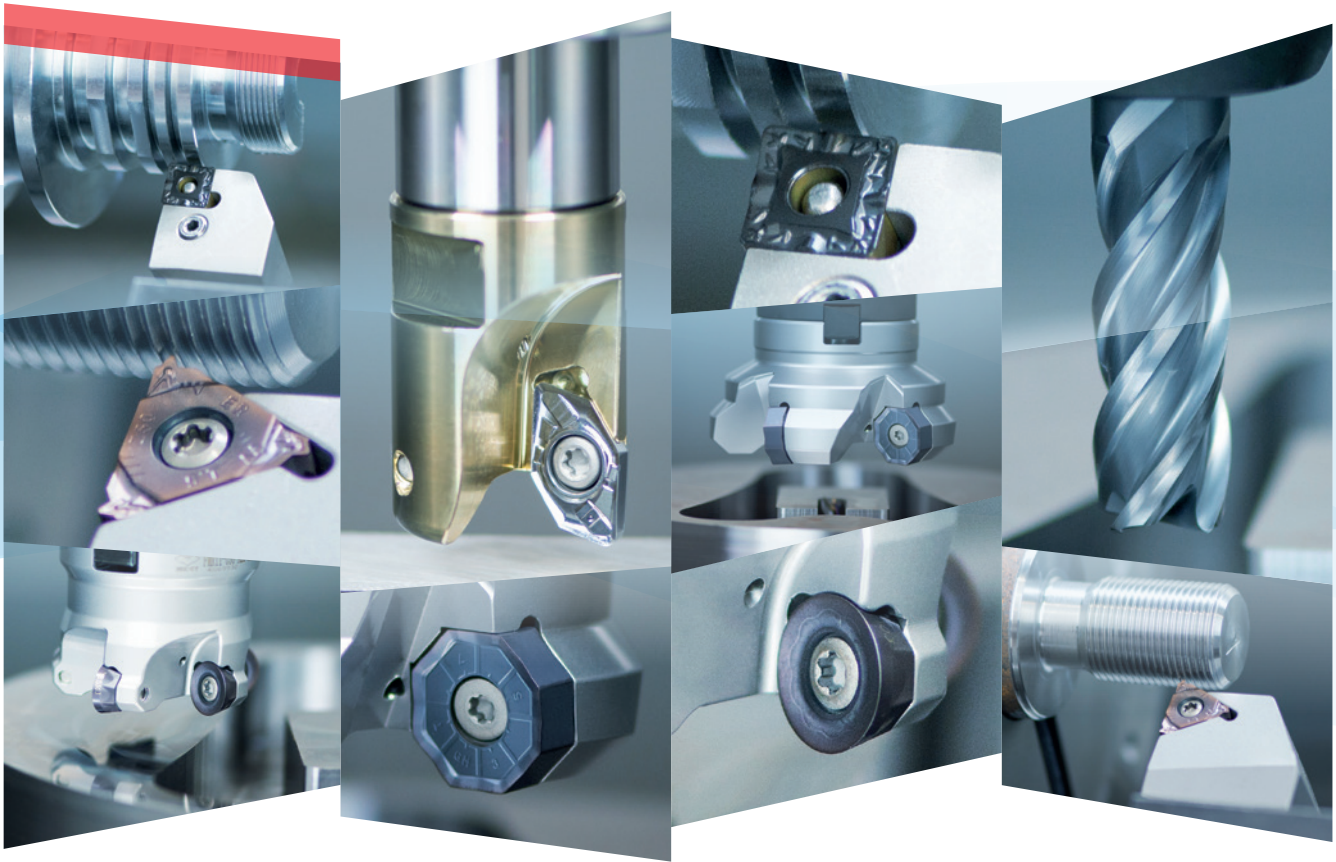




ZCC Cutting Tools
Europe GmbH



Product Innovations 09/2022

XMH chip breaker – zType threading inserts – EMP14 aluminium milling system
FMA12 face milling system – FMR11 round insert milling cutter – VPM solid carbide milling cutters

– EN –

The Company

Zhuzhou Cemented Carbide Cutting Tools Co., Ltd. (ZCC-CT), based in Zhuzhou, China, is the largest Chinese manufacturer of carbide tools. It is also a key company of China Tungsten High-Tech Material Co. Ltd. part of the China Minmetals Corporation.

Since its founding in 1953, ZCC Cutting Tools Co., Ltd. has grown to become one of the world's leading carbide manufacturers with more than 2,000 employees by using the latest technologies and employing highly skilled personnel. The company continuously modernises production technologies and expands its production capacities to enable the company's ongoing growth. As part of Minmetals Corporation, ZCC-CT is able to cover the entire value chain of modern carbide tool production itself, from raw material extraction through to the coated end product and all associated intermediate steps.

By drawing on the latest in European production technology, the company offers products that consistently meet the highest quality standards. Our extensive product range includes carbide/solid carbide, cermet, CBN, PCD and ceramic inserts, carbide tools, tool holders, milling bodies and the accompanying tool systems. All products are consistently produced to accepted international standards, including ISO, DIN, ANSI, JIS and BSI. In addition, ZCC-CT offers customised solutions and special carbide products built to individual specifications.

ZCC-CT invests heavily in research and development. The associated investments go beyond that of most competitors. ZCC Cutting Tools' excellently trained engineers, scientists and a competent, international team, research the necessary fundamentals. These form the basis for the ongoing development of new products and the improvement of existing ones.

The company continuously introduces improvements in quality to meet the customers' ever-increasing demands for new and innovative products and to maximise the benefit of each individual

customer. Both production and administration in China are subject to the ISO 9001:2008 standard, while environmental management is subject to the requirements set out in ISO 14001:2004.

The foundation of the European headquarters of ZCC-CT, ZCC Cutting Tools Europe GmbH and the European central warehouse, both located in Düsseldorf (Germany), dates back to 2003. Today, all European countries as well as the adjacent markets are served from there.

The quality management system of ZCC Cutting Tools Europe GmbH is certified in the area of 'distribution and logistics of metal-working tools' in accordance with ISO 9001:2008.

The Test and Demonstration Centre is available for optimizing customer processes according to individual requirements.

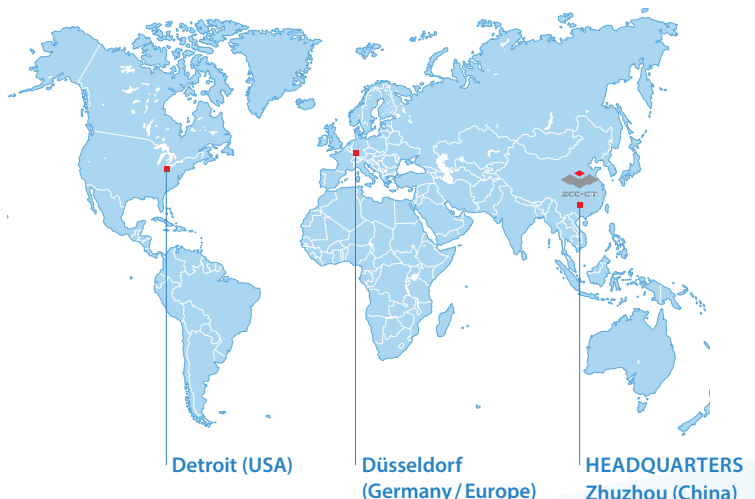
External sales staff and distribution partners in Europe work hand in hand to support customers across the region. Our friendly ZCC-CT application engineers are also available to support you with their expertise and experience by phone, e-mail or in person at your production facility.

The entire field and office sales force is available to answer enquiries from clients across Europe in their native language. Together with employees from the logistics team and with the help of a sophisticated service system, they ensure that all orders are delivered as quickly as possible to you. Branch offices in France and Great Britain add to additional regional proximity to customers.

ZCC Cutting Tools Europe GmbH and all of our employees are there for you and have your back as a competent partner for all matters concerning machining production. This is how we define 'your partner – your value'.



Member of Minmetals Group



This brochure will be presenting the following new products:

Product Innovations 09 / 2022

GENERAL TURNING

Page



XMH chip breaker – Semi-finishing made easy

A8

THREADING

Page



zType threading inserts – New series for high-quality results in threading operations

A11

INDEXABLE MILLING

Page



FMA12 face milling system – Now available in new ONHU09T5 insert size

B30



EMP14 aluminium milling system – Precisely 90° for shoulder milling operations

B34



FMR11 round insert milling cutter – Maximum cutting performance

B42

SOLID CARBIDE MILLING

Page



VPM series – Now also available as a torus milling cutter/with Weldon clamping surface

B67



A glimpse inside: Highlights from previous Product Innovations brochures

Product Innovations 05 / 2022

GENERAL TURNING

miniTURN – New YPG202 grade for enhanced performance

INDEXABLE MILLING

YBG205H grade – Optimal for high-temperature applications

FMP06 – High-performance hard machining with 88° approach angle

FMA17 – Versatile milling system for efficient facing operations

FMP17 – Efficient universal tool for machining end faces and contours

FMR04 – Extension: Now with new inserts and chip breakers

SOLID CARBIDE MILLING

TM series – Expanded line with compact torus milling cutters from Ø1.0 mm

VPM series – High-speed full-slot milling

SOLID CARBIDE DRILLING

UD series – Extension: Now available in diameters from 1.0 mm with internal cooling



[Go to PDF online](#)

Product Innovations 11 / 2021

GENERAL TURNING

XF chip breaker – For maximum control

XM chip breaker – High-performance all-round tool

YBC grade – For unrivalled productivity and reliability

RF / RH chip breaker – Specialised chip breakers for rail applications

LNIX inserts – Specialised inserts for rail applications

CNMM / CNMG inserts – Specialised inserts for rail applications

External tool holders for rail applications

ZNEX compact boring system – Specialised tool for cutting hard metals

PARTING & GROOVING

zFlex – Extension: now also available for deep parting off operations

SOLID CARBIDE MILLING

UM series – Extension: end mills with five cutting edges and neck

UMC series – Short chips despite long cutting edges



[Go to PDF online](#)

Product Innovations 05 / 2021

PARTING & GROOVING

zFlex – Modular grooving system

INDEXABLE MILLING

FMA04 – Ideal choice when working under unstable conditions or on thin components

FMWX – Maximum precision and ultra-high surface qualities

EMP09 – Extension: GL chip breaker for LNKT inserts

SOLID CARBIDE MILLING

ALP / ALG series – Extension: single-edged tools (for full-slot machining and profiling)

SOLID CARBIDE DRILLS

GD series – Extension: Now also available in 3xD with Weldon surface



[Go to PDF online](#)

Product Innovations 09 / 2020

GENERAL TURNING

zRay – Extension: now available with dual coolant supply

INDEXABLE MILLING

FMA12 – Extension: GL/GH/W chip breakers now available in combination with YB9320 grade (for ONHU/ONMU)

QCH series – Indexable interchangeable head milling cutters

SOLID CARBIDE MILLING

HPC series – Extension: KMG406 grade

INDEXABLE DRILLS

ZSD series – For optimum surface quality

SOLID CARBIDE DRILLS

UD series – Solid carbide drills for difficult-to-machine materials

GD series – Solid carbide drills for high feeds



[Go to PDF online](#)

Product Innovations 03 / 2020

GENERAL TURNING

zRay – 100% chip control

YBC103 grade – Maximum productivity

XM chip breaker – High-performance all-rounder

YB7305 grade – Maximum performance for cast iron materials

TK chip breaker – The universal tool for cast iron materials

YBS103 grade – High-performance PVD grade for nickel-based alloys

YBS203 grade – Universal PVD grade for turning and milling operations

PARTING & GROOVING

Precision monoblock tool holder – Extension: Now available with internal cooling

INDEXABLE MILLING

YBS203 grade – High-performance PVD grade for nickel-based alloys

YBS303 grade – Universal PVD grade for titanium alloys with an interrupted cut

NM chip breaker – For reliable machining operations

XR chip breaker – Universal high-feed geometry

SOLID CARBIDE MILLING

PM series – Program extension in the field of micro-machining

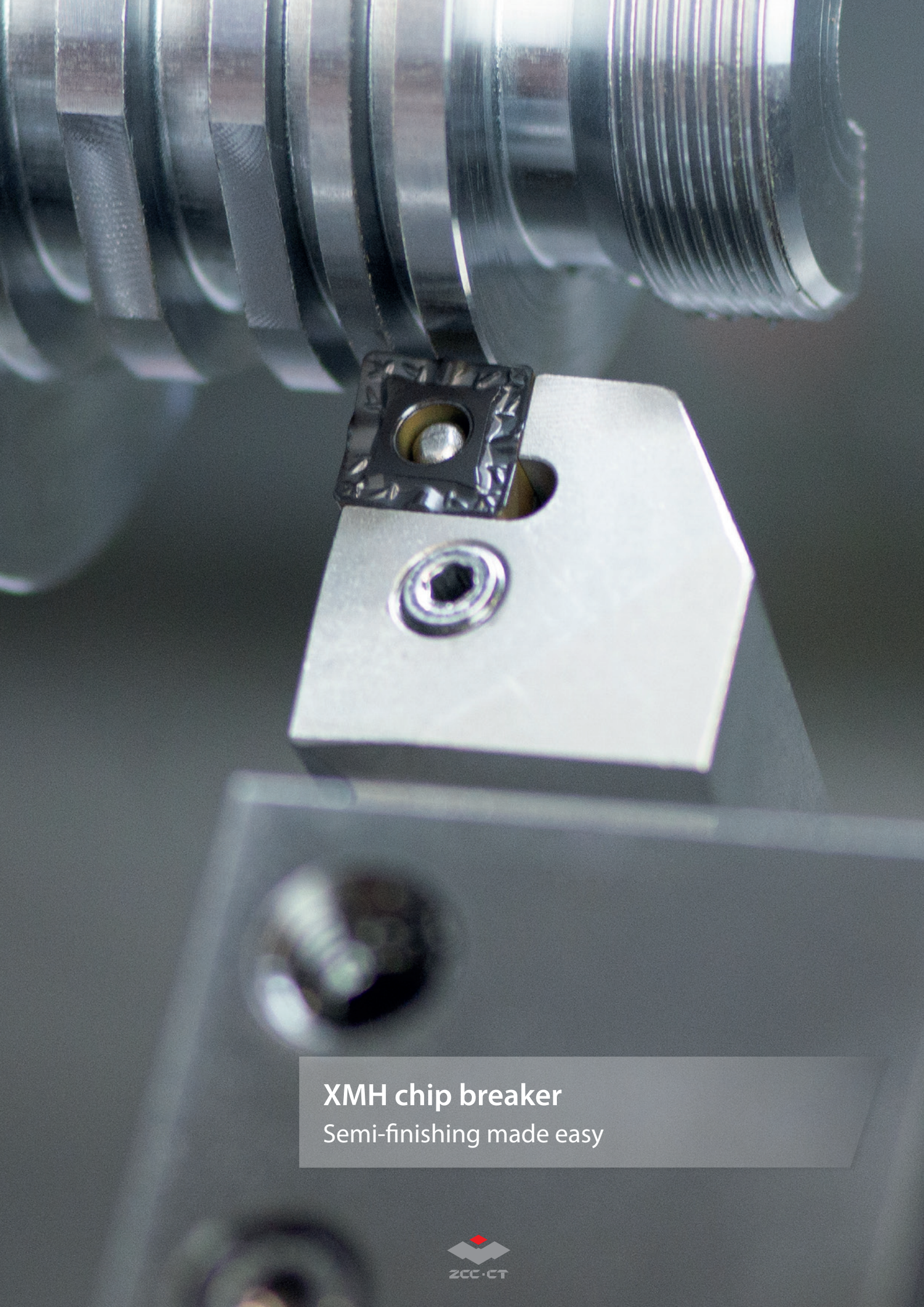
TM series – For machining titanium and superalloys

QCH series – Solid carbide interchangeable head milling cutters

FM series – Extension: 120° deburring cutter



[Go to PDF online](#)



XMH chip breaker
Semi-finishing made easy

General turning

XMH chip breaker

A8



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XMH chip breaker

Semi-finishing made easy

YOUR BENEFITS

- Positive geometry **for low cutting forces at high feed rates**
- Recommended for low-power machines
- Excellent chip control even at low cutting depths thanks to optimum positioning of chip-forming elements

Positive rake angle for reduced cutting forces and vibration

Positive cutting edge for higher feed rates at lower cutting forces

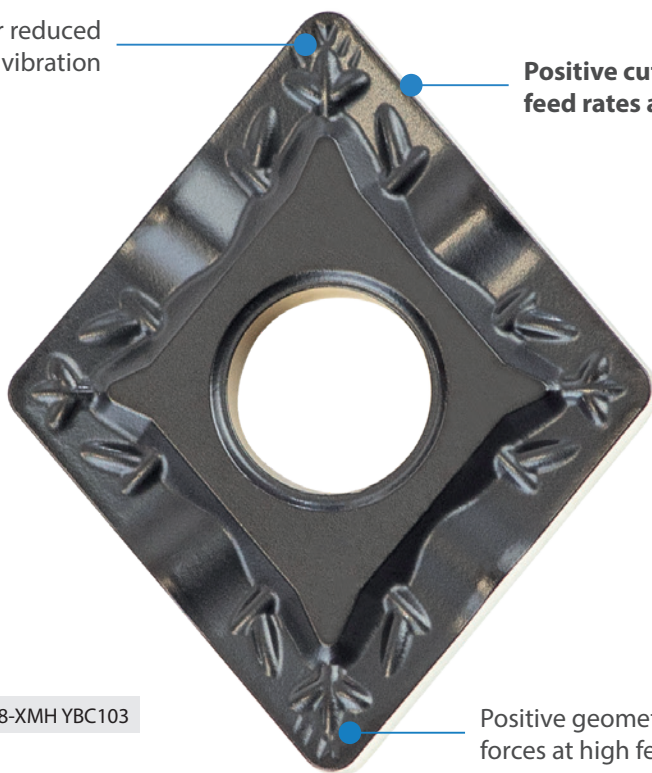


Fig.: CNMG120408-XMH YBC103

Positive geometry for low cutting forces at high feed rates

Articles available at launch of new XMH chip breaker:

Article	r [mm]	ap [mm]	f [mm/U]	YBC103	YBC203
CNMG120408-XMH	0,8	1,0–4,2	0,2–0,4	●	●
CNMG120412-XMH	1,2	1,0–4,2	0,2–0,6	●	●
CNMG160608-XMH	0,8	1,0–5,6	0,2–0,4	○	○
CNMG160612-XMH	1,2	1,0–5,6	0,2–0,6	●	●
CNMG160616-XMH	1,6	1,0–5,6	0,2–0,8	●	●
WNMG060408-XMH	0,8	1,0–2,1	0,2–0,4	●	●
WNMG060412-XMH	1,2	1,0–2,1	0,2–0,6	●	○
WNMG080408-XMH	0,8	1,0–2,8	0,2–0,4	●	○
WNMG080412-XMH	1,2	1,0–2,8	0,2–0,6	●	●
WNMG080416-XMH	1,6	1,0–2,8	0,2–0,8	●	○

● Ex stock

○ On demand

Threading

System code – inserts	A10
zType threading inserts	A11–A22
Recommended cutting data	A23



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Z 16 ER 1.5 ISO PP

1 2 3 4 5 6

Turning

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Product line

1

Insert size [mm]

Code	I.C
11	6,35
16	9,252
22	12,70

2

Application

Code	Description
ER	External thread right
IR	Internal thread right
EL	External thread left
IL	Internal thread left

3

Pitch

Code	Pitch range (part profile)
A	0,5 – 1,5 mm 48 – 16 (TPI)
AG	0,5 – 3,0 mm 48 – 8 (TPI)
G	1,75 – 3,0 mm 14 – 8 (TPI)
N	3,5 – 5,0 mm 7 – 5 (TPI)

Pitch range [mm] (full profile)

0.5 0.75 1.0 1.25 1.5
1.75 2.0 2.5 3.0 3.5
4.0 4.5 5.0 5.5 6.0

Pitch range (TPI) (full profile)

4 5 6 8
10 11 11.5 12
14 16 18 19
20 24 27 28

4

Thread profile

Code	Description
ISO	ISO metric coarse thread 60°
60	Partial profile 60°
55	Partial profile 55°
W	Whitworth
UN	Unified conventional thread
BSPT	Whitworth taper pipe thread
NPT	American taper pipe thread
RD	API round thread
R	Knuckle thread 30°
TR	Metrical trapezoidal thread 30°

5

Chip breaker

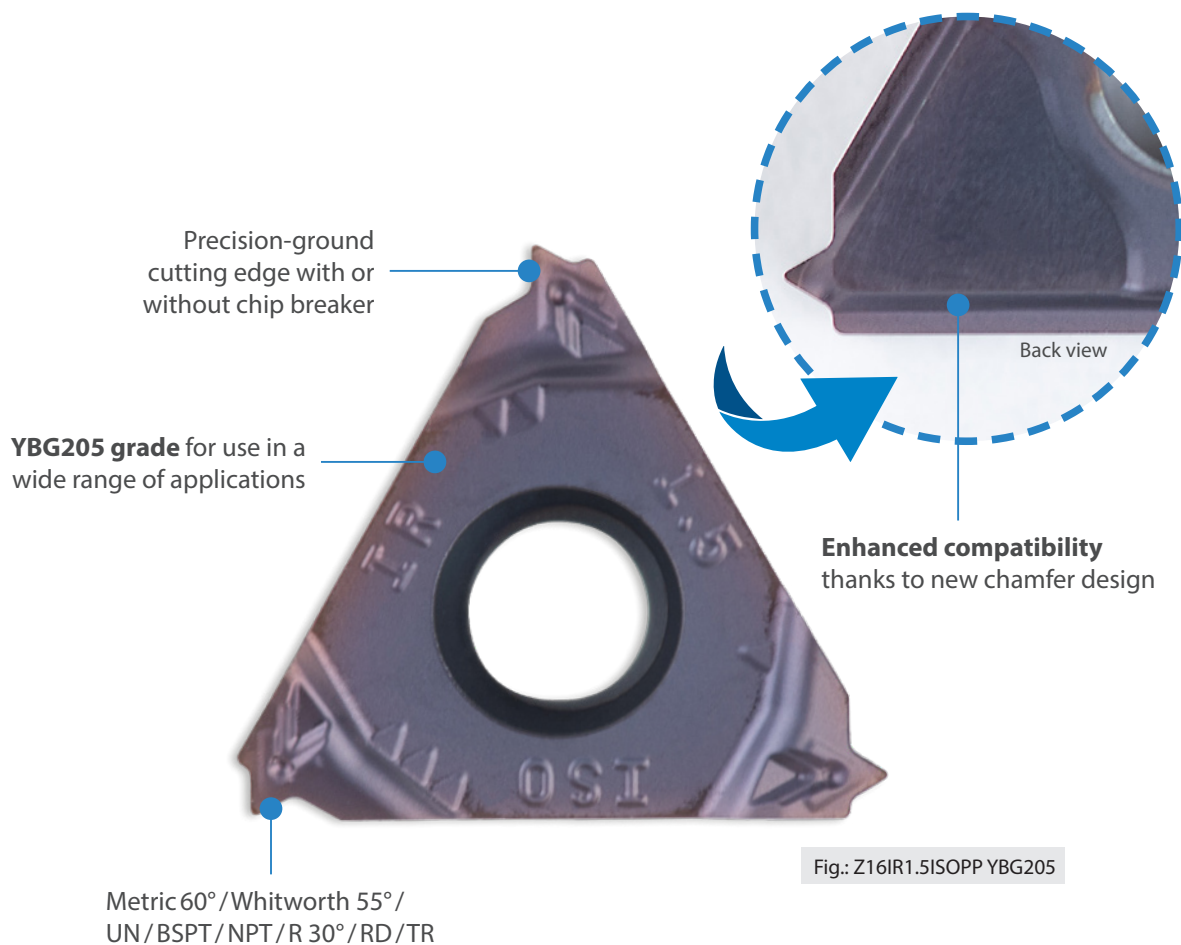
6

zType threading inserts

New series for high-quality results in threading operations

YOUR BENEFITS

- **Highly compatible with commercially available systems**
- Tried-and-tested YBG205 grade for use in a wide range of applications
- **Wide assortment of thread types**
- Available with or without chip breaker
- Lower carbide content to conserve resources and save money



A

zType threading inserts

Z	I.C	S	d
11	6,35	3,05	3,2
16	9,525	3,52	4,0

Turning

B

Milling

C

Drilling

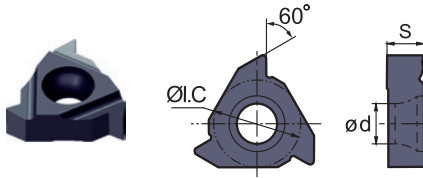
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Technical Information

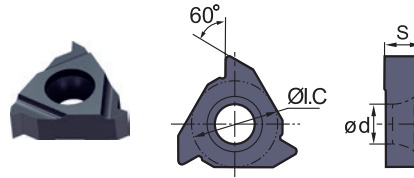
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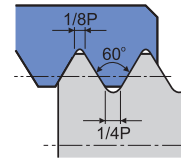
ISO metric coarse thread 60°



External right hand
Internal left hand



Internal right hand
External left hand



ISO 965-1980 DIN 13
GB-T 197-2003 Tolerance: 6g/6H

ISO	Pitch [mm]	External machining	HC ¹ (PVD)					Internal machining	HC ¹ (PVD)				
			YBG205						YBG205				
11	1	-						Z11IR1.0ISO	•				
		-						Z11IL1.0ISO	•				
	1,25	-						Z11IR1.25ISO	•				
		-						Z11IL1.25ISO	•				
	1,5	-						Z11IR1.5ISO	•				
		-						Z11IL1.5ISO	•				
16	1	-						Z11IR2.0ISO	•				
		-						Z11IL2.0ISO	•				
		Z16ER1.0ISO	•					Z16IR1.0ISO	•				
		Z16ER1.0ISOPP	•					Z16IR1.0ISOPP	•				
	1,25	Z16EL1.0ISO	•					Z16IL10ISO	•				
		Z16EL1.0ISOPP	○					-					
		Z16ER1.25ISO	•					Z16IR1.25ISO	•				
		Z16ER1.25ISOPP	•					Z16IR1.25ISOPP	•				
	1,5	Z16EL1.25ISO	•					Z16IL1.25ISO	•				
		Z16ER1.5ISO	•					Z16IR1.5ISO	•				
		Z16ER1.5ISOPP	•					Z16IR1.5ISOPP	•				
		Z16EL1.5ISO	•					Z16IL1.5ISO	•				
	1,75	Z16ER1.75ISO	•					Z16IR1.75ISO	•				
		Z16ER1.75ISOPP	•					Z16IR1.75ISOPP	•				
		Z16EL1.75ISO	•					Z16IL1.75ISO	•				
		Z16ER2.0ISO	•					Z16IR2.0ISO	•				
	2	Z16ER2.0ISOPP	•					Z16IR2.0ISOPP	•				
		Z16EL2.0ISO	•					Z16IL2.0ISO	•				

• Ex stock ○ On demand
PP*: Inserts with chip-breakers

HC¹ Coated cemented carbide

Tool holders

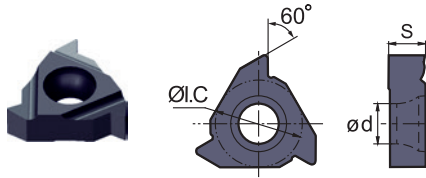
SWR/L

SNR/L

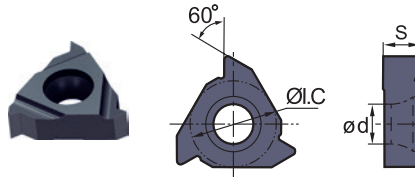


zType threading inserts

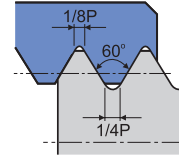
Z	I.C	S	d
16	9,525	3,52	4,0
22	12,7	4,65	5,0

ISO metric coarse thread 60°


External right hand
Internal left hand



Internal right hand
External left hand



ISO 965-1980 DIN 13
GB-T 197-2003 Tolerance: 6g/6H

ISO	Pitch [mm]	External machining	HC ¹ (PVD)					Internal machining	HC ¹ (PVD)				
			YBG205						YBG205				
16	2,5	Z16ER2.5ISO	●					Z16IR2.5ISO	●				
		Z16ER2.5ISOPP	●					Z16IR2.5ISOPP	●				
		Z16EL2.5ISO	●					Z16IL2.5ISO	●				
	3	Z16ER3.0ISO	●					Z16IR3.0ISO	●				
		Z16ER3.0ISOPP	●					Z16IR3.0ISOPP	●				
		Z16EL3.0ISO	●					Z16IL3.0ISO	●				
22	3,5	Z22ER3.5ISO	●					Z22IR3.5ISO	●				
		Z22EL3.5ISO	●					Z22IL3.5ISO	○				
	4	Z22ER4.0ISO	●					Z22IR4.0ISO	●				
		Z22EL4.0ISO	○					Z22IL4.0ISO	○				
	4,5	Z22ER4.5ISO	●					Z22IR4.5ISO	●				
		Z22EL4.5ISO	○					Z22IL4.5ISO	○				
	5	Z22ER5.0ISO	●					Z22IR5.0ISO	●				
		Z22EL5.0ISO	●					Z22IL5.0ISO	●				
	5,5	Z22ER5.5ISO	●					Z22IR5.5ISO	●				
		Z22EL5.5ISO	●					Z22IL5.5ISO	●				
	6	Z22ER6.0ISO	●					Z22IR6.0ISO	●				
		Z22EL6.0ISO	○					Z22IL6.0ISO	●				

● Ex stock ○ On demand
PP*: Inserts with chip-breakers

HC¹ Coated cemented carbide

Tool holders

SWR/L

SNR/L



A

Turning

B

Milling

C

Drilling

D

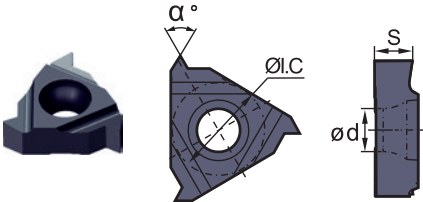
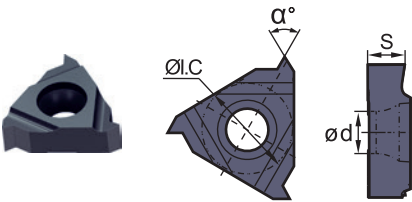
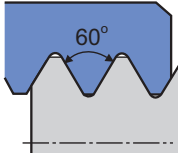
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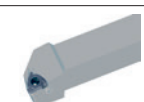
Z	I.C	S	d
11	6,35	3,05	3,2
16	9,525	3,52	4,0
22	12,7	4,65	5,0

zType threading inserts

Partial profile 60°											
											
External right hand Internal left hand			Internal right hand External left hand								
ISO	Pitch [mm]	External machining	HC ¹ (PVD)				Internal machining	HC ¹ (PVD)			
			YBG205					YBG205			
11	0,50–1,50	–					Z11IRA60	•			
		–					Z11ILA60	•			
16	0,50–1,50	Z16ERA60	•				Z16IRA60	•			
		Z16ERA60PP	•				Z16IRA60PP	•			
		Z16ELA60	•				Z16ILA60	•			
	0,50–3,00	Z16ERAG60	•				Z16IRAG60	•			
		Z16ERAG60PP	•				Z16IRAG60PP	•			
		Z16ELAG60	•				Z16ILAG60	•			
	1,75–3,00	Z16ERG60	•				Z16IRG60	•			
		Z16ERG60PP	•				Z16IRG60PP	•			
		Z16ELG60	•				Z16ILG60	•			
	22	3,5–5,00	Z22ERN60	•				Z22IRN60	•		

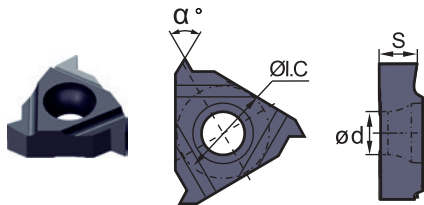
• Ex stock ○ On demand
PP*: Inserts with chip-breakers

HC¹ Coated cemented carbide

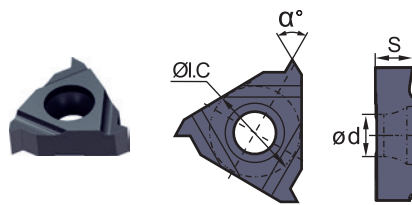
Tool holders	
SWR/L	SNR/L
	

zType threading inserts

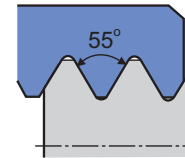
Z	I.C	S	d
11	6,35	3,05	3,2
16	9,525	3,52	4,0
22	12,7	4,65	5,0

Partial profile 55°


External right hand
Internal left hand



Internal right hand
External left hand



ISO	Thread pitches [mm]	External machining	HC ¹ (PVD)					Internal machining	HC ¹ (PVD)				
			YBG205						YBG205				
11	48-16	-						Z11IRA55	●				
		-						Z11ILA55	●				
16	48-16	Z16ERA55	○					Z16IRA55	●				
		Z16ERA55PP	●					Z16IRA55PP	●				
		Z16ELA55	●					Z16ILA55	●				
	48-8	Z16ERAG55	●					Z16IRAG55	●				
		Z16ERAG55PP	●					Z16IRAG55PP	●				
		Z16ELAG55	●					Z16ILAG55	●				
	14-8	Z16ERG55	●					Z16IRG55	●				
		Z16ERG55PP	●					Z16IRG55PP	●				
		Z16ELG55	●					Z16ILG55	●				
	7-5	Z22ERN55	●					Z22IRN55	●				

● Ex stock ○ On demand
PP*: Inserts with chip-breakers

HC¹ Coated cemented carbide

Tool holders

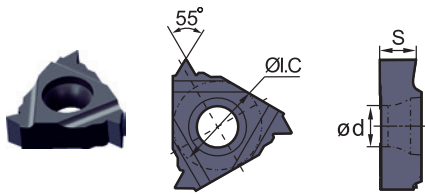
SWR/L	SNR/L

A

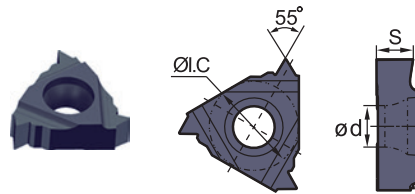
zType threading inserts

Z	I.C	S	d
16	9,525	3,52	4,0

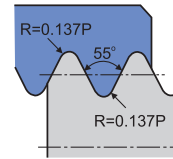
Turning



External right hand
Internal left hand



Internal right hand
External left hand



ISO 965-1980 DIN 13
GB-T 197-2003 Tolerance: medium class A

B

Milling

ISO	Thread pitches [mm]	External machining	HC ¹ (PVD)					Internal machining	HC ¹ (PVD)				
			YBG205						YBG205				
16	8	Z16ER8W	●					Z16IR8W	●				
	9	Z16ER9W	●					Z16IR9W	●				
	10	Z16ER10W	●					Z16IR10W	●				
		Z16EL10W	●					Z16IL10W	●				
	11	Z16ER11W	●					Z16IR11W	●				
		Z16ER11WPP	●					Z16IR11WPP	●				
		Z16EL11W	●					Z16IL11W	●				
	12	Z16ER12W	●					Z16IR12W	●				
		Z16EL12W	●					Z16IL12W	●				
	14	Z16ER14W	●					Z16IR14W	●				
		Z16ER14WPP	●					Z16IR14WPP	●				
		Z16EL14W	●					Z16IL14W	●				
	16	Z16ER16W	●					Z16IR16W	●				
		Z16EL16W	●					Z16IL16W	●				
	18	Z16ER18W	●					Z16IR18W	●				
		Z16EL18W	●					Z16IL18W	●				
	19	Z16ER19W	●					Z16IR19W	●				
		Z16ER19WPP	●					Z16IR19WPP	●				
		Z16EL19W	●					Z16IL19W	●				

● Ex stock ○ On demand
PP*: Inserts with chip-breakers

HC¹ Coated cemented carbide

C

Drilling

D

Technical Information

Tool holders

SWR/L

SNR/L

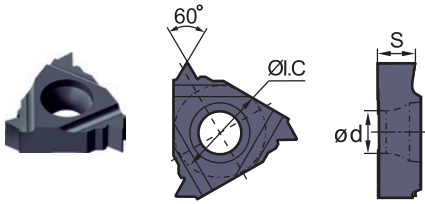


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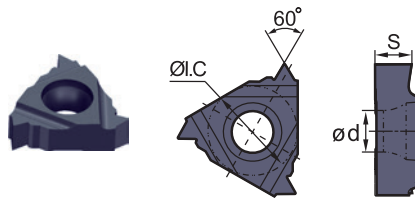
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zType threading inserts

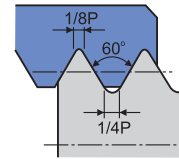
Z	I.C	S	d
16	9,525	3,52	4,0

Unified conventional thread UN


External right hand
Internal left hand



Internal right hand
External left hand



ASME B1.1-1989
Tolerance: 2A/2B

ISO	Thread pitches [mm]	External machining	HC ¹ (PVD)					Internal machining	HC ¹ (PVD)				
			YBG205						YBG205				
16	8	Z16ER8UN	●					Z16IR8UN	●				
		Z16EL8UN	●					Z16IL8UN	○				
	10	Z16ER10UN	●					Z16IR10UN	●				
		Z16EL10UN	●					Z16IL10UN	○				
	12	Z16ER12UN	●					Z16IR12UN	●				
		Z16ER12UNPP	●					Z16IR12UNPP	●				
		Z16EL12UN	●					Z16IL12UN	●				
	14	Z16ER14UN	●					Z16IR14UN	●				
		Z16ER14UNPP	●					Z16IR14UNPP	●				
		Z16EL14UN	●					Z16IL14UN	○				
	16	Z16ER16UN	●					Z16IR16UN	●				
		Z16ER16UNPP	●					Z16IR16UNPP	●				
		Z16EL16UN	●					Z16IL16UN	●				
	18	Z16ER18UN	●					Z16IR18UN	●				
		Z16EL18UN	●					Z16IL18UN	●				
	20	Z16ER20UN	●					Z16IR20UN	●				
		Z16EL20UN	●					Z16IL20UN	●				
	24	Z16ER24UN	●					Z16IR24UN	●				
		Z16EL24UN	●					Z16IL24UN	○				

● Ex stock ○ On demand
PP*: Inserts with chip-breakers

HC¹ Coated cemented carbide

Tool holders

SWR/L

SNR/L

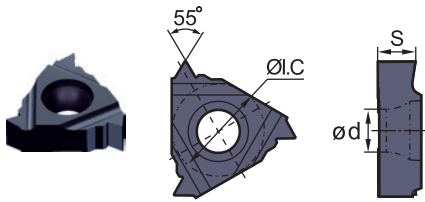


A

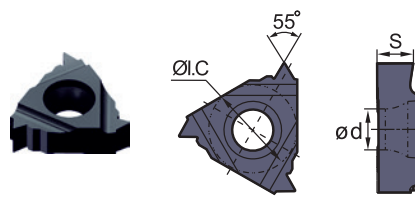
zType threading inserts

Z	I.C	S	d
16	9,525	3,52	4,0

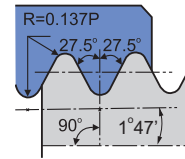
Turning



External right hand
Internal left hand



Internal right hand
External left hand



ASME B1.1-1989
Tolerance: 2A/2B

B

Milling

ISO	Thread pitches [mm]	External machining	HC ¹ (PVD)					Internal machining	HC ¹ (PVD)				
			YBG205						YBG205				
16	11	Z16ER11BSPT	●					Z16IR11BSPT	●				
		Z16ER11BSPTPP	●					Z16IR11BSPTPP	●				
		Z16EL11BSPT	●					–					
	14	Z16ER14BSPT	●					Z16IR14BSPT	●				
		Z16ER14BSPTPP	●					Z16IR14BSPTPP	●				
		Z16EL14BSPT	●					–					
	19	Z16ER19BSPT	●					Z16IR19BSPT	●				
		Z16ER19BSPTPP	●					Z16IR19BSPTPP	●				
		Z16EL19BSPT	●					Z16IL19BSPT	●				
	28	Z16ER28BSPT	●					Z16IR28BSPT	●				
		Z16EL28BSPT	●					–					

● Ex stock ○ On demand
PP*: Inserts with chip-breakers

HC¹ Coated cemented carbide

D

Technical Information

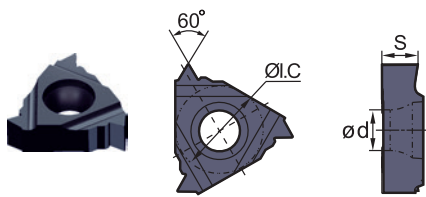
Tool holders	
SWR/L	SNR/L

E

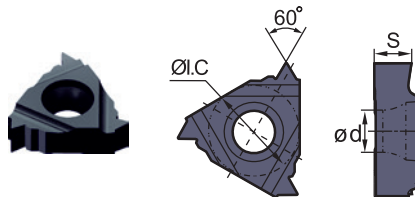
Index

zType threading inserts

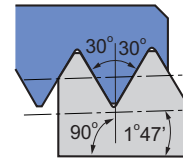
Z	I.C	S	d
16	9,525	3,52	4,0

American taper pipe thread NPT


External right hand
Internal left hand



Internal right hand
External left hand



ASME B1.20.1-1983
Standard NPT

ISO	Thread pitches [mm]	External machining	HC ¹ (PVD)					Internal machining	HC ¹ (PVD)				
			YBG205						YBG205				
16	8	Z16ER8NPT	●					Z16IR8NPT	○				
		Z16EL8NPT	●					-					
	11,5	Z16ER11.5NPT	●					Z16IR11.5NPT	●				
		Z16ER11.5NPTTP	●					Z16IR11.5NPTTP	●				
		Z16EL11.5NPT	●					-					
	14	Z16ER14NPT	●					Z16IR14NPT	●				
		Z16ER14NPTTP	●					Z16IR14NPTTP	●				
		Z16EL14NPT	●					-					
	18	Z16ER18NPT	●					Z16IR18NPT	●				
		Z16ER18NPTTP	●					Z16IR18NPTTP	●				
		Z16EL18NPT	●					Z16IL18NPT	●				
	27	Z16ER27NPT	●					Z16IR27NPT	●				
		Z16EL27NPT	●					-					

● Ex stock ○ On demand
PP*: Inserts with chip-breakers

HC¹ Coated cemented carbide

Tool holders

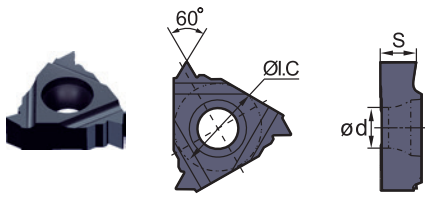
SWR/L	SNR/L

A

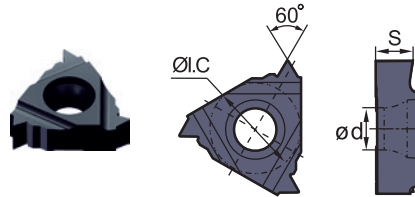
zType threading inserts

Z	I.C	S	d
16	9,525	3,52	4,0

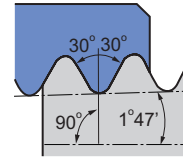
Turning



External right hand
Internal left hand



Internal right hand
External left hand



API spec.5B
Tolerance: API RD

B

Milling

ISO	Thread pitches [mm]	External machining	HC ¹ (PVD)					Internal machining	HC ¹ (PVD)				
			YBG205						YBG205				
16	8	Z16ER8RD	●					Z16IR8RD	●				
	10	Z16ER10RD	●					Z16IR10RD	●				

● Ex stock ○ On demand

HC¹ Coated cemented carbide

C

Drilling

Tool holders	
SWR/L	SNR/L

D

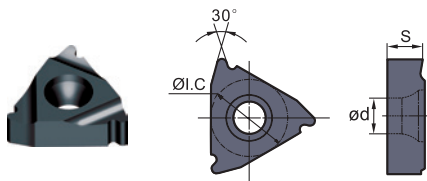
Technical Information

E

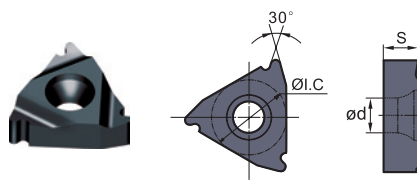
Index

zType threading inserts

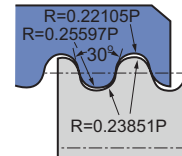
Z	I.C	S	d
16	9,525	3,52	4,0

Knuckle thread 30°


External right hand
Internal left hand



Internal right hand
External left hand



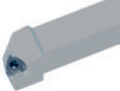
DIN 405
Tolerance: 7

ISO	Thread pitches [mm]	External machining	HC ¹ (PVD)						Internal machining	HC ¹ (PVD)					
			YBG205							YBG205					
16	8	Z16ER8R	●						-						
	10	Z16ER10R	●						-						

● Ex stock ○ On demand

HC¹ Coated cemented carbide

Tool holders

SWR/L	SNR/L
	

A

Turning

B

Milling

C

Drilling

D

Technical
Information

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Index

A

zType threading inserts

Z	I.C	S	d
16	9,525	3,52	4,0

Turning

B

Milling

C

Drilling

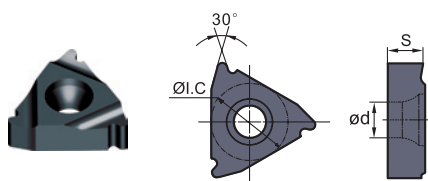
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Technical Information

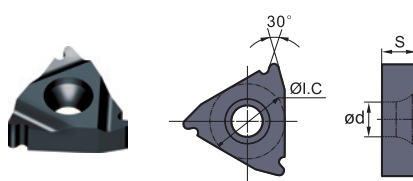
E

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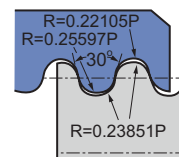
Metrical trapezoidal thread 30°



External right hand
Internal left hand



Internal right hand
External left hand



DIN 405
Tolerance: 7

ISO	Pitch [mm]	External machining	HC ¹ (PVD)					Internal machining	HC ¹ (PVD)				
			YBG205						YBG205				
16	2	Z16ER2.0TR	●					-					

● Ex stock ○ On demand

HC¹ Coated cemented carbide

Tool holders

SWR/L

SNR/L



Threading inserts

Material group		Composition / structure / heat treatment		Brinell hardness HB	Machining group	Starting values for cutting speed v_c [m/min]		
						HC (PVD)		
						YBG205		
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	190		
		approx. 0,45 % C	annealed	190	2	175		
		approx. 0,45 % C	tempered	250	3	145		
		approx. 0,75 % C	annealed	270	4	140		
		approx. 0,75 % C	tempered	300	5	135		
	Low-alloyed steel		annealed	180	6	170		
			tempered	275	7	125		
			tempered	300	8	115		
			tempered	350	9	105		
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	125		
			hardened and tempered	325	11	95		
M	Stainless steel	ferritic/martensitic	annealed	200	12	165		
		martensitic	tempered	240	13	135		
		austenitic	quench hardened	180	14	155		
		austenitic-ferritic		230	15	135		
K	Grey cast iron	perlitic/ferritic		180	16	240		
		perlitic (martensitic)		260	17	185		
	Cast iron with spheroidal graphite	ferritic		160	18	220		
		perlitic		250	19	165		
	Malleable cast iron	ferritic		130	20	175		
		perlitic		230	21	165		
N	Aluminium wrought alloys	cannot be hardened		60	22	800		
		hardenable	hardened	100	23	600		
	Cast aluminium alloys	≤ 12% Si, cannot be hardened		75	24	320		
		≤ 12% Si, hardenable	hardened	90	25	240		
		> 12% Si, cannot be hardened		130	26	160		
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27	160		
		CuZn, CuSnZn		90	28	600		
		CuSn, Pb-free copper, electrolytic copper		100	29	200		
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30	95		
			hardened	280	31	50		
		Ni or Co base	annealed	250	32	80		
			hardened	350	33	70		
			cast	320	34	70		
	Titanium alloys	pure titanium		R _m 400	35	145		
		α and β alloys	hardened	R _m 1050	36	50		
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.
For examples of material for cutting tool groups view page D11.

HC Coated carbide

A

Turning

B

Milling

C

Drilling

D

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zType
Threading inserts

Indexable milling

System code – milling bodies	B26–B27
ISO-Code – inserts	B28–B29
FMA12	B30–B33
EMP14	B34–B41
FMR11	B42–B49
Recommended cutting data	B50–B63

B

A

Turning

B

Milling

C

Drilling

D

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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	
A	45°
E	75°
D	60°
P	90°
R	

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 	C 
D 	E 
F 	N 
P 	

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)					
	Ø	B27	B32	B40	B40
		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.

S P K N 12 04 ED T21K R – DM

1 2 3 4 5 6 7 8 9 10

A

Turning

B

Milling

C

Drilling

D

Technical
Information

E

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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	

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

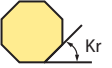
4

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	an
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	P	
T		2	15°	2	0,20	W	
S		3	20°	3	0,25	-	
		4	25°	4	0,30		
		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

A

Turning

B

Milling

C

Drilling

D

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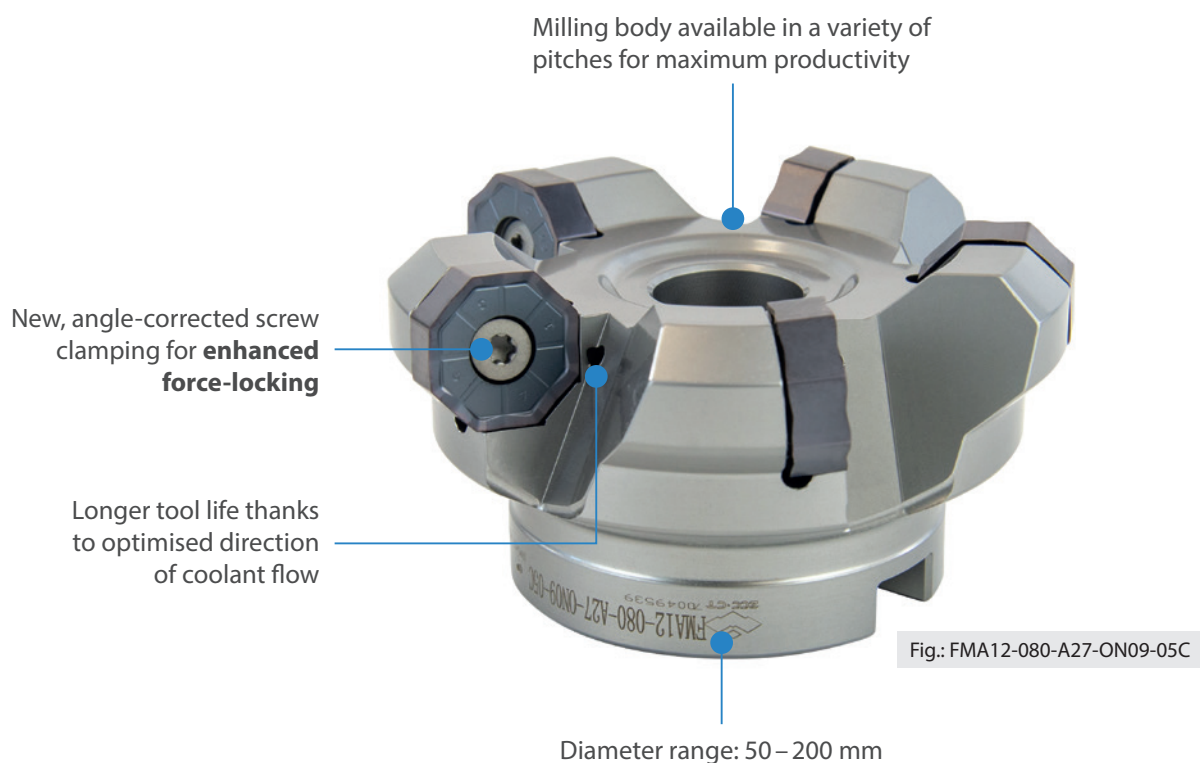
FMA12 face milling system

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



Insert grades

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

Chip breaker

-GM



General machining

-GL



General machining

-GH



Soft cutting geometry

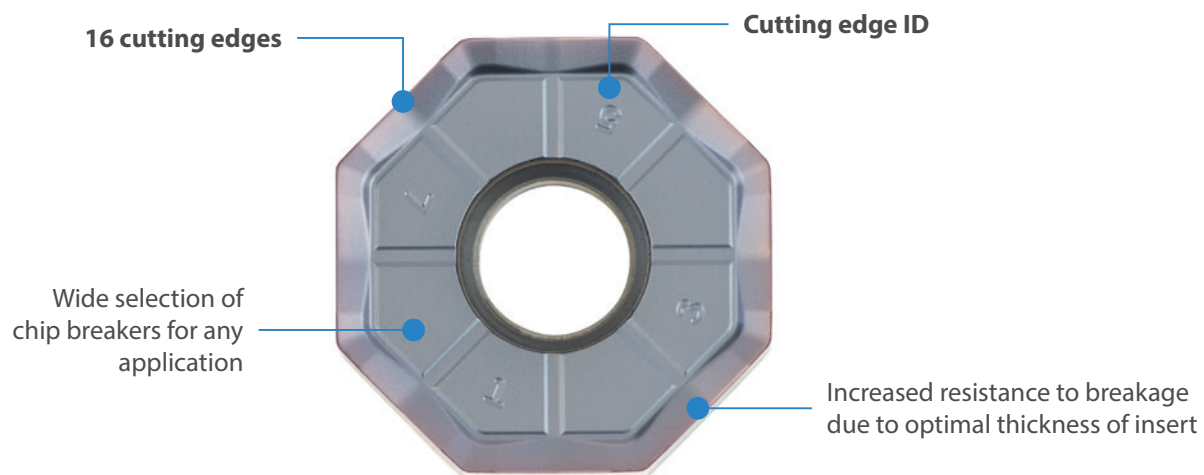
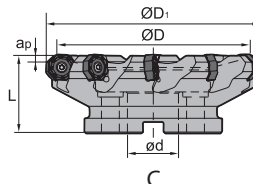
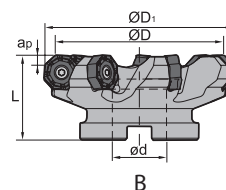
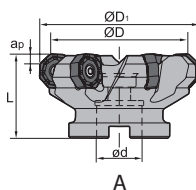
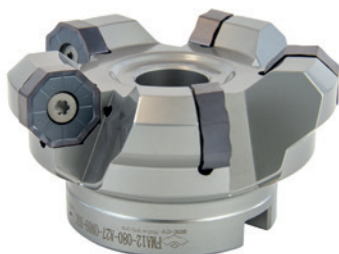


Fig.: ONHU09T508ANN-GM YBG205H

Face mill

FMA12 Kr: 45°



Article	*	Stock	Dimensions [mm]					Teeth	Coupling	kg	Insert
			ØD	ØD ₁	ød	L	a _{p max}				
FMA12-050-A22-ON06-04C	*	●	50	62	22	40	4	4	A	0,3	ONHU0604 ONMU0604
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	
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	ONHU09T5 ONMU09T5
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	
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

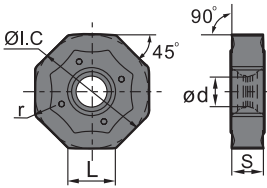
Spare parts

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



Insert grades

YD101

N05 – N20

Chip breaker

-LP



Aluminium machining

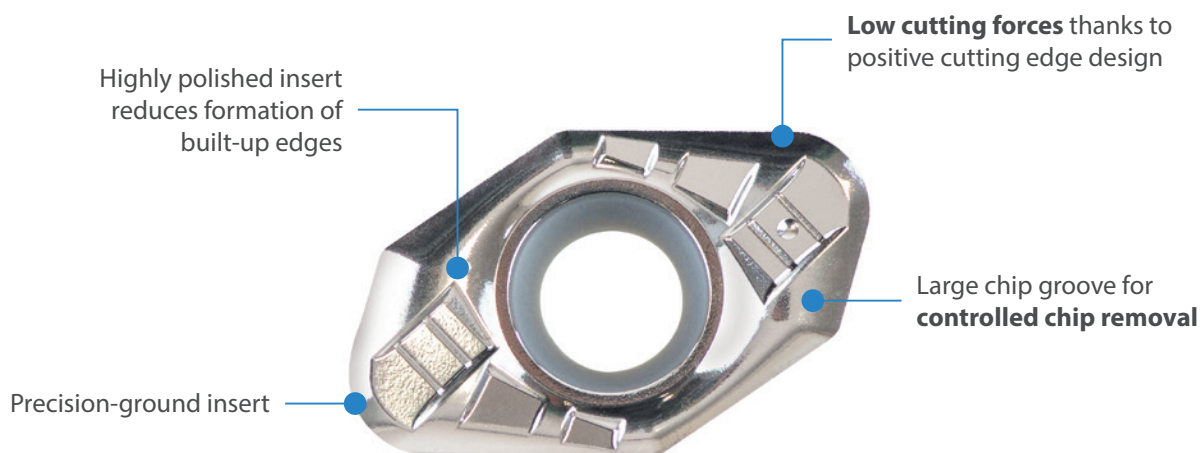


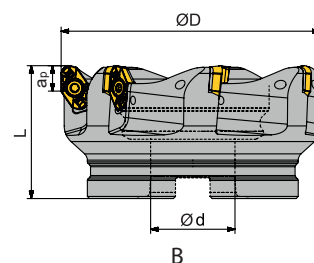
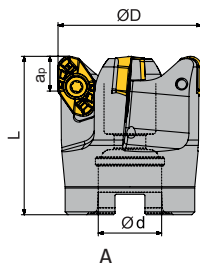
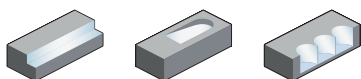
Fig.: VPGT220530-LP YD101

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°



Article	*	Stock	Dimensions [mm]				Teeth	Coupling	kg	Insert
			ØD	Ød	L	a _p max				
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	VPGT220540 – VPGT220550
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	
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

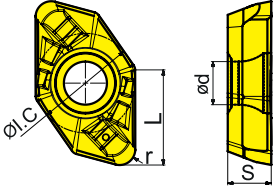
* With internal cooling

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

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			HC ¹ (CVD)	HC ¹ (PVD)	HT	HC ²	HW
		P					
		M					
		K					
		N					
		S					
		H					
ISO		r				VD101	
	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

A

Turning

B

Milling

C

Drilling

D

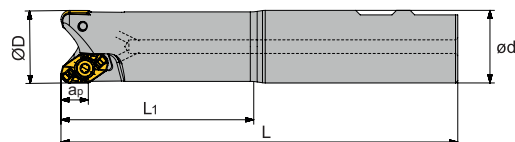
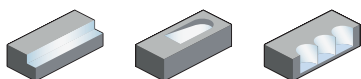
Technical
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Square shoulder mill

EMP14 Kr: 90°



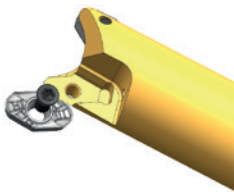
Straight shank

Article	*	Stock	Dimensions [mm]					Teeth	kg	Insert
			ØD	ød	L ₁	L	a _p max			
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

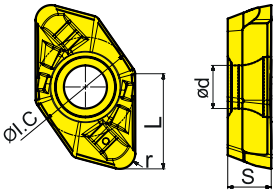
Spare parts

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

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			HC ¹ (CVD)	HC ¹ (PVD)	HT	HC ²	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

A

Turning

B

Milling

C

Drilling

D

Technical
Information

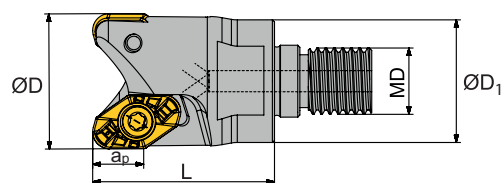
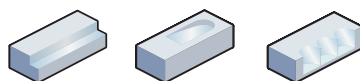
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Square shoulder milling cutter – QCH series

QCH – VPGT

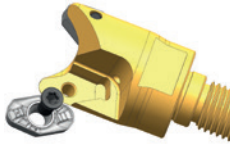
Kr: 90°



Article	*	Stock	Dimensions [mm]					Teeth	kg	Insert
			ØD	ØD ₁	L	MD	a _p max			
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

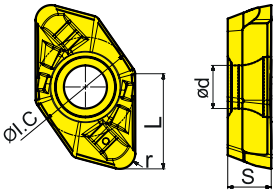
* With internal cooling

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			HC ¹ (CVD)	HC ¹ (PVD)	HT	HC ²	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

A

Turning

B

Milling

C

Drilling

D

Technical
Information

E

Index

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



Insert grades

YBG205H

PVD
P10–P30
M20–M40

YB9320

PVD
P10–P30
M10–M25

YBS303

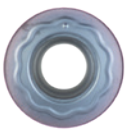
PVD
S25–S35

YBD252

CVD
K20–K35

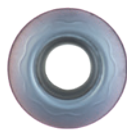
Chip breaker

RDMT-M
RPMT-M



General machining

RDMT-MM
RPMT-MM



Soft cutting geometry

RDMW-H
RPMW-H



Roughing

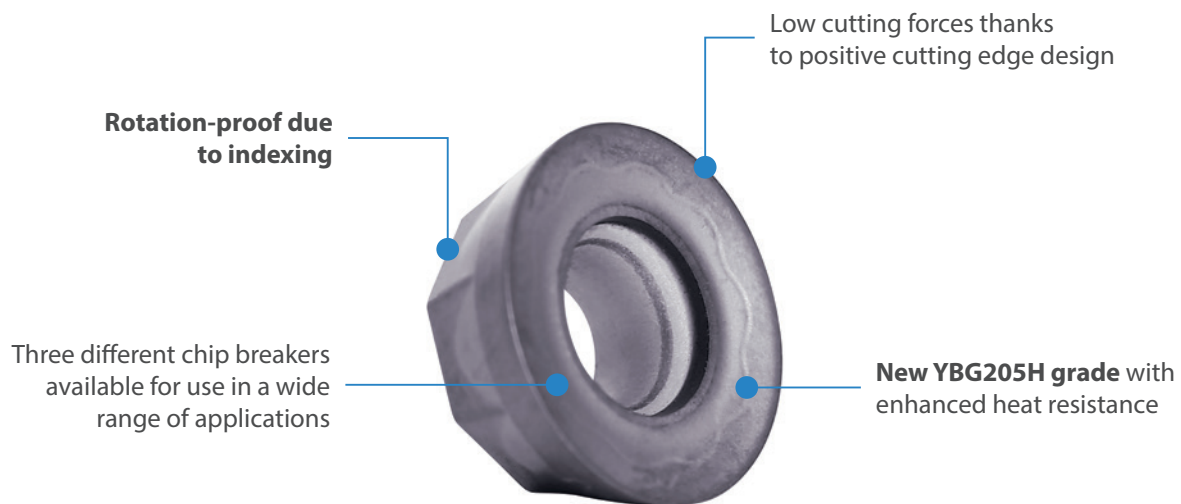
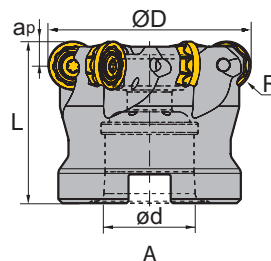
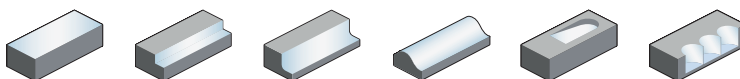


Fig.: RDMT1204-MO-M YBG205H

Face mill

FMR11



Article	*	Stock	Dimensions [mm]					Teeth	Coupling	kg	Insert
			R	ØD	ød	L	ap max				
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

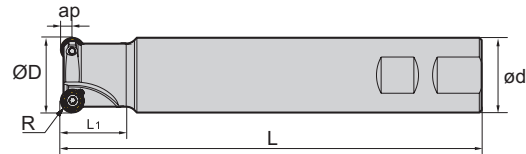
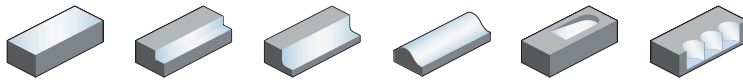
* With internal cooling

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]						Teeth	kg	Insert
			R	ØD	ød	L ₁	L	a _{p max}			
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

A

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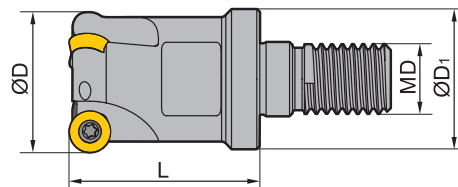
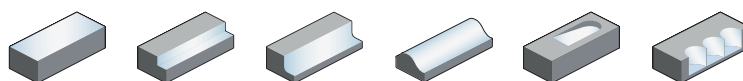
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Face mill – QCH series

QCH – R***



Article	*	Stock	Dimensions [mm]					Teeth	kg	Insert
			R	ØD	ØD ₁	L	MD			
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

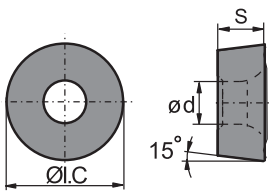
* With internal cooling

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			HC ¹ (CVD)	HC ¹ (PVD)	HT	HC ²	HW
	P			● ●			
	M			● ●			
	K	●					
	N						
	S			● ● ●			
	H			●			
ISO		YBD252		YBG205H YB9320 YBS303			
	RDMT10T3MO-M	●		● ○ ●			
	RDMT1204MO-M	●		● ○ ●			
	RDMT10T3MO-MM			● ○ ●			
	RDMT1204MO-MM			● ○ ●			

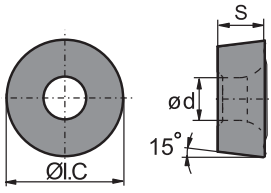
● Ex stock ○ On demand

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			HC ¹ (CVD)	HC ¹ (PVD)	HT	HC ²	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

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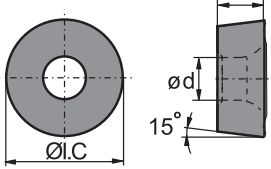
A

Turning

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			HC ¹ (CVD)	HC ¹ (PVD)	HT	HC ²	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

B

Milling

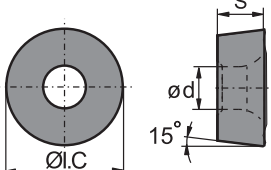
C

Drilling

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			HC ¹ (CVD)	HC ¹ (PVD)	HT	HC ²	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

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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				
B	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								
H	Hardened steel	α and β alloys	hardened	R _m 1050	36								
			hardened and tempered	55 HRC	37								
	Hard cast iron		hardened and tempered	60 HRC	38								
			cast	400	39								
X	Non-metallic materials		hardened and tempered	55 HRC	40								
		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.

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	Si ₃ N ₄ ceramic
CM	Mixed ceramic
HC ₁	Coated cermet
BC	CBN with coating
CC	Coated cutting ceramic
CR	Cutting ceramic, primary component aluminium oxide (Al ₂ O ₃), reinforced
DP	Polycrystalline diamond

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	Si ₃ N ₄ ceramic
CM	Mixed ceramic
HC ₁	Coated cermet
BC	CBN with coating
CC	Coated cutting ceramic
CR	Cutting ceramic, primary component aluminium oxide (Al ₂ O 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	$\leq 12\%$ Si, cannot be hardened		75	24									
		$\leq 12\%$ Si, hardenable	hardened	90	25									
		$> 12\%$ Si, cannot be hardened		130	26									
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27									
		CuZn, CuSnZn		90	28									
CuSn, Pb-free copper, electrolytic copper		100	29											
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30									
			hardened	280	31									
		Ni or Co bass	annealed	250	32									
			hardened	350	33									
			cast	320	34									
	Titanium alloys	pure titanium		R_m 400	35									
		α and β alloys	hardened	R_m 1050	36									
H	Hardened steel		hardened and tempered	55 HRC	37									
			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.

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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			YBG212		
						a_e / D			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
P	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	$\leq 12\% \text{ Si}$, cannot be hardened		75	24						
		$\leq 12\% \text{ Si}$, hardenable	hardened	90	25						
		$> 12\% \text{ Si}$, 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						
H	Titanium alloys	pure titanium		R_m 400	35						
		α and β alloys	hardened	R_m 1050	36						
	Hardened steel		hardened and tempered	55 HRC	37	90	150				
			hardened and tempered	60 HRC	38	80	120				
X	Non-metallic materials	Hard cast iron	cast	400	39						
		Hardened cast iron	hardened and tempered	55 HRC	40	90	120				
		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.

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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	Si ₃ N ₄ ceramic
CM	Mixed ceramic
HC ₁	Coated cermet
BC	CBN with coating
CC	Coated cutting ceramic
CR	Cutting ceramic, primary component aluminium oxide (Al ₂ O 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		
	Low-alloyed steel		0,23	0,47		0,26	0,51		0,22			0,23		0,17	0,22		0,17	0,22		
	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		
	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		
	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								
	Aluminum cast alloys								0,20			0,21								
	Copper and copper alloys (bronze/brass)								0,18			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.

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								
	Low-alloyed steel					0,22			0,23			0,22								
	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								
	Cast iron with spheroidal graphite	0,15	0,20	0,30		0,23			0,25			0,23								
	Malleable cast iron	0,15	0,20	0,30		0,23			0,25			0,23								
N	Aluminum wrought alloys											0,20								
	Aluminum cast alloys											0,20								
	Copper and copper alloys (bronze/brass)											0,18								
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.

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		
	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, FME01/02, EMP01/02/03/04/14)

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

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.

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
Low-alloyed steel	0,11	0,14	0,16	0,21	0,28	0,23	0,31	0,06
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
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
Malleable cast iron	0,10	0,13	0,14	0,19	0,26	0,21	0,28	0,06
N Aluminium wrought alloys								
Aluminum cast alloys								
Copper and copper alloys (bronze/brass)								
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.

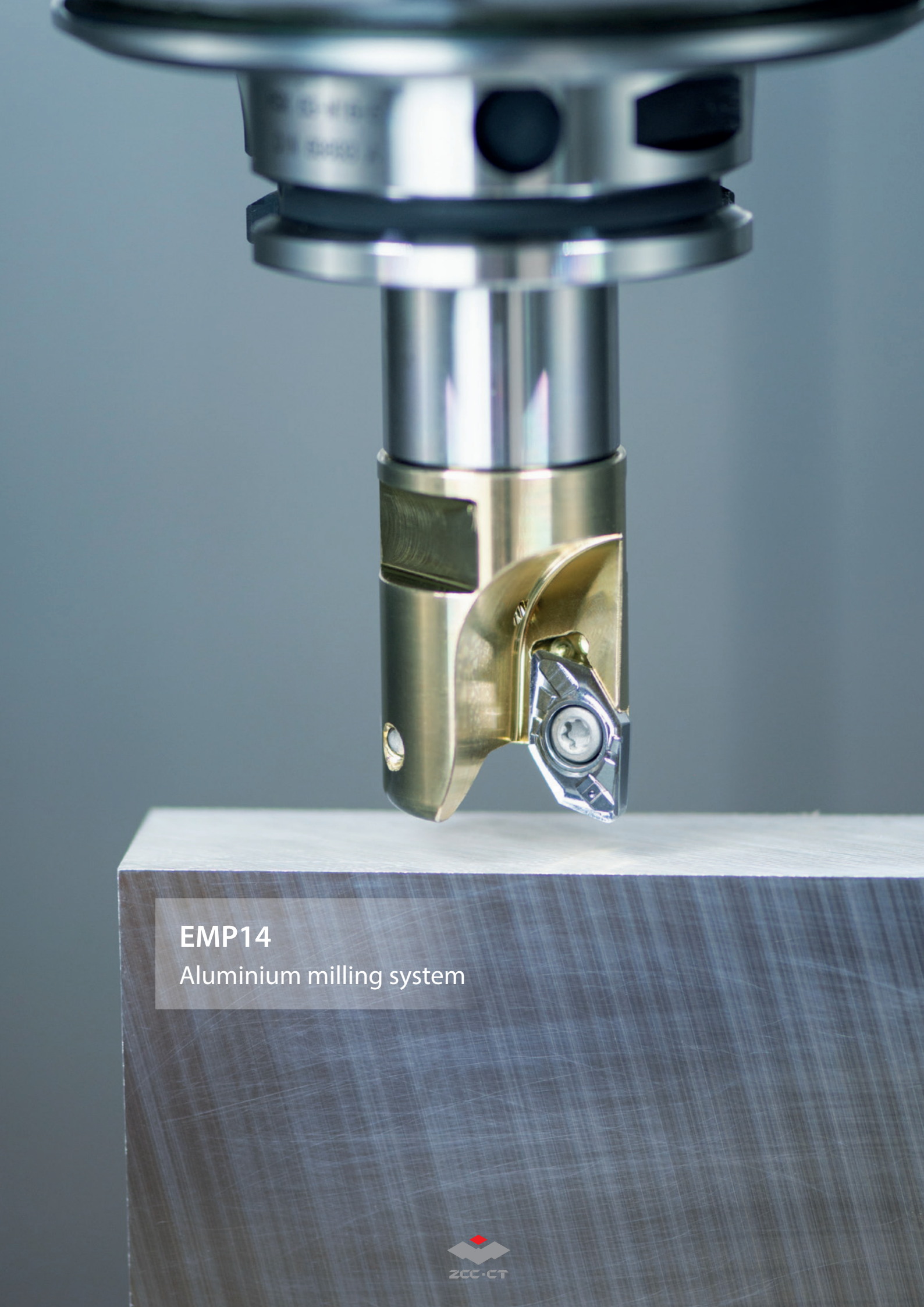
Indexable milling – group 3 (FMR01/02/03/04/11) Circular milling

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					
Low-alloyed steel	0,11	0,15	0,15					
High-alloyed steel and high-alloyed tool steel	0,10	0,14	0,14					
M Stainless steel	0,07	0,10	0,10					
Grey cast iron	0,11	0,15	0,15					
K Cast iron with spheroidal graphite	0,10	0,14	0,14					
Malleable cast iron	0,10	0,14	0,14					
N Aluminium wrought alloys	0,10	0,11	0,11					
Aluminum cast alloys	0,10	0,11	0,11					
Copper and copper alloys (bronze/brass)	0,10	0,11	0,11					
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
	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]							

A close-up photograph of a precision-machined metal milling tool, specifically the EMP14 Aluminium milling system. The tool features a silver-colored upper section with a circular flange and a central shaft. Below the shaft is a gold-colored section with a complex, curved cutting edge. The tool is positioned vertically, just above a dark, textured metal workpiece. The background is a soft, out-of-focus grey.

EMP14

Aluminium milling system

Solid carbide milling

System code – JIS	B66
VPM series	B67–B73
Recommended cutting data	B74–B78

B

A

Turning

B

Milling

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Technical
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GM – 2 E L P – D12 R0.5 – M08

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Turning

B

Milling

C

Drilling

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Technical Information

E

Index

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

Number of teeth

1

2

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

3

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

4

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

5

Diameter [mm]	
Code	Description
D3.0	3,0
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 (**Quick-Change Head**) replaceable head milling cutter with Q interface for added flexibility in your applications

Excellent ramping properties
thanks to large side clearance angle

New geometry for
increased chip volume
with no loss of stability

Grade KMG406
AlCrN PVD coating well
suited for steel and cast
iron

Now optionally available
with Weldon clamping
surface



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

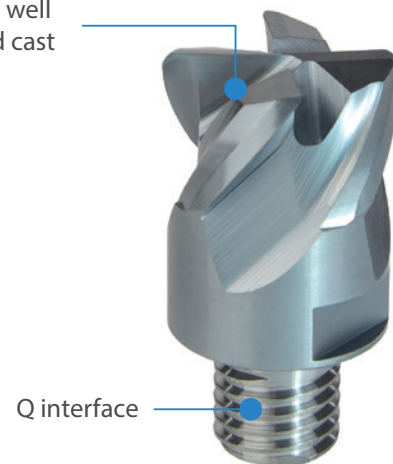


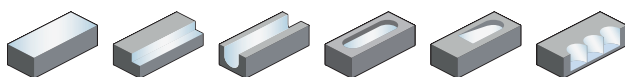
Fig.: Q14-VPM-4E-D25.0 KMG406

A

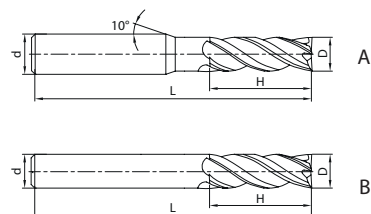
End mill

High-performance machining

VPM-4E



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



Turning

B

Milling

C

Drilling

D

Technical Information

E

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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

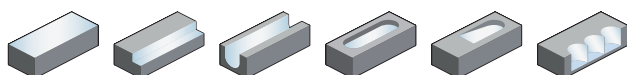
* With internal cooling

Application field

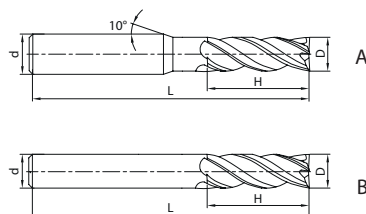
P	M	K	N	S	H
✓	✓	✓			✓

✓ 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

A

Turning

B

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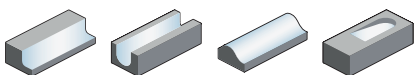
A

Turning

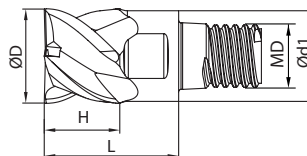
End mill

High-performance machining

VPM-4E



- Centre cutting
- Helix angle 36°/38°



B

Milling

Article	*	Dimensions [mm]					Geometry	Grade
		D	d1	H	L	MD		
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

C

Drilling

Application field					
P	M	K	N	S	H
✓	✓	✓			✓

✓ Very suitable

✓ Suitable

D

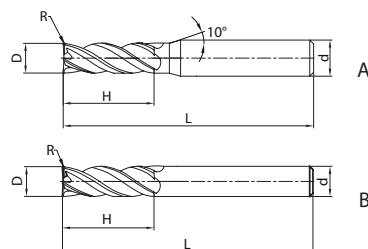
Technical Information

E

Index

Torus mill **High-performance machining**
VPM-4R

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



Article	*	Dimensions [mm]					Teeth	Geometry	Grade KMG406
		R	D	d (h6)	H	L			
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
✓	✓	✓			✓

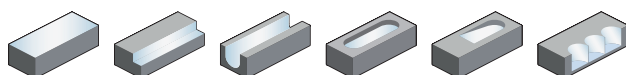
✓ Very suitable

✓ Suitable

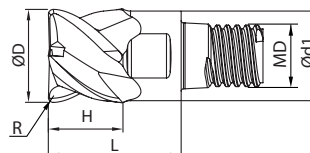
Torus mill

High-performance machining

VPM-4R



- Centre cutting
- Helix angle 36°/38°



Article	*	Dimensions [mm]					MD	Teeth	Grade KMG406
		R	D	d (h6)	H	L			
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		
						$\varnothing$ [mm]	$a_{p \max}$	$\varnothing$ [mm]	$a_{e \max}$	$\varnothing$ [mm]	$a_{p \max}$	$\varnothing$ [mm]	$a_{e \max}$	
						$0 < x < 3$	$0,1 \times D$	$0 < x \leq 20$	$0,15 \times D$	$0 < x < 3$	$0,1 \times D$	$0 < x \leq 20$	$0,15 \times D$	
						$3 \leq x < 6$	$0,3 \times D$			$3 \leq x < 6$	$0,3 \times D$			
						$6 \leq x \leq 20$	$0,5 \times D$			$6 \leq x \leq 20$	$0,5 \times D$			
				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	$\leq 12\%$ Si, cannot be hardened		75	24									
		$\leq 12\%$ Si, hardenable	hardened	90	25									
		$> 12\%$ Si, cannot be hardened		130	26									
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27									
		CuZn, CuSnZn		90	28									
		CuSn, Pb-free copper, electrolytic copper		100	29									
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30									
			hardened	280	31									
		Ni or Co bass	annealed	250	32									
			hardened	350	33									
		cast	320	34										
		Titanium alloys	pure titanium	R_m 400	35									
α and β alloys	hardened		R_m 1050	36										
H	Hardened steel		hardened and tempered	55 HRC	37	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									

Index

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											
						$\varnothing$ [mm]	$a_{p \max}$	$\varnothing$ [mm]	$a_{e \max}$										
						$0 < x < 3$	$0,3 \times D$	$0 < x < 20$	$0,15 \times D$										
						$3 \leq x < 6$	$0,3 \times D$												
						$6 \leq x \leq 20$	$0,5 \times D$												
				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	$\leq 12\%$ Si, cannot be hardened		75	24														
		$\leq 12\%$ Si, hardenable	hardened	90	25														
		$> 12\%$ Si, cannot be hardened		130	26														
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27														
		CuZn, CuSnZn		90	28														
CuSn, Pb-free copper, electrolytic copper		100	29																
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30														
			hardened	280	31														
		Ni or Co bass	annealed	250	32														
			hardened	350	33														
			cast	320	34														
	Titanium alloys	pure titanium		R_m 400	35														
		α and β alloys	hardened	R_m 1050	36														
H	Hardened steel		hardened and tempered	55 HRC	37	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.

[illegible]

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.

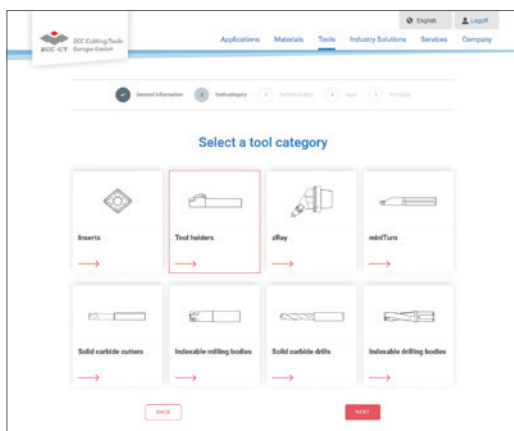
Solid carbide milling group 9 – Square shoulder mills UM/UMC series, VPM series HSC/HPC

	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.

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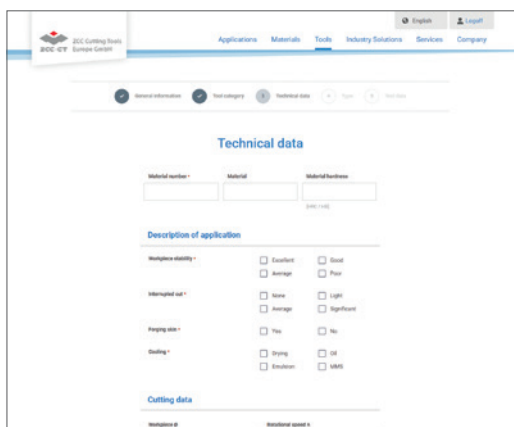
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