	○	●	○	●			

● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

Indexable milling – group 2 (FMA01/02/03/04, FME02/03/17, FMP01/02, EMP01/02/03/04/05/08/10/14)

Material group		Composition / structure / heat treatment			Machining group	Starting values for cutting speed v_c [m/min]							
						HC (CVD)							
						YBC302		YBC401		YBD152		YBD252	
						a_e / D		a_e / D		a_e / D		a_e / D	
						1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	245	285	210	245				
		approx. 0,45 % C	annealed	190	2	210	245	180	210				
		approx. 0,45 % C	tempered	250	3	200	230	170	200				
		approx. 0,75 % C	annealed	270	4	175	200	150	175				
		approx. 0,75 % C	tempered	300	5	160	190	140	160				
	Low-alloyed steel		annealed	180	6	210	245	180	210				
			tempered	275	7	175	200	150	175				
			tempered	300	8	160	190	140	160				
			tempered	350	9	135	160	120	135				
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	125	145	105	125				
			hardened and tempered	325	11	90	100	75	90				
M	Stainless steel	ferritic/martensitic	annealed	200	12								
		martensitic	tempered	240	13								
		austenitic	quench hardened	180	14								
		austenitic-ferritic		230	15								
K	Grey cast iron	perlitic/ferritic		180	16					315	365	270	315
		perlitic (martensitic)		260	17					185	215	160	190
	Cast iron with spheroidal graphite	ferritic		160	18					215	250	185	215
		perlitic		250	19					145	170	125	145
	Malleable cast iron	ferritic		130	20					260	300	225	260
		perlitic		230	21					175	205	150	175
N	Aluminium wrought alloys	cannot be hardened		60	22								
		hardenable	hardened	100	23								
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24								
		≤ 12 % Si, hardenable	hardened	90	25								
		> 12 % Si, cannot be hardened		130	26								
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27								
		CuZn, CuSnZn		90	28								
		CuSn, Pb-free copper, electrolytic copper		100	29								
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30								
			hardened	280	31								
		Ni or Co bass	annealed	250	32								
			hardened	350	33								
			cast	320	34								
	Titanium alloys	pure titanium		R_m 400	35								
		α and β alloys	hardened	R_m 1050	36								
H	Hardened steel		hardened and tempered	55 HRC	37								
			hardened and tempered	60 HRC	38								
	Hard cast iron		cast	400	39								
	Hardened cast iron		hardened and tempered	55 HRC	40								
X	Non-metallic materials	Thermoplasts			41								
		Thermosetting plastics			42								
		Plastic, glass-fibre reinforced GFRP			43								
		Plastic, carbon fibre reinforced CFRP			44								
		Graphite			45								
		Wood			46								

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B38–B43.

	Starting values for cutting speed v_c [m/min]																					
	HC (CVD)				HC (PVD)														HW			
	YBM253		PG8020		YBG101		YBG102		YBG152		YB9320		YBG205(H)		YBG252		YBG302		YD101		YD201	
	a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D	
	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5
	245	285					255	295	240	280	230	265	220	255	215	250	210	245				
	210	245					220	255	205	240	200	230	190	220	185	215	180	210				
	200	230					205	240	195	225	185	215	180	205	175	200	170	200				
	175	200					180	210	170	200	165	190	155	180	155	175	150	175				
	160	190					170	195	160	185	150	175	145	170	140	165	140	160				
	210	245					220	255	205	240	200	230	190	220	185	215	180	210				
	175	200					180	210	170	200	165	190	155	180	155	175	150	175				
	160	190					170	195	160	185	150	175	145	170	140	165	140	160				
	135	160					145	165	135	155	130	150	125	145	120	140	120	135				
	125	145					130	150	120	140	115	135	110	130	110	125	105	125				
	90	100					90	105	85	100	85	95	80	90	80	90	75	90				
	125	145	145	165			130	150	120	140	115	135	110	130	110	125	105	125				
	105	120	120	137			110	125	105	120	100	115	95	110	95	105	90	105				
	130	155	150	171			140	160	130	150	125	145	120	140	115	135	115	130				
	105	120	120	137			110	125	105	120	100	115	95	110	95	105	90	105				
							285	330	265	305	255	295	245	285	240	280	235	275				
							170	195	160	185	150	175	145	170	140	165	140	160				
							195	225	180	210	175	200	165	195	165	190	160	185				
							130	150	120	140	115	135	110	130	110	125	105	125				
							230	270	220	255	210	240	200	230	195	225	190	225				
							155	180	145	170	140	160	135	155	130	150	130	150				
					1505	1735													1205	1390	1040	1200
					1225	1420													980	1140	850	980
					540	620													435	500	375	435
					435	505													350	405	300	350
					220	255													180	205	155	180
					170	195													140	160	120	140
					210	245													170	200	150	170
					385	445													310	360	265	310
			75	86			75	85	70	80	65	75	65	75	65	75	60	70				
			52	59			50	55	50	55	45	50	45	50	45	50	40	45				
			63	72			60	70	55	65	55	65	50	55	50	55	50	55				
			35	40			35	40	35	40	30	35	30	35	30	35	30	35				
			75	86			45	50	45	50	40	45	40	45	40	45	40	45				
			75	86			75	85	70	80	65	75	65	75	65	75	60	70				
			75	86			75	85	70	80	65	75	65	75	65	75	60	70				

HC Coated carbide
HT Uncoated carbide, primary component (TiC) or (TiN), cermet
HW Uncoated carbide, primary component (WC)
BL Cubic boron nitride with low BN content
BH Cubic boron nitride with high BN content
CN Si3N4 ceramic
CM Mixed ceramic
HC_1 Coated cermet
BC CBN with coating
CC Coated cutting ceramic
CR Cutting ceramic, primary component aluminium oxide (Al_2O_3), reinforced
DP Polycrystalline diamond

Indexable milling – group 7 (XMR01, XMR12, XMR13, XMP01, QCH)

Material group		Composition / structure / heat treatment			Machining group	Starting values for cutting speed v_c [m/min] HC (CVD) YBC302 a_e / D 1/1 | 3/4	YBC302 a_e / D 1/5	YBC302 a_e / D 1/20	YBD152 a_e / D 1/1 | 3/4	YBD152 a_e / D 1/5	YBD152 a_e / D 1/20
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	260	300	390			
		approx. 0,45 % C	annealed	190	2	225	255	335			
		approx. 0,45 % C	tempered	250	3	210	240	315			
		approx. 0,75 % C	annealed	270	4	185	210	275			
		approx. 0,75 % C	tempered	300	5	170	195	255			
	Low-alloyed steel		annealed	180	6	225	255	335			
			tempered	275	7	185	210	275			
			tempered	300	8	170	195	255			
			tempered	350	9	145	165	215			
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	130	150	195			
			hardened and tempered	325	11	95	105	140			
M	Stainless steel	ferritic/martensitic	annealed	200	12						
		martensitic	tempered	240	13						
		austenitic	quench hardened	180	14						
		austenitic-ferritic		230	15						
K	Grey cast iron	perlitic/ferritic		180	16				335	390	510
		perlitic (martensitic)		260	17				200	230	300
	Cast iron with spheroidal graphite	ferritic		160	18				225	260	340
		perlitic		250	19				150	175	230
	Malleable cast iron	ferritic		130	20				275	320	420
		perlitic		230	21				185	215	280
N	Aluminium wrought alloys	cannot be hardened		60	22						
		hardenable	hardened	100	23						
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24						
		≤ 12 % Si, hardenable	hardened	90	25						
		> 12 % Si, cannot be hardened		130	26						
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27						
		CuZn, CuSnZn		90	28						
		CuSn, Pb-free copper, electrolytic copper		100	29						
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30						
			hardened	280	31						
		Ni or Co bass	annealed	250	32						
			hardened	350	33						
			cast	320	34						
	Titanium alloys	pure titanium		R_m 400	35						
		α and β alloys	hardened	R_m 1050	36						
H	Hardened steel		hardened and tempered	55 HRC	37						
			hardened and tempered	60 HRC	38						
	Hard cast iron		cast	400	39						
	Hardened cast iron		hardened and tempered	55 HRC	40						
X	Non-metallic materials	Thermoplasts			41						
		Thermosetting plastics			42						
		Plastic, glass-fibre reinforced GFRP			43						
		Plastic, carbon fibre reinforced CFRP			44						
		Graphite			45						
		Wood			46						

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B38–B43.

	Starting values for cutting speed v_c [m/min]																				
	HC (CVD)						HC (PVD)														
	YBD252			YBM253			YBG102			YBG152			YB9320			YBG205(H)			YBG212		
	a_e / D			a_e / D			a_e / D			a_e / D			a_e / D			a_e / D			a_e / D		
	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20
				260	300	390	270	315	410	255	295	385	245	285	375	235	275	360	240	280	365
				225	255	335	230	270	355	220	255	335	210	245	320	200	235	310	205	240	315
				210	240	315	220	255	335	205	240	315	200	230	300	190	220	290	195	225	295
				185	210	275	190	225	295	180	210	275	175	200	260	165	195	255	170	200	260
				170	195	255	180	205	270	170	195	255	160	190	250	155	180	235	160	185	245
				225	255	335	230	270	355	220	255	335	210	245	320	200	235	310	205	240	315
				185	210	275	190	225	295	180	210	275	175	200	260	165	195	255	170	200	260
				170	195	255	180	205	270	170	195	255	160	190	250	155	180	235	160	185	245
				145	165	215	150	175	230	145	165	215	135	160	210	130	155	205	135	155	205
				130	150	195	135	160	210	130	150	195	125	145	190	120	140	185	120	140	185
				95	105	140	95	115	150	90	105	140	90	100	130	85	100	130	85	100	130
				130	150	195	135	160	205	130	150	195	125	145	190	120	140	180	120	140	185
				110	130	165	115	135	175	110	125	165	105	120	160	100	120	155	105	120	155
				140	160	210	145	170	220	140	160	205	130	155	200	125	150	195	130	150	195
				110	130	165	115	135	175	110	125	165	105	120	160	100	120	155	105	120	155
	290	335	440				300	345	450	285	330	430	270	315	410	260	300	390	265	305	400
	170	195	255				180	205	270	170	195	255	160	190	250	155	180	235	160	185	245
	195	225	295				205	240	315	195	225	295	185	215	280	180	210	275	180	210	275
	130	150	195				135	160	210	130	150	195	125	145	190	120	140	185	120	140	185
	235	270	355				245	285	375	230	270	355	225	260	340	215	250	325	220	255	335
	160	180	235				165	190	250	155	180	235	150	175	230	145	165	215	145	170	225

HC Coated carbide
HT Uncoated carbide, primary component (TiC) or (TiN), cermet
HW Uncoated carbide, primary component (WC)
BL Cubic boron nitride with low BN content
BH Cubic boron nitride with high BN content
CN Si3N4 ceramic
CM Mixed ceramic
HC_1 Coated cermet
BC CBN with coating
CC Coated cutting ceramic
CR Cutting ceramic, primary component aluminium oxide (Al_2O_3), reinforced
DP Polycrystalline diamond

Recommended feed rate

Indexable milling – group 2 (FMA01/02/03/04, FME02/03/17, FMP01/02, EMP01/02/03/04/05/08/10/14)

Material group		Feed rate per cutting edge [mm]																	
		FMA01 | FMA02			FMA03			FMA03			FMA04			FMA04			FMA04		
		SEET12			SEKN12			SEKN15			OFKT05			OFKR07			ODHT06		
		Application																	
		F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R
P	Unalloyed steel	0,15	0,20	0,25		0,18			0,20		0,20	0,25		0,20	0,25		0,20	0,25	
	Low-alloyed steel	0,14	0,19	0,23		0,17			0,19		0,19	0,23		0,19	0,23		0,19	0,23	
	High-alloyed steel and high-alloyed tool steel	0,13	0,18	0,22		0,16			0,18		0,18	0,22		0,18	0,22		0,18	0,22	
M	Stainless steel	0,11	0,14	0,18		0,13			0,14		0,14	0,18		0,14	0,18		0,14	0,18	
K	Grey cast iron	0,17	0,22	0,28		0,20			0,22		0,22	0,28		0,22	0,28		0,22	0,28	
	Cast iron with spheroidal graphite	0,15	0,20	0,25		0,18			0,20		0,20	0,25		0,20	0,25		0,20	0,25	
	Malleable cast iron	0,15	0,20	0,25		0,18			0,20		0,20	0,25		0,20	0,25		0,20	0,25	
N	Aluminium wrought alloys	0,13	0,17	0,21							0,17	0,21		0,17	0,21		0,17	0,21	
	Aluminum cast alloys	0,13	0,17	0,21							0,17	0,21		0,17	0,21		0,17	0,21	
	Copper and copper alloys (bronze/brass)	0,11	0,15	0,19							0,15	0,19		0,15	0,19		0,15	0,19	
S	Heat-resistant alloys	0,11	0,14	0,18							0,14	0,18		0,14	0,18		0,14	0,18	
	Titanium alloys	0,11	0,14	0,18							0,14	0,18		0,14	0,18		0,14	0,18	
H	Hardened steel																		
	Hard cast iron																		
	Hardened cast iron																		
X	Non-metallic materials																		

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

Indexable milling – group 2 (FMA01/02/03/04, FME02/03/17, FMP01/02, EMP01/02/03/04/05/08/10/14)

Material group		Feed rate per cutting edge [mm]																	
		EMP03 | EMP04			EMP05			EMP08			EMP10			EMP14					
		APKT11			ADKT**			SNGY			SOKX			VPGT22					
		Application																	
		F	M	R	F	M	R	F	M	R	F	M	R	F	M	R			
P	Unalloyed steel	0,12	0,17	0,23	0,10	0,15	0,20	0,12	0,2	–	0,12	0,2	–						
	Low-alloyed steel	0,11	0,16	0,21	0,09	0,14	0,19	0,1	0,14	–	0,1	0,14	–						
	High-alloyed steel and high-alloyed tool steel	0,10	0,15	0,20	0,09	0,13	0,18	0,1	0,14	–	0,1	0,14	–						
M	Stainless steel	0,08	0,12	0,16	0,07	0,11	0,14	0,1	0,14	–	0,1	0,14	–						
K	Grey cast iron	0,13	0,19	0,25	0,11	0,17	0,22	0,1	0,2	–	0,1	0,2	–						
	Cast iron with spheroidal graphite	0,12	0,17	0,23	0,10	0,15	0,20	0,1	0,2	–	0,1	0,2	–						
	Malleable cast iron	0,12	0,17	0,23	0,10	0,15	0,20	0,1	0,2	–	0,1	0,2	–						
N	Aluminium wrought alloys	0,10	0,15	0,20	0,09	0,13	0,17							0,05	0,2	0,3			
	Aluminum cast alloys	0,10	0,15	0,20	0,09	0,13	0,17							0,05	0,2	0,3			
	Copper and copper alloys (bronze/brass)	0,09	0,13	0,18	0,08	0,11	0,15							0,05	0,2	0,3			
S	Heat-resistant alloys																		
	Titanium alloys																		
H	Hardened steel																		
	Hard cast iron																		
	Hardened cast iron																		
X	Non-metallic materials																		

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

	Feed rate per cutting edge [mm]																							
	FME02			FME03			FME03			FME17			FMP01			FMP02			EMP01 | EMP02			EMP01 | EMP02		
	SPK*12			SPK*12			SPK*15			SNGX1205ENN**			TPKN22			SEET12			APKT11			APKT16		
	Application																							
	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R
		0,20			0,19			0,20		0,20	0,25			0,20		0,15	0,20	0,25	0,10	0,15	0,20	0,12	0,17	0,23
		0,19			0,17			0,19		0,19	0,23			0,19		0,14	0,19	0,23	0,09	0,14	0,19	0,11	0,16	0,21
		0,18			0,16			0,18		0,18	0,22			0,18		0,13	0,18	0,22	0,09	0,13	0,18	0,10	0,15	0,20
		0,14			0,13			0,14		0,14	0,18			0,14		0,11	0,14	0,18	0,07	0,11	0,14	0,08	0,12	0,16
		0,22			0,20			0,22		0,22	0,28			0,22		0,17	0,22	0,28	0,11	0,17	0,22	0,13	0,19	0,25
		0,20			0,19			0,20		0,20	0,25			0,20		0,15	0,20	0,25	0,10	0,15	0,20	0,12	0,17	0,23
		0,20			0,19			0,20		0,20	0,25			0,20		0,15	0,20	0,25	0,10	0,15	0,20	0,12	0,17	0,23
										0,17	0,21					0,13	0,17	0,21	0,09	0,13	0,17	0,10	0,15	0,20
										0,17	0,21					0,13	0,17	0,21	0,09	0,13	0,17	0,10	0,15	0,20
										0,15	0,19					0,11	0,15	0,19	0,08	0,11	0,15	0,09	0,13	0,18
										0,14	0,18													
										0,14	0,18													

F Finishing
M Medium machining
R Roughing

F Finishing
M Medium machining
R Roughing

Recommended feed rate

Indexable milling – group 7 (XMR01, XMR12, XMR13, XMP01, QCH)

Material group		Feed rate per cutting edge [mm]								
		XMR01 face milling			XMR01 plunge milling			XMR01 circular milling		
		SDMT/WPGT			SDMT/WPGT			SDMT/WPGT		
		Tool diameter [mm]								
		20–25	30–50	63–160	20–25	30–50	63–160	20–25	30–50	63–160
P	Unalloyed steel	1,00	1,20	2,00	0,20	0,25	0,30	0,80	0,96	1,40
P	Low-alloyed steel	0,93	1,12	1,86	0,19	0,23	0,28	0,74	0,89	1,30
P	High-alloyed steel and high-alloyed tool steel	0,70	0,84	1,40	0,18	0,22	0,26	0,70	0,84	1,23
M	Stainless steel	0,50	0,60	1,00	0,14	0,18	0,21	0,56	0,67	0,98
K	Grey cast iron	0,90	1,08	1,80	0,22	0,28	0,33	0,88	1,06	1,54
K	Cast iron with spheroidal graphite	0,90	1,08	1,80	0,20	0,25	0,30	0,80	0,96	1,40
K	Malleable cast iron	1,00	1,20	2,00	0,20	0,25	0,30	0,80	0,96	1,40
N	Aluminium wrought alloys									
N	Aluminum cast alloys									
N	Copper and copper alloys (bronze/brass)									
S	Heat-resistant alloys									
S	Titanium alloys									
H	Hardened steel									
H	Hard cast iron									
H	Hardened cast iron									
X	Non-metallic materials									

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

Indexable milling – group 7 (XMR01, XMR12, XMR13, XMP01, QCH)

Material group		Feed rate per cutting edge [mm]							
		XMP01	QCH	QCH	QCH	QCH	QCH	QCH	QCH
		CNE	ZOHX	RD*	APKT	WPGT	SDMT	XPHT	ENMX
		Tool diameter [mm]							
		80–400	16–32	15–32	16–40	20–42	20–40	16–32	16–40
P	Unalloyed steel	0,20	0,20	0,20	0,15	1,00	1,00	0,20	1,00
P	Low-alloyed steel	0,20	0,19	0,19	0,14	0,93	0,93	0,19	0,93
P	High-alloyed steel and high-alloyed tool steel	0,20	0,18	0,18	0,13	0,70	0,70	0,18	0,70
M	Stainless steel	0,20	0,14	0,14	0,11	0,50	0,50	0,14	0,50
K	Grey cast iron	0,20	0,22	0,22	0,17	0,90	0,90	0,22	0,90
K	Cast iron with spheroidal graphite	0,20	0,20	0,20	0,15	0,90	0,90	0,20	0,90
K	Malleable cast iron	0,20	0,20	0,20	0,15	1,00	1,00	0,20	1,00
N	Aluminium wrought alloys				0,13				
N	Aluminum cast alloys				0,13				
N	Copper and copper alloys (bronze/brass)				0,11				
S	Heat-resistant alloys								
S	Titanium alloys								
H	Hardened steel								
H	Hard cast iron								
H	Hardened cast iron								
X	Non-metallic materials								

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

	Feed rate per cutting edge [mm]								
	XMR01 face milling		XMR01 plunge milling		XMR01 circular milling		XMR12	XMR13	
	ENMX-R30 / ENMX-XR		ENMX-R30 / ENMX-XR		ENMX-R30 / ENMX-XR		ENMX-08-GM	SNMU13	
	Tool diameter [mm]								
	16–30	32–63	16–30	32–63	16–30	32–63	16–63	50–160	
	1,00	1,20	0,20	0,25	0,80	0,96	0,20	1,5	
	0,93	1,12	0,19	0,23	0,74	0,89	0,20	1,5	
	0,70	0,84	0,18	0,22	0,70	0,84	0,20	1,2	
	0,50	0,60	0,14	0,18	0,56	0,67	0,20	1,2	
	0,90	1,08	0,22	0,28	0,88	1,06	0,20	1,5	
	0,90	1,08	0,20	0,25	0,80	0,96	0,20	1,2	
	1,00	1,20	0,20	0,25	0,80	0,96	0,20	1,2	



PGMS series

Solid carbide milling

Systemcode – DIN-ISO	**B74**
PANGU PGMS series Update	**B75–B76**
System code – QCH series	**B77**
XM-2C series	**B78–B83**
Recommendes cutting data	**B84–B86**

B

Solid carbide milling System code – DIN-ISO

5	5	0	1	R	30	2	GM	R05	0800
1	2	3	4	5	6	7	8	9	10

1 Type

Code	Description
5	Milling cutter

2 Shank type

Code	Description
1	Shank
5	DIN 6535 HA
6	Weldon shank DIN 6535 HB
7	Whistle Notch DIN 6535 HE
9	Morse taper shank

3 Cutting edge type

Code	Description
0	Square shoulder mill
6	Ball nose cutter
8	Torus mill

4 Tool length

Code	Description
1	DIN 6527 K
2	DIN 6527 L
5	Factory standard ZCC-A
6	Factory standard ZCC-B
8	DIN 6528
9	Factory standard ZCC-D

5 Rotation direction

Code	Description
R	Right
L	Left

6 Helix angle

Code	Description
20	20°
30	30°
3841	38°/41°
45	45°
55	55°
60	60°

7 Number of teeth

Code	Description
2	2
...	
M	Indicated when different diameters have a different number of teeth

8 Application

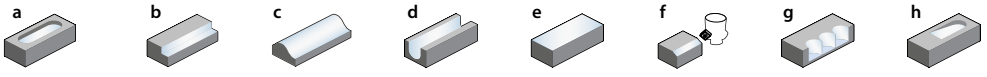
Code	Description
GM	Semi-finishing
GF	Finishing
HM	Hard machining
MHH	High-speed hard machining
NH	High-performance machining of heat-resistant alloys

9 Radius [mm]

Code	Description
R03	0,3
R15	1,5
R30	3,0
...	

10 Diameter [mm]

Code	Description
0100	1,0
0800	8,0
2000	20,0
...	



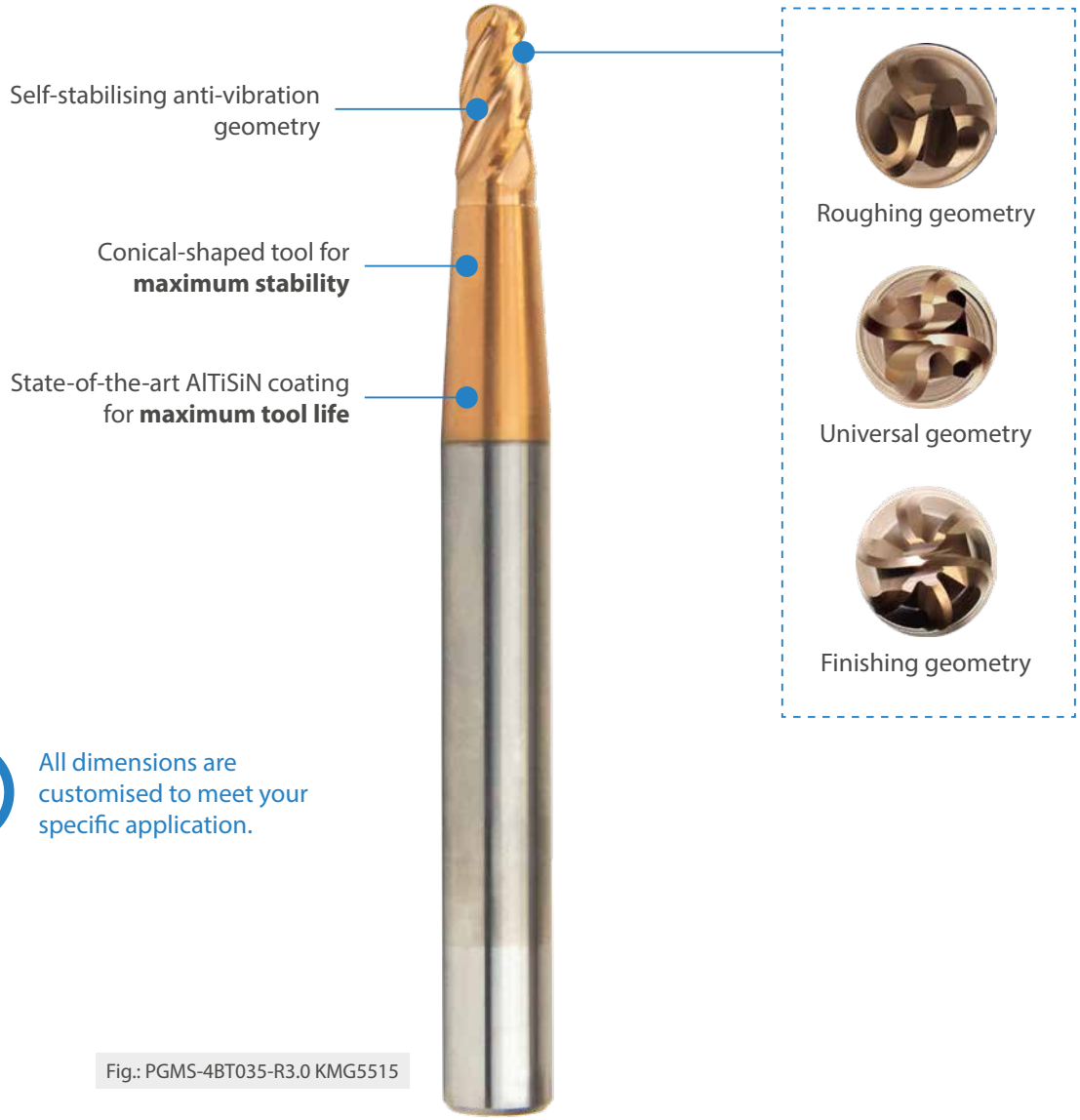
a Groove milling
b Square shoulder milling
c Profile milling
d Slot milling
e Face milling
f Chamfer milling
g Plunge milling
h Circular milling/Ramping

PGMS series

The ideal choice for complex contours

YOUR BENEFITS

– **Higher productivity** thanks to conical cutting edge
– **Flawless surface quality** made possible by low-vibration machining
– **Shorter process times** thanks to enhanced tool geometry
– **Extremely long tool life** when machining HRSA and titanium thanks to customised cutting edge geometry



All dimensions are customised to meet your specific application.

Fig.: PGMS-4BT035-R3.0 KMG5515

Ball nose cutters

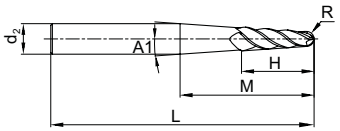
High-performance machining

Update

PGMS-4BT

– Straight shank
– Centre cutting
– Tapered cutting edge





Article	✻	Dimensions [mm]						Grade
		A1	R	d_2	H	M	L	KMG5515
PGMS-4BT020-R1.0		2°	1.0	4	10	32.5	60	●
PGMS-4BT020-R2.0		2°	2.0	4	12	33.5	75	●
PGMS-4BT020-R4.0		2°	4.0	10	15	35.5	100	●
PGMS-4BT020-R5.0		2°	5.0	12	20	65	120	●
PGMS-4BT020-R6.0		2°	6.0	16	25	66	150	●
PGMS-4BT040-R1.0		4°	1.0	6	10	31	75	●
PGMS-4BT040-R2.0		4°	2.0	8	12	32	100	●
PGMS-4BT040-R4.0		4°	4.0	12	15	34	100	●
PGMS-4BT040-R5.0		4°	5.0	16	20	49	120	●
PGMS-4BT040-R6.0		4°	6.0	20	25	64.5	150	●
PGMS-4BT050-R2.0		5°	2.0	8	12	26	75	●
PGMS-4BT050-R3.0		5°	3.0	12	15	38	100	●
PGMS-4BT050-R4.0		5°	4.0	16	15	50	100	●
PGMS-4BT050-R5.0		5°	5.0	16	20	40	120	●
PGMS-4BT050-R6.0		5°	6.0	20	25	52.5	150	●
PGMS-4BT060-R2.0		6°	2.0	10	12	40	100	●
PGMS-4BT060-R4.0		6°	4.0	16	15	42	100	●
PGMS-4BT060-R5.0		6°	5.0	18	20	43	120	●
PGMS-4BT060-R6.0		6°	6.0	20	25	44.5	150	●

● Ex stock ○ On demand
✻ With inner cooling

Application fields

P	M	K	N	S	H
✔	✔	✔	✔	✔	

✔ Very suitable
✔ Suitable

Q 08 – XM – 2 C60 – D12 H9.4

1	2	3	4	5	6	7

Thread type

1

Thread diametre [mm]	
Code	Description
08	8,0
10	10,0
12	12,0
14	14,0
18	18,0

2

Application	
Code	Description
PM	High-performance machining
HMX	Hard machining
XM	Deburring

3

Number of teeth

4

Cutting edge type	
Code	Description
E	Square shoulder mill with protective chamfer
B	Ball nose cutter
R	Torus mill
C	

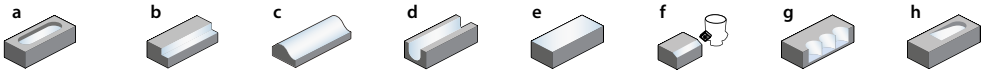
5

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

6

Radius R / Effective cutting edge length H [mm]	
Code	Description
R0.5	0,5
R1.0	1,5
R3.0	3,0
H9.4	9,4

7



a Groove milling **b** Square shoulder milling **c** Profile milling **d** Slot milling **e** Face milling **f** Chamfer milling **g** Plunge milling **h** Circular milling/Ramping

XM-2C series

Flexible deburring cutter with interchangeable head

YOUR BENEFITS

– **Greater flexibility** in real-world applications thanks to numerous possible combinations
– **Perfect concentricity** and **maximum change-over accuracy** thanks to patented Q interface
– **Universal tool** for countersinking holes and deburring contours

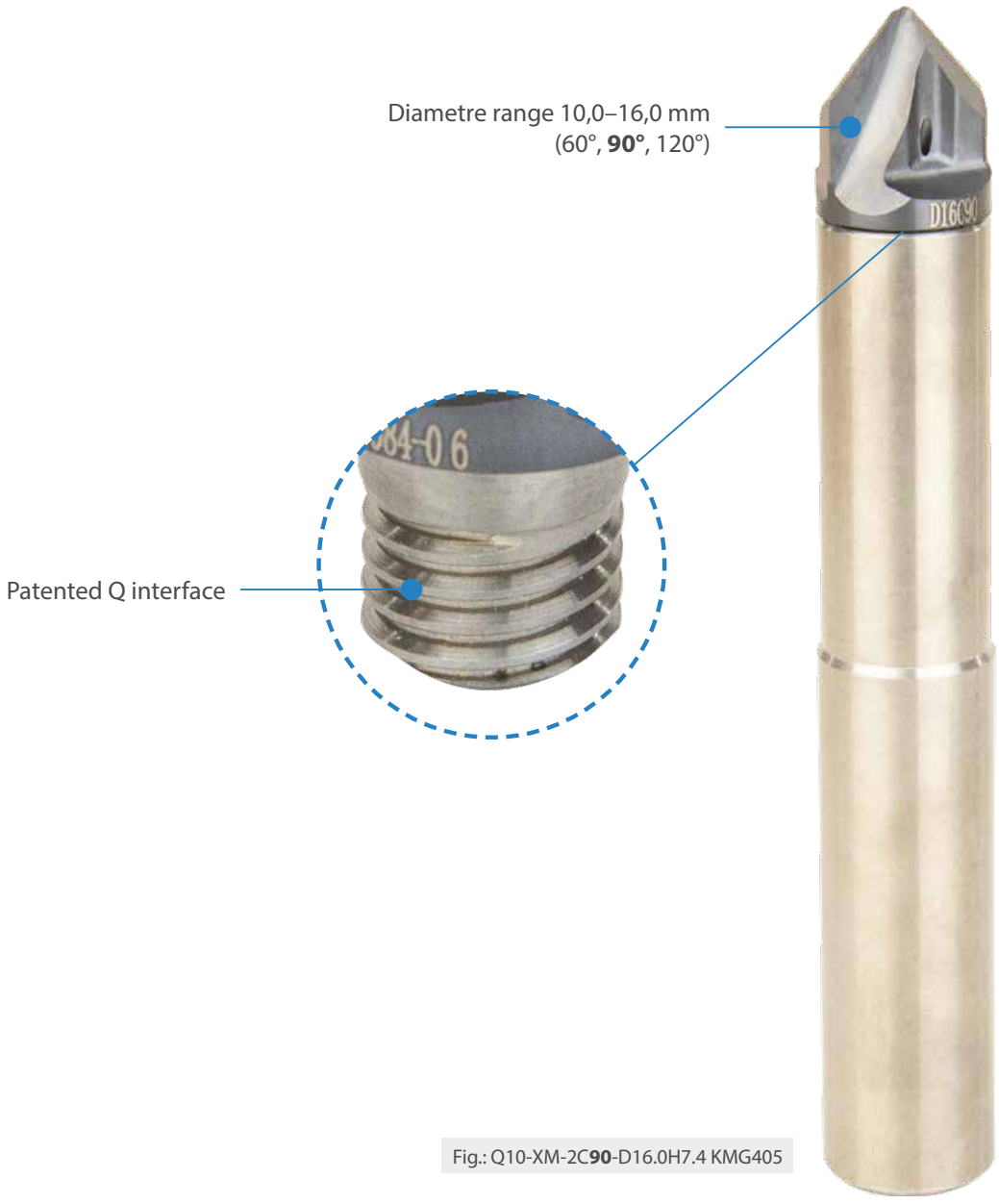
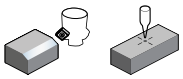


Fig.: Q10-XM-2C**90**-D16.0H7.4 KMG405

Deburring cutters

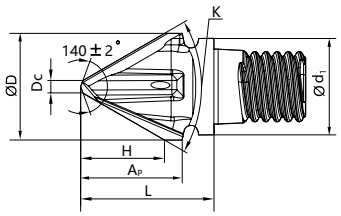
General machining

XM-2C



– Centre cutting
– Helix angle 0°





Article	✻	Dimensions [mm]								Teeth	Grade
		D	d_1	Dc	A_p	H	K	L	MD		KMG405
Q07-XM-2C60-D10.0H7.6	✻	10.0	9.5	1.5	9.3	7.6	60°	12.0	Q07	2	●
Q07-XM-2C90-D10.0H4.5	✻	10.0	9.5	1.5	9.3	4.5	90°	12.0	Q07	2	●
Q07-XM-2C120-D10.0H2.7	✻	10.0	9.5	1.5	9.3	2.7	120°	12.0	Q07	2	●
Q08-XM-2C60-D12.0H9.2	✻	12.0	11.5	1.5	11.0	9.2	60°	16.0	Q08	2	●
Q08-XM-2C90-D12.0H5.3	✻	12.0	11.5	1.5	11.0	5.3	90°	16.0	Q08	2	●
Q08-XM-2C120-D12.0H3.5	✻	12.0	11.5	1.5	11.0	3.5	120°	16.0	Q08	2	●
Q10-XM-2C60-D16.0H12.1	✻	16.0	15.2	1.5	14.0	12.1	60°	18.0	Q10	2	●
Q10-XM-2C90-D16.0H7.4	✻	16.0	15.2	1.5	14.0	7.4	90°	18.0	Q10	2	●
Q10-XM-2C120-D16.0H4.5	✻	16.0	15.2	1.5	14.0	4.5	120°	18.0	Q10	2	●

● Ex stock ○ On demand
✻ With inner cooling

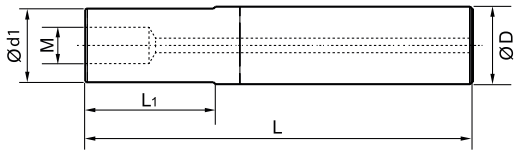
Application fields

P	M	K	N	S	H
✔	✔	✔	✔	✔	✔

✔ Very suitable
✔ Suitable

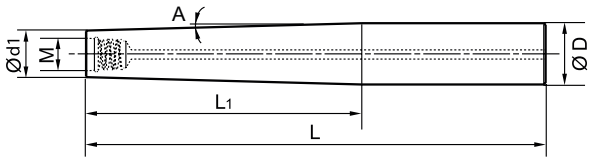
Indexable heads shanks

Solid carbide shank, stepped, Q thread



Article	Dimensions [mm]				Thread (M)	Stock
	D	d1	L	L1		
G12-QCH-Q08-80C	12	11,5	80	30	Q8	●
G12-QCH-Q08-100C	12	11,5	100	50	Q8	●
G12-QCH-Q08-120C	12	11,5	120	70	Q8	●
G16-QCH-Q10-90C	16	15,2	90	40	Q10	●
G16-QCH-Q10-120C	16	15,2	120	70	Q10	●
G16-QCH-Q10-150C	16	15,2	150	100	Q10	●
G20-QCH-Q12-100C	20	19	100	40	Q12	●
G20-QCH-Q12-140C	20	19	140	80	Q12	●
G20-QCH-Q12-180C	20	19	180	120	Q12	●
G25-QCH-Q14-120C	25	24	120	50	Q14	●
G25-QCH-Q14-170C	25	24	170	100	Q14	●
G25-QCH-Q14-220C	25	24	220	150	Q14	●
G32-QCH-Q18-140C	32	30	140	70	Q18	●
G32-QCH-Q18-200C	32	30	200	130	Q18	●
G32-QCH-Q18-260C	32	30	260	190	Q18	●
G32-QCH-Q18-320C	32	30	320	250	Q18	●

Solid carbide shank, tapered, Q thread



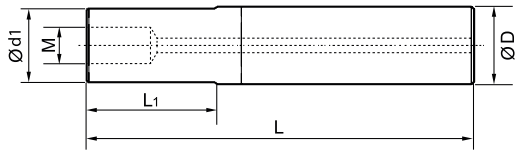
Article	Dimensions [mm]				Thread (M)	Angle (A)	Stock
	D	d1	L	L1			
G16-QCH-Q08-140C-ZJ90	16	11,5	140	90	Q8	1,0	●
G20-QCH-Q10-200C-ZJ140	20	15,2	200	140	Q8	0,8	●
G25-QCH-Q12-250C-ZJ180	25	19	250	180	Q8	0,8	●
G32-QCH-Q14-270C-ZJ200	32	30	270	200	Q10	0,8	●

Spare parts

	Thread	Q8 / Q10	Q12 / Q14	Q18
	Wrench	QCH-10×13	QCH-16×20	QCH-26

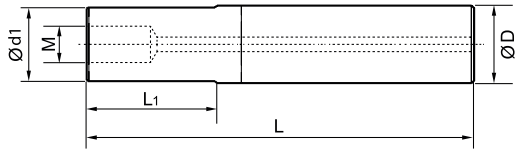
Indexable heads shanks

Steel shank, stepped, Q thread



Article	Dimensions [mm]				Thread (M)	Stock
	D	d1	L	L1		
G12-QCH-Q08-65S	12	11,5	65	19	Q08	●
G16-QCH-Q10-100S	16	15,2	100	42	Q10	●
G20-QCH-Q12-110S	20	19	110	54	Q12	●

Solid carbide shank, stepped, metric thread



Article	Dimensions [mm]				Thread (M)	Stock
	D	d1	L	L1		
G16-QCH-M8-90C-125	16	12,5	90	35	M8	○
G16-QCH-M8-110C-125	16	12,5	110	55	M8	○
G16-QCH-M8-130C-125	16	12,5	130	75	M8	○
G16-QCH-M8-90C	16	15	90	35	M8	○
G16-QCH-M8-110C	16	15	110	55	M8	○
G16-QCH-M8-130C	16	15	130	75	M8	○
G16-QCH-M8-170C	16	15	170	115	M8	○
G16-QCH-M8-200C	16	15	200	145	M8	○
G20-QCH-M10-87C	20	18,5	87	30	M10	○
G20-QCH-M10-107C	20	18,5	107	50	M10	○
G20-QCH-M10-127C	20	18,5	127	70	M10	○
G20-QCH-M10-167C	20	18,5	167	110	M10	○
G20-QCH-M10-197C	20	18,5	197	140	M10	○
G25-QCH-M12-128C	25	23	128	65	M12	○
G25-QCH-M12-148C	25	23	148	85	M12	○
G25-QCH-M12-168C	25	23	168	105	M12	○
G25-QCH-M12-198C	25	23	198	135	M12	○
G25-QCH-M12-228C	25	23	228	165	M12	○
G32-QCH-M16-161C	32	29	161	95	M16	○
G32-QCH-M16-211C	32	29	211	145	M16	○
G32-QCH-M16-281C	32	29	281	215	M16	○
G32-QCH-M16-311C	32	29	311	245	M16	○
G32-QCH-M16-361C	32	29	361	295	M16	○

Notes



XM-2C deburring cutter with interchangeable head

End mill – QCH series

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

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

	Starting values for cutting speed v_c [m/min]																			
	Q**-HMX-4E Q**-HMX-4R				Q**-HMX-2B Q**-HMX-4B				Q**-XM-2C											
			Shoulder milling																	
	Ø [mm]	$a_{p\,max}$	Ø [mm]	$a_{e\,max}$	Ø [mm]	$a_{p\,max}$	Ø [mm]	$a_{e\,max}$	Ø [mm]	$a_{p\,max}$	Ø [mm]	$a_{e\,max}$								
			0 < x ≤ 20	0.15 x D																
	KMG5515				KMG5515				KMG405											
	a_e / D				a_e / D				a_e / D											
	1/1	1/2	1/10	f-group	1/1	1/2	1/10	f-group	1/1	1/2	1/10	f-group								
									–	–	230	11								
									–	–	220	11								
									–	–	165	11								
									–	–	140	11								
									–	–	130	11								
									–	–	175	11								
									–	–	140	11								
									–	–	130	11								
									–	–	120	11								
									–	–	165	11								
									–	–	125	11								
									–	–	75	11								
									–	–	65	11								
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									–	–	65	11								
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									–	–	420	11								
									–	–	360	11								
									–	–	60	11								
									–	–	50	11								
									–	–	50	11								
									–	–	30	11								
									–	–	40	11								
									–	–	70	11								
									–	–	60	11								
	55	100	125	3		130	145	7	–	–	70	11								
	55	95	120	3		80	90	7	–	–	40	11								
	70	125	160	3		163	181	7	–	–	80	11								
	55	100	125	3		109	145	7	–	–	40	11								

Solid carbide milling group 11 – Deburring cutters FM series, QCH series

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

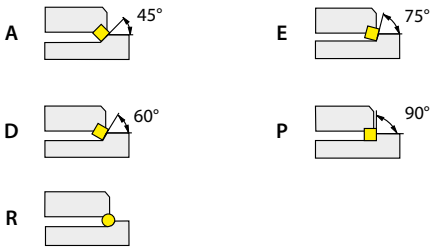
Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

FM	A	12	050	–	A22	O	–	N	06	–	04	(L)	(AC)
1	2	3	4		5	6		7	8		9	10	11

Type	
Code	Description
BM	Profile milling
CM	Chamfer milling
EM	Square shoulder milling
FM	Face milling
HM	Helical milling
SM	Slot milling
TM	T-slot milling
XM	Special

1

Entering angle



2

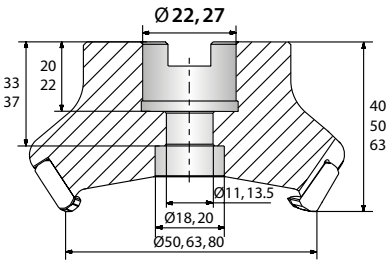
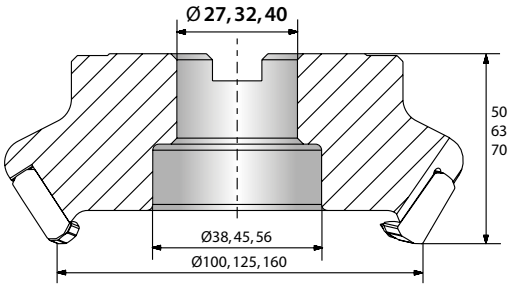
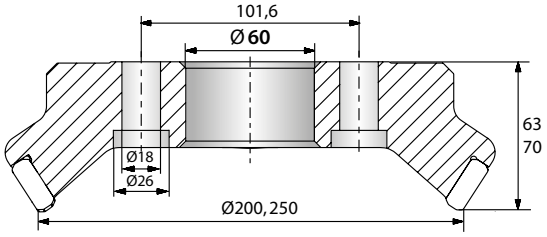
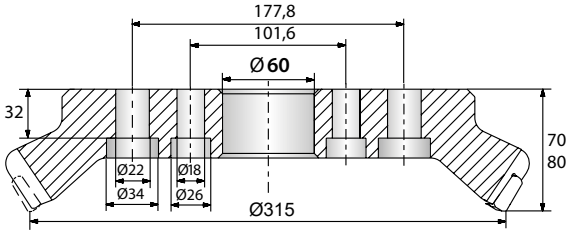
Serial number

3

Nominal diameter [mm]	
Code	Description
025	25
050	50
160	160
315	315
...	

4

Type and size of tool holders

Code	Type	Code	Type
A	Nominal diameter Ø50 – 80 mm 	**B**	Nominal diameter Ø100 – 160 mm 
C	Nominal diameter Ø200 – 250 mm 	**D**	Nominal diameter Ø315 mm 
G	Straight shank	**XP**	Weldon shank
K	Bore with keyway		

5

With respect to mounting please adhere to the information provided by the tool holder manufacturer.

Insert shape			
A		C	
H		L	
M		O	
P		R	
S		T	
W		X	Special
Z	Special		

6

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

7

Cutting edge length l [mm]	
Insert shape	
	
A	C, M
	
H, O, P	L
	
R	S
	
T	W

8

Number of teeth

9

Cutting direction	
Code	Description
L	Left

10

Cooling	
Code	Description
C	Inner cooling
AC	Air cooling

11

Tools with B coupling and inner coolant supply require the following spare parts:



Coolant clamp screw



Coolant shower plate



Spare parts (B coupling with inner coolant supply)

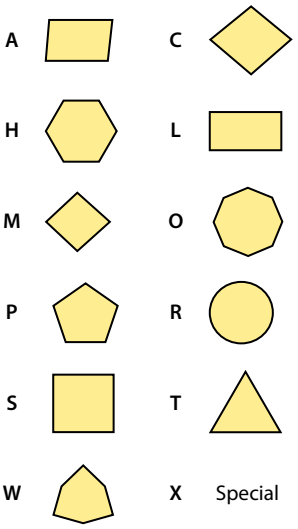
		B27	B32	B40	B40
	Ø	**80**	**100**	**125**	**160**
	**Coolant clamp screw**	LDB27C	LDB32C	LDB40C	LDB40C
	**Coolant shower plate**	B27-002-CP	B32-002-CP	B40-002-CP	B40-003-CP

When purchasing tools with inner coolant supply and B coupling these spare parts are included in delivery.

Indexable milling ISO code – inserts

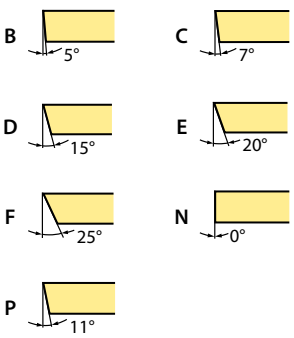
S	P	K	N	12	04	ED	T21K	R	–	DM
1	2	3	4	5	6	7	8	9		10

Insert shape



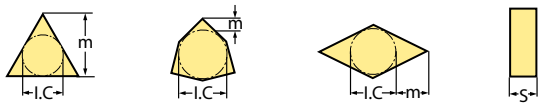
1

Clearance angle



2

Tolerance class

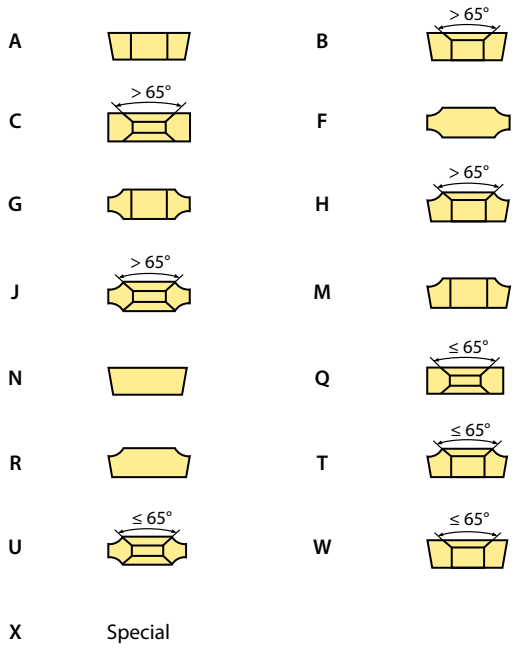


Code	I.C [mm]	m [mm]	S [mm]
A	±0,025	±0,005	±0,025
C	±0,025	±0,013	±0,025
E	±0,025	±0,025	±0,025
F	±0,013	±0,005	±0,025
G	±0,025	±0,025	±0,130
H	±0,013	±0,013	±0,025
J	±0,05–0,13	±0,005	±0,025
K	±0,05–0,13	±0,013	±0,025
L	±0,05–0,13	±0,025	±0,025
M	±0,05–0,13	±0,08–0,18	±0,130
N	±0,05–0,13	±0,08–0,18	±0,025
U	±0,08–0,25	±0,13–0,38	±0,130

3

Fastening features (metric)

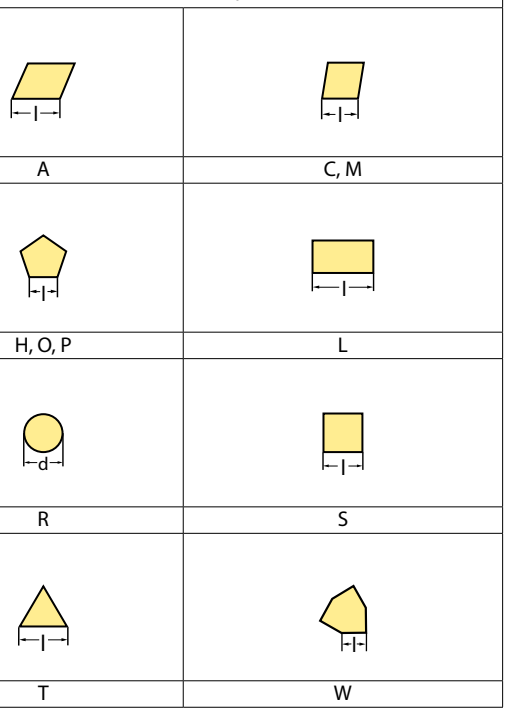
Insert shape



4

Cutting edge length l [mm]

Insert shape



5

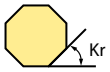
Insert thickness S [mm]



Code	S	Code	S
00	0,79	**05**	5,56
T0	0,99	**T5**	5,95
01	1,59	**06**	6,35
T1	1,98	**T6**	6,75
02	2,38	**07**	7,94
T2	2,58	**09**	9,52
03	3,18	**T9**	9,72
T3	3,97	**11**	11,11
04	4,76	**12**	12,70
T4	4,96		

6

Angle





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

7

Chamfer

Code	Type	Code	Angle	Code	Width [mm]	Code	Position
F		**0**	5°	**0**	0,10	**K**	
E		**1**	10°	**1**	0,15		
T		**2**	15°	**2**	0,20	**P**	
S		**3**	20°	**3**	0,25		
		4	25°	**4**	0,30	**W**	
		5	30°	**5**	0,35		
				6	0,40		
				7	0,45	**–**	

8

Cutting direction

Code	Description
R	Right
L	Left
N	Right and left

9

Chip breakers

10

XMR12 high-feed milling system

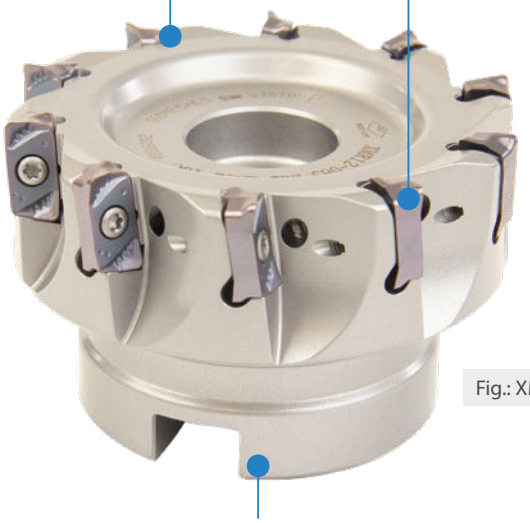
Maximum chip removal rates coupled with minimum machining times

YOUR BENEFITS

– Double-sided inserts for **greater efficiency** and **stability**
– Finer pitch for **higher productivity**
– Top results when working with **steel** and **cast materials**
– Positive cutting geometry for **lower cutting forces**
– **Wide range of applications** (e.g., face milling, grooving, ramping)
– Available as an end mill, a shell-type milling cutter or an indexable head

Higher feed rates possible thanks to large number of insert seats available

Thicker inserts for increased process reliability



Diameter range 16 – 63 mm

Fig.: XMR12-063-A22-EN12-10C



Fig.: QCH-25-EN12-M12-04-XMR12

Insert grades

YBG205H

PVD
P10 – P30
M20 – M40

Chip breaker

ENMX-GM



General machining

ENMX-XR



High-feed machining

Four-edged inserts for **high efficiency**

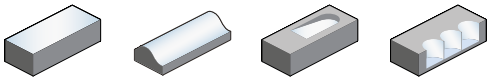
Low cutting forces thanks
to positive cutting edge design



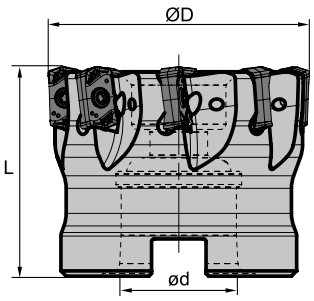
Fig.: ENMX-120608-GM YBG205H

High-feed milling

XMR12 Kr: 18°







Article	✻	Stock	Dimensions [mm]			Teeth	Coupling	kg	Insert
			ØD	ød	L				
XMR12-040-A16-EN12-06C	✻	●	40	16	40	6	A	0,204	
XMR12-050-A22-EN12-08C	✻	●	50	22	50	8	A	0,336	ENMX1206**
XMR12-063-A22-EN12-10C	✻	●	63	22	50	10	A		

● Ex stock ○ On demand

✻ With internal cooling

Spare parts

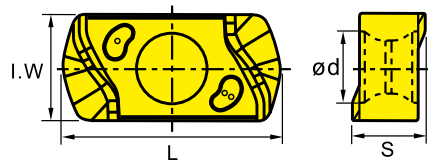
	Insert	**ENMX1206****
	ØD	**32-80**
	Screw	I60M2,5×6,5 (1,0 Nm)
	Wrench	WT07IP



Ideal machining conditions
Normal machining conditions
Unfavourable machining conditions

ENMX	L	S	d
12 06	12	3	2,88

Milling inserts



EN** milling inserts					HC¹ (CVD)									HC¹ (PVD)												HT	HC²	HW	
				P																									
				M																									
				K																									
				N																									
				S																									
				H																									
ISO		r	l.W	a_p max	YBC302	YBC301	YBC401	YBM253	YBM251	YBM351	YBD152	YBD252	YBD203	YBH053	YBG101	YBG102	YBG202	YBG212	YBS203	YBG205	YBG205H	YB9320	YBG302	YBS303	YBG252	YNG151	YNG151C	YD101	YD201
	**ENMX120608-GM**	0,8	6	2,8																	○								
	ENMX1206R30-GM	3	6	2,8																	○								
	**ENMX1206XR-GM**	0,6	6	0,6																	○								

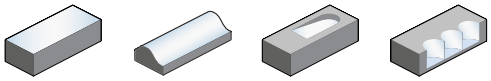
● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

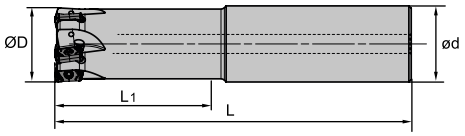
For **ENMX120608** and **ENMX1206R30** the diameter changes [ØD] -0.4mm / [L1] +0.11mm.

High-feed milling

XMR12 Kr: 18°







Article	✻	Stock	Dimensions [mm]				Teeth	kg	Insert
			ØD	ød	L_1	L			
XMR12-016-G16-EN12-02C	✻	●	16	16	30	100	2	0,13	
XMR12-017-G16-EN12-02C	✻	●	17	16	30	100	2	0,13	
XMR12-018-G16-EN12-02C	✻	●	18	16	30	100	2	0,13	
XMR12-020-G20-EN12-03C	✻	●	20	20	50	130	3	0,25	
XMR12-022-G20-EN12-03C	✻	●	22	20	50	130	3	0,25	ENMX1206**
XMR12-025-G25-EN12-04C	✻	●	25	25	60	140	4	0,44	
XMR12-028-G25-EN12-04C	✻	○	28	25	60	140	4	0,44	
XMR12-032-G32-EN12-05C	✻	●	32	32	70	150	5	0,84	
XMR12-035-G32-EN12-05C	✻	●	35	32	35	150	5	0,86	

● Ex stock ○ On demand

✻ With internal cooling

Spare parts

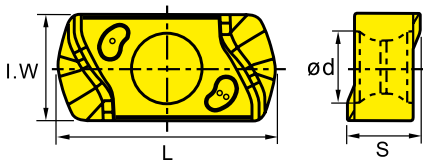
	Insert	**ENMX1206****
	ØD	**12-45**
	Screw	I60M2,5×6,5 (1,0 Nm)
	Wrench	WT07IP



Ideal machining conditions
Normal machining conditions
Unfavourable machining conditions

ENMX	L	S	d
12 06	12	3	2,88

Milling inserts



EN** milling inserts					HC¹ (CVD)								HC¹ (PVD)											HT	HC²	HW	
				P																							
				M																							
				K																							
				N																							
				S																							
				H																							
ISO		r	l.W	a_p max	YBC302	YBC301	YBC401	YBM253	YBM251	YBM351	YBD152	YBD252	YBD203	YBH053	YBG101	YBG102	YBG202	YBG212	YBS203	YBG205	YBG205H	YB9320	YBG302	YBS303	YBG252	YNG151	YNG151C	YD101	YD201
	**ENMX120608-GM**	0,8	6	2,8																	○								
	ENMX1206R30-GM	3	6	2,8																	○								
	**ENMX1206XR-GM**	0,6	6	0,6																	○								

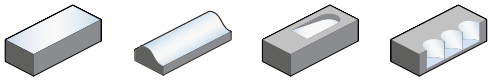
● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

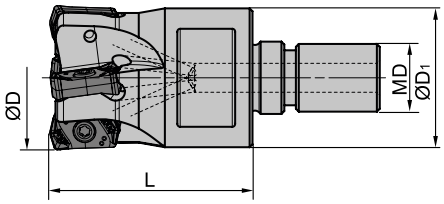
For **ENMX120608** and **ENMX1206R30** the diameter changes [ØD] -0.4mm / [L1] +0.11mm.

High-feed milling

QCH-EN Kr: 18







Article	✻	Stock	Dimensions [mm]				Teeth	kg	Insert
			ØD	ØD1	L	MD			
QCH-16-EN12-M8-02-XMR12	✻	●	16	13	28	8	2	0,025	ENMX1206**
QCH-17-EN12-M8-02-XMR12	✻	●	17	15	28	8	2		
QCH-18-EN12-M8-02-XMR12	✻	●	18	15	28	8	2	0,033	
QCH-20-EN12-M10-03-XMR12	✻	●	20	17	30	10	3	0,046	
QCH-22-EN12-M10-03-XMR12	✻	●	22	19	30	10	3	0,057	
QCH-25-EN12-M12-04-XMR12	✻	●	25	21,6	35	12	4	0,09	
QCH-28-EN12-M12-04-XMR12	✻	●	28	21,6	35	12	4	0,104	
QCH-32-EN12-M16-05-XMR12	✻	●	32	28	43	16	5	0,199	
QCH-33-EN12-M16-05-XMR12	✻	●	33	28	43	16	5		
QCH-40-EN12-M16-06-XMR12	✻	●	40	29	40	16	6		

● Ex stock ○ On demand

✻ With internal cooling

Spare parts

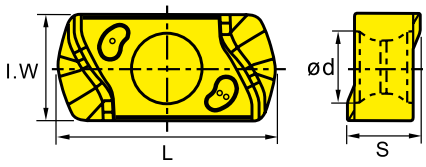
	Insert	**ENMX1206****
	ØD	**16-45**
	Screw	I60M2,5×6,5 (1,0 Nm)
	Wrench	WT07IP



- Ideal machining conditions
- Normal machining conditions
- Unfavourable machining conditions

ENMX	L	S	d
12 06	12	3	2,88

Milling inserts



EN** milling inserts					HC¹ (CVD)								HC¹ (PVD)											HT	HC²	HW	
				P																							
				M																							
				K																							
				N																							
				S																							
				H																							
ISO		r	l.W	a_p max	YBC302	YBC301	YBC401	YBM253	YBM251	YBM351	YBD152	YBD252	YBD203	YBH053	YBG101	YBG102	YBG202	YBG212	YBS203	YBG205	YBG205H	YB9320	YBG302	YBS303	YBG252	YNG151	YNG151C	YD101	YD201
	**ENMX120608-GM**	0,8	6	2,8																	○								
	ENMX1206R30-GM	3	6	2,8																	○								
	**ENMX1206XR-GM**	0,6	6	0,6																	○								

● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

For **ENMX120608** and **ENMX1206R30** the diameter changes [ØD] -0.4mm / [L1] +0.11mm.

Indexable milling – group 7 (XMR01, XMR12, XMP01, QCH)

Material group		Composition / structure / heat treatment		Brinell hardness HB	Machining group	Starting values for cutting speed v_c [m/min] HC (CVD) YBC302 a_e / D 1/1 | 3/4	YBC302 a_e / D 1/5	YBC302 a_e / D 1/20	YBD152 a_e / D 1/1 | 3/4	YBD152 a_e / D 1/5	YBD152 a_e / D 1/20
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	260	300	390			
		approx. 0,45 % C	annealed	190	2	225	255	335			
		approx. 0,45 % C	tempered	250	3	210	240	315			
		approx. 0,75 % C	annealed	270	4	185	210	275			
		approx. 0,75 % C	tempered	300	5	170	195	255			
	Low-alloyed steel		annealed	180	6	225	255	335			
			tempered	275	7	185	210	275			
			tempered	300	8	170	195	255			
			tempered	350	9	145	165	215			
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	130	150	195			
			hardened and tempered	325	11	95	105	140			
M	Stainless steel	ferritic/martensitic	annealed	200	12						
		martensitic	tempered	240	13						
		austenitic	quench hardened	180	14						
		austenitic-ferritic		230	15						
K	Grey cast iron	perlitic/ferritic		180	16				335	390	510
		perlitic (martensitic)		260	17				200	230	300
	Cast iron with spheroidal graphite	ferritic		160	18				225	260	340
		perlitic		250	19				150	175	230
	Malleable cast iron	ferritic		130	20				275	320	420
		perlitic		230	21				185	215	280
N	Aluminium wrought alloys	cannot be hardened		60	22						
		hardenable	hardened	100	23						
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24						
		≤ 12 % Si, hardenable	hardened	90	25						
		> 12 % Si, cannot be hardened		130	26						
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27						
		CuZn, CuSnZn		90	28						
		CuSn, Pb-free copper, electrolytic copper		100	29						
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30						
			hardened	280	31						
		Ni or Co bass	annealed	250	32						
			hardened	350	33						
			cast	320	34						
	Titanium alloys	pure titanium		R_m 400	35						
		α and β alloys	hardened	R_m 1050	36						
H	Hardened steel		hardened and tempered	55 HRC	37						
			hardened and tempered	60 HRC	38						
	Hard cast iron		cast	400	39						
	Hardened cast iron		hardened and tempered	55 HRC	40						
X	Non-metallic materials	Thermoplasts			41						
		Thermosetting plastics			42						
		Plastic, glass-fibre reinforced GFRP			43						
		Plastic, carbon fibre reinforced CFRP			44						
		Graphite			45						
		Wood			46						

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B254.
For examples of material for cutting tool groups view page D11.

	Starting values for cutting speed v_c [m/min]																				
	HC (CVD)						HC (PVD)														
	YBD252			YBM253			YBG102			YBG152			YB9320			YBG205(H)			YBG212		
	a_e / D			a_e / D			a_e / D			a_e / D			a_e / D			a_e / D			a_e / D		
	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20
				260	300	390	270	315	410	255	295	385	245	285	375	235	275	360	240	280	365
				225	255	335	230	270	355	220	255	335	210	245	320	200	235	310	205	240	315
				210	240	315	220	255	335	205	240	315	200	230	300	190	220	290	195	225	295
				185	210	275	190	225	295	180	210	275	175	200	260	165	195	255	170	200	260
				170	195	255	180	205	270	170	195	255	160	190	250	155	180	235	160	185	245
				225	255	335	230	270	355	220	255	335	210	245	320	200	235	310	205	240	315
				185	210	275	190	225	295	180	210	275	175	200	260	165	195	255	170	200	260
				170	195	255	180	205	270	170	195	255	160	190	250	155	180	235	160	185	245
				145	165	215	150	175	230	145	165	215	135	160	210	130	155	205	135	155	205
				130	150	195	135	160	210	130	150	195	125	145	190	120	140	185	120	140	185
				95	105	140	95	115	150	90	105	140	90	100	130	85	100	130	85	100	130
				130	150	195	135	160	205	130	150	195	125	145	190	120	140	180	120	140	185
				110	130	165	115	135	175	110	125	165	105	120	160	100	120	155	105	120	155
				140	160	210	145	170	220	140	160	205	130	155	200	125	150	195	130	150	195
				110	130	165	115	135	175	110	125	165	105	120	160	100	120	155	105	120	155
	290	335	440				300	345	450	285	330	430	270	315	410	260	300	390	265	305	400
	170	195	255				180	205	270	170	195	255	160	190	250	155	180	235	160	185	245
	195	225	295				205	240	315	195	225	295	185	215	280	180	210	275	180	210	275
	130	150	195				135	160	210	130	150	195	125	145	190	120	140	185	120	140	185
	235	270	355				245	285	375	230	270	355	225	260	340	215	250	325	220	255	335
	160	180	235				165	190	250	155	180	235	150	175	230	145	165	215	145	170	225

HC Coated carbide
HT Uncoated carbide, main component (TiC) o. (TiN), cermet
HC_1 Coated cermet
HW Uncoated carbide, main component (WC)

Recommended feed rate

Indexable milling – group7 (XMR01, XMR12, XMP01, QCH)

Material group		Feed rate per cutting edge [mm]								
		XMR01 face milling			XMR01 plunge milling			XMR01 circular milling		
		SDMT/WPGT			SDMT/WPGT			SDMT/WPGT		
		Tool diameter [mm]								
		20–25	30–50	63–160	20–25	30–50	63–160	20–25	30–50	63–160
P	Unalloyed steel	1,00	1,20	2,00	0,20	0,25	0,30	0,80	0,96	1,40
P	Low-alloyed steel	0,93	1,12	1,86	0,19	0,23	0,28	0,74	0,89	1,30
P	High-alloyed steel and high-alloyed tool steel	0,70	0,84	1,40	0,18	0,22	0,26	0,70	0,84	1,23
M	Stainless steel	0,50	0,60	1,00	0,14	0,18	0,21	0,56	0,67	0,98
K	Grey cast iron	0,90	1,08	1,80	0,22	0,28	0,33	0,88	1,06	1,54
K	Cast iron with spheroidal graphite	0,90	1,08	1,80	0,20	0,25	0,30	0,80	0,96	1,40
K	Malleable cast iron	1,00	1,20	2,00	0,20	0,25	0,30	0,80	0,96	1,40
N	Aluminium wrought alloys									
N	Aluminum cast alloys									
N	Copper and copper alloys (bronze/brass)									
S	Heat-resistant alloys									
S	Titanium alloys									
H	Hardened steel									
H	Hard cast iron									
H	Hardened cast iron									
X	Non-metallic materials									

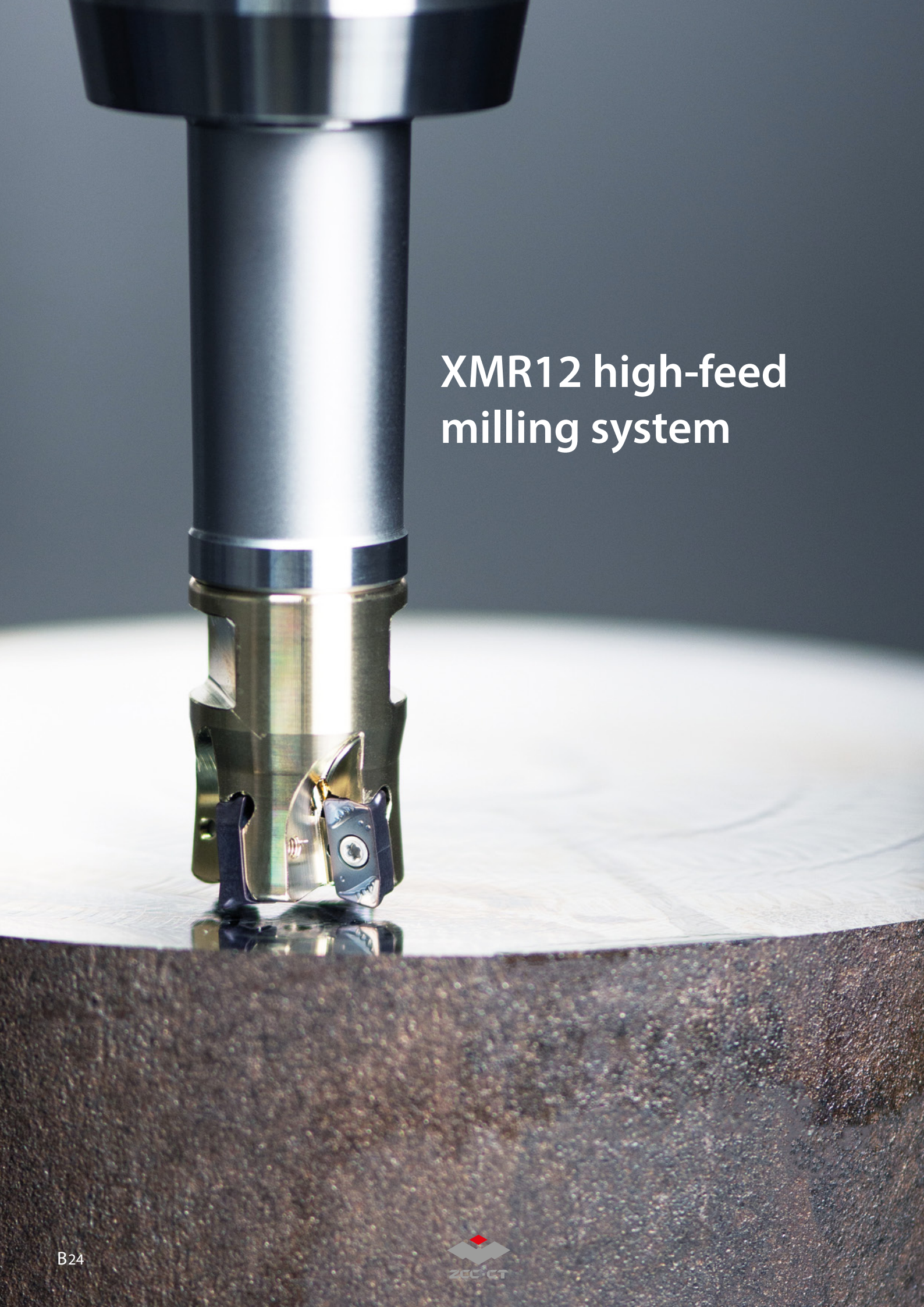
Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

Indexable milling – group7 (XMR01, XMR12, XMP01, QCH)

Material group		Feed rate per cutting edge [mm]							
		XMP01	QCH	QCH	QCH	QCH	QCH	QCH	QCH
		CNE	ZOHX	RD*	APKT	WPGT	SDMT	XPHT	ENMX
		Tool diameter [mm]							
		80–400	16–32	15–32	16–40	20–42	20–40	16–32	16–40
P	Unalloyed steel	0,20	0,20	0,20	0,15	1,00	1,00	0,20	1,00
P	Low-alloyed steel	0,20	0,19	0,19	0,14	0,93	0,93	0,19	0,93
P	High-alloyed steel and high-alloyed tool steel	0,20	0,18	0,18	0,13	0,70	0,70	0,18	0,70
M	Stainless steel	0,20	0,14	0,14	0,11	0,50	0,50	0,14	0,50
K	Grey cast iron	0,20	0,22	0,22	0,17	0,90	0,90	0,22	0,90
K	Cast iron with spheroidal graphite	0,20	0,20	0,20	0,15	0,90	0,90	0,20	0,90
K	Malleable cast iron	0,20	0,20	0,20	0,15	1,00	1,00	0,20	1,00
N	Aluminium wrought alloys				0,13				
N	Aluminum cast alloys				0,13				
N	Copper and copper alloys (bronze/brass)				0,11				
S	Heat-resistant alloys								
S	Titanium alloys								
H	Hardened steel								
H	Hard cast iron								
H	Hardened cast iron								
X	Non-metallic materials								

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

	Feed rate per cutting edge [mm]							
	XMR01 face milling		XMR01 plunge milling		XMR01 circular milling		XMR12	
	ENMX-R30 / ENMX-XR		ENMX-R30 / ENMX-XR		ENMX-R30 / ENMX-XR		ENMX-08-GM	
	Tool diameter [mm]							
	16–30	32–63	16–30	32–63	16–30	32–63	16–63	
	1,00	1,20	0,20	0,25	0,80	0,96	0,20	
	0,93	1,12	0,19	0,23	0,74	0,89	0,20	
	0,70	0,84	0,18	0,22	0,70	0,84	0,20	
	0,50	0,60	0,14	0,18	0,56	0,67	0,20	
	0,90	1,08	0,22	0,28	0,88	1,06	0,20	
	0,90	1,08	0,20	0,25	0,80	0,96	0,20	
	1,00	1,20	0,20	0,25	0,80	0,96	0,20	



XMR12 high-feed milling system

Solid carbide milling

System code – series QCH **B26**

XM-2C series **B27–B29**

QCH shanks & spare parts **B29–B30**

Recommended cutting data **B32–B33**

B

Solid carbide milling System code – QCH series

Q	08	–	XM	–	2	C60	–	D12	H9.4
1	2		3		4	5		6	7

Thread type

1

Thread diametre [mm]	
Code	Description
08	8,0
10	10,0
12	12,0
14	14,0
18	18,0

2

Application	
Code	Description
PM	High-performance machining
HMX	Hard machining
XM	Deburring

3

Number of teeth

4

Cutting edge type	
Code	Description
E	Square shoulder mill with protective chamfer
B	Ball nose cutter
R	Torus mill
C	

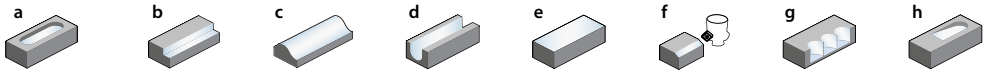
5

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

6

Radius R / Effective cutting edge length H [mm]	
Code	Description
R0.5	0,5
R1.0	1,5
R3.0	3,0
H9.4	9,4

7



a Groove milling **b** Square shoulder milling **c** Profile milling **d** Slot milling **e** Face milling **f** Chamfer milling **g** Plunge milling **h** Circular milling/Ramping

XM-2C series

Flexible deburring cutter with interchangeable head

YOUR BENEFITS

– **Greater flexibility** in real-world applications thanks to numerous possible combinations
– **Perfect concentricity** and **maximum change-over accuracy** thanks to patented Q interface
– **Universal tool** for countersinking holes and deburring contours

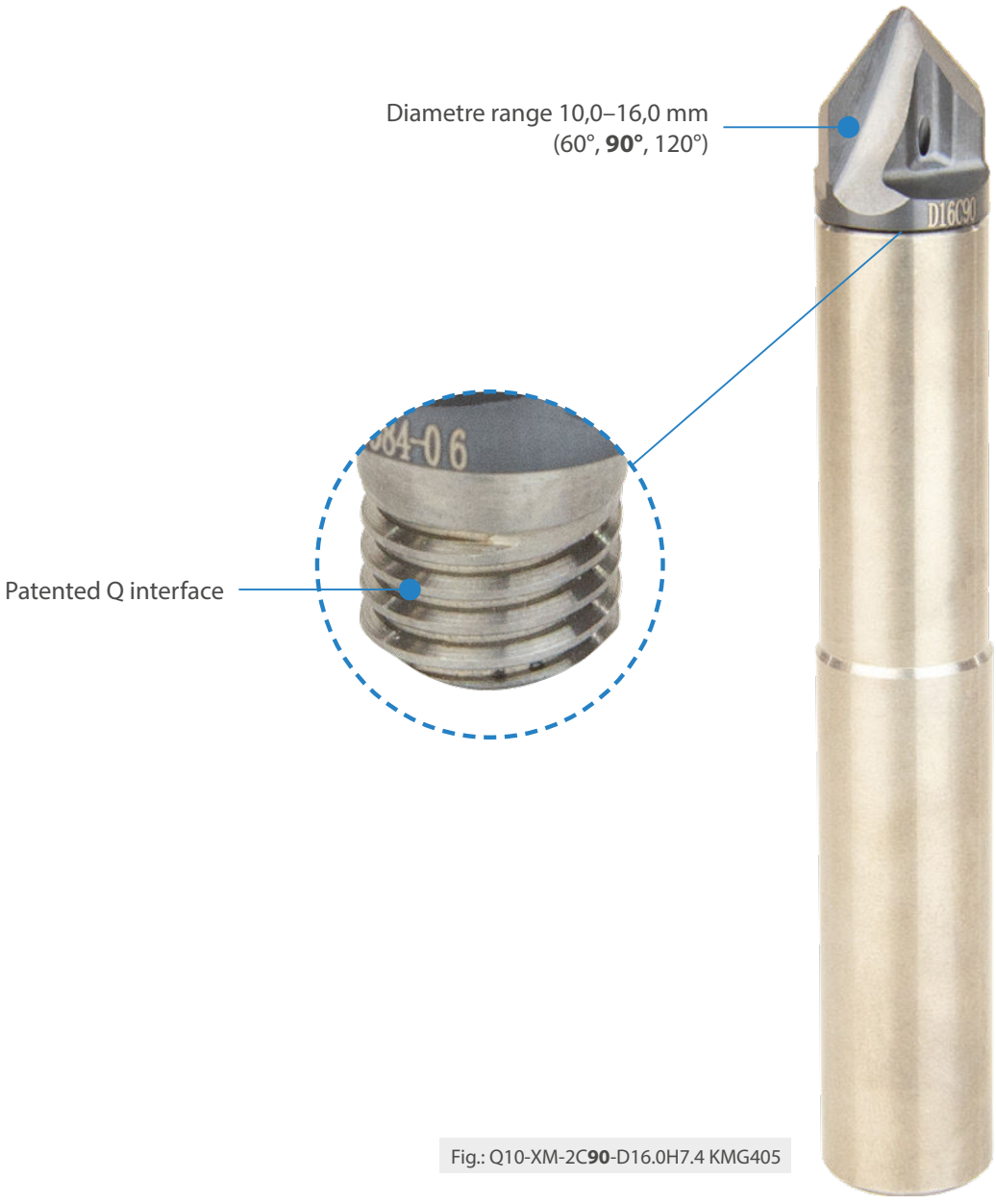
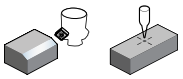


Fig.: Q10-XM-2C**90**-D16.0H7.4 KMG405

Deburring cutters

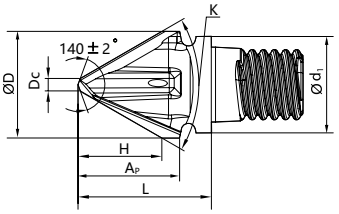
General machining

XM-2C



– Centre cutting
– Helix angle 0°





Article	✻	Dimensions [mm]								Teeth	Grade
		D	d_1	Dc	A_p	H	K	L	MD		KMG405
Q07-XM-2C60-D10.0H7.6	✻	10.0	9.5	1.5	9.3	7.6	60°	12.0	Q07	2	●
Q07-XM-2C90-D10.0H4.5	✻	10.0	9.5	1.5	9.3	4.5	90°	12.0	Q07	2	●
Q07-XM-2C120-D10.0H2.7	✻	10.0	9.5	1.5	9.3	2.7	120°	12.0	Q07	2	●
Q08-XM-2C60-D12.0H9.2	✻	12.0	11.5	1.5	11.0	9.2	60°	16.0	Q08	2	●
Q08-XM-2C90-D12.0H5.3	✻	12.0	11.5	1.5	11.0	5.3	90°	16.0	Q08	2	●
Q08-XM-2C120-D12.0H3.5	✻	12.0	11.5	1.5	11.0	3.5	120°	16.0	Q08	2	●
Q10-XM-2C60-D16.0H12.1	✻	16.0	15.2	1.5	14.0	12.1	60°	18.0	Q10	2	●
Q10-XM-2C90-D16.0H7.4	✻	16.0	15.2	1.5	14.0	7.4	90°	18.0	Q10	2	●
Q10-XM-2C120-D16.0H4.5	✻	16.0	15.2	1.5	14.0	4.5	120°	18.0	Q10	2	●

● Ex stock ○ On demand

✻ With inner cooling

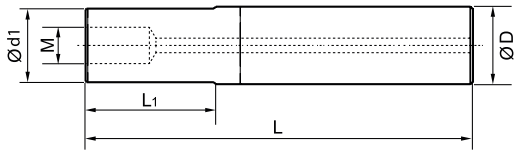
Application fields

P	M	K	N	S	H
✔	✔	✔	✔	✔	✔

✔ Very suitable
✔ Suitable

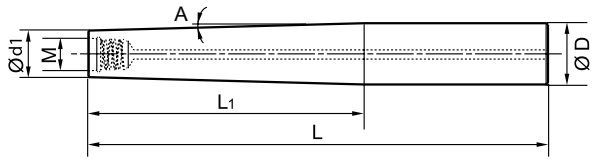
Indexable heads shanks

Solid carbide shank, stepped, Q thread



Article	Dimensions [mm]				Thread (M)	Stock
	D	d1	L	L1		
G12-QCH-Q08-80C	12	11,5	80	30	Q8	●
G12-QCH-Q08-100C	12	11,5	100	50	Q8	●
G12-QCH-Q08-120C	12	11,5	120	70	Q8	●
G16-QCH-Q10-90C	16	15,2	90	40	Q10	●
G16-QCH-Q10-120C	16	15,2	120	70	Q10	●
G16-QCH-Q10-150C	16	15,2	150	100	Q10	●
G20-QCH-Q12-100C	20	19	100	40	Q12	●
G20-QCH-Q12-140C	20	19	140	80	Q12	●
G20-QCH-Q12-180C	20	19	180	120	Q12	●
G25-QCH-Q14-120C	25	24	120	50	Q14	●
G25-QCH-Q14-170C	25	24	170	100	Q14	●
G25-QCH-Q14-220C	25	24	220	150	Q14	●
G32-QCH-Q18-140C	32	30	140	70	Q18	●
G32-QCH-Q18-200C	32	30	200	130	Q18	●
G32-QCH-Q18-260C	32	30	260	190	Q18	●
G32-QCH-Q18-320C	32	30	320	250	Q18	●

Solid carbide shank, tapered, Q thread



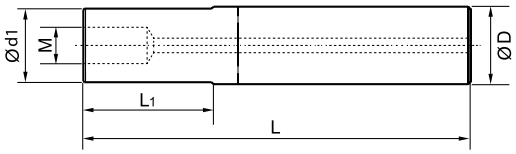
Article	Dimensions [mm]				Thread (M)	Angle (A)	Stock
	D	d1	L	L1			
G16-QCH-Q08-140C-ZJ90	16	11,5	140	90	Q8	1,0	●
G20-QCH-Q10-200C-ZJ140	20	15,2	200	140	Q8	0,8	●
G25-QCH-Q12-250C-ZJ180	25	19	250	180	Q8	0,8	●
G32-QCH-Q14-270C-ZJ200	32	30	270	200	Q10	0,8	●

Spare parts

	Thread	Q8 / Q10	Q12 / Q14	Q18
	Wrench	QCH-10×13	QCH-16×20	QCH-26

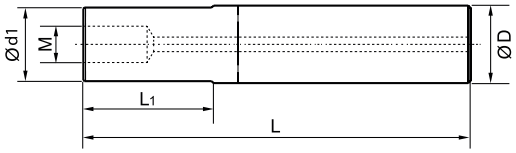
Indexable heads shanks

Steel shank, stepped, Q thread



Article	Dimensions [mm]				Thread (M)	Stock
	D	d1	L	L1		
G12-QCH-Q08-65S	12	11,5	65	19	Q08	●
G16-QCH-Q10-100S	16	15,2	100	42	Q10	●
G20-QCH-Q12-110S	20	19	110	54	Q12	●

Solid carbide shank, stepped, metric thread



Article	Dimensions [mm]				Thread (M)	Stock
	D	d1	L	L1		
G16-QCH-M8-90C-125	16	12,5	90	35	M8	○
G16-QCH-M8-110C-125	16	12,5	110	55	M8	○
G16-QCH-M8-130C-125	16	12,5	130	75	M8	○
G16-QCH-M8-90C	16	15	90	35	M8	○
G16-QCH-M8-110C	16	15	110	55	M8	○
G16-QCH-M8-130C	16	15	130	75	M8	○
G16-QCH-M8-170C	16	15	170	115	M8	○
G16-QCH-M8-200C	16	15	200	145	M8	○
G20-QCH-M10-87C	20	18,5	87	30	M10	○
G20-QCH-M10-107C	20	18,5	107	50	M10	○
G20-QCH-M10-127C	20	18,5	127	70	M10	○
G20-QCH-M10-167C	20	18,5	167	110	M10	○
G20-QCH-M10-197C	20	18,5	197	140	M10	○
G25-QCH-M12-128C	25	23	128	65	M12	○
G25-QCH-M12-148C	25	23	148	85	M12	○
G25-QCH-M12-168C	25	23	168	105	M12	○
G25-QCH-M12-198C	25	23	198	135	M12	○
G25-QCH-M12-228C	25	23	228	165	M12	○
G32-QCH-M16-161C	32	29	161	95	M16	○
G32-QCH-M16-211C	32	29	211	145	M16	○
G32-QCH-M16-281C	32	29	281	215	M16	○
G32-QCH-M16-311C	32	29	311	245	M16	○
G32-QCH-M16-361C	32	29	361	295	M16	○


XM-2C deburring cutter
with interchangeable head

Solid carbide milling Recommended cutting data

End mills – QCH series

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

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B522.
For examples of material for cutting tool groups view page D11.

	Starting values for cutting speed v_c [m/min]																			
	Q**-HMX-4E Q**-HMX-4R				Q**-HMX-2B Q**-HMX-4B				Q**-XM-2C											
			Shoulder milling																	
	Ø [mm]	$a_{p\,max}$	Ø [mm]	$a_{e\,max}$	Ø [mm]	$a_{p\,max}$	Ø [mm]	$a_{e\,max}$												
			0 < x ≤ 20	0.15 x D																
	KMG5515 a_e / D				KMG5515 a_e / D				KMG405 a_e / D											
	1/1	1/2	1/10	f-group	1/1	1/2	1/10	f-group	1/1	1/2	1/10	f-group								
									–	–	230	11								
									–	–	220	11								
									–	–	165	11								
									–	–	140	11								
									–	–	130	11								
									–	–	175	11								
									–	–	140	11								
									–	–	130	11								
									–	–	120	11								
									–	–	165	11								
									–	–	125	11								
									–	–	75	11								
									–	–	65	11								
									–	–	80	11								
									–	–	65	11								
									–	–	170	11								
									–	–	140	11								
									–	–	210	11								
									–	–	165	11								
									–	–	230	11								
									–	–	185	11								
									–	–	1200	11								
									–	–	720	11								
									–	–	480	11								
									–	–	600	11								
									–	–	180	11								
									–	–	360	11								
									–	–	420	11								
									–	–	360	11								
									–	–	60	11								
									–	–	50	11								
									–	–	50	11								
									–	–	30	11								
									–	–	40	11								
									–	–	70	11								
	–	–	–	–	–	–	–	–	–	–	60	11								
	55	100	125	3	–	130	145	7	–	–	70	11								
	55	95	120	3	–	80	90	7	–	–	40	11								
	70	125	160	3	–	163	181	7	–	–	80	11								
	55	100	125	3	–	109	145	7	–	–	40	11								

Solid carbide milling group 11 – Deburring cutters FM series, QCH series

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

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

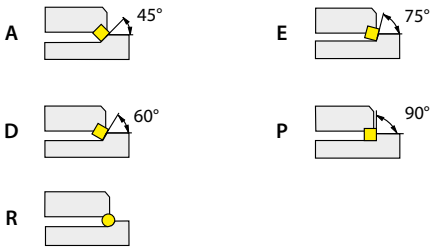
Indexable milling System code – milling bodies

FM	A	12	050	–	A22	O	–	N	06	–	04	(L)	(AC)
1	2	3	4		5	6		7	8		9	10	11

Type	
Code	Description
BM	Profile milling
CM	Chamfer milling
EM	Square shoulder milling
FM	Face milling
HM	Helical milling
SM	Slot milling
TM	T-slot milling
XM	Special

1

Entering angle



2

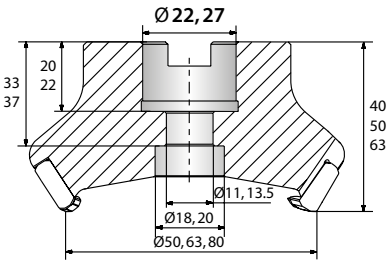
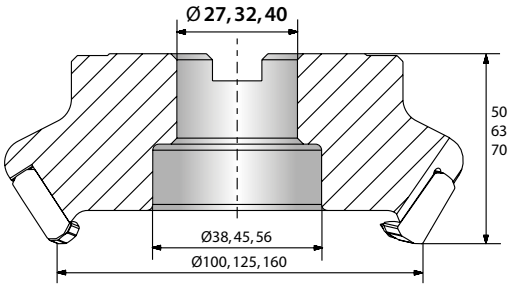
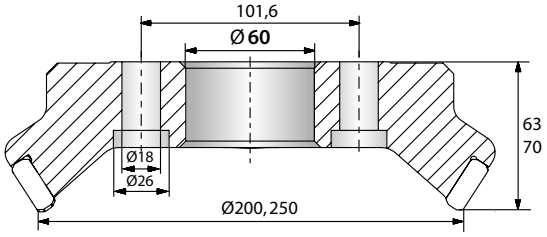
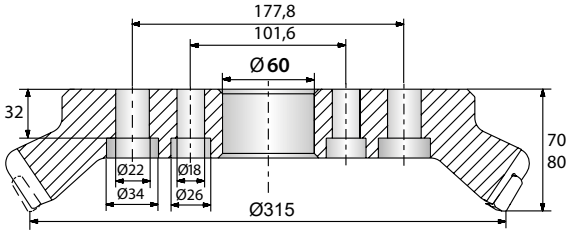
Serial number

3

Nominal diameter [mm]	
Code	Description
025	25
050	50
160	160
315	315
...	

4

Type and size of tool holders

Code	Type	Code	Type
A	Nominal diameter Ø50 – 80 mm 	**B**	Nominal diameter Ø100 – 160 mm 
C	Nominal diameter Ø200 – 250 mm 	**D**	Nominal diameter Ø315 mm 
G	Straight shank	**XP**	Weldon shank
K	Bore with keyway		

5

With respect to mounting please adhere to the information provided by the tool holder manufacturer.

Insert shape			
A		C	
H		L	
M		O	
P		R	
S		T	
W		X	Special
Z	Special		

6

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

7

Cutting edge length l [mm]	
Insert shape	
	
A	C, M
	
H, O, P	L
	
R	S
	
T	W

8

Number of teeth

9

Cutting direction	
Code	Description
L	Left

10

Cooling	
Code	Description
C	Inner cooling
AC	Air cooling

11

Tools with B coupling and inner coolant supply require the following spare parts:



Coolant clamp screw



Coolant shower plate



Spare parts (B coupling with inner coolant supply)

		B27	B32	B40	B40
	Ø	**80**	**100**	**125**	**160**
	**Coolant clamp screw**	LDB27C	LDB32C	LDB40C	LDB40C
	**Coolant shower plate**	B27-002-CP	B32-002-CP	B40-002-CP	B40-003-CP

When purchasing tools with inner coolant supply and B coupling these spare parts are included in delivery.

Indexable milling ISO code – inserts

S	P	K	N	12	04	ED	T21K	R	–	DM
1	2	3	4	5	6	7	8	9		10

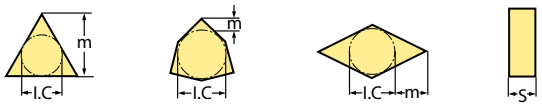
Insert shape

A		C	
H		L	
M		O	
P		R	
S		T	
W		X	Special
Z	Special		

Clearance angle

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

Tolerance class



Code	I.C [mm]	m [mm]	S [mm]
A	±0,025	±0,005	±0,025
C	±0,025	±0,013	±0,025
E	±0,025	±0,025	±0,025
F	±0,013	±0,005	±0,025
G	±0,025	±0,025	±0,130
H	±0,013	±0,013	±0,025
J	±0,05–0,13	±0,005	±0,025
K	±0,05–0,13	±0,013	±0,025
L	±0,05–0,13	±0,025	±0,025
M	±0,05–0,13	±0,08–0,18	±0,130
N	±0,05–0,13	±0,08–0,18	±0,025
U	±0,08–0,25	±0,13–0,38	±0,130

1 2 3

Fastening features (metric)

Insert shape

A		B	> 65°
C	> 65°	F	
G		H	> 65°
J	> 65°	M	
N		Q	≤ 65°
R		T	≤ 65°
U	≤ 65°	W	≤ 65°
X	Special		

Cutting edge length l [mm]

Insert shape

	
A	C, M
	
H, O, P	L
	
R	S
	
T	W

4 5

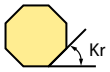
Insert thickness S [mm]



Code	S	Code	S
00	0,79	**05**	5,56
T0	0,99	**T5**	5,95
01	1,59	**06**	6,35
T1	1,98	**T6**	6,75
02	2,38	**07**	7,94
T2	2,58	**09**	9,52
03	3,18	**T9**	9,72
T3	3,97	**11**	11,11
04	4,76	**12**	12,70
T4	4,96		

6

Angle





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

7

Chamfer

Code	Type	Code	Angle	Code	Width [mm]	Code	Position
F		**0**	5°	**0**	0,10	**K**	
E		**1**	10°	**1**	0,15		
T		**2**	15°	**2**	0,20	**P**	
S		**3**	20°	**3**	0,25		
		4	25°	**4**	0,30	**W**	
		5	30°	**5**	0,35		
				6	0,40		
				7	0,45	**–**	

8

Cutting direction

Code	Description
R	Right
L	Left
N	Right and left

9

Chip breakers

10

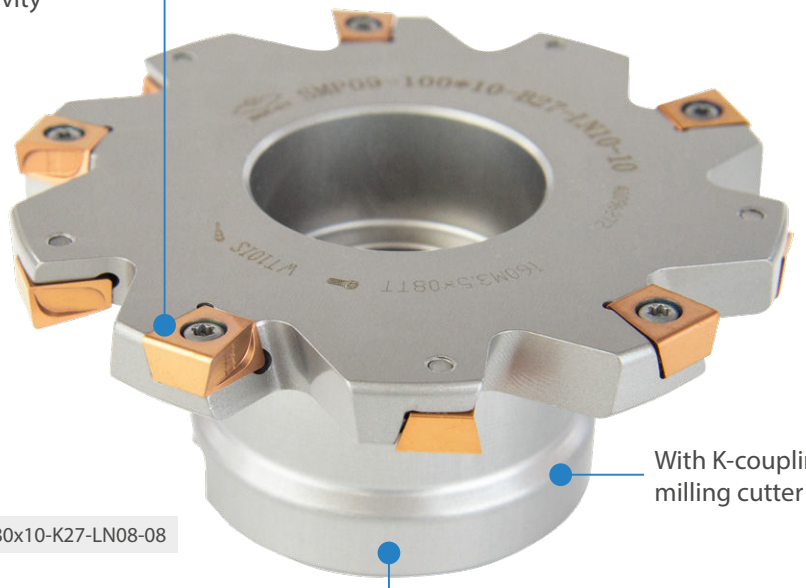
SMP09 slot mill cutting system

Highly versatile tangential milling system

YOUR BENEFITS

– **Highly versatile tool** for slot, face and square shoulder milling
– Groove widths of 10–20 mm and diameters of 80–315 mm possible for **maximum flexibility**
– Smooth cutting action and high stability for a **top-quality surface finish**
– Extremely well suited for machining **steel, stainless steel and cast iron**
– **Efficient machining operations** thanks to four-edged LNGX insert

Mounted tangentially
for stability and higher productivity



With K-coupling and as a shell-type milling cutter (versions A, B and C)

Fig.: SMP09-080x10-K27-LN08-08

Diameter range 80–315 mm

Insert grades

YBM253
CVD
P20 – P40
M15 – M35

YB9320
PVD
P10 – P30
M10 – M25

Chip breaker

LNGX-GM



General machining

Large chip groove for **controlled chip removal**

Cutting radius 0.4–5.0 mm

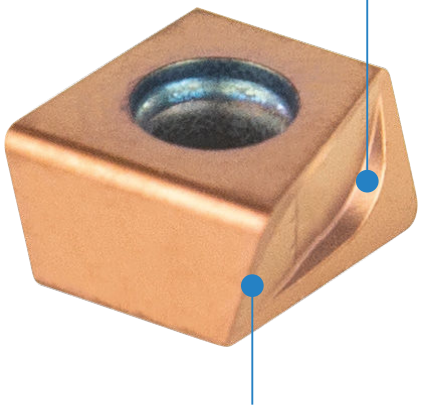


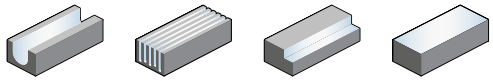


Fig.: LNGX0804-GM YB9320

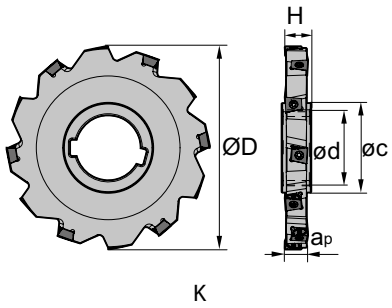
Low cutting forces thanks to soft cutting design

Slot milling

SMP09 Kr: 90°







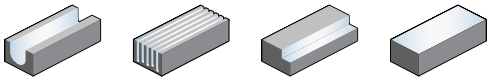
Article	✻	Stock	Dimensions [mm]						Teeth	Coupling	kg	Insert
			ØD	ød	Øc	H	a_p	$a_{e\ max}$				
SMP09-080x10-K27-LN08-08		●	80	27	43	14	10	17	8	K	0,20	
SMP09-100x10-K32-LN08-10		●	100	32	47	14	10	25	10	K	0,37	
SMP09-125x10-K40-LN08-12		●	125	40	55	14	10	34	12	K	0,50	LNGX0804*
SMP09-160x10-K40-LN08-14		●	160	40	62	14	10	47	14	K	1,00	
SMP09-200x10-K50-LN08-16		●	200	50	72	14	10	62	16	K	1,60	
SMP09-100x12-K32-LN08-10		●	100	32	47	16	12	25	10	K	0,40	
SMP09-125x12-K40-LN08-12		●	125	40	55	16	12	34	12	K	0,60	LNGX0804*
SMP09-160x12-K40-LN08-14		●	160	40	62	16	12	47	14	K	1,10	
SMP09-200x12-K50-LN08-16		●	200	50	72	16	12	62	16	K	1,80	
SMP09-100x14-K32-LN10-10		○	100	32	47	18	14	25	10	K	0,40	
SMP09-125x14-K40-LN10-12		○	125	40	55	18	14	34	12	K	0,90	LNGX1005**
SMP09-160x14-K40-LN10-14		○	160	40	62	18	14	47	14	K	1,60	
SMP09-200x14-K50-LN10-16		○	200	50	72	18	14	62	16	K	2,50	
SMP09-125X16-K40-LN10-12		●	125	40	55	20	16	34	12	K	1,00	
SMP09-160x16-K40-LN10-14		●	160	40	62	20	16	47	14	K	1,80	LNGX1005**
SMP09-200X16-K50-LN10-16		●	200	50	72	20	16	62	16	K	2,90	
SMP09-125x18-K40-LN10-12		○	125	40	55	24	18	34	12	K	1,20	
SMP09-160x18-K40-LN10-14		○	160	40	62	24	18	47	14	K	2,10	LNGX1005**
SMP09-200x18-K50-LN10-16		○	200	50	72	24	18	62	16	K	3,40	
SMP09-250x18-K50-LN10-18		○	250	50	80	24	18	83	18	K	5,50	
SMP09-125x20-K40-LN14-10		●	125	40	55	26	20	34	10	K	1,20	
SMP09-160x20-K40-LN14-12		●	160	40	62	26	20	47	12	K	2,10	LNGX1407**
SMP09-200x20-K50-LN14-14		●	200	50	72	26	20	62	14	K	3,50	
SMP09-250x20-K50-LN14-16		●	250	50	80	26	20	83	16	K	5,80	
SMP09-160x25-K40-LN14-12		○	160	40	62	30	25	47	12	K	2,80	
SMP09-200x25-K50-LN14-14		○	200	50	72	30	25	62	14	K	4,50	LNGX1407**
SMP09-250x25-K50-LN14-16		○	250	50	80	30	25	83	16	K	7,50	

● Ex Stock ○ On demand

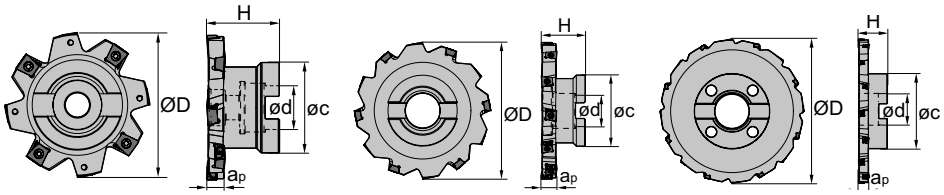
✻ With internal cooling

Slot milling

SMP09 Kr: 90°







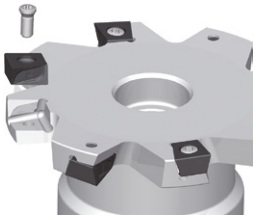
Article	✻	Stock	Dimensions [mm]						Teeth	Coupling	kg	Insert
			ØD	ød	Øc	H	a_p	$a_{e\ max}$				
SMP09-080x10-A22-LN08-08		●	80	22	45	40	10	20	8	A	0,40	LNGX0804*
SMP09-100x10-B27-LN08-10		●	100	27	55	45	10	24	10	B	0,60	
SMP09-125x10-B32-LN08-12		●	125	32	65	45	10	33	12	B	1,00	
SMP09-160x10-B40-LN08-14		●	160	40	80	50	10	42	14	B	2,00	
SMP09-200x10-C40-LN08-16		●	200	22	92	50	10	53	16	C	2,90	
SMP09-100x12-B27-LN08-08		●	100	27	55	45	12	24	10	B	0,60	LNGX0804*
SMP09-125x12-B32-LN08-12		●	125	32	65	45	12	33	12	B	1,00	
SMP09-160x12-B40-LN08-14		●	160	40	80	50	12	42	14	B	2,10	
SMP09-200x12-C40-LN08-16		●	200	40	92	50	12	53	16	C	2,90	
SMP09-100x14-B27-LN10-10		○	100	27	55	50	14	24	10	B	0,70	LNGX1005**
SMP09-125x14-B32-LN10-12		○	125	32	65	50	14	33	12	B	1,20	
SMP09-160x14-B40-LN10-14		○	160	40	80	50	14	42	14	B	2,40	
SMP09-200x14-C40-LN10-16		○	200	40	92	50	14	53	16	C	3,60	
SMP09-125x16-B32-LN10-12		●	125	32	65	50	16	33	12	B	1,40	LNGX1005**
SMP09-160x16-B40-LN10-14		●	160	40	80	50	16	42	14	B	2,60	
SMP09-200x16-C40-LN10-16		●	200	40	92	50	16	53	16	C	4,00	
SMP09-125x18-B32-LN10-12		●	125	32	65	50	18	33	12	B	1,50	LNGX1005**
SMP09-160x18-B40-LN10-14		○	160	40	80	50	18	42	14	B	2,90	
SMP09-200x18-C40-LN10-16		○	200	40	92	50	18	53	16	C	4,30	
SMP09-250x18-C60-LN10-18		○	250	60	132	50	18	58	18	C	7,20	
SMP09-125x20-B32-LN14-10		●	125	32	65	50	20	33	10	B	1,60	LNGX1407**
SMP09-160x20-B40-LN14-12		●	160	40	80	50	20	42	12	B	2,70	
SMP09-200x20-C40-LN14-14		●	200	40	92	50	20	53	14	C	4,60	
SMP09-250x20-C60-LN14-16		●	250	60	132	50	20	58	16	C	7,40	
SMP09-160x25-B40-LN14-12		●	160	40	80	50	25	42	12	B	3,20	LNGX1407**
SMP09-200x25-C40-LN14-14		○	200	40	92	50	25	53	14	C	5,20	
SMP09-250x25-C60-LN14-16		○	250	60	132	50	25	58	16	C	8,60	
SMP09-315x25-C60-LN14-20		○	315	60	132	50	25	90	20	C	13,20	

● Ex Stock ○ On demand

✻ With internal cooling

Spare parts

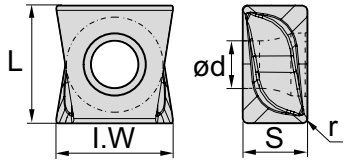
	Insert	LNGX0804**	LNGX0804**	LNGX1005**	LNGX1005**	LNGX1407**	LNGX1407**
	ØD	80-200	100-250	80-200	100-250	100-200	125-315
	Screw (Insert)	I60M3*7	I60M3*7	I60M3,5*08TT (2,3N/m)	I60M3,5*08TT (2,3N/m)	I60M4*10 (3,4N/m)	I60M4*12 (3,4N/m)
	Wrench (Insert)	WT09IP/IS	WT09IP/IS	WT10IS	WT10IS	WT15IS	WT15IS



Milling insert

● Ideal machining conditions
◉ Normal machining conditions
◉ Unfavourable machining conditions

LNGX	L	I.C	S	d
08 04	7,75	8,5	4	3,5
10 05	10,00	9,90	5,50	4,10
14 07	14,00	13,40	7,50	4,40



LNGX milling insert			HC¹ (CVD)							HC¹ (PVD)									HT	HC²	HW	
		P	◉	◉	◉	◉	◉	◉		◉	◉	◉	◉	◉	◉		●		●	●		
		M	◉	◉	◉	◉	◉	◉		◉	◉	◉	◉	◉	◉	◉	●		●	●		
		K						◉	◉	●							●					◉
		N								◉												◉
		S			◉		◉			●	◉		◉	◉	◉		◉					
		H																				
ISO		r	YBC302	YBC301	YBC401	YBM253	YBM251	YBM351	YBD152	YBD252	YBG101	YBG102	YBG202	YBG212	YBS203	YBG205H	YB9320	YBG302	YBS303	YBG252	YNG151	YNG151C	YD101	YD201
	LNGX080404-GM	0,4				○											●		○					
	LNGX080408-GM	0,8				○											●		○					
	LNGX080412-GM	1,2				○											●		○					
	LNGX080416-GM	1,6				○											●		○					
	LNGX080420-GM	2,0				○											●		○					
	LNGX080424-GM	2,4				○											●		○					
	LNGX100504-GM	0,4				○											●		○					
	LNGX100508-GM	0,8				○				○							●							
	LNGX100510-GM	1,0				○											●		○					
	LNGX100512-GM	1,2															●							
	LNGX100516-GM	1,6															●							
	LNGX100520-GM	2,0				○											●		○					
	LNGX100524-GM	2,4															○							
	LNGX100530-GM	3,0				○											○		○					
	LNGX100540-GM	4,0				○											○		○					

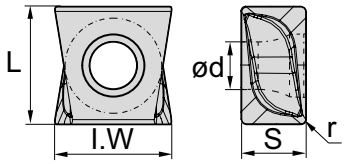
● Ex Stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

Milling insert

Ideal machining conditions
Normal machining conditions
Unfavourable machining conditions

LNGX	L	I.C	S	d
08 04	7,75	8,5	4	3,5
10 05	10,00	9,90	5,50	4,10
14 07	14,00	13,40	7,50	4,40



LNGX milling insert			HC[1] (CVD)							HC[1] (PVD)									HT	HC[2]	HW	
		P																				
		M																				
		K																				
		N																				
		S																				
		H																				
ISO		r	YBC302	YBC301	YBC401	YBM253	YBM251	YBM351	YBD152	YBD252	YBG101	YBG102	YBG202	YBG212	YBS203	YBG205H	YB9320	YBG302	YBS303	YBG252	YNG151	YNG151C	YD101	YD201
	**LNGX140704-GM**	**0,4**				○				○							●		○					
	LNGX140708-GM	**0,8**				○				○							●							
	LNGX140710-GM	**1,0**				○													○					
	LNGX140712-GM	**1,2**															○							
	LNGX140716-GM	**1,6**				○											○							
	LNGX140720-GM	**2,0**				○											○		○					
	LNGX140724-GM	**2,4**															○							
	LNGX140730-GM	**3,0**				○											○		○					
	LNGX140732-GM	**3,2**															○							
	LNGX140740-GM	**4,0**				○											○							
	LNGX140750-GM	**5,0**				○											○							
	LNGX140760-GM	**6,0**				○													○					

● Ex Stock ○ On demand

HC[1] Coated carbide
HT Uncoated cermet
HC[2] Coated cermet
HW Uncoated carbide

Indexable milling – group 5 (SMP01/03/05/09)

Material group		Composition / structure / heat treatment		Brinell hardness HB	Machining group	Starting values for cutting speed v_c [m/min]			
						HC (CVD)		HC (PVD)	
						YBC302	YBM253	YBG101	YB9320
						a_e / D 1/4	a_e / D 1/4	a_e / D 1/4	a_e / D 1/4
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	165	180	190	175
		approx. 0,45 % C	annealed	190	2	145	155	165	150
		approx. 0,45 % C	tempered	250	3	135	145	155	140
		approx. 0,75 % C	annealed	270	4	120	130	135	125
		approx. 0,75 % C	tempered	300	5	110	120	125	115
	Low-alloyed steel		annealed	180	6	145	155	165	150
			tempered	275	7	120	130	135	125
			tempered	300	8	110	120	125	115
			tempered	350	9	95	100	105	100
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	85	90	95	90
			hardened and tempered	325	11	60	65	70	65
M	Stainless steel	ferritic/martensitic	annealed	200	12		90	95	90
		martensitic	tempered	240	13		80	80	75
		austenitic	quench hardened	180	14		100	105	95
		austenitic-ferritic		230	15		80	80	75
K	Grey cast iron	perlitic/ferritic		180	16			215	190
		perlitic (martensitic)		260	17			125	115
	Cast iron with spheroidal graphite	ferritic		160	18			145	135
		perlitic		250	19			95	90
	Malleable cast iron	ferritic		130	20			175	160
		perlitic		230	21			115	105
N	Aluminium wrought alloys	cannot be hardened		60	22				
		hardenable	hardened	100	23				
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24				
		≤ 12 % Si, hardenable	hardened	90	25				
		> 12 % Si, cannot be hardened		130	26				
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27				
		CuZn, CuSnZn		90	28				
		CuSn, Pb-free copper, electrolytic copper		100	29				
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30				
			hardened	280	31				
		Ni or Co bass	annealed	250	32				
			hardened	350	33				
			cast	320	34				
	Titanium alloys	pure titanium		R_m 400	35				
		α and β alloys	hardened	R_m 1050	36				
H	Hardened steel		hardened and tempered	55 HRC	37				
			hardened and tempered	60 HRC	38				
	Hard cast iron		cast	400	39				
	Hardened cast iron		hardened and tempered	55 HRC	40				
X	Non-metallic materials	Thermoplasts			41				
		Thermosetting plastics			42				
		Plastic, glass-fibre reinforced GFRP			43				
		Plastic, carbon fibre reinforced CFRP			44				
		Graphite			45				
		Wood			46				

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B254.
For examples of material for cutting tool groups view page D11.

	Starting values for cutting speed v_c [m/min]		
	HC (PVD)		
	YBG205H	YBG302	
	a_e / D	a_e / D	
	1/4	1/4	
	190	160	
	165	140	
	155	130	
	135	115	
	125	105	
	165	140	
	135	115	
	125	105	
	105	90	
	95	80	
	70	60	
	95	80	
	80	70	
	105	85	
	80	70	
	215	175	
	125	105	
	145	120	
	95	80	
	175	145	
	115	100	

HC Coated carbide
HT Uncoated carbide, main component (TiC) o. (TiN), cermet
HC_1 Coated cermet
HW Uncoated carbide, main component (WC)

Recommended feed rate

Indexable milling – group 5 (SMP01/03/05/09)

Material group		Feed rate per cutting edge [mm]								
		SMP01	SMP01	SMP01	SMP01	SMP01	SMP03	SMP03	SMP03	SMP05
		XSEQ1202	XSEQ1203	XSEQ12T3	XSEQ1204	XSEQ12T4	MPHT06	MPHT08	MPHT12	QC16
		Tool diameter [mm]								
		63-100	63-100	63-160	63-160	63-160	80-125	125-200	120-200	25-39
P	Unalloyed steel	0,12	0,12	0,13	0,13	0,14	0,14	0,15	0,16	0,08
P	Low-alloyed steel	0,11	0,11	0,12	0,12	0,13	0,13	0,14	0,15	0,08
P	High-alloyed steel and high-alloyed tool steel	0,10	0,10	0,11	0,11	0,12	0,12	0,13	0,14	0,07
M	Stainless steel	0,10	0,10	0,11	0,11	0,12	0,12	0,13	0,14	0,07
K	Grey cast iron	0,11	0,11	0,12	0,12	0,13	0,13	0,14	0,15	0,08
K	Cast iron with spheroidal graphite	0,11	0,11	0,12	0,12	0,13	0,13	0,14	0,15	0,07
K	Malleable cast iron	0,11	0,11	0,12	0,12	0,13	0,13	0,14	0,15	0,07
N	Aluminium wrought alloys									
N	Aluminum cast alloys									
N	Copper and copper alloys (bronze/brass)									
S	Heat-resistant alloys									
S	Titanium alloys									
H	Hardened steel									
H	Hard cast iron									
H	Hardened cast iron									
X	Non-metallic materials									

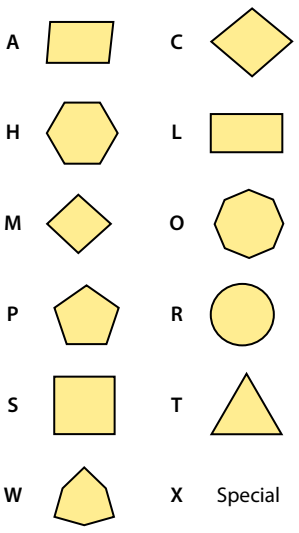
Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

	Feed rate per cutting edge [mm]				
	SMP05	SMP09	SMP09	SMP09	
	QC22	LNGX0804	LNGX1005	LNGX1407	
	Tool diameter [mm]				
	44	–	–	–	
	0,08	0,14	0,15	0,16	
	0,08	0,13	0,14	0,15	
	0,07	0,12	0,13	0,13	
	0,07	0,12	0,13	0,14	
	0,08	0,13	0,14	0,15	
	0,07	0,13	0,14	0,15	
	0,07	0,10	0,11	0,12	

Indexable milling ISO code – inserts

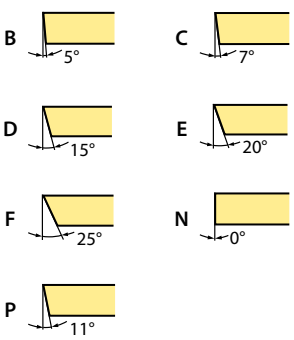
S	P	K	N	12	04	ED	T21K	R	–	DM
1	2	3	4	5	6	7	8	9		10

Insert shape



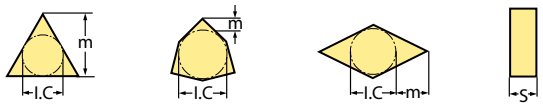
1

Clearance angle



2

Tolerance class

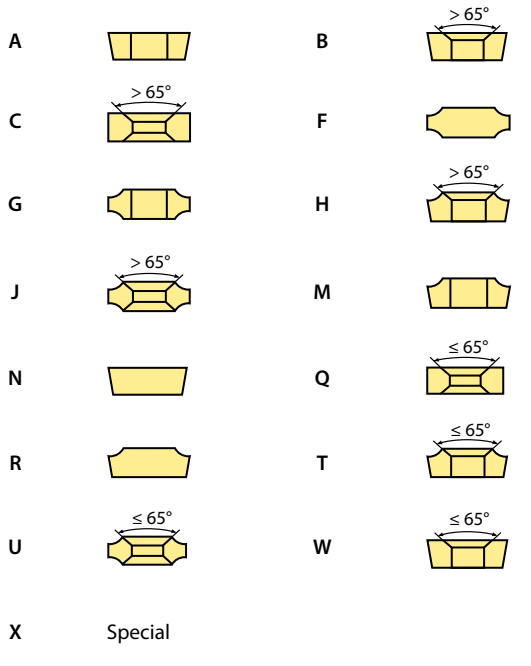


Code	l.C [mm]	m [mm]	S [mm]
A	±0,025	±0,005	±0,025
C	±0,025	±0,013	±0,025
E	±0,025	±0,025	±0,025
F	±0,013	±0,005	±0,025
G	±0,025	±0,025	±0,130
H	±0,013	±0,013	±0,025
J	±0,05–0,13	±0,005	±0,025
K	±0,05–0,13	±0,013	±0,025
L	±0,05–0,13	±0,025	±0,025
M	±0,05–0,13	±0,08–0,18	±0,130
N	±0,05–0,13	±0,08–0,18	±0,025
U	±0,08–0,25	±0,13–0,38	±0,130

3

Fastening features (metric)

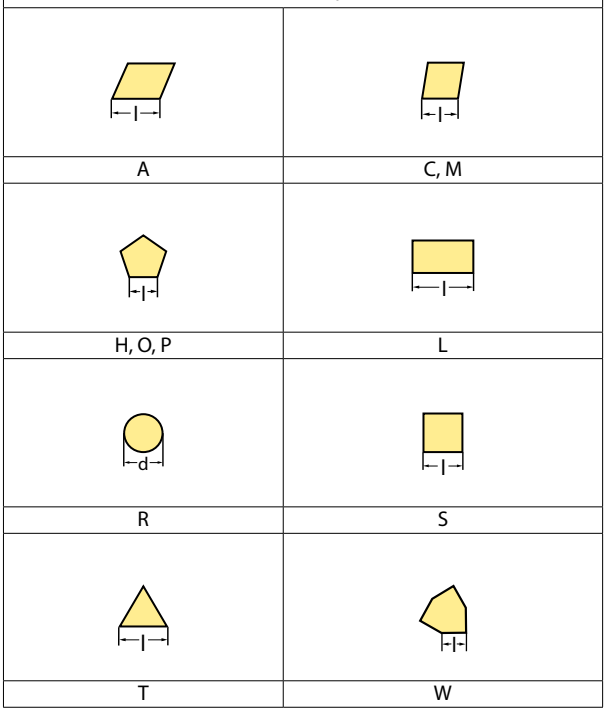
Insert shape



4

Cutting edge length l [mm]

Insert shape



5

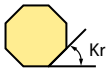
Insert thickness S [mm]



Code	S	Code	S
00	0,79	**05**	5,56
T0	0,99	**T5**	5,95
01	1,59	**06**	6,35
T1	1,98	**T6**	6,75
02	2,38	**07**	7,94
T2	2,58	**09**	9,52
03	3,18	**T9**	9,72
T3	3,97	**11**	11,11
04	4,76	**12**	12,70
T4	4,96		

6

Angle





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

7

Chamfer

Code	Type	Code	Angle	Code	Width [mm]	Code	Position
F		**0**	5°	**0**	0,10	**K**	
E		**1**	10°	**1**	0,15		
T		**2**	15°	**2**	0,20	**P**	
S		**3**	20°	**3**	0,25		
		4	25°	**4**	0,30	**W**	
		5	30°	**5**	0,35		
				6	0,40		
				7	0,45	**–**	

8

Cutting direction

Code	Description
R	Right
L	Left
N	Right and left

9

Chip breakers

10

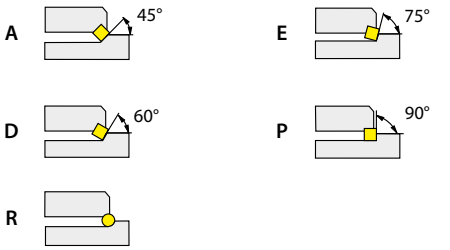
Indexable milling System code – milling bodies

FM	A	12	050	–	A22	O	–	N	06	–	04	(L)	(AC)
1	2	3	4		5	6		7	8		9	10	11

Type	
Code	Description
BM	Profile milling
CM	Chamfer milling
EM	Square shoulder milling
FM	Face milling
HM	Helical milling
SM	Slot milling
TM	T-slot milling
XM	Special

1

Entering angle



2

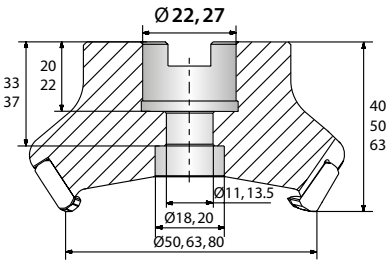
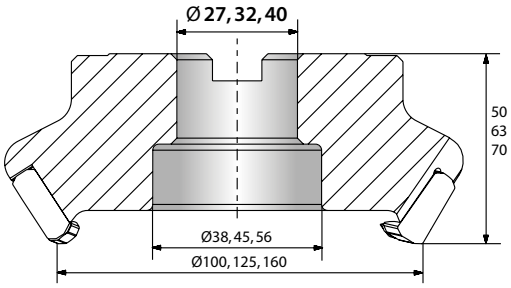
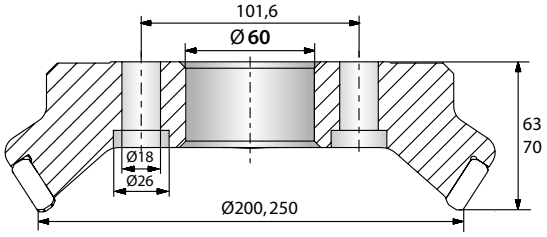
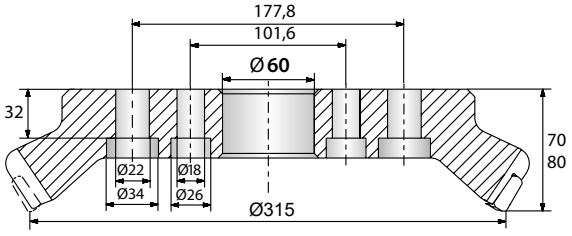
Serial number

3

Nominal diameter [mm]	
Code	Description
025	25
050	50
160	160
315	315
...	

4

Type and size of tool holders

Code	Type	Code	Type
A	Nominal diameter Ø50 – 80 mm 	**B**	Nominal diameter Ø100 – 160 mm 
C	Nominal diameter Ø200 – 250 mm 	**D**	Nominal diameter Ø315 mm 
G	Straight shank	**XP**	Weldon shank
K	Bore with keyway		

5

With respect to mounting please adhere to the information provided by the tool holder manufacturer.

Insert shape			
A		C	
H		L	
M		O	
P		R	
S		T	
W		X	Special
Z	Special		

6

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

7

Cutting edge length l [mm]	
Insert shape	
A	C, M
H, O, P	L
R	S
T	W

8

Number of teeth

9

Cutting direction	
Code	Description
L	Left

10

Cooling	
Code	Description
C	Inner cooling
AC	Air cooling

11

Tools with B coupling and inner coolant supply require the following spare parts:



Coolant clamp screw



Coolant shower plate



Spare parts (B coupling with inner coolant supply)

		B27	B32	B40	B40
	Ø	**80**	**100**	**125**	**160**
	**Coolant clamp screw**	LDB27C	LDB32C	LDB40C	LDB40C
	**Coolant shower plate**	B27-002-CP	B32-002-CP	B40-002-CP	B40-003-CP

When purchasing tools with inner coolant supply and B coupling these spare parts are included in delivery.

FME17 face milling system

Highly efficient universal tool for machining end faces and contours

YOUR BENEFITS

– The 75° milling system with negative inserts ensures a **stable cutting edge**
– Available for a wide range of finishing and roughing applications
– The newly developed chip breaker features a **positive cutting edge geometry and generates lower cutting forces**
– The **SNMX120512-**** insert can be used in combination with the **FME17, FMA17** and **FMP17** systems
– **Highly economical** thanks to eight-edged inserts

Precision insert seat enables **high surface qualities**

New insert design provides for **increased resistance to breaking and greater process reliability**



Fig.: FME17-063-A22-SN12-07C

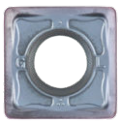
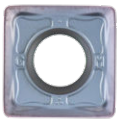
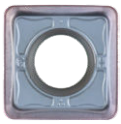
Diameter range: 50 – 400 mm

The **face milling system FME17** can be used in combination with SNGX1205**ENN** and SNMX120512 inserts.

Insert grades

YBM253	YBG205H	YBD252	YBS303
CVD	*PVD*	*CVD*	*PVD*
P20 – P40	*P10 – P30*	*K20 – K35*	*S25 – S35*
M15 – M35	*M20 – M40*		

Chip breaker

SN*X-GL	SN*X-GM	SN*X-GH
		
Finishing	General machining	Roughing

Easy to identify cutting edges

Low cutting forces thanks to positive cutting edge design

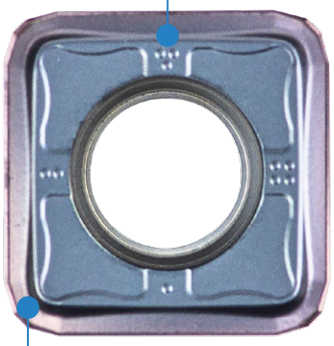


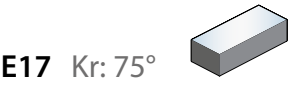


Fig.: SNGX1205**ENN**-GH YBG205H

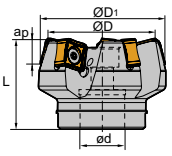
Controlled chip removal thanks to open chip former design

Face milling

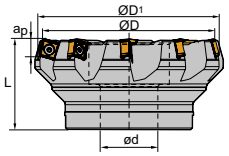
FME17 Kr: 75°



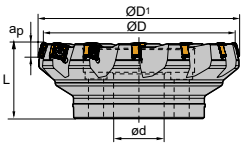




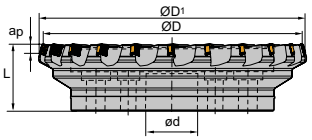
A



B



C



D

Article	✻	Stock		Dimensions [mm]					Teeth	Coupling	kg	Inserts
		R	L	ØD	$ØD_1$	ød	L	$a_{p\,max}$				
FME17-050-A22-SN12-04C	✻	○	○	50	60	22	40	8	4	A	0.361	SNGX1205ENN SNMX120512
FME17-050-A22-SN12-05C	✻	●		50	60	22	40	8	5	A	0.337	
FME17-063-A22-SN12-05C	✻	○	○	63	73	22	50	8	5	A	0.52	
FME17-080-A27-SN12-06C	✻	●	○	80	90	27	63	8	6	A	1.101	
FME17-063-A22-SN12-07C	✻	●		63	73	22	50	8	7	A	0.53	
FME17-100-A32-SN12-08C	✻	●	○	100	110	32	63	8	8	A	1.663	
FME17-080-A27-SN12-09C	✻	●		80	90	27	63	8	9	A	1.112	
FME17-100-A32-SN12-11C	✻	●		100	110	32	63	8	11	A	1.577	
FME17-125-B40-SN12-10		●	○	125	135	40	63	8	10	B	3.099	
FME17-125-B40-SN12-14		●		125	170	40	63	8	14	B	3.145	
FME17-160-C40-SN12-12		●	○	160	170	40	63	8	12	C	4.535	
FME17-200-C60-SN12-14		○	○	200	210	60	63	8	18	C	6.45	
FME17-250-C60-SN12-18		○		250	260	60	63	8	18	C	12.98	
FME17-160-C40-SN12-18		●		160	210	40	63	8	20	C	4.647	
FME17-200-C60-SN12-22		○		200	215	60	63	8	22	C	6.552	
FME17-315-D60-SN12-22		○		315	325	60	80	8	22	D	21.98	

● Ex stock ○ On demand

✻ With internal cooling

Spare parts

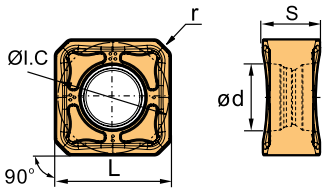
	Insert	**SNGX1205ENN**	**SNGX1205ENN**	**SNGX1205ENN**
	ØD	**50-75**	**80-180**	**200-400**
	Screw (insert)	IRM4×10 (3.4 Nm)	IRM4×10 (3.4 Nm)	IRM4×10 (3.4 Nm)
	Wrench (insert)	WT15IP		
	Wrench (insert)		WT15IS	
	Wrench (insert)			WT15IT



Milling inserts

Ideal machining conditions
Normal machining conditions
Unfavourable machining conditions

SNGX	L	I.C	S	d
12 05	12.7	12.7	6.5	5.9



SN** milling insert			HC¹ (CVD)								HC¹ (PVD)										HT	HC²	HW	
		P																						
		M																						
		K																						
		N																						
		S																						
		H																						
ISO		r	YBC302	YBC301	YBM253	YBC401	YBM251	YBM351	YBD152	YBD252	YBD203	YBG101	YBG102	YBG202	YBG212	YBS203	YBG205	YBG205H	YB9320	YBG302	YBS303	YBG252	YNG151	YNG151C	YD101	YD201
	**SNGX1205ENN-GH**	0,8								●								●								
	**SNGX1205ENN-GL**	0,8																●								
	**SNGX1205ENN-GM**	0,8							○	●								●								
	**SNMX120512-GH**	1,2								●								●								
	**SNMX120512-GM**	1,2								●								●								

● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

EMP05 plunge milling system

Universal tool for any machining application

Now with new design New

YOUR BENEFITS

– Flexible, versatile system for **slot and plunge milling**
– For use in any machine and plant engineering application
– Equipped with two inserts for **deep groove milling**
– **Ramping possible** (ideal for die and mould making)
– Can be used in centre cutting operations and **as a groove milling cutter**



Fig.: EMP05-025-G25-AD12-C

A **left-hand** and a **right-hand cutting insert** must be employed.

Insert grades

YB9320

PVD
P10–P30
M10–M25

Chip breaker

ADKT*-L-GM



General machining

ADKT*-R-GM



General machining

Left-hand and right-hand cutting type

High-performance YB9320 grade for steel, stainless steel and cast iron

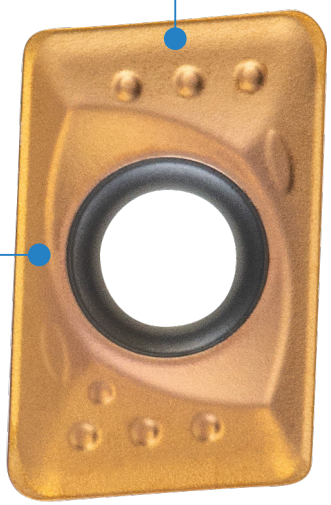


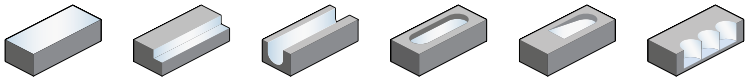
Fig.: ADKT12T308L-GM YB9320

The **new EMP05 plunge milling system** can **only** be used in combination with the **new ADKT inserts**!

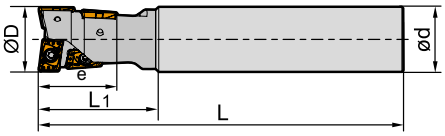
Example: EMP05-020-G20-**AD**10-C with **AD**KT100308**L**-GM YB9320 and **AD**KT100308**R**-GM YB9320

Square shoulder milling

EMP05 Kr: 90°







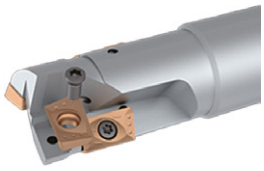
Article	✻	Stock	Dimensions [mm]					Teeth	kg	Inserts
			ØD	e	ød	L_1	L			
EMP05-016-G16-AD08-C	✻	●	16	19	16	33	120	4	0.154	ADKT0803L & ADKT0903R
EMP05-020-G20-AD10-C	✻	●	20	23	20	35	130	4	0.262	ADKT1003L & ADKT1003R
EMP05-025-G25-AD12-C	✻	●	25	29	25	45	140	4	0.425	ADKT12T3L & ADKT12T3R
EMP05-040-G32-AD12-C	✻	●	40	40	32	55	160	6	0.943	
EMP05-032-G32-AD15-C	✻	●	32	34	32	50	150	4	0.425	ADKT1605L & ADKT1505R
EMP05-050-G40-AD15-C	✻	●	50	50	40	70	170	6	1.612	

● Ex stock ○ On demand

✻ With internal cooling

Spare parts

	Insert	**ADKT0803L & ADKT0903R**	**ADKT1003L & ADKT1003R**	**ADKT12T3L & ADKT12T3R**	**ADKT12T3L & ADKT12T3R**	**ADKT1605L & ADKT1505R**	**ADKT1605L & ADKT1505R**	
	ØD	**16**	**20**	**25**	**40**	**32**	**50**	
	Screw (insert)	I60M2.2×5.5 (0.8 Nm)		I60M4×7 (3.4 Nm)	I60M4×7 (3.4 Nm)	I43M4×8 (3.4 Nm)	I43M4×8 (3.4 Nm)	
	Screw (insert)		I60M2.5×6.5T (1.0 Nm)					
	Wrench (insert)	WT07IP	WT08IP	WT09IP	WT09IP			
	Wrench (insert)					WT15S	WT15S	

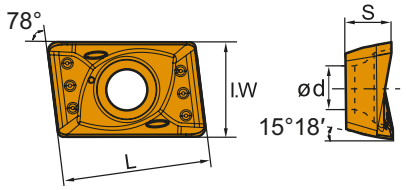


ADKT	L	S	d
08 03	7.96	3	2.4
10 03	10	3.2	2.8
12 T3	12.44	3.9	3.5
16 05	16	5	4.4

Ideal machining conditions
Normal machining conditions
Unfavourable machining conditions

Milling inserts

AD** milling insert			HC¹ (CVD)								HC¹ (PVD)										HT	HC²	HW	
		P																						
		M																						
		K																						
		N																						
		S																						
		H																						
ISO		I.W	YBC302	YBC301	YBM253	YBC401	YBM251	YBM351	YBD152	YBD252	YBD203	YBG101	YBG102	YBG202	YBG212	YBS203	YBG205	YBG205H	YB9320	YBG302	YBS303	YBG252	YNG151	YNG151C	YD101	YD201
	**ADKT080308L-GM**	5.33																	●							
	ADKT100308L-GM	6.44																	●							
	ADKT12T308L-GM	8																	●							
	ADKT160508L-GM	9.62																	●							



● Ex stock ○ On demand

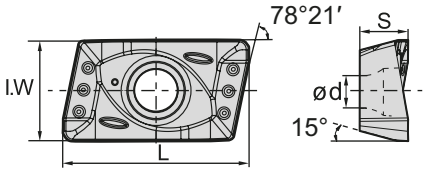
HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

Ideal machining conditions
Normal machining conditions
Unfavourable machining conditions

ADKT	L	S	d
09 03	10	2.8	2.4
10 03	11.65	3.5	2.8
12 T3	15	3.9	3.54
15 05	17.05	4.95	4.5

Milling inserts

AD** milling insert			HC¹ (CVD)								HC¹ (PVD)										HT	HC²	HW	
		P																						
		M																						
		K																						
		N																						
		S																						
		H																						
ISO		I.W	YBC302	YBC301	YBC401	YBM253	YBM251	YBM351	YBD152	YBD252	YBD203	YBG101	YBG102	YBG202	YBG212	YBS203	YBG205	YBG205H	YB9320	YBG302	YBS303	YBG252	YNG151	YNG151C	YD101	YD201
	**ADKT090308R-GM**	5																	●							
	ADKT100308R-GM	6.04																	●							
	ADKT12T308R-GM	8.16																	●							
	ADKT150508R-GM	8.81																	●							

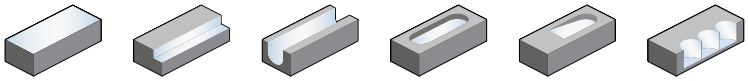


● Ex stock ○ On demand

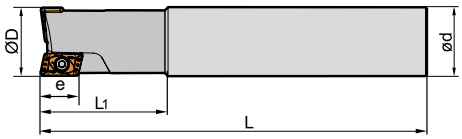
HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

Square shoulder milling

EMP05 Kr: 90°







Article	✻	Stock	Dimensions [mm]					Teeth	kg	Inserts
			ØD	e	ød	L_1	L			
EMP05-S017-G16-AD08-C	✻	○	17	8.5	16	33	120	2	0.166	ADKT0803L & ADKT0903R
EMP05-S020-G20-AD10-C	✻	○	20	9.5	20	35	130	2	0.275	ADKT1003L & ADKT1003R
EMP05-S021-G20-AD10-C	✻	○	21	9.5	20	35	130	2	0.282	
EMP05-S025-G25-AD12-C	✻	○	25	12.5	25	45	140	2	0.453	ADKT12T3L & ADKT12T3R
EMP05-S026-G25-AD12-C	✻	○	26	12.5	25	45	140	2	0.467	
EMP05-S040-G32-AD12-C	✻	○	40	12.5	32	55	160	3	1.02	
EMP05-S032-G32-AD15-C	✻	○	32	14.5	32	50	150	2	0.81	ADKT1605L & ADKT1505R
EMP05-S033-G32-AD15-C	✻	○	33	14.5	32	50	150	2	0.829	
EMP05-S050-G40-AD15-C	✻	○	50	14.5	40	70	170	3	1.725	

● Ex stock ○ On demand

✻ With internal cooling

Spare parts

	Insert	ADKT0803L & ADKT0903R	ADKT1003L & ADKT1003R	ADKT1003L & ADKT1003R	ADKT12T3L & ADKT12T3R	ADKT12T3L & ADKT12T3R	ADKT12T3L & ADKT12T3R	ADKT1605L & ADKT1505R	ADKT1605L & ADKT1505R	ADKT1605L & ADKT1505R	
	ØD	17	20	21	25	26	40	32	33	50	
	Screw (insert)	I60M2.2×5.5 (0.8 Nm)			I60M4×7 (3.4 Nm)	I60M4×7 (3.4 Nm)	I60M4×7 (3.4 Nm)	I43M4×8 (3.4 Nm)	I43M4×8 (3.4 Nm)	I43M4×8 (3.4 Nm)	
	Screw (insert)		I60M2.5×6.5T (1.0 Nm)	I60M2.5×6.5T (1.0 Nm)							
	Wrench (insert)	WT07IP	WT08IP	WT08IP	WT09IP	WT09IP	WT09IP				
	Wrench (insert)							WT15S	WT15S	WT15S	



ADKT	L	S	d
08 03	7.96	3	2.4
10 03	10	3.2	2.8
12 T3	12.44	3.9	3.5
16 05	16	5	4.4

Ideal machining conditions
Normal machining conditions
Unfavourable machining conditions

Milling inserts

AD** milling insert			HC¹ (CVD)								HC¹ (PVD)										HT	HC²	HW	
		P																						
		M																						
		K																						
		N																						
		S																						
		H																						
ISO		I.W	YBC302	YBC301	YBC401	YBM253	YBM251	YBM351	YBD152	YBD252	YBD203	YBG101	YBG102	YBG202	YBG212	YBS203	YBG205	YBG205H	YB9320	YBG302	YBG252	YBS303	YNG151	YNG151C	YD101	YD201
	ADKT080308L-GM	5.33																	●							
	ADKT100308L-GM	6.44																	●							
	ADKT12T308L-GM	8																	●							
	ADKT160508L-GM	9.62																	●							

● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

ADKT	L	S	d
09 03	10	2.8	2.4
10 03	11.65	3.5	2.8
12 T3	15	3.9	3.54
15 05	17.05	4.95	4.5

Ideal machining conditions
Normal machining conditions
Unfavourable machining conditions

Milling inserts

AD** milling insert			HC¹ (CVD)								HC¹ (PVD)										HT	HC²	HW	
		P																						
		M																						
		K																						
		N																						
		S																						
		H																						
ISO		I.W	YBC302	YBC301	YBC401	YBM253	YBM251	YBM351	YBD152	YBD252	YBD203	YBG101	YBG102	YBG202	YBG212	YBS203	YBG205	YBG205H	YB9320	YBG302	YBG252	YBS303	YNG151	YNG151C	YD101	YD201
	ADKT090308R-GM	5																	●							
	ADKT100308R-GM	6.04																	●							
	ADKT12T308R-GM	8.16																	●							
	ADKT150508R-GM	8.81																	●							

● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

FMR06 round insert milling cutter

Maximum stability in facing operations

YOUR BENEFITS

– Milling system **for solid CBN and ceramic inserts**
– Milling system for high performance values
– **Heavy-duty round insert mill** for use in a wide range of applications
– Well suited for use in die and mould making and in aerospace applications
– Safe and easy to use thanks to wedge clamping
– Air cooling (AC) for optimum chip removal
– Well suited for machining cast iron, hardened steel and superalloys

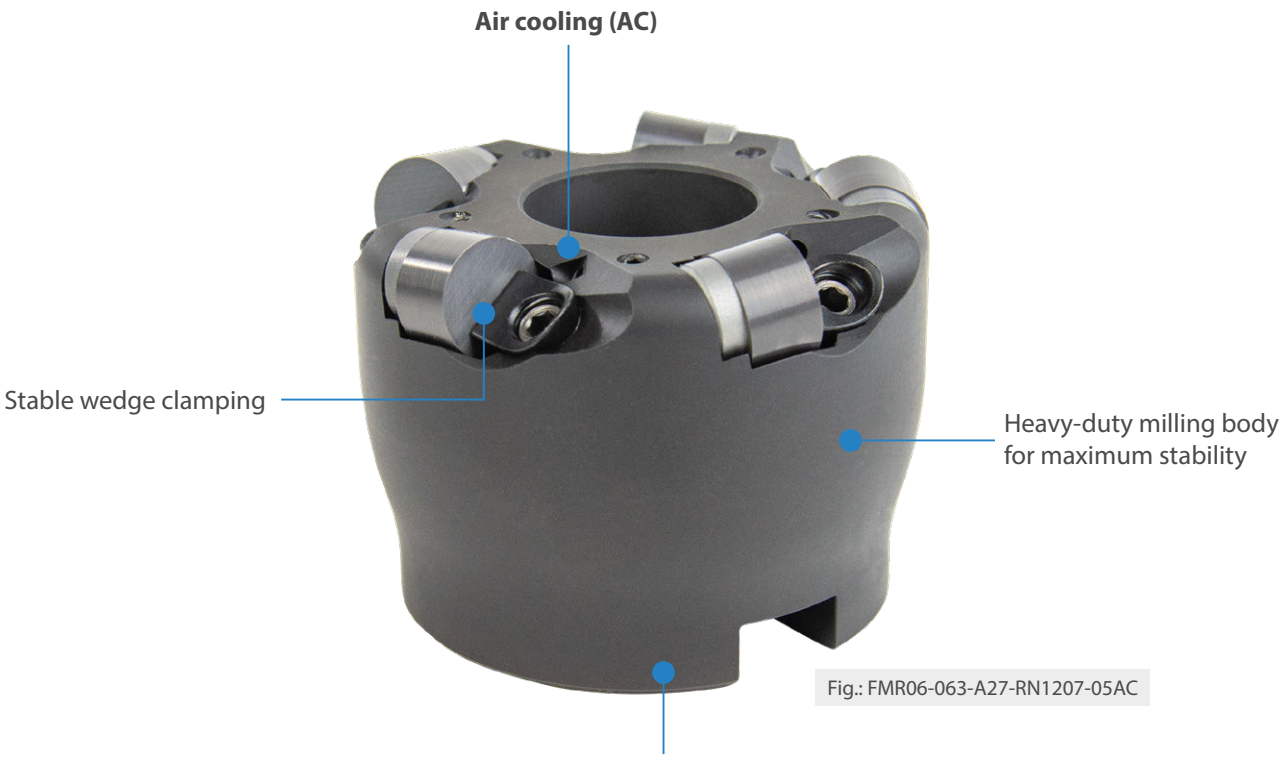


Fig.: FMR06-063-A27-RN1207-05AC

Insert grades

CA1000	CM1000	CN1000	CSX1000	New	YZB223
Mixed ceramic	*Mixed ceramic*	*Si_3N_4 ceramic*	*SiAlON ceramic*		*Solid CBN*
K10 – K25	*K10 – K25*	*K05 – K15*	*S05 – S20*		*K10 – K25*
H10 – H25	*H10 – H25*				

Inserts

RNGN090300



RNGN120400



RNGN120700



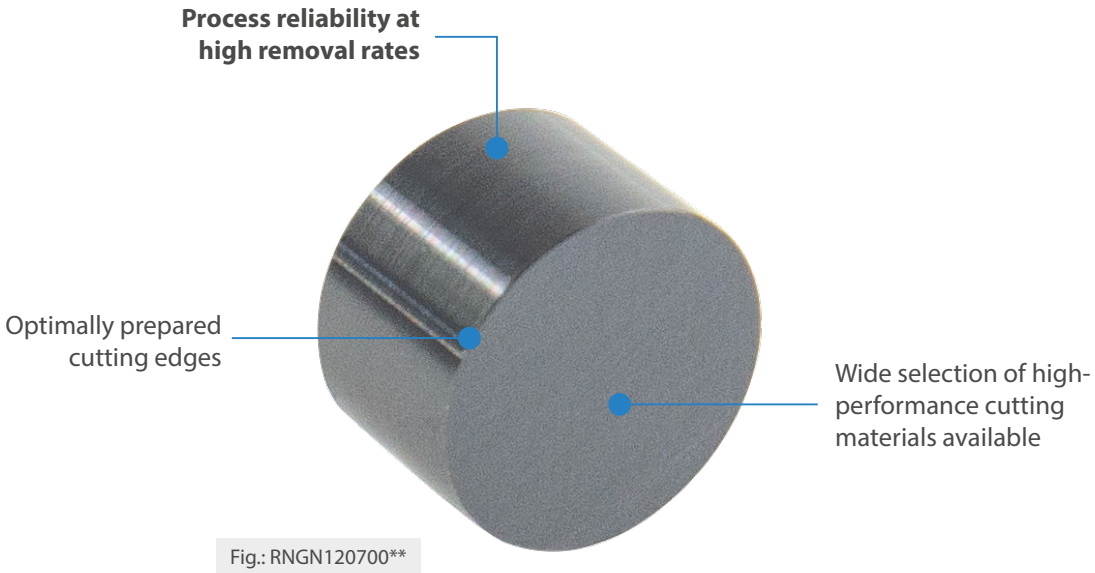


Fig.: RNGN120700**

CSX1000 grade

High-performance grade for superalloys

YOUR BENEFITS

– Latest generation of SiAlON ceramic for **longer tool life**
– Well suited for applications ranging from semi-finishing to the roughing of heat-resistant alloys
– Achieves excellent balance between toughness and wear resistance
– Suitable for **turning applications** or **milling operations**, for example, with our new FMR06 round insert milling system

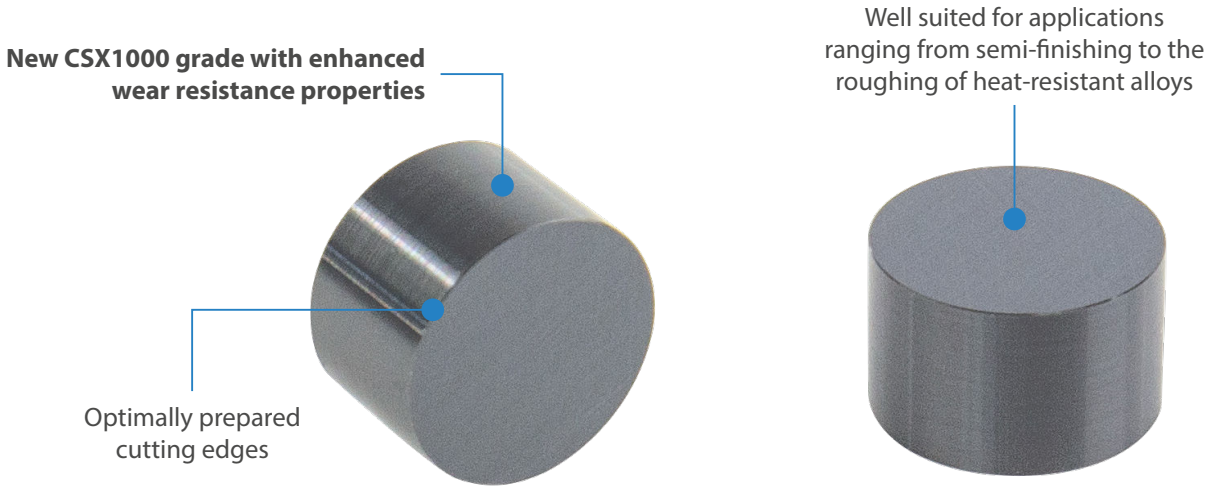
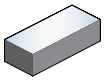


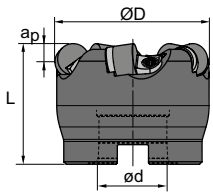
Fig.: RNGN120700T00525 CSX1000

Face milling

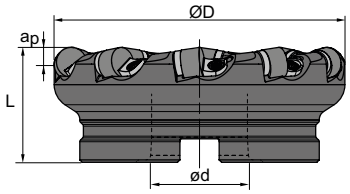
FMR06







A



B

Article	✻	Stock	Dimensions [mm]				Teeth	Coupling	kg	Inserts
			ØD	ød	L	$a_{p\,max}$				
FMR06-050-A22-RN0903-05AC	✻	○	50	22	50	2	5	A	0.3	RNGN0903
FMR06-063-A22-RN0903-05AC	✻	○	63	22	50	2	5	A	0.5	
FMR06-050-A22-RN0904-05AC	✻	○	50	22	50	2	5	A	0.3	RNGN0904
FMR06-063-A22-RN1204-05AC	✻	○	63	22	50	4	5	A	0.5	RNGN1204
FMR06-080-A27-RN1204-07AC	✻	○	80	27	50	4	7	A	0.7	
FMR06-100-B32-RN1204-06		○	100	32	50	4	6	B	1.965	
FMR06-100-B32-RN1204-09AC	✻	○	100	32	50	4	9	B	1.2	
FMR06-125-B40-RN1204-11AC	✻	○	125	40	63	4	11	B	1.9	
FMR06-050-A22-RN1207-04		○	50	22	50	4	4	A	0.3	RNGN1207
FMR06-063-A22-RN1207-04		○	63	22	50	4	4	A	0.7	
FMR06-063-A22-RN1207-05AC	✻	○	63	22	50	4	5	A	0.5	
FMR06-080-A27-RN1207-06AC	✻	○	80	27	50	4	6	A	0.7	
FMR06-100-B32-RN1207-08AC	✻	○	100	32	50	4	8	B	1.2	
FMR06-125-B40-RN1207-10AC	✻	○	125	40	63	4	10	B	1.9	

● Ex stock ○ On demand

✻ With internal cooling

Spare parts

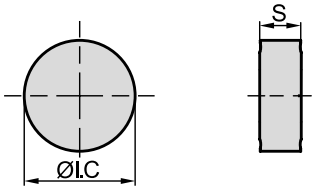
	Insert	RNGN0903	RNGN0904	RNGN1204	RNGN1207
	ØD	50-160	50-160	50-160	50-160
	Screw (wedge)	DM6×17.5A (11.4 Nm)	DM6×17.5A (11.4 Nm)	DM6×17.5A (11.4 Nm)	DM6×17.5A (11.4 Nm)
	Shim pin (shim)			SM5×8.65XA (4.0 Nm)	SM5×8.65XA (4.0 Nm)
	Shim pin (shim)	SP3	SP3		
	Shim	R09BS	R09BS		
	Shim			R12BS	R12BS
	Wedge	W18N	W18N	W18N	W18N
	Wrench (wedge)	WT15IT	WT15IT	WT15IT	WT15IT



Milling inserts

- Ideal machining conditions
- Normal machining conditions
- Unfavourable machining conditions

	I.C	S
09 03	9,525	3,18
12 04	12,40	4,76
12 07	12,70	7,94



RN** Milling Insert			CM	CC	CN	CR	CS
		P					
		M					
		K	○ ○		◎		
		N					
		S				◎ ◎	◎
		H	◎ ◎				
ISO		r	CA1000	CM1000	CN1000	CW1400 CW1800	CSX1000
	RNGN090300 T01525	4,5	●	●			●
	RNGN120400 T01525	6,0	●	●			●
	RNGN120700 T01525	6,0	●	●			●

● Ex stock ○ On demand

Other cutting edge designs and grades available on demand!

CM Mixed ceramic
CC Mixed ceramic, coated
CN Si3N4 Ceramic
CR Al2O3 cutting ceramic, reinforced
CS Cutting ceramic, SiAlON



FMR06 round insert milling cutter

Maximum stability in facing operations

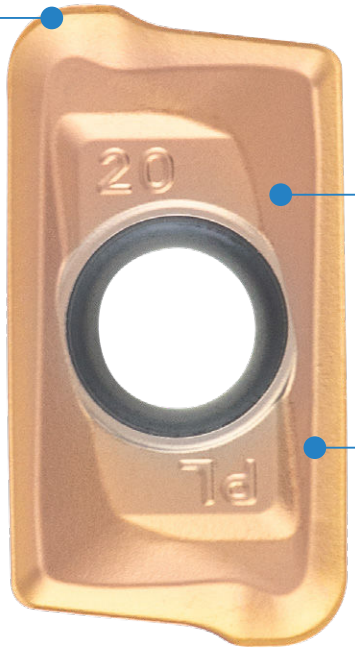
APL chip breaker

Universal geometry

YOUR BENEFITS

– **Can be used in any application** involving steel, stainless steel and cast iron
– Wide range of applications possible thanks to array of sizes and radii available

Available radii:
0.4 mm / 0.8 mm / 2 mm



Available in YB9320 and
YBS203 / YBS303 grades

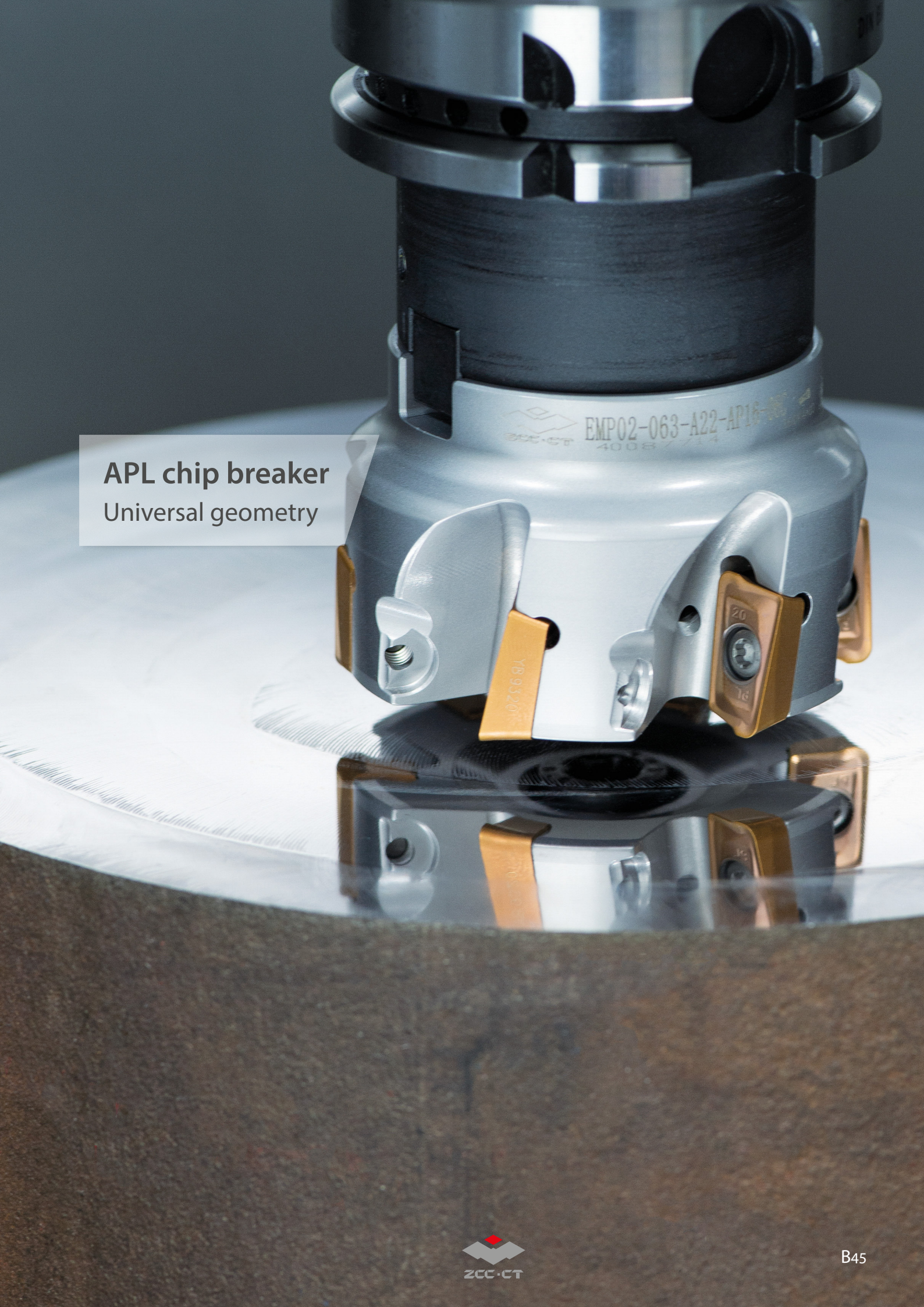
For use in EMP01/EMP02 and
QCH-APKT milling systems

Fig.: APKT160420-APL YB9320

Articles available at launch of new APL chip breaker:

Article	Stock
APKT11T304-APL YB9320	●
APKT11T308-APL YB9320	●
APKT160408-APL YB9320	●
APKT160420-APL YB9320	●

● Ex stock ○ On demand



APL chip breaker

Universal geometry

Indexable milling – group 2 (FMA01/02/03/04, FME02/03/17, FMP01/02, EMP01/02/03/04/05/14)

Material group		Composition / structure / heat treatment			Machining group	Starting values for cutting speed v_c [m/min]							
						HC (CVD)							
						YBC302		YBC401		YBD152		YBD252	
						a_e / D		a_e / D		a_e / D		a_e / D	
						1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	245	285	210	245				
		approx. 0,45 % C	annealed	190	2	210	245	180	210				
		approx. 0,45 % C	tempered	250	3	200	230	170	200				
		approx. 0,75 % C	annealed	270	4	175	200	150	175				
		approx. 0,75 % C	tempered	300	5	160	190	140	160				
	Low-alloyed steel		annealed	180	6	210	245	180	210				
			tempered	275	7	175	200	150	175				
			tempered	300	8	160	190	140	160				
			tempered	350	9	135	160	120	135				
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	125	145	105	125				
			hardened and tempered	325	11	90	100	75	90				
M	Stainless steel	ferritic/martensitic	annealed	200	12								
		martensitic	tempered	240	13								
		austenitic	quench hardened	180	14								
		austenitic-ferritic		230	15								
K	Grey cast iron	perlitic/ferritic		180	16					315	365	270	315
		perlitic (martensitic)		260	17					185	215	160	190
	Cast iron with spheroidal graphite	ferritic		160	18					215	250	185	215
		perlitic		250	19					145	170	125	145
	Malleable cast iron	ferritic		130	20					260	300	225	260
		perlitic		230	21					175	205	150	175
N	Aluminium wrought alloys	cannot be hardened		60	22								
		hardenable	hardened	100	23								
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24								
		≤ 12 % Si, hardenable	hardened	90	25								
		> 12 % Si, cannot be hardened		130	26								
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27								
		CuZn, CuSnZn		90	28								
		CuSn, Pb-free copper, electrolytic copper		100	29								
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30								
			hardened	280	31								
		Ni or Co bass	annealed	250	32								
			hardened	350	33								
			cast	320	34								
	Titanium alloys	pure titanium		R_m 400	35								
		α and β alloys	hardened	R_m 1050	36								
H	Hardened steel		hardened and tempered	55 HRC	37								
			hardened and tempered	60 HRC	38								
	Hard cast iron		cast	400	39								
	Hardened cast iron		hardened and tempered	55 HRC	40								
X	Non-metallic materials	Thermoplasts			41								
		Thermosetting plastics			42								
		Plastic, glass-fibre reinforced GFRP			43								
		Plastic, carbon fibre reinforced CFRP			44								
		Graphite			45								
		Wood			46								

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B38–B43.

	Starting values for cutting speed v_c [m/min]																					
	HC (CVD)		HC (PVD)														HW				HT	
	YBM253		YBG101		YBG102		YBG152		YB9320		YBG205(H)		YBG252		YBG302		YD101		YD201		YNG151	
	a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D	
	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5
	245	285			255	295	240	280	230	265	220	255	215	250	210	245					270	315
	210	245			220	255	205	240	200	230	190	220	185	215	180	210					235	270
	200	230			205	240	195	225	185	215	180	205	175	200	170	200					220	255
	175	200			180	210	170	200	165	190	155	180	155	175	150	175					195	220
	160	190			170	195	160	185	150	175	145	170	140	165	140	160					180	210
	210	245			220	255	205	240	200	230	190	220	185	215	180	210					235	270
	175	200			180	210	170	200	165	190	155	180	155	175	150	175					195	220
	160	190			170	195	160	185	150	175	145	170	140	165	140	160					180	210
	135	160			145	165	135	155	130	150	125	145	120	140	120	135					150	180
	125	145			130	150	120	140	115	135	110	130	110	125	105	125					140	160
	90	100			90	105	85	100	85	95	80	90	80	90	75	90					100	110
	125	145			130	150	120	140	115	135	110	130	110	125	105	125					135	160
	105	120			110	125	105	120	100	115	95	110	95	105	90	105					115	135
	130	155			140	160	130	150	125	145	120	140	115	135	115	130					145	170
	105	120			110	125	105	120	100	115	95	110	95	105	90	105					115	135
					285	330	265	305	255	295	245	285	240	280	235	275						
					170	195	160	185	150	175	145	170	140	165	140	160						
					195	225	180	210	175	200	165	195	165	190	160	185						
					130	150	120	140	115	135	110	130	110	125	105	125						
					230	270	220	255	210	240	200	230	195	225	190	225						
					155	180	145	170	140	160	135	155	130	150	130	150						
			1505	1735													1205	1390	1040	1200		
			1225	1420													980	1140	850	980		
			540	620													435	500	375	435		
			435	505													350	405	300	350		
			220	255													180	205	155	180		
			170	195													140	160	120	140		
			210	245													170	200	150	170		
			385	445													310	360	265	310		
					75	85	70	80	65	75	65	75	65	75	60	70						
					50	55	50	55	45	50	45	50	45	50	40	45						
					60	70	55	65	55	65	50	55	50	55	50	55						
					35	40	35	40	30	35	30	35	30	35	30	35						
					45	50	45	50	40	45	40	45	40	45	40	45						
					75	85	70	80	65	75	65	75	65	75	60	70						
					75	85	70	80	65	75	65	75	65	75	60	70						

HC Coated carbide
HT Uncoated carbide, primary component (TiC) or (TiN), cermet
HW Uncoated carbide, primary component (WC)
BL Cubic boron nitride with low BN content
BH Cubic boron nitride with high BN content
CN Si3N4 ceramic
CM Mixed ceramic
HC_1 Coated cermet
BC CBN with coating
CC Coated cutting ceramic
CR Cutting ceramic, primary component aluminium oxide (Al_2O_3), reinforced
DP Polycrystalline diamond

Indexable milling – group 8 (FMP06, FMR06)

Material group		Composition / structure / heat treatment			Machining group	Starting values for cutting speed v_c [m/min]							
						HC (CVD)				HC (PVD)		BH	
						YBM253		YBD252		YB9320		YZB223	
						a_e / D		a_e / D		a_e / D		a_e / D	
						1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	260	300	280	360	245	285		
		approx. 0,45 % C	annealed	190	2	225	255	280	320	210	245		
		approx. 0,45 % C	tempered	250	3	210	240	260	300	200	230		
		approx. 0,75 % C	annealed	270	4	185	210	220	280	175	200		
		approx. 0,75 % C	tempered	300	5	170	195	220	280	160	190		
	Low-alloyed steel		annealed	180	6	225	255	280	320	210	245		
			tempered	275	7	185	210	240	280	175	200		
			tempered	300	8	170	195	240	280	160	190		
			tempered	350	9	145	165	220	240	135	160		
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	130	150	200	260	125	145		
			hardened and tempered	325	11	95	105	200	220	90	100		
M	Stainless steel	ferritic/martensitic	annealed	200	12	130	150			125	145		
		martensitic	tempered	240	13	11	130			105	120		
		austenitic	quench hardened	180	14	140	160			130	155		
		austenitic-ferritic		230	15	110	130			105	120		
K	Grey cast iron	perlitic/ferritic		180	16			320	370	270	315	1000	1200
		perlitic (martensitic)		260	17			220	260	160	190	700	900
	Cast iron with spheroidal graphite	ferritic		160	18			240	280	185	215	–	–
		perlitic		250	19			220	260	125	145	300	400
	Malleable cast iron	ferritic		130	20			280	305	225	260	–	–
		perlitic		230	21			180	220	150	175	300	400
N	Aluminium wrought alloys	cannot be hardened		60	22								
		hardenable	hardened	100	23								
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24								
		≤ 12 % Si, hardenable	hardened	90	25								
		> 12 % Si, cannot be hardened		130	26								
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27								
		CuZn, CuSnZn		90	28								
		CuSn, Pb-free copper, electrolytic copper		100	29								
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30								
			hardened	280	31								
		Ni or Co bass	annealed	250	32								
			hardened	350	33								
			cast	320	34								
	Titanium alloys	pure titanium		R_m 400	35								
		α and β alloys	hardened	R_m 1050	36								
H	Hardened steel		hardened and tempered	55 HRC	37								
			hardened and tempered	60 HRC	38								
	Hard cast iron		cast	400	39								
	Hardened cast iron		hardened and tempered	55 HRC	40								
X	Non-metallic materials	Thermoplasts			41								
		Thermosetting plastics			42								
		Plastic, glass-fibre reinforced GFRP			43								
		Plastic, carbon fibre reinforced CFRP			44								
		Graphite			45								
		Wood			46								

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B38–B43.

Starting values for cutting speed v_c [m/min]																								
CM					CR				CN															
CA1000		CM1000			CW1400		CW1800		CN1000		CSX1000													
a_e / D		a_e / D			a_e / D		a_e / D		a_e / D		a_e / D													
1/1 | 3/4	1/5	1/1 | 3/4	1/5		1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5										
									600	800														
									450	600														
									600	800														
									450	600														
									–	–														
									–	–														
					150	360	–	–			–	–												
					150	360	–	–			–	–												
					–	–	150	400			700	900												
					–	–	150	400			600	800												
					–	–	150	400			600	800												
140	200	140	200																					
120	180	120	180																					
–	–	–	–																					
120	180	120	180																					

HC Coated carbide
HT Uncoated carbide, primary component (TiC) or (TiN), cermet
HW Uncoated carbide, primary component (WC)
BL Cubic boron nitride with low BN content
BH Cubic boron nitride with high BN content
CN Si3N4 ceramic
CM Mixed ceramic
HC_1 Coated cermet
BC CBN with coating
CC Coated cutting ceramic
CR Cutting ceramic, primary component aluminium oxide (Al_2O_3), reinforced
DP Polycrystalline diamond

Recommended feed rate

Indexable milling – group 2 (FMA01/02/03/04, FME02/03/17, FMP01/02, EMP01/02/03/04/05/14)

Material group		Feed rate per cutting edge [mm]																	
		FMA01 | FMA02			FMA03			FMA03			FMA04			FMA04			FMA04		
		SEET12			SEKN12			SEKN15			OFKT05			OFKR07			ODHT06		
		Application																	
		F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R
P	Unalloyed steel	0,15	0,20	0,25		0,18			0,20		0,20	0,25		0,20	0,25		0,20	0,25	
P	Low-alloyed steel	0,14	0,19	0,23		0,17			0,19		0,19	0,23		0,19	0,23		0,19	0,23	
P	High-alloyed steel and high-alloyed tool steel	0,13	0,18	0,22		0,16			0,18		0,18	0,22		0,18	0,22		0,18	0,22	
M	Stainless steel	0,11	0,14	0,18		0,13			0,14		0,14	0,18		0,14	0,18		0,14	0,18	
K	Grey cast iron	0,17	0,22	0,28		0,20			0,22		0,22	0,28		0,22	0,28		0,22	0,28	
K	Cast iron with spheroidal graphite	0,15	0,20	0,25		0,18			0,20		0,20	0,25		0,20	0,25		0,20	0,25	
K	Malleable cast iron	0,15	0,20	0,25		0,18			0,20		0,20	0,25		0,20	0,25		0,20	0,25	
N	Aluminium wrought alloys	0,13	0,17	0,21							0,17	0,21		0,17	0,21		0,17	0,21	
N	Aluminum cast alloys	0,13	0,17	0,21							0,17	0,21		0,17	0,21		0,17	0,21	
N	Copper and copper alloys (bronze/brass)	0,11	0,15	0,19							0,15	0,19		0,15	0,19		0,15	0,19	
S	Heat-resistant alloys	0,11	0,14	0,18							0,14	0,18		0,14	0,18		0,14	0,18	
S	Titanium alloys	0,11	0,14	0,18							0,14	0,18		0,14	0,18		0,14	0,18	
H	Hardened steel																		
H	Hard cast iron																		
H	Hardened cast iron																		
X	Non-metallic materials																		

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

Indexable milling – group 2 (FMA01/02/03/04, FME02/03/17, FMP01/02, EMP01/02/03/04/05/14)

Material group		Feed rate per cutting edge [mm]																	
		EMP03 | EMP04			EMP05			EMP14											
		APKT11			ADKT**			VPGT22											
		Application																	
		F	M	R	F	M	R	F	M	R									
P	Unalloyed steel	0,12	0,17	0,23	0,10	0,15	0,20												
P	Low-alloyed steel	0,11	0,16	0,21	0,09	0,14	0,19												
P	High-alloyed steel and high-alloyed tool steel	0,10	0,15	0,20	0,09	0,13	0,18												
M	Stainless steel	0,08	0,12	0,16	0,07	0,11	0,14												
K	Grey cast iron	0,13	0,19	0,25	0,11	0,17	0,22												
K	Cast iron with spheroidal graphite	0,12	0,17	0,23	0,10	0,15	0,20												
K	Malleable cast iron	0,12	0,17	0,23	0,10	0,15	0,20												
N	Aluminium wrought alloys	0,10	0,15	0,20	0,09	0,13	0,17	0,05	0,2	0,3									
N	Aluminum cast alloys	0,10	0,15	0,20	0,09	0,13	0,17	0,05	0,2	0,3									
N	Copper and copper alloys (bronze/brass)	0,09	0,13	0,18	0,08	0,11	0,15	0,05	0,2	0,3									
S	Heat-resistant alloys																		
S	Titanium alloys																		
H	Hardened steel																		
H	Hard cast iron																		
H	Hardened cast iron																		
X	Non-metallic materials																		

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

	Feed rate per cutting edge [mm]																							
	FME02			FME03			FME03			FME17			FMP01			FMP02			EMP01 | EMP02			EMP01 | EMP02		
	SPK*12			SPK*12			SPK*15			SNGX1205ENN**			TPKN22			SEET12			APKT11			APKT16		
	Application																							
	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R
		0,20			0,19			0,20		0,20	0,25			0,20		0,15	0,20	0,25	0,10	0,15	0,20	0,12	0,17	0,23
		0,19			0,17			0,19		0,19	0,23			0,19		0,14	0,19	0,23	0,09	0,14	0,19	0,11	0,16	0,21
		0,18			0,16			0,18		0,18	0,22			0,18		0,13	0,18	0,22	0,09	0,13	0,18	0,10	0,15	0,20
		0,14			0,13			0,14		0,14	0,18			0,14		0,11	0,14	0,18	0,07	0,11	0,14	0,08	0,12	0,16
		0,22			0,20			0,22		0,22	0,28			0,22		0,17	0,22	0,28	0,11	0,17	0,22	0,13	0,19	0,25
		0,20			0,19			0,20		0,20	0,25			0,20		0,15	0,20	0,25	0,10	0,15	0,20	0,12	0,17	0,23
		0,20			0,19			0,20		0,20	0,25			0,20		0,15	0,20	0,25	0,10	0,15	0,20	0,12	0,17	0,23
										0,17	0,21					0,13	0,17	0,21	0,09	0,13	0,17	0,10	0,15	0,20
										0,17	0,21					0,13	0,17	0,21	0,09	0,13	0,17	0,10	0,15	0,20
										0,15	0,19					0,11	0,15	0,19	0,08	0,11	0,15	0,09	0,13	0,18
										0,14	0,18													
										0,14	0,18													

F Finishing
M Medium machining
R Roughing

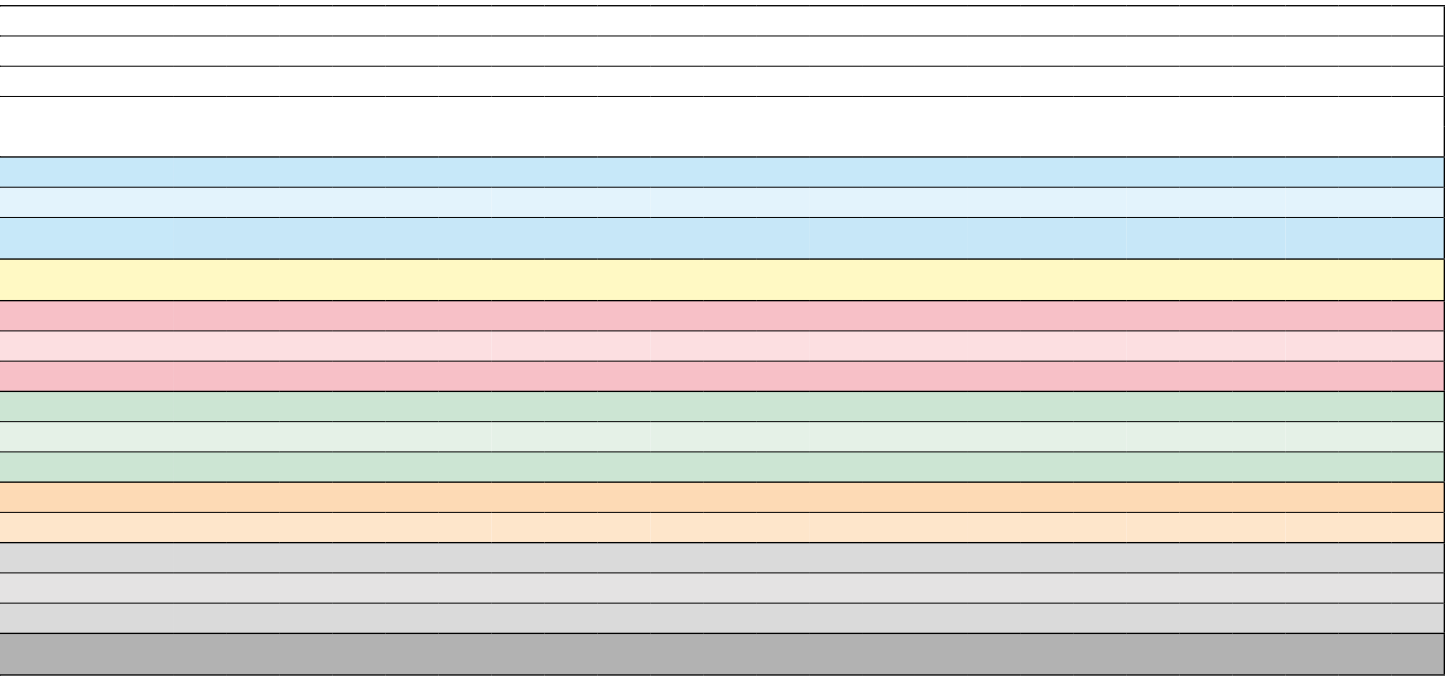
F Finishing
M Medium machining
R Roughing

Recommended feed rate

Indexable milling – group 8 (FMP06, FMR06)

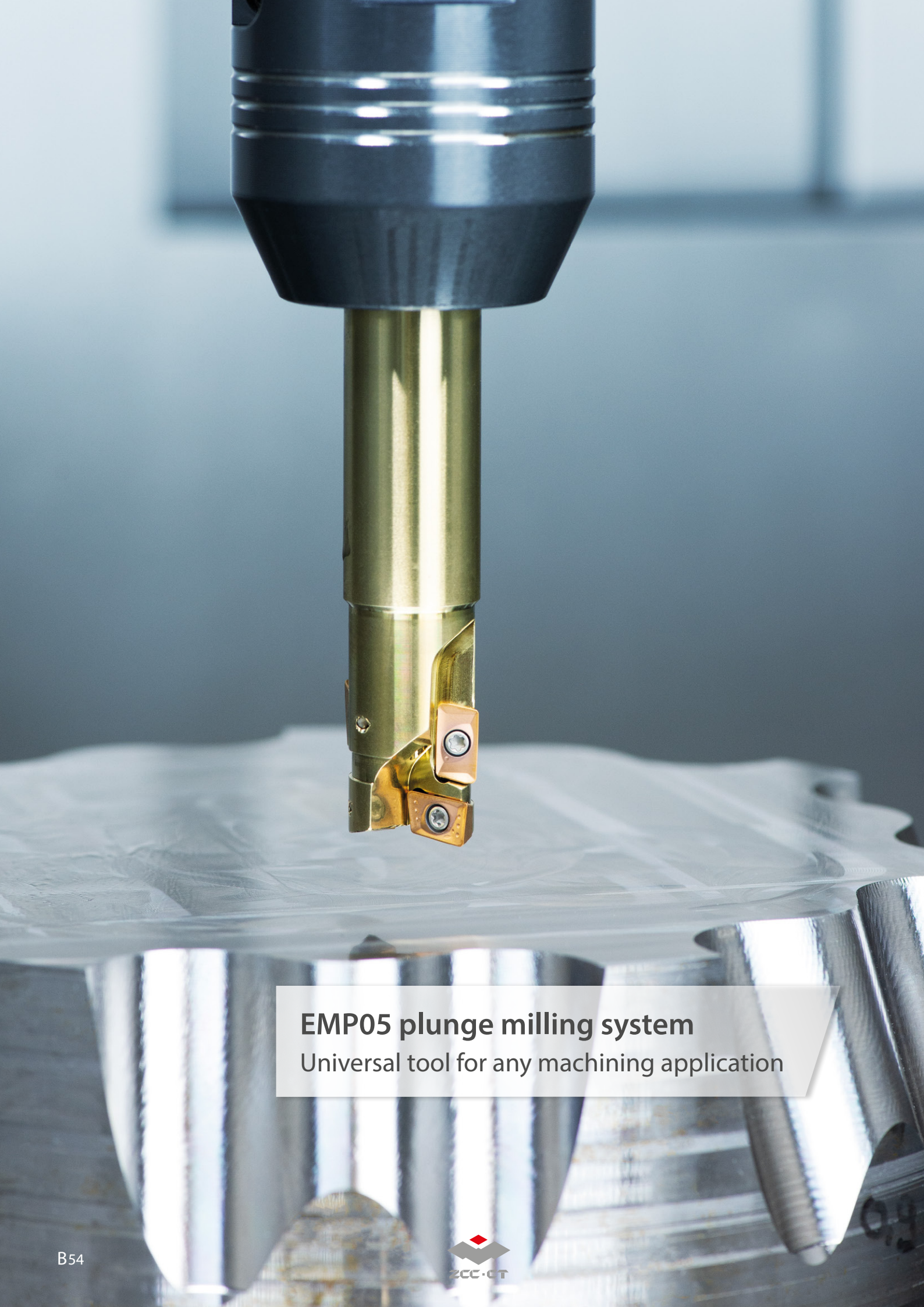
Material group		Feed rate per cutting edge [mm]																		
		FMP06			FMP06			FMP06			FMR06			FMR06						
		SNCU12 (HC)			SNGN12 (CN)			SNGN12 (CM)			RNGN* (CN)			RNGN* (CM)						
		Application																		
		F	M	R	F	M	R	F	M	R	F	M	R							
P	Unalloyed steel		0,23																	
	Low-alloyed steel		0,22																	
	High-alloyed steel and high-alloyed tool steel		0,20																	
M	Stainless steel		0,16																	
K	Grey cast iron		0,26			0,10	0,25					0,10	0,25							
	Cast iron with spheroidal graphite		0,23			0,10	0,25					0,10	0,25							
	Malleable cast iron		0,23			0,10	0,25					0,10	0,25							
N	Aluminum wrought alloys																			
	Aluminum cast alloys																			
	Copper and copper alloys (bronze/brass)																			
S	Heat-resistant alloys																			
	Titanium alloys																			
H	Hardened steel								0,05	0,10					0,05	0,10				
	Hard cast iron																			
	Hardened cast iron								0,05	0,10					0,05	0,10				
X	Non-metallic materials																			

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



HC	Coated carbide
CN	Si3N4 ceramic
CM	Mixed ceramic

F	Finishing
M	Medium machining
R	Roughing



EMP05 plunge milling system

Universal tool for any machining application

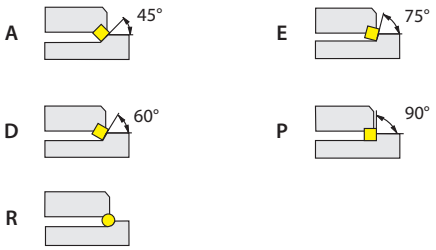
Indexable milling System code – milling bodies

FM	A	12	050	–	A22	O	–	N	06	–	04	(L)	(C)
1	2	3	4		5	6		7	8		9	10	11

Type	
Code	Description
BM	Profile milling
CM	Chamfer milling
EM	Square shoulder milling
FM	Face milling
HM	Helical milling
SM	Slot milling
TM	T-slot milling
XM	Special

1

Entering angle



2

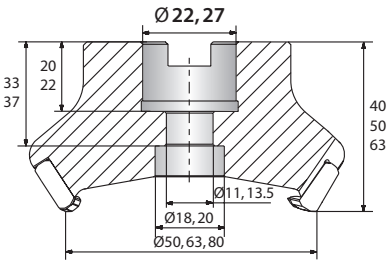
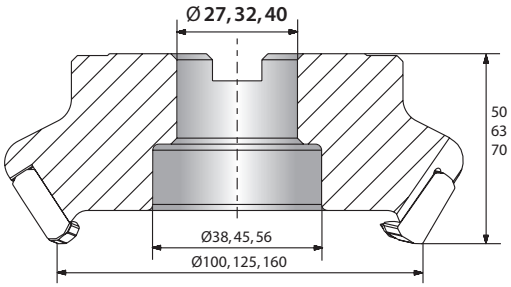
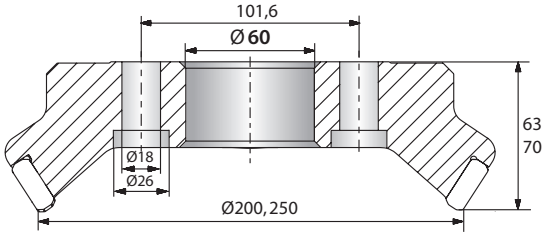
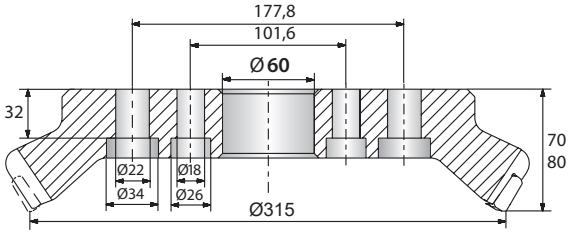
Serial number

3

Nominal diameter [mm]	
Code	Description
025	25
050	50
160	160
315	315
...	

4

Type and size of tool holders

Code	Type	Code	Type
A	Nominal diameter Ø50 – 80 mm 	B	Nominal diameter Ø100 – 160 mm 
C	Nominal diameter Ø200 – 250 mm 	D	Nominal diameter Ø315 mm 
G	Straight shank	XP	Weldon shank
K	Bore with keyway		

5

With respect to mounting please adhere to the information provided by the tool holder manufacturer.

Insert shape			
A		C	
H		L	
M		O	
P		R	
S		T	
W		X	Special
Z	Special		

6

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

7

Cutting edge length l [mm]	
Insert shape	
A	C, M
H, O, P	L
R	S
T	W

8

Number of teeth

9

Cutting direction	
Code	Description
L	Left

10

With inner cooling

11

Tools with B coupling and inner coolant supply require the following spare parts:



Coolant clamp screw



Coolant shower plate



Spare parts (B coupling with inner coolant supply)

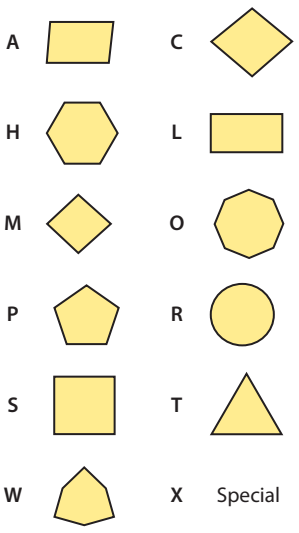
		B27	B32	B40	B40
	Ø	**80**	**100**	**125**	**160**
	**Coolant clamp screw**	LDB27C	LDB32C	LDB40C	LDB40C
	**Coolant shower plate**	B27-002-CP	B32-002-CP	B40-002-CP	B40-003-CP

When purchasing tools with inner coolant supply and B coupling these spare parts are included in delivery.

Indexable milling ISO code – inserts

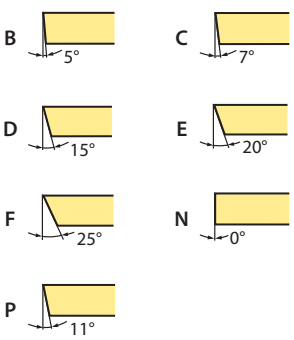
S	P	K	N	12	04	ED	T21K	R	–	DM
1	2	3	4	5	6	7	8	9		10

Insert shape



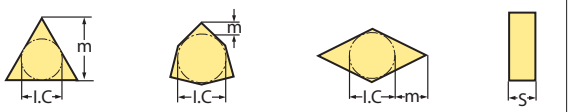
1

Clearance angle



2

Tolerance class

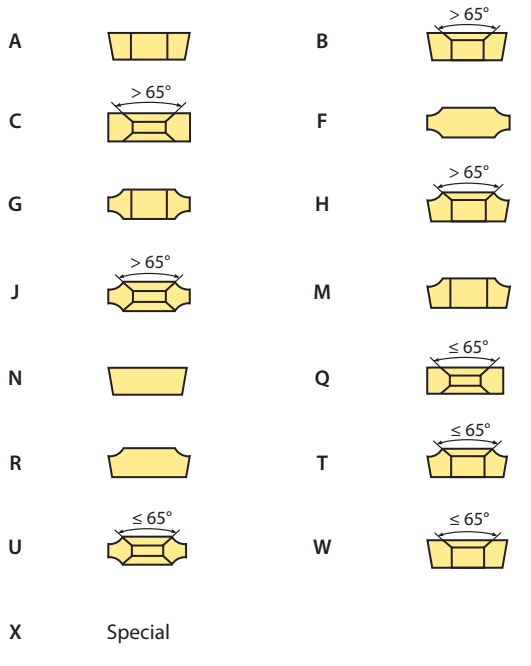


Code	I.C [mm]	m [mm]	S [mm]
A	±0,025	±0,005	±0,025
C	±0,025	±0,013	±0,025
E	±0,025	±0,025	±0,025
F	±0,013	±0,005	±0,025
G	±0,025	±0,025	±0,130
H	±0,013	±0,013	±0,025
J	±0,05–0,13	±0,005	±0,025
K	±0,05–0,13	±0,013	±0,025
L	±0,05–0,13	±0,025	±0,025
M	±0,05–0,13	±0,08–0,18	±0,130
N	±0,05–0,13	±0,08–0,18	±0,025
U	±0,08–0,25	±0,13–0,38	±0,130

3

Fastening features (metric)

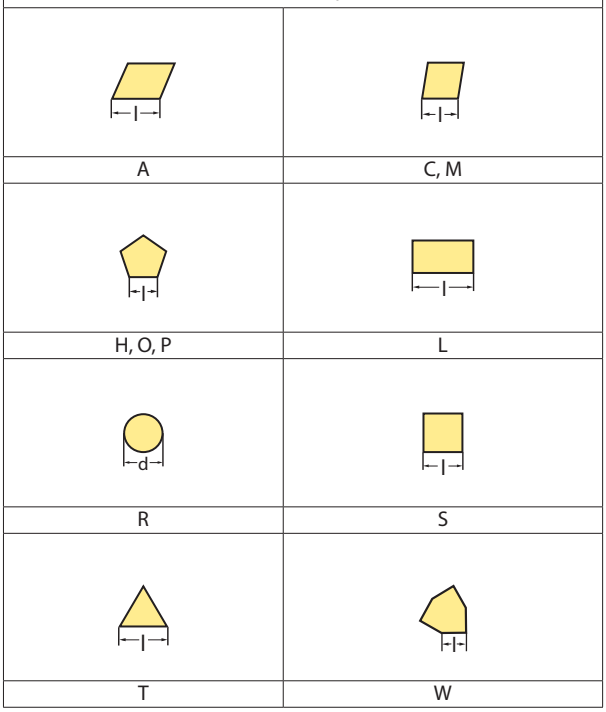
Insert shape



4

Cutting edge length l [mm]

Insert shape



5

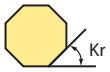
Insert thickness S [mm]



Code	S	Code	S
00	0,79	**05**	5,56
T0	0,99	**T5**	5,95
01	1,59	**06**	6,35
T1	1,98	**T6**	6,75
02	2,38	**07**	7,94
T2	2,58	**09**	9,52
03	3,18	**T9**	9,72
T3	3,97	**11**	11,11
04	4,76	**12**	12,70
T4	4,96		

6

Angle





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

7

Chamfer

Code	Type	Code	Angle	Code	Width [mm]	Code	Position
F		**0**	5°	**0**	0,10	**K**	
E		**1**	10°	**1**	0,15		
T		**2**	15°	**2**	0,20	**P**	
S		**3**	20°	**3**	0,25		
		4	25°	**4**	0,30	**W**	
		5	30°	**5**	0,35		
				6	0,40	**–**	
				7	0,45		

8

Cutting direction

Code	Description
R	Right
L	Left
N	Right and left

9

Chip breakers

10

FMA12 face milling system

Wide assortment and maximum efficiency

Now available in new ONHU09T5 insert size New

YOUR BENEFITS

– **Highly economical thanks to 16 cutting edges**
– The 45° milling system with negative inserts ensures a stable cutting edge
– Available for a wide range of finishing and roughing applications
– The newly developed chip breakers feature a positive insert geometry and generate lower cutting forces

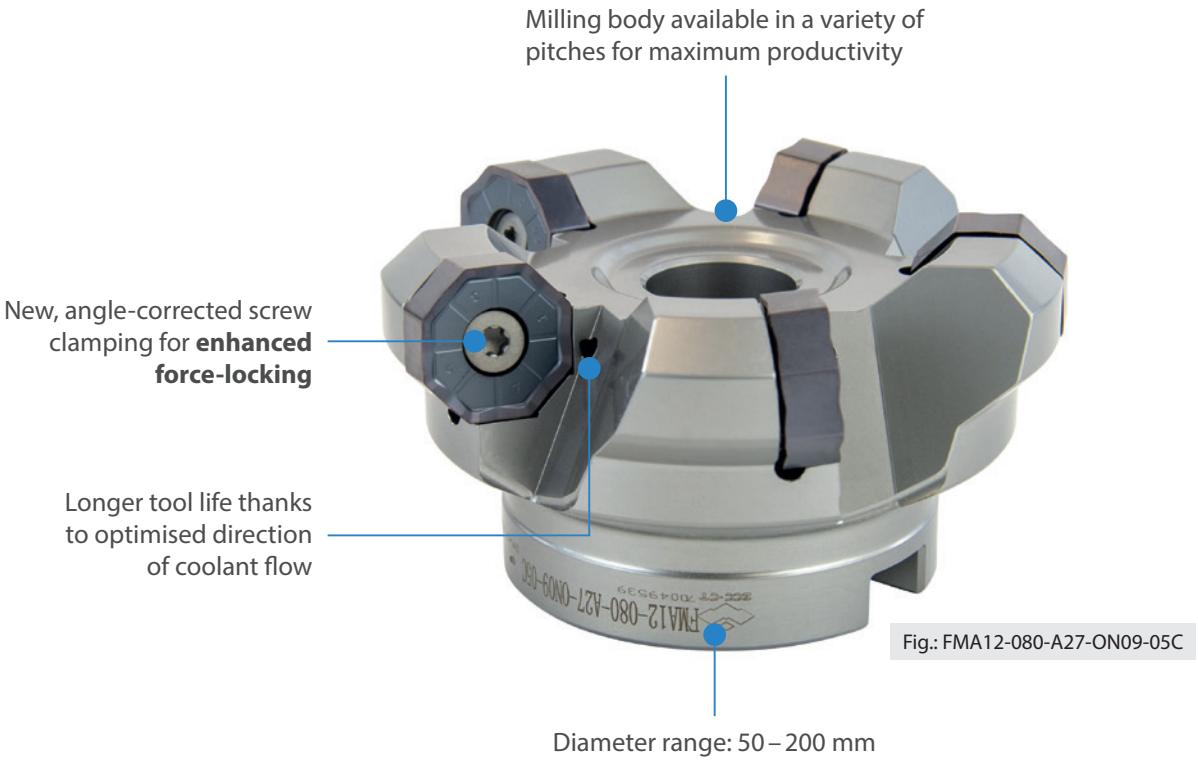


Fig.: FMA12-080-A27-ON09-05C

Insert grades

YBG205H	YBG205	YB9320	YBM253	YBD152	YBD252
PVD *P10–P30* *M20–M40*	*PVD* *P10–P30* *M20–M40*	*PVD* *P10–P30* *M10–M25*	*CVD* *P20–P40* *M15–M35*	*CVD* *K10–K25*	*CVD* *K20–K35*

Chip breaker

-GM	-GL	-GH
		
General machining	General machining	Soft cutting geometry

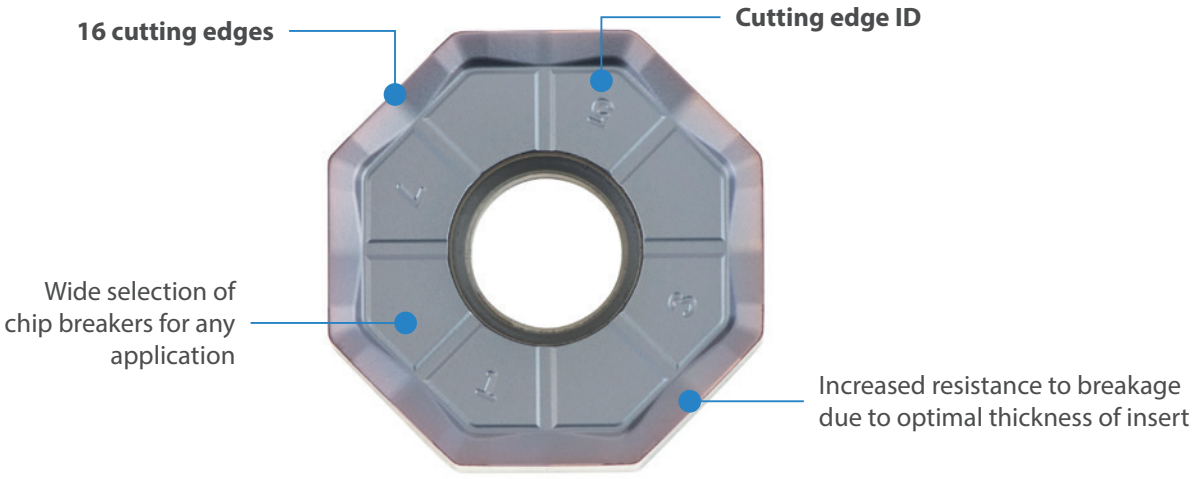
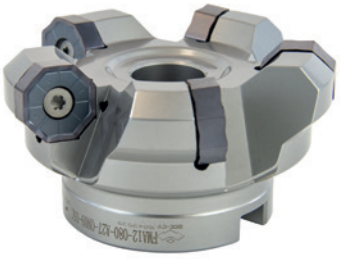


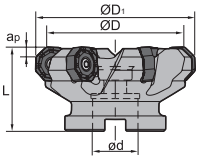
Fig.: ONHU09T508ANN-GM YBG205H

Face mill

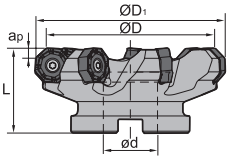
FMA12 Kr: 45°



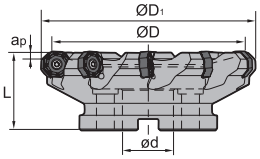




A



B



C

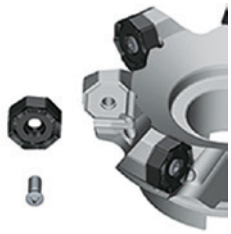
Article	✻	Stock	Dimensions [mm] ØD	ØD1	ød	L	ap max	Teeth	Coupling	kg	Insert
FMA12-050-A22-ON06-04C	✻	●	50	62	22	40	4	4	A	0,3	
FMA12-050-A22-ON06-05C	✻	●	50	62	22	40	4	5	A	0,3	
FMA12-063-A27-ON06-05C	✻	●	63	75	27	40	4	5	A	0,5	
FMA12-063-A27-ON06-07C	✻	●	63	75	27	40	4	7	A	0,5	
FMA12-080-A27-ON06-07C	✻	●	80	92	27	50	4	6	A	1	
FMA12-080-A27-ON06-09C	✻	●	80	92	27	50	4	9	A	1	
FMA12-100-A32-ON06-08C	✻	●	100	112	32	63	4	8	A	1,9	ONHU0604 ONMU0604
FMA12-100-A32-ON06-11C	✻	●	100	112	32	63	4	11	A	1,9	
FMA12-125-B40-ON06-10		●	125	137	40	63	4	10	B	3,5	
FMA12-125-B40-ON06-14		●	125	137	40	63	4	14	B	3,5	
FMA12-160-C40-ON06-12		●	160	172	40	63	4	12	C	4,3	
FMA12-160-C40-ON06-18		●	160	172	40	63	4	18	C	4,3	
FMA12-200-C60-ON06-14		○	200	212	60	63	4	14	C	6,4	
FMA12-200-C60-ON06-22		○	200	212	60	63	4	22	C	6,4	
FMA12-063-A27-ON09-04C	✻	○	63	76	27	50	5,5	4	A	0,7	
FMA12-063-A27-ON09-06C	✻	●	63	76	27	50	5,5	6	A	0,84	
FMA12-080-A27-ON09-05C	✻	○	80	93	27	50	5,5	5	A	1,1	
FMA12-080-A27-ON09-07C	✻	●	80	93	27	50	5,5	7	A	1,24	
FMA12-100-A32-ON09-06C	✻	○	100	113	32	63	5,5	6	A	1,6	
FMA12-100-A32-ON09-10C	✻	●	100	113	32	63	5,5	10	A	1,809	ONHU09T5 ONMU09T5
FMA12-125-B40-ON09-08		○	125	138	40	63	5,5	8	B	3,1	
FMA12-125-B40-ON09-12C	✻	●	125	138	40	63	5,5	12	B	3,648	
FMA12-160-C40-ON09-10		○	160	173	40	63	5,5	10	C	3,982	
FMA12-160-C40-ON09-15		○	160	173	40	63	5,5	15	C	4,303	
FMA12-200-C60-ON09-12		○	200	303	60	63	5,5	12	C	4,987	
FMA12-200-C60-ON09-18		○	200	303	60	63	5,5	18	C	5,754	

● Ex stock ○ On demand

✻ With internal cooling

Spare parts

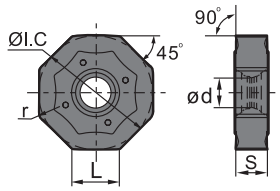
	Inserts	ON*U0604**	ONHU08T6	ON*U09T5
	ØD	50–200	63–200	63–200
	Screw (insert)	IRM4*10 (3,4Nm)	I60M5x13 (5,0Nm)	I60M5x13 (5,0Nm)
	Wrench (insert)	WT15IP	WT20IS	WT20IS
	Wrench (insert)	WT15IS WT15IT	WT20IT	WT20IT



Milling insert

- Ideal machining conditions
- Normal machining conditions
- Unfavourable machining conditions

ON*U	L	I.C	S	d
06 04	6,15	15,80	5,54	6,00
08 T6	6,38	20,20	6,30	5,30
09 T5	8,00	20,20	5,80	7,00



ON** milling insert			HC¹ (CVD)			HC¹ (PVD)			HT	HC²	HW
		P									
		M									
		K									
		N									
		S									
		H									
	ISO	r	YBM253	YBD152	YBD252	YBG205	YB9320	YBS303			
	ONHU060408ANN-GH	0,8	●	●	●	●	●	○			
	ONHU09T508ANN-GH New	0,8	●	●		○					
	ONMU09T512-GH New	1,2	○	○		○					
	ONHU060404ANN-GL	0,4	●	○		●	●	○			
	ONHU09T508ANN-GL New	0,8	○	○		●					
	ONHU060408ANN-GM	0,8	●	●		●	●				
	ONHU08T624R-GM	2,4	○	○		○					
	ONHU09T508ANN-GM New	0,8	○	●		●					
	ONMU09T512-GM New	1,2	○	○		○					

● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

EMP14 aluminium milling system

Precisely 90° for shoulder milling operations

YOUR BENEFITS

– **Shoulder milling at precisely 90°**
– Wide assortment of nose radii available to choose from (0.2–5.0 mm)
– Ideal choice for the aerospace industry
– Highly polished, precision-ground inserts for top-quality surfaces
– New chip space design for optimum chip removal



Fig.: EMP14-050-A22-VP22-04C

Insert grades

YD101

–

N05 – N20

Chip breaker

-LP



Aluminium machining

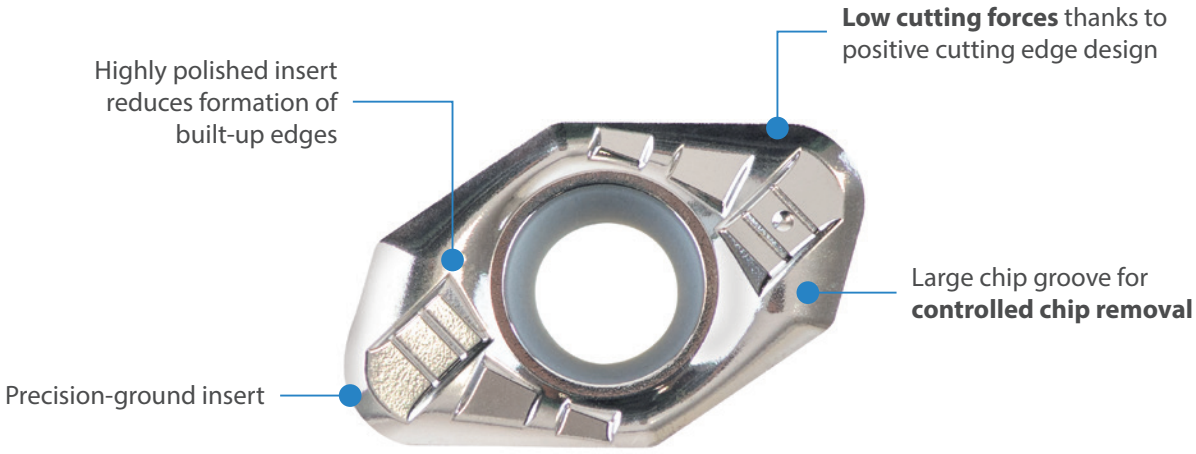


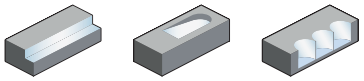
Fig.: VPGT220530-LP YD101

Recommended cutting data

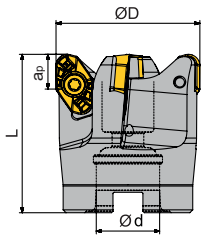
ISO group	Material	Cutting speed v_c (m/min)	Feed f_z [mm]
N	Aluminium wrought alloys	800 – 3500	0,05 – 0,3
N	Cast aluminium alloys >12 % Si	400 – 1000	0,05 – 0,3
N	Copper and copper alloys (bronze/brass)	700 – 1200	0,10 – 0,3
X	Plastic, graphite, CFRP / GFRP	200 – 1000	0,10 – 0,3
X	Epoxy resin	900 – 1500	0,18 – 0,5
X	Wood composites	2000 – 5000	0,05 – 1,0

Square shoulder mill

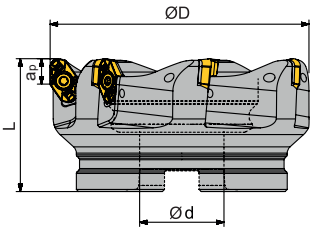
EMP14 Kr: 90°







A



B

Article	✻	Stock	Dimensions [mm] ØD	ød	L	$a_{p\ max}$	Teeth	Coupling	kg	Insert
EMP14-040-A16-VP22-03CA	✻	●	40	16	55	10	3	A	0,24	VPGT220502 – VPGT220532
EMP14-042-A16-VP22-03CA	✻	●	42	16	55	10	3	A	0,27	
EMP14-050-A22-VP22-03CA	✻	○	50	22	55	10	3	A	0,34	
EMP14-050-A22-VP22-04CA	✻	●	50	22	55	10	4	A	0,34	
EMP14-052-A22-VP22-04CA	✻	●	52	22	55	10	4	A	0,37	
EMP14-063-A27-VP22-04CA	✻	●	63	27	55	10	4	A	0,54	
EMP14-066-A27-VP22-05CA	✻	○	66	27	55	10	5	A	0,60	
EMP14-080-A27-VP22-05CA	✻	●	80	27	55	10	5	A	0,86	
EMP14-100-B32-VP22-05CA	✻	●	100	32	55	10	5	B	1,47	
EMP14-100-B32-VP22-06CA	✻	○	100	32	55	10	6	B	1,47	
EMP14-125-B40-VP22-05CA	✻	○	125	40	63	10	5	B	2,85	
EMP14-125-B40-VP22-07CA	✻	●	125	40	63	10	7	B	2,85	
EMP14-040-A16-VP22-03C	✻	●	40	16	55	10	3	A	0,28	VPGT220540 – VPGT220550
EMP14-042-A16-VP22-03C	✻	●	42	16	55	10	3	A	0,31	
EMP14-050-A22-VP22-03C	✻	○	50	22	55	10	3	A	0,39	
EMP14-050-A22-VP22-04C	✻	●	50	22	55	10	4	A	0,39	
EMP14-052-A22-VP22-04C	✻	●	52	22	55	10	4	A	0,43	
EMP14-063-A27-VP22-04C	✻	●	63	27	55	10	4	A	0,61	
EMP14-066-A27-VP22-05C	✻	○	66	27	55	10	5	A	0,68	
EMP14-080-A27-VP22-05C	✻	●	80	27	55	10	5	A	0,99	
EMP14-100-B32-VP22-05C	✻	●	100	32	55	10	5	B	1,58	
EMP14-100-B32-VP22-06C	✻	○	100	32	55	10	6	B	1,58	
EMP14-125-B40-VP22-05C	✻	○	125	40	63	10	5	B	3,07	
EMP14-125-B40-VP22-07C	✻	●	125	40	63	10	7	B	3,07	

● Ex stock ○ On demand

✻ With internal cooling

Spare parts

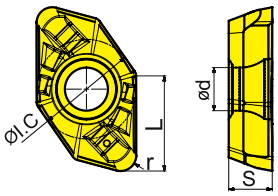
	Insert	VPGT2205**
	ØD	32–125
	Screw (Insert)	I60M5*11 (5,0 Nm)
	Wrench (Insert)	WT20IT



- Ideal machining conditions
- Normal machining conditions
- Unfavourable machining conditions

VPGT	L	I.C	S	d
22 05	12,00	12,70	5,56	5,50

Milling insert

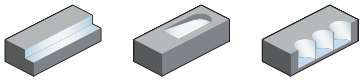
VPGT milling insert			HC¹ (CVD)	HC¹ (PVD)	HT	HC²	HW
		P					
		M					
		K					
		N					⊛
		S					
		H					
ISO		r					YD101
	VPGT220502-LP	0,20					○
	VPGT220505-LP	0,50					●
	VPGT220508-LP	0,80					●
	VPGT220510-LP	1,00					●
	VPGT220515-LP	1,50					●
	VPGT220520-LP	2,00					●
	VPGT220525-LP	2,50					●
	VPGT220530-LP	3,00					●
	VPGT220532-LP	3,20					●
	VPGT220540-LP	4,00					●
	VPGT220550-LP	5,00					○
	VPGT220560-LP	6,00					○

● Ex stock ○ On demand

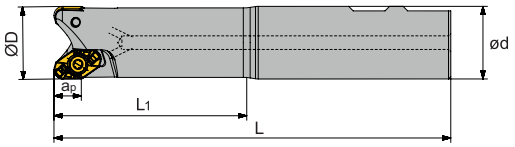
HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

Square shoulder mill

EMP14 Kr: 90°







Straight shank

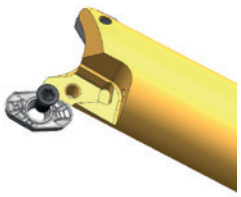
Article	✻	Stock	Dimensions [mm] ØD	ød	L_1	L	$a_{p\,max}$	Teeth	kg	Insert
EMP14-032-XP32-VP22-02CA-L1-100-L-200	✻	○	32	32	100	200	10	2	1,06	VPGT220502 – VPGT220532
EMP14-032-XP32-VP22-02CA	✻	●	32	32	30	125	10	2	0,65	
EMP14-032-XP32-VP22-02CA-L1-85-L-175	✻	●	32	32	85	175	10	2	0,92	
EMP14-032-XP32-VP22-02CA-L1-150-L-250	✻	○	32	32	150	250	10	2	1,34	
EMP14-032-XP32-VP22-02C-L1-100-L-200	✻	○	32	32	100	200	10	2	1,06	VPGT220540 – VPGT220550
EMP14-032-XP32-VP22-02C	✻	●	32	32	30	125	10	2	0,64	
EMP14-032-XP32-VP22-02C-L1-85-L-175	✻	●	32	32	85	175	10	2	0,92	
EMP14-032-XP32-VP22-02C-L1-150-L-250	✻	○	32	32	150	250	10	2	1,34	

● Ex stock ○ On demand

✻ With internal cooling

Spare parts

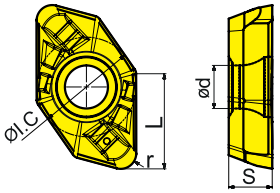
	Insert	**VPGT2205****
	ØD	**32–125**
	Screw (Insert)	I60M5*11 (5,0 Nm)
	Wrench (Insert)	WT20IT



- Ideal machining conditions
- Normal machining conditions
- Unfavourable machining conditions

VPGT	L	I.C	S	d
22 05	12,00	12,70	5,56	5,50

Milling insert

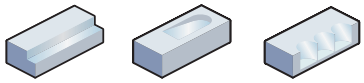
VPGT milling insert			HC¹ (CVD)	HC¹ (PVD)	HT	HC²	HW
		**P**					
		M					
		K					
		N					⊛
		S					
		H					
ISO		r					YD101
	VPGT220502-LP	0,20					○
	VPGT220505-LP	0,50					●
	VPGT220508-LP	0,80					●
	VPGT220510-LP	1,00					●
	VPGT220515-LP	1,50					●
	VPGT220520-LP	2,00					●
	VPGT220525-LP	2,50					●
	VPGT220530-LP	3,00					●
	VPGT220532-LP	3,20					●
	VPGT220540-LP	4,00					●
	VPGT220550-LP	5,00					○
	VPGT220560-LP	6,00					○

● Ex stock ○ On demand

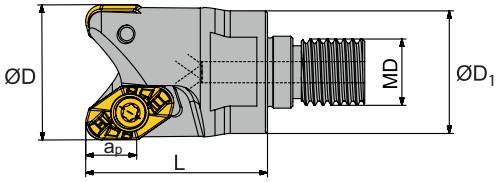
HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

Square shoulder milling cutter – QCH series

QCH – VPGT Kr: 90°







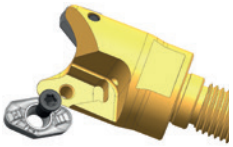
Article	✻	Stock	Dimensions [mm] ØD	ØD1	L	MD	ap max	Teeth	kg	Insert
QCH-32-VP22-M16-02CA	✻	●	32	30	43	M16	10	2	0,18	VPGT220502 – VPGT220532
QCH-32-VP22-M16-02C	✻	●	32	30	43	M16	10	2	0,18	VPGT220540 – VPGT220550

● Ex stock ○ On demand

✻ With internal cooling

Spare parts

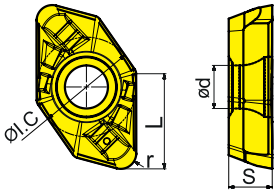
	Insert	VPGT2205**
	ØD	32–125
	Screw (Insert)	I60M5*11 (5,0 Nm)
	Wrench (Insert)	WT20IT



Milling insert

- Ideal machining conditions
- Normal machining conditions
- Unfavourable machining conditions

VPGT	L	I.C	S	d
22 05	12,00	12,70	5,56	5,50

VPGT milling insert			HC¹ (CVD)	HC¹ (PVD)	HT	HC²	HW
		P					
		M					
		K					
		N					●
		S					
		H					
ISO		r					YD101
	VPGT220502-LP	0,20					○
	VPGT220505-LP	0,50					●
	VPGT220508-LP	0,80					●
	VPGT220510-LP	1,00					●
	VPGT220515-LP	1,50					●
	VPGT220520-LP	2,00					●
	VPGT220525-LP	2,50					●
	VPGT220530-LP	3,00					●
	VPGT220532-LP	3,20					●
	VPGT220540-LP	4,00					●
	VPGT220550-LP	5,00					○
	VPGT220560-LP	6,00					○

● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

FMR11 round insert milling cutter

Maximum cutting performance

YOUR BENEFITS

- **Indexing for optimum use of cutting edge**
- Heavy-duty round insert mill for a wide range of applications
- Well suited for die and mould making
- Round insert for high feed rates and machining capacities
- Optimal chip removal because chip pocket free of interfering contours
- Safe and easy to use thanks to screw clamping

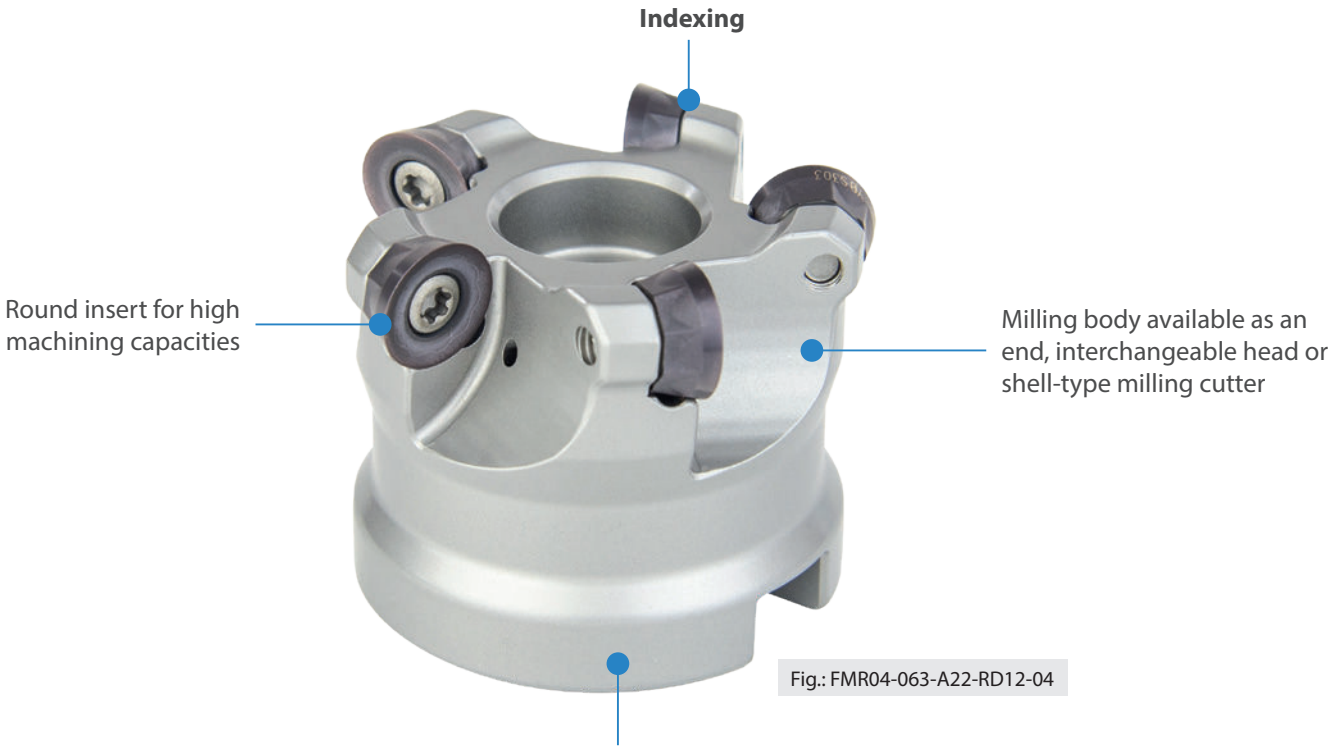
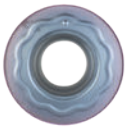


Fig.: FMR04-063-A22-RD12-04

Insert grades

YBG205H	YB9320	YBS303	YBD252
PVD *P10 – P30* *M20 – M40*	*PVD* *P10 – P30* *M10 – M25*	*PVD* *S25 – S35*	*CVD* *K20 – K35*

Chip breaker

RDMT-M RPMT-M	RDMT-MM RPMT-MM	RDMW-H RPMW-H
		
General machining	Soft cutting geometry	Roughing

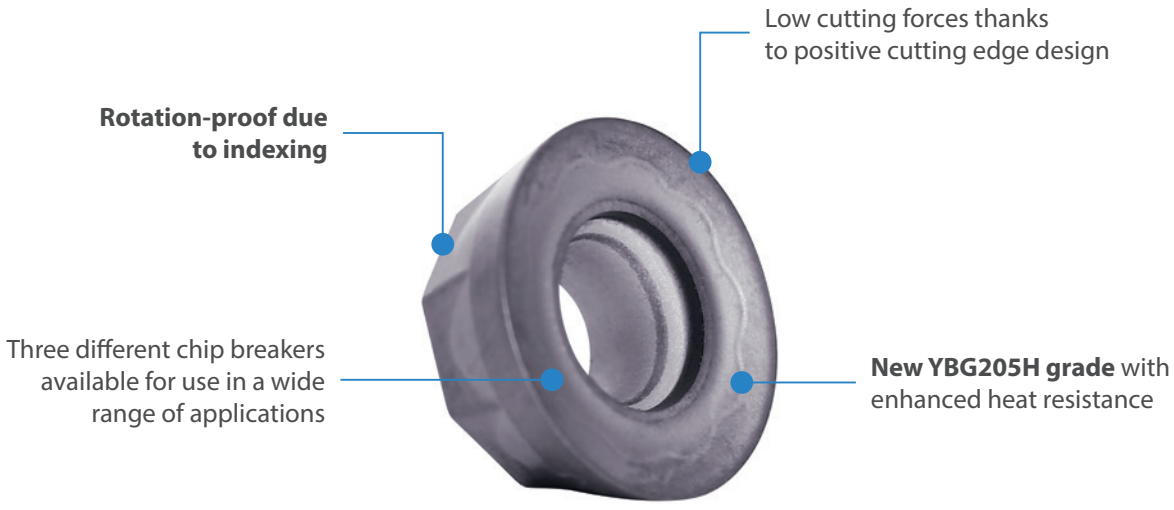
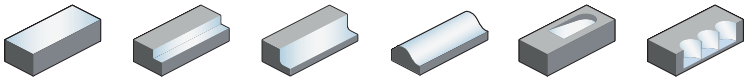


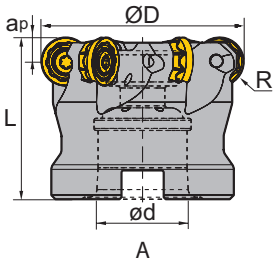
Fig.: RDMT1204-MO-M YBG205H

Face mill

FMR11







Article	✻	Stock	Dimensions [mm] R	ØD	ød	L	$a_{p\,max}$	Teeth	Coupling	kg	Insert
FMR11-040-A16-RD10-06C	✻	○	5	40	16	40	5	6	A	–	RD**10T3
FMR11-050-A22-RD10-07C	✻	●	5	50	22	40	5	7	A	0,30	
FMR11-052-A22-RD10-07C	✻	●	5	52	22	40	5	7	A	0,28	
FMR11-063-A22-RD10-08C	✻	●	5	63	22	40	5	8	A	0,50	
FMR11-066-A22-RD10-08C	✻	●	5	66	22	40	5	8	A	0,46	
FMR11-080-A27-RD10-09C	✻	●	5	80	27	50	5	9	A	0,82	
FMR11-040-A16-RD12-05C	✻	●	6	40	16	40	6	5	A	0,18	RD**1204
FMR11-050-A22-RD12-05C	✻	●	6	50	22	40	6	5	A	0,27	
FMR11-050-A22-RD12-06C	✻	●	6	50	22	40	6	6	A	0,27	
FMR11-052-A22-RD12-06C	✻	●	6	52	22	40	6	6	A	0,27	
FMR11-063-A27-RD12-07C	✻	●	6	63	27	40	6	7	A	0,39	
FMR11-066-A27-RD12-07C	✻	●	6	66	27	40	6	7	A	0,40	
FMR11-080-A27-RD12-08C	✻	●	6	80	27	50	6	8	A	1,00	
FMR11-040-A16-RP10-06C	✻	●	5	40	16	40	5	6	A	0,19	RP**10T3
FMR11-050-A22-RP10-07C	✻	●	5	50	22	40	5	7	A	0,29	
FMR11-052-A22-RP10-07C	✻	●	5	52	22	40	5	7	A	0,29	
FMR11-063-A22-RP10-08C	✻	●	5	63	22	40	5	8	A	0,48	
FMR11-066-A22-RP10-08C	✻	●	5	66	22	40	5	8	A	0,49	
FMR11-080-A27-RP10-09C	✻	●	5	80	27	50	5	9	A	0,93	
FMR11-040-A16-RP12-05C	✻	●	6	40	16	40	6	5	A	0,16	RP**1204
FMR11-050-A22-RP12-06C	✻	●	6	50	22	40	6	6	A	0,27	
FMR11-052-A22-RP12-06C	✻	●	6	52	22	40	6	6	A	0,28	
FMR11-063-A27-RP12-07C	✻	●	6	63	27	40	6	7	A	0,40	
FMR11-066-A27-RP12-07C	✻	●	6	66	27	40	6	7	A	0,43	
FMR11-080-A27-RP12-08C	✻	●	6	80	27	50	6	8	A	1,00	

● Ex stock ○ On demand

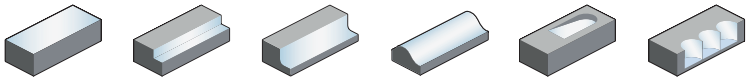
✻ With internal cooling

Spare parts

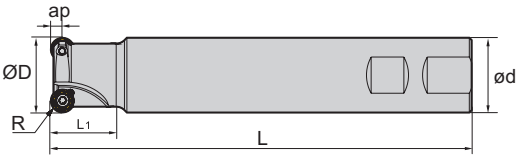
	Insert	RD**10T3	RD**1204	RP**10T3	RP***1204
	ØD	20 – 66	20 – 66	80	80
	Screw (insert)	I60M3,5*8 (2,7Nm)	I60M3,5*8 (2,7Nm)	I60M4*8,4 (3,4Nm)	I60M4*8,4 (3,4Nm)
	Wrench (insert)	WT15IP	WT15IP	WT15IS	WT15IS

Face mill

FMR11







Straight shank

Article	✻	Stock	Dimensions [mm] R	ØD	ød	L_1	L	$a_{p\,max}$	Teeth	kg	Insert
FMR11-032-XP32-RD10-03C	✻	○	5	32	32	35	120	5	3	–	RD**10T3
FMR11-040-XP32-RD10-04C	✻	○	5	40	32	40	120	5	4	–	
FMR11-032-XP32-RD10-03C	✻	●	5	32	32	30	180	5	3	0,98	
FMR11-040-XP32-RD10-04C	✻	●	5	40	32	30	200	5	4	1,2	
FMR11-032-XP32-RD12-03C	✻	○	6	32	32	35	120	6	3	–	RD**1204
FMR11-040-XP32-RD12-04C	✻	○	6	40	32	40	120	6	4	–	
FMR11-032-XP32-RD12-03C	✻	●	6	32	32	30	180	6	3	0,97	
FMR11-040-XP32-RD12-04C	✻	●	6	40	32	30	200	6	4	1,15	
FMR11-032-XP32-RP10-03C	✻	○	5	32	32	35	120	5	3	–	RP**10T3
FMR11-040-XP32-RP10-04C	✻	○	5	40	32	40	120	5	4	–	
FMR11-032-XP32-RP10-03C	✻	●	5	32	32	30	180	5	3	0,98	
FMR11-040-XP32-RP10-04C	✻	●	5	40	32	30	200	5	4	1,17	
FMR11-032-XP32-RP12-03C	✻	○	6	32	32	35	120	6	3	–	RP**1204
FMR11-040-XP32-RP12-04C	✻	○	6	40	32	40	120	6	4	–	
FMR11-032-XP32-RP12-03C	✻	●	6	32	32	30	180	6	3	0,98	
FMR11-040-XP32-RP12-04C	✻	●	6	40	32	30	200	6	4	1,16	

● Ex stock ○ On demand

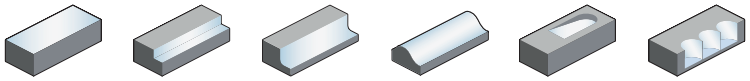
✻ With internal cooling

Spare parts

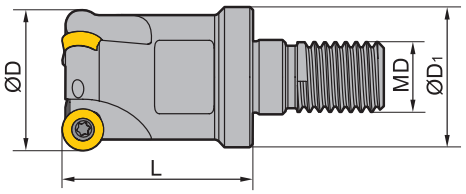
	Insert	**RD**10T3**	**RD**1204**	**RP**10T3**	**RP**1204**
	ØD	**20 – 66**	**20 – 66**	**80**	**80**
	Screw (insert)	I60M3,5*8 (2,7Nm)	I60M3,5*8 (2,7Nm)	I60M4*8,4 (3,4Nm)	I60M4*8,4 (3,4Nm)
	Wrench (insert)	WT15IP	WT15IP	WT15IS	WT15IS

Face mill – QCH series

QCH – R***







Article	✲	Stock	Dimensions [mm] R	ØD	ØD1	L	MD	Teeth	kg	Insert
QCH-20-RD10-M10-02-FMR11	✲	○	5	20	18	30	10	2	–	RD**10T3
QCH-25-RD10-M12-03-FMR11	✲	●	5	25	21	35	12	3	0,08	
QCH-32-RD10-M16-03-FMR11	✲	●	5	32	30	45	16	3	0,21	
QCH-42-RD10-M16-05-FMR11	✲	●	5	42	40	45	16	5	0,29	
QCH-20-RD12-M10-02-FMR11	✲	○	6	20	18	30	10	2	–	RD**1204
QCH-25-RD12-M12-03-FMR11	✲	●	6	25	21	35	12	3	–	
QCH-32-RD12-M16-03-FMR11	✲	●	6	32	30	45	16	3	0,20	
QCH-42-RD12-M16-05-FMR11	✲	●	6	42	40	45	16	5	0,27	
QCH-20-RP10-M10-02-FMR11		○	5	20	18	30	10	2	–	RP**10T3
QCH-25-RP10-M12-03-FMR11		○	5	25	21	35	12	3	–	
QCH-32-RP10-M16-03 -FMR11		○	5	32	30	45	16	3	–	
QCH-42-RP10-M16-05-FMR11		○	5	42	40	45	16	5	–	
QCH-20-RP12-M10-02-FMR11		○	6	20	18	30	10	2	–	RP**1204
QCH-25-RP12-M12-03-FMR11		○	6	25	21	35	12	3	–	
QCH-32-RP12-M16-03-FMR11		○	6	32	30	45	16	3	–	
QCH-42-RP12-M16-05-FMR11		○	6	42	40	45	16	5	–	

● Ex stock ○ On demand

✲ With internal cooling

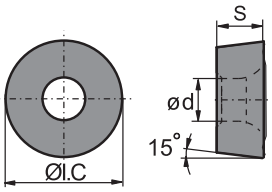
Spare parts

	Insert	RD**10T3	RD**1204	RP**10T3	RP**1204	
	ØD	20 – 66	20 – 66	80	80	
	Screw (insert)	I60M3,5*8 (2,7Nm)	I60M3,5*8 (2,7Nm)	I60M4*8,4 (3,4Nm)	I60M4*8,4 (3,4Nm)	
	Wrench (insert)	WT15IP	WT15IP	WT15IS	WT15IS	

Milling insert

Ideal machining conditions
Normal machining conditions
Unfavourable machining conditions

RDMT	I.C	S	d
10 T3	10,00	3,97	4,10
12 04	12,00	4,76	4,40

RD** milling insert		HC¹ (CVD)	HC¹ (PVD)			HT	HC²	HW
	P		●	●				
	M		○	○				
	K	●						
	N							
	S		●	●	●			
	H		●					
ISO		YBD252	YBG205H	YB9320	YBS303			
	**RDMT10T3MO-M**	●	●	○	●			
	RDMT1204MO-M	●	●	○	●			
	**RDMT10T3MO-MM**		●	○	●			
	RDMT1204MO-MM		●	○	●			

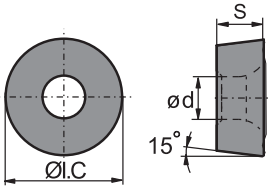
● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

Milling insert

Ideal machining conditions
Normal machining conditions
Unfavourable machining conditions

RDMW	I.C	S	d
10 T3	10,00	3,97	4,10
12 04	12,00	4,76	4,40

RD** milling insert		HC¹ (CVD)	HC¹ (PVD)		HT	HC²	HW
	P		●	●			
	M						
	K	●					
	N						
	S						
	H		●				
ISO		YBD252	YBG205H	YB9320			
	**RDMW10T3MO-H**	●	●	○			
	RDMW1204MO-H	●	●	○			

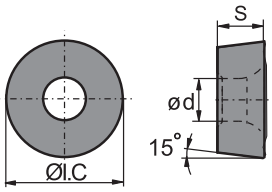
● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

Milling insert

- Ideal machining conditions
- Normal machining conditions
- Unfavourable machining conditions

RPMT	I.C	S	d
10 T3	10,00	3,97	4,10
12 04	12,00	4,76	4,40

RP** milling insert		HC¹ (CVD)	HC¹ (PVD)			HT	HC²	HW
	P		●	●				
	M		○	○				
	K	●						
	N							
	S		○	○	○			
	H		●					
ISO		YBD252	YBG205H	YB9320	YBS303			
 RPMT10T3MO-M		●	●	○	●			
RPMT1204MO-M		●	●	○	●			
 RPMT10T3MO-MM			●	○	●			
RPMT1204MO-MM			●	○	●			

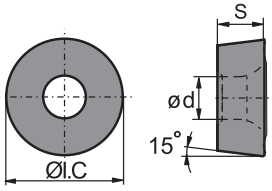
● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

Milling insert

- Ideal machining conditions
- Normal machining conditions
- Unfavourable machining conditions

RPMW	I.C	S	d
10 T3	10,00	3,97	4,10
12 04	12,00	4,76	4,40

RP** milling insert		HC¹ (CVD)	HC¹ (PVD)		HT	HC²	HW
	P		●	●			
	M						
	K	●					
	N						
	S						
	H		●				
ISO		YBD252	YBG205H	YB9320			
 RPMW10T3MO-H		●	●	○			
RPMW1204MO-H		●	●	○			

● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide



FMR11

Round insert milling cutter

Indexable milling – group 1 (FMA07/11/12/17, FMP12/17, FMD02, EMP09/13)

Material group		Composition / structure / heat treatment			Machining group	Starting values for cutting speed v_c [m/min]							
						HC (CVD)							
						YBC302		YBC401		YBD152		YBD252	
						a_e / D		a_e / D		a_e / D		a_e / D	
						1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	260	300	225	260				
		approx. 0,45 % C	annealed	190	2	225	255	195	225				
		approx. 0,45 % C	tempered	250	3	210	240	180	210				
		approx. 0,75 % C	annealed	270	4	185	210	160	185				
		approx. 0,75 % C	tempered	300	5	170	195	150	170				
	Low-alloyed steel		annealed	180	6	225	255	195	225				
			tempered	275	7	185	210	160	185				
			tempered	300	8	170	195	150	170				
			tempered	350	9	145	165	125	145				
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	130	150	115	130				
			hardened and tempered	325	11	95	105	80	95				
M	Stainless steel	ferritic/martensitic	annealed	200	12								
		martensitic	tempered	240	13								
		austenitic	quench hardened	180	14								
		austenitic-ferritic		230	15								
K	Grey cast iron	perlitic/ferritic		180	16					370	430	320	370
		perlitic (martensitic)		260	17					220	255	190	220
	Cast iron with spheroidal graphite	ferritic		160	18					255	295	220	255
		perlitic		250	19					170	200	145	170
	Malleable cast iron	ferritic		130	20					305	355	265	305
		perlitic		230	21					205	240	175	205
N	Aluminium wrought alloys	cannot be hardened		60	22								
		hardenable	hardened	100	23								
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24								
		≤ 12 % Si, hardenable	hardened	90	25								
		> 12 % Si, cannot be hardened		130	26								
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27								
		CuZn, CuSnZn		90	28								
		CuSn, Pb-free copper, electrolytic copper		100	29								
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30								
			hardened	280	31								
		Ni or Co bass	annealed	250	32								
			hardened	350	33								
			cast	320	34								
	Titanium alloys	pure titanium		R_m 400	35								
		α and β alloys	hardened	R_m 1050	36								
H	Hardened steel		hardened and tempered	55 HRC	37								
			hardened and tempered	60 HRC	38								
	Hard cast iron		cast	400	39								
	Hardened cast iron		hardened and tempered	55 HRC	40								
X	Non-metallic materials	Thermoplasts			41								
		Thermosetting plastics			42								
		Plastic, glass-fibre reinforced GFRP			43								
		Plastic, carbon fibre reinforced CFRP			44								
		Graphite			45								
		Wood			46								

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B38–B43.

	Starting values for cutting speed v_c [m/min]																				
	HC (CVD)		HC (PVD)														HW				
	YBM253		YBG102		YB9320		YBG205		YBG205H		YBG252		YBG302		YBS303		YD101		YD201		
	a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		
	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	
	260	300	270	315	245	285	235	275	235	275	230	265	225	260							
	225	255	230	270	210	245	200	235	200	235	200	230	195	225							
	210	240	220	255	200	230	190	220	190	220	185	215	180	210							
	185	210	190	225	175	200	165	195	165	195	165	190	160	185							
	170	195	180	205	160	190	155	180	155	180	150	175	150	170							
	225	255	230	270	210	245	200	235	200	235	200	230	195	225							
	185	210	190	225	175	200	165	195	165	195	165	190	160	185							
	170	195	180	205	160	190	155	180	155	180	150	175	150	170							
	145	165	150	175	135	160	130	155	130	155	130	150	125	145							
	130	150	135	160	125	145	120	140	120	140	115	135	115	130							
	95	105	95	115	90	100	85	100	85	100	85	95	80	95							
	130	150	135	160	125	145	120	140			115	135	115	130	140	185					
	110	130	115	135	105	120	100	120			100	115	95	110	120	155					
	140	160	145	170	130	155	125	150			125	145	120	140	150	195					
	110	130	115	135	105	120	100	120			100	115	95	110	120	155					
			300	345	270	315	260	300	270	315	255	295	250	290							
			180	205	160	190	155	180	160	190	150	175	150	170							
			205	240	185	215	180	210	185	215	175	200	170	195							
			135	160	125	145	120	140	125	145	115	135	115	130							
			245	285	225	260	215	250	225	260	210	240	205	235							
			165	190	150	175	145	165	150	175	140	160	135	160							
																	1505	1735	1450	1670	
																	1225	1420	1180	1370	
																	540	620	515	600	
																	435	505	420	485	
																	220	255	215	250	
																	170	195	160	190	
																	210	245	205	235	
																	385	445	370	430	
									90	150											
									80	120											
									90	120											

HC Coated carbide
HT Uncoated carbide, primary component (TiC) or (TiN), cermet
HW Uncoated carbide, primary component (WC)
BL Cubic boron nitride with low BN content
BH Cubic boron nitride with high BN content
CN Si3N4 ceramic
CM Mixed ceramic
HC_1 Coated cermet
BC CBN with coating
CC Coated cutting ceramic
CR Cutting ceramic, primary component aluminium oxide (Al_2O_3), reinforced
DP Polycrystalline diamond

Indexable milling – group 2 (FMA01/02/03/04, FME01/02, EMP01/02/03/04/14)

Material group		Composition / structure / heat treatment			Machining group	Starting values for cutting speed v_c [m/min]							
						HC (CVD)							
						YBC302		YBC401		YBD152		YBD252	
						a_e / D		a_e / D		a_e / D		a_e / D	
						1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	245	285	210	245				
		approx. 0,45 % C	annealed	190	2	210	245	180	210				
		approx. 0,45 % C	tempered	250	3	200	230	170	200				
		approx. 0,75 % C	annealed	270	4	175	200	150	175				
		approx. 0,75 % C	tempered	300	5	160	190	140	160				
	Low-alloyed steel		annealed	180	6	210	245	180	210				
			tempered	275	7	175	200	150	175				
			tempered	300	8	160	190	140	160				
			tempered	350	9	135	160	120	135				
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	125	145	105	125				
			hardened and tempered	325	11	90	100	75	90				
M	Stainless steel	ferritic/martensitic	annealed	200	12								
		martensitic	tempered	240	13								
		austenitic	quench hardened	180	14								
		austenitic-ferritic		230	15								
K	Grey cast iron	perlitic/ferritic		180	16					315	365	270	315
		perlitic (martensitic)		260	17					185	215	160	190
	Cast iron with spheroidal graphite	ferritic		160	18					215	250	185	215
		perlitic		250	19					145	170	125	145
	Malleable cast iron	ferritic		130	20					260	300	225	260
		perlitic		230	21					175	205	150	175
N	Aluminium wrought alloys	cannot be hardened		60	22								
		hardenable	hardened	100	23								
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24								
		≤ 12 % Si, hardenable	hardened	90	25								
		> 12 % Si, cannot be hardened		130	26								
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27								
		CuZn, CuSnZn		90	28								
		CuSn, Pb-free copper, electrolytic copper		100	29								
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30								
			hardened	280	31								
		Ni or Co bass	annealed	250	32								
			hardened	350	33								
			cast	320	34								
	Titanium alloys	pure titanium		R_m 400	35								
		α and β alloys	hardened	R_m 1050	36								
H	Hardened steel		hardened and tempered	55 HRC	37								
			hardened and tempered	60 HRC	38								
	Hard cast iron		cast	400	39								
	Hardened cast iron		hardened and tempered	55 HRC	40								
X	Non-metallic materials	Thermoplasts			41								
		Thermosetting plastics			42								
		Plastic, glass-fibre reinforced GFRP			43								
		Plastic, carbon fibre reinforced CFRP			44								
		Graphite			45								
		Wood			46								

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B38–B43.

	Starting values for cutting speed v_c [m/min]																					
	HC (CVD)		HC (PVD)														HW				HT	
	YBM253		YBG101		YBG102		YBG152		YB9320		YBG205		YBG252		YBG302		YD101		YD201		YNG151	
	a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D	
	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5
	245	285			255	295	240	280	230	265	220	255	215	250	210	245					270	315
	210	245			220	255	205	240	200	230	190	220	185	215	180	210					235	270
	200	230			205	240	195	225	185	215	180	205	175	200	170	200					220	255
	175	200			180	210	170	200	165	190	155	180	155	175	150	175					195	220
	160	190			170	195	160	185	150	175	145	170	140	165	140	160					180	210
	210	245			220	255	205	240	200	230	190	220	185	215	180	210					235	270
	175	200			180	210	170	200	165	190	155	180	155	175	150	175					195	220
	160	190			170	195	160	185	150	175	145	170	140	165	140	160					180	210
	135	160			145	165	135	155	130	150	125	145	120	140	120	135					150	180
	125	145			130	150	120	140	115	135	110	130	110	125	105	125					140	160
	90	100			90	105	85	100	85	95	80	90	80	90	75	90					100	110
	125	145			130	150	120	140	115	135	110	130	110	125	105	125					135	160
	105	120			110	125	105	120	100	115	95	110	95	105	90	105					115	135
	130	155			140	160	130	150	125	145	120	140	115	135	115	130					145	170
	105	120			110	125	105	120	100	115	95	110	95	105	90	105					115	135
					285	330	265	305	255	295	245	285	240	280	235	275						
					170	195	160	185	150	175	145	170	140	165	140	160						
					195	225	180	210	175	200	165	195	165	190	160	185						
					130	150	120	140	115	135	110	130	110	125	105	125						
					230	270	220	255	210	240	200	230	195	225	190	225						
					155	180	145	170	140	160	135	155	130	150	130	150						
			1505	1735													1205	1390	1040	1200		
			1225	1420													980	1140	850	980		
			540	620													435	500	375	435		
			435	505													350	405	300	350		
			220	255													180	205	155	180		
			170	195													140	160	120	140		
			210	245													170	200	150	170		
			385	445													310	360	265	310		
					75	85	70	80	65	75	65	75	65	75	60	70						
					50	55	50	55	45	50	45	50	45	50	40	45						
					60	70	55	65	55	65	50	55	50	55	50	55						
					35	40	35	40	30	35	30	35	30	35	30	35						
					45	50	45	50	40	45	40	45	40	45	40	45						
					75	85	70	80	65	75	65	75	65	75	60	70						
					75	85	70	80	65	75	65	75	65	75	60	70						

HC Coated carbide
HT Uncoated carbide, primary component (TiC) or (TiN), cermet
HW Uncoated carbide, primary component (WC)
BL Cubic boron nitride with low BN content
BH Cubic boron nitride with high BN content
CN Si3N4 ceramic
CM Mixed ceramic
HC_1 Coated cermet
BC CBN with coating
CC Coated cutting ceramic
CR Cutting ceramic, primary component aluminium oxide (Al_2O_3), reinforced
DP Polycrystalline diamond

Indexable milling – group 3 (FMR01/02/03/04/11)

Material group		Composition / structure / heat treatment			Machining group	Starting values for cutting speed v_c [m/min] HC (PVD) YBG205H a_e / D			YBG212 a_e / D		
						1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	235	275		240	280	365
		approx. 0,45 % C	annealed	190	2	200	235		205	240	315
		approx. 0,45 % C	tempered	250	3	190	220		195	225	295
		approx. 0,75 % C	annealed	270	4	165	195		170	200	260
		approx. 0,75 % C	tempered	300	5	155	180		160	185	245
	Low-alloyed steel		annealed	180	6	200	235		205	240	315
			tempered	275	7	165	195		170	200	260
			tempered	300	8	155	180		160	185	245
			tempered	350	9	130	155		135	155	205
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	120	140		120	140	185
			hardened and tempered	325	11	85	100		85	100	130
M	Stainless steel	ferritic/martensitic	annealed	200	12				120	140	185
		martensitic	tempered	240	13				105	120	155
		austenitic	quench hardened	180	14				130	150	195
		austenitic-ferritic		230	15				105	120	155
K	Grey cast iron	perlitic/ferritic		180	16	270	315		265	305	400
		perlitic (martensitic)		260	17	160	190		160	185	245
	Cast iron with spheroidal graphite	ferritic		160	18	185	215		180	210	275
		perlitic		250	19	125	145		120	140	185
	Malleable cast iron	ferritic		130	20	225	260		220	255	335
		perlitic		230	21	150	175		145	170	225
N	Aluminium wrought alloys	cannot be hardened		60	22						
		hardenable	hardened	100	23						
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24						
		≤ 12 % Si, hardenable	hardened	90	25						
		> 12 % Si, cannot be hardened		130	26						
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27						
		CuZn, CuSnZn		90	28						
		CuSn, Pb-free copper, electrolytic copper		100	29						
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30						
			hardened	280	31						
		Ni or Co bass	annealed	250	32						
			hardened	350	33						
			cast	320	34						
	Titanium alloys	pure titanium		R_m 400	35						
		α and β alloys	hardened	R_m 1050	36						
H	Hardened steel		hardened and tempered	55 HRC	37	90	150				
			hardened and tempered	60 HRC	38	80	120				
	Hard cast iron		cast	400	39						
	Hardened cast iron		hardened and tempered	55 HRC	40	90	120				
X	Non-metallic materials	Thermoplasts			41						
		Thermosetting plastics			42						
		Plastic, glass-fibre reinforced GFRP			43						
		Plastic, carbon fibre reinforced CFRP			44						
		Graphite			45						
		Wood			46						

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B38–B43.

Starting values for cutting speed v_c [m/min]														
	HC (PVD)									HW				
	YBG252			YBG302			YBS303			YD101		YD201		
	a_e / D			a_e / D			a_e / D			a_e / D		a_e / D		
	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/1 | 3/4	1/5	
	230	265	345	225	260	340								
	200	230	300	195	225	295								
	185	215	280	180	210	275								
	165	190	250	160	185	245								
	150	175	230	150	170	225								
	200	230	300	195	225	295								
	165	190	250	160	185	245								
	150	175	230	150	170	225								
	130	150	195	125	145	190								
	115	135	180	115	130	170								
	85	95	125	80	95	125								
	115	135	175	115	130	170	140	185						
	100	115	145	95	110	145	120	155						
	125	145	185	120	140	185	150	195						
	100	115	145	95	110	145	120	155						
	255	295	385	250	290	380								
	150	175	230	150	170	225								
	175	200	260	170	195	255								
	115	135	180	115	130	170								
	210	240	315	205	235	310								
	140	160	210	135	160	210								
										1505	1735	1450	1670	
										1225	1420	1180	1370	
										540	620	515	600	
										435	505	420	485	
										220	255	215	250	
										170	195	160	190	
										210	245	205	235	
										385	445	370	430	

HC Coated carbide
HT Uncoated carbide, primary component (TiC) or (TiN), cermet
HW Uncoated carbide, primary component (WC)
BL Cubic boron nitride with low BN content
BH Cubic boron nitride with high BN content
CN Si3N4 ceramic
CM Mixed ceramic
HC_1 Coated cermet
BC CBN with coating
CC Coated cutting ceramic
CR Cutting ceramic, primary component aluminium oxide (Al_2O_3), reinforced
DP Polycrystalline diamond

Recommended feed rate

Indexable milling – group1 (FMA07/11/12/17, FMP12/17, FMD02, EMP09/13)

Material group		Feed rate per cutting edge [mm]																	
		EMP09			EMP09			EMP13			EMP13			FMA07			FMA07		
		LNKT08/12			LNKT16			ANGX11			ANGX15			ONHU06			ONHU08		
		Application																	
		F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R
P	Unalloyed steel		0,25	0,50		0,28	0,55		0,23			0,25		0,19	0,23		0,19	0,23	
P	Low-alloyed steel		0,23	0,47		0,26	0,51		0,22			0,23		0,17	0,22		0,17	0,22	
P	High-alloyed steel and high-alloyed tool steel		0,22	0,44		0,24	0,48		0,20			0,22		0,16	0,20		0,16	0,20	
M	Stainless steel		0,18	0,35		0,19	0,39		0,16			0,18							
K	Grey cast iron		0,28	0,55		0,30	0,61		0,26			0,28		0,20	0,26		0,20	0,26	
K	Cast iron with spheroidal graphite		0,25	0,50		0,28	0,55		0,23			0,25		0,19	0,23		0,19	0,23	
K	Malleable cast iron		0,25	0,50		0,28	0,55		0,23			0,25		0,19	0,23		0,19	0,23	
N	Aluminum wrought alloys								0,20			0,21							
N	Aluminum cast alloys								0,20			0,21							
N	Copper and copper alloys (bronze/brass)								0,18			0,19							
S	Heat-resistant alloys																		
S	Titanium alloys																		
H	Hardened steel																		
H	Hard cast iron																		
H	Hardened cast iron																		
X	Non-metallic materials																		

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

Recommended feed rate

Indexable milling – group1 (FMA07/11/12/17, FMP12/17, FMD02, EMP09/13)

Material group		Feed rate per cutting edge [mm]																	
		FMD02			FMP12			FMP12			FMP17								
		HNEX09			WNHU06			WNHU08			SNGX12								
		Application																	
		F	M	R	F	M	R	F	M	R	F	M	R						
P	Unalloyed steel					0,23			0,25			0,23							
P	Low-alloyed steel					0,22			0,23			0,22							
P	High-alloyed steel and high-alloyed tool steel					0,20			0,22			0,20							
M	Stainless steel					0,16			0,18			0,16							
K	Grey cast iron	0,17	0,22	0,33		0,26			0,28			0,26							
K	Cast iron with spheroidal graphite	0,15	0,20	0,30		0,23			0,25			0,23							
K	Malleable cast iron	0,15	0,20	0,30		0,23			0,25			0,23							
N	Aluminum wrought alloys											0,20							
N	Aluminum cast alloys											0,20							
N	Copper and copper alloys (bronze/brass)											0,18							
S	Heat-resistant alloys																		
S	Titanium alloys																		
H	Hardened steel																		
H	Hard cast iron																		
H	Hardened cast iron																		
X	Non-metallic materials																		

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

	Feed rate per cutting edge [mm]																							
	FMA11			FMA11			FMA11			FMA12			FMA12			FMA12			FMA17			FMD02		
	SNEG12			SNEG15			SNEG19			ONHU06			ONHU08			ONHU09			SNGX12			PNEG11		
	Application																							
	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R
		0,20	0,23		0,22	0,25			0,29	0,19	0,23			0,23			0,23			0,20	0,23	0,15	0,20	0,30
		0,19	0,21		0,20	0,24			0,27	0,17	0,22			0,22			0,22			0,19	0,21	0,14	0,19	0,28
		0,18	0,20		0,19	0,22			0,26	0,16	0,20			0,20			0,20			0,18	0,20	0,13	0,18	0,26
		0,14	0,16		0,15	0,18			0,20					0,16			0,16			0,14	0,16			
		0,22	0,25		0,24	0,28			0,32	0,20	0,26			0,26			0,26			0,22	0,25	0,17	0,22	0,33
		0,20	0,23		0,22	0,25			0,29	0,19	0,23			0,23			0,23			0,20	0,23	0,15	0,20	0,30
		0,20	0,23		0,22	0,25			0,29	0,19	0,23			0,23			0,23			0,20	0,23	0,15	0,20	0,30

F Finishing
M Medium machining
R Roughing

F Finishing
M Medium machining
R Roughing

Recommended feed rate

Indexable milling – group 2 (FMA01/02/03/04, FME01/02, EMP01/02/03/04/14)

Material group		Feed rate per cutting edge [mm]																	
		FMA01 | FMA02			FMA03			FMA03			FMA04			FMA04			FMA04		
		SEET12			SEKN12			SEKN15			OFKT05			OFKR07			ODHT06		
		Application																	
		F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R
P	Unalloyed steel	0,15	0,20	0,25		0,18			0,20		0,20	0,25		0,20	0,25		0,20	0,25	
P	Low-alloyed steel	0,14	0,19	0,23		0,17			0,19		0,19	0,23		0,19	0,23		0,19	0,23	
P	High-alloyed steel and high-alloyed tool steel	0,13	0,18	0,22		0,16			0,18		0,18	0,22		0,18	0,22		0,18	0,22	
M	Stainless steel	0,11	0,14	0,18		0,13			0,14		0,14	0,18		0,14	0,18		0,14	0,18	
K	Grey cast iron	0,17	0,22	0,28		0,20			0,22		0,22	0,28		0,22	0,28		0,22	0,28	
K	Cast iron with spheroidal graphite	0,15	0,20	0,25		0,18			0,20		0,20	0,25		0,20	0,25		0,20	0,25	
K	Malleable cast iron	0,15	0,20	0,25		0,18			0,20		0,20	0,25		0,20	0,25		0,20	0,25	
N	Aluminium wrought alloys	0,13	0,17	0,21							0,17	0,21		0,17	0,21		0,17	0,21	
N	Aluminum cast alloys	0,13	0,17	0,21							0,17	0,21		0,17	0,21		0,17	0,21	
N	Copper and copper alloys (bronze/brass)	0,11	0,15	0,19							0,15	0,19		0,15	0,19		0,15	0,19	
S	Heat-resistant alloys	0,11	0,14	0,18							0,14	0,18		0,14	0,18		0,14	0,18	
S	Titanium alloys	0,11	0,14	0,18							0,14	0,18		0,14	0,18		0,14	0,18	
H	Hardened steel																		
H	Hard cast iron																		
H	Hardened cast iron																		
X	Non-metallic materials																		

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

Indexable milling – group 2 (FMA01/02/03/04, FME01/02, EMP01/02/03/04/14)

Material group		Feed rate per cutting edge [mm]																	
		EMP14																	
		VPGT22																	
		Application																	
		F	M	R															
P	Unalloyed steel																		
P	Low-alloyed steel																		
P	High-alloyed steel and high-alloyed tool steel																		
M	Stainless steel																		
K	Grey cast iron																		
K	Cast iron with spheroidal graphite																		
K	Malleable cast iron																		
N	Aluminium wrought alloys	0,05	0,2	0,3															
N	Aluminum cast alloys	0,05	0,2	0,3															
N	Copper and copper alloys (bronze/brass)	0,05	0,2	0,3															
S	Heat-resistant alloys																		
S	Titanium alloys																		
H	Hardened steel																		
H	Hard cast iron																		
H	Hardened cast iron																		
X	Non-metallic materials																		

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

	Feed rate per cutting edge [mm]																							
	FME02			FME03			FME03			FMP01			FMP02			EMP01 | EMP02			EMP01 | EMP02			EMP03 | EMP04		
	SPK*12			SPK*12			SPK*15			TPKN22			SEET12			APKT11			APKT16			APKT11		
	Application																							
	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R
		0,20			0,19			0,20			0,20		0,15	0,20	0,25	0,10	0,15	0,20	0,12	0,17	0,23	0,10	0,20	0,25
		0,19			0,17			0,19			0,19		0,14	0,19	0,23	0,09	0,14	0,19	0,11	0,16	0,21	0,09	0,19	0,23
		0,18			0,16			0,18			0,18		0,13	0,18	0,22	0,09	0,13	0,18	0,10	0,15	0,20	0,09	0,18	0,22
		0,14			0,13			0,14			0,14		0,11	0,14	0,18	0,07	0,11	0,14	0,08	0,12	0,16	0,07	0,14	0,18
		0,22			0,20			0,22			0,22		0,17	0,22	0,28	0,11	0,17	0,22	0,13	0,19	0,25	0,11	0,22	0,28
		0,20			0,19			0,20			0,20		0,15	0,20	0,25	0,10	0,15	0,20	0,12	0,17	0,23	0,10	0,20	0,25
		0,20			0,19			0,20			0,20		0,15	0,20	0,25	0,10	0,15	0,20	0,12	0,17	0,23	0,10	0,20	0,25
													0,13	0,17	0,21	0,09	0,13	0,17	0,10	0,15	0,20	0,09	0,17	0,21
													0,13	0,17	0,21	0,09	0,13	0,17	0,10	0,15	0,20	0,09	0,17	0,21
													0,11	0,15	0,19	0,08	0,11	0,15	0,09	0,13	0,18	0,08	0,15	0,19

F Finishing
M Medium machining
R Roughing

F Finishing
M Medium machining
R Roughing

Recommended feed rate

Indexable milling – group 3 (FMR01/02/03/04/11) Face milling

Material group		Feed rate per cutting edge [mm]																	
		FMR01			FMR01			FMR02			FMR02			FMR02			FMR03		
		RCKT10			RC*12			RC*12			RCKT16			RCKT20			RDKW07		
		Application																	
		F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R
P	Unalloyed steel		0,20	0,25		0,20	0,25		0,20	0,25		0,23	0,29		0,26	0,33		0,17	
	Low-alloyed steel		0,19	0,23		0,19	0,23		0,19	0,23		0,21	0,27		0,25	0,31		0,16	
	High-alloyed steel and high-alloyed tool steel		0,18	0,22		0,18	0,22		0,18	0,22		0,20	0,25		0,23	0,29		0,15	
M	Stainless steel		0,14	0,18		0,14	0,18		0,14	0,18		0,16	0,20		0,19	0,23		0,12	
K	Grey cast iron		0,22	0,28		0,22	0,28		0,22	0,28		0,25	0,32		0,29	0,36		0,19	
	Cast iron with spheroidal graphite		0,20	0,25		0,20	0,25		0,20	0,25		0,23	0,29		0,26	0,33		0,17	
	Malleable cast iron		0,20	0,25		0,20	0,25		0,20	0,25		0,23	0,29		0,26	0,33		0,17	
N	Aluminum wrought alloys					0,17	0,21		0,17	0,21									
	Aluminum cast alloys					0,17	0,21		0,17	0,21									
	Copper and copper alloys (bronze/brass)					0,15	0,19		0,15	0,19									
S	Heat-resistant alloys																		
	Titanium alloys																		
H	Hardened steel																		
	Hard cast iron																		
	Hardened cast iron																		
X	Non-metallic materials																		

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

Indexable milling – group 3 (FMR01/02/03/04/11) Face milling

Material group		Feed rate per cutting edge [mm]																	
		FMR11			FMR11			FMR11											
		RP**10			RD**12			RP**12											
		Application																	
		F	M	R	F	M	R	F	M	R									
P	Unalloyed steel		0,20		0,15	0,20	0,25	0,15	0,20	0,25									
	Low-alloyed steel		0,19		0,14	0,19	0,23	0,14	0,19	0,23									
	High-alloyed steel and high-alloyed tool steel		0,18		0,13	0,18	0,22	0,13	0,18	0,22									
M	Stainless steel		0,14		0,11	0,14	0,18	0,11	0,14	0,18									
K	Grey cast iron		0,22		0,17	0,22	0,28	0,17	0,22	0,28									
	Cast iron with spheroidal graphite		0,20		0,15	0,20	0,25	0,15	0,20	0,25									
	Malleable cast iron		0,20		0,15	0,20	0,25	0,15	0,20	0,25									
N	Aluminum wrought alloys		0,17		0,13	0,17	0,21	0,13	0,17	0,21									
	Aluminum cast alloys		0,17		0,13	0,17	0,21	0,13	0,17	0,21									
	Copper and copper alloys (bronze/brass)		0,15		0,11	0,15	0,19	0,11	0,15	0,19									
S	Heat-resistant alloys																		
	Titanium alloys																		
H	Hardened steel																		
	Hard cast iron																		
	Hardened cast iron																		
X	Non-metallic materials																		

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

	Feed rate per cutting edge [mm]																							
	FMR03			FMR03			FMR04			FMR04			FMR04			FMR04			FMR04			FMR11		
	RDKW08			RD*10			RD*12			RDKW16			RDKW20			RD**10			RD**12			RD**10		
	Application																							
	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R		M		F	M	R	F	M	R
		0,17			0,20		0,15	0,20	0,25	0,17	0,23	0,29	0,2	0,26	0,33		0,20		0,15	0,20	0,25		0,20	
		0,16			0,19		0,14	0,19	0,23	0,16	0,21	0,27	0,19	0,25	0,31		0,19		0,14	0,19	0,23		0,19	
		0,15			0,18		0,13	0,18	0,22	0,15	0,20	0,25	0,18	0,23	0,29		0,18		0,13	0,18	0,22		0,18	
		0,12			0,14		0,11	0,14	0,18	0,12	0,16	0,20	0,14	0,19	0,23		0,14		0,11	0,14	0,18		0,14	
		0,19			0,22		0,17	0,22	0,28	0,19	0,25	0,32	0,22	0,29	0,36		0,22		0,17	0,22	0,28		0,22	
		0,17			0,20		0,15	0,20	0,25	0,17	0,23	0,29	0,20	0,26	0,33		0,20		0,15	0,20	0,25		0,20	
		0,17			0,20		0,15	0,20	0,25	0,17	0,23	0,29	0,20	0,26	0,33		0,20		0,15	0,20	0,25		0,20	
					0,17		0,13	0,17	0,21								0,17		0,13	0,17	0,21		0,17	
					0,17		0,13	0,17	0,21								0,17		0,13	0,17	0,21		0,17	
					0,15		0,11	0,15	0,19								0,15		0,11	0,15	0,19		0,15	

F Finishing
M Medium machining
R Roughing

F Finishing
M Medium machining
R Roughing

Recommended feed rate

Indexable milling – group 3 (FMR01/02/03/04/11) Circular milling

Material group		Feed rate per cutting edge [mm]							
		FMR01	FMR01	FMR02	FMR02		FMR02		FMR03
		RCKT10	RC*12	RC*12	RCKT16		RCKT20		RDKW07
		Tool diameter [mm]							
		25-32	40-50	50-100	63-125	160-200	80-125	160-250	15
P	Unalloyed steel	0,12	0,16	0,18	0,24	0,32	0,26	0,35	0,07
P	Low-alloyed steel	0,11	0,14	0,16	0,21	0,28	0,23	0,31	0,06
P	High-alloyed steel and high-alloyed tool steel	0,10	0,13	0,14	0,19	0,26	0,21	0,28	0,06
M	Stainless steel	0,07	0,09	0,10	0,14	0,18	0,15	0,20	0,04
K	Grey cast iron	0,11	0,14	0,16	0,22	0,29	0,23	0,32	0,06
K	Cast iron with spheroidal graphite	0,10	0,13	0,14	0,19	0,26	0,21	0,28	0,06
K	Malleable cast iron	0,10	0,13	0,14	0,19	0,26	0,21	0,28	0,06
N	Aluminium wrought alloys								
N	Aluminum cast alloys								
N	Copper and copper alloys (bronze/brass)								
S	Heat-resistant alloys								
S	Titanium alloys								
H	Hardened steel								
H	Hard cast iron								
H	Hardened cast iron								
X	Non-metallic materials								

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

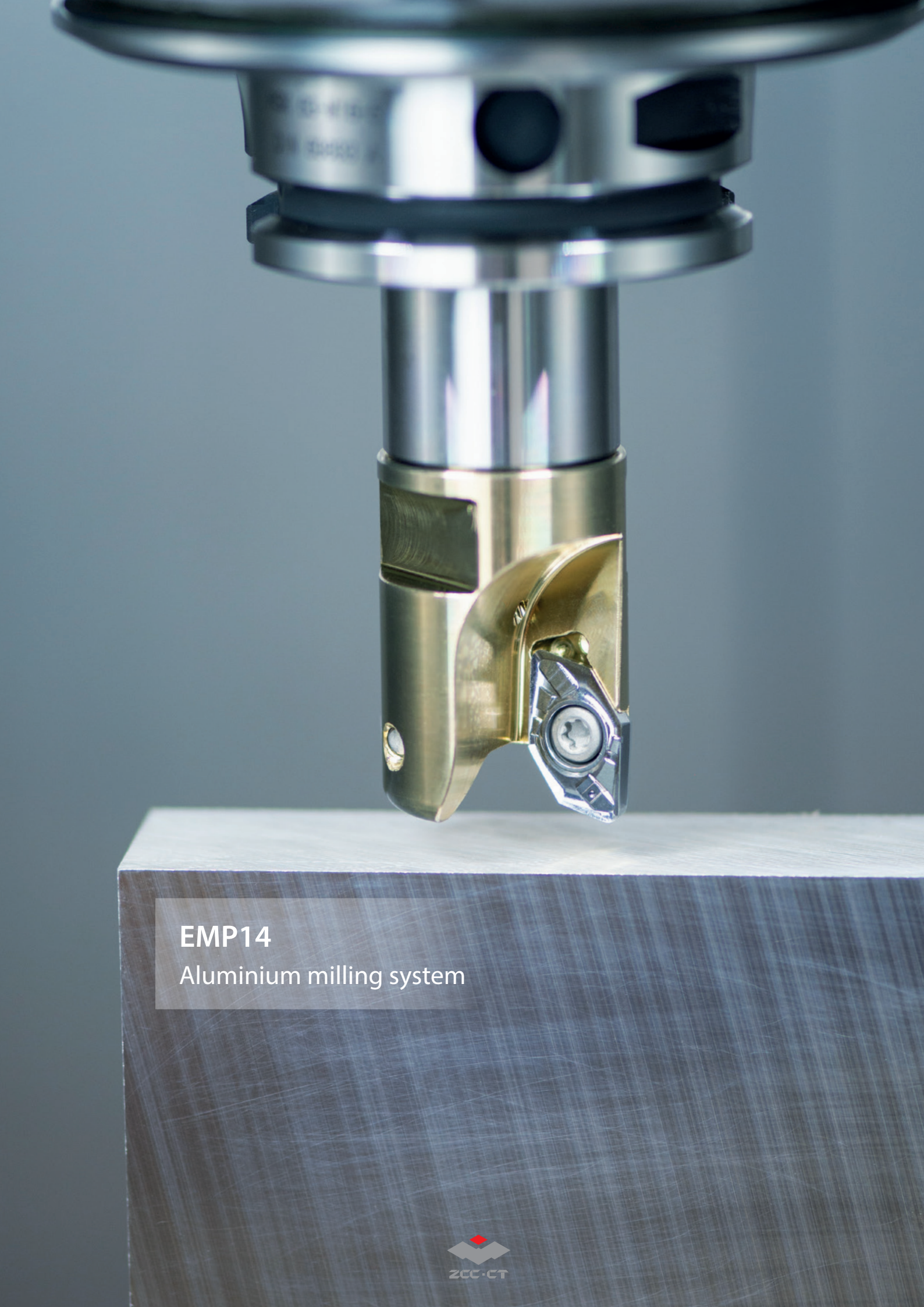
Indexable milling – group 3 (FMR01/02/03/04/11) Circular milling

Material group		Feed rate per cutting edge [mm]					
		FMR11	FMR11	FMR11			
		RP**10	RD**12	RP**12			
		Tool diameter [mm]					
		32-40	40-80	40-80			
P	Unalloyed steel	0,12	0,17	0,17			
P	Low-alloyed steel	0,11	0,15	0,15			
P	High-alloyed steel and high-alloyed tool steel	0,10	0,14	0,14			
M	Stainless steel	0,07	0,10	0,10			
K	Grey cast iron	0,11	0,15	0,15			
K	Cast iron with spheroidal graphite	0,10	0,14	0,14			
K	Malleable cast iron	0,10	0,14	0,14			
N	Aluminium wrought alloys	0,10	0,11	0,11			
N	Aluminum cast alloys	0,10	0,11	0,11			
N	Copper and copper alloys (bronze/brass)	0,10	0,11	0,11			
S	Heat-resistant alloys						
S	Titanium alloys						
H	Hardened steel						
H	Hard cast iron						
H	Hardened cast iron						
X	Non-metallic materials						

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

	Feed rate per cutting edge [mm]							
	FMR03	FMR03	FMR04	FMR04	FMR04	FMR04	FMR04	FMR11
	RDKW08	RD*10	RD*12	RDKW16	RDKW20	RD**10	RD**12	RD**10
	Tool diameter [mm]							
	16-25	32	50-63	80-100	125-160	32-40	40-80	32-40
	0,07	0,12	0,17	0,24	0,30	0,12	0,17	0,12
	0,06	0,11	0,15	0,21	0,26	0,11	0,15	0,11
	0,06	0,10	0,14	0,19	0,24	0,10	0,14	0,10
	0,04	0,07	0,10	0,14	0,17	0,07	0,10	0,07
	0,06	0,11	0,15	0,22	0,27	0,11	0,15	0,11
	0,06	0,10	0,14	0,19	0,24	0,10	0,14	0,10
	0,06	0,10	0,14	0,19	0,24	0,10	0,14	0,10
		0,10	0,11			0,10	0,11	0,10
		0,10	0,11			0,10	0,11	0,10
		0,10	0,11			0,10	0,11	0,10

	Feed rate per cutting edge [mm]							
	Tool diameter [mm]							



EMP14

Aluminium milling system

Solid carbide milling

System code – JIS **B66**

VPM series **B67–B73**

Recommended cutting data **B74–B78**

B

Solid carbide milling System code – JIS

GM	–	2	E	L	P	–	D12	R0.5	–	M08
1		2	3	4	5		6	7		8

Application	
Code	Description
GR	General roughing
GM	Semi-finishing
GF	Finishing
PM	High-performance machining
EPM	«Ecoline» – High-performance machining
VPM	Full-slot applications
HM	Hard machining
NM	General machining of non-ferrous metals
AL	General machining of Al and Al alloys
ALP	High-performance machining of Al and Al alloys
ALG	General machining of Al and Al alloys
UM	HSC/HPC machining
UMC	HSC machining with chip splitter geometry
VSM	General machining of heat-resistant alloys
TM	General machining of heat-resistant alloys

1

Number of teeth

2

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

3

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

4

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

5

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

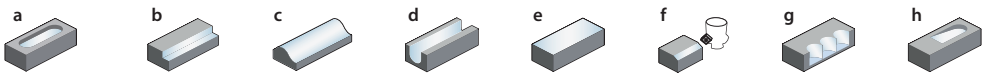
6

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

7

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

8



a Groove milling b Square shoulder milling c Profile milling d Slot milling e Face milling f Chamfer milling g Plunge milling h Circular milling/Ramping

VPM series

High-speed full-slot milling

Now also available as a torus milling cutter/with Weldon clamping surface New

YOUR BENEFITS

– Well suited for **full-slot milling** and applications involving **large contact widths**
– **Short machining times** thanks to high stock removal rate
– Low-vibration machining even under extreme conditions
– Optionally available as a QCH (**Q**uick-**C**hange **H**ead) replaceable head milling cutter with Q interface for added flexibility in your applications



Fig.: VPM-4E-D12.0 KMG406

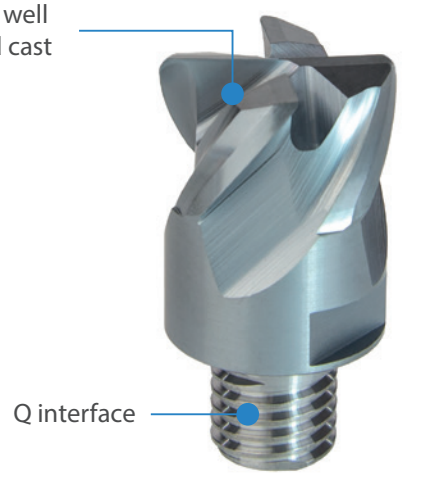
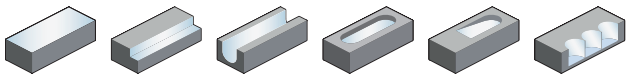


Fig.: Q14-VPM-4E-D25.0 KMG406

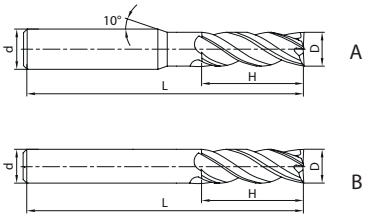
End mill High-performance machining

VPM-4E



– Factory standard
– Centre cutting
– Helix angle 36°/38°





Article	✻	Dimensions [mm]				Teeth	Geometry	Grade
		D	d (h6)	H	L			KMG406
VPM-4E-D3.0		3	6	8	50	4	A	●
VPM-4E-D4.0		4	6	11	50	4	A	●
VPM-4E-D5.0		5	6	13	50	4	A	●
VPM-4E-D6.0		6	6	16	50	4	B	●
VPM-4E-D7.0		7	8	20	60	4	A	●
VPM-4E-D8.0		8	8	20	60	4	B	●
VPM-4E-D9.0		9	10	22	75	4	A	●
VPM-4E-D10.0		10	10	25	75	4	B	●
VPM-4E-D11.0		11	12	26	75	4	A	●
VPM-4E-D12.0		12	12	30	75	4	B	●
VPM-4E-D14.0		14	14	32	75	4	B	●
VPM-4E-D16.0		16	16	45	100	4	B	●
VPM-4E-D18.0		18	18	45	100	4	B	●
VPM-4E-D20.0		20	20	45	100	4	B	●

● Ex stock ○ On demand
✻ With internal cooling

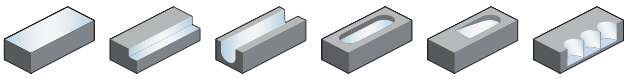
Application field

P	M	K	N	S	H
✔	✔	✔			✔

✔ Very suitable
✔ Suitable

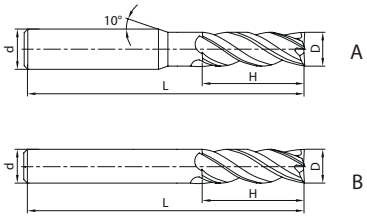
End mill High-performance machining

VPM-4E-W



– Factory standard
– Centre cutting
– Helix angle 36°/38°





Article	✻	Dimensions [mm]				Teeth	Geometry	Grade
		D	d (h6)	H	L			KMG406
VPM-4E-D5.0-W KMG406		5	6	13	50	4	A	○
VPM-4E-D6.0-W KMG406		6	6	16	50	4	B	●
VPM-4E-D7.0-W KMG406		7	8	20	60	4	A	○
VPM-4E-D8.0-W KMG406		8	8	20	60	4	B	●
VPM-4E-D9.0-W KMG406		9	10	22	75	4	A	○
VPM-4E-D10.0-W KMG406		10	10	25	75	4	B	●
VPM-4E-D11.0-W KMG406		11	12	26	75	4	A	○
VPM-4E-D12.0-W KMG406		12	12	30	75	4	B	●
VPM-4E-D14.0-W KMG406		14	14	32	75	4	B	●
VPM-4E-D16.0-W KMG406		16	16	45	100	4	B	●
VPM-4E-D18.0-W KMG406		18	18	45	100	4	B	●
VPM-4E-D20.0-W KMG406		20	20	45	100	4	B	●

● Ex stock ○ On demand

✻ With internal cooling

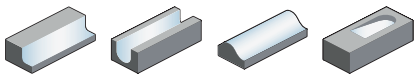
Application field

P	M	K	N	S	H
✔	✔	✔			✔

✔ Very suitable
✔ Suitable

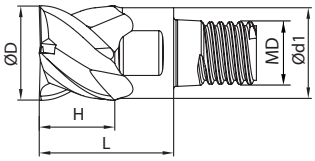
End mill High-performance machining

VPM-4E



– Centre cutting
– Helix angle 36°/38°





Article	✻	Dimensions [mm]					Geometry	Grade
		D	d1	H	L	MD		KMG406
Q08-VPM-4E-D12.0		12	11,5	7	17	8	4	●
Q10-VPM-4E-D16.0		16	15,2	9	21,5	10	4	●
Q12-VPM-4E-D20.0		20	19	11	25,5	12	4	●
Q14-VPM-4E-D25.0		25	24	13,5	31,5	14	4	●

● Ex stock ○ On demand

✻ With internal cooling

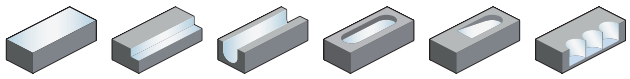
Application field

P	M	K	N	S	H
✔	✔	✔			✔

✔ Very suitable
✔ Suitable

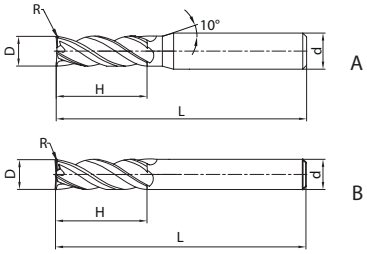
Torus mill | High-performance machining

VPM-4R



– Factory standard
– Centre cutting
– Helix angle 36°/38°





Article	✻	Dimensions [mm]					Teeth	Geometry	Grade
		R	D	d (h6)	H	L			KMG406
VPM-4R-D3.0R0.2 KMG406		0,2	3	6	8	50	4	A	●
VPM-4R-D3.0R0.3 KMG406		0,3	3	6	8	50	4	A	○
VPM-4R-D3.0R0.5 KMG406		0,5	3	6	8	50	4	A	●
VPM-4R-D4.0R0.2 KMG406		0,2	4	6	10	50	4	A	●
VPM-4R-D4.0R0.3 KMG406		0,3	4	6	10	50	4	A	○
VPM-4R-D4.0R0.5 KMG406		0,5	4	6	10	50	4	A	●
VPM-4R-D5.0R0.3 KMG406		0,3	5	6	13	50	4	A	○
VPM-4R-D5.0R0.5 KMG406		0,5	5	6	13	50	4	A	●
VPM-4R-D5.0R1.0 KMG406		1	5	6	13	50	4	A	●
VPM-4R-D6.0R0.1 KMG406		0,1	6	6	16	50	4	B	○
VPM-4R-D6.0R0.2 KMG406		0,2	6	6	16	50	4	B	○
VPM-4R-D6.0R0.3 KMG406		0,3	6	6	16	50	4	B	○
VPM-4R-D6.0R0.5 KMG406		0,5	6	6	16	50	4	B	●
VPM-4R-D6.0R1.0 KMG406		1	6	6	16	50	4	B	●
VPM-4R-D6.0R1.4 KMG406		1,4	6	6	16	50	4	B	○
VPM-4R-D6.0R1.5 KMG406		1,5	6	6	16	50	4	B	○
VPM-4R-D8.0R0.3 KMG406		0,3	8	8	20	60	4	B	○
VPM-4R-D8.0R0.5 KMG406		0,5	8	8	20	60	4	B	●
VPM-4R-D8.0R1.0 KMG406		1	8	8	20	60	4	B	●
VPM-4R-D10.0R0.3 KMG406		0,3	10	10	25	75	4	B	○
VPM-4R-D10.0R0.5 KMG406		0,5	10	10	25	75	4	B	●
VPM-4R-D10.0R1.0 KMG406		1	10	10	25	75	4	B	●
VPM-4R-D10.0R1.5 KMG406		1,5	10	10	25	75	4	B	○
VPM-4R-D10.0R2.0 KMG406		2	10	10	25	75	4	B	●
VPM-4R-D12.0R0.3 KMG406		0,3	12	12	30	75	4	B	○
VPM-4R-D12.0R0.5 KMG406		0,5	12	12	30	75	4	B	○
VPM-4R-D12.0R1.0 KMG406		1	12	12	30	75	4	B	●
VPM-4R-D12.0R1.5 KMG406		1,5	12	12	30	75	4	B	○
VPM-4R-D12.0R2.0 KMG406		2	12	12	30	75	4	B	●
VPM-4R-D16.0R1.0 KMG406		1	16	16	45	100	4	B	○

● Ex stock ○ On demand
✻ With internal cooling

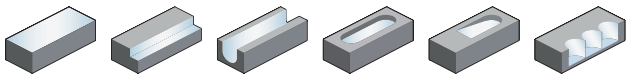
Application field

P	M	K	N	S	H
✔	✔	✔			✔

✔ Very suitable
✔ Suitable

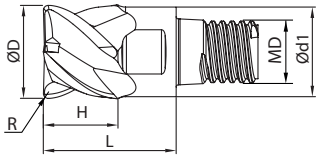
Torus mill High-performance machining

VPM-4R



– Centre cutting
– Helix angle 36°/38°





Article	✻	Dimensions [mm]					MD	Teeth	Grade
		R	D	d (h6)	H	L			KMG406
Q08-VPM-4R-D12.0R0.3 KMG406		0,3	12	11,5	7	17	8	4	○
Q08-VPM-4R-D12.0R0.5 KMG406		0,5	12	11,5	7	17	8	4	●
Q08-VPM-4R-D12.0R1.5 KMG406		1,5	12	11,5	7	17	8	4	○
Q08-VPM-4R-D12.0R2.0 KMG406		2	12	11,5	7	17	8	4	●
Q10-VPM-4R-D16.0R0.5 KMG406		0,5	16	15,2	9	21,5	10	4	○
Q10-VPM-4R-D16.0R1.0 KMG406		1	16	15,2	9	21,5	10	4	●
Q10-VPM-4R-D16.0R1.5 KMG406		1,5	16	15,2	9	21,5	10	4	○
Q10-VPM-4R-D16.0R2.0 KMG406		2	16	15,2	9	21,5	10	4	●
Q10-VPM-4R-D16.0R3.0 KMG406		3	16	15,2	9	21,5	10	4	●
Q12-VPM-4R-D20.0R1.0 KMG406		1	20	19	11	25,5	12	4	●
Q12-VPM-4R-D20.0R1.5 KMG406		1,5	20	19	11	25,5	12	4	○
Q12-VPM-4R-D20.0R2.0 KMG406		2	20	19	11	25,5	12	4	●
Q12-VPM-4R-D20.0R3.0 KMG406		3	20	19	11	25,5	12	4	●
Q14-VPM-4R-D25.0R1.5 KMG406		1,5	25	24	13,5	31,5	14	4	○
Q14-VPM-4R-D25.0R2.0 KMG406		2	25	24	13,5	31,5	14	4	●
Q14-VPM-4R-D25.0R2.5 KMG406		2,5	25	24	13,5	31,5	14	4	○
Q14-VPM-4R-D25.0R3.0 KMG406		3	25	24	13,5	31,5	14	4	●
Q18-VPM-4R-D32.0R2.0 KMG406		2	32	30	17	36	18	4	○
Q18-VPM-4R-D32.0R2.5 KMG406		2,5	32	30	17	36	18	4	○
Q18-VPM-4R-D32.0R4.0 KMG406		4	32	30	17	36	18	4	○

● Ex stock ○ On demand

✻ With internal cooling

Application field

P	M	K	N	S	H
✔	✔	✔			✔

✔ Very suitable
✔ Suitable



VPM series

High-speed full-slot milling

End mill – PM series, VPM series

Material group		Composition / structure / heat treatment		Brinell hardness HB	Machining group	Starting values for cutting speed v_c [m/min]							
						PM-2R PM-4R				PM-4RL			
						Slot milling		Shoulder milling		Slot milling		Shoulder milling	
						Ø [mm]	$a_{p\,max}$	Ø [mm]	$a_{e\,max}$	Ø [mm]	$a_{p\,max}$	Ø [mm]	$a_{e\,max}$
						0 < x < 3	0,1 5x D	0 < x ≤ 20	0.15 x D	0 < x < 3	0,1 5x D	0 < x ≤ 20	0.15 x D
						3 ≤ x < 6	0,3 x D			3 ≤ x < 6	0,3 x D		
						6 ≤ x ≤ 20	0,5 x D			6 ≤ x ≤ 20	0,5 x D		
						KMG405				KMG405			
						a_e / D				a_e / D			
						1/1	1/2	1/10	f-group	1/1	1/2	1/10	f-group
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	165	220	300	1	150	200	265	1
		approx. 0,45 % C	annealed	190	2	160	210	285	1	145	190	255	1
		approx. 0,45 % C	tempered	250	3	120	155	210	1	105	140	190	1
		approx. 0,75 % C	annealed	270	4	100	135	180	1	90	120	160	1
		approx. 0,75 % C	tempered	300	5	95	125	165	1	85	110	150	1
	Low-alloyed steel		annealed	180	6	125	165	225	1	115	150	200	1
			tempered	275	7	100	135	180	1	90	120	160	1
			tempered	300	8	95	125	165	1	85	110	150	1
			tempered	350	9	90	115	160	1	80	105	140	1
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	120	155	210	1	105	140	190	1
			hardened and tempered	325	11	90	120	160	1	80	110	145	1
M	Stainless steel	ferritic/martensitic	annealed	200	12	55	75	100	1	50	65	85	1
		martensitic	tempered	240	13	50	65	85	1	45	60	75	1
		austenitic	quench hardened	180	14	60	75	105	1	55	70	95	1
		austenitic-ferritic		230	15	50	65	85	1	45	60	75	1
K	Grey cast iron	perlitic/ferritic		180	16	125	165	220	1	110	150	195	1
		perlitic (martensitic)		260	17	100	135	180	1	90	120	160	1
	Cast iron with spheroidal graphite	ferritic		160	18	150	200	270	1	135	180	240	1
		perlitic		250	19	120	155	210	1	105	140	190	1
	Malleable cast iron	ferritic		130	20	165	220	300	1	150	200	265	1
		perlitic		230	21	135	180	240	1	120	160	215	1
N	Aluminium wrought alloys	cannot be hardened		60	22								
		hardenable	hardened	100	23								
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24								
		≤ 12 % Si, hardenable	hardened	90	25								
		> 12 % Si, cannot be hardened		130	26								
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27								
		CuZn, CuSnZn		90	28								
		CuSn, Pb-free copper, electrolytic copper		100	29								
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30								
			hardened	280	31								
		Ni or Co bass	annealed	250	32								
			hardened	350	33								
			cast	320	34								
	Titanium alloys	pure titanium		R_m 400	35								
		α and β alloys	hardened	R_m 1050	36								
H	Hardened steel		hardened and tempered	55 HRC	37	85	110	145	1	70	95	125	1
			hardened and tempered	60 HRC	38	–	–	–	–	–	–	–	–
	Hard cast iron		cast	400	39	115	145	190	1	95	125	165	1
	Hardened cast iron		hardened and tempered	55 HRC	40	–	–	–	–	–	–	–	–
X	Non-metallic materials	Thermoplasts			41								
		Thermosetting plastics			42								
		Plastic, glass-fibre reinforced GFRP			43								
		Plastic, carbon fibre reinforced CFRP			44								
		Graphite			45								
		Wood			46								

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B76.

	Starting values for cutting speed v_c [m/min]								
	PM-4H PM-4HL				VPM-4E VPM-4R				
			Shoulder milling						
			Ø [mm]	$a_{e\,max}$					
			0 < x ≤ 20	0.15 x D	0 < x < 3	0,5x D	0 < x < 3	0.15 x D	
					3 ≤ x < 12	1,5x D	3 ≤ x < 20	0,5 x D	
					12≤x≤20	2,0x D			
	KMG405				KMG406				
	a_e / D				a_e / D				
	1/1	1/2	1/10	f-group	1/1	1/2	1/10		
	–	210	270	6	230	280	350	9	
	–	200	260	6	220	270	340	9	
	–	150	190	6	160	190	250	9	
	–	130	165	6	140	160	210	9	
	–	120	150	6	130	150	200	9	
	–	160	205	6	180	215	270	9	
	–	130	165	6	130	170	220	9	
	–	120	150	6	125	150	190	9	
	–	110	145	6	120	150	190	9	
	–	150	190	6	160	190	250	9	
	–	115	145	6	115	140	190	9	
	–	70	90	6	70	90	110	9	
	–	60	80	6	60	80	100	9	
	–	75	95	6	75	90	120	9	
	–	60	80	6	65	80	100	9	
	–	155	200	6	160	200	260	9	
	–	130	165	6	140	170	220	9	
	–	190	245	6	215	250	330	9	
	–	150	190	6	160	200	250	9	
	–	210	270	6	230	280	360	9	
	–	170	220	6	180	230	290	9	
	–	100	125	1	100	120	150	9	
	–	–	–	–	–	–	–	–	
	–	130	165	1	110	150	180	9	
	–	–	–	–	–	–	–	–	

End mill – QCH series

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

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B76.

	Starting values for cutting speed v_c [m/min]																			
	Q**-HMX-4E Q**-HMX-4R				Q**-HMX-2B Q**-HMX-4B															
			Shoulder milling																	
			Ø [mm]	$a_{e\,max}$																
			0 < x ≤ 20	0.15 x D																
	KMG5515				KMG5515															
	a_e / D				a_e / D															
	1/1	1/2	1/10	f-group	1/1	1/2	1/10	f-group												
	55	100	125	3	–	130	145	7												
	55	95	120	3	–	80	90	7												
	70	125	160	3	–	163	181	7												
	55	100	125	3	–	109	145	7												

Recommended feed rate

Solid carbide milling group 1 – Square shoulder mills PM series, QCH series, EPM series

	a_e / D	Feed rate per cutting edge (f_z) [mm]																			
		Ø0,5	Ø0,8	Ø 1	Ø 2	Ø 3	Ø 4	Ø 5	Ø 6	Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 18	Ø 20					
P	1/1	0,01	0,02	0,02	0,02	0,02	0,02	0,03	0,03	0,05	0,07	0,08	0,08	0,09	0,09	0,10					
	1/2	0,01	0,03	0,03	0,03	0,03	0,03	0,04	0,04	0,06	0,09	0,10	0,10	0,12	0,12	0,13					
	1/10	0,02	0,05	0,05	0,05	0,05	0,05	0,07	0,07	0,09	0,14	0,16	0,16	0,18	0,18	0,20					
M	1/1	0,01	0,02	0,02	0,02	0,02	0,02	0,03	0,03	0,04	0,05	0,06	0,06	0,07	0,07	0,08					
	1/2	0,01	0,02	0,02	0,02	0,02	0,02	0,04	0,04	0,05	0,07	0,08	0,08	0,10	0,10	0,11					
	1/10	0,02	0,04	0,04	0,04	0,04	0,04	0,05	0,05	0,07	0,11	0,13	0,13	0,15	0,15	0,16					
K	1/1	0,01	0,02	0,02	0,02	0,02	0,02	0,03	0,03	0,05	0,07	0,08	0,08	0,09	0,09	0,10					
	1/2	0,01	0,03	0,03	0,03	0,03	0,03	0,04	0,04	0,06	0,09	0,10	0,10	0,12	0,12	0,13					
	1/10	0,02	0,05	0,05	0,05	0,05	0,05	0,07	0,07	0,09	0,14	0,16	0,16	0,18	0,18	0,20					
H	1/1	0,01	0,02	0,02	0,02	0,02	0,02	0,03	0,03	0,04	0,05	0,06	0,06	0,07	0,07	0,08					
	1/2	0,01	0,02	0,02	0,02	0,02	0,02	0,04	0,04	0,05	0,07	0,08	0,08	0,10	0,10	0,11					
	1/10	0,02	0,04	0,04	0,04	0,04	0,04	0,05	0,05	0,07	0,11	0,13	0,13	0,15	0,15	0,16					

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

Solid carbide milling group 9 – Square shoulder mills UM/UMC series, VPM series HSC/HPC

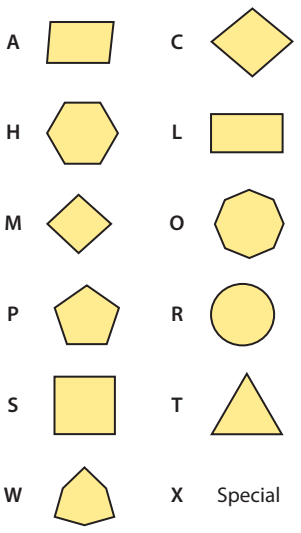
	a_e / D	Feed rate per cutting edge (f_z) [mm]																			
		Ø 4	Ø 5	Ø 6	Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 18	Ø 20										
P	1/1	0,06	0,06	0,06	0,07	0,07	0,07	0,07	0,08	0,08	0,08										
	1/2	0,08	0,08	0,08	0,09	0,09	0,09	0,09	0,10	0,10	0,10										
	1/10	0,14	0,14	0,16	0,18	0,22	0,25	0,27	0,3	0,32	0,36										
M	1/1	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,06	0,06	0,06										
	1/2	0,06	0,06	0,06	0,07	0,07	0,07	0,07	0,08	0,08	0,08										
	1/10	0,10	0,10	0,10	0,12	0,12	0,14	0,16	0,16	0,18	0,18										
K	1/1	0,06	0,06	0,06	0,07	0,07	0,07	0,07	0,08	0,08	0,08										
	1/2	0,08	0,08	0,08	0,09	0,09	0,09	0,09	0,10	0,10	0,10										
	1/10	0,14	0,14	0,16	0,18	0,22	0,25	0,27	0,3	0,32	0,36										
H	1/1	0,045	0,045	0,045	0,053	0,053	0,053	0,053	0,06	0,06	0,06										
	1/2	0,06	0,06	0,06	0,07	0,07	0,07	0,07	0,08	0,08	0,08										
	1/10	0,10	0,10	0,10	0,12	0,12	0,14	0,16	0,16	0,18	0,18										

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

Indexable milling ISO code – inserts

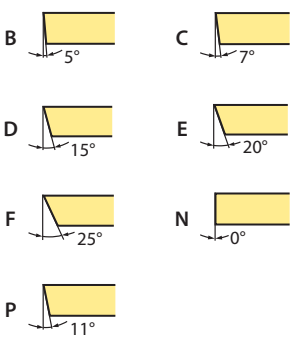
S	P	K	N	12	04	ED	T21K	R	–	DM
1	2	3	4	5	6	7	8	9		10

Insert shape



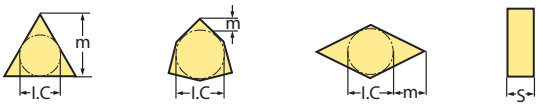
1

Clearance angle



2

Tolerance class

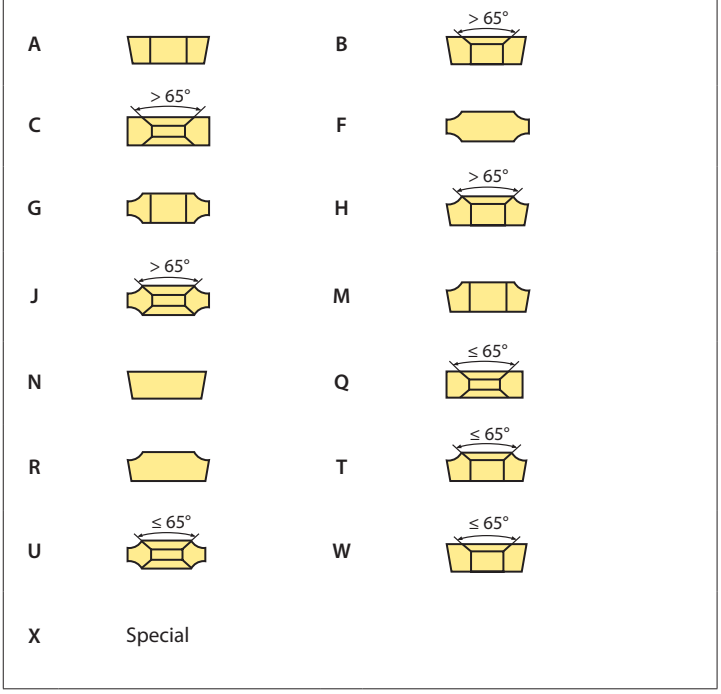


Code	I.C [mm]	m [mm]	S [mm]
A	±0,025	±0,005	±0,025
C	±0,025	±0,013	±0,025
E	±0,025	±0,025	±0,025
F	±0,013	±0,005	±0,025
G	±0,025	±0,025	±0,130
H	±0,013	±0,013	±0,025
J	±0,05–0,13	±0,005	±0,025
K	±0,05–0,13	±0,013	±0,025
L	±0,05–0,13	±0,025	±0,025
M	±0,05–0,13	±0,08–0,18	±0,130
N	±0,05–0,13	±0,08–0,18	±0,025
U	±0,08–0,25	±0,13–0,38	±0,130

3

Fastening features (metric)

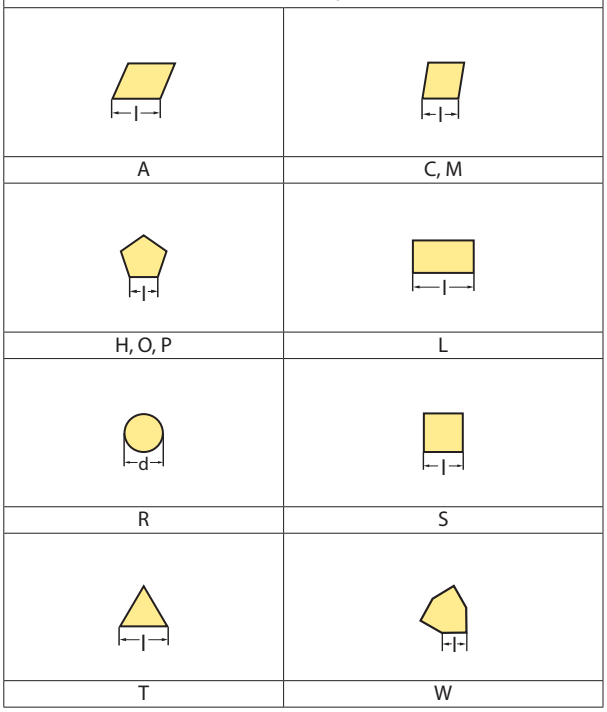
Insert shape



4

Cutting edge length l [mm]

Insert shape



5

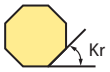
Insert thickness S [mm]



Code	S	Code	S
00	0,79	**05**	5,56
T0	0,99	**T5**	5,95
01	1,59	**06**	6,35
T1	1,98	**T6**	6,75
02	2,38	**07**	7,94
T2	2,58	**09**	9,52
03	3,18	**T9**	9,72
T3	3,97	**11**	11,11
04	4,76	**12**	12,70
T4	4,96		

6

Angle





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

7

Chamfer

Code	Type
F	
E	
T	
S	

Code	Angle
0	5°
1	10°
2	15°
3	20°
4	25°
5	30°

Code	Width [mm]
0	0,10
1	0,15
2	0,20
3	0,25
4	0,30
5	0,35
6	0,40
7	0,45

Code	Position
K	
P	
W	
–	

8

Cutting direction

Code	Description
R	Right
L	Left
N	Right and left

9

Chip breakers

10

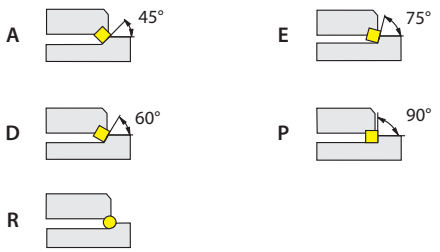
Indexable milling System code – milling bodies

FM	A	12	050	–	A22	O	–	N	06	–	04	(L)	(C)
1	2	3	4		5	6		7	8		9	10	11

Type	
Code	Description
BM	Profile milling
CM	Chamfer milling
EM	Square shoulder milling
FM	Face milling
HM	Helical milling
SM	Slot milling
TM	T-slot milling
XM	Special

1

Entering angle



2

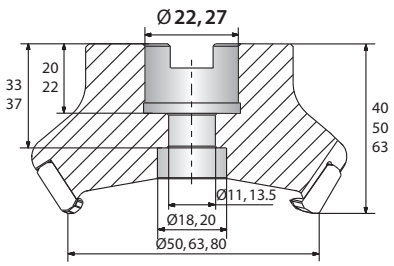
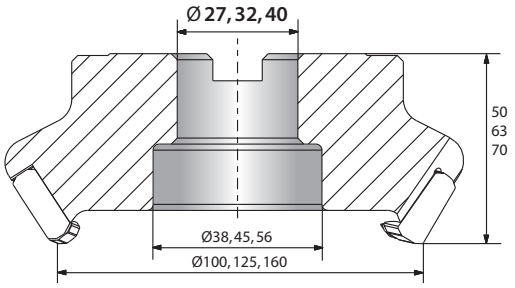
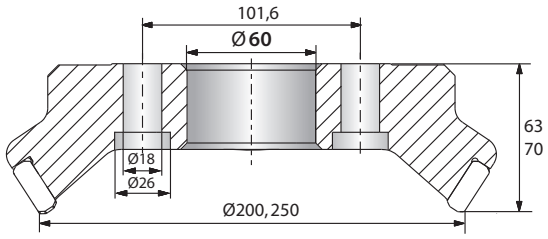
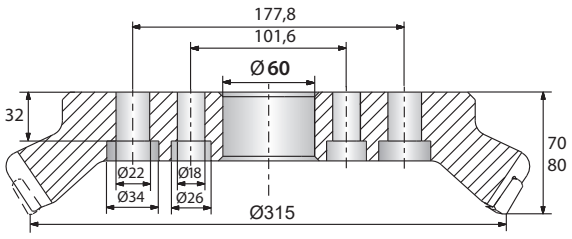
Serial number

3

Nominal diameter [mm]	
Code	Description
025	25
050	50
160	160
315	315
...	

4

Type and size of tool holders

Code	Type	Code	Type
A	Nominal diameter Ø50 – 80 mm 	**B**	Nominal diameter Ø100 – 160 mm 
C	Nominal diameter Ø200 – 250 mm 	**D**	Nominal diameter Ø315 mm 
G	Straight shank	**XP**	Weldon shank
K	Bore with keyway		

5

With respect to mounting please adhere to the information provided by the tool holder manufacturer.

Insert shape			
A		C	
H		L	
M		O	
P		R	
S		T	
W		X	Special
Z	Special		

6

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

7

Cutting edge length l [mm]	
Insert shape	
	
A	C, M
	
H, O, P	L
	
R	S
	
T	W

8

Number of teeth

9

Cutting direction	
Code	Description
L	Left

10

With inner cooling

11

Tools with B coupling and inner coolant supply require the following spare parts:



Coolant clamp screw



Coolant shower plate



Spare parts (B coupling with inner coolant supply)

		B27	B32	B40	B40
	Ø	**80**	**100**	**125**	**160**
	**Coolant clamp screw**	LDB27C	LDB32C	LDB40C	LDB40C
	**Coolant shower plate**	B27-002-CP	B32-002-CP	B40-002-CP	B40-003-CP

When purchasing tools with inner coolant supply and B coupling these spare parts are included in delivery.

YBG205H grade

Optimal for high-temperature applications

YOUR BENEFITS

– Ultra-modern TiAlSiN PVD coating with optimal stability for a long tool life
– Well suited for machining steel, stainless steel, aluminium and hardened steel up to HRC 58.
– Thin layer structure for optimally defined and prepared cutting edges
– Ideal for dry machining operations

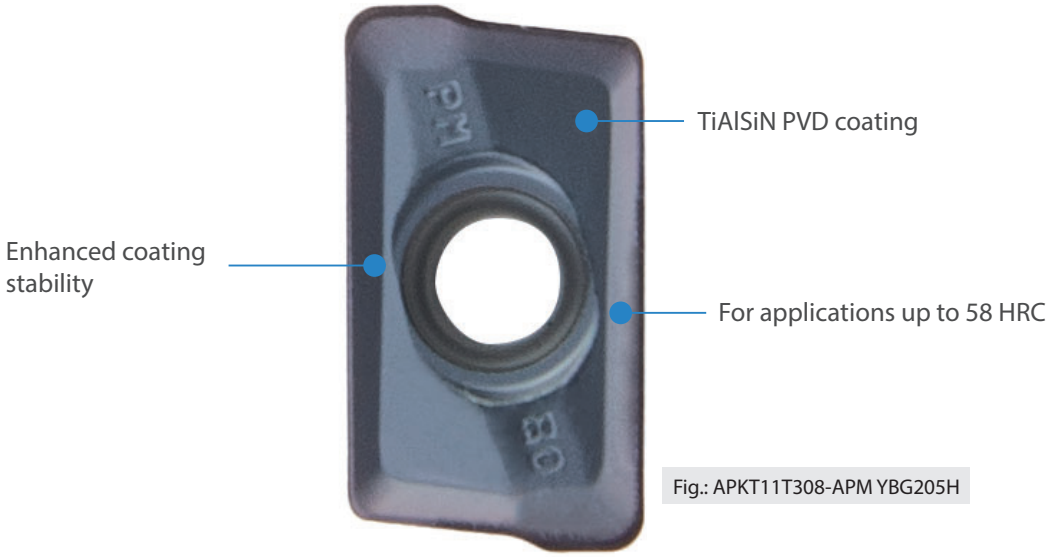


Fig.: APKT11T308-APM YBG205H

The following articles are currently available with the new YBG205H grade:

Article	Stock
APKT0702-XR YBG205H	●
APKT11T308-APM YBG205H	●
APKT160408-APM YBG205H	●
LNKT080408PNR-GM YBG205H	●
LNKT120608PNR-GM YBG205H	●
ONHU09T508ANN-GM YBG205H	●
RDKT1204MO-MM YBG205H	●
RDKW1003MO-1 YBG205H	●
RDKW12T3MO-1 YBG205H	●
RDMT10T3MO-MM YBG205H	●
RDMT10T3MO-M YBG205H	●
RDMT1204MO-MM YBG205H	●
RDMT1204MO-M YBG205H	●
RDMW10T3MO-H YBG205H	●
RDMW1204MO-H YBG205H	●
SDMT06T208-PM YBG205H	●
SDMT09T312-DM YBG205H	●

● Ex stock ○ On demand

Article	Stock
SDMT09T312-PM YBG205H	●
SDMT120412-DM YBG205H	●
SDMT120412-NM YBG205H	○
SDMT120412-PM YBG205H	●
SEET120308PER-APR YBG205H	●
SEET12T3-DF YBG205H	●
SEET12T3-DM YBG205H	●
SNEG1205ANR-GM YBG205H	●
SNEG1506ANR-GM YBG205H	●
SNGX1205ANN-GH YBG205H	●
SNGX1205ANN-GL YBG205H	●
SNGX1205ANN-GM YBG205H	●
SNGX1205PNN-GH YBG205H	●
SNGX1205PNN-GL YBG205H	●
SNGX1205PNN-GM YBG205H	●
SNMX120512-GH YBG205H	●
SNMX120512-GM YBG205H	●

● Ex stock ○ On demand

Notes

FMP06 face milling system

High-performance hard machining with 88° approach angle

YOUR BENEFITS

– Milling system for high-performance values
– Milling system for solid carbide and ceramic inserts
– Inserts with S geometry for high feed rates and machining capacities
– Safe and easy to use thanks to screw and wedge clamping
– Eight-edged inserts for efficient machining operations

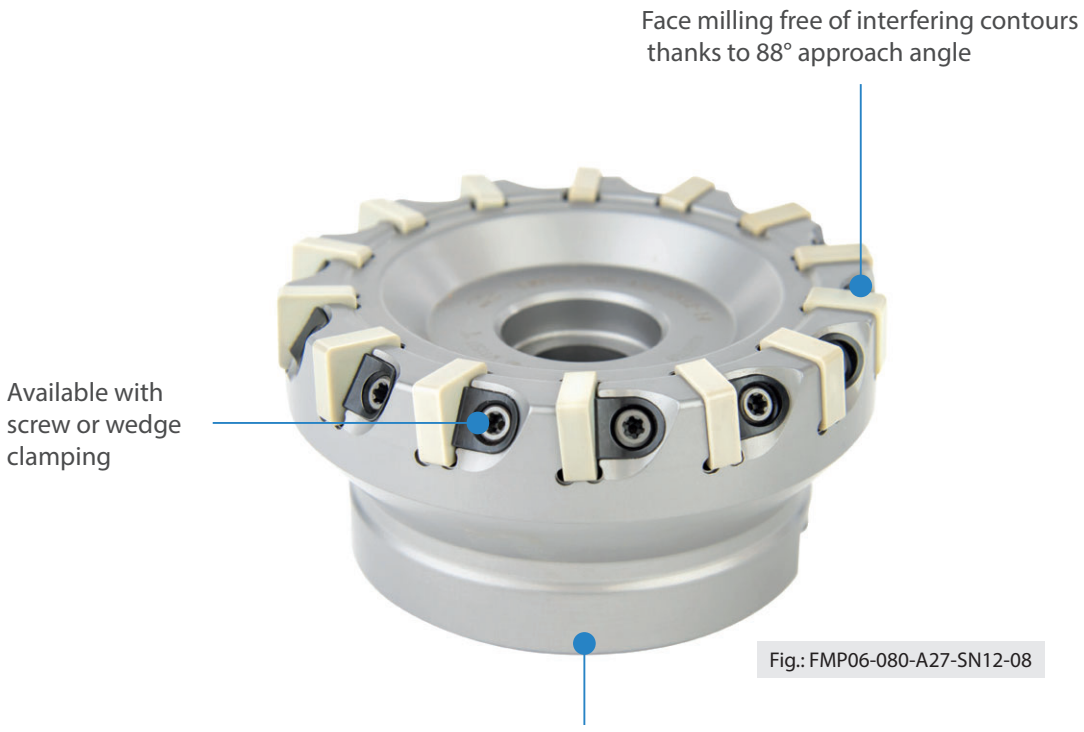


Fig.: FMP06-080-A27-SN12-08

Insert grades

YBM253	YBG102	YBD152	YBD252	CN1000	CM1000
PVD *P20–P40* *M15–M35*	*PVD* *S05–S15*	*CVD* *K15–K35*	*CVD* *K20–K35*	*Si_3N_4 ceramic* –	*Mixed ceramic* –

Chip breaker

SNCU-CF	SNCU-CM	SNCU-W	SNGA	SNGN
				
Finishing	General machining	Finishing	Medium machining	Medium machining

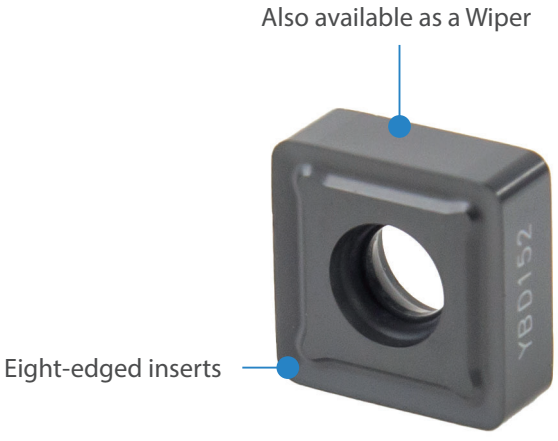


Fig.: SNCU120412-CF YBD152

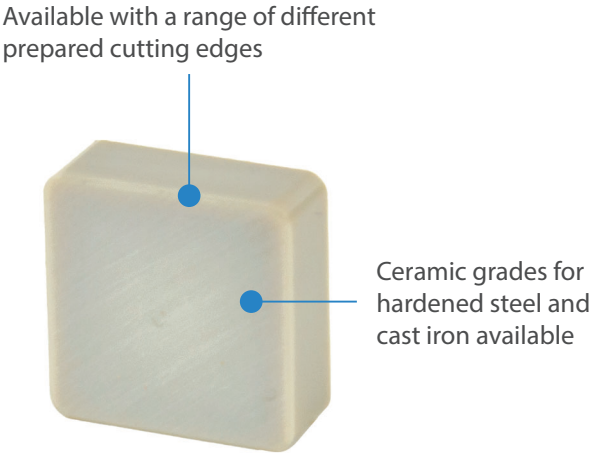
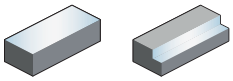


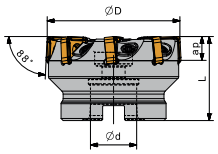
Fig.: SNGA120408T02020 CM1000

Face milling

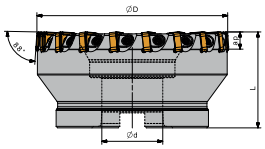
FMP06 Kr: 88°



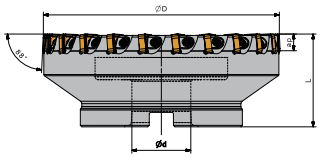




A



B



C

Article	✻	Stock	Dimensions [mm]					Teeth	Coupling	kg	Inserts
			ØD	$ØD_1$	ød	L	$a_{p\,max}$				
FMP06-050-A22-SN12-04		●	50	51.3	22	40	9.8	4	A	0.46	
FMP06-063-A22-SN12-06		○	63	64.3	22	40	9.8	6	A	0.55	
FMP06-063-A22-SN12-08		●	63	64.3	22	50	9.8	8	A	0.5	
FMP06-080-A27-SN12-08		○	80	81.3	27	40	9.8	8	A	1.1	
FMP06-100-A32-SN12-10		○	100	101.3	32	50	9.8	10	A	1.4	
FMP06-080-A27-SN12-11		●	80	81.3	27	50	9.8	11	A	1.2	
FMP06-100-A32-SN12-14		●	100	101.3	32	50	9.8	14	A	1.8	
FMP06-125-B40-SN12-12		○	125	126.3	40	63	9.8	12	B	3.2	SN**1204
FMP06-125-B40-SN12-18		●	125	126.3	40	63	9.8	18	B	3.5	
FMP06-160-C40-SN12-14		○	160	161.3	40	63	9.8	14	C	4	
FMP06-200-C60-SN12-16		○	200	201.2	60	63	9.8	16	C	6.5	
FMP06-250-C60-SN12-18		○	250	251.2	60	63	9.8	18	C	11.5	
FMP06-160-C40-SN12-22		●	160	161.3	40	63	9.8	22	C	4.7	
FMP06-200-C60-SN12-28		○	200	201.2	60	63	9.8	28	C	6.6	
FMP06-250-C60-SN12-36		○	250	251.2	60	63	9.8	36	C	13	

● Ex stock ○ On demand

✻ With internal cooling

Spare parts

	Insert	**SN**1204**	**SN**1204**
	ØD	**50-250**	**63-250**
	Screw (insert)	l60M4×10 (3.4 Nm)	
	Screw (wedge)		DM6×20A (7.0 Nm)
	Wedge		W18N
	Wrench (insert)	WT15IT	WT15IT



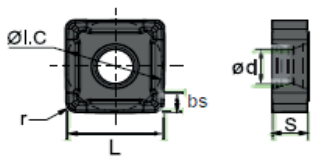
SNCU	L	I.C	S	d
12 04	12,7	12,7	4,76	4,68

SNGA	L	I.C	S	d
12 04	12,7	12,7	4,76	5,16

SNGN	L	I.C	S	d
12 04	12,7	12,7	4,76	–

Ideal machining conditions
Normal machining conditions
Unfavourable machining conditions

Milling inserts



SN** negative insert				HC¹ (CVD)				HC¹ (PVD)		CN	CM
			P								
			M								
			K								
			N								
			S								
			H								
	ISO	r	bs	YBC302	YBM253	YBD152	YBD252	YBG102		CN1000	CM1000
	**SNCU1204-W**	–	4		○	○		○			
	**SNCU120412-CF**	1,2	1,5	○		○	○				
	**SNCU120412-CM**	1,2	1,5	○		○	○				
	**SNGA120404T02020**	0,4	–							○	
	SNGA120408S02020	0,8	–								○
	SNGA120408T02020	0,8	–							○	○
	SNGA120412T02020	1,2	–							○	
	**SNGN120408S02020**	0,8	–								○
	SNGN120408T00520	0,8	–							○	
	SNGN120408T02020	0,8	–							●	
	SNGN120412T02020	1,2	–							○	
	SNGN120416T02020	1,6	–							○	

● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

FMA17 face milling system

Versatile milling system for efficient facing operations

YOUR BENEFITS

– The 45° milling system with negative inserts ensures a stable cutting edge
– Available for a wide range of finishing and roughing applications
– The newly developed chip breakers feature a positive insert geometry and generate lower cutting forces
– The **SNMX120512-**** insert can be used in combination with the **FMA17** and **FMP17** systems
– Highly economical thanks to eight-edged inserts

Precision insert seat enables high surface qualities

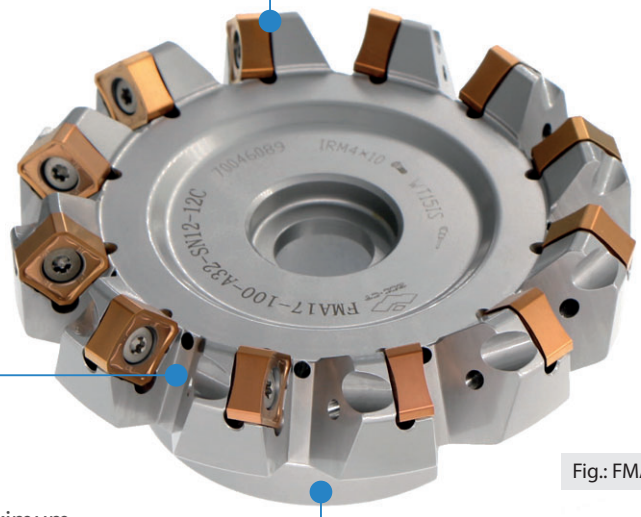


Fig.: FMA17-100-A32-SN12-12C

Fine pitch for maximum productivity

Diameter range 50–400 mm

Note: The FMA17 milling system can be used in combination with SNGX1205**ANN** and SNMX120512 inserts.

Insert grades

YBM253	YBG205H	YBD252	YBS303
CVD	*PVD*	*CVD*	*PVD*
P20 – P40	*P10 – P30*	*K20 – K35*	*S25 – S35*
M15 – M35	*M20 – M40*		

Chip breaker

SN*X-GL	SN*X-GM	SN*X-GH
		
Finishing	General machining	Roughing

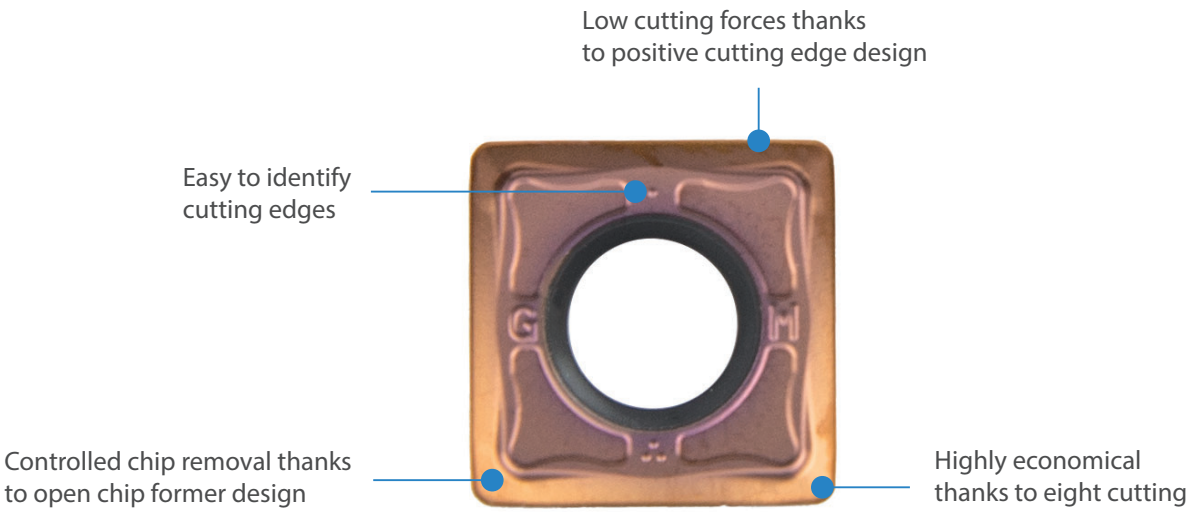
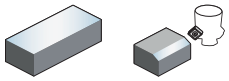


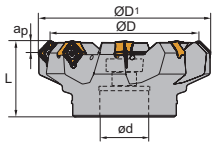
Fig.: SNGX1205**ANN**-GM YB9320

Face milling

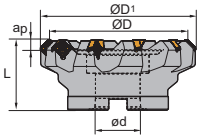
FMA17 Kr: 45°



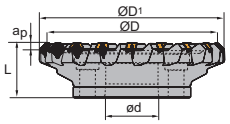




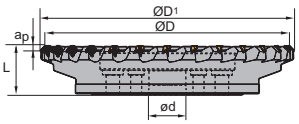
A



B



C



D

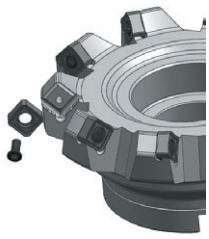
Article	✻	Stock R	Stock L	Dimensions [mm] ØD	ØD1	ød	L	ap max	Teeth	Coupling	kg	Inserts
FMA17-050-A22-SN12-04C	✻	○	○	50	65	22	40	6.5	4	A	0.384	SNGX1205
FMA17-050-A22-SN12-06C	✻	●		50	65	22	40	6.5	6	A	0.381	
FMA17-063-A22-SN12-06C	✻	●	○	63	78	22	50	6.5	6	A	0.717	
FMA17-080-A27-SN12-07C	✻	●	○	80	95	27	63	6.5	7	A	1.085	
FMA17-100-A32-SN12-08			○	100	115	32	63	6.5	8	A	1.558	
FMA17-063-A22-SN12-08C	✻	●		63	78	22	50	6.5	8	A	0.717	
FMA17-100-A32-SN12-08C	✻	●		100	115	32	63	6.5	8	A	1.558	
FMA17-080-A27-SN12-10C	✻	●		80	95	27	63	6.5	10	A	1.105	
FMA17-100-A32-SN12-12C	✻	●		100	115	32	63	6.5	12	A	1.656	
FMA17-125-B40-SN12-10		●	○	125	140	40	63	6.5	10	B	3.012	
FMA17-125-B40-SN12-16		●		125	140	40	63	6.5	16	B	3.103	
FMA17-160-C40-SN12-12		●	○	160	175	40	63	6.5	12	C	4.358	
FMA17-200-C60-SN12-18		●		200	215	60	63	6.5	18	C	6.337	
FMA17-160-C40-SN12-20		○		160	175	40	63	6.5	20	C	4.6	
FMA17-250-C60-SN12-20		●		250	265	60	63	6.5	20	C	12.36	
FMA17-200-C60-SN12-24		○		200	215	60	63	6.5	24	C	6.569	
FMA17-315-D60-SN12-22		○		315	330	60	80	6.5	22	D	21.224	
FMA17-400-D60-SN12-28		○		400	415	60	80	6.5	28	D	39.535	

● Ex stock ○ On demand

✻ With internal cooling

Spare parts

	Insert	SNGX1205	SNGX1205	SNGX1205
	ØD	50-78	80-180	200-400
	Screw (insert)	IRM4×10 (3.4 Nm)	IRM4×10 (3.4 Nm)	IRM4×10 (3.4 Nm)
	Wrench (insert)	WT15IP		
	Wrench (insert)		WT15IS	
	Wrench (insert)			WT15IT

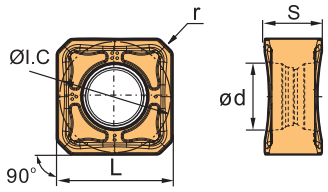


- Ideal machining conditions
- Normal machining conditions
- Unfavourable machining conditions

SN**	L	I.C	S	d
12 05	12,7	12,7	6,5	5,9

Milling inserts

SN** negative insert



	ISO	r	HC¹ (CVD) YBD252	HC¹ (PVD) YBG205H	HC¹ (PVD) YBS303	HT	HC²	HW
P			◉	◉				
M				◉	◉			
K			◉					
N								
S					◉			
H				○				
	**SNGX1205ANN-GH**	–	●	●				
	**SNGX1205ANN-GL**	–	●	●				
	**SNGX1205ANN-GM**	–	●	●	●			
	**SNMX120512-GH**	1,2	●	●				
	**SNMX120512-GM**	1,2	●	●				

● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

FMP17 face/square shoulder milling system

Highly efficient universal tool for machining end faces and contours

YOUR BENEFITS

– The 88° milling system with negative inserts ensures a stable cutting edge
– Available for a wide range of finishing and roughing applications
– The newly developed chip breakers feature a positive insert geometry and generate lower cutting forces
– The **SNMX120512-**** insert can be used in combination with the **FMA17** and **FMP17** systems
– Highly economical thanks to eight-edged inserts

Precision insert seat enables high surface qualities

New insert design provides for increased resistance to breaking and greater process reliability

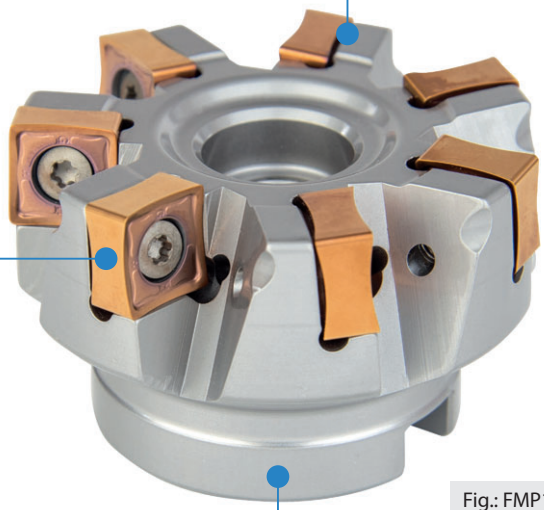


Fig.: FMP17-080-A27-SN12-07C

Diameter range: 50–400 mm

Note: The FMP17 milling system can be used in combination with SNGX1205**PNN** and SNMX120512 inserts.

Insert grades

YBM253	YBG205H	YBD252	YBS303
CVD *P20 – P40* *M15 – M35*	*PVD* *P10 – P30* *M20 – M40*	*CVD* *K20 – K35*	*PVD* *S25 – S35*

Chip breaker

SN*X-GL	SN*X-GM	SN*X-GH
		
Finishing	General machining	Roughing

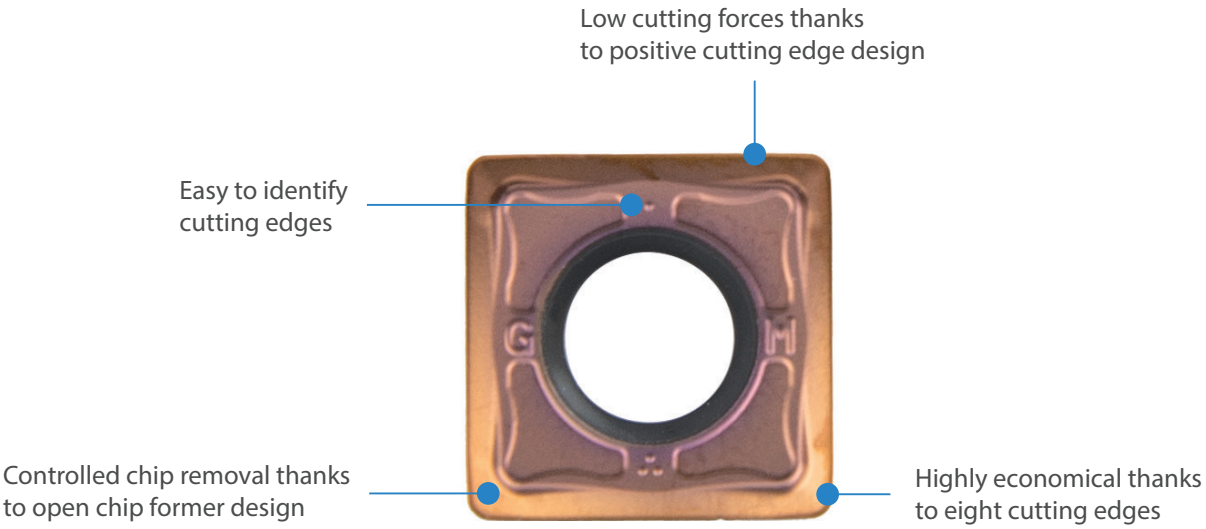
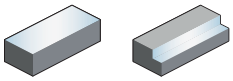


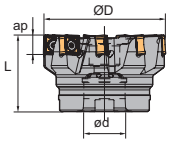
Fig.: SNGX1205**PNN**-GM YB9320

Face milling

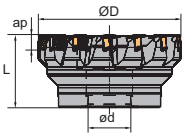
FMP17 Kr: 88°



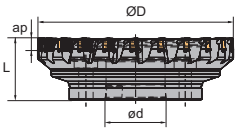




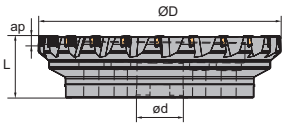
A



B



C



D

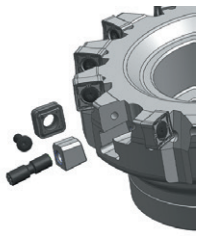
Article	✲	Stock R	Stock L	Dimensions [mm] ØD	Dimensions [mm] ød	Dimensions [mm] L	Dimensions [mm] $a_{p\ max}$	Teeth	Coupling	kg	Inserts
FMP17-050-A22-SN12-04C	✲	○	○	50	22	40	10.5	4	A	0.296	SNGX1205
FMP17-050-A22-SN12-05C	✲	●		50	22	40	10.5	5	A	0.288	
FMP17-063-A22-SN12-05C	✲	●	○	63	22	50	10.5	5	A	0.462	
FMP17-063-A22-SN12-07C	✲	●		63	22	50	10.5	7	A	0.466	
FMP17-080-A27-SN12-07C	✲	●	○	80	27	63	10.5	7	A	1	
FMP17-100-A32-SN12-08			○	100	32	63	10.5	8	A	1.577	
FMP17-100-A32-SN12-08C	✲	●		100	32	63	10.5	8	A	1.577	
FMP17-080-A27-SN12-09C	✲	●		80	27	63	10.5	9	A	1.02	
FMP17-100-A32-SN12-11C	✲	●		100	32	63	10.5	11	A	1.592	
FMP17-125-B40-SN12-10		●	○	125	40	63	10.5	10	B	3.043	
FMP17-125-B40-SN12-14		●		125	40	63	10.5	14	B	3.033	
FMP17-160-C40-SN12-12		●	○	160	40	63	10.5	12	C	4.344	
FMP17-200-C60-SN12-14		●		200	60	63	10.5	14	C	6.552	
FMP17-160-C40-SN12-18		○		160	40	63	10.5	18	C	4.431	
FMP17-250-C60-SN12-18		○		250	60	63	10.5	18	C	13.025	
FMP17-200-C60-SN12-22		○		200	60	63	10.5	22	C	6.711	
FMP17-315-D60-SN12-22		○		315	60	80	10.5	22	D	21.935	
FMP17-400-D60-SN12-28		○		400	60	80	10.5	28	D	41.661	

● Ex stock ○ On demand

✲ With internal cooling

Spare parts

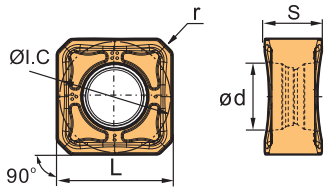
	Insert	SNGX1205	SNGX1205	SNGX1205
	ØD	50-63	80-180	200-400
	Screw (insert)	IRM4×10 (3.4 Nm)	IRM4×10 (3.4 Nm)	IRM4×10 (3.4 Nm)
	Wrench (insert)	WT15IP		
	Wrench (insert)		WT15IS	
	Wrench (insert)			WT15IT



- Ideal machining conditions
- Normal machining conditions
- Unfavourable machining conditions

SN**	L	I.C	S	d
12 05	12,7	12,7	6,5	5,9

Milling inserts



SN** negative insert		HC¹ (CVD)	HC¹ (PVD)	HT	HC²	HW
P						
M						
K						
N						
S						
H						
ISO	r	YBD252	YBG205H YBS303			
	SNGX1205PNN-GH	–	●	●			
	SNGX1205PNN-GL	–	●	●			
	SNGX1205PNN-GM	–	●	● ●			
	SNMX120512-GH	1,2	●	●			
	SNMX120512-GM	1,2	●	●			

● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

FMR04 round insert milling cutter

Maximum cutting performance

Now with new inserts and chip breakers New

YOUR BENEFITS

– Heavy-duty round insert mill for a wide range of applications
– Well suited for die and mould making
– Round insert for high feed rates and machining capacities
– Optimal chip removal because chip pocket free of interfering contours
– Safe and easy to use thanks to screw clamping

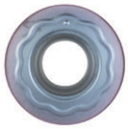
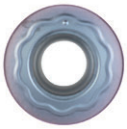
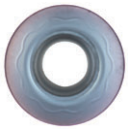


Fig.: FMR04-063-A22-RD12-04

Insert grades

YBG205H New	YB9320	YBD252	YBS303
PVD *P10 – P30* *M20 – M40*	*PVD* *P10 – P30* *M10 – M25*	*CVD* *K20 – K35*	*PVD* *S25 – S35*

Chip breaker

RDKW	RDMT-M New	RDMT-MM New	RDMW-H New
			
General machining	General machining	Soft cutting geometry	Roughing

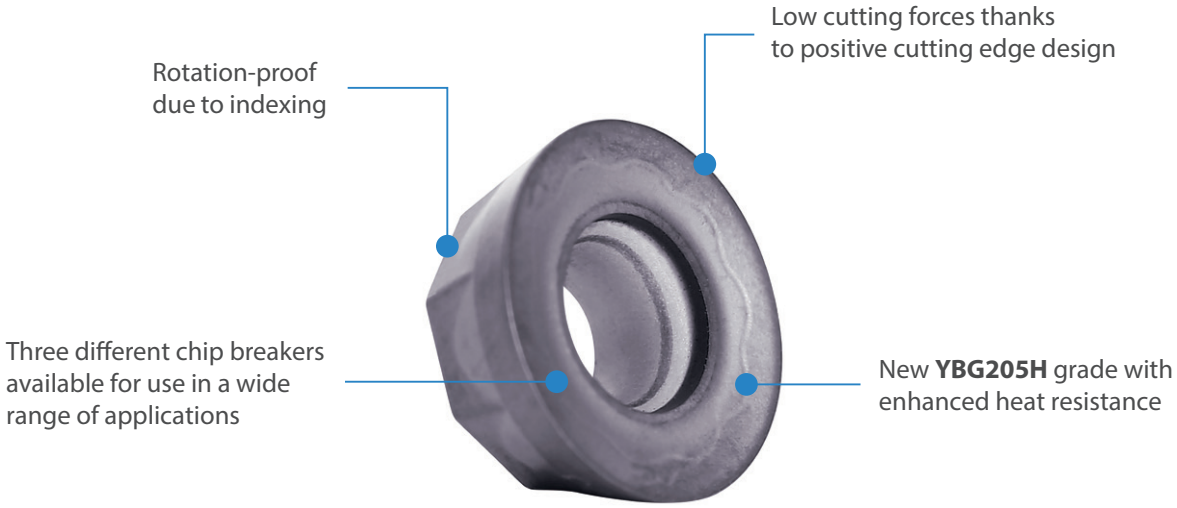
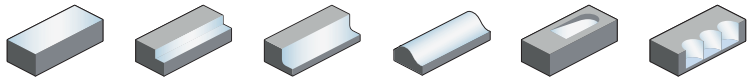


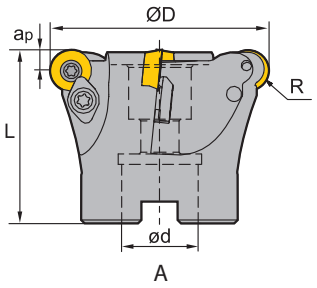
Fig.: RDMT1204-MO-M YBG205H

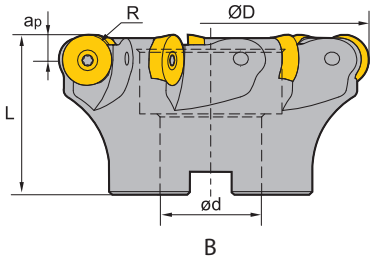
Face milling

FMR04









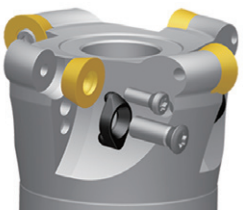
Article	✻	Stock	Dimensions [mm]					Teeth	Coupling	kg	Inserts
			R	ØD	ød	L	$a_{p\ max}$				
FMR04-050-A22-RD12-03		●	6	50	22	40	6	3	A	0.3	RDKW1204
FMR04-063-A22-RD12-04		●	6	63	22	50	6	4	A	0.5	
FMR04-080-B27-RD16-05		●	8	80	27	50	8	5	B	1.2	RDKW1605
FMR04-100-B32-RD16-06		●	8	100	32	50	8	6	B	1	
FMR04-125-B40-RD20-06		○	10	125	40	63	10	6	B	1.9	RDKW2006
FMR04-125-B40-RD20-06C	✻	○	10	125	40	63	10	6	B	1.9	
FMR04-160-B40-RD20-07		○	10	160	40	63	10	7	B	3.7	

● Ex stock ○ On demand

✻ With internal cooling

Spare parts

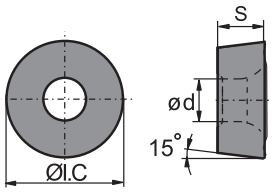
	Insert	**RDKW1204**	**RDKW1605**	**RDKW2006**
	ØD	**50-63**	**80-100**	**125 -160**
	Clamp	WD-204	WD-207	
	Screw (clamp)	I60M4*10 (3.4 Nm)	I60M5*13 (6.7 Nm)	
	Screw (insert)	I60M3.5*10 (2.7 Nm)	I60M5*13 (6.7 Nm)	I43M6*16 (9.1 Nm)
	Wrench (clamp)	WT15IP		
	Wrench (clamp)		WT20IT	
	Wrench (insert)	WT15IP		
	Wrench (insert)		WT20IT	WT25IT



Milling inserts

Ideal machining conditions
Normal machining conditions
Unfavourable machining conditions

RDMW	I.C	S	d
10 T3	10,00	3,97	4,10
12 04	12,00	4,76	4,40

RD** milling insert		HC¹ (CVD)	HC¹ (PVD)	HT	HC²	HW
	P		⊛ ⊛			
	M					
	K	⊛				
	N					
	S					
	H		○			
ISO		YBD252	YBG205H YB9320			
	RDMW10T3MO-H	●	● ○			
	RDMW1204MO-H	●	● ○			

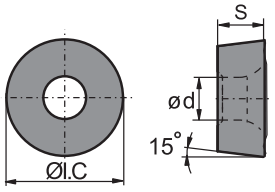
● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

Milling inserts

Ideal machining conditions
Normal machining conditions
Unfavourable machining conditions

RDMT	I.C	S	d
10 T3	10,00	3,97	4,10
12 04	12,00	4,76	4,40

RD** milling insert		HC¹ (CVD)	HC¹ (PVD)	HT	HC²	HW
	P		⊛ ⊛			
	M		⊛ ⊛			
	K	⊛				
	N					
	S		⊛ ⊛ ⊛			
	H		○			
ISO		YBD252	YBG205H YB9320 YBS303			
	RDMT10T3MO-M	●	● ○ ●			
	RDMT1204MO-M	●	● ○ ●			
	RDMT10T3MO-MM		● ○ ●			
	RDMT1204MO-MM		● ○ ●			

● Ex stock ○ On demand

HC¹ Coated carbide
HT Uncoated cermet
HC² Coated cermet
HW Uncoated carbide

Indexable milling – group 1 (FMA07/11/12/17, FMP12/17, FMD02, EMP09/13)

Material group		Composition / structure / heat treatment			Machining group	Starting values for cutting speed v_c [m/min]							
						HC (CVD)							
						YBC302		YBC401		YBD152		YBD252	
						a_e / D		a_e / D		a_e / D		a_e / D	
						1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	260	300	225	260				
		approx. 0,45 % C	annealed	190	2	225	255	195	225				
		approx. 0,45 % C	tempered	250	3	210	240	180	210				
		approx. 0,75 % C	annealed	270	4	185	210	160	185				
		approx. 0,75 % C	tempered	300	5	170	195	150	170				
	Low-alloyed steel		annealed	180	6	225	255	195	225				
			tempered	275	7	185	210	160	185				
			tempered	300	8	170	195	150	170				
			tempered	350	9	145	165	125	145				
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	130	150	115	130				
			hardened and tempered	325	11	95	105	80	95				
M	Stainless steel	ferritic/martensitic	annealed	200	12								
		martensitic	tempered	240	13								
		austenitic	quench hardened	180	14								
		austenitic-ferritic		230	15								
K	Grey cast iron	perlitic/ferritic		180	16					370	430	320	370
		perlitic (martensitic)		260	17					220	255	190	220
	Cast iron with spheroidal graphite	ferritic		160	18					255	295	220	255
		perlitic		250	19					170	200	145	170
	Malleable cast iron	ferritic		130	20					305	355	265	305
		perlitic		230	21					205	240	175	205
N	Aluminium wrought alloys	cannot be hardened		60	22								
		hardenable	hardened	100	23								
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24								
		≤ 12 % Si, hardenable	hardened	90	25								
		> 12 % Si, cannot be hardened		130	26								
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27								
		CuZn, CuSnZn		90	28								
		CuSn, Pb-free copper, electrolytic copper		100	29								
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30								
			hardened	280	31								
		Ni or Co bass	annealed	250	32								
			hardened	350	33								
			cast	320	34								
	Titanium alloys	pure titanium		R_m 400	35								
		α and β alloys	hardened	R_m 1050	36								
H	Hardened steel		hardened and tempered	55 HRC	37								
			hardened and tempered	60 HRC	38								
	Hard cast iron		cast	400	39								
	Hardened cast iron		hardened and tempered	55 HRC	40								
X	Non-metallic materials	Thermoplasts			41								
		Thermosetting plastics			42								
		Plastic, glass-fibre reinforced GFRP			43								
		Plastic, carbon fibre reinforced CFRP			44								
		Graphite			45								
		Wood			46								

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B38–B43.

Starting values for cutting speed v_c [m/min]																					
HC (CVD)		HC (PVD)														HW					
YBM253		YBG102		YB9320		YBG205		YBG205H		YBG252		YBG302		YBS303		YD101		YD201			
a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D			
1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	
260	300	270	315	245	285	235	275	235	275	230	265	225	260								
225	255	230	270	210	245	200	235	200	235	200	230	195	225								
210	240	220	255	200	230	190	220	190	220	185	215	180	210								
185	210	190	225	175	200	165	195	165	195	165	190	160	185								
170	195	180	205	160	190	155	180	155	180	150	175	150	170								
225	255	230	270	210	245	200	235	200	235	200	230	195	225								
185	210	190	225	175	200	165	195	165	195	165	190	160	185								
170	195	180	205	160	190	155	180	155	180	150	175	150	170								
145	165	150	175	135	160	130	155	130	155	130	150	125	145								
130	150	135	160	125	145	120	140	120	140	115	135	115	130								
95	105	95	115	90	100	85	100	85	100	85	95	80	95								
130	150	135	160	125	145	120	140			115	135	115	130	140	185						
110	130	115	135	105	120	100	120			100	115	95	110	120	155						
140	160	145	170	130	155	125	150			125	145	120	140	150	195						
110	130	115	135	105	120	100	120			100	115	95	110	120	155						
		300	345	270	315	260	300	270	315	255	295	250	290								
		180	205	160	190	155	180	160	190	150	175	150	170								
		205	240	185	215	180	210	185	215	175	200	170	195								
		135	160	125	145	120	140	125	145	115	135	115	130								
		245	285	225	260	215	250	225	260	210	240	205	235								
		165	190	150	175	145	165	150	175	140	160	135	160								
																1505	1735	1450	1670		
																1225	1420	1180	1370		
																540	620	515	600		
																435	505	420	485		
																220	255	215	250		
																170	195	160	190		
																210	245	205	235		
																385	445	370	430		
								90	150												
								80	120												
								90	120												

HC Coated carbide
HT Uncoated carbide, primary component (TiC) or (TiN), cermet
HW Uncoated carbide, primary component (WC)
BL Cubic boron nitride with low BN content
BH Cubic boron nitride with high BN content
CN Si3N4 ceramic
CM Mixed ceramic
HC_1 Coated cermet
BC CBN with coating
CC Coated cutting ceramic
CR Cutting ceramic, primary component aluminium oxide (Al_2O_3), reinforced
DP Polycrystalline diamond

Indexable milling – group 3 (FMR01/02/03/04)

Material group		Composition / structure / heat treatment			Machining group	Starting values for cutting speed v_c [m/min] HC (PVD) YBG205H a_e / D			YBG212 a_e / D		
						1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	235	275		240	280	365
		approx. 0,45 % C	annealed	190	2	200	235		205	240	315
		approx. 0,45 % C	tempered	250	3	190	220		195	225	295
		approx. 0,75 % C	annealed	270	4	165	195		170	200	260
		approx. 0,75 % C	tempered	300	5	155	180		160	185	245
	Low-alloyed steel		annealed	180	6	200	235		205	240	315
			tempered	275	7	165	195		170	200	260
			tempered	300	8	155	180		160	185	245
			tempered	350	9	130	155		135	155	205
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	120	140		120	140	185
			hardened and tempered	325	11	85	100		85	100	130
M	Stainless steel	ferritic/martensitic	annealed	200	12				120	140	185
		martensitic	tempered	240	13				105	120	155
		austenitic	quench hardened	180	14				130	150	195
		austenitic-ferritic		230	15				105	120	155
K	Grey cast iron	perlitic/ferritic		180	16	270	315		265	305	400
		perlitic (martensitic)		260	17	160	190		160	185	245
	Cast iron with spheroidal graphite	ferritic		160	18	185	215		180	210	275
		perlitic		250	19	125	145		120	140	185
	Malleable cast iron	ferritic		130	20	225	260		220	255	335
		perlitic		230	21	150	175		145	170	225
N	Aluminium wrought alloys	cannot be hardened		60	22						
		hardenable	hardened	100	23						
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24						
		≤ 12 % Si, hardenable	hardened	90	25						
		> 12 % Si, cannot be hardened		130	26						
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27						
		CuZn, CuSnZn		90	28						
		CuSn, Pb-free copper, electrolytic copper		100	29						
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30						
			hardened	280	31						
		Ni or Co bass	annealed	250	32						
			hardened	350	33						
			cast	320	34						
	Titanium alloys	pure titanium		R_m 400	35						
		α and β alloys	hardened	R_m 1050	36						
H	Hardened steel		hardened and tempered	55 HRC	37	90	150				
			hardened and tempered	60 HRC	38	80	120				
	Hard cast iron		cast	400	39						
	Hardened cast iron		hardened and tempered	55 HRC	40	90	120				
X	Non-metallic materials	Thermoplasts			41						
		Thermosetting plastics			42						
		Plastic, glass-fibre reinforced GFRP			43						
		Plastic, carbon fibre reinforced CFRP			44						
		Graphite			45						
		Wood			46						

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B38–B43.

Starting values for cutting speed v_c [m/min]														
HC (PVD)										HW				
YBG252			YBG302			YBS303				YD101		YD201		
a_e / D			a_e / D			a_e / D				a_e / D		a_e / D		
1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20		1/1 | 3/4	1/5	1/1 | 3/4	1/5	
230	265	345	225	260	340									
200	230	300	195	225	295									
185	215	280	180	210	275									
165	190	250	160	185	245									
150	175	230	150	170	225									
200	230	300	195	225	295									
165	190	250	160	185	245									
150	175	230	150	170	225									
130	150	195	125	145	190									
115	135	180	115	130	170									
85	95	125	80	95	125									
115	135	175	115	130	170	140	185							
100	115	145	95	110	145	120	155							
125	145	185	120	140	185	150	195							
100	115	145	95	110	145	120	155							
255	295	385	250	290	380									
150	175	230	150	170	225									
175	200	260	170	195	255									
115	135	180	115	130	170									
210	240	315	205	235	310									
140	160	210	135	160	210									
										1505	1735	1450	1670	
										1225	1420	1180	1370	
										540	620	515	600	
										435	505	420	485	
										220	255	215	250	
										170	195	160	190	
										210	245	205	235	
										385	445	370	430	

HC	Coated carbide
HT	Uncoated carbide, primary component (TiC) or (TiN), cermet
HW	Uncoated carbide, primary component (WC)
BL	Cubic boron nitride with low BN content
BH	Cubic boron nitride with high BN content
CN	Si3N4 ceramic
CM	Mixed ceramic
HC_1	Coated cermet
BC	CBN with coating
CC	Coated cutting ceramic
CR	Cutting ceramic, primary component aluminium oxide (Al_2O_3), reinforced
DP	Polycrystalline diamond

Indexable milling – group 8 (FMP06)

Material group		Composition / structure / heat treatment			Machining group	Starting values for cutting speed v_c [m/min]							
						HC (CVD)				HC (PVD)		CN	
						YBM253		YBD252		YB9320		CN1000	
						a_e / D		a_e / D		a_e / D		a_e / D	
						1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	260	300	280	360	245	285		
		approx. 0,45 % C	annealed	190	2	225	255	280	320	210	245		
		approx. 0,45 % C	tempered	250	3	210	240	260	300	200	230		
		approx. 0,75 % C	annealed	270	4	185	210	220	280	175	200		
		approx. 0,75 % C	tempered	300	5	170	195	220	280	160	190		
	Low-alloyed steel		annealed	180	6	225	255	280	320	210	245		
			tempered	275	7	185	210	240	280	175	200		
			tempered	300	8	170	195	240	280	160	190		
			tempered	350	9	145	165	220	240	135	160		
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	130	150	200	260	125	145		
			hardened and tempered	325	11	95	105	200	220	90	100		
M	Stainless steel	ferritic/martensitic	annealed	200	12	130	150			125	145		
		martensitic	tempered	240	13	11	130			105	120		
		austenitic	quench hardened	180	14	140	160			130	155		
		austenitic-ferritic		230	15	110	130			105	120		
K	Grey cast iron	perlitic/ferritic		180	16			320	370	270	315	600	800
		perlitic (martensitic)		260	17			220	260	160	190	450	600
	Cast iron with spheroidal graphite	ferritic		160	18			240	280	185	215	600	800
		perlitic		250	19			220	260	125	145	450	600
	Malleable cast iron	ferritic		130	20			280	305	225	260	–	–
		perlitic		230	21			180	220	150	175	–	–
N	Aluminium wrought alloys	cannot be hardened		60	22								
		hardenable	hardened	100	23								
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24								
		≤ 12 % Si, hardenable	hardened	90	25								
		> 12 % Si, cannot be hardened		130	26								
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27								
		CuZn, CuSnZn		90	28								
		CuSn, Pb-free copper, electrolytic copper		100	29								
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30								
			hardened	280	31								
		Ni or Co bass	annealed	250	32								
			hardened	350	33								
			cast	320	34								
	Titanium alloys	pure titanium		R_m 400	35								
		α and β alloys	hardened	R_m 1050	36								
H	Hardened steel		hardened and tempered	55 HRC	37								
			hardened and tempered	60 HRC	38								
	Hard cast iron		cast	400	39								
	Hardened cast iron		hardened and tempered	55 HRC	40								
X	Non-metallic materials	Thermoplasts			41								
		Thermosetting plastics			42								
		Plastic, glass-fibre reinforced GFRP			43								
		Plastic, carbon fibre reinforced CFRP			44								
		Graphite			45								
		Wood			46								

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B38–B43.

Starting values for cutting speed v_c [m/min]																					
CM				CR																	
CA1000		CM1000		CW1400		CW1800															
a_e / D		a_e / D		a_e / D		a_e / D															
1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5														
				150	360	–	–														
				150	360	–	–														
				–	–	150	400														
				–	–	150	400														
				–	–	150	400														
140	200	140	200																		
120	180	120	180																		
–	–	–	–																		
120	180	120	180																		

HC Coated carbide
HT Uncoated carbide, primary component (TiC) or (TiN), cermet
HW Uncoated carbide, primary component (WC)
BL Cubic boron nitride with low BN content
BH Cubic boron nitride with high BN content
CN Si3N4 ceramic
CM Mixed ceramic
HC_1 Coated cermet
BC CBN with coating
CC Coated cutting ceramic
CR Cutting ceramic, primary component aluminium oxide (Al_2O_3), reinforced
DP Polycrystalline diamond

Recommended feed rate

Indexable milling – group1 (FMA07/11/12/17, FMP12/17, FMD02, EMP09/13)

Material group		Feed rate per cutting edge [mm]																		
		EMP09			EMP09			EMP13			EMP13			FMA07			FMA07			
		LNKT08/12			LNKT16			ANGX11			ANGX15			ONHU06			ONHU08			
		Application																		
		F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	
P	Unalloyed steel		0,25	0,50		0,28	0,55		0,23			0,25		0,19	0,23		0,19	0,23		
P	Low-alloyed steel		0,23	0,47		0,26	0,51		0,22			0,23		0,17	0,22		0,17	0,22		
P	High-alloyed steel and high-alloyed tool steel		0,22	0,44		0,24	0,48		0,20			0,22		0,16	0,20		0,16	0,20		
M	Stainless steel		0,18	0,35		0,19	0,39		0,16			0,18								
K	Grey cast iron		0,28	0,55		0,30	0,61		0,26			0,28		0,20	0,26		0,20	0,26		
K	Cast iron with spheroidal graphite		0,25	0,50		0,28	0,55		0,23			0,25		0,19	0,23		0,19	0,23		
K	Malleable cast iron		0,25	0,50		0,28	0,55		0,23			0,25		0,19	0,23		0,19	0,23		
N	Aluminum wrought alloys								0,20			0,21								
N	Aluminum cast alloys								0,20			0,21								
N	Copper and copper alloys (bronze/brass)								0,18			0,19								
S	Heat-resistant alloys																			
S	Titanium alloys																			
H	Hardened steel																			
H	Hard cast iron																			
H	Hardened cast iron																			
X	Non-metallic materials																			

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

Recommended feed rate

Indexable milling – group1 (FMA07/11/12/17, FMP12/17, FMD02, EMP09/13)

Material group		Feed rate per cutting edge [mm]																		
		FMP12			FMP17															
		WNHU08			SNGX12															
		Application																		
		F	M	R	F	M	R													
P	Unalloyed steel		0,25			0,23														
P	Low-alloyed steel		0,23			0,22														
P	High-alloyed steel and high-alloyed tool steel		0,22			0,20														
M	Stainless steel		0,18			0,16														
K	Grey cast iron		0,28			0,26														
K	Cast iron with spheroidal graphite		0,25			0,23														
K	Malleable cast iron		0,25			0,23														
N	Aluminum wrought alloys					0,20														
N	Aluminum cast alloys					0,20														
N	Copper and copper alloys (bronze/brass)					0,18														
S	Heat-resistant alloys																			
S	Titanium alloys																			
H	Hardened steel																			
H	Hard cast iron																			
H	Hardened cast iron																			
X	Non-metallic materials																			

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

	Feed rate per cutting edge [mm]																							
	FMA11			FMA11			FMA11			FMA12			FMA17			FMD02			FMD02			FMP12		
	SNEG12			SNEG15			SNEG19			ONHU08			SNGX12			PNEG11			HNEX09			WNHU06		
	Application																							
	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R
		0,20	0,23		0,22	0,25			0,29		0,23			0,20	0,23	0,15	0,20	0,30					0,23	
		0,19	0,21		0,20	0,24			0,27		0,22			0,19	0,21	0,14	0,19	0,28					0,22	
		0,18	0,20		0,19	0,22			0,26		0,20			0,18	0,20	0,13	0,18	0,26					0,20	
		0,14	0,16		0,15	0,18			0,20		0,16			0,14	0,16								0,16	
		0,22	0,25		0,24	0,28			0,32		0,26			0,22	0,25	0,17	0,22	0,33	0,17	0,22	0,33		0,26	
		0,20	0,23		0,22	0,25			0,29		0,23			0,20	0,23	0,15	0,20	0,30	0,15	0,20	0,30		0,23	
		0,20	0,23		0,22	0,25			0,29		0,23			0,20	0,23	0,15	0,20	0,30	0,15	0,20	0,30		0,23	

F Finishing
M Medium machining
R Roughing

	Feed rate per cutting edge [mm]																							
	Application																							

F Finishing
M Medium machining
R Roughing

Recommended feed rate

Indexable milling – group 3 (FMR01/02/03/04) Face milling

Material group		Feed rate per cutting edge [mm]																	
		FMR01 RCKT10			FMR01 RC*12			FMR02 RC*12			FMR02 RCKT16			FMR02 RCKT20			FMR03 RDKW07		
		Application																	
		F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R
P	Unalloyed steel		0,20	0,25		0,20	0,25		0,20	0,25		0,23	0,29		0,26	0,33		0,17	
P	Low-alloyed steel		0,19	0,23		0,19	0,23		0,19	0,23		0,21	0,27		0,25	0,31		0,16	
P	High-alloyed steel and high-alloyed tool steel		0,18	0,22		0,18	0,22		0,18	0,22		0,20	0,25		0,23	0,29		0,15	
M	Stainless steel		0,14	0,18		0,14	0,18		0,14	0,18		0,16	0,20		0,19	0,23		0,12	
K	Grey cast iron		0,22	0,28		0,22	0,28		0,22	0,28		0,25	0,32		0,29	0,36		0,19	
K	Cast iron with spheroidal graphite		0,20	0,25		0,20	0,25		0,20	0,25		0,23	0,29		0,26	0,33		0,17	
K	Malleable cast iron		0,20	0,25		0,20	0,25		0,20	0,25		0,23	0,29		0,26	0,33		0,17	
N	Aluminum wrought alloys					0,17	0,21		0,17	0,21									
N	Aluminum cast alloys					0,17	0,21		0,17	0,21									
N	Copper and copper alloys (bronze/brass)					0,15	0,19		0,15	0,19									
S	Heat-resistant alloys																		
S	Titanium alloys																		
H	Hardened steel																		
H	Hard cast iron																		
H	Hardened cast iron																		
X	Non-metallic materials																		

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

Indexable milling – group 3 (FMR01/02/03/04) Circular milling

Material group		Feed rate per cutting edge [mm]							
		FMR01 RCKT10	FMR01 RC*12	FMR02 RC*12	FMR02 RCKT16		FMR02 RCKT20		FMR03 RDKW07
		Tool diameter [mm]							
		25-32	40-50	50-100	63-125	160-200	80-125	160-250	15
P	Unalloyed steel	0,12	0,16	0,18	0,24	0,32	0,26	0,35	0,07
P	Low-alloyed steel	0,11	0,14	0,16	0,21	0,28	0,23	0,31	0,06
P	High-alloyed steel and high-alloyed tool steel	0,10	0,13	0,14	0,19	0,26	0,21	0,28	0,06
M	Stainless steel	0,07	0,09	0,10	0,14	0,18	0,15	0,20	0,04
K	Grey cast iron	0,11	0,14	0,16	0,22	0,29	0,23	0,32	0,06
K	Cast iron with spheroidal graphite	0,10	0,13	0,14	0,19	0,26	0,21	0,28	0,06
K	Malleable cast iron	0,10	0,13	0,14	0,19	0,26	0,21	0,28	0,06
N	Aluminium wrought alloys								
N	Aluminum cast alloys								
N	Copper and copper alloys (bronze/brass)								
S	Heat-resistant alloys								
S	Titanium alloys								
H	Hardened steel								
H	Hard cast iron								
H	Hardened cast iron								
X	Non-metallic materials								

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

	Feed rate per cutting edge [mm]																				
	FMR03			FMR03			FMR04			FMR04			FMR04			FMR04			FMR04		
	RDKW08			RD*10			RD*12			RDKW16			RDKW20			RD**10			RD**12		
	Application																				
	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R		M		F	M	R
		0,17			0,20		0,15	0,20	0,25	0,17	0,23	0,29	0,2	0,26	0,33		0,20		0,15	0,20	0,25
		0,16			0,19		0,14	0,19	0,23	0,16	0,21	0,27	0,19	0,25	0,31		0,19		0,14	0,19	0,23
		0,15			0,18		0,13	0,18	0,22	0,15	0,20	0,25	0,18	0,23	0,29		0,18		0,13	0,18	0,22
		0,12			0,14		0,11	0,14	0,18	0,12	0,16	0,20	0,14	0,19	0,23		0,14		0,11	0,14	0,18
		0,19			0,22		0,17	0,22	0,28	0,19	0,25	0,32	0,22	0,29	0,36		0,22		0,17	0,22	0,28
		0,17			0,20		0,15	0,20	0,25	0,17	0,23	0,29	0,20	0,26	0,33		0,20		0,15	0,20	0,25
		0,17			0,20		0,15	0,20	0,25	0,17	0,23	0,29	0,20	0,26	0,33		0,20		0,15	0,20	0,25
					0,17		0,13	0,17	0,21								0,17		0,13	0,17	0,21
					0,17		0,13	0,17	0,21								0,17		0,13	0,17	0,21
					0,15		0,11	0,15	0,19								0,15		0,11	0,15	0,19

F Finishing
M Medium machining
R Roughing

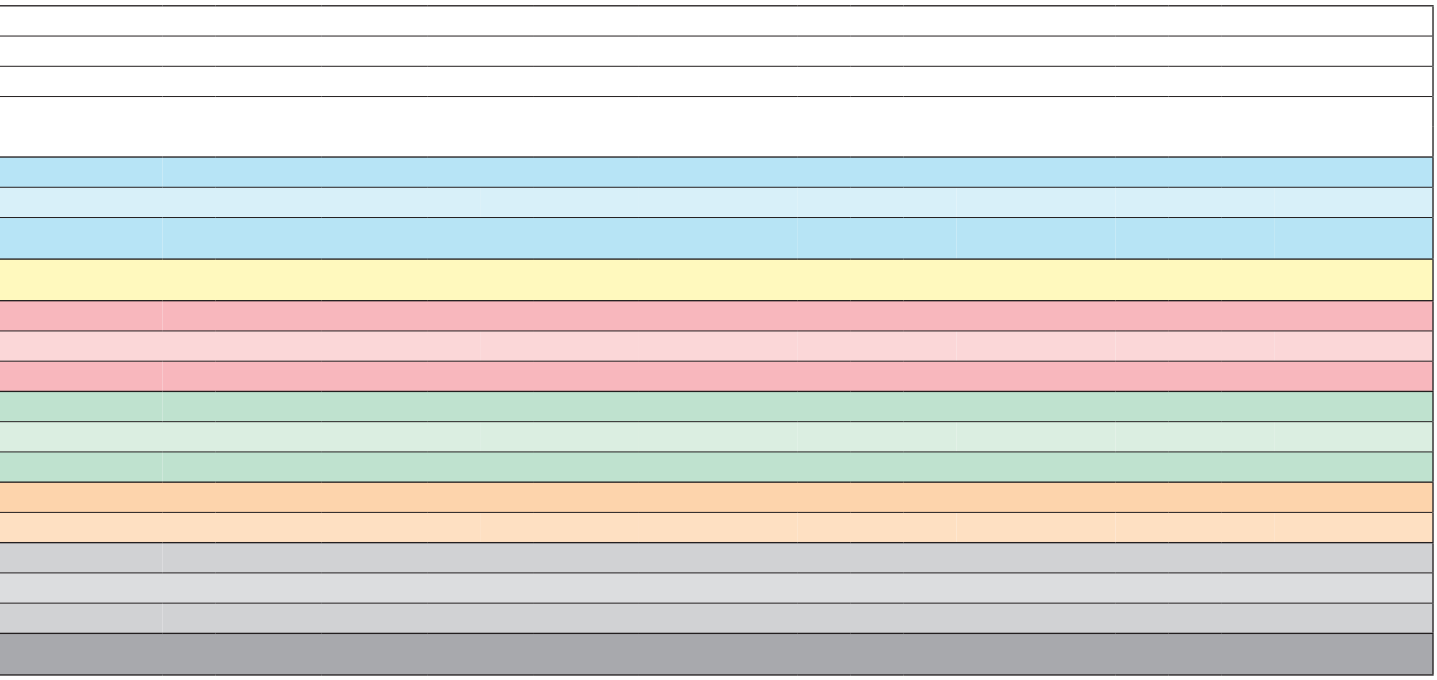
	Feed rate per cutting edge [mm]						
	FMR03	FMR03	FMR04	FMR04	FMR04	FMR04	FMR04
	RDKW08	RD*10	RD*12	RDKW16	RDKW20	RD**10	RD**12
	Tool diameter [mm]						
	16-25	32	50-63	80-100	125-160	32-40	40-80
	0,07	0,12	0,17	0,24	0,30	0,12	0,17
	0,06	0,11	0,15	0,21	0,26	0,11	0,15
	0,06	0,10	0,14	0,19	0,24	0,10	0,14
	0,04	0,07	0,10	0,14	0,17	0,07	0,10
	0,06	0,11	0,15	0,22	0,27	0,11	0,15
	0,06	0,10	0,14	0,19	0,24	0,10	0,14
	0,06	0,10	0,14	0,19	0,24	0,10	0,14
		0,10	0,11			0,10	0,11
		0,10	0,11			0,10	0,11
		0,10	0,11			0,10	0,11

Recommended feed rate

Indexable milling – group 8 (FMP06)

Material group		Feed rate per cutting edge [mm]																			
		FMP06 SNCU12 (HC)			FMP06 SNGN12 (CN)			FMP06 SNGN12 (CM)													
		Application																			
		F	M	R	F	M	R	F	M	R											
P	Unalloyed steel		0,23																		
P	Low-alloyed steel		0,22																		
P	High-alloyed steel and high-alloyed tool steel		0,20																		
M	Stainless steel		0,16																		
K	Grey cast iron		0,26			0,10	0,25														
K	Cast iron with spheroidal graphite		0,23			0,10	0,25														
K	Malleable cast iron		0,23			0,10	0,25														
N	Aluminum wrought alloys																				
N	Aluminum cast alloys																				
N	Copper and copper alloys (bronze/brass)																				
S	Heat-resistant alloys																				
S	Titanium alloys																				
H	Hardened steel								0,05	0,10											
H	Hard cast iron																				
H	Hardened cast iron								0,05	0,10											
X	Non-metallic materials																				

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



HC Coated carbide
CN Si3N4 ceramic
CM Mixed ceramic

F Finishing
M Medium machining
R Roughing

Notes

Solid carbide milling

System code – JIS	**B46**
TM series	**B47–B65**
VPM series	**B66–B69**
Recommended cutting data	**B70–B76**

B

Solid carbide milling System code – JIS

GM	–	2	E	L	P	–	D12	R0.5	–	M08
1		2	3	4	5		6	7		8

Application	
Code	Description
GR	General roughing
GM	Semi-finishing
GF	Finishing
PM	High-performance machining
EPM	«Ecoline» – High-performance machining
VPM	Full-slot applications
HM	Hard machining
NM	General machining of non-ferrous metals
AL	General machining of Al and Al alloys
ALP	High-performance machining of Al and Al alloys
ALG	General machining of Al and Al alloys
UM	HSC/HPC machining
UMC	HSC machining with chip splitter geometry
VSM	General machining of heat-resistant alloys
TM	General machining of heat-resistant alloys

1

Number of teeth
2

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

3

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

4

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

5

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

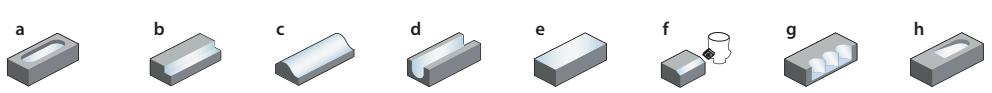
6

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

7

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

8



a Groove milling b Square shoulder milling c Profile milling d Slot milling e Face milling f Chamfer milling g Plunge milling h Circular milling/Ramping

TM series

The perfect choice for machining titanium and superalloys

Expanded line with compact torus milling cutters featuring diameters from 1.0 mm New

YOUR BENEFITS

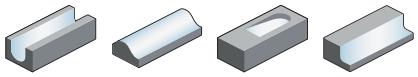
– Extremely well suited for roughing/finishing titanium, as well as nickel- and cobalt-based alloys
– Reliable results thanks to high cutting edge stability in difficult machining applications
– Extended tool life thanks to new substrate featuring cutting-edge coating technology



Fig.: TM-3R-D5.0R0.1 KMS405

Torus mills

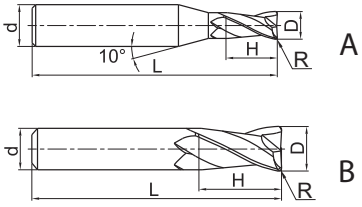
High-performance machining



TM-2R New

– Factory standard
– Centre cutting
– Helix angle 38°





Article	✲	Dimensions [mm]					Teeth	Geometry	Grade
		D	R	d (h5)	H	L			KMS405
TM-2R-D1.0R0.05		1	0,05	4	3	50	2	A	●
TM-2R-D1.0R0.30		1	0,3	4	3	50	2	A	●
TM-2R-D2.0R0.05		2	0,05	4	6	50	2	A	●
TM-2R-D2.0R0.30		2	0,3	4	6	50	2	A	●
TM-2R-D2.5R0.05		2,5	0,05	4	8	50	2	A	○
TM-2R-D2.5R0.30		2,5	0,3	4	8	50	2	A	○
TM-2R-D3.0R0.05		3	0,05	4	8	50	2	A	●
TM-2R-D3.0R0.30		3	0,3	4	8	50	2	A	○
TM-2R-D4.0R0.10		4	0,1	4	11	50	2	B	●
TM-2R-D4.0R0.30		4	0,3	4	11	50	2	B	○
TM-2R-D4.0R0.50		4	0,5	4	11	50	2	B	○
TM-2R-D5.0R0.10		5	0,1	6	13	50	2	A	●
TM-2R-D5.0R0.30		5	0,3	6	13	50	2	A	○
TM-2R-D5.0R0.50		5	0,5	6	13	50	2	A	○

● Ex stock ○ On demand

✲ With internal cooling

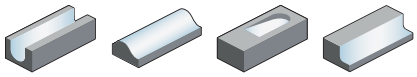
Application field

P	M	K	N	S	H
	✔			✔	

✔ Very suitable
✔ suitable

Torus mills

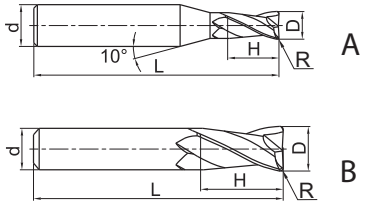
High-performance machining



TM-3R New

– Factory standard
– Centre cutting
– Helix angle 38°





Article	✲	Dimensions [mm]					Teeth	Geometry	Grade
		D	R	d (h5)	H	L			KMS405
TM-3R-D3.0R0.1		3	0,1	4	8	50	3	A	●
TM-3R-D3.0R0.3		3	0,3	4	8	50	3	A	○
TM-3R-D3.0R0.5		3	0,5	4	8	50	3	A	●
TM-3R-D4.0R0.1		4	0,1	4	11	50	3	B	●
TM-3R-D4.0R0.3		4	0,3	4	11	50	3	B	○
TM-3R-D4.0R0.5		4	0,5	4	11	50	3	B	●
TM-3R-D5.0R0.1		5	0,1	6	13	50	3	A	●
TM-3R-D5.0R0.3		5	0,3	6	13	50	3	A	○
TM-3R-D5.0R0.5		5	0,5	6	13	50	3	A	●

● Ex stock ○ On demand

✲ With internal cooling

Application field

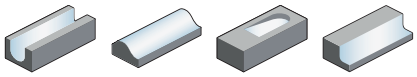
P	M	K	N	S	H
	✔			✔	

✔ Very suitable
✔ suitable

Ball nose cutters

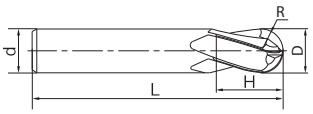
High-performance machining

TM-4B



– Factory standard
– Centre cutting
– Helix angle 38°





Article	✻	Dimensions [mm]					Teeth	Grade
		D	R	d (h6)	H	L		KMS405
TM-4B-R3.0		6	3	6	9	50	4	●
TM-4B-R4.0		8	4	8	12	60	4	●
TM-4B-R5.0		10	5	10	15	75	4	●
TM-4B-R6.0		12	6	12	18	75	4	●
TM-4B-R8.0		16	8	16	24	85	4	●
TM-4B-R10.0		20	10	20	30	100	4	●

● Ex stock ○ On demand

✻ With internal cooling

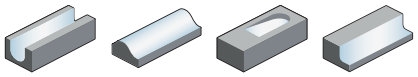
Application field

P	M	K	N	S	H
	✔			✔	

✔ Very suitable
✔ suitable

Ball nose cutters

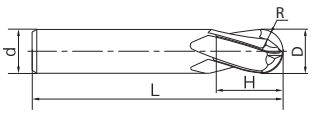
High-performance machining



TM-4BL

– Type of shank DIN 6535HA
– Centre cutting
– Helix angle 38°





Article	✻	Dimensions [mm]					Teeth	Grade
		D	R	d (h6)	H	L		KMS405
TM-4BL-R3.0		6	3	6	16	57	4	●
TM-4BL-R4.0		8	4	8	20	63	4	●
TM-4BL-R5.0		10	5	10	22	72	4	●
TM-4BL-R6.0		12	6	12	25	83	4	●
TM-4BL-R8.0		16	8	16	32	92	4	●
TM-4BL-R10.0		20	10	20	38	104	4	●

● Ex stock ○ On demand

✻ With internal cooling

Application field

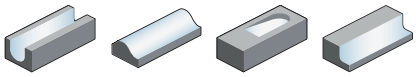
P	M	K	N	S	H
	✔			✔	

✔ Very suitable
✔ suitable

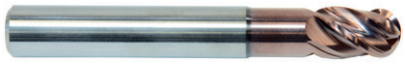
Ball nose cutters

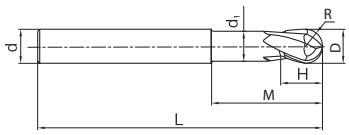
High-performance machining

TM-4BP



– Factory standard
– Centre cutting
– Helix angle 38°





Article	✻	Dimensions [mm]							Teeth	Grade
		D	R	d (h6)	d_1	H	M	L		KMS405
TM-4BP-R3.0		6	3	6	5.5	9	18	60	4	●
TM-4BP-R4.0		8	4	8	7.4	12	24	75	4	●
TM-4BP-R5.0		10	5	10	9.4	15	30	75	4	●
TM-4BP-R6.0		12	6	12	11.4	18	35	90	4	●
TM-4BP-R8.0		16	8	16	15.4	24	40	90	4	●
TM-4BP-R10.0		20	10	20	19.4	35	50	110	4	●

● Ex stock ○ On demand
✻ With internal cooling

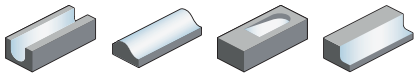
Application field

P	M	K	N	S	H
	✔			✔	

✔ Very suitable
✔ suitable

Ball nose cutters

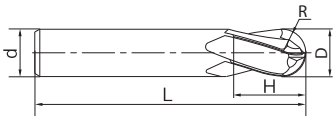
High-performance machining



TM-5B

– Factory standard
– Helix angle 38°





Article	✻	Dimensions [mm]					Teeth	Grade
		D	R	d (h6)	H	L		KMS405
TM-5B-R3.0		6	3	6	9	50	5	●
TM-5B-R4.0		8	4	8	12	60	5	●
TM-5B-R5.0		10	5	10	15	75	5	●
TM-5B-R6.0		12	6	12	18	75	5	●
TM-5B-R8.0		16	8	16	24	85	5	●
TM-5B-R10.0		20	10	20	30	100	5	●

● Ex stock ○ On demand

✻ With internal cooling

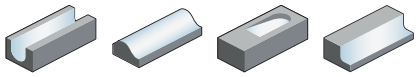
Application field

P	M	K	N	S	H
	✔			✔	

✔ Very suitable
✔ suitable

Ball nose cutters

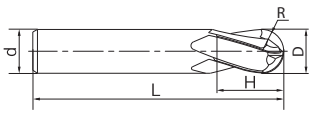
High-performance machining



TM-5BL

– Type of shank DIN 6535HA
– Helix angle 38°





Article	✻	Dimensions [mm]					Teeth	Grade
		D	R	d (h6)	H	L		KMS405
TM-5BL-R3.0		6	3	6	16	57	5	●
TM-5BL-R4.0		8	4	8	20	63	5	●
TM-5BL-R5.0		10	5	10	22	72	5	●
TM-5BL-R6.0		12	6	12	25	83	5	●
TM-5BL-R8.0		16	8	16	32	92	5	●
TM-5BL-R10.0		20	10	20	38	104	5	●

● Ex stock ○ On demand
✻ With internal cooling

Application field

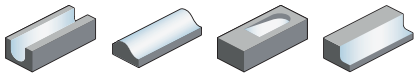
P	M	K	N	S	H
	✔			✔	

✔ Very suitable
✔ suitable

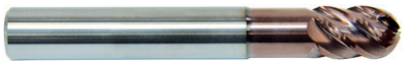
Ball nose cutters

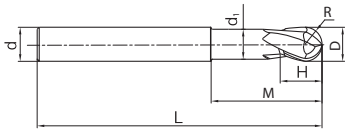
High-performance machining

TM-5BP



– Factory standard
– Helix angle 38°





Article	✻	Dimensions [mm]							Teeth	Grade
		D	R	d (h6)	d_1	H	M	L		KMS405
TM-5BP-R3.0		6	3	6	5.5	9	18	60	5	●
TM-5BP-R4.0		8	4	8	7.4	12	24	75	5	●
TM-5BP-R5.0		10	5	10	9.4	15	30	75	5	●
TM-5BP-R6.0		12	6	12	11.4	18	35	90	5	●
TM-5BP-R8.0		16	8	16	15.4	24	40	90	5	●
TM-5BP-R10.0		20	10	20	19.4	35	50	110	5	●

● Ex stock ○ On demand

✻ With internal cooling

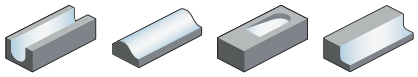
Application field

P	M	K	N	S	H
	✔			✔	

✔ Very suitable
✔ suitable

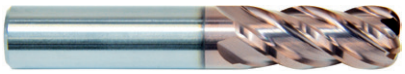
Torus mills

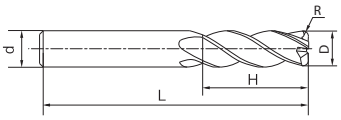
High-performance machining



TM-4R

– Factory standard
– Centre cutting
– Helix angle 38°





Article	✻	Dimensions [mm]					Teeth	Grade
		D	R	d (h6)	H	L		KMS405
TM-4R-D6.0R0.3		6	0.3	6	16	50	4	●
TM-4R-D6.0R0.5		6	0.5	6	16	50	4	●
TM-4R-D6.0R 0.75		6	0.75	6	16	50	4	○
TM-4R-D6.0R1.0		6	1.0	6	16	50	4	●
TM-4R-D8.0R0.3		8	0.3	8	20	60	4	●
TM-4R-D8.0R0.5		8	0.5	8	20	60	4	●
TM-4R-D8.0R0.75		8	0.75	8	20	60	4	○
TM-4R-D8.0R1.0		8	1.0	8	20	60	4	●
TM-4R-D10.0R0.5		10	0.5	10	25	75	4	●
TM-4R-D10.0R0.75		10	0.75	10	25	75	4	○
TM-4R-D10.0R1.0		10	1.0	10	25	75	4	●
TM-4R-D10.0R1.25		10	1.25	10	25	75	4	○
TM-4R-D10.0R1.5		10	1.5	10	25	75	4	●
TM-4R-D10.0R1.6		10	1.6	10	25	75	4	●
TM-4R-D10.0R2.0		10	2.0	10	25	75	4	●
TM-4R-D10.0R2.5		10	2.5	10	25	75	4	○
TM-4R-D10.0R3.0		10	3.0	10	25	75	4	●
TM-4R-D12.0R0.5		12	0.5	12	30	75	4	●
TM-4R-D12.0R0.75		12	0.75	12	30	75	4	○
TM-4R-D12.0R1.0		12	1.0	12	30	75	4	●
TM-4R-D12.0R1.25		12	1.25	12	30	75	4	○
TM-4R-D12.0R1.5		12	1.5	12	30	75	4	●
TM-4R-D12.0R1.6		12	1.6	12	30	75	4	●
TM-4R-D12.0R2.0		12	2.0	12	30	75	4	●
TM-4R-D12.0R2.5		12	2.5	12	30	75	4	●
TM-4R-D12.0R3.0		12	3.0	12	30	75	4	●
TM-4R-D12.0R3.2		12	3.2	12	30	75	4	●
TM-4R-D12.0R4.0		12	4.0	12	30	75	4	●
TM-4R-D16.0R1.0		16	1.0	16	35	90	4	●
TM-4R-D16.0R1.25		16	1.25	16	35	90	4	●
TM-4R-D16.0R1.5		16	1.5	16	35	90	4	●
TM-4R-D16.0R1.6		16	1.6	16	35	90	4	●

● Ex stock ○ On demand

✻ With internal cooling

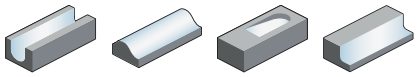
Application field

P	M	K	N	S	H
	✔			✔	

✔ Very suitable
✔ suitable

Torus mills

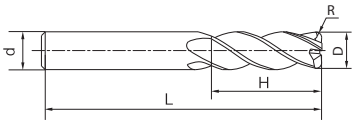
High-performance machining



TM-4R

– Factory standard
– Centre cutting
– Helix angle 38°





Article	✻	Dimensions [mm]					Teeth	Grade
		D	R	d (h6)	H	L		KMS405
TM-4R-D16.0R2.0		16	2.0	16	35	90	4	●
TM-4R-D16.0R2.5		16	2.5	16	35	90	4	●
TM-4R-D16.0R3.0		16	3.0	16	35	90	4	●
TM-4R-D16.0R3.2		16	3.2	16	35	90	4	●
TM-4R-D16.0R4.0		16	4.0	16	35	90	4	●
TM-4R-D16.0R5.0		16	5.0	16	35	90	4	●
TM-4R-D16.0R6.3		16	6.3	16	35	90	4	○
TM-4R-D20.0R1.0		20	1.0	20	45	100	4	●
TM-4R-D20.0R1.25		20	1.25	20	45	100	4	●
TM-4R-D20.0R1.5		20	1.5	20	45	100	4	●
TM-4R-D20.0R1.6		20	1.6	20	45	100	4	●
TM-4R-D20.0R2.0		20	2.0	20	45	100	4	●
TM-4R-D20.0R2.5		20	2.5	20	45	100	4	●
TM-4R-D20.0R3.0		20	3.0	20	45	100	4	●
TM-4R-D20.0R3.2		20	3.2	20	45	100	4	●
TM-4R-D20.0R4.0		20	4.0	20	45	100	4	●
TM-4R-D20.0R5.0		20	5.0	20	45	100	4	●
TM-4R-D20.0R6.3		20	6.3	20	45	100	4	●
TM-4R-D25.0R1.0		25	1.0	25	50	110	4	●
TM-4R-D25.0R1.25		25	1.25	25	50	110	4	○
TM-4R-D25.0R1.5		25	1.5	25	50	110	4	●
TM-4R-D25.0R1.6		25	1.6	25	50	110	4	●
TM-4R-D25.0R2.0		25	2.0	25	50	110	4	●
TM-4R-D25.0R2.5		25	2.5	25	50	110	4	○
TM-4R-D25.0R3.0		25	3.0	25	50	110	4	●
TM-4R-D25.0R3.2		25	3.2	25	50	110	4	●
TM-4R-D25.0R4.0		25	4.0	25	50	110	4	●
TM-4R-D25.0R5.0		25	5.0	25	50	110	4	●
TM-4R-D25.0R6.3		25	6.3	25	50	110	4	●

● Ex stock ○ On demand
✻ With internal cooling

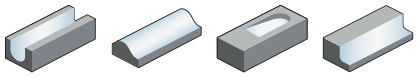
Application field

P	M	K	N	S	H
	✔			✔	

✔ Very suitable
✔ suitable

Torus mills

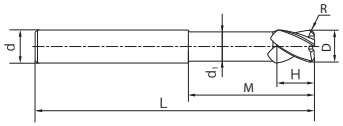
High-performance machining



TM-4RP

– Factory standard
– Centre cutting
– Helix angle 38°





Article	✻	Dimensions [mm]							Teeth	Grade
		D	R	d (h6)	d_1	H	M	L		KMS405
TM-4RP-D8.0R0.3		8	0.3	8	7.4	16	25	75	4	●
TM-4RP-D8.0R0.5		8	0.5	8	7.4	16	25	75	4	●
TM-4RP-D8.0R0.75		8	0.75	8	7.4	16	25	75	4	○
TM-4RP-D8.0R1.0		8	1.0	8	7.4	16	25	75	4	●
TM-4RP-D10.0R0.5		10	0.5	10	9.4	20	32	75	4	●
TM-4RP-D10.0R0.75		10	0.75	10	9.4	20	32	75	4	○
TM-4RP-D10.0R1.0		10	1.0	10	9.4	20	32	75	4	●
TM-4RP-D10.0R1.25		10	1.25	10	9.4	20	32	75	4	●
TM-4RP-D10.0R1.5		10	1.5	10	9.4	20	32	75	4	●
TM-4RP-D10.0R1.6		10	1.6	10	9.4	20	32	75	4	●
TM-4RP-D10.0R2.0		10	2.0	10	9.4	20	32	75	4	●
TM-4RP-D10.0R2.5		10	2.5	10	9.4	20	32	75	4	○
TM-4RP-D10.0R3.0		10	3.0	10	9.4	20	32	75	4	●
TM-4RP-D12.0R0.5		12	0.5	12	11.4	24	40	90	4	●
TM-4RP-D12.0R0.75		12	0.75	12	11.4	24	40	90	4	○
TM-4RP-D12.0R1.0		12	1.0	12	11.4	24	40	90	4	●
TM-4RP-D12.0R1.25		12	1.25	12	11.4	24	40	90	4	●
TM-4RP-D12.0R1.5		12	1.5	12	11.4	24	40	90	4	●
TM-4RP-D12.0R1.6		12	1.6	12	11.4	24	40	90	4	●
TM-4RP-D12.0R2.0		12	2.0	12	11.4	24	40	90	4	●
TM-4RP-D12.0R2.5		12	2.5	12	11.4	24	40	90	4	○
TM-4RP-D12.0R3.0		12	3.0	12	11.4	24	40	90	4	●
TM-4RP-D12.0R3.2		12	3.2	12	11.4	24	40	90	4	●
TM-4RP-D12.0R4.0		12	4.0	12	11.4	24	40	90	4	●
TM-4RP-D16.0R1.0		16	1.0	16	15	32	50	100	4	●
TM-4RP-D16.0R1.25		16	1.25	16	15	32	50	100	4	●
TM-4RP-D16.0R1.5		16	1.5	16	15	32	50	100	4	●
TM-4RP-D16.0R1.6		16	1.6	16	15	32	50	100	4	●
TM-4RP-D16.0R2.0		16	2.0	16	15	32	50	100	4	●

● Ex stock ○ On demand
✻ With internal cooling

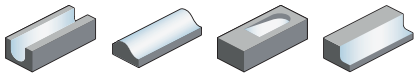
Application field

P	M	K	N	S	H
	✔			✔	

✔ Very suitable
✔ suitable

Torus mills

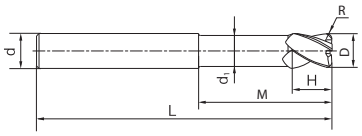
High-performance machining



TM-4RP

– Factory standard
– Centre cutting
– Helix angle 38°





Article	✻	Dimensions [mm]							Teeth	Grade
		D	R	d (h6)	d_1	H	M	L		KMS405
TM-4RP-D16.0R2.5		16	2.5	16	15	32	50	100	4	○
TM-4RP-D16.0R3.0		16	3.0	15	14	32	50	100	4	●
TM-4RP-D16.0R3.2		16	3.2	16	15	32	50	100	4	●
TM-4RP-D16.0R4.0		16	4.0	16	15	32	50	100	4	●
TM-4RP-D16.0R5.0		16	5.0	16	15	32	50	100	4	●
TM-4RP-D16.0R6.3		16	6.3	16	15	32	50	100	4	○
TM-4RP-D20.0R1.0		20	1.0	20	19	35	60	110	4	●
TM-4RP-D20.0R1.25		20	1.25	20	19	35	60	110	4	●
TM-4RP-D20.0R1.5		20	1.5	20	19	35	60	110	4	●
TM-4RP-D20.0R1.6		20	1.6	20	19	35	60	110	4	●
TM-4RP-D20.0R2.0		20	2.0	20	19	35	60	110	4	●
TM-4RP-D20.0R2.5		20	2.5	20	19	35	60	110	4	○
TM-4RP-D20.0R3.0		20	3.0	20	19	35	60	110	4	●
TM-4RP-D20.0R3.2		20	3.2	20	19	35	60	110	4	●
TM-4RP-D20.0R4.0		20	4.0	20	19	35	60	110	4	●
TM-4RP-D20.0R5.0		20	5.0	20	19	35	60	110	4	●
TM-4RP-D20.0R6.3		20	6.3	20	19	35	60	110	4	●
TM-4RP-D25.0R1.0		25	1.0	25	24	45	75	150	4	●
TM-4RP-D25.0R1.25		25	1.25	25	24	45	75	150	4	○
TM-4RP-D25.0R1.5		25	1.5	25	24	45	75	150	4	●
TM-4RP-D25.0R1.6		25	1.6	25	24	45	75	150	4	●
TM-4RP-D25.0R2.0		25	2.0	25	24	45	75	150	4	●
TM-4RP-D25.0R2.5		25	2.5	25	24	45	75	150	4	●
TM-4RP-D25.0R3.0		25	3.0	25	24	45	75	150	4	●
TM-4RP-D25.0R3.2		25	3.2	25	24	45	75	150	4	●
TM-4RP-D25.0R4.0		25	4.0	25	24	45	75	150	4	●
TM-4RP-D25.0R5.0		25	5.0	25	24	45	75	150	4	●
TM-4RP-D25.0R6.3		25	6.3	25	24	45	75	150	4	●

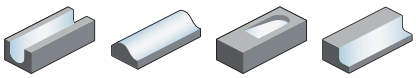
● Ex stock ○ On demand
✻ With internal cooling

Application field

P	M	K	N	S	H
	✔			✔	

✔ Very suitable
✔ suitable

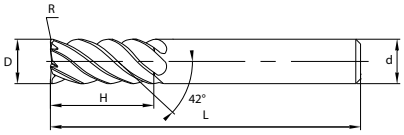
Torus mills High-performance machining



TM-5R

– Factory standard
– Helix angle 42°





Article	✻	Dimensions [mm]					Teeth	Grade
		D	R	d (h6)	H	L		KMS405
TM-5R-D6.0R0.3		6	0.3	6	16	50	5	●
TM-5R-D6.0R0.5		6	0.5	6	16	50	5	●
TM-5R-D6.0R 0.75		6	0.75	6	16	50	5	○
TM-5R-D6.0R1.0		6	1.0	6	16	50	5	●
TM-5R-D8.0R0.3		8	0.3	8	20	60	5	●
TM-5R-D8.0R0.5		8	0.5	8	20	60	5	●
TM-5R-D8.0R0.75		8	0.75	8	20	60	5	○
TM-5R-D8.0R1.0		8	1.0	8	20	60	5	●
TM-5R-D10.0R0.5		10	0.5	10	25	75	5	●
TM-5R-D10.0R0.75		10	0.75	10	25	75	5	○
TM-5R-D10.0R1.0		10	1.0	10	25	75	5	●
TM-5R-D10.0R1.25		10	1.25	10	25	75	5	○
TM-5R-D10.0R1.5		10	1.5	10	25	75	5	●
TM-5R-D10.0R1.6		10	1.6	10	25	75	5	●
TM-5R-D10.0R2.0		10	2.0	10	25	75	5	●
TM-5R-D10.0R2.5		10	2.5	10	25	75	5	○
TM-5R-D10.0R3.0		10	3.0	10	25	75	5	●

● Ex stock ○ On demand
✻ With internal cooling

Application field

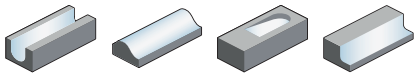
P	M	K	N	S	H
	✔			✔	

✔ Very suitable
✔ Suitable

Torus mills

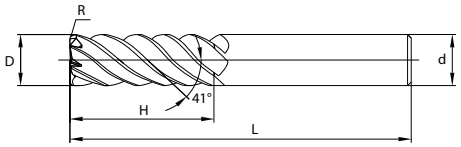
High-performance machining

TM-7R



– Factory standard
– Helix angle 41°





Article	✻	Dimensions [mm]					Teeth	Grade
		D	R	d (h6)	H	L		KMS405
TM-7R-D12.0R0.5		12	0.5	12	30	75	7	●
TM-7R-D12.0R0.75		12	0.75	12	30	75	7	○
TM-7R-D12.0R1.0		12	1.0	12	30	75	7	●
TM-7R-D12.0R1.25		12	1.25	12	30	75	7	○
TM-7R-D12.0R1.5		12	1.5	12	30	75	7	●
TM-7R-D12.0R1.6		12	1.6	12	30	75	7	●
TM-7R-D12.0R2.0		12	2.0	12	30	75	7	●
TM-7R-D12.0R2.5		12	2.5	12	30	75	7	●
TM-7R-D12.0R3.0		12	3.0	12	30	75	7	●
TM-7R-D12.0R3.2		12	3.2	12	30	75	7	●
TM-7R-D12.0R4.0		12	4.0	12	30	75	7	●
TM-7R-D16.0R1.0		16	1.0	16	35	90	7	●
TM-7R-D16.0R1.25		16	1.25	16	35	90	7	○
TM-7R-D16.0R1.5		16	1.5	16	35	90	7	●
TM-7R-D16.0R1.6		16	1.6	16	35	90	7	●
TM-7R-D16.0R2.0		16	2.0	16	35	90	7	●
TM-7R-D16.0R2.5		16	2.5	16	35	90	7	●
TM-7R-D16.0R3.0		16	3.0	16	35	90	7	●
TM-7R-D16.0R3.2		16	3.2	16	35	90	7	●
TM-7R-D16.0R4.0		16	4.0	16	35	90	7	●
TM-7R-D16.0R5.0		16	5.0	16	35	90	7	●
TM-7R-D16.0R6.3		16	6.3	16	35	90	7	○
TM-7R-D20.0R1.0		20	1.0	20	45	100	7	●
TM-7R-D20.0R1.25		20	1.25	20	45	100	7	○
TM-7R-D20.0R1.5		20	1.5	20	45	100	7	●
TM-7R-D20.0R1.6		20	1.6	20	45	100	7	●
TM-7R-D20.0R2.0		20	2.0	20	45	100	7	●
TM-7R-D20.0R2.5		20	2.5	20	45	100	7	●
TM-7R-D20.0R3.0		20	3.0	20	45	100	7	●
TM-7R-D20.0R3.2		20	3.2	20	45	100	7	●
TM-7R-D20.0R4.0		20	4.0	20	45	100	7	●
TM-7R-D20.0R5.0		20	5.0	20	45	100	7	●
TM-7R-D20.0R6.3		20	6.3	20	45	100	7	●

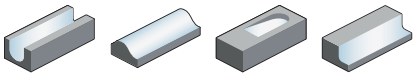
● Ex stock ○ On demand
✻ With internal cooling

Application field

P	M	K	N	S	H
	✔			✔	

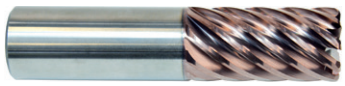
✔ Very suitable
✔ Suitable

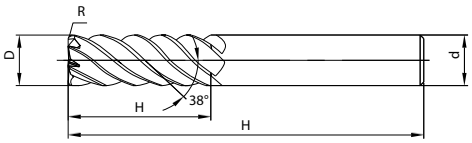
Torus mills High-performance machining



TM-9R

– Factory standard
– Helix angle 38°





Article	✻	Dimensions [mm]					Teeth	Grade
		D	R	d (h6)	H	L		KMS405
TM-9R-D25.0R1.0		25	1.0	25	50	110	9	●
TM-9R-D25.0R1.25		25	1.25	25	50	110	9	○
TM-9R-D25.0R1.5		25	1.5	25	50	110	9	●
TM-9R-D25.0R1.6		25	1.6	25	50	110	9	●
TM-9R-D25.0R2.0		25	2.0	25	50	110	9	●
TM-9R-D25.0R2.5		25	2.5	25	50	110	9	○
TM-9R-D25.0R3.0		25	3.0	25	50	110	9	●
TM-9R-D25.0R3.2		25	3.2	25	50	110	9	●
TM-9R-D25.0R4.0		25	4.0	25	50	110	9	●
TM-9R-D25.0R5.0		25	5.0	25	50	110	9	●
TM-9R-D25.0R6.3		25	6.3	25	50	110	9	●

● Ex stock ○ On demand
✻ With internal cooling

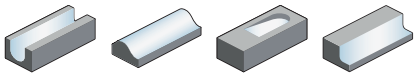
Application field

P	M	K	N	S	H
	✔			✔	

✔ Very suitable
✔ suitable

Torus mills

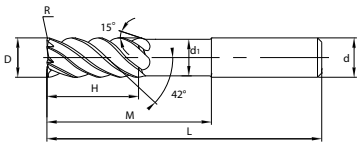
High-performance machining



TM-5RP

– Factory standard
– Helix angle 41°





Article	✻	Dimensions [mm]							Teeth	Grade
		D	R	d (h6)	d_1	H	M	L		KMS405
TM-5RP-D8.0R0.3		8	0.3	8	7.4	16	25	75	5	●
TM-5RP-D8.0R0.5		8	0.5	8	7.4	16	25	75	5	●
TM-5RP-D8.0R0.75		8	0.75	8	7.4	16	25	75	5	○
TM-5RP-D8.0R1.0		8	1.0	8	7.4	16	25	75	5	●
TM-5RP-D10.0R0.5		10	0.5	10	9.4	20	32	75	5	●
TM-5RP-D10.0R0.75		10	0.75	10	9.4	20	32	75	5	○
TM-5RP-D10.0R1.0		10	1.0	10	9.4	20	32	75	5	●
TM-5RP-D10.0R1.25		10	1.25	10	9.4	20	32	75	5	○
TM-5RP-D10.0R1.5		10	1.5	10	9.4	20	32	75	5	●
TM-5RP-D10.0R1.6		10	1.6	10	9.4	20	32	75	5	●
TM-5RP-D10.0R2.0		10	2.0	10	9.4	20	32	75	5	●
TM-5RP-D10.0R2.5		10	2.5	10	9.4	20	32	75	5	●
TM-5RP-D10.0R3.0		10	3.0	10	9.4	20	32	75	5	●

● Ex stock ○ On demand

✻ With internal cooling

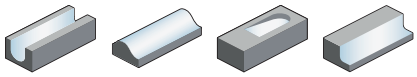
Application field

P	M	K	N	S	H
	✔			✔	

✔ Very suitable
✔ suitable

Torus mills

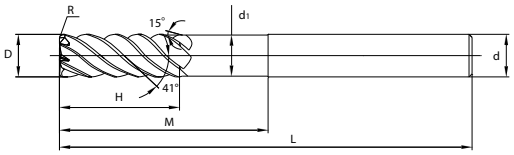
High-performance machining



TM-7RP

– Factory standard
– Helix angle 42°





Article	✻	Dimensions [mm]							Teeth	Grade
		D	R	d (h6)	d_1	H	M	L		KMS405
TM-7RP-D12.0R0.5		12	0.5	12	11.4	24	40	90	7	●
TM-7RP-D12.0R0.75		12	0.75	12	11.4	24	40	90	7	○
TM-7RP-D12.0R1.0		12	1.0	12	11.4	24	40	90	7	●
TM-7RP-D12.0R1.25		12	1.25	12	11.4	24	40	90	7	○
TM-7RP-D12.0R1.5		12	1.5	12	11.4	24	40	90	7	●
TM-7RP-D12.0R1.6		12	1.6	12	11.4	24	40	90	7	●
TM-7RP-D12.0R2.0		12	2.0	12	11.4	24	40	90	7	●
TM-7RP-D12.0R2.5		12	2.5	12	11.4	24	40	90	7	●
TM-7RP-D12.0R3.0		12	3.0	12	11.4	24	40	90	7	●
TM-7RP-D12.0R3.2		12	3.2	12	11.4	24	40	90	7	●
TM-7RP-D12.0R4.0		12	4.0	12	11.4	24	40	90	7	●
TM-7RP-D16.0R1.0		16	1.0	16	15	32	50	100	7	●
TM-7RP-D16.0R1.25		16	1.25	16	15	32	50	100	7	○
TM-7RP-D16.0R1.5		16	1.5	16	15	32	50	100	7	●
TM-7RP-D16.0R1.6		16	1.6	16	15	32	50	100	7	●
TM-7RP-D16.0R2.0		16	2.0	16	15	32	50	100	7	●
TM-7RP-D16.0R2.5		16	2.5	16	15	32	50	100	7	●
TM-7RP-D16.0R3.0		16	3.0	16	15	32	50	100	7	●
TM-7RP-D16.0R3.2		16	3.2	16	15	32	50	100	7	●
TM-7RP-D16.0R4.0		16	4.0	16	15	32	50	100	7	●
TM-7RP-D16.0R5.0		16	5.0	16	15	32	50	100	7	●
TM-7RP-D16.0R6.3		16	6.3	16	15	32	50	100	7	○
TM-7RP-D20.0R1.0		20	1.0	20	19	35	60	110	7	●
TM-7RP-D20.0R1.25		20	1.25	20	19	35	60	110	7	○
TM-7RP-D20.0R1.5		20	1.5	20	19	35	60	110	7	●
TM-7RP-D20.0R1.6		20	1.6	20	19	35	60	110	7	●
TM-7RP-D20.0R2.0		20	2.0	20	19	35	60	110	7	●
TM-7RP-D20.0R2.5		20	2.5	20	19	35	60	110	7	●
TM-7RP-D20.0R3.0		20	3.0	20	19	35	60	110	7	●
TM-7RP-D20.0R3.2		20	3.2	20	19	35	60	110	7	●
TM-7RP-D20.0R4.0		20	4.0	20	19	35	60	110	7	●
TM-7RP-D20.0R5.0		20	5.0	20	19	35	60	110	7	●
TM-7RP-D20.0R6.3		20	6.3	20	19	35	60	110	7	●

● Ex stock ○ On demand
✻ With internal cooling

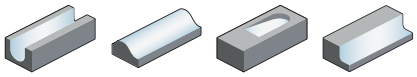
Application field

P	M	K	N	S	H
	✔			✔	

✔ Very suitable
✔ suitable

Torus mills

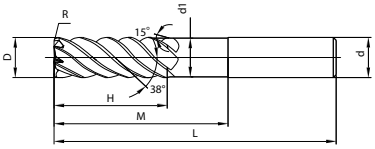
High-performance machining



TM-9RP

– Factory standard
– Helix angle 38°





Article	✻	Dimensions [mm]							Teeth	Grade
		D	R	d (h6)	d_1	H	M	L		KMS405
TM-9RP-D25.0R1.0		25	1.0	25	24	45	75	150	9	●
TM-9RP-D25.0R1.25		25	1.25	25	24	45	75	150	9	○
TM-9RP-D25.0R1.5		25	1.5	25	24	45	75	150	9	●
TM-9RP-D25.0R1.6		25	1.6	25	24	45	75	150	9	●
TM-9RP-D25.0R2.0		25	2.0	25	24	45	75	150	9	●
TM-9RP-D25.0R2.5		25	2.5	25	24	45	75	150	9	●
TM-9RP-D25.0R3.0		25	3.0	25	24	45	75	150	9	●
TM-9RP-D25.0R3.2		25	3.2	25	24	45	75	150	9	●
TM-9RP-D25.0R4.0		25	4.0	25	24	45	75	150	9	●
TM-9RP-D25.0R5.0		25	5.0	25	24	45	75	150	9	●
TM-9RP-D25.0R6.3		25	6.3	25	24	45	75	150	9	●

● Ex stock ○ On demand
✻ With internal cooling

Application field

P	M	K	N	S	H
	✔			✔	

✔ Very suitable
✔ suitable

VPM series

High-speed full-slot milling

YOUR BENEFITS

– Well suited for full-slot milling and applications involving large contact widths
– Short machining times thanks to high stock removal rate
– Low-vibration machining even under extreme conditions

Excellent ramping properties
thanks to large side clearance angle

New geometry for
increased chip volume
with no loss of stability



KMG406
AlCrN PVD coating well
suited for steel and cast iron

Fig.: VPM-4E-D12.0 KMG406

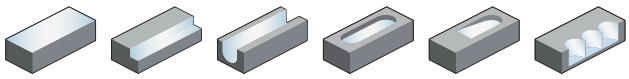


Available with optional Q
thread for added flexibility
in real-world applications

Fig.: Q14-VPM-4E-D25.0 KMG406

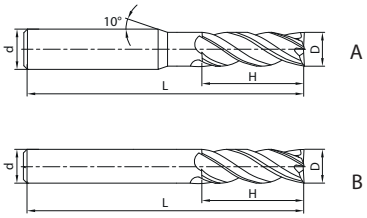
End mill High-performance machining

VPM-4E



– Factory standard
– Centre cutting
– Helix angle 36°/38°





Article	✻	Dimensions [mm]				Teeth	Geometry	Grade
		D	d (h6)	H	L			KMG406
VPM-4E-D3.0		3	6	8	50	4	A	●
VPM-4E-D4.0		4	6	11	50	4	A	●
VPM-4E-D5.0		5	6	13	50	4	A	●
VPM-4E-D6.0		6	6	16	50	4	B	●
VPM-4E-D7.0		7	8	20	60	4	A	●
VPM-4E-D8.0		8	8	20	60	4	B	●
VPM-4E-D9.0		9	10	22	75	4	A	●
VPM-4E-D10.0		10	10	25	75	4	B	●
VPM-4E-D11.0		11	12	26	75	4	A	●
VPM-4E-D12.0		12	12	30	75	4	B	●
VPM-4E-D14.0		14	14	32	75	4	B	●
VPM-4E-D16.0		16	16	45	100	4	B	●
VPM-4E-D18.0		18	18	45	100	4	B	●
VPM-4E-D20.0		20	20	45	100	4	B	●

● Ex stock ○ On demand
✻ With internal cooling

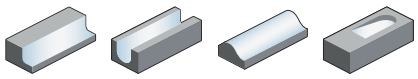
Application field

P	M	K	N	S	H
✔	✔	✔			✔

✔ Very suitable
✔ Suitable

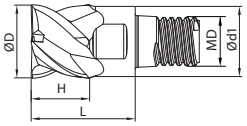
Square shoulder mill | High-performance machining

VPM-4E



– Centre cutting
– Helix angle 38°





Article	✲	Dimensions [mm] D	d1	H	L	MD	Teeth	Grade KMG406
Q08-VPM-4E-D12.0		12	11.5	7	17	8	4	●
Q10-VPM-4E-D16.0		16	15.2	9	21.5	10	4	●
Q12-VPM-4E-D20.0		20	19	11	25.5	12	4	●
Q14-VPM-4E-D25.0		25	24	13.5	31.5	14	4	●

● Ex stock ○ On demand
✲ With internal cooling

Application field

P	M	K	N	S	H
✔	✔	✔			✔

✔ Very suitable
✔ Suitable

Notes

Solid carbide milling Recommended cutting data

End mill – PM series, VPM series

Material group		Composition / structure / heat treatment		Brinell hardness HB	Machining group	Starting values for cutting speed v_c [m/min]							
						PM-2R PM-4R				PM-4RL			
						Slot milling		Shoulder milling		Slot milling		Shoulder milling	
						Ø [mm]	$a_{p\,max}$	Ø [mm]	$a_{e\,max}$	Ø [mm]	$a_{p\,max}$	Ø [mm]	$a_{e\,max}$
						0 < x < 3	0,1 5x D	0 < x ≤ 20	0.15 x D	0 < x < 3	0,1 5x D	0 < x ≤ 20	0.15 x D
						3 ≤ x < 6	0,3 x D			3 ≤ x < 6	0,3 x D		
						6 ≤ x ≤ 20	0,5 x D			6 ≤ x ≤ 20	0,5 x D		
						KMG405				KMG405			
						a_e / D				a_e / D			
						1/1	1/2	1/10	f-group	1/1	1/2	1/10	f-group
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	165	220	300	1	150	200	265	1
		approx. 0,45 % C	annealed	190	2	160	210	285	1	145	190	255	1
		approx. 0,45 % C	tempered	250	3	120	155	210	1	105	140	190	1
		approx. 0,75 % C	annealed	270	4	100	135	180	1	90	120	160	1
		approx. 0,75 % C	tempered	300	5	95	125	165	1	85	110	150	1
	Low-alloyed steel		annealed	180	6	125	165	225	1	115	150	200	1
			tempered	275	7	100	135	180	1	90	120	160	1
			tempered	300	8	95	125	165	1	85	110	150	1
			tempered	350	9	90	115	160	1	80	105	140	1
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	120	155	210	1	105	140	190	1
			hardened and tempered	325	11	90	120	160	1	80	110	145	1
M	Stainless steel	ferritic/martensitic	annealed	200	12	55	75	100	1	50	65	85	1
		martensitic	tempered	240	13	50	65	85	1	45	60	75	1
		austenitic	quench hardened	180	14	60	75	105	1	55	70	95	1
		austenitic-ferritic		230	15	50	65	85	1	45	60	75	1
K	Grey cast iron	perlitic/ferritic		180	16	125	165	220	1	110	150	195	1
		perlitic (martensitic)		260	17	100	135	180	1	90	120	160	1
	Cast iron with spheroidal graphite	ferritic		160	18	150	200	270	1	135	180	240	1
		perlitic		250	19	120	155	210	1	105	140	190	1
	Malleable cast iron	ferritic		130	20	165	220	300	1	150	200	265	1
		perlitic		230	21	135	180	240	1	120	160	215	1
N	Aluminium wrought alloys	cannot be hardened		60	22								
		hardenable	hardened	100	23								
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24								
		≤ 12 % Si, hardenable	hardened	90	25								
		> 12 % Si, cannot be hardened		130	26								
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27								
		CuZn, CuSnZn		90	28								
		CuSn, Pb-free copper, electrolytic copper		100	29								
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30								
			hardened	280	31								
		Ni or Co bass	annealed	250	32								
			hardened	350	33								
			cast	320	34								
	Titanium alloys	pure titanium		R_m 400	35								
		α and β alloys	hardened	R_m 1050	36								
H	Hardened steel		hardened and tempered	55 HRC	37	85	110	145	1	70	95	125	1
			hardened and tempered	60 HRC	38	–	–	–	–	–	–	–	–
	Hard cast iron		cast	400	39	115	145	190	1	95	125	165	1
	Hardened cast iron		hardened and tempered	55 HRC	40	–	–	–	–	–	–	–	–
X	Non-metallic materials	Thermoplasts			41								
		Thermosetting plastics			42								
		Plastic, glass-fibre reinforced GFRP			43								
		Plastic, carbon fibre reinforced CFRP			44								
		Graphite			45								
		Wood			46								

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B76.

	Starting values for cutting speed v_c [m/min]								
	PM-4H PM-4HL				VPM-4E				
			Shoulder milling						
			Ø [mm]	$a_{e\,max}$					
			0 < x ≤ 20	0.15 x D	0 < x < 3	0,5x D	0 < x < 3	0.15 x D	
					3 ≤ x < 12	1,5x D	3 ≤ x < 20	0,5 x D	
					12≤x≤20	2,0x D			
	KMG405				KMG406				
	a_e / D				a_e / D				
	1/1	1/2	1/10	f-group	1/1	1/2	1/10		
	–	210	270	6	230	280	350	9	
	–	200	260	6	220	270	340	9	
	–	150	190	6	160	190	250	9	
	–	130	165	6	140	160	210	9	
	–	120	150	6	130	150	200	9	
	–	160	205	6	180	215	270	9	
	–	130	165	6	130	170	220	9	
	–	120	150	6	125	150	190	9	
	–	110	145	6	120	150	190	9	
	–	150	190	6	160	190	250	9	
	–	115	145	6	115	140	190	9	
	–	70	90	6	70	90	110	9	
	–	60	80	6	60	80	100	9	
	–	75	95	6	75	90	120	9	
	–	60	80	6	65	80	100	9	
	–	155	200	6	160	200	260	9	
	–	130	165	6	140	170	220	9	
	–	190	245	6	215	250	330	9	
	–	150	190	6	160	200	250	9	
	–	210	270	6	230	280	360	9	
	–	170	220	6	180	230	290	9	
	–	100	125	1	100	120	150	9	
	–	–	–	–	–	–	–	–	
	–	130	165	1	110	150	180	9	
	–	–	–	–	–	–	–	–	

Solid carbide milling Recommended cutting data

End mill – QCH series

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

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B76.

	Starting values for cutting speed v_c [m/min]																			
	Q**-HMX-4E Q**-HMX-4R				Q**-HMX-2B Q**-HMX-4B															
			Shoulder milling																	
			Ø [mm]	$a_{e\,max}$																
			0 < x ≤ 20	0.15 x D																
	KMG5515				KMG5515															
	a_e / D				a_e / D															
	1/1	1/2	1/10	f-group	1/1	1/2	1/10	f-group												
	55	100	125	3	–	130	145	7												
	55	95	120	3	–	80	90	7												
	70	125	160	3	–	163	181	7												
	55	100	125	3	–	109	145	7												

Solid carbide milling Recommended cutting data

End mill – TM series

	Material group	Composition / structure / heat treatment		Brinell hardness HB	Machining group	Starting values for cutting speed v_c [m/min]							
						TM-4R / TM-4RP TM-5R / TM-5RP TM-7R / TM-7RP TM-9R / TM-9RP				TM-4B / TM-4BP TM-5B / TM-5BP			
						Slot milling		Shoulder milling		Slot milling		Shoulder milling	
						0 < x < 3	0,3 x D	0 < x < 3					
						3 ≤ x < 12	0,7 x D	3 ≤ x < 20	0,3 x D				
						12 ≤ x ≤ 20	1,5 x D						
						KMS405				KMS405			
						a_e / D				a_e / D			
						1/1	1/2	1/10	f-group	1/1	1/10	1/20	f-group
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1								
		approx. 0,45 % C	annealed	190	2								
		approx. 0,45 % C	tempered	250	3								
		approx. 0,75 % C	annealed	270	4								
		approx. 0,75 % C	tempered	300	5								
	Low-alloyed steel		annealed	180	6								
			tempered	275	7								
			tempered	300	8								
			tempered	350	9								
	High-alloyed steel and high-alloyed tool steel		annealed	200	10								
			hardened and tempered	325	11								
M	Stainless steel	ferritic/martensitic	annealed	200	12								
		martensitic	tempered	240	13								
		austenitic	quench hardened	180	14								
		austenitic-ferritic		230	15								
K	Grey cast iron	perlitic/ferritic		180	16								
		perlitic (martensitic)		260	17								
	Cast iron with spheroidal graphite	ferritic		160	18								
		perlitic		250	19								
	Malleable cast iron	ferritic		130	20								
		perlitic		230	21								
N	Aluminium wrought alloys	cannot be hardened		60	22								
		hardenable	hardened	100	23								
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24								
		≤ 12 % Si, hardenable	hardened	90	25								
		> 12 % Si, cannot be hardened		130	26								
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27								
		CuZn, CuSnZn		90	28								
		CuSn, Pb-free copper, electrolytic copper		100	29								
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30	45	55	85	10	–	85	90	10
			hardened	280	31	25	30	45	10	–	45	50	10
		Ni or Co bass	annealed	250	32	45	55	85	10	–	85	90	10
			hardened	350	33	25	30	45	10	–	45	50	10
			cast	320	34	25	30	45	10	–	45	50	10
	Titanium alloys	pure titanium		R_m 400	35	75	90	135	10	–	135	145	10
		α and β alloys	hardened	R_m 1050	36	45	55	85	10	–	85	90	10
H	Hardened steel		hardened and tempered	55 HRC	37								
			hardened and tempered	60 HRC	38								
	Hard cast iron		cast	400	39								
	Hardened cast iron		hardened and tempered	55 HRC	40								
X	Non-metallic materials	Thermoplasts			41								
		Thermosetting plastics			42								
		Plastic, glass-fibre reinforced GFRP			43								
		Plastic, carbon fibre reinforced CFRP			44								
		Graphite			45								
		Wood			46								

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B76.

Recommended feed rate

Solid carbide milling group 1 – Square shoulder mills PM series, QCH series, EPM series

	a_e / D	Feed rate per cutting edge (f_z) [mm]																		
		Ø0,5	Ø0,8	Ø 1	Ø 2	Ø 3	Ø 4	Ø 5	Ø 6	Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 18	Ø 20				
P	1/1	0,01	0,02	0,02	0,02	0,02	0,02	0,03	0,03	0,05	0,07	0,08	0,08	0,09	0,09	0,10				
	1/2	0,01	0,03	0,03	0,03	0,03	0,03	0,04	0,04	0,06	0,09	0,10	0,10	0,12	0,12	0,13				
	1/10	0,02	0,05	0,05	0,05	0,05	0,05	0,07	0,07	0,09	0,14	0,16	0,16	0,18	0,18	0,20				
M	1/1	0,01	0,02	0,02	0,02	0,02	0,02	0,03	0,03	0,04	0,05	0,06	0,06	0,07	0,07	0,08				
	1/2	0,01	0,02	0,02	0,02	0,02	0,02	0,04	0,04	0,05	0,07	0,08	0,08	0,10	0,10	0,11				
	1/10	0,02	0,04	0,04	0,04	0,04	0,04	0,05	0,05	0,07	0,11	0,13	0,13	0,15	0,15	0,16				
K	1/1	0,01	0,02	0,02	0,02	0,02	0,02	0,03	0,03	0,05	0,07	0,08	0,08	0,09	0,09	0,10				
	1/2	0,01	0,03	0,03	0,03	0,03	0,03	0,04	0,04	0,06	0,09	0,10	0,10	0,12	0,12	0,13				
	1/10	0,02	0,05	0,05	0,05	0,05	0,05	0,07	0,07	0,09	0,14	0,16	0,16	0,18	0,18	0,20				
H	1/1	0,01	0,02	0,02	0,02	0,02	0,02	0,03	0,03	0,04	0,05	0,06	0,06	0,07	0,07	0,08				
	1/2	0,01	0,02	0,02	0,02	0,02	0,02	0,04	0,04	0,05	0,07	0,08	0,08	0,10	0,10	0,11				
	1/10	0,02	0,04	0,04	0,04	0,04	0,04	0,05	0,05	0,07	0,11	0,13	0,13	0,15	0,15	0,16				

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

Solid carbide milling group 9 – Square shoulder mills UM/UMC series, VPM series HSC/HPC

	a_e / D	Feed rate per cutting edge (f_z) [mm]																		
		Ø 4	Ø 5	Ø 6	Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 18	Ø 20									
P	1/1	0,06	0,06	0,06	0,07	0,07	0,07	0,07	0,08	0,08	0,08									
	1/2	0,08	0,08	0,08	0,09	0,09	0,09	0,09	0,10	0,10	0,10									
	1/10	0,14	0,14	0,16	0,18	0,22	0,25	0,27	0,3	0,32	0,36									
M	1/1	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,06	0,06	0,06									
	1/2	0,06	0,06	0,06	0,07	0,07	0,07	0,07	0,08	0,08	0,08									
	1/10	0,10	0,10	0,10	0,12	0,12	0,14	0,16	0,16	0,18	0,18									
K	1/1	0,06	0,06	0,06	0,07	0,07	0,07	0,07	0,08	0,08	0,08									
	1/2	0,08	0,08	0,08	0,09	0,09	0,09	0,09	0,10	0,10	0,10									
	1/10	0,14	0,14	0,16	0,18	0,22	0,25	0,27	0,3	0,32	0,36									
H	1/1	0,045	0,045	0,045	0,053	0,053	0,053	0,053	0,06	0,06	0,06									
	1/2	0,06	0,06	0,06	0,07	0,07	0,07	0,07	0,08	0,08	0,08									
	1/10	0,10	0,10	0,10	0,12	0,12	0,14	0,16	0,16	0,18	0,18									

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

Solid carbide milling group 10 – Square shoulder mills VSM series, TM series

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

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

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