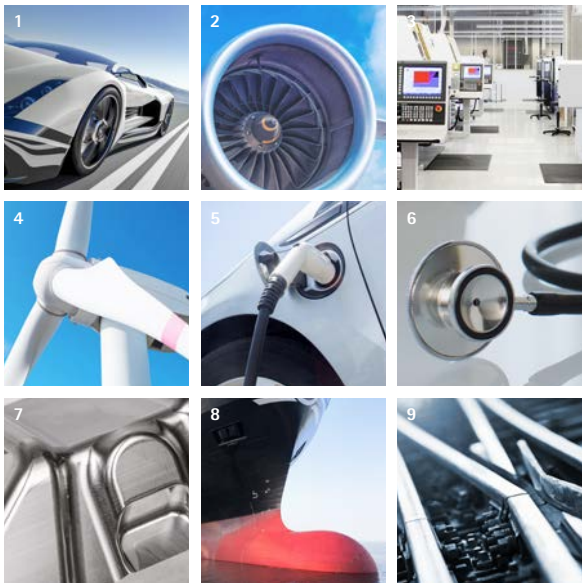
Your technology partner for cost-effective machining

SUPPLEMENTARY VOLUME 2019

Tool and process solutions combined with comprehensive services

We see ourselves as a technology partner, supporting you with the development of efficient and resource-saving manufacturing processes using standard tools, individual tool concepts and the optimisation of tool details. Our tools satisfy all the requirements on process reliability, precision and simple handling. How? Using advanced development and design methods as well as production using the latest manufacturing facilities.

You do not just need the optimal tool for your task, you are also looking for a partner who takes over the entire planning and management of your process? We are also there for you in this situation. We support you during all production phases and keep your manufacturing at the top level: highly productive, cost-effective and reliable. We also offer you complete networked solutions for all peripheral tasks related to the actual machining process.



Markets and sectors

1 Automotive
2 Aerospace
3 Machine engineering
4 Power generation
5 Electromobility
6 Medical technology
7 Mould making
8 Shipbuilding
9 Rail transport

Subsidiaries with production, sales and service in 25 countries

Representatives in more than 19 countries

Over **5,500** staff worldwide

No. 1 technology leader for the machining of cubic parts

Product areas

1 Reaming and fine boring
2 Drilling from solid, boring and countersinking
3 Milling
4 Turning
5 Actuating
6 Clamping
7 Setting, measuring and dispensing
8 Services

The MAPAL catalogue range

The Supplementary volume 2019 contains numerous new products and additions to the programme. Together with the Supplementary volume 2018 and the catalogue slipcase, it completes the current MAPAL range.

2017
Complete range as catalogue slipcase

2018
Supplementary volume 1 to the catalogue slipcase

2019
Supplementary volume 2 to the catalogue slipcase

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Innovations and product range additions 2019

Drilling from solid

Double and triple edge solid carbide drills for drilling steel, stainless steel and cast iron from solid.
CVD diamond-coated indexable inserts for drilling aluminium from solid.

▸ **From page 8**

Boring | Turning

Positive radial indexable inserts for boring and turning.

▸ **From page 92**

Milling

End milling cutters for roughing, finishing, ramping and trochoidal milling.
PCD face milling cutters for the highest surface finishes in aluminium.
Radial milling range with pressed ISO indexable inserts.

▸ **From page 118**

Clamping

Vibration-damped milling cutter arbors.
Power chuck MillChuck, System HB.
Additions to hydraulic chuck series.

▸ **From page 236**

Setting | Measuring | Dispensing

UNIBASE-S as decentral storage system.

▸ **From page 264**


MEGA-Speed-Drill-Steel


Tritan-Drill-Steel


Tritan-Drill-Uni-Plus


Tritan-Spot-Drill-Steel

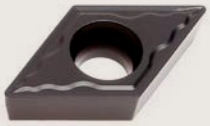

Tritan-Step-Drill-Steel

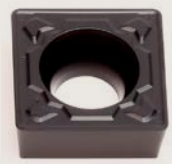

MEGA-Quadro-Drill-Plus

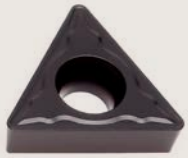

Replaceable drill head TTD-Tritan


Indexable insert drill


CCGT, CCMT


DCMT


SCMT | SPMT


TCMT


VCGT, VCMT


OptiMill-Alu-HPC-Pocket


OptiMill-Uni-HPC-Plus with corner radius

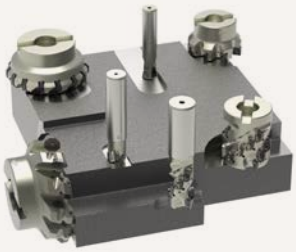

OptiMill-Uni-Wave


OptiMill-Uni-HPC-Finish


OptiMill-Trochoid


PowerMill-Blue


FaceMill-Diamond as milling cutter head


Milling cutters with radial ISO indexable inserts

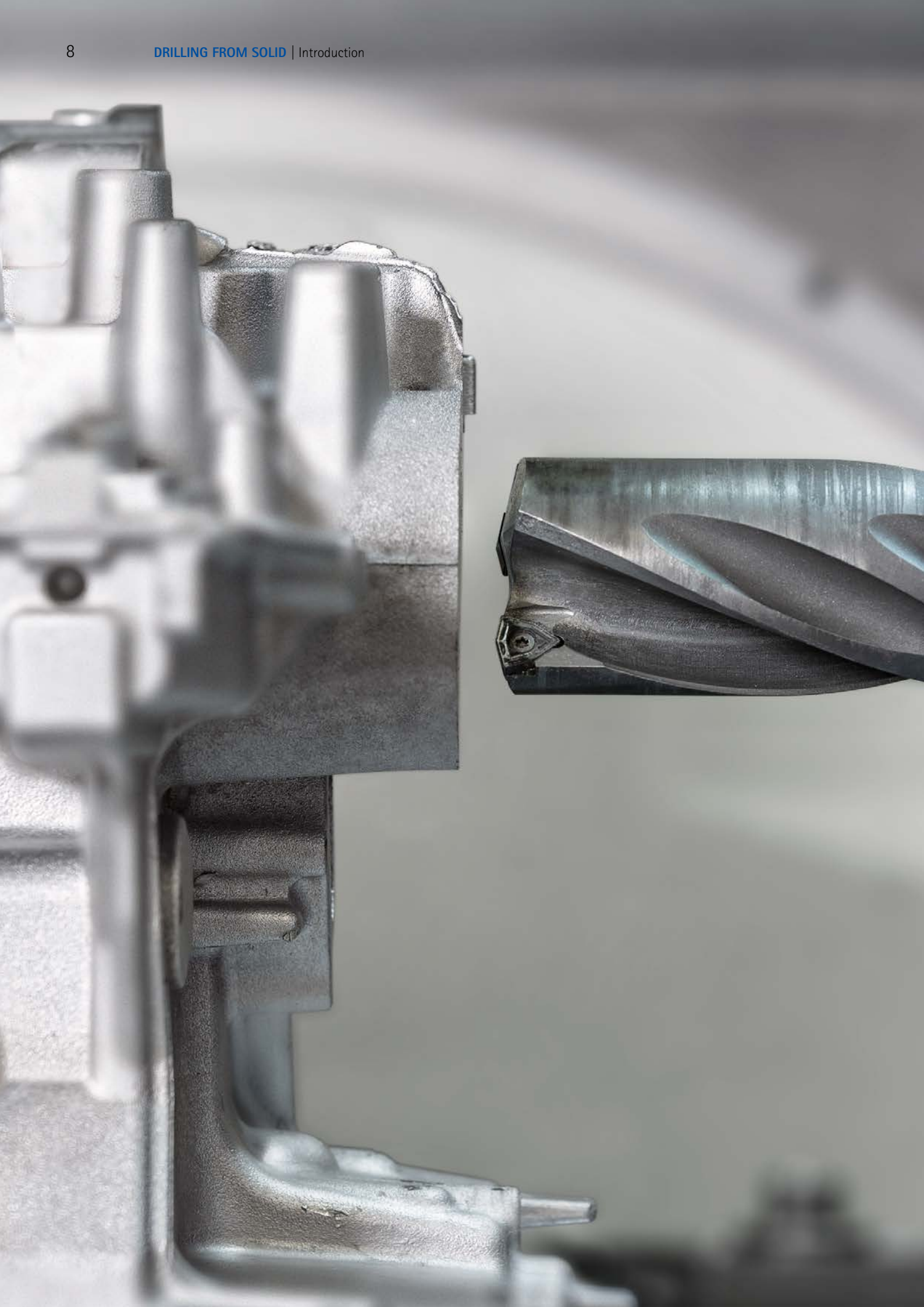

Milling cutter arbor, vibration-damped


MillChuck, System HB


Hydraulic chucks HighTorque Chuck HTC

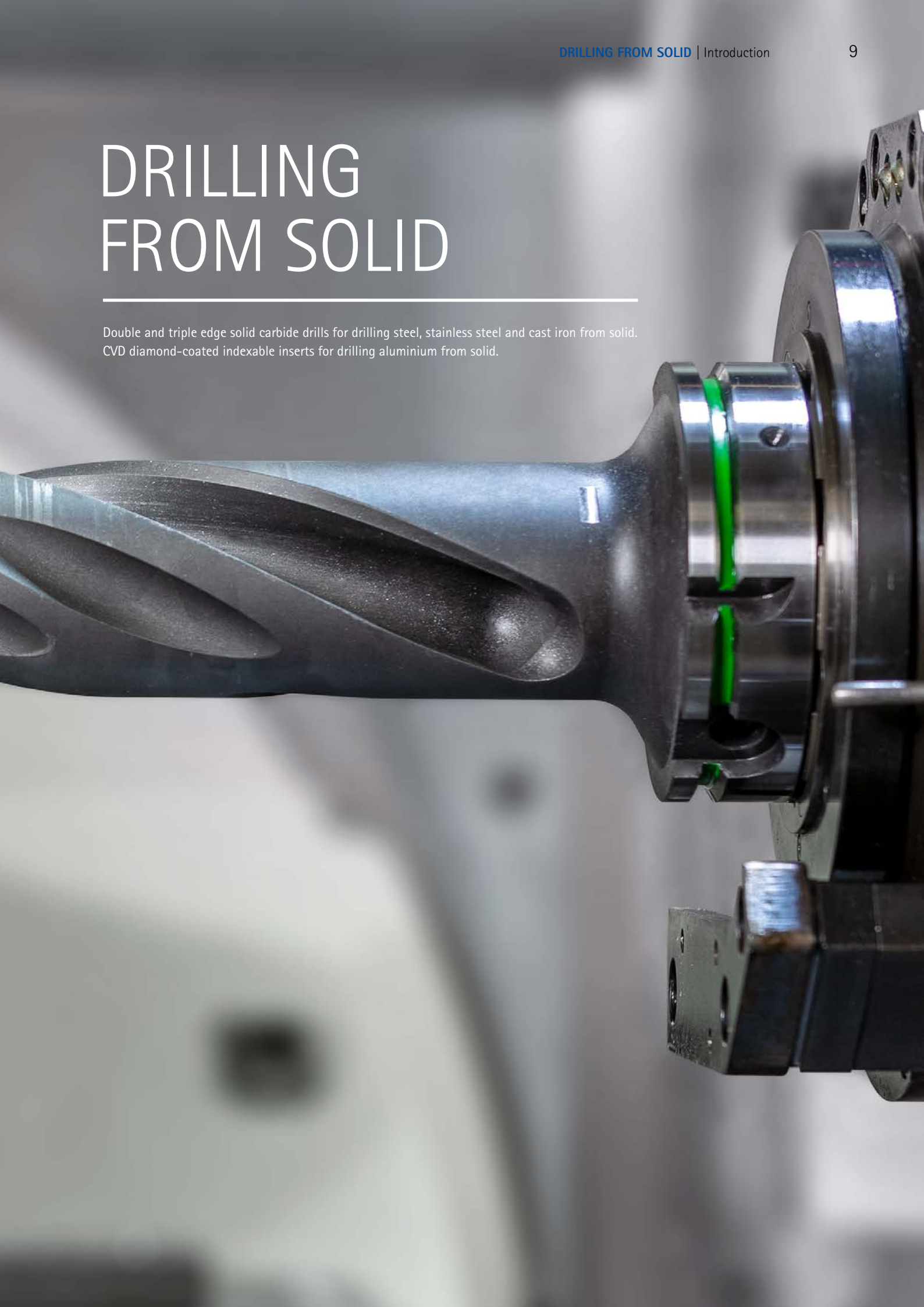

Hydraulic chucks HydroChuck

Decentral storage system UNIBASE-S



DRILLING FROM SOLID

Double and triple edge solid carbide drills for drilling steel, stainless steel and cast iron from solid.
CVD diamond-coated indexable inserts for drilling aluminium from solid.



DRILLING FROM SOLID

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Drilling from solid using indexable inserts

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ADDITIONS TO PROGRAMME

New solid carbide drills and drills with indexable inserts

MAPAL is completing the range of highly cost-effective drills with three cutting edges with the new Tritan-Drill-Uni-Plus and the Tritan-Step-Drill-Steel.
The new MEGA-Quadro-Drill-Plus impresses due to its improved point thinning, a new coating, as well as improved edge rounding. The MEGA-Speed-Drill-Steel has been expanded with the dimensions 3xD and 8xD.
The new triple edge radial indexable inserts with CVD diamond coating are excellently suited for drilling aluminium from solid. Due to its extremely high hardness, which is close to that of a natural diamond, the coating is exceptionally wear-resistant. The composition of the coating is characterised by a particularly low affinity for non-ferrous metals, in particular aluminium. In this way the adhesion of material and therefore the formation of built-up edges is prevented. In addition, the good thermal conductivity of the diamond coating ensures the quick removal of residual heat. Consequently, very high machining speeds are possible. This aspect enhances the extremely cost-effective use of the inserts with the highest productivity at the same time.

Basic LINE **Basic Line:**
Universal tools, broad application area, low procurement costs

Performance LINE **Performance Line:**
High-performance tools, broad application area, high productivity in series production manufacturing

Expert LINE **Expert Line:**
Specialist tools for selected applications, maximum precision and productivity

Drilling from solid using solid carbide

Expert LINE

MEGA-Speed-Drill-Steel

High-speed drill for machining steel.
Now also in 3xD and 8xD.

- Special, spherical main cutting edge is resilient and robust
- Three guiding chamfers ensure maximum smooth running and process reliability
- Unique, very finely ground groove profile for reduced friction

ø range: 4.00 - 20.00 mm

Drilling depth:
3xD 5xD 8xD 12xD

P M K N

Page 24

Performance LINE

MEGA-Quadro-Drill-Plus

Four guiding chamfers for maximum bore quality, concentricity and positioning accuracy.

- New coating, improved point thinning
- Optimised edge rounding results in significant improvement in tool life

ø range: 3.00 – 20.00 mm

Drilling depth:
3xD 5xD 8xD

P M K

Page 33

Performance LINE

Tritan-Drill

Drilling with three cutting edges for all materials and applications.

- Tritan-Drill-Alu and Tritan-Drill-Iron as application-specific custom solutions for the respective material groups
- Tritan-Step-Drill for the production of stepped bores for tapping bores
- Tritan-Spot-Drill-Steel as pilot tool especially for the Tritan-Drill-Steel

ø range: 3.00 – 20.00 mm

Drilling depth:
2xD 3xD 4xD 5xD

P M K

Page 45

Drilling from solid using replaceable head drills

Performance LINE

Replaceable head drill TTD-Tritan

First replaceable head drill with three cutting edges available as standard

- Now also in 8xD
- Up to twice the feed compared to replaceable head drills with two cutting edges

ø range: 12.00 – 32.40 mm

Drilling depth:

3xD 5xD 8xD

P K

Page 70

Drilling from solid using indexable inserts

Indexable insert drill for aluminium

- CVD diamond-coated indexable inserts with three cutting edges for highest productivity and cost-effectiveness
- Drilling AlSi1 to AlSi12 from the solid
- With internal cooling, MQL also possible
- Single or multi-stepped with indexable insert or PCD finishing stage
- Tool lengths up to 5xD possible

ø range: 16.00 - 54.90 mm

Drilling depth:

up to 3xD

N

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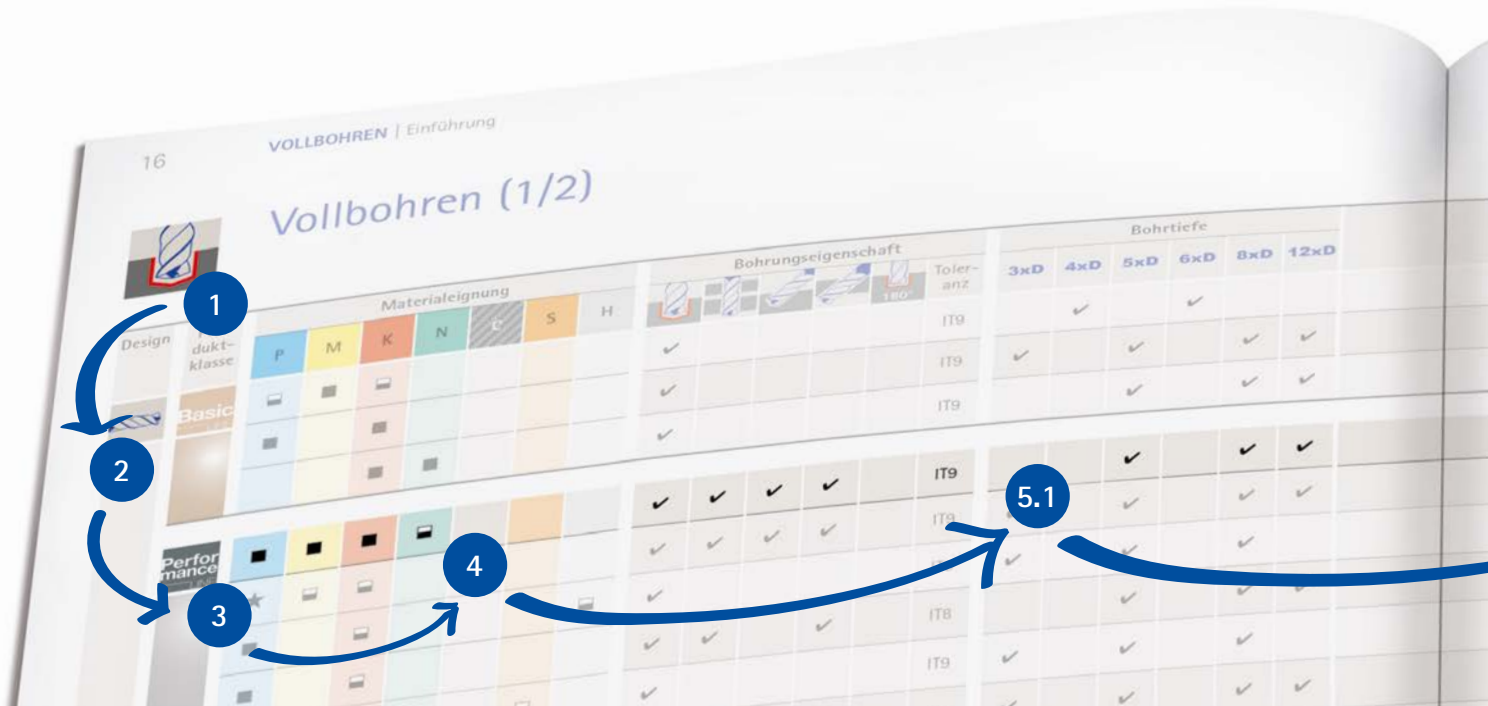
SELECTION OF A DRILL

Step-by-step to the right drill

The selection aid will lead you step-by-step to the right drill.

1	**Application**	Select your main application.		Drilling from solid		Deep hole drilling
2	**Design**	Select your preferred tool design.		Monolithic		Connection QTS
3	**Product class**	Decide for a product class.		**Basic Line:** Universal tools, broad application area, low procurement costs		
4	**Material suitability**	Identify your workpiece material as per the MAPAL machining groups (MMG).		Steel		Stainless steel
5.1	**Part characteristics**	Check the requirements placed on your tool by the characteristics of the bore.		Drilling into solid		Interrupted cut
5.2	**Tool features**	Check whether the geometric features meet your requirements.		Diameter range		Number of cutting edges
6	**Product**	Select your drill.		Specification		




Drilling


Stepped drilling

Connection TTS


With
indexable insert

Performance LINE

Performance Line:
High-performance tools, broad application area,
high productivity in series production manufacturing

Expert LINE

Expert Line:
Specialist tools for selected applications,
maximum precision and productivity

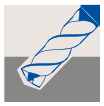
K Cast iron

N Non-ferrous metals and plastics

C Composite materials

S Super alloys and titanium

H Hardened steel and cast steel


Inclined
bore entrance

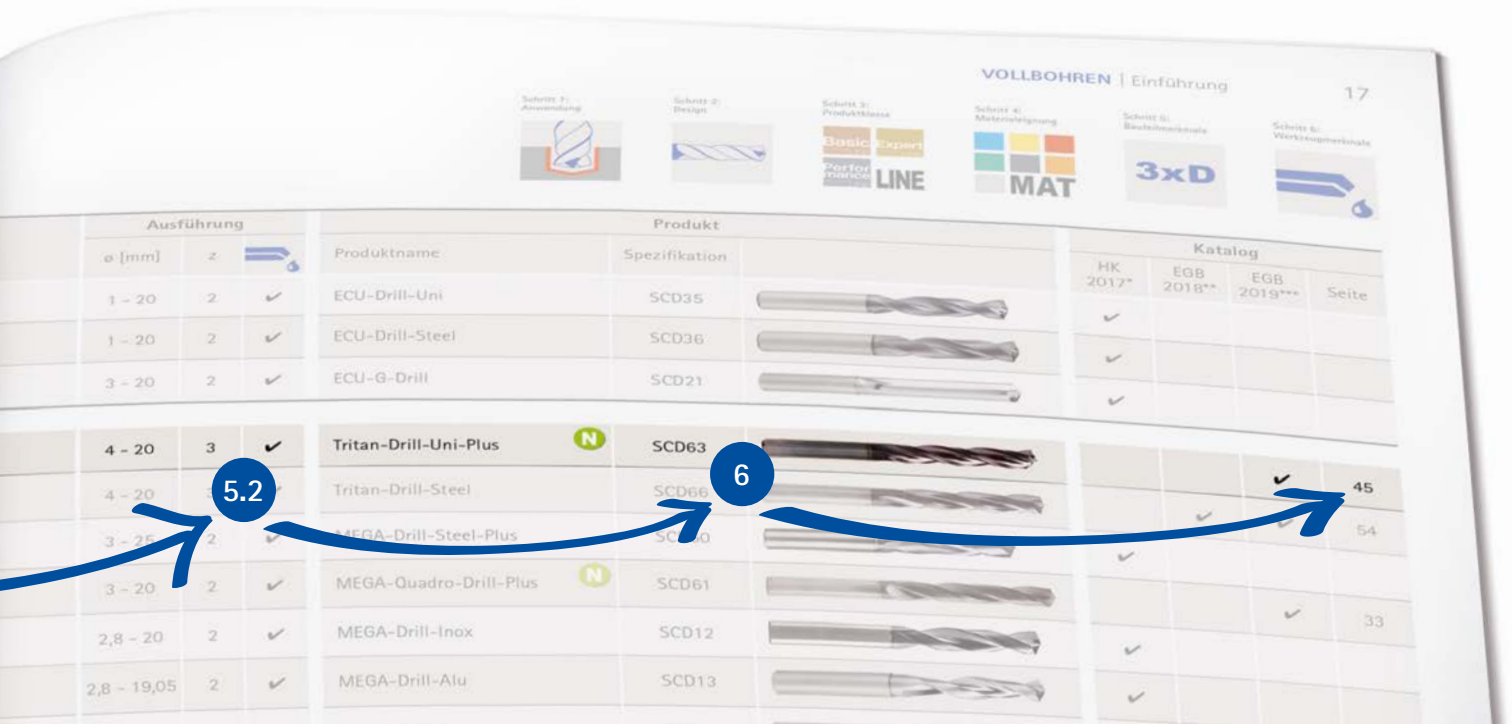

Inclined
bore outlet

Flat 180° bottom
of the bore

IT7 IT8 IT9 IT10 Achievable bore tolerance

3xD Maximum drilling depth


Coolant supply



Drilling from solid (1/2)

Design	Product class	Material suitability							Bore characteristic						Drilling depth						
		P	M	K	N	C	S	H					180°	Tolerance	3xD	4xD	5xD	6xD	8xD	12xD	
	Basic LINE	◒	■	◒					✔					IT9		✔		✔			
		■		■					✔					IT9	✔		✔		✔	✔	
				■	■				✔					IT9			✔		✔	✔	
	Performance LINE	■	■	■	◒				✔	✔	✔	✔		IT9			✔		✔	✔	
		★	◒	◒					✔	✔	✔	✔		IT9	✔		✔		✔	✔	
		■		◒				◒	✔					IT9	✔		✔		✔		
		■		◒					✔	✔		✔		IT8			✔		✔	✔	
		◒	★	◒	◒		◒		✔					IT9	✔		✔		✔		
					■				✔					IT9	✔		✔		✔	✔	
							★		✔	✔		✔		IT9			✔				
								★	✔					IT9		✔					
					◒	■			✔					IT9			✔				
		■	◒	■	◒				✔					IT9			✔		✔	✔	
					◒	■			✔					IT9			✔				
	Expert LINE	★	◒	◒					✔			✔		IT9	✔		✔		✔		
		■	★				■		✔			✔		IT9	✔						
				★					✔			✔		IT9	✔						
							★		✔			✔		IT9	✔						
					■	◒			✔					IT7				✔			
						■			✔					IT8			✔				
		■		■	■				✔					IT7	✔		✔				
		■	■	■					✔		✔	✔	✔	IT9	✔		✔				
					■				✔		✔	✔	✔	IT9	✔		✔				

★ 1st choice ■ highly suitable ◒ suitable in some situations

Step 1: Application | Step 2: Design | Step 3: Product class | Step 4: Material suitability | Step 5: Part characteristics | Step 6: Tool features

Design			Product			Catalogue			
ø [mm]	z		Product name	Specification		MC 2017*	SV 2018**	SV 2019***	Page
1 - 20	2	✔	ECU-Drill-Uni	SCD35		✔			
1 - 20	2	✔	ECU-Drill-Steel	SCD36		✔			
3 - 20	2	✔	ECU-G-Drill	SCD21		✔			
4 - 20	3	✔	Tritan-Drill-Uni-Plus (N)	SCD63				✔	45
4 - 20	3	✔	Tritan-Drill-Steel	SCD66			✔	✔	54
3 - 25	2	✔	MEGA-Drill-Steel-Plus	SCD60		✔			
3 - 20	2	✔	MEGA-Quadro-Drill-Plus (N)	SCD61				✔	33
2,8 - 20	2	✔	MEGA-Drill-Inox	SCD12		✔			
2,8 - 19,05	2	✔	MEGA-Drill-Alu	SCD13		✔			
3 - 12	2	✔	MEGA-Drill-Inco	SCD21		✔			
2,55 - 16	2		MEGA-Drill-Hardened	SCD14		✔			
2,5 - 12	2		MEGA-Drill-Composite-MD	SCD25		✔			
1 - 2,9	2	✔	MEGA-SMART-Drill	SCD15		✔			
0,5 - 2,9	2		MEGA-Drill-Composite-MD-Micro	SCD40		✔			
3 - 20	2	✔	MEGA-Speed-Drill-Steel (N)	SCD62			✔	✔	24
3 - 20	2	✔	MEGA-Speed-Drill-Inox	SCD41		✔			
3 - 20	2	✔	MEGA-Speed-Drill-Iron	SCD42		✔			
3 - 12	2	✔	MEGA-Speed-Drill-Titan	SCD30		✔			
0,97 - 13,03	1		Mono-Drill-Plastic	SCD57		✔			
3 - 12	2		MEGA-Drill-Composite-UDX	SCD27		✔			
5,97 - 12,72	2	✔	MEGA-Drill-Reamer	SCD20		✔			
3 - 20	2	✔	MEGA-180°-Drill	SCD23		✔			
3 - 20	2	✔	MEGA-180°-Drill-Alu	SCD24		✔			

* Main catalogue 2017
** Supplementary volume 2018
*** Supplementary volume 2019

(N) New ⊕ Additions to programme

Drilling from solid (2/2)

Design	Product class	Material suitability							Bore characteristic						Drilling depth						
		P	M	K	N	C	S	H					180°	Tolerance	1xD	1.5xD	3xD	5xD	8xD	12xD	
	Performance LINE	★						⬓	✔					IT10		✔	✔	✔	✔	✔	
		⬓	★	⬓	⬓		⬓		✔					IT10		✔	✔	✔	✔	✔	
					★				✔					IT10		✔	✔	✔	✔	✔	
				★					✔					IT10		✔	✔	✔	✔	✔	
	Performance LINE	★		⬓					✔					IT9			✔	✔	✔		
		■		⬓				⬓	✔					IT9	✔		✔	✔	✔	✔	
		■		■					✔					IT9	✔		✔	✔	✔	✔	
		⬓	★	⬓	⬓		⬓		✔					IT9	✔		✔	✔	✔	✔	
				★					✔					IT9	✔		✔	✔	✔	✔	
					★				✔					IT9	✔		✔	✔	✔	✔	
					★				✔						✔	✔	✔				

★ 1st choice ■ highly suitable ⬓ suitable in some situations

Step 1: Application | Step 2: Design | Step 3: Product class | Step 4: Material suitability | Step 5: Part characteristics | Step 6: Tool features

Design			Product			Catalogue			
ø [mm]	z		Product name	Type		MC 2017*	SV 2018**	SV 2019***	Page
8 - 50	2	✔	Indexable inserts QTD Steel	01-Steel		✔			
8 - 50	2	✔	Indexable inserts QTD Inox	02-Inox		✔			
8 - 50	2	✔	Indexable inserts QTD Iron	04-Iron		✔			
8 - 50	2	✔	Indexable inserts QTD Alu	03-Alu		✔			
12 - 32,4	3	✔	Replaceable drill head TTD-Tritan Uni ⊕	01-Uni			✔	✔	70
12 - 45	2	✔	Replaceable drill head TTD Uni	01-Uni		✔			
12 - 45	2	✔	Replaceable drill head TTD Steel	04-Steel		✔			
12 - 45	2	✔	Replaceable drill head TTD Inox	02-Inox		✔			
12 - 45	2	✔	Replaceable drill head TTD Iron	05-Iron		✔			
12 - 45	2	✔	Replaceable drill head TTD Alu	03-Alu		✔			
16,0 - 54,9	1	✔	Indexable inserts WOGT Ⓝ	WOGT-X40				✔	80

* Main catalogue 2017
** Supplementary volume 2018
*** Supplementary volume 2019

Ⓝ New ⊕ Additions to programme

Pilot drills

Design	Product class	Material suitability							Bore characteristic						Drilling depth				
		P	M	K	N	C	S	H					180°	Tolerance	15xD	20xD	25xD	30xD	40xD
	Basic LINE	■	⬓																
	Performance LINE	■	⬓	⬓							✔								

Deep hole drills

Design	Product class	Material suitability							Bore characteristic						Drilling depth				
		P	M	K	N	C	S	H					180°	Tolerance	15xD	20xD	25xD	30xD	40xD
	Performance LINE	■		■					✔			✔		IT9	✔	✔	✔	✔	✔
					■				✔			✔		IT9	✔	✔	✔	✔	✔

Step drills

Design	Product class	Material suitability							Bore characteristic						Drilling depth				
		P	M	K	N	C	S	H					180°	Tolerance	15xD	20xD	25xD	30xD	40xD
	Performance LINE	■		⬓				⬓	✔					IT9					
		■		⬓				⬓	✔					IT9					

★ 1st choice ■ highly suitable ⬓ suitable in some situations

Step 1: Application | Step 2: Design | Step 3: Product class | Step 4: Material suitability | Step 5: Part characteristics | Step 6: Tool features

Design			Product			Catalogue			
ø [mm]	z		Product name	Specification		MC 2017*	SV 2018**	SV 2019***	Page
0,5 - 6,3	2		ECU-Centre-Drill	SCD45		✔			
4 - 20	3		Tritan-Spot-Drill-Steel	SCD67			✔	✔	66

Design			Product			Catalogue			
ø [mm]	z		Product name	Specification		MC 2017*	SV 2018**	SV 2019***	Page
3 - 16	2	✔	MEGA-Deep-Drill	SCD17		✔			
3 - 16	2	✔	MEGA-Deep-Drill-Alu	SCD18		✔			

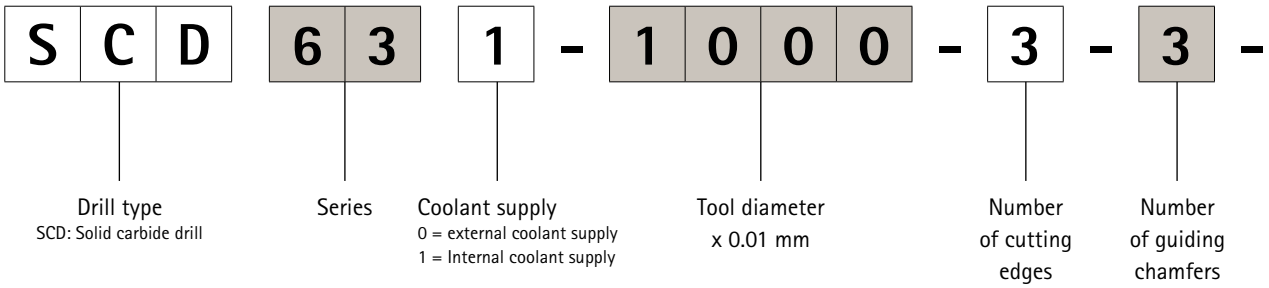
Design			Product			Catalogue			
ø [mm]	z		Product name	Specification		MC 2017*	SV 2018**	SV 2019***	Page
4,2 - 14	3	✔	Tritan-Step-Drill-Steel (N)	SCD56				✔	67
2,5 - 14	2	✔	MEGA-Step-Drill-Steel	SCD11		✔			

* Main catalogue 2017
** Supplementary volume 2018
*** Supplementary volume 2019

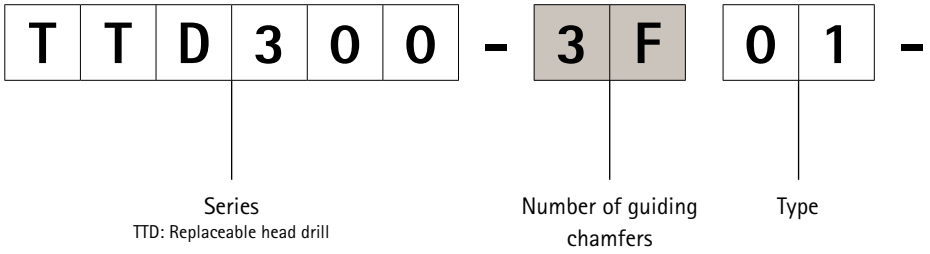
(N) New ⊕ Additions to programme

Designation key

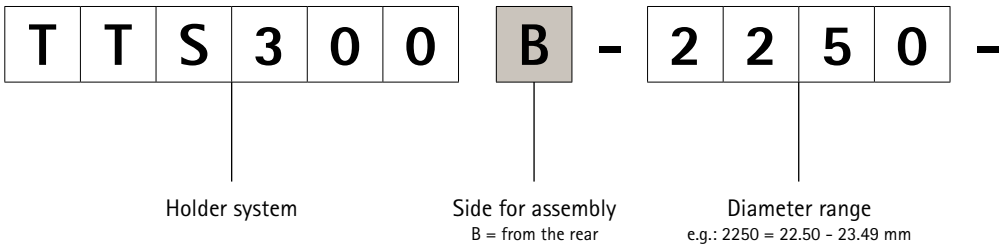
Solid carbide drill

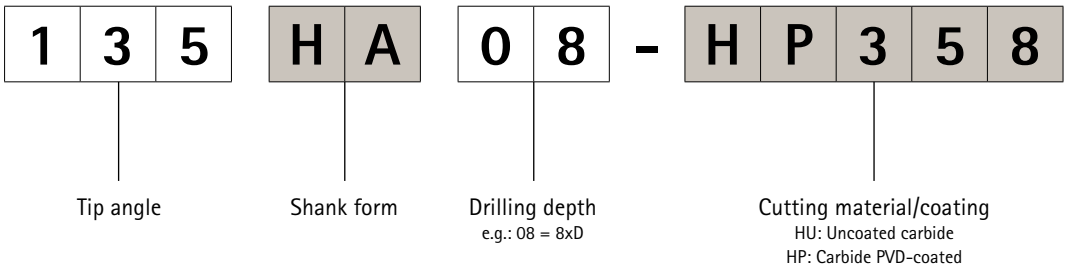


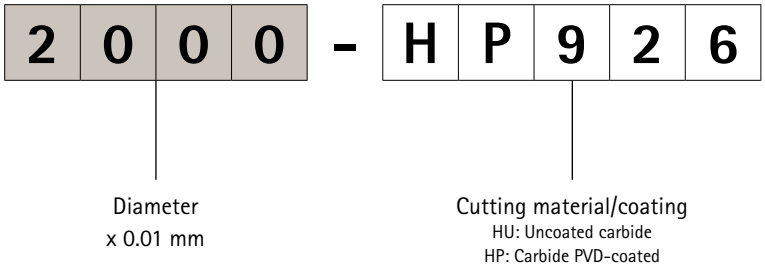
Replaceable head drill TTD-Tritan

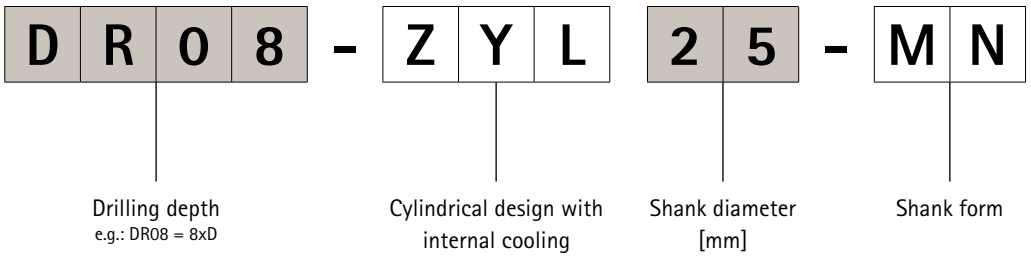


Holder range TTS for TTD-Tritan




1 3 5
H A
0 8
-
H P 3 5 8
Tip angle
Shank form
Drilling depth
e.g.: 08 = 8xD
Cutting material/coating
HU: Uncoated carbide
HP: Carbide PVD-coated


2 0 0 0
-
H P 9 2 6
Diameter
x 0.01 mm
Cutting material/coating
HU: Uncoated carbide
HP: Carbide PVD-coated

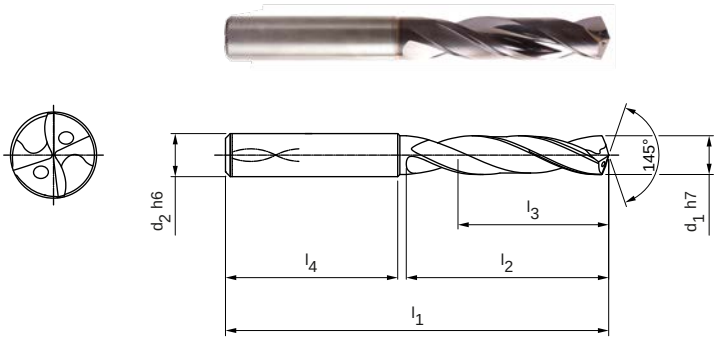

D R 0 8
-
Z Y L
2 5
-
M N
Drilling depth
e.g.: DR08 = 8xD
Cylindrical design with
internal cooling
Shank diameter
[mm]
Shank form

MEGA-Speed-Drill-Steel

Solid carbide twist drill
SCD62 (3xD), internal coolant supply, successor product to the MEGA-Speed-Drill-Steel (SCD22)

Design:

Drill diameter:	3.00 – 20.00 mm
Bore tolerance:	IT 9 (achievable)
Cutting material:	HP358
Number of cutting edges:	2
Number of guiding chamfers:	3
Tip angle:	145°
Helix angle:	30°



Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
3,00	6	62	20	14	36	SCD621-0300-2-3-145HA03-HP358	31036265
3,10	6	62	20	14	36	SCD621-0310-2-3-145HA03-HP358	31036266
3,20	6	62	20	14	36	SCD621-0320-2-3-145HA03-HP358	31036267
3,30	6	62	20	14	36	SCD621-0330-2-3-145HA03-HP358	31036268
3,40	6	62	20	14	36	SCD621-0340-2-3-145HA03-HP358	31036269
3,50	6	62	20	14	36	SCD621-0350-2-3-145HA03-HP358	31036270
3,60	6	62	20	14	36	SCD621-0360-2-3-145HA03-HP358	31036271
3,70	6	62	20	14	36	SCD621-0370-2-3-145HA03-HP358	31036272
3,80	6	66	24	17	36	SCD621-0380-2-3-145HA03-HP358	31036273
3,90	6	66	24	17	36	SCD621-0390-2-3-145HA03-HP358	31036274
4,00	6	66	24	17	36	SCD621-0400-2-3-145HA03-HP358	31036275
4,10	6	66	24	17	36	SCD621-0410-2-3-145HA03-HP358	31036276
4,20	6	66	24	17	36	SCD621-0420-2-3-145HA03-HP358	31036277
4,30	6	66	24	17	36	SCD621-0430-2-3-145HA03-HP358	31036278
4,40	6	66	24	17	36	SCD621-0440-2-3-145HA03-HP358	31036279
4,50	6	66	24	17	36	SCD621-0450-2-3-145HA03-HP358	31036280
4,60	6	66	24	17	36	SCD621-0460-2-3-145HA03-HP358	31036281
4,70	6	66	24	17	36	SCD621-0470-2-3-145HA03-HP358	31036282
4,80	6	66	28	20	36	SCD621-0480-2-3-145HA03-HP358	31036283
4,90	6	66	28	20	36	SCD621-0490-2-3-145HA03-HP358	31036284
5,00	6	66	28	20	36	SCD621-0500-2-3-145HA03-HP358	31036285
5,10	6	66	28	20	36	SCD621-0510-2-3-145HA03-HP358	31036286
5,20	6	66	28	20	36	SCD621-0520-2-3-145HA03-HP358	31036287
5,30	6	66	28	20	36	SCD621-0530-2-3-145HA03-HP358	31036288
5,40	6	66	28	20	36	SCD621-0540-2-3-145HA03-HP358	31036289
5,50	6	66	28	20	36	SCD621-0550-2-3-145HA03-HP358	31036290
5,60	6	66	28	20	36	SCD621-0560-2-3-145HA03-HP358	31036291
5,70	6	66	28	20	36	SCD621-0570-2-3-145HA03-HP358	31036292
5,80	6	66	28	20	36	SCD621-0580-2-3-145HA03-HP358	31036293
5,90	6	66	28	20	36	SCD621-0590-2-3-145HA03-HP358	31036294
6,00	6	66	28	20	36	SCD621-0600-2-3-145HA03-HP358	31036295
6,10	8	79	34	24	36	SCD621-0610-2-3-145HA03-HP358	31036296
6,20	8	79	34	24	36	SCD621-0620-2-3-145HA03-HP358	31036297
6,30	8	79	34	24	36	SCD621-0630-2-3-145HA03-HP358	31036298
6,40	8	79	34	24	36	SCD621-0640-2-3-145HA03-HP358	31036299
6,50	8	79	34	24	36	SCD621-0650-2-3-145HA03-HP358	31036300

MEGA-Speed-Drill-Steel | Solid carbide twist drills SCD62 (3xD), internal coolant supply

Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
6,60	8	79	34	24	36	SCD621-0660-2-3-145HA03-HP358	31036301
6,70	8	79	34	24	36	SCD621-0670-2-3-145HA03-HP358	31036302
6,80	8	79	34	24	36	SCD621-0680-2-3-145HA03-HP358	31036303
6,90	8	79	34	24	36	SCD621-0690-2-3-145HA03-HP358	31036304
7,00	8	79	34	24	36	SCD621-0700-2-3-145HA03-HP358	31036305
7,10	8	79	41	29	36	SCD621-0710-2-3-145HA03-HP358	31036306
7,20	8	79	41	29	36	SCD621-0720-2-3-145HA03-HP358	31036307
7,30	8	79	41	29	36	SCD621-0730-2-3-145HA03-HP358	31036308
7,40	8	79	41	29	36	SCD621-0740-2-3-145HA03-HP358	31036309
7,50	8	79	41	29	36	SCD621-0750-2-3-145HA03-HP358	31036310
7,60	8	79	41	29	36	SCD621-0760-2-3-145HA03-HP358	31036311
7,70	8	79	41	29	36	SCD621-0770-2-3-145HA03-HP358	31036312
7,80	8	79	41	29	36	SCD621-0780-2-3-145HA03-HP358	31036313
7,90	8	79	41	29	36	SCD621-0790-2-3-145HA03-HP358	31036314
8,00	8	79	41	29	36	SCD621-0800-2-3-145HA03-HP358	31036315
8,10	10	89	47	35	40	SCD621-0810-2-3-145HA03-HP358	31036316
8,20	10	89	47	35	40	SCD621-0820-2-3-145HA03-HP358	31036317
8,30	10	89	47	35	40	SCD621-0830-2-3-145HA03-HP358	31036318
8,40	10	89	47	35	40	SCD621-0840-2-3-145HA03-HP358	31036319
8,50	10	89	47	35	40	SCD621-0850-2-3-145HA03-HP358	31036320
8,60	10	89	47	35	40	SCD621-0860-2-3-145HA03-HP358	31036321
8,70	10	89	47	35	40	SCD621-0870-2-3-145HA03-HP358	31036322
8,80	10	89	47	35	40	SCD621-0880-2-3-145HA03-HP358	31036323
8,90	10	89	47	35	40	SCD621-0890-2-3-145HA03-HP358	31036324
9,00	10	89	47	35	40	SCD621-0900-2-3-145HA03-HP358	31036325
9,10	10	89	47	35	40	SCD621-0910-2-3-145HA03-HP358	31036326
9,20	10	89	47	35	40	SCD621-0920-2-3-145HA03-HP358	31036327
9,30	10	89	47	35	40	SCD621-0930-2-3-145HA03-HP358	31036328
9,40	10	89	47	35	40	SCD621-0940-2-3-145HA03-HP358	31036329
9,50	10	89	47	35	40	SCD621-0950-2-3-145HA03-HP358	31036330
9,60	10	89	47	35	40	SCD621-0960-2-3-145HA03-HP358	31036331
9,70	10	89	47	35	40	SCD621-0970-2-3-145HA03-HP358	31036332
9,80	10	89	47	35	40	SCD621-0980-2-3-145HA03-HP358	31036333
9,90	10	89	47	35	40	SCD621-0990-2-3-145HA03-HP358	31036334
10,00	10	89	47	35	40	SCD621-1000-2-3-145HA03-HP358	31036335
10,10	12	102	55	40	45	SCD621-1010-2-3-145HA03-HP358	31036336
10,20	12	102	55	40	45	SCD621-1020-2-3-145HA03-HP358	31036337
10,30	12	102	55	40	45	SCD621-1030-2-3-145HA03-HP358	31036338
10,40	12	102	55	40	45	SCD621-1040-2-3-145HA03-HP358	31036339
10,50	12	102	55	40	45	SCD621-1050-2-3-145HA03-HP358	31036340
10,60	12	102	55	40	45	SCD621-1060-2-3-145HA03-HP358	31036341
10,70	12	102	55	40	45	SCD621-1070-2-3-145HA03-HP358	31036342
10,80	12	102	55	40	45	SCD621-1080-2-3-145HA03-HP358	31036343
10,90	12	102	55	40	45	SCD621-1090-2-3-145HA03-HP358	31036344
11,00	12	102	55	40	45	SCD621-1100-2-3-145HA03-HP358	31036345
11,10	12	102	55	40	45	SCD621-1110-2-3-145HA03-HP358	31036346
11,20	12	102	55	40	45	SCD621-1120-2-3-145HA03-HP358	31036347
11,30	12	102	55	40	45	SCD621-1130-2-3-145HA03-HP358	31036348
11,40	12	102	55	40	45	SCD621-1140-2-3-145HA03-HP358	31036349
11,50	12	102	55	40	45	SCD621-1150-2-3-145HA03-HP358	31036350
11,60	12	102	55	40	45	SCD621-1160-2-3-145HA03-HP358	31036351
11,70	12	102	55	40	45	SCD621-1170-2-3-145HA03-HP358	31036352
11,80	12	102	55	40	45	SCD621-1180-2-3-145HA03-HP358	31036353
11,90	12	102	55	40	45	SCD621-1190-2-3-145HA03-HP358	31036354
12,00	12	102	55	40	45	SCD621-1200-2-3-145HA03-HP358	31036355
12,20	14	107	60	43	45	SCD621-1220-2-3-145HA03-HP358	31036356
12,50	14	107	60	43	45	SCD621-1250-2-3-145HA03-HP358	31036357

Continued on next page.

MEGA-Speed-Drill-Steel | Solid carbide twist drills SCD62 (3xD), internal coolant supply

Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
12,80	14	107	60	43	45	SCD621-1280-2-3-145HA03-HP358	31036358
13,00	14	107	60	43	45	SCD621-1300-2-3-145HA03-HP358	31036359
13,50	14	107	60	43	45	SCD621-1350-2-3-145HA03-HP358	31036360
13,80	14	107	60	43	45	SCD621-1380-2-3-145HA03-HP358	31036361
14,00	14	107	60	43	45	SCD621-1400-2-3-145HA03-HP358	31036362
14,20	16	115	65	45	48	SCD621-1420-2-3-145HA03-HP358	31036363
14,50	16	115	65	45	48	SCD621-1450-2-3-145HA03-HP358	31036364
14,80	16	115	65	45	48	SCD621-1480-2-3-145HA03-HP358	31036365
15,00	16	115	65	45	48	SCD621-1500-2-3-145HA03-HP358	31036366
15,20	16	115	65	45	48	SCD621-1520-2-3-145HA03-HP358	31036367
15,50	16	115	65	45	48	SCD621-1550-2-3-145HA03-HP358	31036368
15,80	16	115	65	45	48	SCD621-1580-2-3-145HA03-HP358	31036369
16,00	16	115	65	45	48	SCD621-1600-2-3-145HA03-HP358	31036370
16,50	18	123	73	51	48	SCD621-1650-2-3-145HA03-HP358	31036371
16,80	18	123	73	51	48	SCD621-1680-2-3-145HA03-HP358	31036372
17,00	18	123	73	51	48	SCD621-1700-2-3-145HA03-HP358	31036373
17,50	18	123	73	51	48	SCD621-1750-2-3-145HA03-HP358	31036374
17,80	18	123	73	51	48	SCD621-1780-2-3-145HA03-HP358	31036375
18,00	18	123	73	51	48	SCD621-1800-2-3-145HA03-HP358	31036376
18,50	20	131	79	55	50	SCD621-1850-2-3-145HA03-HP358	31036377
18,80	20	131	79	55	50	SCD621-1880-2-3-145HA03-HP358	31036378
19,00	20	131	79	55	50	SCD621-1900-2-3-145HA03-HP358	31036379
19,50	20	131	79	55	50	SCD621-1950-2-3-145HA03-HP358	31036390
19,80	20	131	79	55	50	SCD621-1980-2-3-145HA03-HP358	31036391
20,00	20	131	79	55	50	SCD621-2000-2-3-145HA03-HP358	31036392

Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

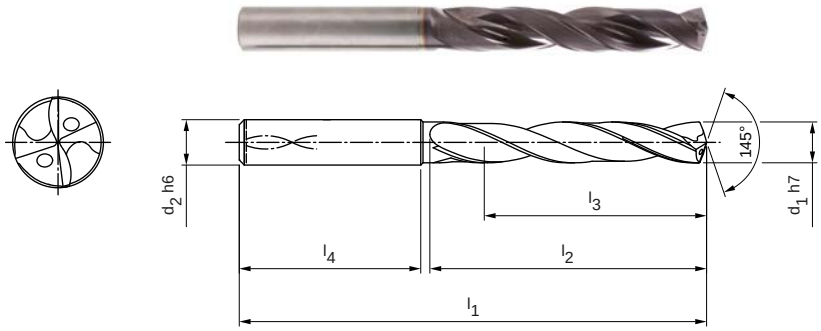
MEGA-Speed-Drill-Steel

Solid carbide twist drill

SCD62 (5xD), internal coolant supply, successor product to the MEGA-Speed-Drill-Steel (SCD22)

Design:

Drill diameter:	3.00 – 20.00 mm
Bore tolerance:	≥ IT 9
Cutting material:	HP358
Number of cutting edges:	2
Number of guiding chamfers:	3
Tip angle:	145°
Helix angle:	30°



P 1 2 3 4 5 6 M 1 2 3 K 1 2 3 N 1 2 3 4 S 1 2 3 4 5 H 1 2

Expert LINE HA DIN 6535

Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
3,00	6	66	28	23	36	SCD621-0300-2-3-145HA05-HP358	30966287
3,10	6	66	28	23	36	SCD621-0310-2-3-145HA05-HP358	30966288
3,20	6	66	28	23	36	SCD621-0320-2-3-145HA05-HP358	30966289
3,30	6	66	28	23	36	SCD621-0330-2-3-145HA05-HP358	30966310
3,40	6	66	28	23	36	SCD621-0340-2-3-145HA05-HP358	30966311
3,50	6	66	28	23	36	SCD621-0350-2-3-145HA05-HP358	30959126
3,60	6	66	28	23	36	SCD621-0360-2-3-145HA05-HP358	30966312
3,70	6	66	28	23	36	SCD621-0370-2-3-145HA05-HP358	30966313
3,80	6	74	36	29	36	SCD621-0380-2-3-145HA05-HP358	30966314
3,90	6	74	36	29	36	SCD621-0390-2-3-145HA05-HP358	30966315
4,00	6	74	36	29	36	SCD621-0400-2-3-145HA05-HP358	30966316
4,10	6	74	36	29	36	SCD621-0410-2-3-145HA05-HP358	30966317
4,20	6	74	36	29	36	SCD621-0420-2-3-145HA05-HP358	30966318
4,30	6	74	36	29	36	SCD621-0430-2-3-145HA05-HP358	30966319
4,40	6	74	36	29	36	SCD621-0440-2-3-145HA05-HP358	30966320
4,50	6	74	36	29	36	SCD621-0450-2-3-145HA05-HP358	30966321
4,60	6	74	36	29	36	SCD621-0460-2-3-145HA05-HP358	30966322
4,70	6	74	36	29	36	SCD621-0470-2-3-145HA05-HP358	30966323
4,80	6	82	44	35	36	SCD621-0480-2-3-145HA05-HP358	30966324
4,90	6	82	44	35	36	SCD621-0490-2-3-145HA05-HP358	30966326
5,00	6	82	44	35	36	SCD621-0500-2-3-145HA05-HP358	30966327
5,10	6	82	44	35	36	SCD621-0510-2-3-145HA05-HP358	30966328
5,20	6	82	44	35	36	SCD621-0520-2-3-145HA05-HP358	30966329
5,30	6	82	44	35	36	SCD621-0530-2-3-145HA05-HP358	30966330
5,40	6	82	44	35	36	SCD621-0540-2-3-145HA05-HP358	30966331
5,50	6	82	44	35	36	SCD621-0550-2-3-145HA05-HP358	30966332
5,60	6	82	44	35	36	SCD621-0560-2-3-145HA05-HP358	30966333
5,70	6	82	44	35	36	SCD621-0570-2-3-145HA05-HP358	30966334
5,80	6	82	44	35	36	SCD621-0580-2-3-145HA05-HP358	30966335
5,90	6	82	44	35	36	SCD621-0590-2-3-145HA05-HP358	30966336
6,00	6	82	44	35	36	SCD621-0600-2-3-145HA05-HP358	30966337
6,10	8	91	53	43	36	SCD621-0610-2-3-145HA05-HP358	30966338
6,20	8	91	53	43	36	SCD621-0620-2-3-145HA05-HP358	30966339
6,30	8	91	53	43	36	SCD621-0630-2-3-145HA05-HP358	30966340
6,40	8	91	53	43	36	SCD621-0640-2-3-145HA05-HP358	30966341
6,50	8	91	53	43	36	SCD621-0650-2-3-145HA05-HP358	30966342

Continued on next page.

MEGA-Speed-Drill-Steel | Solid carbide twist drills SCD62 (5xD), internal coolant supply

Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
6,60	8	91	53	43	36	SCD621-0660-2-3-145HA05-HP358	30966343
6,70	8	91	53	43	36	SCD621-0670-2-3-145HA05-HP358	30966344
6,80	8	91	53	43	36	SCD621-0680-2-3-145HA05-HP358	30966345
6,90	8	91	53	43	36	SCD621-0690-2-3-145HA05-HP358	30966346
7,00	8	91	53	43	36	SCD621-0700-2-3-145HA05-HP358	30966347
7,10	8	91	53	43	36	SCD621-0710-2-3-145HA05-HP358	30966348
7,20	8	91	53	43	36	SCD621-0720-2-3-145HA05-HP358	30966349
7,30	8	91	53	43	36	SCD621-0730-2-3-145HA05-HP358	30966350
7,40	8	91	53	43	36	SCD621-0740-2-3-145HA05-HP358	30966351
7,50	8	91	53	43	36	SCD621-0750-2-3-145HA05-HP358	30966352
7,60	8	91	53	43	36	SCD621-0760-2-3-145HA05-HP358	30966353
7,70	8	91	53	43	36	SCD621-0770-2-3-145HA05-HP358	30966354
7,80	8	91	53	43	36	SCD621-0780-2-3-145HA05-HP358	30966355
7,90	8	91	53	43	36	SCD621-0790-2-3-145HA05-HP358	30966356
8,00	8	91	53	43	36	SCD621-0800-2-3-145HA05-HP358	30948674
8,10	10	103	61	49	40	SCD621-0810-2-3-145HA05-HP358	30966357
8,20	10	103	61	49	40	SCD621-0820-2-3-145HA05-HP358	30966358
8,30	10	103	61	49	40	SCD621-0830-2-3-145HA05-HP358	30966359
8,40	10	103	61	49	40	SCD621-0840-2-3-145HA05-HP358	30966360
8,50	10	103	61	49	40	SCD621-0850-2-3-145HA05-HP358	30959302
8,60	10	103	61	49	40	SCD621-0860-2-3-145HA05-HP358	30966361
8,70	10	103	61	49	40	SCD621-0870-2-3-145HA05-HP358	30812607
8,80	10	103	61	49	40	SCD621-0880-2-3-145HA05-HP358	30966362
8,90	10	103	61	49	40	SCD621-0890-2-3-145HA05-HP358	30966363
9,00	10	103	61	49	40	SCD621-0900-2-3-145HA05-HP358	30966364
9,10	10	103	61	49	40	SCD621-0910-2-3-145HA05-HP358	30966365
9,20	10	103	61	49	40	SCD621-0920-2-3-145HA05-HP358	30966366
9,30	10	103	61	49	40	SCD621-0930-2-3-145HA05-HP358	30966367
9,40	10	103	61	49	40	SCD621-0940-2-3-145HA05-HP358	30966368
9,50	10	103	61	49	40	SCD621-0950-2-3-145HA05-HP358	30966369
9,60	10	103	61	49	40	SCD621-0960-2-3-145HA05-HP358	30966370
9,70	10	103	61	49	40	SCD621-0970-2-3-145HA05-HP358	30958145
9,80	10	103	61	49	40	SCD621-0980-2-3-145HA05-HP358	30959402
9,90	10	103	61	49	40	SCD621-0990-2-3-145HA05-HP358	30966371
10,00	10	103	61	49	40	SCD621-1000-2-3-145HA05-HP358	30948675
10,10	12	118	71	56	45	SCD621-1010-2-3-145HA05-HP358	30966372
10,20	12	118	71	56	45	SCD621-1020-2-3-145HA05-HP358	30966373
10,30	12	118	71	56	45	SCD621-1030-2-3-145HA05-HP358	30966374
10,40	12	118	71	56	45	SCD621-1040-2-3-145HA05-HP358	30966375
10,50	12	118	71	56	45	SCD621-1050-2-3-145HA05-HP358	30966376
10,60	12	118	71	56	45	SCD621-1060-2-3-145HA05-HP358	30966377
10,70	12	118	71	56	45	SCD621-1070-2-3-145HA05-HP358	30966378
10,80	12	118	71	56	45	SCD621-1080-2-3-145HA05-HP358	30966379
10,90	12	118	71	56	45	SCD621-1090-2-3-145HA05-HP358	30966380
11,00	12	118	71	56	45	SCD621-1100-2-3-145HA05-HP358	30966381
11,10	12	118	71	56	45	SCD621-1110-2-3-145HA05-HP358	30966382
11,20	12	118	71	56	45	SCD621-1120-2-3-145HA05-HP358	30966383
11,30	12	118	71	56	45	SCD621-1130-2-3-145HA05-HP358	30966384
11,40	12	118	71	56	45	SCD621-1140-2-3-145HA05-HP358	30966385
11,50	12	118	71	56	45	SCD621-1150-2-3-145HA05-HP358	30966386
11,60	12	118	71	56	45	SCD621-1160-2-3-145HA05-HP358	30966387
11,70	12	118	71	56	45	SCD621-1170-2-3-145HA05-HP358	30966388
11,80	12	118	71	56	45	SCD621-1180-2-3-145HA05-HP358	30966389
11,90	12	118	71	56	45	SCD621-1190-2-3-145HA05-HP358	30966390
12,00	12	118	71	56	45	SCD621-1200-2-3-145HA05-HP358	30948676
12,20	14	124	77	60	45	SCD621-1220-2-3-145HA05-HP358	30966391
12,50	14	124	77	60	45	SCD621-1250-2-3-145HA05-HP358	30966392

MEGA-Speed-Drill-Steel | Solid carbide twist drills SCD62 (5xD), internal coolant supply

Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
12,80	14	124	77	60	45	SCD621-1280-2-3-145HA05-HP358	30980599
13,00	14	124	77	60	45	SCD621-1300-2-3-145HA05-HP358	30966393
13,50	14	124	77	60	45	SCD621-1350-2-3-145HA05-HP358	30966394
13,80	14	124	77	60	45	SCD621-1380-2-3-145HA05-HP358	30966395
14,00	14	124	77	60	45	SCD621-1400-2-3-145HA05-HP358	30966396
14,20	16	133	83	63	48	SCD621-1420-2-3-145HA05-HP358	30966397
14,50	16	133	83	63	48	SCD621-1450-2-3-145HA05-HP358	30966398
14,80	16	133	83	63	48	SCD621-1480-2-3-145HA05-HP358	30966399
15,00	16	133	83	63	48	SCD621-1500-2-3-145HA05-HP358	30966400
15,20	16	133	83	63	48	SCD621-1520-2-3-145HA05-HP358	30966401
15,50	16	133	83	63	48	SCD621-1550-2-3-145HA05-HP358	30966402
15,80	16	133	83	63	48	SCD621-1580-2-3-145HA05-HP358	30966403
16,00	16	133	83	63	48	SCD621-1600-2-3-145HA05-HP358	30966404
16,50	18	143	93	71	48	SCD621-1650-2-3-145HA05-HP358	30966405
16,80	18	143	93	71	48	SCD621-1680-2-3-145HA05-HP358	30966406
17,00	18	143	93	71	48	SCD621-1700-2-3-145HA05-HP358	30966407
17,50	18	143	93	71	48	SCD621-1750-2-3-145HA05-HP358	30966408
17,80	18	143	93	71	48	SCD621-1780-2-3-145HA05-HP358	30966409
18,00	18	143	93	71	48	SCD621-1800-2-3-145HA05-HP358	30966410
18,50	20	153	101	77	50	SCD621-1850-2-3-145HA05-HP358	30966411
18,80	20	153	101	77	50	SCD621-1880-2-3-145HA05-HP358	30966412
19,00	20	153	101	77	50	SCD621-1900-2-3-145HA05-HP358	30966413
19,50	20	153	101	77	50	SCD621-1950-2-3-145HA05-HP358	30966414
19,80	20	153	101	77	50	SCD621-1980-2-3-145HA05-HP358	30966415
20,00	20	153	101	77	50	SCD621-2000-2-3-145HA05-HP358	30966416

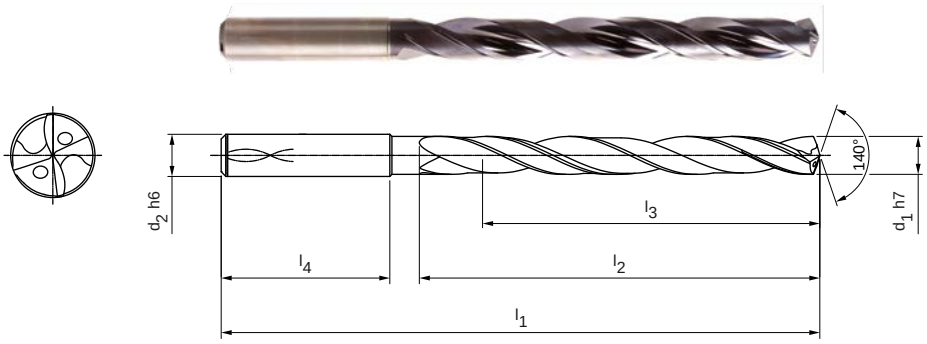
Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

MEGA-Speed-Drill-Steel

Solid carbide twist drill
SCD62 (8xD), internal coolant supply, successor product to the MEGA-Speed-Drill-Steel (SCD22)

Design:

Drill diameter:	3.00 – 20.00 mm
Bore tolerance:	IT 9 (achievable)
Cutting material:	HP358
Number of cutting edges:	2
Number of guiding chamfers:	3
Tip angle:	140°
Helix angle:	30°



P 1 2 3 4 5 6 M 1 2 3 K 1 2 3 N 1 2 3 4 S 1 2 3 4 5 H 1 2

Expert LINE HA DIN 6535

Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
3,00	6	72	34	29	36	SCD621-0300-2-3-140HA08-HP358	31036147
3,10	6	72	34	29	36	SCD621-0310-2-3-140HA08-HP358	31036148
3,20	6	72	34	29	36	SCD621-0320-2-3-140HA08-HP358	31036149
3,30	6	72	34	29	36	SCD621-0330-2-3-140HA08-HP358	31036150
3,40	6	72	34	29	36	SCD621-0340-2-3-140HA08-HP358	31036151
3,50	6	72	34	29	36	SCD621-0350-2-3-140HA08-HP358	31036152
3,60	6	72	34	29	36	SCD621-0360-2-3-140HA08-HP358	31036153
3,70	6	72	34	29	36	SCD621-0370-2-3-140HA08-HP358	31036154
3,80	6	81	43	36	36	SCD621-0380-2-3-140HA08-HP358	31036155
3,90	6	81	43	36	36	SCD621-0390-2-3-140HA08-HP358	31036156
4,00	6	81	43	36	36	SCD621-0400-2-3-140HA08-HP358	31036157
4,10	6	81	43	36	36	SCD621-0410-2-3-140HA08-HP358	31036158
4,20	6	81	43	36	36	SCD621-0420-2-3-140HA08-HP358	31036159
4,30	6	81	43	36	36	SCD621-0430-2-3-140HA08-HP358	31036160
4,40	6	81	43	36	36	SCD621-0440-2-3-140HA08-HP358	31036161
4,50	6	81	43	36	36	SCD621-0450-2-3-140HA08-HP358	31036162
4,60	6	81	43	36	36	SCD621-0460-2-3-140HA08-HP358	31036163
4,70	6	81	43	36	36	SCD621-0470-2-3-140HA08-HP358	31036164
4,80	6	95	57	48	36	SCD621-0480-2-3-140HA08-HP358	31036165
4,90	6	95	57	48	36	SCD621-0490-2-3-140HA08-HP358	31036166
5,00	6	95	57	48	36	SCD621-0500-2-3-140HA08-HP358	31036167
5,10	6	95	57	48	36	SCD621-0510-2-3-140HA08-HP358	31036168
5,20	6	95	57	48	36	SCD621-0520-2-3-140HA08-HP358	31036169
5,30	6	95	57	48	36	SCD621-0530-2-3-140HA08-HP358	31036170
5,40	6	95	57	48	36	SCD621-0540-2-3-140HA08-HP358	31036171
5,50	6	95	57	48	36	SCD621-0550-2-3-140HA08-HP358	31036172
5,60	6	95	57	48	36	SCD621-0560-2-3-140HA08-HP358	31036173
5,70	6	95	57	48	36	SCD621-0570-2-3-140HA08-HP358	31036174
5,80	6	95	57	48	36	SCD621-0580-2-3-140HA08-HP358	31036175
5,90	6	95	57	48	36	SCD621-0590-2-3-140HA08-HP358	31036176
6,00	6	95	57	48	36	SCD621-0600-2-3-140HA08-HP358	31036177
6,10	8	114	76	64	36	SCD621-0610-2-3-140HA08-HP358	31036178
6,20	8	114	76	64	36	SCD621-0620-2-3-140HA08-HP358	31036179
6,30	8	114	76	64	36	SCD621-0630-2-3-140HA08-HP358	31036180
6,40	8	114	76	64	36	SCD621-0640-2-3-140HA08-HP358	31036181
6,50	8	114	76	64	36	SCD621-0650-2-3-140HA08-HP358	31036182

MEGA-Speed-Drill-Steel | Solid carbide twist drills SCD62 (8xD), internal coolant supply

Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
6,60	8	114	76	64	36	SCD621-0660-2-3-140HA08-HP358	31036183
6,70	8	114	76	64	36	SCD621-0670-2-3-140HA08-HP358	31036184
6,80	8	114	76	64	36	SCD621-0680-2-3-140HA08-HP358	31036185
6,90	8	114	76	64	36	SCD621-0690-2-3-140HA08-HP358	31036186
7,00	8	114	76	64	36	SCD621-0700-2-3-140HA08-HP358	31036187
7,10	8	114	76	64	36	SCD621-0710-2-3-140HA08-HP358	31036188
7,20	8	114	76	64	36	SCD621-0720-2-3-140HA08-HP358	31036189
7,30	8	114	76	64	36	SCD621-0730-2-3-140HA08-HP358	31036190
7,40	8	114	76	64	36	SCD621-0740-2-3-140HA08-HP358	31036191
7,50	8	114	76	64	36	SCD621-0750-2-3-140HA08-HP358	31036192
7,60	8	114	76	64	36	SCD621-0760-2-3-140HA08-HP358	31036193
7,70	8	114	76	64	36	SCD621-0770-2-3-140HA08-HP358	31036194
7,80	8	114	76	64	36	SCD621-0780-2-3-140HA08-HP358	31036195
7,90	8	114	76	64	36	SCD621-0790-2-3-140HA08-HP358	31036196
8,00	8	114	76	64	36	SCD621-0800-2-3-140HA08-HP358	31036197
8,10	10	142	95	80	40	SCD621-0810-2-3-140HA08-HP358	31036198
8,20	10	142	95	80	40	SCD621-0820-2-3-140HA08-HP358	31036199
8,30	10	142	95	80	40	SCD621-0830-2-3-140HA08-HP358	31036200
8,40	10	142	95	80	40	SCD621-0840-2-3-140HA08-HP358	31036201
8,50	10	142	95	80	40	SCD621-0850-2-3-140HA08-HP358	31036202
8,60	10	142	95	80	40	SCD621-0860-2-3-140HA08-HP358	31036203
8,70	10	142	95	80	40	SCD621-0870-2-3-140HA08-HP358	31036204
8,80	10	142	95	80	40	SCD621-0880-2-3-140HA08-HP358	31036205
8,90	10	142	95	80	40	SCD621-0890-2-3-140HA08-HP358	31036206
9,00	10	142	95	80	40	SCD621-0900-2-3-140HA08-HP358	31036207
9,10	10	142	95	80	40	SCD621-0910-2-3-140HA08-HP358	31036208
9,20	10	142	95	80	40	SCD621-0920-2-3-140HA08-HP358	31036209
9,30	10	142	95	80	40	SCD621-0930-2-3-140HA08-HP358	31036210
9,40	10	142	95	80	40	SCD621-0940-2-3-140HA08-HP358	31036211
9,50	10	142	95	80	40	SCD621-0950-2-3-140HA08-HP358	31036212
9,60	10	142	95	80	40	SCD621-0960-2-3-140HA08-HP358	31036213
9,70	10	142	95	80	40	SCD621-0970-2-3-140HA08-HP358	31036214
9,80	10	142	95	80	40	SCD621-0980-2-3-140HA08-HP358	31036215
9,90	10	142	95	80	40	SCD621-0990-2-3-140HA08-HP358	31036216
10,00	10	142	95	80	40	SCD621-1000-2-3-140HA08-HP358	31036217
10,10	12	162	114	96	45	SCD621-1010-2-3-140HA08-HP358	31036218
10,20	12	162	114	96	45	SCD621-1020-2-3-140HA08-HP358	31036219
10,30	12	162	114	96	45	SCD621-1030-2-3-140HA08-HP358	31036220
10,40	12	162	114	96	45	SCD621-1040-2-3-140HA08-HP358	31036221
10,50	12	162	114	96	45	SCD621-1050-2-3-140HA08-HP358	31036222
10,60	12	162	114	96	45	SCD621-1060-2-3-140HA08-HP358	31036223
10,70	12	162	114	96	45	SCD621-1070-2-3-140HA08-HP358	31036224
10,80	12	162	114	96	45	SCD621-1080-2-3-140HA08-HP358	31036225
10,90	12	162	114	96	45	SCD621-1090-2-3-140HA08-HP358	31036226
11,00	12	162	114	96	45	SCD621-1100-2-3-140HA08-HP358	31036227
11,10	12	162	114	96	45	SCD621-1110-2-3-140HA08-HP358	31036228
11,20	12	162	114	96	45	SCD621-1120-2-3-140HA08-HP358	31036229
11,30	12	162	114	96	45	SCD621-1130-2-3-140HA08-HP358	31036230
11,40	12	162	114	96	45	SCD621-1140-2-3-140HA08-HP358	31036231
11,50	12	162	114	96	45	SCD621-1150-2-3-140HA08-HP358	31036232
11,60	12	162	114	96	45	SCD621-1160-2-3-140HA08-HP358	31036233
11,70	12	162	114	96	45	SCD621-1170-2-3-140HA08-HP358	31036234
11,80	12	162	114	96	45	SCD621-1180-2-3-140HA08-HP358	31036235
11,90	12	162	114	96	45	SCD621-1190-2-3-140HA08-HP358	31036236
12,00	12	162	114	96	45	SCD621-1200-2-3-140HA08-HP358	31036237
12,20	14	178	133	112	45	SCD621-1220-2-3-140HA08-HP358	31036238
12,50	14	178	133	112	45	SCD621-1250-2-3-140HA08-HP358	31036239

Continued on next page.

MEGA-Speed-Drill-Steel | Solid carbide twist drills SCD62 (8xD), internal coolant supply

Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
12,80	14	178	133	112	45	SCD621-1280-2-3-140HA08-HP358	31036240
13,00	14	178	133	112	45	SCD621-1300-2-3-140HA08-HP358	31036241
13,50	14	178	133	112	45	SCD621-1350-2-3-140HA08-HP358	31036242
13,80	14	178	133	112	45	SCD621-1380-2-3-140HA08-HP358	31036243
14,00	14	178	133	112	45	SCD621-1400-2-3-140HA08-HP358	31036244
14,20	16	203	152	128	48	SCD621-1420-2-3-140HA08-HP358	31036245
14,50	16	203	152	128	48	SCD621-1450-2-3-140HA08-HP358	31036246
14,80	16	203	152	128	48	SCD621-1480-2-3-140HA08-HP358	31036247
15,00	16	203	152	128	48	SCD621-1500-2-3-140HA08-HP358	31036248
15,20	16	203	152	128	48	SCD621-1520-2-3-140HA08-HP358	31036249
15,50	16	203	152	128	48	SCD621-1550-2-3-140HA08-HP358	31036250
15,80	16	203	152	128	48	SCD621-1580-2-3-140HA08-HP358	31036251
16,00	16	203	152	128	48	SCD621-1600-2-3-140HA08-HP358	31036252
16,50	18	222	171	144	48	SCD621-1650-2-3-140HA08-HP358	31036253
16,80	18	222	171	144	48	SCD621-1680-2-3-140HA08-HP358	31036254
17,00	18	222	171	144	48	SCD621-1700-2-3-140HA08-HP358	31036255
17,50	18	222	171	144	48	SCD621-1750-2-3-140HA08-HP358	31036256
17,80	18	222	171	144	48	SCD621-1780-2-3-140HA08-HP358	31036257
18,00	18	222	171	144	48	SCD621-1800-2-3-140HA08-HP358	31036258
18,50	20	243	190	160	50	SCD621-1850-2-3-140HA08-HP358	31036259
18,80	20	243	190	160	50	SCD621-1880-2-3-140HA08-HP358	31036260
19,00	20	243	190	160	50	SCD621-1900-2-3-140HA08-HP358	31036261
19,50	20	243	190	160	50	SCD621-1950-2-3-140HA08-HP358	31036262
19,80	20	243	190	160	50	SCD621-1980-2-3-140HA08-HP358	31036263
20,00	20	243	190	160	50	SCD621-2000-2-3-140HA08-HP358	31036264

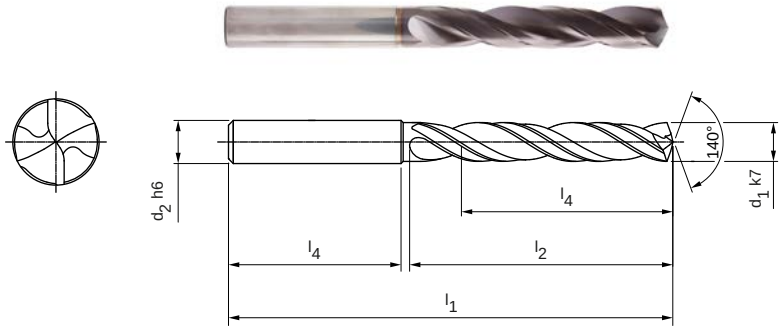
Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

MEGA-Quadro-Drill-Plus

Solid carbide twist drill
SCD61 (5xD), external coolant supply, successor product to the MEGA-Quadro-Drill (SCD16)

Design:

Drill diameter:	3.00 – 20.00 mm
Bore tolerance:	≥ IT 8
Cutting material:	HP358
Number of cutting edges:	2
Number of guiding chamfers:	4
Tip angle:	140°
Helix angle:	30°



P 1 2 3 4 5 6 M 1 2 3 K 1 2 3 N 1 2 3 4 S 1 2 3 4 5 H 1 2

Dimensions						Shank form HA	
d_1 k7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
3,00	6	66	28	23	36	SCD610-0300-2-4-140HA05-HP358	31052631
3,10	6	66	28	23	36	SCD610-0310-2-4-140HA05-HP358	31052632
3,20	6	66	28	23	36	SCD610-0320-2-4-140HA05-HP358	31052633
3,30	6	66	28	23	36	SCD610-0330-2-4-140HA05-HP358	31052634
3,40	6	66	28	23	36	SCD610-0340-2-4-140HA05-HP358	31052635
3,50	6	66	28	23	36	SCD610-0350-2-4-140HA05-HP358	31052636
3,60	6	66	28	23	36	SCD610-0360-2-4-140HA05-HP358	31052637
3,70	6	66	28	23	36	SCD610-0370-2-4-140HA05-HP358	31052638
3,80	6	74	36	29	36	SCD610-0380-2-4-140HA05-HP358	31052639
3,90	6	74	36	29	36	SCD610-0390-2-4-140HA05-HP358	31052640
4,00	6	74	36	29	36	SCD610-0400-2-4-140HA05-HP358	31052641
4,10	6	74	36	29	36	SCD610-0410-2-4-140HA05-HP358	31052642
4,20	6	74	36	29	36	SCD610-0420-2-4-140HA05-HP358	31052643
4,30	6	74	36	29	36	SCD610-0430-2-4-140HA05-HP358	31052644
4,40	6	74	36	29	36	SCD610-0440-2-4-140HA05-HP358	31052645
4,50	6	74	36	29	36	SCD610-0450-2-4-140HA05-HP358	31052646
4,60	6	74	36	29	36	SCD610-0460-2-4-140HA05-HP358	31052647
4,70	6	74	36	29	36	SCD610-0470-2-4-140HA05-HP358	31052648
4,80	6	82	44	35	36	SCD610-0480-2-4-140HA05-HP358	31052649
4,90	6	82	44	35	36	SCD610-0490-2-4-140HA05-HP358	31052650
5,00	6	82	44	35	36	SCD610-0500-2-4-140HA05-HP358	31052651
5,10	6	82	44	35	36	SCD610-0510-2-4-140HA05-HP358	31052652
5,20	6	82	44	35	36	SCD610-0520-2-4-140HA05-HP358	31052653
5,30	6	82	44	35	36	SCD610-0530-2-4-140HA05-HP358	31052654
5,40	6	82	44	35	36	SCD610-0540-2-4-140HA05-HP358	31052655
5,50	6	82	44	35	36	SCD610-0550-2-4-140HA05-HP358	31052656
5,60	6	82	44	35	36	SCD610-0560-2-4-140HA05-HP358	31052657
5,70	6	82	44	35	36	SCD610-0570-2-4-140HA05-HP358	31052658
5,80	6	82	44	35	36	SCD610-0580-2-4-140HA05-HP358	31052659
5,90	6	82	44	35	36	SCD610-0590-2-4-140HA05-HP358	31052660
6,00	6	82	44	35	36	SCD610-0600-2-4-140HA05-HP358	31052661
6,10	8	91	53	43	36	SCD610-0610-2-4-140HA05-HP358	31052662
6,20	8	91	53	43	36	SCD610-0620-2-4-140HA05-HP358	31052663
6,30	8	91	53	43	36	SCD610-0630-2-4-140HA05-HP358	31052664
6,40	8	91	53	43	36	SCD610-0640-2-4-140HA05-HP358	31052665
6,50	8	91	53	43	36	SCD610-0650-2-4-140HA05-HP358	31052666

Continued on next page.

MEGA-Quadro-Drill-Plus | Solid carbide twist drills SCD61 (5xD), external coolant supply

Dimensions						Shank form HA	
d_1 k7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
6,60	8	91	53	43	36	SCD610-0660-2-4-140HA05-HP358	31052667
6,70	8	91	53	43	36	SCD610-0670-2-4-140HA05-HP358	31052668
6,80	8	91	53	43	36	SCD610-0680-2-4-140HA05-HP358	31052669
6,90	8	91	53	43	36	SCD610-0690-2-4-140HA05-HP358	31052670
7,00	8	91	53	43	36	SCD610-0700-2-4-140HA05-HP358	31052671
7,10	8	91	53	43	36	SCD610-0710-2-4-140HA05-HP358	31052672
7,20	8	91	53	43	36	SCD610-0720-2-4-140HA05-HP358	31052673
7,30	8	91	53	43	36	SCD610-0730-2-4-140HA05-HP358	31052674
7,40	8	91	53	43	36	SCD610-0740-2-4-140HA05-HP358	31052675
7,50	8	91	53	43	36	SCD610-0750-2-4-140HA05-HP358	31052676
7,60	8	91	53	43	36	SCD610-0760-2-4-140HA05-HP358	31052677
7,70	8	91	53	43	36	SCD610-0770-2-4-140HA05-HP358	31052678
7,80	8	91	53	43	36	SCD610-0780-2-4-140HA05-HP358	31052679
7,90	8	91	53	43	36	SCD610-0790-2-4-140HA05-HP358	31052680
8,00	8	91	53	43	36	SCD610-0800-2-4-140HA05-HP358	31052681
8,10	10	103	61	49	40	SCD610-0810-2-4-140HA05-HP358	31052682
8,20	10	103	61	49	40	SCD610-0820-2-4-140HA05-HP358	31052683
8,30	10	103	61	49	40	SCD610-0830-2-4-140HA05-HP358	31052684
8,40	10	103	61	49	40	SCD610-0840-2-4-140HA05-HP358	31052685
8,50	10	103	61	49	40	SCD610-0850-2-4-140HA05-HP358	31052686
8,60	10	103	61	49	40	SCD610-0860-2-4-140HA05-HP358	31052687
8,70	10	103	61	49	40	SCD610-0870-2-4-140HA05-HP358	31052688
8,80	10	103	61	49	40	SCD610-0880-2-4-140HA05-HP358	31052689
8,90	10	103	61	49	40	SCD610-0890-2-4-140HA05-HP358	31052690
9,00	10	103	61	49	40	SCD610-0900-2-4-140HA05-HP358	31052691
9,10	10	103	61	49	40	SCD610-0910-2-4-140HA05-HP358	31052692
9,20	10	103	61	49	40	SCD610-0920-2-4-140HA05-HP358	31052693
9,30	10	103	61	49	40	SCD610-0930-2-4-140HA05-HP358	31052694
9,40	10	103	61	49	40	SCD610-0940-2-4-140HA05-HP358	31052695
9,50	10	103	61	49	40	SCD610-0950-2-4-140HA05-HP358	31052696
9,60	10	103	61	49	40	SCD610-0960-2-4-140HA05-HP358	31052697
9,70	10	103	61	49	40	SCD610-0970-2-4-140HA05-HP358	31052698
9,80	10	103	61	49	40	SCD610-0980-2-4-140HA05-HP358	31052699
9,90	10	103	61	49	40	SCD610-0990-2-4-140HA05-HP358	31052700
10,00	10	103	61	49	40	SCD610-1000-2-4-140HA05-HP358	31052701
10,10	12	118	71	56	45	SCD610-1010-2-4-140HA05-HP358	31052702
10,20	12	118	71	56	45	SCD610-1020-2-4-140HA05-HP358	31052703
10,30	12	118	71	56	45	SCD610-1030-2-4-140HA05-HP358	31052704
10,40	12	118	71	56	45	SCD610-1040-2-4-140HA05-HP358	31052705
10,50	12	118	71	56	45	SCD610-1050-2-4-140HA05-HP358	31052706
10,60	12	118	71	56	45	SCD610-1060-2-4-140HA05-HP358	31052707
10,70	12	118	71	56	45	SCD610-1070-2-4-140HA05-HP358	31052708
10,80	12	118	71	56	45	SCD610-1080-2-4-140HA05-HP358	31052709
10,90	12	118	71	56	45	SCD610-1090-2-4-140HA05-HP358	31052710
11,00	12	118	71	56	45	SCD610-1100-2-4-140HA05-HP358	31052711
11,10	12	118	71	56	45	SCD610-1110-2-4-140HA05-HP358	31052712
11,20	12	118	71	56	45	SCD610-1120-2-4-140HA05-HP358	31052713
11,30	12	118	71	56	45	SCD610-1130-2-4-140HA05-HP358	31052714
11,40	12	118	71	56	45	SCD610-1140-2-4-140HA05-HP358	31052715
11,50	12	118	71	56	45	SCD610-1150-2-4-140HA05-HP358	31052716
11,60	12	118	71	56	45	SCD610-1160-2-4-140HA05-HP358	31052717
11,70	12	118	71	56	45	SCD610-1170-2-4-140HA05-HP358	31052718
11,80	12	118	71	56	45	SCD610-1180-2-4-140HA05-HP358	31052719
11,90	12	118	71	56	45	SCD610-1190-2-4-140HA05-HP358	31052720
12,00	12	118	71	56	45	SCD610-1200-2-4-140HA05-HP358	31052721
12,50	14	124	77	60	45	SCD610-1250-2-4-140HA05-HP358	31052722
12,80	14	124	77	60	45	SCD610-1280-2-4-140HA05-HP358	31052723

MEGA-Quadro-Drill-Plus | Solid carbide twist drills SCD61 (5xD), external coolant supply

Dimensions						Shank form HA	
d_1 k7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
13,00	14	124	77	60	45	SCD610-1300-2-4-140HA05-HP358	31052724
13,50	14	124	77	60	45	SCD610-1350-2-4-140HA05-HP358	31052725
13,80	14	124	77	60	45	SCD610-1380-2-4-140HA05-HP358	31052726
14,00	14	124	77	60	45	SCD610-1400-2-4-140HA05-HP358	31052727
14,50	16	133	83	63	48	SCD610-1450-2-4-140HA05-HP358	31052728
14,80	16	133	83	63	48	SCD610-1480-2-4-140HA05-HP358	31052729
15,00	16	133	83	63	48	SCD610-1500-2-4-140HA05-HP358	31052730
15,50	16	133	83	63	48	SCD610-1550-2-4-140HA05-HP358	31052731
15,80	16	133	83	63	48	SCD610-1580-2-4-140HA05-HP358	31052732
16,00	16	133	83	63	48	SCD610-1600-2-4-140HA05-HP358	31052733
16,50	18	143	93	71	48	SCD610-1650-2-4-140HA05-HP358	31052734
16,80	18	143	93	71	48	SCD610-1680-2-4-140HA05-HP358	31052735
17,00	18	143	93	71	48	SCD610-1700-2-4-140HA05-HP358	31052736
17,50	18	143	93	71	48	SCD610-1750-2-4-140HA05-HP358	31052737
17,80	18	143	93	71	48	SCD610-1780-2-4-140HA05-HP358	31052738
18,00	18	143	93	71	48	SCD610-1800-2-4-140HA05-HP358	31052739
18,50	20	153	101	77	50	SCD610-1850-2-4-140HA05-HP358	31052740
18,80	20	153	101	77	50	SCD610-1880-2-4-140HA05-HP358	31052741
19,00	20	153	101	77	50	SCD610-1900-2-4-140HA05-HP358	31052742
19,50	20	153	101	77	50	SCD610-1950-2-4-140HA05-HP358	31052743
19,80	20	153	101	77	50	SCD610-1980-2-4-140HA05-HP358	31052744
20,00	20	153	101	77	50	SCD610-2000-2-4-140HA05-HP358	31052745

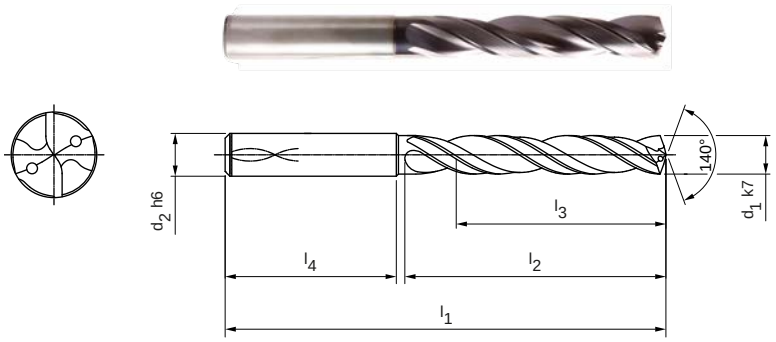
Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

MEGA-Quadro-Drill-Plus

Solid carbide twist drill
SCD61 (5xD), internal coolant supply, successor product to the MEGA-Quadro-Drill (SCD16)

Design:

Drill diameter:	3.00 – 20.00 mm
Bore tolerance:	≥ IT 8
Cutting material:	HP358
Number of cutting edges:	2
Number of guiding chamfers:	4
Tip angle:	140°
Helix angle:	30°



P 1 2 3 4 5 6 M 1 2 3 K 1 2 3 N 1 2 3 4 S 1 2 3 4 5 H 1 2

Dimensions						Shank form HA	
d_1 k7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
3,00	6	66	28	23	36	SCD611-0300-2-4-140HA05-HP358	31052795
3,10	6	66	28	23	36	SCD611-0310-2-4-140HA05-HP358	31052796
3,20	6	66	28	23	36	SCD611-0320-2-4-140HA05-HP358	31052797
3,30	6	66	28	23	36	SCD611-0330-2-4-140HA05-HP358	31052798
3,40	6	66	28	23	36	SCD611-0340-2-4-140HA05-HP358	31052799
3,50	6	66	28	23	36	SCD611-0350-2-4-140HA05-HP358	31052800
3,60	6	66	28	23	36	SCD611-0360-2-4-140HA05-HP358	31052801
3,70	6	66	28	23	36	SCD611-0370-2-4-140HA05-HP358	31052802
3,80	6	74	36	29	36	SCD611-0380-2-4-140HA05-HP358	31052803
3,90	6	74	36	29	36	SCD611-0390-2-4-140HA05-HP358	31052804
4,00	6	74	36	29	36	SCD611-0400-2-4-140HA05-HP358	31052805
4,10	6	74	36	29	36	SCD611-0410-2-4-140HA05-HP358	31052806
4,20	6	74	36	29	36	SCD611-0420-2-4-140HA05-HP358	31052807
4,30	6	74	36	29	36	SCD611-0430-2-4-140HA05-HP358	31052808
4,40	6	74	36	29	36	SCD611-0440-2-4-140HA05-HP358	31052809
4,50	6	74	36	29	36	SCD611-0450-2-4-140HA05-HP358	31052810
4,60	6	74	36	29	36	SCD611-0460-2-4-140HA05-HP358	31052811
4,70	6	74	36	29	36	SCD611-0470-2-4-140HA05-HP358	31052812
4,80	6	82	44	35	36	SCD611-0480-2-4-140HA05-HP358	31052813
4,90	6	82	44	35	36	SCD611-0490-2-4-140HA05-HP358	31052814
5,00	6	82	44	35	36	SCD611-0500-2-4-140HA05-HP358	31052815
5,10	6	82	44	35	36	SCD611-0510-2-4-140HA05-HP358	31052816
5,20	6	82	44	35	36	SCD611-0520-2-4-140HA05-HP358	31052817
5,30	6	82	44	35	36	SCD611-0530-2-4-140HA05-HP358	31052818
5,40	6	82	44	35	36	SCD611-0540-2-4-140HA05-HP358	31052819
5,50	6	82	44	35	36	SCD611-0550-2-4-140HA05-HP358	31052820
5,60	6	82	44	35	36	SCD611-0560-2-4-140HA05-HP358	31052821
5,70	6	82	44	35	36	SCD611-0570-2-4-140HA05-HP358	31052822
5,80	6	82	44	35	36	SCD611-0580-2-4-140HA05-HP358	31052823
5,90	6	82	44	35	36	SCD611-0590-2-4-140HA05-HP358	31052824
6,00	6	82	44	35	36	SCD611-0600-2-4-140HA05-HP358	31052825
6,10	8	91	53	43	36	SCD611-0610-2-4-140HA05-HP358	31052826
6,20	8	91	53	43	36	SCD611-0620-2-4-140HA05-HP358	31052827
6,30	8	91	53	43	36	SCD611-0630-2-4-140HA05-HP358	31052828
6,40	8	91	53	43	36	SCD611-0640-2-4-140HA05-HP358	31052829
6,50	8	91	53	43	36	SCD611-0650-2-4-140HA05-HP358	31052830

MEGA-Quadro-Drill-Plus | Solid carbide twist drills SCD61 (5xD), internal coolant supply

Dimensions						Shank form HA	
d_1 k7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
6,60	8	91	53	43	36	SCD611-0660-2-4-140HA05-HP358	31052831
6,70	8	91	53	43	36	SCD611-0670-2-4-140HA05-HP358	31052832
6,80	8	91	53	43	36	SCD611-0680-2-4-140HA05-HP358	31052833
6,90	8	91	53	43	36	SCD611-0690-2-4-140HA05-HP358	31052834
7,00	8	91	53	43	36	SCD611-0700-2-4-140HA05-HP358	31052835
7,10	8	91	53	43	36	SCD611-0710-2-4-140HA05-HP358	31052836
7,20	8	91	53	43	36	SCD611-0720-2-4-140HA05-HP358	31052837
7,30	8	91	53	43	36	SCD611-0730-2-4-140HA05-HP358	31052838
7,40	8	91	53	43	36	SCD611-0740-2-4-140HA05-HP358	31052839
7,50	8	91	53	43	36	SCD611-0750-2-4-140HA05-HP358	31052840
7,60	8	91	53	43	36	SCD611-0760-2-4-140HA05-HP358	31052841
7,70	8	91	53	43	36	SCD611-0770-2-4-140HA05-HP358	31052842
7,80	8	91	53	43	36	SCD611-0780-2-4-140HA05-HP358	31052843
7,90	8	91	53	43	36	SCD611-0790-2-4-140HA05-HP358	31052844
8,00	8	91	53	43	36	SCD611-0800-2-4-140HA05-HP358	31052845
8,10	10	103	61	49	40	SCD611-0810-2-4-140HA05-HP358	31052846
8,20	10	103	61	49	40	SCD611-0820-2-4-140HA05-HP358	31052847
8,30	10	103	61	49	40	SCD611-0830-2-4-140HA05-HP358	31052848
8,40	10	103	61	49	40	SCD611-0840-2-4-140HA05-HP358	31052849
8,50	10	103	61	49	40	SCD611-0850-2-4-140HA05-HP358	31052850
8,60	10	103	61	49	40	SCD611-0860-2-4-140HA05-HP358	31052851
8,70	10	103	61	49	40	SCD611-0870-2-4-140HA05-HP358	31052852
8,80	10	103	61	49	40	SCD611-0880-2-4-140HA05-HP358	31052853
8,90	10	103	61	49	40	SCD611-0890-2-4-140HA05-HP358	31052854
9,00	10	103	61	49	40	SCD611-0900-2-4-140HA05-HP358	31052855
9,10	10	103	61	49	40	SCD611-0910-2-4-140HA05-HP358	31052856
9,20	10	103	61	49	40	SCD611-0920-2-4-140HA05-HP358	31052857
9,30	10	103	61	49	40	SCD611-0930-2-4-140HA05-HP358	31052858
9,40	10	103	61	49	40	SCD611-0940-2-4-140HA05-HP358	31052859
9,50	10	103	61	49	40	SCD611-0950-2-4-140HA05-HP358	31052860
9,60	10	103	61	49	40	SCD611-0960-2-4-140HA05-HP358	31052861
9,70	10	103	61	49	40	SCD611-0970-2-4-140HA05-HP358	31052862
9,80	10	103	61	49	40	SCD611-0980-2-4-140HA05-HP358	31052863
9,90	10	103	61	49	40	SCD611-0990-2-4-140HA05-HP358	31052864
10,00	10	103	61	49	40	SCD611-1000-2-4-140HA05-HP358	31052865
10,10	12	118	71	56	45	SCD611-1010-2-4-140HA05-HP358	31052866
10,20	12	118	71	56	45	SCD611-1020-2-4-140HA05-HP358	31052867
10,30	12	118	71	56	45	SCD611-1030-2-4-140HA05-HP358	31052868
10,40	12	118	71	56	45	SCD611-1040-2-4-140HA05-HP358	31052869
10,50	12	118	71	56	45	SCD611-1050-2-4-140HA05-HP358	31052870
10,60	12	118	71	56	45	SCD611-1060-2-4-140HA05-HP358	31052871
10,70	12	118	71	56	45	SCD611-1070-2-4-140HA05-HP358	31052872
10,80	12	118	71	56	45	SCD611-1080-2-4-140HA05-HP358	31052873
10,90	12	118	71	56	45	SCD611-1090-2-4-140HA05-HP358	31052874
11,00	12	118	71	56	45	SCD611-1100-2-4-140HA05-HP358	31052875
11,10	12	118	71	56	45	SCD611-1110-2-4-140HA05-HP358	31052876
11,20	12	118	71	56	45	SCD611-1120-2-4-140HA05-HP358	31052877
11,30	12	118	71	56	45	SCD611-1130-2-4-140HA05-HP358	31052878
11,40	12	118	71	56	45	SCD611-1140-2-4-140HA05-HP358	31052879
11,50	12	118	71	56	45	SCD611-1150-2-4-140HA05-HP358	31052880
11,60	12	118	71	56	45	SCD611-1160-2-4-140HA05-HP358	31052881
11,70	12	118	71	56	45	SCD611-1170-2-4-140HA05-HP358	31052882
11,80	12	118	71	56	45	SCD611-1180-2-4-140HA05-HP358	31052883
11,90	12	118	71	56	45	SCD611-1190-2-4-140HA05-HP358	31052884
12,00	12	118	71	56	45	SCD611-1200-2-4-140HA05-HP358	31052885
12,50	14	124	77	60	45	SCD611-1250-2-4-140HA05-HP358	31052886
12,80	14	124	77	60	45	SCD611-1280-2-4-140HA05-HP358	31052887

Continued on next page.

MEGA-Quadro-Drill-Plus | Solid carbide twist drills SCD61 (5xD), internal coolant supply

Dimensions						Shank form HA	
d_1 k7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
13,00	14	124	77	60	45	SCD611-1300-2-4-140HA05-HP358	31052888
13,50	14	124	77	60	45	SCD611-1350-2-4-140HA05-HP358	31052889
13,80	14	124	77	60	45	SCD611-1380-2-4-140HA05-HP358	31052890
14,00	14	124	77	60	45	SCD611-1400-2-4-140HA05-HP358	31052891
14,50	16	133	83	63	48	SCD611-1450-2-4-140HA05-HP358	31052892
14,80	16	133	83	63	48	SCD611-1480-2-4-140HA05-HP358	31052893
15,00	16	133	83	63	48	SCD611-1500-2-4-140HA05-HP358	31052894
15,50	16	133	83	63	48	SCD611-1550-2-4-140HA05-HP358	31052895
15,80	16	133	83	63	48	SCD611-1580-2-4-140HA05-HP358	31052896
16,00	16	133	83	63	48	SCD611-1600-2-4-140HA05-HP358	31052897
16,50	18	143	93	71	48	SCD611-1650-2-4-140HA05-HP358	31052898
16,80	18	143	93	71	48	SCD611-1680-2-4-140HA05-HP358	31052899
17,00	18	143	93	71	48	SCD611-1700-2-4-140HA05-HP358	31052900
17,50	18	143	93	71	48	SCD611-1750-2-4-140HA05-HP358	31052901
17,80	18	143	93	71	48	SCD611-1780-2-4-140HA05-HP358	31052902
18,00	18	143	93	71	48	SCD611-1800-2-4-140HA05-HP358	31052903
18,50	20	153	101	77	50	SCD611-1850-2-4-140HA05-HP358	31052904
18,80	20	153	101	77	50	SCD611-1880-2-4-140HA05-HP358	31052905
19,00	20	153	101	77	50	SCD611-1900-2-4-140HA05-HP358	31052906
19,50	20	153	101	77	50	SCD611-1950-2-4-140HA05-HP358	31052907
19,80	20	153	101	77	50	SCD611-1980-2-4-140HA05-HP358	31052908
20,00	20	153	101	77	50	SCD611-2000-2-4-140HA05-HP358	31052909

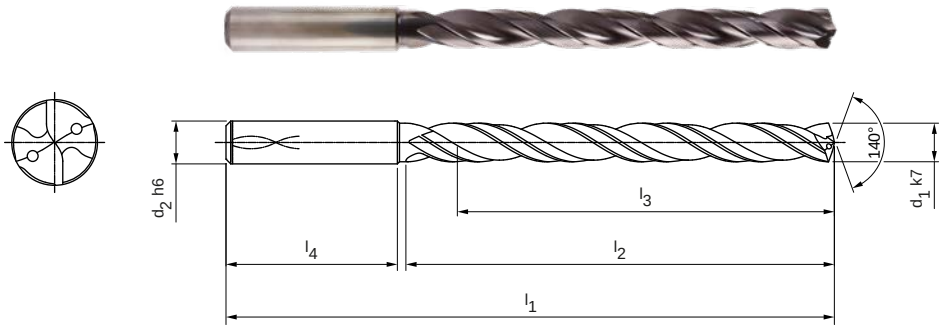
Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

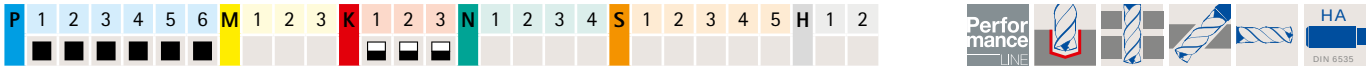
MEGA-Quadro-Drill-Plus

Solid carbide twist drill
SCD61 (8xD), internal coolant supply, successor product to the MEGA-Quadro-Drill (SCD16)

Design:

Drill diameter:	3.00 – 20.00 mm
Bore tolerance:	≥ IT 8
Cutting material:	HP358
Number of cutting edges:	2
Number of guiding chamfers:	4
Tip angle:	140°
Helix angle:	30°





Dimensions						Shank form HA	
d_1 k7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
3,00	6	72	34	29	36	SCD611-0300-2-4-140HA08-HP358	31052910
3,10	6	72	34	29	36	SCD611-0310-2-4-140HA08-HP358	31052911
3,20	6	72	34	29	36	SCD611-0320-2-4-140HA08-HP358	31052912
3,30	6	72	34	29	36	SCD611-0330-2-4-140HA08-HP358	31052913
3,40	6	72	34	29	36	SCD611-0340-2-4-140HA08-HP358	31052914
3,50	6	72	34	29	36	SCD611-0350-2-4-140HA08-HP358	31052915
3,60	6	72	34	29	36	SCD611-0360-2-4-140HA08-HP358	31052916
3,70	6	72	34	29	36	SCD611-0370-2-4-140HA08-HP358	31052917
3,80	6	81	43	36	36	SCD611-0380-2-4-140HA08-HP358	31052918
3,90	6	81	43	36	36	SCD611-0390-2-4-140HA08-HP358	31052919
4,00	6	81	43	36	36	SCD611-0400-2-4-140HA08-HP358	31052920
4,10	6	81	43	36	36	SCD611-0410-2-4-140HA08-HP358	31052921
4,20	6	81	43	36	36	SCD611-0420-2-4-140HA08-HP358	31052922
4,30	6	81	43	36	36	SCD611-0430-2-4-140HA08-HP358	31052923
4,40	6	81	43	36	36	SCD611-0440-2-4-140HA08-HP358	31052924
4,50	6	81	43	36	36	SCD611-0450-2-4-140HA08-HP358	31052925
4,60	6	81	43	36	36	SCD611-0460-2-4-140HA08-HP358	31052926
4,70	6	81	43	36	36	SCD611-0470-2-4-140HA08-HP358	31052927
4,80	6	95	57	48	36	SCD611-0480-2-4-140HA08-HP358	31052928
4,90	6	95	57	48	36	SCD611-0490-2-4-140HA08-HP358	31052929
5,00	6	95	57	48	36	SCD611-0500-2-4-140HA08-HP358	31052930
5,10	6	95	57	48	36	SCD611-0510-2-4-140HA08-HP358	31052931
5,20	6	95	57	48	36	SCD611-0520-2-4-140HA08-HP358	31052932
5,30	6	95	57	48	36	SCD611-0530-2-4-140HA08-HP358	31052933
5,40	6	95	57	48	36	SCD611-0540-2-4-140HA08-HP358	31052934
5,50	6	95	57	48	36	SCD611-0550-2-4-140HA08-HP358	31052935
5,60	6	95	57	48	36	SCD611-0560-2-4-140HA08-HP358	31052936
5,70	6	95	57	48	36	SCD611-0570-2-4-140HA08-HP358	31052937
5,80	6	95	57	48	36	SCD611-0580-2-4-140HA08-HP358	31052938
5,90	6	95	57	48	36	SCD611-0590-2-4-140HA08-HP358	31052939
6,00	6	95	57	48	36	SCD611-0600-2-4-140HA08-HP358	31052940
6,10	8	114	76	64	36	SCD611-0610-2-4-140HA08-HP358	31052941
6,20	8	114	76	64	36	SCD611-0620-2-4-140HA08-HP358	31052942
6,30	8	114	76	64	36	SCD611-0630-2-4-140HA08-HP358	31052943
6,40	8	114	76	64	36	SCD611-0640-2-4-140HA08-HP358	31052944
6,50	8	114	76	64	36	SCD611-0650-2-4-140HA08-HP358	31052945

Continued on next page.

MEGA-Quadro-Drill-Plus | Solid carbide twist drills SCD61 (8xD), internal coolant supply

Dimensions						Shank form HA	
d_1 k7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
6,60	8	114	76	64	36	SCD611-0660-2-4-140HA08-HP358	31052946
6,70	8	114	76	64	36	SCD611-0670-2-4-140HA08-HP358	31052947
6,80	8	114	76	64	36	SCD611-0680-2-4-140HA08-HP358	31052948
6,90	8	114	76	64	36	SCD611-0690-2-4-140HA08-HP358	31052949
7,00	8	114	76	64	36	SCD611-0700-2-4-140HA08-HP358	31052950
7,10	8	114	76	64	36	SCD611-0710-2-4-140HA08-HP358	31052951
7,20	8	114	76	64	36	SCD611-0720-2-4-140HA08-HP358	31052952
7,30	8	114	76	64	36	SCD611-0730-2-4-140HA08-HP358	31052953
7,40	8	114	76	64	36	SCD611-0740-2-4-140HA08-HP358	31052954
7,50	8	114	76	64	36	SCD611-0750-2-4-140HA08-HP358	31052955
7,60	8	114	76	64	36	SCD611-0760-2-4-140HA08-HP358	31052956
7,70	8	114	76	64	36	SCD611-0770-2-4-140HA08-HP358	31052957
7,80	8	114	76	64	36	SCD611-0780-2-4-140HA08-HP358	31052958
7,90	8	114	76	64	36	SCD611-0790-2-4-140HA08-HP358	31052959
8,00	8	114	76	64	36	SCD611-0800-2-4-140HA08-HP358	31052960
8,10	10	142	95	80	40	SCD611-0810-2-4-140HA08-HP358	31052961
8,20	10	142	95	80	40	SCD611-0820-2-4-140HA08-HP358	31052962
8,30	10	142	95	80	40	SCD611-0830-2-4-140HA08-HP358	31052963
8,40	10	142	95	80	40	SCD611-0840-2-4-140HA08-HP358	31052964
8,50	10	142	95	80	40	SCD611-0850-2-4-140HA08-HP358	31052965
8,60	10	142	95	80	40	SCD611-0860-2-4-140HA08-HP358	31052966
8,70	10	142	95	80	40	SCD611-0870-2-4-140HA08-HP358	31052967
8,80	10	142	95	80	40	SCD611-0880-2-4-140HA08-HP358	31052968
8,90	10	142	95	80	40	SCD611-0890-2-4-140HA08-HP358	31052969
9,00	10	142	95	80	40	SCD611-0900-2-4-140HA08-HP358	31052970
9,10	10	142	95	80	40	SCD611-0910-2-4-140HA08-HP358	31052971
9,20	10	142	95	80	40	SCD611-0920-2-4-140HA08-HP358	31052972
9,30	10	142	95	80	40	SCD611-0930-2-4-140HA08-HP358	31052973
9,40	10	142	95	80	40	SCD611-0940-2-4-140HA08-HP358	31052974
9,50	10	142	95	80	40	SCD611-0950-2-4-140HA08-HP358	31052975
9,60	10	142	95	80	40	SCD611-0960-2-4-140HA08-HP358	31052976
9,70	10	142	95	80	40	SCD611-0970-2-4-140HA08-HP358	31052977
9,80	10	142	95	80	40	SCD611-0980-2-4-140HA08-HP358	31052978
9,90	10	142	95	80	40	SCD611-0990-2-4-140HA08-HP358	31052979
10,00	10	142	95	80	40	SCD611-1000-2-4-140HA08-HP358	31052980
10,10	12	162	114	96	45	SCD611-1010-2-4-140HA08-HP358	31052981
10,20	12	162	114	96	45	SCD611-1020-2-4-140HA08-HP358	31052982
10,30	12	162	114	96	45	SCD611-1030-2-4-140HA08-HP358	31052983
10,40	12	162	114	96	45	SCD611-1040-2-4-140HA08-HP358	31052984
10,50	12	162	114	96	45	SCD611-1050-2-4-140HA08-HP358	31052985
10,60	12	162	114	96	45	SCD611-1060-2-4-140HA08-HP358	31052986
10,70	12	162	114	96	45	SCD611-1070-2-4-140HA08-HP358	31052987
10,80	12	162	114	96	45	SCD611-1080-2-4-140HA08-HP358	31052988
10,90	12	162	114	96	45	SCD611-1090-2-4-140HA08-HP358	31052989
11,00	12	162	114	96	45	SCD611-1100-2-4-140HA08-HP358	31052990
11,10	12	162	114	96	45	SCD611-1110-2-4-140HA08-HP358	31052991
11,20	12	162	114	96	45	SCD611-1120-2-4-140HA08-HP358	31052992
11,30	12	162	114	96	45	SCD611-1130-2-4-140HA08-HP358	31052993
11,40	12	162	114	96	45	SCD611-1140-2-4-140HA08-HP358	31052994
11,50	12	162	114	96	45	SCD611-1150-2-4-140HA08-HP358	31052995
11,60	12	162	114	96	45	SCD611-1160-2-4-140HA08-HP358	31052996
11,70	12	162	114	96	45	SCD611-1170-2-4-140HA08-HP358	31052997
11,80	12	162	114	96	45	SCD611-1180-2-4-140HA08-HP358	31052998
11,90	12	162	114	96	45	SCD611-1190-2-4-140HA08-HP358	31052999
12,00	12	162	114	96	45	SCD611-1200-2-4-140HA08-HP358	31053000
12,50	14	178	133	112	45	SCD611-1250-2-4-140HA08-HP358	31053001
12,80	14	178	133	112	45	SCD611-1280-2-4-140HA08-HP358	31053002

MEGA-Quadro-Drill-Plus | Solid carbide twist drills SCD61 (8xD), internal coolant supply

Dimensions						Shank form HA	
d_1 k7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
13,00	14	178	133	112	45	SCD611-1300-2-4-140HA08-HP358	31053003
13,50	14	178	133	112	45	SCD611-1350-2-4-140HA08-HP358	31053004
13,80	14	178	133	112	45	SCD611-1380-2-4-140HA08-HP358	31053005
14,00	14	178	133	112	45	SCD611-1400-2-4-140HA08-HP358	31053006
14,50	16	203	152	128	48	SCD611-1450-2-4-140HA08-HP358	31053007
14,80	16	203	152	128	48	SCD611-1480-2-4-140HA08-HP358	31053008
15,00	16	203	152	128	48	SCD611-1500-2-4-140HA08-HP358	31053009
15,50	16	203	152	128	48	SCD611-1550-2-4-140HA08-HP358	31053010
15,80	16	203	152	128	48	SCD611-1580-2-4-140HA08-HP358	31053011
16,00	16	203	152	128	48	SCD611-1600-2-4-140HA08-HP358	31053012
16,50	18	222	171	144	48	SCD611-1650-2-4-140HA08-HP358	31053013
16,80	18	222	171	144	48	SCD611-1680-2-4-140HA08-HP358	31053014
17,00	18	222	171	144	48	SCD611-1700-2-4-140HA08-HP358	31053015
17,50	18	222	171	144	48	SCD611-1750-2-4-140HA08-HP358	31053016
17,80	18	222	171	144	48	SCD611-1780-2-4-140HA08-HP358	31053017
18,00	18	222	171	144	48	SCD611-1800-2-4-140HA08-HP358	31053018
18,50	20	243	190	160	50	SCD611-1850-2-4-140HA08-HP358	31053019
18,80	20	243	190	160	50	SCD611-1880-2-4-140HA08-HP358	31053020
19,00	20	243	190	160	50	SCD611-1900-2-4-140HA08-HP358	31053021
19,50	20	243	190	160	50	SCD611-1950-2-4-140HA08-HP358	31053022
19,80	20	243	190	160	50	SCD611-1980-2-4-140HA08-HP358	31053023
20,00	20	243	190	160	50	SCD611-2000-2-4-140HA08-HP358	31053024

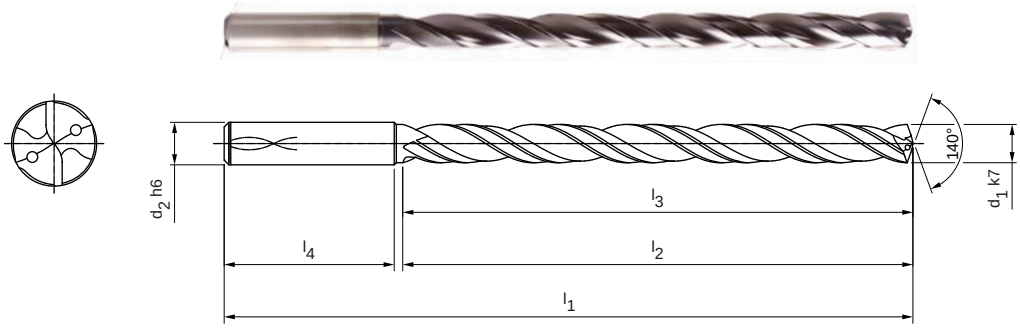
Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

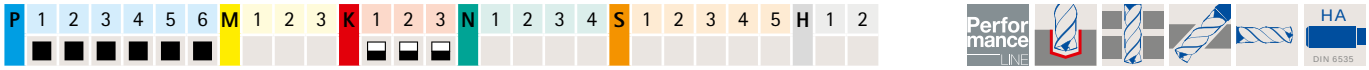
MEGA-Quadro-Drill-Plus

Solid carbide twist drill
SCD61 (12xD), internal coolant supply, successor product to the MEGA-Quadro-Drill (SCD16)

Design:

Drill diameter:	3.00 – 20.00 mm
Bore tolerance:	≥ IT 8
Cutting material:	HP358
Number of cutting edges:	2
Number of guiding chamfers:	4
Tip angle:	140°
Helix angle:	30°





Dimensions						Shank form HA	
d_1 k7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
3,00	6	92	54	48	36	SCD611-0300-2-4-140HA12-HP358	31053025
3,10	6	92	54	48	36	SCD611-0310-2-4-140HA12-HP358	31053026
3,20	6	92	54	48	36	SCD611-0320-2-4-140HA12-HP358	31053027
3,30	6	92	54	48	36	SCD611-0330-2-4-140HA12-HP358	31053028
3,40	6	92	54	48	36	SCD611-0340-2-4-140HA12-HP358	31053029
3,50	6	92	54	48	36	SCD611-0350-2-4-140HA12-HP358	31053030
3,60	6	92	54	48	36	SCD611-0360-2-4-140HA12-HP358	31053031
3,70	6	92	54	48	36	SCD611-0370-2-4-140HA12-HP358	31053032
3,80	6	102	64	58	36	SCD611-0380-2-4-140HA12-HP358	31053033
3,90	6	102	64	58	36	SCD611-0390-2-4-140HA12-HP358	31053034
4,00	6	102	64	58	36	SCD611-0400-2-4-140HA12-HP358	31053035
4,10	6	102	64	58	36	SCD611-0410-2-4-140HA12-HP358	31053036
4,20	6	102	64	58	36	SCD611-0420-2-4-140HA12-HP358	31053037
4,30	6	102	64	58	36	SCD611-0430-2-4-140HA12-HP358	31053038
4,40	6	102	64	58	36	SCD611-0440-2-4-140HA12-HP358	31053039
4,50	6	102	64	58	36	SCD611-0450-2-4-140HA12-HP358	31053040
4,60	6	102	64	58	36	SCD611-0460-2-4-140HA12-HP358	31053041
4,70	6	102	64	58	36	SCD611-0470-2-4-140HA12-HP358	31053042
4,80	6	116	78	70	36	SCD611-0480-2-4-140HA12-HP358	31053043
4,90	6	116	78	70	36	SCD611-0490-2-4-140HA12-HP358	31053044
5,00	6	116	78	70	36	SCD611-0500-2-4-140HA12-HP358	31053045
5,10	6	116	78	70	36	SCD611-0510-2-4-140HA12-HP358	31053046
5,20	6	116	78	70	36	SCD611-0520-2-4-140HA12-HP358	31053047
5,30	6	116	78	70	36	SCD611-0530-2-4-140HA12-HP358	31053048
5,40	6	116	78	70	36	SCD611-0540-2-4-140HA12-HP358	31053049
5,50	6	116	78	70	36	SCD611-0550-2-4-140HA12-HP358	31053050
5,60	6	116	78	70	36	SCD611-0560-2-4-140HA12-HP358	31053051
5,70	6	116	78	70	36	SCD611-0570-2-4-140HA12-HP358	31053052
5,80	6	116	78	70	36	SCD611-0580-2-4-140HA12-HP358	31053053
5,90	6	116	78	70	36	SCD611-0590-2-4-140HA12-HP358	31053054
6,00	6	116	78	70	36	SCD611-0600-2-4-140HA12-HP358	31053055
6,10	8	146	108	94	36	SCD611-0610-2-4-140HA12-HP358	31053056
6,20	8	146	108	94	36	SCD611-0620-2-4-140HA12-HP358	31053057
6,30	8	146	108	94	36	SCD611-0630-2-4-140HA12-HP358	31053058
6,40	8	146	108	94	36	SCD611-0640-2-4-140HA12-HP358	31053059
6,50	8	146	108	94	36	SCD611-0650-2-4-140HA12-HP358	31053060

MEGA-Quadro-Drill-Plus | Solid carbide twist drills SCD61 (12xD), internal coolant supply

Dimensions						Shank form HA	
d_1 k7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
6,60	8	146	108	94	36	SCD611-0660-2-4-140HA12-HP358	31053061
6,70	8	146	108	94	36	SCD611-0670-2-4-140HA12-HP358	31053062
6,80	8	146	108	94	36	SCD611-0680-2-4-140HA12-HP358	31053063
6,90	8	146	108	94	36	SCD611-0690-2-4-140HA12-HP358	31053064
7,00	8	146	108	94	36	SCD611-0700-2-4-140HA12-HP358	31053065
7,10	8	146	108	94	36	SCD611-0710-2-4-140HA12-HP358	31053066
7,20	8	146	108	94	36	SCD611-0720-2-4-140HA12-HP358	31053067
7,30	8	146	108	94	36	SCD611-0730-2-4-140HA12-HP358	31053068
7,40	8	146	108	94	36	SCD611-0740-2-4-140HA12-HP358	31053069
7,50	8	146	108	94	36	SCD611-0750-2-4-140HA12-HP358	31053070
7,60	8	146	108	94	36	SCD611-0760-2-4-140HA12-HP358	31053071
7,70	8	146	108	94	36	SCD611-0770-2-4-140HA12-HP358	31053072
7,80	8	146	108	94	36	SCD611-0780-2-4-140HA12-HP358	31053073
7,90	8	146	108	94	36	SCD611-0790-2-4-140HA12-HP358	31053074
8,00	8	146	108	94	36	SCD611-0800-2-4-140HA12-HP358	31053075
8,10	10	162	120	110	40	SCD611-0810-2-4-140HA12-HP358	31053076
8,20	10	162	120	110	40	SCD611-0820-2-4-140HA12-HP358	31053077
8,30	10	162	120	110	40	SCD611-0830-2-4-140HA12-HP358	31053078
8,40	10	162	120	110	40	SCD611-0840-2-4-140HA12-HP358	31053079
8,50	10	162	120	110	40	SCD611-0850-2-4-140HA12-HP358	31053080
8,60	10	162	120	110	40	SCD611-0860-2-4-140HA12-HP358	31053081
8,70	10	162	120	110	40	SCD611-0870-2-4-140HA12-HP358	31053082
8,80	10	162	120	110	40	SCD611-0880-2-4-140HA12-HP358	31053083
8,90	10	162	120	110	40	SCD611-0890-2-4-140HA12-HP358	31053084
9,00	10	162	120	110	40	SCD611-0900-2-4-140HA12-HP358	31053085
9,10	10	162	120	110	40	SCD611-0910-2-4-140HA12-HP358	31053086
9,20	10	162	120	110	40	SCD611-0920-2-4-140HA12-HP358	31053087
9,30	10	162	120	110	40	SCD611-0930-2-4-140HA12-HP358	31053088
9,40	10	162	120	110	40	SCD611-0940-2-4-140HA12-HP358	31053089
9,50	10	162	120	110	40	SCD611-0950-2-4-140HA12-HP358	31053090
9,60	10	162	120	110	40	SCD611-0960-2-4-140HA12-HP358	31053091
9,70	10	162	120	110	40	SCD611-0970-2-4-140HA12-HP358	31053092
9,80	10	162	120	110	40	SCD611-0980-2-4-140HA12-HP358	31053093
9,90	10	162	120	110	40	SCD611-0990-2-4-140HA12-HP358	31053094
10,00	10	162	120	110	40	SCD611-1000-2-4-140HA12-HP358	31053095
10,10	12	204	156	142	45	SCD611-1010-2-4-140HA12-HP358	31053096
10,20	12	204	156	142	45	SCD611-1020-2-4-140HA12-HP358	31053097
10,30	12	204	156	142	45	SCD611-1030-2-4-140HA12-HP358	31053098
10,40	12	204	156	142	45	SCD611-1040-2-4-140HA12-HP358	31053099
10,50	12	204	156	142	45	SCD611-1050-2-4-140HA12-HP358	31053100
10,60	12	204	156	142	45	SCD611-1060-2-4-140HA12-HP358	31053101
10,70	12	204	156	142	45	SCD611-1070-2-4-140HA12-HP358	31053102
10,80	12	204	156	142	45	SCD611-1080-2-4-140HA12-HP358	31053103
10,90	12	204	156	142	45	SCD611-1090-2-4-140HA12-HP358	31053104
11,00	12	204	156	142	45	SCD611-1100-2-4-140HA12-HP358	31053105
11,10	12	204	156	142	45	SCD611-1110-2-4-140HA12-HP358	31053106
11,20	12	204	156	142	45	SCD611-1120-2-4-140HA12-HP358	31053107
11,30	12	204	156	142	45	SCD611-1130-2-4-140HA12-HP358	31053108
11,40	12	204	156	142	45	SCD611-1140-2-4-140HA12-HP358	31053109
11,50	12	204	156	142	45	SCD611-1150-2-4-140HA12-HP358	31053110
11,60	12	204	156	142	45	SCD611-1160-2-4-140HA12-HP358	31053111
11,70	12	204	156	142	45	SCD611-1170-2-4-140HA12-HP358	31053112
11,80	12	204	156	142	45	SCD611-1180-2-4-140HA12-HP358	31053113
11,90	12	204	156	142	45	SCD611-1190-2-4-140HA12-HP358	31053114
12,00	12	204	156	142	45	SCD611-1200-2-4-140HA12-HP358	31053115
12,50	14	230	182	166	45	SCD611-1250-2-4-140HA12-HP358	31053116
12,80	14	230	182	166	45	SCD611-1280-2-4-140HA12-HP358	31053117

Continued on next page.

MEGA-Quadro-Drill-Plus | Solid carbide twist drills SCD61 (12xD), internal coolant supply

Dimensions						Shank form HA	
d_1 k7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
13,00	14	230	182	166	45	SCD611-1300-2-4-140HA12-HP358	31053118
13,50	14	230	182	166	45	SCD611-1350-2-4-140HA12-HP358	31053119
13,80	14	230	182	166	45	SCD611-1380-2-4-140HA12-HP358	31053120
14,00	14	230	182	166	45	SCD611-1400-2-4-140HA12-HP358	31053121
14,50	16	260	208	192	48	SCD611-1450-2-4-140HA12-HP358	31053122
14,80	16	260	208	192	48	SCD611-1480-2-4-140HA12-HP358	31053123
15,00	16	260	208	192	48	SCD611-1500-2-4-140HA12-HP358	31053124
15,50	16	260	208	192	48	SCD611-1550-2-4-140HA12-HP358	31053125
15,80	16	260	208	192	48	SCD611-1580-2-4-140HA12-HP358	31053126
16,00	16	260	208	192	48	SCD611-1600-2-4-140HA12-HP358	31053127
16,50	18	285	234	216	48	SCD611-1650-2-4-140HA12-HP358	31053128
16,80	18	285	234	216	48	SCD611-1680-2-4-140HA12-HP358	31053129
17,00	18	285	234	216	48	SCD611-1700-2-4-140HA12-HP358	31053130
17,50	18	285	234	216	48	SCD611-1750-2-4-140HA12-HP358	31053131
17,80	18	285	234	216	48	SCD611-1780-2-4-140HA12-HP358	31053132
18,00	18	285	234	216	48	SCD611-1800-2-4-140HA12-HP358	31053133
18,50	20	310	258	240	50	SCD611-1850-2-4-140HA12-HP358	31053134
18,80	20	310	258	240	50	SCD611-1880-2-4-140HA12-HP358	31053135
19,00	20	310	258	240	50	SCD611-1900-2-4-140HA12-HP358	31053136
19,50	20	310	258	240	50	SCD611-1950-2-4-140HA12-HP358	31053137
19,80	20	310	258	240	50	SCD611-1980-2-4-140HA12-HP358	31053138
20,00	20	310	258	240	50	SCD611-2000-2-4-140HA12-HP358	31053139

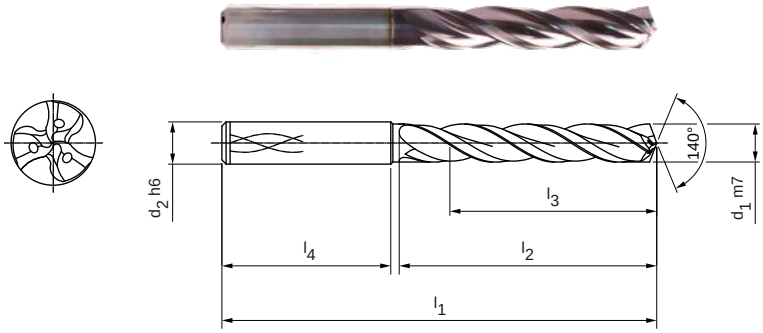
Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

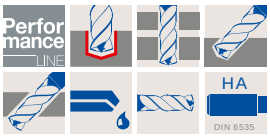
Tritan-Drill-Uni-Plus

Solid carbide twist drill
SCD63 (5xD), internal coolant supply, successor product to the Tritan-Drill-Uni (SCD44)

Design:

Drill diameter:	4.00 – 20.00 mm
Bore tolerance:	IT 9 (achievable)
Cutting material:	HP358
Number of cutting edges:	3
Number of guiding chamfers:	3
Tip angle:	140°
Helix angle:	30°





Dimensions						Shank form HA	
d_1 m7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
4,00	6	74	36	29	36	SCD631-0400-3-3-140HA05-HP358	31037282
4,10	6	74	36	29	36	SCD631-0410-3-3-140HA05-HP358	31037283
4,20	6	74	36	29	36	SCD631-0420-3-3-140HA05-HP358	31037284
4,30	6	74	36	29	36	SCD631-0430-3-3-140HA05-HP358	31037285
4,40	6	74	36	29	36	SCD631-0440-3-3-140HA05-HP358	31037286
4,50	6	74	36	29	36	SCD631-0450-3-3-140HA05-HP358	31037287
4,60	6	74	36	29	36	SCD631-0460-3-3-140HA05-HP358	31037288
4,70	6	74	36	29	36	SCD631-0470-3-3-140HA05-HP358	31037289
4,80	6	82	44	35	36	SCD631-0480-3-3-140HA05-HP358	31037290
4,90	6	82	44	35	36	SCD631-0490-3-3-140HA05-HP358	31037291
5,00	6	82	44	35	36	SCD631-0500-3-3-140HA05-HP358	31037292
5,10	6	82	44	35	36	SCD631-0510-3-3-140HA05-HP358	31037293
5,20	6	82	44	35	36	SCD631-0520-3-3-140HA05-HP358	31037294
5,30	6	82	44	35	36	SCD631-0530-3-3-140HA05-HP358	31037295
5,40	6	82	44	35	36	SCD631-0540-3-3-140HA05-HP358	31037296
5,50	6	82	44	35	36	SCD631-0550-3-3-140HA05-HP358	31037297
5,60	6	82	44	35	36	SCD631-0560-3-3-140HA05-HP358	31037298
5,70	6	82	44	35	36	SCD631-0570-3-3-140HA05-HP358	31037299
5,80	6	82	44	35	36	SCD631-0580-3-3-140HA05-HP358	31037300
5,90	6	82	44	35	36	SCD631-0590-3-3-140HA05-HP358	31037301
6,00	6	82	44	35	36	SCD631-0600-3-3-140HA05-HP358	31037302
6,10	8	91	53	43	36	SCD631-0610-3-3-140HA05-HP358	31037303
6,20	8	91	53	43	36	SCD631-0620-3-3-140HA05-HP358	31037304
6,30	8	91	53	43	36	SCD631-0630-3-3-140HA05-HP358	31037305
6,40	8	91	53	43	36	SCD631-0640-3-3-140HA05-HP358	31037306
6,50	8	91	53	43	36	SCD631-0650-3-3-140HA05-HP358	31037307
6,60	8	91	53	43	36	SCD631-0660-3-3-140HA05-HP358	31037308
6,70	8	91	53	43	36	SCD631-0670-3-3-140HA05-HP358	31037309
6,80	8	91	53	43	36	SCD631-0680-3-3-140HA05-HP358	31037310
6,90	8	91	53	43	36	SCD631-0690-3-3-140HA05-HP358	31037311
7,00	8	91	53	43	36	SCD631-0700-3-3-140HA05-HP358	31037312
7,10	8	91	53	43	36	SCD631-0710-3-3-140HA05-HP358	31037313
7,20	8	91	53	43	36	SCD631-0720-3-3-140HA05-HP358	31037314
7,30	8	91	53	43	36	SCD631-0730-3-3-140HA05-HP358	31037315
7,40	8	91	53	43	36	SCD631-0740-3-3-140HA05-HP358	31037316
7,50	8	91	53	43	36	SCD631-0750-3-3-140HA05-HP358	31037317

Continued on next page.

Tritan-Drill-Uni-Plus | Solid carbide twist drills SCD63 (5xD), internal coolant supply

Dimensions						Shank form HA	
d_1 m7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
7,60	8	91	53	43	36	SCD631-0760-3-3-140HA05-HP358	31037318
7,70	8	91	53	43	36	SCD631-0770-3-3-140HA05-HP358	31037319
7,80	8	91	53	43	36	SCD631-0780-3-3-140HA05-HP358	31037320
7,90	8	91	53	43	36	SCD631-0790-3-3-140HA05-HP358	31037321
8,00	8	91	53	43	36	SCD631-0800-3-3-140HA05-HP358	31037322
8,10	10	103	61	49	40	SCD631-0810-3-3-140HA05-HP358	31037323
8,20	10	103	61	49	40	SCD631-0820-3-3-140HA05-HP358	31037324
8,30	10	103	61	49	40	SCD631-0830-3-3-140HA05-HP358	31037325
8,40	10	103	61	49	40	SCD631-0840-3-3-140HA05-HP358	31037326
8,50	10	103	61	49	40	SCD631-0850-3-3-140HA05-HP358	31037327
8,60	10	103	61	49	40	SCD631-0860-3-3-140HA05-HP358	31037328
8,70	10	103	61	49	40	SCD631-0870-3-3-140HA05-HP358	31037329
8,80	10	103	61	49	40	SCD631-0880-3-3-140HA05-HP358	31037330
8,90	10	103	61	49	40	SCD631-0890-3-3-140HA05-HP358	31037331
9,00	10	103	61	49	40	SCD631-0900-3-3-140HA05-HP358	31037332
9,10	10	103	61	49	40	SCD631-0910-3-3-140HA05-HP358	31037333
9,20	10	103	61	49	40	SCD631-0920-3-3-140HA05-HP358	31037334
9,30	10	103	61	49	40	SCD631-0930-3-3-140HA05-HP358	31037335
9,40	10	103	61	49	40	SCD631-0940-3-3-140HA05-HP358	31037336
9,50	10	103	61	49	40	SCD631-0950-3-3-140HA05-HP358	31037337
9,60	10	103	61	49	40	SCD631-0960-3-3-140HA05-HP358	31037338
9,70	10	103	61	49	40	SCD631-0970-3-3-140HA05-HP358	31037339
9,80	10	103	61	49	40	SCD631-0980-3-3-140HA05-HP358	31037340
9,90	10	103	61	49	40	SCD631-0990-3-3-140HA05-HP358	31037341
10,00	10	103	61	49	40	SCD631-1000-3-3-140HA05-HP358	31037342
10,10	12	118	71	56	45	SCD631-1010-3-3-140HA05-HP358	31037343
10,20	12	118	71	56	45	SCD631-1020-3-3-140HA05-HP358	31037344
10,30	12	118	71	56	45	SCD631-1030-3-3-140HA05-HP358	31037345
10,40	12	118	71	56	45	SCD631-1040-3-3-140HA05-HP358	31037346
10,50	12	118	71	56	45	SCD631-1050-3-3-140HA05-HP358	31037347
10,60	12	118	71	56	45	SCD631-1060-3-3-140HA05-HP358	31037348
10,70	12	118	71	56	45	SCD631-1070-3-3-140HA05-HP358	31037349
10,80	12	118	71	56	45	SCD631-1080-3-3-140HA05-HP358	31037350
10,90	12	118	71	56	45	SCD631-1090-3-3-140HA05-HP358	31037351
11,00	12	118	71	56	45	SCD631-1100-3-3-140HA05-HP358	31037352
11,10	12	118	71	56	45	SCD631-1110-3-3-140HA05-HP358	31037353
11,20	12	118	71	56	45	SCD631-1120-3-3-140HA05-HP358	31037354
11,30	12	118	71	56	45	SCD631-1130-3-3-140HA05-HP358	31037355
11,40	12	118	71	56	45	SCD631-1140-3-3-140HA05-HP358	31037356
11,50	12	118	71	56	45	SCD631-1150-3-3-140HA05-HP358	31037357
11,60	12	118	71	56	45	SCD631-1160-3-3-140HA05-HP358	31037358
11,70	12	118	71	56	45	SCD631-1170-3-3-140HA05-HP358	31037359
11,80	12	118	71	56	45	SCD631-1180-3-3-140HA05-HP358	31037360
11,90	12	118	71	56	45	SCD631-1190-3-3-140HA05-HP358	31037361
12,00	12	118	71	56	45	SCD631-1200-3-3-140HA05-HP358	31037362
12,50	14	124	77	60	45	SCD631-1250-3-3-140HA05-HP358	31037364
12,80	14	124	77	60	45	SCD631-1280-3-3-140HA05-HP358	31037365
13,00	14	124	77	60	45	SCD631-1300-3-3-140HA05-HP358	31037366
13,50	14	124	77	60	45	SCD631-1350-3-3-140HA05-HP358	31037368
13,80	14	124	77	60	45	SCD631-1380-3-3-140HA05-HP358	31037369
14,00	14	124	77	60	45	SCD631-1400-3-3-140HA05-HP358	31037370
14,50	16	133	83	63	48	SCD631-1450-3-3-140HA05-HP358	31037372
14,80	16	133	83	63	48	SCD631-1480-3-3-140HA05-HP358	31037373
15,00	16	133	83	63	48	SCD631-1500-3-3-140HA05-HP358	31037374
15,50	16	133	83	63	48	SCD631-1550-3-3-140HA05-HP358	31037376
15,80	16	133	83	63	48	SCD631-1580-3-3-140HA05-HP358	31037377
16,00	16	133	83	63	48	SCD631-1600-3-3-140HA05-HP358	31037378

Tritan-Drill-Uni-Plus | Solid carbide twist drills SCD63 (5xD), internal coolant supply

Dimensions						Shank form HA	
d_1 m7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
16,50	18	143	93	71	48	SCD631-1650-3-3-140HA05-HP358	31037380
16,80	18	143	93	71	48	SCD631-1680-3-3-140HA05-HP358	31037381
17,00	18	143	93	71	48	SCD631-1700-3-3-140HA05-HP358	31037382
17,50	18	143	93	71	48	SCD631-1750-3-3-140HA05-HP358	31037384
17,80	18	143	93	71	48	SCD631-1780-3-3-140HA05-HP358	31037385
18,00	18	143	93	71	48	SCD631-1800-3-3-140HA05-HP358	31037386
18,50	20	153	101	77	50	SCD631-1850-3-3-140HA05-HP358	31037388
18,80	20	153	101	77	50	SCD631-1880-3-3-140HA05-HP358	31037389
19,00	20	153	101	77	50	SCD631-1900-3-3-140HA05-HP358	31037390
19,50	20	153	101	77	50	SCD631-1950-3-3-140HA05-HP358	31037392
19,80	20	153	101	77	50	SCD631-1980-3-3-140HA05-HP358	31037393
20,00	20	153	101	77	50	SCD631-2000-3-3-140HA05-HP358	31037394

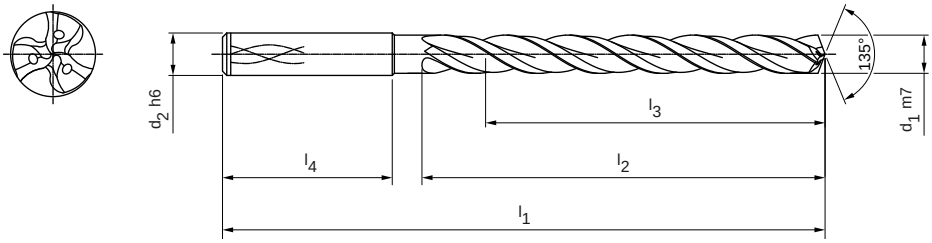
Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

Tritan-Drill-Uni-Plus

Solid carbide twist drill
SCD63 (8xD), internal coolant supply, successor product to the Tritan-Drill-Uni (SCD44)

Design:

Drill diameter:	4.00 – 20.00 mm
Bore tolerance:	IT 9 (achievable)
Cutting material:	HP358
Number of cutting edges:	3
Number of guiding chamfers:	3
Tip angle:	135°
Helix angle:	30°



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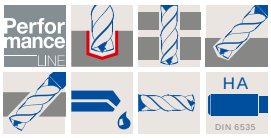

Dimensions						Shank form HA	
d_1 m7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
4,00	6	81	43	36	36	SCD631-0400-3-3-135HA08-HP358	31037395
4,10	6	81	43	36	36	SCD631-0410-3-3-135HA08-HP358	31037396
4,20	6	81	43	36	36	SCD631-0420-3-3-135HA08-HP358	31037397
4,30	6	81	43	36	36	SCD631-0430-3-3-135HA08-HP358	31037398
4,40	6	81	43	36	36	SCD631-0440-3-3-135HA08-HP358	31037399
4,50	6	81	43	36	36	SCD631-0450-3-3-135HA08-HP358	31037400
4,60	6	81	43	36	36	SCD631-0460-3-3-135HA08-HP358	31037401
4,70	6	81	43	36	36	SCD631-0470-3-3-135HA08-HP358	31037402
4,80	6	95	57	48	36	SCD631-0480-3-3-135HA08-HP358	31037403
4,90	6	95	57	48	36	SCD631-0490-3-3-135HA08-HP358	31037404
5,00	6	95	57	48	36	SCD631-0500-3-3-135HA08-HP358	31037405
5,10	6	95	57	48	36	SCD631-0510-3-3-135HA08-HP358	31037406
5,20	6	95	57	48	36	SCD631-0520-3-3-135HA08-HP358	31037407
5,30	6	95	57	48	36	SCD631-0530-3-3-135HA08-HP358	31037408
5,40	6	95	57	48	36	SCD631-0540-3-3-135HA08-HP358	31037409
5,50	6	95	57	48	36	SCD631-0550-3-3-135HA08-HP358	31037410
5,60	6	95	57	48	36	SCD631-0560-3-3-135HA08-HP358	31037411
5,70	6	95	57	48	36	SCD631-0570-3-3-135HA08-HP358	31037412
5,80	6	95	57	48	36	SCD631-0580-3-3-135HA08-HP358	31037413
5,90	6	95	57	48	36	SCD631-0590-3-3-135HA08-HP358	31037414
6,00	6	95	57	48	36	SCD631-0600-3-3-135HA08-HP358	31037415
6,10	8	114	76	64	36	SCD631-0610-3-3-135HA08-HP358	31037416
6,20	8	114	76	64	36	SCD631-0620-3-3-135HA08-HP358	31037417
6,30	8	114	76	64	36	SCD631-0630-3-3-135HA08-HP358	31037418
6,40	8	114	76	64	36	SCD631-0640-3-3-135HA08-HP358	31037419
6,50	8	114	76	64	36	SCD631-0650-3-3-135HA08-HP358	31037420
6,60	8	114	76	64	36	SCD631-0660-3-3-135HA08-HP358	31037421
6,70	8	114	76	64	36	SCD631-0670-3-3-135HA08-HP358	31037422
6,80	8	114	76	64	36	SCD631-0680-3-3-135HA08-HP358	31037423
6,90	8	114	76	64	36	SCD631-0690-3-3-135HA08-HP358	31037424
7,00	8	114	76	64	36	SCD631-0700-3-3-135HA08-HP358	31037425
7,10	8	114	76	64	36	SCD631-0710-3-3-135HA08-HP358	31037426
7,20	8	114	76	64	36	SCD631-0720-3-3-135HA08-HP358	31037427
7,30	8	114	76	64	36	SCD631-0730-3-3-135HA08-HP358	31037428
7,40	8	114	76	64	36	SCD631-0740-3-3-135HA08-HP358	31037429
7,50	8	114	76	64	36	SCD631-0750-3-3-135HA08-HP358	31037430

Tritan-Drill-Uni-Plus | Solid carbide twist drills SCD63 (8xD), internal coolant supply

Dimensions						Shank form HA	
d_1 m7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
7,60	8	114	76	64	36	SCD631-0760-3-3-135HA08-HP358	31037431
7,70	8	114	76	64	36	SCD631-0770-3-3-135HA08-HP358	31037432
7,80	8	114	76	64	36	SCD631-0780-3-3-135HA08-HP358	31037433
7,90	8	114	76	64	36	SCD631-0790-3-3-135HA08-HP358	31037434
8,00	8	114	76	64	36	SCD631-0800-3-3-135HA08-HP358	31037435
8,10	10	142	95	80	40	SCD631-0810-3-3-135HA08-HP358	31037436
8,20	10	142	95	80	40	SCD631-0820-3-3-135HA08-HP358	31037437
8,30	10	142	95	80	40	SCD631-0830-3-3-135HA08-HP358	31037438
8,40	10	142	95	80	40	SCD631-0840-3-3-135HA08-HP358	31037439
8,50	10	142	95	80	40	SCD631-0850-3-3-135HA08-HP358	31037440
8,60	10	142	95	80	40	SCD631-0860-3-3-135HA08-HP358	31037441
8,70	10	142	95	80	40	SCD631-0870-3-3-135HA08-HP358	31037442
8,80	10	142	95	80	40	SCD631-0880-3-3-135HA08-HP358	31037443
8,90	10	142	95	80	40	SCD631-0890-3-3-135HA08-HP358	31037444
9,00	10	142	95	80	40	SCD631-0900-3-3-135HA08-HP358	31037445
9,10	10	142	95	80	40	SCD631-0910-3-3-135HA08-HP358	31037446
9,20	10	142	95	80	40	SCD631-0920-3-3-135HA08-HP358	31037447
9,30	10	142	95	80	40	SCD631-0930-3-3-135HA08-HP358	31037448
9,40	10	142	95	80	40	SCD631-0940-3-3-135HA08-HP358	31037449
9,50	10	142	95	80	40	SCD631-0950-3-3-135HA08-HP358	31037450
9,60	10	142	95	80	40	SCD631-0960-3-3-135HA08-HP358	31037451
9,70	10	142	95	80	40	SCD631-0970-3-3-135HA08-HP358	31037452
9,80	10	142	95	80	40	SCD631-0980-3-3-135HA08-HP358	31037453
9,90	10	142	95	80	40	SCD631-0990-3-3-135HA08-HP358	31037454
10,00	10	142	95	80	40	SCD631-1000-3-3-135HA08-HP358	31037455
10,10	12	162	114	96	45	SCD631-1010-3-3-135HA08-HP358	31037456
10,20	12	162	114	96	45	SCD631-1020-3-3-135HA08-HP358	31037457
10,30	12	162	114	96	45	SCD631-1030-3-3-135HA08-HP358	31037458
10,40	12	162	114	96	45	SCD631-1040-3-3-135HA08-HP358	31037459
10,50	12	162	114	96	45	SCD631-1050-3-3-135HA08-HP358	31037460
10,60	12	162	114	96	45	SCD631-1060-3-3-135HA08-HP358	31037461
10,70	12	162	114	96	45	SCD631-1070-3-3-135HA08-HP358	31037462
10,80	12	162	114	96	45	SCD631-1080-3-3-135HA08-HP358	31037463
10,90	12	162	114	96	45	SCD631-1090-3-3-135HA08-HP358	31037464
11,00	12	162	114	96	45	SCD631-1100-3-3-135HA08-HP358	31037465
11,10	12	162	114	96	45	SCD631-1110-3-3-135HA08-HP358	31037466
11,20	12	162	114	96	45	SCD631-1120-3-3-135HA08-HP358	31037467
11,30	12	162	114	96	45	SCD631-1130-3-3-135HA08-HP358	31037468
11,40	12	162	114	96	45	SCD631-1140-3-3-135HA08-HP358	31037469
11,50	12	162	114	96	45	SCD631-1150-3-3-135HA08-HP358	31037470
11,60	12	162	114	96	45	SCD631-1160-3-3-135HA08-HP358	31037471
11,70	12	162	114	96	45	SCD631-1170-3-3-135HA08-HP358	31037472
11,80	12	162	114	96	45	SCD631-1180-3-3-135HA08-HP358	31037473
11,90	12	162	114	96	45	SCD631-1190-3-3-135HA08-HP358	31037474
12,00	12	162	114	96	45	SCD631-1200-3-3-135HA08-HP358	31037475
12,50	14	178	133	112	45	SCD631-1250-3-3-135HA08-HP358	31037477
12,80	14	178	133	112	45	SCD631-1280-3-3-135HA08-HP358	31037478
13,00	14	178	133	112	45	SCD631-1300-3-3-135HA08-HP358	31037479
13,50	14	178	133	112	45	SCD631-1350-3-3-135HA08-HP358	31037481
13,80	14	178	133	112	45	SCD631-1380-3-3-135HA08-HP358	31037482
14,00	14	178	133	112	45	SCD631-1400-3-3-135HA08-HP358	31037483
14,50	16	203	152	128	48	SCD631-1450-3-3-135HA08-HP358	31037485
14,80	16	203	152	128	48	SCD631-1480-3-3-135HA08-HP358	31037486
15,00	16	203	152	128	48	SCD631-1500-3-3-135HA08-HP358	31037487
15,50	16	203	152	128	48	SCD631-1550-3-3-135HA08-HP358	31037489
15,80	16	203	152	128	48	SCD631-1580-3-3-135HA08-HP358	31037490
16,00	16	203	152	128	48	SCD631-1600-3-3-135HA08-HP358	31037491

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Tritan-Drill-Uni-Plus | Solid carbide twist drills SCD63 (8xD), internal coolant supply

Dimensions						Shank form HA	
d_1 m7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
16,50	18	222	171	144	48	SCD631-1650-3-3-135HA08-HP358	31037493
16,80	18	222	171	144	48	SCD631-1680-3-3-135HA08-HP358	31037494
17,00	18	222	171	144	48	SCD631-1700-3-3-135HA08-HP358	31037495
17,50	18	222	171	144	48	SCD631-1750-3-3-135HA08-HP358	31037497
17,80	18	222	171	144	48	SCD631-1780-3-3-135HA08-HP358	31037498
18,00	18	222	171	144	48	SCD631-1800-3-3-135HA08-HP358	31037499
18,50	20	243	190	160	50	SCD631-1850-3-3-135HA08-HP358	31037501
18,80	20	243	190	160	50	SCD631-1880-3-3-135HA08-HP358	31037502
19,00	20	243	190	160	50	SCD631-1900-3-3-135HA08-HP358	31037503
19,50	20	243	190	160	50	SCD631-1950-3-3-135HA08-HP358	31037505
19,80	20	243	190	160	50	SCD631-1980-3-3-135HA08-HP358	31037506
20,00	20	243	190	160	50	SCD631-2000-3-3-135HA08-HP358	31037507

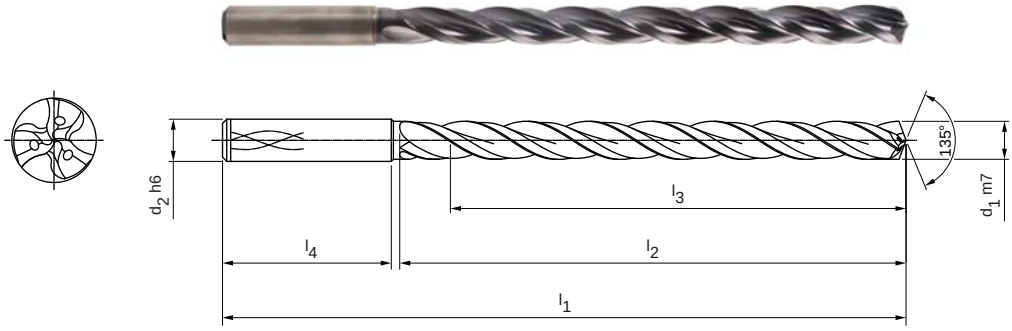
Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

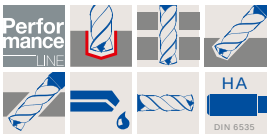
Tritan-Drill-Uni-Plus

Solid carbide twist drill
SCD63 (12xD), internal coolant supply, successor product to the Tritan-Drill-Uni (SCD44)

Design:

Drill diameter:	4.00 – 20.00 mm
Bore tolerance:	IT 9 (achievable)
Cutting material:	HP358
Number of cutting edges:	3
Number of guiding chamfers:	3
Tip angle:	135°
Helix angle:	30°





Dimensions						Shank form HA	
d_1 m7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
4,00	6	102	64	58	36	SCD631-0400-3-3-135HA12-HP358	31035357
4,10	6	102	64	58	36	SCD631-0410-3-3-135HA12-HP358	31035358
4,20	6	102	64	58	36	SCD631-0420-3-3-135HA12-HP358	31035359
4,30	6	102	64	58	36	SCD631-0430-3-3-135HA12-HP358	31035360
4,40	6	102	64	58	36	SCD631-0440-3-3-135HA12-HP358	31035361
4,50	6	102	64	58	36	SCD631-0450-3-3-135HA12-HP358	31035362
4,60	6	102	64	58	36	SCD631-0460-3-3-135HA12-HP358	31035363
4,70	6	102	64	58	36	SCD631-0470-3-3-135HA12-HP358	31035364
4,80	6	116	78	70	36	SCD631-0480-3-3-135HA12-HP358	31035365
4,90	6	116	78	70	36	SCD631-0490-3-3-135HA12-HP358	31035366
5,00	6	116	78	70	36	SCD631-0500-3-3-135HA12-HP358	31035367
5,10	6	116	78	70	36	SCD631-0510-3-3-135HA12-HP358	31035368
5,20	6	116	78	70	36	SCD631-0520-3-3-135HA12-HP358	31035369
5,30	6	116	78	70	36	SCD631-0530-3-3-135HA12-HP358	31035370
5,40	6	116	78	70	36	SCD631-0540-3-3-135HA12-HP358	31035371
5,50	6	116	78	70	36	SCD631-0550-3-3-135HA12-HP358	31035372
5,60	6	116	78	70	36	SCD631-0560-3-3-135HA12-HP358	31035373
5,70	6	116	78	70	36	SCD631-0570-3-3-135HA12-HP358	31035374
5,80	6	116	78	70	36	SCD631-0580-3-3-135HA12-HP358	31035375
5,90	6	116	78	70	36	SCD631-0590-3-3-135HA12-HP358	31035376
6,00	6	116	78	70	36	SCD631-0600-3-3-135HA12-HP358	31035377
6,10	8	146	108	94	36	SCD631-0610-3-3-135HA12-HP358	31035378
6,20	8	146	108	94	36	SCD631-0620-3-3-135HA12-HP358	31035379
6,30	8	146	108	94	36	SCD631-0630-3-3-135HA12-HP358	31035380
6,40	8	146	108	94	36	SCD631-0640-3-3-135HA12-HP358	31035381
6,50	8	146	108	94	36	SCD631-0650-3-3-135HA12-HP358	31035382
6,60	8	146	108	94	36	SCD631-0660-3-3-135HA12-HP358	31035383
6,70	8	146	108	94	36	SCD631-0670-3-3-135HA12-HP358	31035384
6,80	8	146	108	94	36	SCD631-0680-3-3-135HA12-HP358	31035385
6,90	8	146	108	94	36	SCD631-0690-3-3-135HA12-HP358	31035386
7,00	8	146	108	94	36	SCD631-0700-3-3-135HA12-HP358	31035387
7,10	8	146	108	94	36	SCD631-0710-3-3-135HA12-HP358	31035388
7,20	8	146	108	94	36	SCD631-0720-3-3-135HA12-HP358	31035389
7,30	8	146	108	94	36	SCD631-0730-3-3-135HA12-HP358	31035390
7,40	8	146	108	94	36	SCD631-0740-3-3-135HA12-HP358	31035391
7,50	8	146	108	94	36	SCD631-0750-3-3-135HA12-HP358	31035392

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Tritan-Drill-Uni-Plus | Solid carbide twist drills SCD63 (12xD), internal coolant supply

Dimensions						Shank form HA	
d_1 m7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
7,60	8	146	108	94	36	SCD631-0760-3-3-135HA12-HP358	31035393
7,70	8	146	108	94	36	SCD631-0770-3-3-135HA12-HP358	31035394
7,80	8	146	108	94	36	SCD631-0780-3-3-135HA12-HP358	31035395
7,90	8	146	108	94	36	SCD631-0790-3-3-135HA12-HP358	31035396
8,00	8	146	108	94	36	SCD631-0800-3-3-135HA12-HP358	31035397
8,10	10	162	120	110	40	SCD631-0810-3-3-135HA12-HP358	31035398
8,20	10	162	120	110	40	SCD631-0820-3-3-135HA12-HP358	31035399
8,30	10	162	120	110	40	SCD631-0830-3-3-135HA12-HP358	31035400
8,40	10	162	120	110	40	SCD631-0840-3-3-135HA12-HP358	31035401
8,50	10	162	120	110	40	SCD631-0850-3-3-135HA12-HP358	31035402
8,60	10	162	120	110	40	SCD631-0860-3-3-135HA12-HP358	31035403
8,70	10	162	120	110	40	SCD631-0870-3-3-135HA12-HP358	31035404
8,80	10	162	120	110	40	SCD631-0880-3-3-135HA12-HP358	31035405
8,90	10	162	120	110	40	SCD631-0890-3-3-135HA12-HP358	31035406
9,00	10	162	120	110	40	SCD631-0900-3-3-135HA12-HP358	31035407
9,10	10	162	120	110	40	SCD631-0910-3-3-135HA12-HP358	31035408
9,20	10	162	120	110	40	SCD631-0920-3-3-135HA12-HP358	31035409
9,30	10	162	120	110	40	SCD631-0930-3-3-135HA12-HP358	31035410
9,40	10	162	120	110	40	SCD631-0940-3-3-135HA12-HP358	31035411
9,50	10	162	120	110	40	SCD631-0950-3-3-135HA12-HP358	31035412
9,60	10	162	120	110	40	SCD631-0960-3-3-135HA12-HP358	31035413
9,70	10	162	120	110	40	SCD631-0970-3-3-135HA12-HP358	31035414
9,80	10	162	120	110	40	SCD631-0980-3-3-135HA12-HP358	31035415
9,90	10	162	120	110	40	SCD631-0990-3-3-135HA12-HP358	31035416
10,00	10	162	120	110	40	SCD631-1000-3-3-135HA12-HP358	31035417
10,10	12	204	156	142	45	SCD631-1010-3-3-135HA12-HP358	31035418
10,20	12	204	156	142	45	SCD631-1020-3-3-135HA12-HP358	31035419
10,30	12	204	156	142	45	SCD631-1030-3-3-135HA12-HP358	31035420
10,40	12	204	156	142	45	SCD631-1040-3-3-135HA12-HP358	31035421
10,50	12	204	156	142	45	SCD631-1050-3-3-135HA12-HP358	31035422
10,60	12	204	156	142	45	SCD631-1060-3-3-135HA12-HP358	31035423
10,70	12	204	156	142	45	SCD631-1070-3-3-135HA12-HP358	31035424
10,80	12	204	156	142	45	SCD631-1080-3-3-135HA12-HP358	31035425
10,90	12	204	156	142	45	SCD631-1090-3-3-135HA12-HP358	31035426
11,00	12	204	156	142	45	SCD631-1100-3-3-135HA12-HP358	31035427
11,10	12	204	156	142	45	SCD631-1110-3-3-135HA12-HP358	31035428
11,20	12	204	156	142	45	SCD631-1120-3-3-135HA12-HP358	31035429
11,30	12	204	156	142	45	SCD631-1130-3-3-135HA12-HP358	31035430
11,40	12	204	156	142	45	SCD631-1140-3-3-135HA12-HP358	31035431
11,50	12	204	156	142	45	SCD631-1150-3-3-135HA12-HP358	31035432
11,60	12	204	156	142	45	SCD631-1160-3-3-135HA12-HP358	31035433
11,70	12	204	156	142	45	SCD631-1170-3-3-135HA12-HP358	31035434
11,80	12	204	156	142	45	SCD631-1180-3-3-135HA12-HP358	31035435
11,90	12	204	156	142	45	SCD631-1190-3-3-135HA12-HP358	31035436
12,00	12	204	156	142	45	SCD631-1200-3-3-135HA12-HP358	31035437
12,20	14	230	182	166	45	SCD631-1220-3-3-135HA12-HP358	31035438
12,50	14	230	182	166	45	SCD631-1250-3-3-135HA12-HP358	31035439
12,80	14	230	182	166	45	SCD631-1280-3-3-135HA12-HP358	31035440
13,00	14	230	182	166	45	SCD631-1300-3-3-135HA12-HP358	31035441
13,20	14	230	182	166	45	SCD631-1320-3-3-135HA12-HP358	31035442
13,50	14	230	182	166	45	SCD631-1350-3-3-135HA12-HP358	31035443
13,80	14	230	182	166	45	SCD631-1380-3-3-135HA12-HP358	31035444
14,00	14	230	182	166	45	SCD631-1400-3-3-135HA12-HP358	31035445
14,20	16	260	208	192	48	SCD631-1420-3-3-135HA12-HP358	31035446
14,50	16	260	208	192	48	SCD631-1450-3-3-135HA12-HP358	31035447
14,80	16	260	208	192	48	SCD631-1480-3-3-135HA12-HP358	31035448
15,00	16	260	208	192	48	SCD631-1500-3-3-135HA12-HP358	31035449

Tritan-Drill-Uni-Plus | Solid carbide twist drills SCD63 (12xD), internal coolant supply

Dimensions						Shank form HA	
d_1 m7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
15,20	16	260	208	192	48	SCD631-1520-3-3-135HA12-HP358	31035450
15,50	16	260	208	192	48	SCD631-1550-3-3-135HA12-HP358	31035451
15,80	16	260	208	192	48	SCD631-1580-3-3-135HA12-HP358	31035452
16,00	16	260	208	192	48	SCD631-1600-3-3-135HA12-HP358	31035453
16,20	18	285	234	216	48	SCD631-1620-3-3-135HA12-HP358	31035454
16,50	18	285	234	216	48	SCD631-1650-3-3-135HA12-HP358	31035455
16,80	18	285	234	216	48	SCD631-1680-3-3-135HA12-HP358	31035456
17,00	18	285	234	216	48	SCD631-1700-3-3-135HA12-HP358	31035457
17,20	18	285	234	216	48	SCD631-1720-3-3-135HA12-HP358	31035458
17,50	18	285	234	216	48	SCD631-1750-3-3-135HA12-HP358	31035459
17,80	18	285	234	216	48	SCD631-1780-3-3-135HA12-HP358	31035460
18,00	18	285	234	216	48	SCD631-1800-3-3-135HA12-HP358	31035461
18,20	20	310	258	240	50	SCD631-1820-3-3-135HA12-HP358	31035462
18,50	20	310	258	240	50	SCD631-1850-3-3-135HA12-HP358	31035463
18,80	20	310	258	240	50	SCD631-1880-3-3-135HA12-HP358	31035464
19,00	20	310	258	240	50	SCD631-1900-3-3-135HA12-HP358	31035465
19,20	20	310	258	240	50	SCD631-1920-3-3-135HA12-HP358	31035466
19,50	20	310	258	240	50	SCD631-1950-3-3-135HA12-HP358	31035467
19,80	20	310	258	240	50	SCD631-1980-3-3-135HA12-HP358	31035468
20,00	20	310	258	240	50	SCD631-2000-3-3-135HA12-HP358	31035469

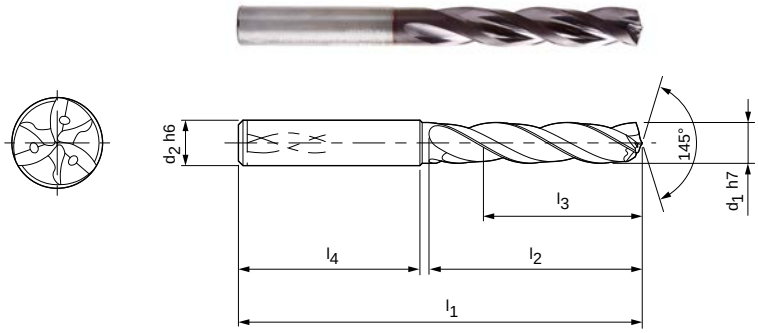
Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

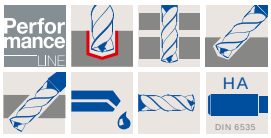
Tritan-Drill-Steel

Solid carbide twist drill
SCD66 (3xD), internal coolant supply

Design:

Drill diameter:	4.00 – 20.00 mm
Bore tolerance:	≥ IT 9
Cutting material:	HP358
Number of cutting edges:	3
Number of guiding chamfers:	3
Tip angle:	145°
Helix angle:	30°





Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
4,00	6	66	24	17	36	SCD661-0400-3-3-145HA03-HP358	30902036
4,10	6	66	24	17	36	SCD661-0410-3-3-145HA03-HP358	30902037
4,20	6	66	24	17	36	SCD661-0420-3-3-145HA03-HP358	30902038
4,30	6	66	24	17	36	SCD661-0430-3-3-145HA03-HP358	30902039
4,40	6	66	24	17	36	SCD661-0440-3-3-145HA03-HP358	30902040
4,50	6	66	24	17	36	SCD661-0450-3-3-145HA03-HP358	30902041
4,60	6	66	24	17	36	SCD661-0460-3-3-145HA03-HP358	30902042
4,65	6	66	24	17	36	SCD661-0465-3-3-145HA03-HP358	30902043
4,70	6	66	24	17	36	SCD661-0470-3-3-145HA03-HP358	30902044
4,80	6	66	28	20	36	SCD661-0480-3-3-145HA03-HP358	30902045
4,90	6	66	28	20	36	SCD661-0490-3-3-145HA03-HP358	30902046
5,00	6	66	28	20	36	SCD661-0500-3-3-145HA03-HP358	30902047
5,10	6	66	28	20	36	SCD661-0510-3-3-145HA03-HP358	30902048
5,20	6	66	28	20	36	SCD661-0520-3-3-145HA03-HP358	30902049
5,30	6	66	28	20	36	SCD661-0530-3-3-145HA03-HP358	30902050
5,40	6	66	28	20	36	SCD661-0540-3-3-145HA03-HP358	30902051
5,50	6	66	28	20	36	SCD661-0550-3-3-145HA03-HP358	30902052
5,55	6	66	28	20	36	SCD661-0555-3-3-145HA03-HP358	30902053
5,60	6	66	28	20	36	SCD661-0560-3-3-145HA03-HP358	30902054
5,70	6	66	28	20	36	SCD661-0570-3-3-145HA03-HP358	30902055
5,80	6	66	28	20	36	SCD661-0580-3-3-145HA03-HP358	30902056
5,90	6	66	28	20	36	SCD661-0590-3-3-145HA03-HP358	30902057
6,00	6	66	28	20	36	SCD661-0600-3-3-145HA03-HP358	30902058
6,10	8	79	34	24	36	SCD661-0610-3-3-145HA03-HP358	30902059
6,20	8	79	34	24	36	SCD661-0620-3-3-145HA03-HP358	30902060
6,30	8	79	34	24	36	SCD661-0630-3-3-145HA03-HP358	30902061
6,40	8	79	34	24	36	SCD661-0640-3-3-145HA03-HP358	30902062
6,50	8	79	34	24	36	SCD661-0650-3-3-145HA03-HP358	30902063
6,60	8	79	34	24	36	SCD661-0660-3-3-145HA03-HP358	30902064
6,70	8	79	34	24	36	SCD661-0670-3-3-145HA03-HP358	30902065
6,80	8	79	34	24	36	SCD661-0680-3-3-145HA03-HP358	30902066
6,90	8	79	34	24	36	SCD661-0690-3-3-145HA03-HP358	30902067
7,00	8	79	34	24	36	SCD661-0700-3-3-145HA03-HP358	30902068
7,10	8	79	41	29	36	SCD661-0710-3-3-145HA03-HP358	30902069
7,20	8	79	41	29	36	SCD661-0720-3-3-145HA03-HP358	30902070
7,30	8	79	41	29	36	SCD661-0730-3-3-145HA03-HP358	30902071

Tritan-Drill-Steel | Solid carbide twist drills SCD66 (3xD), internal coolant supply

Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
7,40	8	79	41	29	36	SCD661-0740-3-3-145HA03-HP358	30902072
7,45	8	79	41	29	36	SCD661-0745-3-3-145HA03-HP358	30902073
7,50	8	79	41	29	36	SCD661-0750-3-3-145HA03-HP358	30902074
7,60	8	79	41	29	36	SCD661-0760-3-3-145HA03-HP358	30902075
7,70	8	79	41	29	36	SCD661-0770-3-3-145HA03-HP358	30902076
7,80	8	79	41	29	36	SCD661-0780-3-3-145HA03-HP358	30902077
7,90	8	79	41	29	36	SCD661-0790-3-3-145HA03-HP358	30902078
8,00	8	79	41	29	36	SCD661-0800-3-3-145HA03-HP358	30902079
8,10	10	89	47	35	40	SCD661-0810-3-3-145HA03-HP358	30902080
8,20	10	89	47	35	40	SCD661-0820-3-3-145HA03-HP358	30902081
8,30	10	89	47	35	40	SCD661-0830-3-3-145HA03-HP358	30902082
8,40	10	89	47	35	40	SCD661-0840-3-3-145HA03-HP358	30902083
8,50	10	89	47	35	40	SCD661-0850-3-3-145HA03-HP358	30902084
8,60	10	89	47	35	40	SCD661-0860-3-3-145HA03-HP358	30902085
8,70	10	89	47	35	40	SCD661-0870-3-3-145HA03-HP358	30902086
8,80	10	89	47	35	40	SCD661-0880-3-3-145HA03-HP358	30902087
8,90	10	89	47	35	40	SCD661-0890-3-3-145HA03-HP358	30902088
9,00	10	89	47	35	40	SCD661-0900-3-3-145HA03-HP358	30902089
9,10	10	89	47	35	40	SCD661-0910-3-3-145HA03-HP358	30902090
9,20	10	89	47	35	40	SCD661-0920-3-3-145HA03-HP358	30902091
9,30	10	89	47	35	40	SCD661-0930-3-3-145HA03-HP358	30902092
9,40	10	89	47	35	40	SCD661-0940-3-3-145HA03-HP358	30902093
9,50	10	89	47	35	40	SCD661-0950-3-3-145HA03-HP358	30902094
9,60	10	89	47	35	40	SCD661-0960-3-3-145HA03-HP358	30902095
9,70	10	89	47	35	40	SCD661-0970-3-3-145HA03-HP358	30902096
9,80	10	89	47	35	40	SCD661-0980-3-3-145HA03-HP358	30902097
9,90	10	89	47	35	40	SCD661-0990-3-3-145HA03-HP358	30902098
10,00	10	89	47	35	40	SCD661-1000-3-3-145HA03-HP358	30902099
10,10	12	102	55	40	45	SCD661-1010-3-3-145HA03-HP358	30902100
10,20	12	102	55	40	45	SCD661-1020-3-3-145HA03-HP358	30902101
10,30	12	102	55	40	45	SCD661-1030-3-3-145HA03-HP358	30902102
10,40	12	102	55	40	45	SCD661-1040-3-3-145HA03-HP358	30902103
10,50	12	102	55	40	45	SCD661-1050-3-3-145HA03-HP358	30902104
10,60	12	102	55	40	45	SCD661-1060-3-3-145HA03-HP358	30902105
10,70	12	102	55	40	45	SCD661-1070-3-3-145HA03-HP358	30902106
10,80	12	102	55	40	45	SCD661-1080-3-3-145HA03-HP358	30902107
10,90	12	102	55	40	45	SCD661-1090-3-3-145HA03-HP358	30902108
11,00	12	102	55	40	45	SCD661-1100-3-3-145HA03-HP358	30902109
11,10	12	102	55	40	45	SCD661-1110-3-3-145HA03-HP358	30902110
11,20	12	102	55	40	45	SCD661-1120-3-3-145HA03-HP358	30902111
11,30	12	102	55	40	45	SCD661-1130-3-3-145HA03-HP358	30902112
11,40	12	102	55	40	45	SCD661-1140-3-3-145HA03-HP358	30902113
11,50	12	102	55	40	45	SCD661-1150-3-3-145HA03-HP358	30902114
11,60	12	102	55	40	45	SCD661-1160-3-3-145HA03-HP358	30902115
11,70	12	102	55	40	45	SCD661-1170-3-3-145HA03-HP358	30902116
11,80	12	102	55	40	45	SCD661-1180-3-3-145HA03-HP358	30902117
11,90	12	102	55	40	45	SCD661-1190-3-3-145HA03-HP358	30902118
12,00	12	102	55	40	45	SCD661-1200-3-3-145HA03-HP358	30902119
12,20	14	107	60	43	45	SCD661-1220-3-3-145HA03-HP358	30902120
12,50	14	107	60	43	45	SCD661-1250-3-3-145HA03-HP358	30902121
12,80	14	107	60	43	45	SCD661-1280-3-3-145HA03-HP358	30902122
13,00	14	107	60	43	45	SCD661-1300-3-3-145HA03-HP358	30902123
13,20	14	107	60	43	45	SCD661-1320-3-3-145HA03-HP358	30902124
13,50	14	107	60	43	45	SCD661-1350-3-3-145HA03-HP358	30902125
13,80	14	107	60	43	45	SCD661-1380-3-3-145HA03-HP358	30902126
14,00	14	107	60	43	45	SCD661-1400-3-3-145HA03-HP358	30902127
14,20	16	115	65	45	48	SCD661-1420-3-3-145HA03-HP358	30902128

Continued on next page.

Tritan-Drill-Steel | Solid carbide twist drills SCD66 (3xD), internal coolant supply

Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
14,50	16	115	65	45	48	SCD661-1450-3-3-145HA03-HP358	30902129
14,80	16	115	65	45	48	SCD661-1480-3-3-145HA03-HP358	30902130
15,00	16	115	65	45	48	SCD661-1500-3-3-145HA03-HP358	30902131
15,20	16	115	65	45	48	SCD661-1520-3-3-145HA03-HP358	30902132
15,50	16	115	65	45	48	SCD661-1550-3-3-145HA03-HP358	30902133
15,80	16	115	65	45	48	SCD661-1580-3-3-145HA03-HP358	30902134
16,00	16	115	65	45	48	SCD661-1600-3-3-145HA03-HP358	30902135
16,20	18	123	73	51	48	SCD661-1620-3-3-145HA03-HP358	30902136
16,50	18	123	73	51	48	SCD661-1650-3-3-145HA03-HP358	30902137
16,80	18	123	73	51	48	SCD661-1680-3-3-145HA03-HP358	30902138
17,00	18	123	73	51	48	SCD661-1700-3-3-145HA03-HP358	30902139
17,20	18	123	73	51	48	SCD661-1720-3-3-145HA03-HP358	30902140
17,50	18	123	73	51	48	SCD661-1750-3-3-145HA03-HP358	30902141
17,80	18	123	73	51	48	SCD661-1780-3-3-145HA03-HP358	30902142
18,00	18	123	73	51	48	SCD661-1800-3-3-145HA03-HP358	30902143
18,20	20	131	79	55	50	SCD661-1820-3-3-145HA03-HP358	30902144
18,50	20	131	79	55	50	SCD661-1850-3-3-145HA03-HP358	30902145
18,80	20	131	79	55	50	SCD661-1880-3-3-145HA03-HP358	30902146
19,00	20	131	79	55	50	SCD661-1900-3-3-145HA03-HP358	30902147
19,20	20	131	79	55	50	SCD661-1920-3-3-145HA03-HP358	30902148
19,50	20	131	79	55	50	SCD661-1950-3-3-145HA03-HP358	30902149
19,80	20	131	79	55	50	SCD661-1980-3-3-145HA03-HP358	30902150
20,00	20	131	79	55	50	SCD661-2000-3-3-145HA03-HP358	30902151

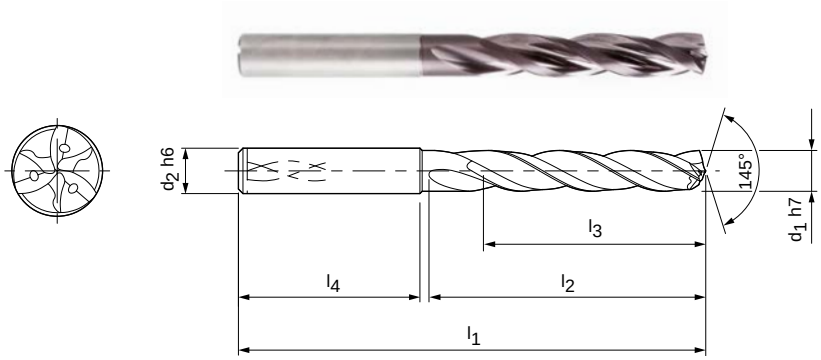
Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

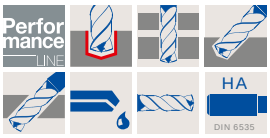
Tritan-Drill-Steel

Solid carbide twist drill
SCD66 (5xD), internal coolant supply

Design:

Drill diameter:	4.00 – 20.00 mm
Bore tolerance:	≥ IT 9
Cutting material:	HP358
Number of cutting edges:	3
Number of guiding chamfers:	3
Tip angle:	145°
Helix angle:	30°





Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
4,00	6	74	36	29	36	SCD661-0400-3-3-145HA05-HP358	30902152
4,10	6	74	36	29	36	SCD661-0410-3-3-145HA05-HP358	30902153
4,20	6	74	36	29	36	SCD661-0420-3-3-145HA05-HP358	30902154
4,30	6	74	36	29	36	SCD661-0430-3-3-145HA05-HP358	30902155
4,40	6	74	36	29	36	SCD661-0440-3-3-145HA05-HP358	30902156
4,50	6	74	36	29	36	SCD661-0450-3-3-145HA05-HP358	30902157
4,60	6	74	36	29	36	SCD661-0460-3-3-145HA05-HP358	30902158
4,65	6	74	36	29	36	SCD661-0465-3-3-145HA05-HP358	30902159
4,70	6	74	36	29	36	SCD661-0470-3-3-145HA05-HP358	30902160
4,80	6	82	44	35	36	SCD661-0480-3-3-145HA05-HP358	30902161
4,90	6	82	44	35	36	SCD661-0490-3-3-145HA05-HP358	30902162
5,00	6	82	44	35	36	SCD661-0500-3-3-145HA05-HP358	30902163
5,10	6	82	44	35	36	SCD661-0510-3-3-145HA05-HP358	30902164
5,20	6	82	44	35	36	SCD661-0520-3-3-145HA05-HP358	30902165
5,30	6	82	44	35	36	SCD661-0530-3-3-145HA05-HP358	30902166
5,40	6	82	44	35	36	SCD661-0540-3-3-145HA05-HP358	30902167
5,50	6	82	44	35	36	SCD661-0550-3-3-145HA05-HP358	30902168
5,55	6	82	44	35	36	SCD661-0555-3-3-145HA05-HP358	30902169
5,60	6	82	44	35	36	SCD661-0560-3-3-145HA05-HP358	30902170
5,70	6	82	44	35	36	SCD661-0570-3-3-145HA05-HP358	30902171
5,80	6	82	44	35	36	SCD661-0580-3-3-145HA05-HP358	30902172
5,90	6	82	44	35	36	SCD661-0590-3-3-145HA05-HP358	30902173
6,00	6	82	44	35	36	SCD661-0600-3-3-145HA05-HP358	30902174
6,10	8	91	53	43	36	SCD661-0610-3-3-145HA05-HP358	30902175
6,20	8	91	53	43	36	SCD661-0620-3-3-145HA05-HP358	30902176
6,30	8	91	53	43	36	SCD661-0630-3-3-145HA05-HP358	30902177
6,40	8	91	53	43	36	SCD661-0640-3-3-145HA05-HP358	30902178
6,50	8	91	53	43	36	SCD661-0650-3-3-145HA05-HP358	30902179
6,60	8	91	53	43	36	SCD661-0660-3-3-145HA05-HP358	30902180
6,70	8	91	53	43	36	SCD661-0670-3-3-145HA05-HP358	30902181
6,80	8	91	53	43	36	SCD661-0680-3-3-145HA05-HP358	30902182
6,90	8	91	53	43	36	SCD661-0690-3-3-145HA05-HP358	30902183
7,00	8	91	53	43	36	SCD661-0700-3-3-145HA05-HP358	30902184
7,10	8	91	53	43	36	SCD661-0710-3-3-145HA05-HP358	30902185
7,20	8	91	53	43	36	SCD661-0720-3-3-145HA05-HP358	30902186
7,30	8	91	53	43	36	SCD661-0730-3-3-145HA05-HP358	30902187

Continued on next page.

Tritan-Drill-Steel | Solid carbide twist drills SCD66 (5xD), internal coolant supply

Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
7,40	8	91	53	43	36	SCD661-0740-3-3-145HA05-HP358	30902188
7,45	8	91	53	43	36	SCD661-0745-3-3-145HA05-HP358	30902189
7,50	8	91	53	43	36	SCD661-0750-3-3-145HA05-HP358	30902190
7,60	8	91	53	43	36	SCD661-0760-3-3-145HA05-HP358	30902191
7,70	8	91	53	43	36	SCD661-0770-3-3-145HA05-HP358	30902192
7,80	8	91	53	43	36	SCD661-0780-3-3-145HA05-HP358	30902193
7,90	8	91	53	43	36	SCD661-0790-3-3-145HA05-HP358	30902194
8,00	8	91	53	43	36	SCD661-0800-3-3-145HA05-HP358	30902195
8,10	10	103	61	49	40	SCD661-0810-3-3-145HA05-HP358	30902196
8,20	10	103	61	49	40	SCD661-0820-3-3-145HA05-HP358	30902197
8,30	10	103	61	49	40	SCD661-0830-3-3-145HA05-HP358	30902198
8,40	10	103	61	49	40	SCD661-0840-3-3-145HA05-HP358	30902199
8,50	10	103	61	49	40	SCD661-0850-3-3-145HA05-HP358	30902200
8,60	10	103	61	49	40	SCD661-0860-3-3-145HA05-HP358	30902201
8,70	10	103	61	49	40	SCD661-0870-3-3-145HA05-HP358	30902202
8,80	10	103	61	49	40	SCD661-0880-3-3-145HA05-HP358	30902203
8,90	10	103	61	49	40	SCD661-0890-3-3-145HA05-HP358	30902204
9,00	10	103	61	49	40	SCD661-0900-3-3-145HA05-HP358	30902205
9,10	10	103	61	49	40	SCD661-0910-3-3-145HA05-HP358	30902206
9,20	10	103	61	49	40	SCD661-0920-3-3-145HA05-HP358	30902207
9,30	10	103	61	49	40	SCD661-0930-3-3-145HA05-HP358	30902208
9,35	10	103	61	49	40	SCD661-0935-3-3-145HA05-HP358	30902209
9,40	10	103	61	49	40	SCD661-0940-3-3-145HA05-HP358	30902210
9,50	10	103	61	49	40	SCD661-0950-3-3-145HA05-HP358	30902211
9,55	10	103	61	49	40	SCD661-0955-3-3-145HA05-HP358	30902212
9,60	10	103	61	49	40	SCD661-0960-3-3-145HA05-HP358	30902213
9,70	10	103	61	49	40	SCD661-0970-3-3-145HA05-HP358	30902214
9,80	10	103	61	49	40	SCD661-0980-3-3-145HA05-HP358	30902215
9,90	10	103	61	49	40	SCD661-0990-3-3-145HA05-HP358	30902216
10,00	10	103	61	49	40	SCD661-1000-3-3-145HA05-HP358	30902217
10,10	12	118	71	56	45	SCD661-1010-3-3-145HA05-HP358	30902218
10,20	12	118	71	56	45	SCD661-1020-3-3-145HA05-HP358	30902219
10,30	12	118	71	56	45	SCD661-1030-3-3-145HA05-HP358	30902220
10,40	12	118	71	56	45	SCD661-1040-3-3-145HA05-HP358	30902221
10,50	12	118	71	56	45	SCD661-1050-3-3-145HA05-HP358	30902222
10,60	12	118	71	56	45	SCD661-1060-3-3-145HA05-HP358	30902223
10,70	12	118	71	56	45	SCD661-1070-3-3-145HA05-HP358	30902224
10,80	12	118	71	56	45	SCD661-1080-3-3-145HA05-HP358	30902225
10,90	12	118	71	56	45	SCD661-1090-3-3-145HA05-HP358	30902226
11,00	12	118	71	56	45	SCD661-1100-3-3-145HA05-HP358	30902227
11,10	12	118	71	56	45	SCD661-1110-3-3-145HA05-HP358	30902228
11,20	12	118	71	56	45	SCD661-1120-3-3-145HA05-HP358	30902229
11,30	12	118	71	56	45	SCD661-1130-3-3-145HA05-HP358	30902230
11,40	12	118	71	56	45	SCD661-1140-3-3-145HA05-HP358	30902231
11,50	12	118	71	56	45	SCD661-1150-3-3-145HA05-HP358	30902232
11,60	12	118	71	56	45	SCD661-1160-3-3-145HA05-HP358	30902233
11,70	12	118	71	56	45	SCD661-1170-3-3-145HA05-HP358	30902234
11,80	12	118	71	56	45	SCD661-1180-3-3-145HA05-HP358	30902235
11,90	12	118	71	56	45	SCD661-1190-3-3-145HA05-HP358	30902236
12,00	12	118	71	56	45	SCD661-1200-3-3-145HA05-HP358	30902237
12,20	14	124	77	60	45	SCD661-1220-3-3-145HA05-HP358	30902238
12,50	14	124	77	60	45	SCD661-1250-3-3-145HA05-HP358	30902239
12,80	14	124	77	60	45	SCD661-1280-3-3-145HA05-HP358	30902240
13,00	14	124	77	60	45	SCD661-1300-3-3-145HA05-HP358	30902241
13,20	14	124	77	60	45	SCD661-1320-3-3-145HA05-HP358	30902242
13,50	14	124	77	60	45	SCD661-1350-3-3-145HA05-HP358	30902243
13,80	14	124	77	60	45	SCD661-1380-3-3-145HA05-HP358	30902244

Tritan-Drill-Steel | Solid carbide twist drills SCD66 (5xD), internal coolant supply

Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
14,00	14	124	77	60	45	SCD661-1400-3-3-145HA05-HP358	30902245
14,20	16	133	83	63	48	SCD661-1420-3-3-145HA05-HP358	30902246
14,50	16	133	83	63	48	SCD661-1450-3-3-145HA05-HP358	30902247
14,80	16	133	83	63	48	SCD661-1480-3-3-145HA05-HP358	30902248
15,00	16	133	83	63	48	SCD661-1500-3-3-145HA05-HP358	30902249
15,10	16	133	83	63	48	SCD661-1510-3-3-145HA05-HP358	30902250
15,20	16	133	83	63	48	SCD661-1520-3-3-145HA05-HP358	30902251
15,25	16	133	83	63	48	SCD661-1525-3-3-145HA05-HP358	30902252
15,50	16	133	83	63	48	SCD661-1550-3-3-145HA05-HP358	30902253
15,80	16	133	83	63	48	SCD661-1580-3-3-145HA05-HP358	30902254
16,00	16	133	83	63	48	SCD661-1600-3-3-145HA05-HP358	30902255
16,20	18	143	93	71	48	SCD661-1620-3-3-145HA05-HP358	30902256
16,50	18	143	93	71	48	SCD661-1650-3-3-145HA05-HP358	30902257
16,80	18	143	93	71	48	SCD661-1680-3-3-145HA05-HP358	30902258
17,00	18	143	93	71	48	SCD661-1700-3-3-145HA05-HP358	30902259
17,20	18	143	93	71	48	SCD661-1720-3-3-145HA05-HP358	30902260
17,50	18	143	93	71	48	SCD661-1750-3-3-145HA05-HP358	30902261
17,80	18	143	93	71	48	SCD661-1780-3-3-145HA05-HP358	30902262
18,00	18	143	93	71	48	SCD661-1800-3-3-145HA05-HP358	30902263
18,20	20	153	101	77	50	SCD661-1820-3-3-145HA05-HP358	30902264
18,50	20	153	101	77	50	SCD661-1850-3-3-145HA05-HP358	30902265
18,80	20	153	101	77	50	SCD661-1880-3-3-145HA05-HP358	30902266
19,00	20	153	101	77	50	SCD661-1900-3-3-145HA05-HP358	30902267
19,20	20	153	101	77	50	SCD661-1920-3-3-145HA05-HP358	30902268
19,50	20	153	101	77	50	SCD661-1950-3-3-145HA05-HP358	30902269
19,80	20	153	101	77	50	SCD661-1980-3-3-145HA05-HP358	30902270
20,00	20	153	101	77	50	SCD661-2000-3-3-145HA05-HP358	30902271

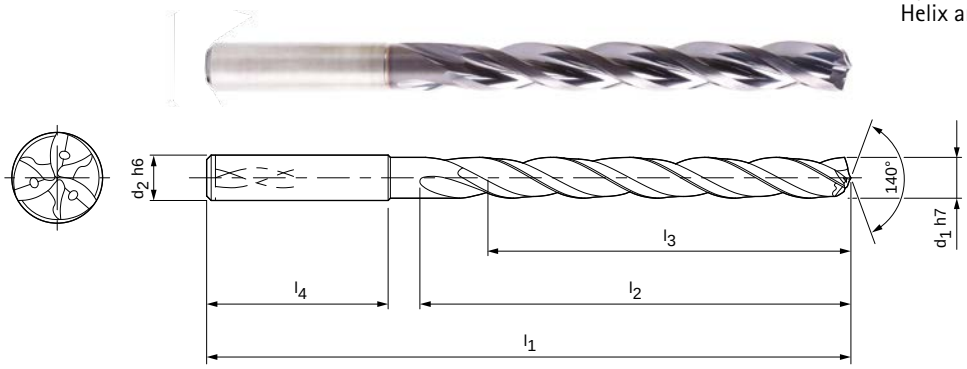
Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

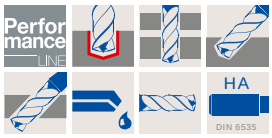
Tritan-Drill-Steel

Solid carbide twist drill
SCD66 (8xD), internal coolant supply

Design:

Drill diameter:	4.00 – 20.00 mm
Bore tolerance:	≥ IT 9
Cutting material:	HP358
Number of cutting edges:	3
Number of guiding chamfers:	3
Tip angle:	140°
Helix angle:	30°





Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
4,00	6	81	43	36	36	SCD661-0400-3-3-140HA08-HP358	30902272
4,10	6	81	43	36	36	SCD661-0410-3-3-140HA08-HP358	30902273
4,20	6	81	43	36	36	SCD661-0420-3-3-140HA08-HP358	30902274
4,30	6	81	43	36	36	SCD661-0430-3-3-140HA08-HP358	30902275
4,40	6	81	43	36	36	SCD661-0440-3-3-140HA08-HP358	30902276
4,50	6	81	43	36	36	SCD661-0450-3-3-140HA08-HP358	30902277
4,60	6	81	43	36	36	SCD661-0460-3-3-140HA08-HP358	30902278
4,70	6	81	43	36	36	SCD661-0470-3-3-140HA08-HP358	30902279
4,80	6	95	57	48	36	SCD661-0480-3-3-140HA08-HP358	30902280
4,90	6	95	57	48	36	SCD661-0490-3-3-140HA08-HP358	30902281
5,00	6	95	57	48	36	SCD661-0500-3-3-140HA08-HP358	30902282
5,10	6	95	57	48	36	SCD661-0510-3-3-140HA08-HP358	30902283
5,20	6	95	57	48	36	SCD661-0520-3-3-140HA08-HP358	30902284
5,30	6	95	57	48	36	SCD661-0530-3-3-140HA08-HP358	30902285
5,40	6	95	57	48	36	SCD661-0540-3-3-140HA08-HP358	30902286
5,50	6	95	57	48	36	SCD661-0550-3-3-140HA08-HP358	30902287
5,60	6	95	57	48	36	SCD661-0560-3-3-140HA08-HP358	30902288
5,70	6	95	57	48	36	SCD661-0570-3-3-140HA08-HP358	30902289
5,80	6	95	57	48	36	SCD661-0580-3-3-140HA08-HP358	30902290
5,90	6	95	57	48	36	SCD661-0590-3-3-140HA08-HP358	30902291
6,00	6	95	57	48	36	SCD661-0600-3-3-140HA08-HP358	30902292
6,10	8	114	76	64	36	SCD661-0610-3-3-140HA08-HP358	30902293
6,20	8	114	76	64	36	SCD661-0620-3-3-140HA08-HP358	30902294
6,30	8	114	76	64	36	SCD661-0630-3-3-140HA08-HP358	30902295
6,40	8	114	76	64	36	SCD661-0640-3-3-140HA08-HP358	30902296
6,50	8	114	76	64	36	SCD661-0650-3-3-140HA08-HP358	30902297
6,60	8	114	76	64	36	SCD661-0660-3-3-140HA08-HP358	30902298
6,70	8	114	76	64	36	SCD661-0670-3-3-140HA08-HP358	30902299
6,80	8	114	76	64	36	SCD661-0680-3-3-140HA08-HP358	30902300
6,90	8	114	76	64	36	SCD661-0690-3-3-140HA08-HP358	30902301
7,00	8	114	76	64	36	SCD661-0700-3-3-140HA08-HP358	30902302
7,10	8	114	76	64	36	SCD661-0710-3-3-140HA08-HP358	30902303
7,20	8	114	76	64	36	SCD661-0720-3-3-140HA08-HP358	30902304
7,30	8	114	76	64	36	SCD661-0730-3-3-140HA08-HP358	30902305
7,40	8	114	76	64	36	SCD661-0740-3-3-140HA08-HP358	30902306
7,50	8	114	76	64	36	SCD661-0750-3-3-140HA08-HP358	30902307

Tritan-Drill-Steel | Solid carbide twist drills SCD66 (8xD), internal coolant supply

Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
7,60	8	114	76	64	36	SCD661-0760-3-3-140HA08-HP358	30902308
7,70	8	114	76	64	36	SCD661-0770-3-3-140HA08-HP358	30902309
7,80	8	114	76	64	36	SCD661-0780-3-3-140HA08-HP358	30902310
7,90	8	114	76	64	36	SCD661-0790-3-3-140HA08-HP358	30902311
8,00	8	114	76	64	36	SCD661-0800-3-3-140HA08-HP358	30902312
8,10	10	142	95	80	40	SCD661-0810-3-3-140HA08-HP358	30902313
8,20	10	142	95	80	40	SCD661-0820-3-3-140HA08-HP358	30902314
8,30	10	142	95	80	40	SCD661-0830-3-3-140HA08-HP358	30902315
8,40	10	142	95	80	40	SCD661-0840-3-3-140HA08-HP358	30902316
8,50	10	142	95	80	40	SCD661-0850-3-3-140HA08-HP358	30902317
8,60	10	142	95	80	40	SCD661-0860-3-3-140HA08-HP358	30902318
8,70	10	142	95	80	40	SCD661-0870-3-3-140HA08-HP358	30902319
8,80	10	142	95	80	40	SCD661-0880-3-3-140HA08-HP358	30902320
8,90	10	142	95	80	40	SCD661-0890-3-3-140HA08-HP358	30902321
9,00	10	142	95	80	40	SCD661-0900-3-3-140HA08-HP358	30902322
9,10	10	142	95	80	40	SCD661-0910-3-3-140HA08-HP358	30902323
9,20	10	142	95	80	40	SCD661-0920-3-3-140HA08-HP358	30902324
9,30	10	142	95	80	40	SCD661-0930-3-3-140HA08-HP358	30902325
9,40	10	142	95	80	40	SCD661-0940-3-3-140HA08-HP358	30902326
9,50	10	142	95	80	40	SCD661-0950-3-3-140HA08-HP358	30902327
9,60	10	142	95	80	40	SCD661-0960-3-3-140HA08-HP358	30902328
9,70	10	142	95	80	40	SCD661-0970-3-3-140HA08-HP358	30902329
9,80	10	142	95	80	40	SCD661-0980-3-3-140HA08-HP358	30902330
9,90	10	142	95	80	40	SCD661-0990-3-3-140HA08-HP358	30902331
10,00	10	142	95	80	40	SCD661-1000-3-3-140HA08-HP358	30902332
10,10	12	162	114	96	45	SCD661-1010-3-3-140HA08-HP358	30902333
10,20	12	162	114	96	45	SCD661-1020-3-3-140HA08-HP358	30902334
10,30	12	162	114	96	45	SCD661-1030-3-3-140HA08-HP358	30902335
10,40	12	162	114	96	45	SCD661-1040-3-3-140HA08-HP358	30902336
10,50	12	162	114	96	45	SCD661-1050-3-3-140HA08-HP358	30902337
10,60	12	162	114	96	45	SCD661-1060-3-3-140HA08-HP358	30902338
10,70	12	162	114	96	45	SCD661-1070-3-3-140HA08-HP358	30902339
10,80	12	162	114	96	45	SCD661-1080-3-3-140HA08-HP358	30902340
10,90	12	162	114	96	45	SCD661-1090-3-3-140HA08-HP358	30902341
11,00	12	162	114	96	45	SCD661-1100-3-3-140HA08-HP358	30902342
11,10	12	162	114	96	45	SCD661-1110-3-3-140HA08-HP358	30902343
11,20	12	162	114	96	45	SCD661-1120-3-3-140HA08-HP358	30902344
11,30	12	162	114	96	45	SCD661-1130-3-3-140HA08-HP358	30902345
11,40	12	162	114	96	45	SCD661-1140-3-3-140HA08-HP358	30902346
11,50	12	162	114	96	45	SCD661-1150-3-3-140HA08-HP358	30902347
11,60	12	162	114	96	45	SCD661-1160-3-3-140HA08-HP358	30902348
11,70	12	162	114	96	45	SCD661-1170-3-3-140HA08-HP358	30902349
11,80	12	162	114	96	45	SCD661-1180-3-3-140HA08-HP358	30902350
11,90	12	162	114	96	45	SCD661-1190-3-3-140HA08-HP358	30902351
12,00	12	162	114	96	45	SCD661-1200-3-3-140HA08-HP358	30902352
12,20	14	178	133	112	45	SCD661-1220-3-3-140HA08-HP358	30902353
12,50	14	178	133	112	45	SCD661-1250-3-3-140HA08-HP358	30902354
12,80	14	178	133	112	45	SCD661-1280-3-3-140HA08-HP358	30902355
13,00	14	178	133	112	45	SCD661-1300-3-3-140HA08-HP358	30902356
13,20	14	178	133	112	45	SCD661-1320-3-3-140HA08-HP358	30902357
13,50	14	178	133	112	45	SCD661-1350-3-3-140HA08-HP358	30902358
13,80	14	178	133	112	45	SCD661-1380-3-3-140HA08-HP358	30902359
14,00	14	178	133	112	45	SCD661-1400-3-3-140HA08-HP358	30902360
14,20	16	203	152	128	48	SCD661-1420-3-3-140HA08-HP358	30902361
14,50	16	203	152	128	48	SCD661-1450-3-3-140HA08-HP358	30902362
14,80	16	203	152	128	48	SCD661-1480-3-3-140HA08-HP358	30902363
15,00	16	203	152	128	48	SCD661-1500-3-3-140HA08-HP358	30902364

Continued on next page.

Tritan-Drill-Steel | Solid carbide twist drills SCD66 (8xD), internal coolant supply

Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
15,20	16	203	152	128	48	SCD661-1520-3-3-140HA08-HP358	30902365
15,50	16	203	152	128	48	SCD661-1550-3-3-140HA08-HP358	30902366
15,80	16	203	152	128	48	SCD661-1580-3-3-140HA08-HP358	30902367
16,00	16	203	152	128	48	SCD661-1600-3-3-140HA08-HP358	30902368
16,20	18	222	171	144	48	SCD661-1620-3-3-140HA08-HP358	30902369
16,50	18	222	171	144	48	SCD661-1650-3-3-140HA08-HP358	30902370
16,80	18	222	171	144	48	SCD661-1680-3-3-140HA08-HP358	30902371
17,00	18	222	171	144	48	SCD661-1700-3-3-140HA08-HP358	30902372
17,20	18	222	171	144	48	SCD661-1720-3-3-140HA08-HP358	30902373
17,50	18	222	171	144	48	SCD661-1750-3-3-140HA08-HP358	30902374
17,80	18	222	171	144	48	SCD661-1780-3-3-140HA08-HP358	30902375
18,00	18	222	171	144	48	SCD661-1800-3-3-140HA08-HP358	30902376
18,20	20	243	190	160	50	SCD661-1820-3-3-140HA08-HP358	30902377
18,50	20	243	190	160	50	SCD661-1850-3-3-140HA08-HP358	30902378
18,80	20	243	190	160	50	SCD661-1880-3-3-140HA08-HP358	30902379
19,00	20	243	190	160	50	SCD661-1900-3-3-140HA08-HP358	30902380
19,20	20	243	190	160	50	SCD661-1920-3-3-140HA08-HP358	30902381
19,50	20	243	190	160	50	SCD661-1950-3-3-140HA08-HP358	30902382
19,80	20	243	190	160	50	SCD661-1980-3-3-140HA08-HP358	30902383
20,00	20	243	190	160	50	SCD661-2000-3-3-140HA08-HP358	30902384

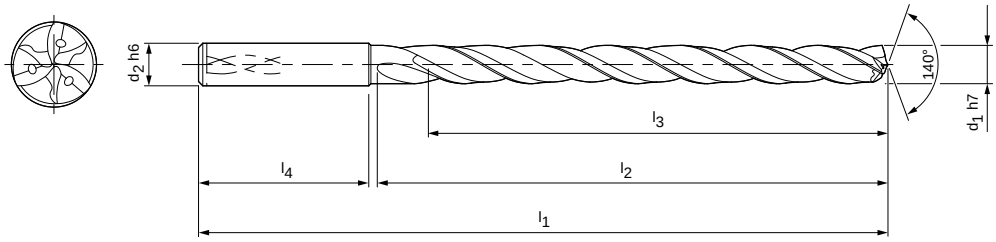
Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

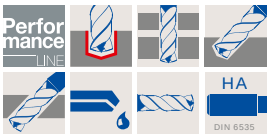
Tritan-Drill-Steel

Solid carbide twist drill
SCD66 (12xD), internal coolant supply

Design:

Drill diameter:	4.00 – 20.00 mm
Bore tolerance:	≥ IT 9
Cutting material:	HP358
Number of cutting edges:	3
Number of guiding chamfers:	3
Tip angle:	140°
Helix angle:	30°





Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
4,00	6	102	64	58	36	SCD661-0400-3-3-140HA12-HP358	30902385
4,10	6	102	64	58	36	SCD661-0410-3-3-140HA12-HP358	30902386
4,20	6	102	64	58	36	SCD661-0420-3-3-140HA12-HP358	30902387
4,30	6	102	64	58	36	SCD661-0430-3-3-140HA12-HP358	30902388
4,40	6	102	64	58	36	SCD661-0440-3-3-140HA12-HP358	30902389
4,50	6	102	64	58	36	SCD661-0450-3-3-140HA12-HP358	30902390
4,60	6	102	64	58	36	SCD661-0460-3-3-140HA12-HP358	30902391
4,70	6	102	64	58	36	SCD661-0470-3-3-140HA12-HP358	30902392
4,80	6	116	78	70	36	SCD661-0480-3-3-140HA12-HP358	30902393
4,90	6	116	78	70	36	SCD661-0490-3-3-140HA12-HP358	30902394
5,00	6	116	78	70	36	SCD661-0500-3-3-140HA12-HP358	30902395
5,10	6	116	78	70	36	SCD661-0510-3-3-140HA12-HP358	30902396
5,20	6	116	78	70	36	SCD661-0520-3-3-140HA12-HP358	30902397
5,30	6	116	78	70	36	SCD661-0530-3-3-140HA12-HP358	30902398
5,40	6	116	78	70	36	SCD661-0540-3-3-140HA12-HP358	30902399
5,50	6	116	78	70	36	SCD661-0550-3-3-140HA12-HP358	30902400
5,60	6	116	78	70	36	SCD661-0560-3-3-140HA12-HP358	30902401
5,70	6	116	78	70	36	SCD661-0570-3-3-140HA12-HP358	30902402
5,80	6	116	78	70	36	SCD661-0580-3-3-140HA12-HP358	30902403
5,90	6	116	78	70	36	SCD661-0590-3-3-140HA12-HP358	30902404
6,00	6	116	78	70	36	SCD661-0600-3-3-140HA12-HP358	30902405
6,10	8	146	108	94	36	SCD661-0610-3-3-140HA12-HP358	30902406
6,20	8	146	108	94	36	SCD661-0620-3-3-140HA12-HP358	30902407
6,30	8	146	108	94	36	SCD661-0630-3-3-140HA12-HP358	30902408
6,40	8	146	108	94	36	SCD661-0640-3-3-140HA12-HP358	30902409
6,50	8	146	108	94	36	SCD661-0650-3-3-140HA12-HP358	30902410
6,60	8	146	108	94	36	SCD661-0660-3-3-140HA12-HP358	30902411
6,70	8	146	108	94	36	SCD661-0670-3-3-140HA12-HP358	30902412
6,80	8	146	108	94	36	SCD661-0680-3-3-140HA12-HP358	30902413
6,90	8	146	108	94	36	SCD661-0690-3-3-140HA12-HP358	30902414
7,00	8	146	108	94	36	SCD661-0700-3-3-140HA12-HP358	30902415
7,10	8	146	108	94	36	SCD661-0710-3-3-140HA12-HP358	30902416
7,20	8	146	108	94	36	SCD661-0720-3-3-140HA12-HP358	30902417
7,30	8	146	108	94	36	SCD661-0730-3-3-140HA12-HP358	30902418
7,40	8	146	108	94	36	SCD661-0740-3-3-140HA12-HP358	30902419
7,50	8	146	108	94	36	SCD661-0750-3-3-140HA12-HP358	30902420

Continued on next page.

Tritan-Drill-Steel | Solid carbide twist drills SCD66 (12xD), internal coolant supply

Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
7,60	8	146	108	94	36	SCD661-0760-3-3-140HA12-HP358	30902421
7,70	8	146	108	94	36	SCD661-0770-3-3-140HA12-HP358	30902422
7,80	8	146	108	94	36	SCD661-0780-3-3-140HA12-HP358	30902423
7,90	8	146	108	94	36	SCD661-0790-3-3-140HA12-HP358	30902424
8,00	8	146	108	94	36	SCD661-0800-3-3-140HA12-HP358	30902425
8,10	10	162	120	110	40	SCD661-0810-3-3-140HA12-HP358	30902426
8,20	10	162	120	110	40	SCD661-0820-3-3-140HA12-HP358	30902427
8,30	10	162	120	110	40	SCD661-0830-3-3-140HA12-HP358	30902428
8,40	10	162	120	110	40	SCD661-0840-3-3-140HA12-HP358	30902429
8,50	10	162	120	110	40	SCD661-0850-3-3-140HA12-HP358	30902430
8,60	10	162	120	110	40	SCD661-0860-3-3-140HA12-HP358	30902431
8,70	10	162	120	110	40	SCD661-0870-3-3-140HA12-HP358	30902432
8,80	10	162	120	110	40	SCD661-0880-3-3-140HA12-HP358	30902433
8,90	10	162	120	110	40	SCD661-0890-3-3-140HA12-HP358	30902434
9,00	10	162	120	110	40	SCD661-0900-3-3-140HA12-HP358	30902435
9,10	10	162	120	110	40	SCD661-0910-3-3-140HA12-HP358	30902436
9,20	10	162	120	110	40	SCD661-0920-3-3-140HA12-HP358	30902437
9,30	10	162	120	110	40	SCD661-0930-3-3-140HA12-HP358	30902438
9,40	10	162	120	110	40	SCD661-0940-3-3-140HA12-HP358	30902439
9,50	10	162	120	110	40	SCD661-0950-3-3-140HA12-HP358	30902440
9,60	10	162	120	110	40	SCD661-0960-3-3-140HA12-HP358	30902441
9,70	10	162	120	110	40	SCD661-0970-3-3-140HA12-HP358	30902442
9,80	10	162	120	110	40	SCD661-0980-3-3-140HA12-HP358	30902443
9,90	10	162	120	110	40	SCD661-0990-3-3-140HA12-HP358	30902444
10,00	10	162	120	110	40	SCD661-1000-3-3-140HA12-HP358	30902445
10,10	12	204	156	142	45	SCD661-1010-3-3-140HA12-HP358	30902446
10,20	12	204	156	142	45	SCD661-1020-3-3-140HA12-HP358	30902447
10,30	12	204	156	142	45	SCD661-1030-3-3-140HA12-HP358	30902448
10,40	12	204	156	142	45	SCD661-1040-3-3-140HA12-HP358	30902449
10,50	12	204	156	142	45	SCD661-1050-3-3-140HA12-HP358	30902450
10,60	12	204	156	142	45	SCD661-1060-3-3-140HA12-HP358	30902451
10,70	12	204	156	142	45	SCD661-1070-3-3-140HA12-HP358	30902452
10,80	12	204	156	142	45	SCD661-1080-3-3-140HA12-HP358	30902453
10,90	12	204	156	142	45	SCD661-1090-3-3-140HA12-HP358	30902454
11,00	12	204	156	142	45	SCD661-1100-3-3-140HA12-HP358	30902455
11,10	12	204	156	142	45	SCD661-1110-3-3-140HA12-HP358	30902456
11,20	12	204	156	142	45	SCD661-1120-3-3-140HA12-HP358	30902457
11,30	12	204	156	142	45	SCD661-1130-3-3-140HA12-HP358	30902458
11,40	12	204	156	142	45	SCD661-1140-3-3-140HA12-HP358	30902459
11,50	12	204	156	142	45	SCD661-1150-3-3-140HA12-HP358	30902460
11,60	12	204	156	142	45	SCD661-1160-3-3-140HA12-HP358	30902461
11,70	12	204	156	142	45	SCD661-1170-3-3-140HA12-HP358	30902462
11,80	12	204	156	142	45	SCD661-1180-3-3-140HA12-HP358	30902463
11,90	12	204	156	142	45	SCD661-1190-3-3-140HA12-HP358	30902464
12,00	12	204	156	142	45	SCD661-1200-3-3-140HA12-HP358	30902465
12,20	14	230	182	166	45	SCD661-1220-3-3-140HA12-HP358	30902466
12,50	14	230	182	166	45	SCD661-1250-3-3-140HA12-HP358	30902467
12,80	14	230	182	166	45	SCD661-1280-3-3-140HA12-HP358	30902468
13,00	14	230	182	166	45	SCD661-1300-3-3-140HA12-HP358	30902469
13,20	14	230	182	166	45	SCD661-1320-3-3-140HA12-HP358	30902470
13,50	14	230	182	166	45	SCD661-1350-3-3-140HA12-HP358	30902471
13,80	14	230	182	166	45	SCD661-1380-3-3-140HA12-HP358	30902472
14,00	14	230	182	166	45	SCD661-1400-3-3-140HA12-HP358	30902473
14,20	16	260	208	192	48	SCD661-1420-3-3-140HA12-HP358	30902474
14,50	16	260	208	192	48	SCD661-1450-3-3-140HA12-HP358	30902475
14,80	16	260	208	192	48	SCD661-1480-3-3-140HA12-HP358	30902476
15,00	16	260	208	192	48	SCD661-1500-3-3-140HA12-HP358	30902477

Tritan-Drill-Steel | Solid carbide twist drills SCD66 (12xD), internal coolant supply

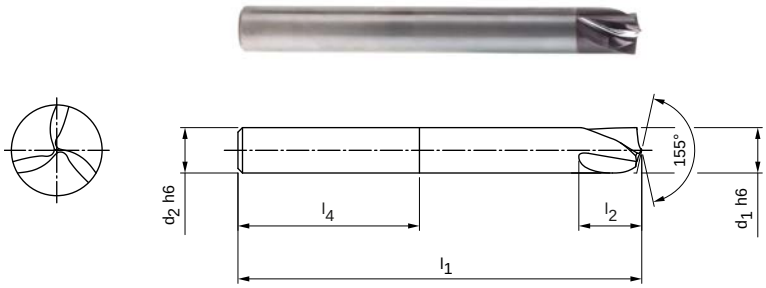
Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
15,20	16	260	208	192	48	SCD661-1520-3-3-140HA12-HP358	30902478
15,50	16	260	208	192	48	SCD661-1550-3-3-140HA12-HP358	30902479
15,80	16	260	208	192	48	SCD661-1580-3-3-140HA12-HP358	30902480
16,00	16	260	208	192	48	SCD661-1600-3-3-140HA12-HP358	30902481
16,20	18	285	234	216	48	SCD661-1620-3-3-140HA12-HP358	30902482
16,50	18	285	234	216	48	SCD661-1650-3-3-140HA12-HP358	30902483
16,80	18	285	234	216	48	SCD661-1680-3-3-140HA12-HP358	30902484
17,00	18	285	234	216	48	SCD661-1700-3-3-140HA12-HP358	30902485
17,20	18	285	234	216	48	SCD661-1720-3-3-140HA12-HP358	30902486
17,50	18	285	234	216	48	SCD661-1750-3-3-140HA12-HP358	30902487
17,80	18	285	234	216	48	SCD661-1780-3-3-140HA12-HP358	30902488
18,00	18	285	234	216	48	SCD661-1800-3-3-140HA12-HP358	30902489
18,20	20	310	258	240	50	SCD661-1820-3-3-140HA12-HP358	30902490
18,50	20	310	258	240	50	SCD661-1850-3-3-140HA12-HP358	30902491
18,80	20	310	258	240	50	SCD661-1880-3-3-140HA12-HP358	30902492
19,00	20	310	258	240	50	SCD661-1900-3-3-140HA12-HP358	30902493
19,20	20	310	258	240	50	SCD661-1920-3-3-140HA12-HP358	30902494
19,50	20	310	258	240	50	SCD661-1950-3-3-140HA12-HP358	30902495
19,80	20	310	258	240	50	SCD661-1980-3-3-140HA12-HP358	30902496
20,00	20	310	258	240	50	SCD661-2000-3-3-140HA12-HP358	30902497

Tritan-Spot-Drill-Steel

Solid carbide NC pilot drills
SCD67, external coolant supply

Design:

Drill diameter:	4.00 – 20.00 mm
Shank form:	HA (DIN 6535)
Cutting material:	HP358
Number of cutting edges:	3
Tip angle:	155°
Note:	Special NC pilot drill for Tritan-Drill-Steel



P 1 2 3 4 5 6 M 1 2 3 K 1 2 3 N 1 2 3 4 S 1 2 3 4 5 H 1 2

Dimensions					Shank form HA	
d_1 h6	d_2 h6	l_1	l_2	l_4	Specification	Order No.
4,00	4	55	6	28	SCD670-0400-3-0-155HA-HP358	30980587
5,00	6	62	7	36	SCD670-0500-3-0-155HA-HP358	30980588
6,00	6	66	9	36	SCD670-0600-3-0-155HA-HP358	30980589
8,00	8	79	11	36	SCD670-0800-3-0-155HA-HP358	30980590
10,00	10	89	14	40	SCD670-1000-3-0-155HA-HP358	30980592
12,00	12	102	17	45	SCD670-1200-3-0-155HA-HP358	30980594
16,00	16	115	23	48	SCD670-1600-3-0-155HA-HP358	30980595
20,00	20	131	28	50	SCD670-2000-3-0-155HA-HP358	30980596

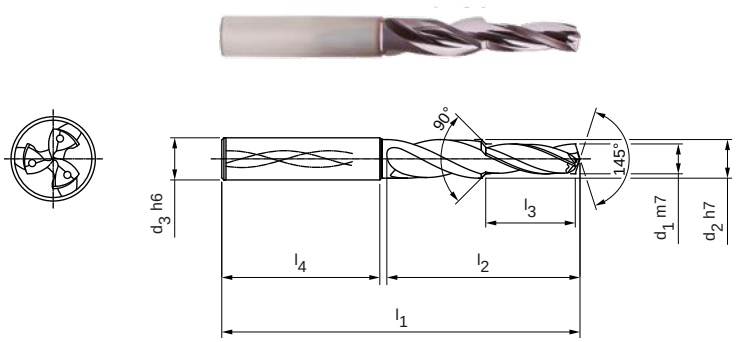
Pilot drilling depths

d_1 h6	d_2 h6	l_1	l_2	l_4	Maximum pilot drilling depth *	Minimum pilot drilling depth **
4,00	4	55	6	28	0,40	0,24
5,00	6	62	7	36	0,50	0,30
6,00	6	66	9	36	0,60	0,36
8,00	8	79	11	36	0,80	0,48
10,00	10	89	14	40	1,00	0,60
12,00	12	102	17	45	1,20	0,72
16,00	16	115	23	48	1,60	0,96
20,00	20	131	28	50	2,00	1,20

* 10 % of nominal Ø
** 6 % of nominal Ø
Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

Tritan-Step-Drill-Steel

Solid carbide step drill for core hole
SCD56, internal coolant supply



Design:

Drill diameter:	4.25 – 14.15 mm
Bore tolerance:	IT 9 (achievable)
Cutting material:	HP835
Number of cutting edges:	3
Number of guiding chamfers:	3
Tip angle:	145°
Helix angle:	30°

Note:
For thread core hole bore with countersink 90°.

Dimensions								Shank form HA	
For thread	d_1 m7	d_2 h7	d_3 h6	l_1	l_2	l_3		Specification	Order No.
M5	4,25	5,5	6	66	28	13,6	36	SCD561-0425-3-3-145HA-HP835	31053657
M6	5,10	6,6	8	79	41	16,5	36	SCD561-0510-3-3-145HA-HP835	31053658
M8	6,85	8,8	10	89	47	21	40	SCD561-0685-3-3-145HA-HP835	31053659
M8x1	7,10	8,8	10	89	47	21	40	SCD561-0710-3-3-145HA-HP835	31073436
M10	8,60	11	12	102	55	25,5	45	SCD561-0860-3-3-145HA-HP835	31053670
M10x1	9,10	11	12	102	55	25,5	45	SCD561-0910-3-3-145HA-HP835	31073438
M12	10,35	13,2	14	107	60	30	45	SCD561-1035-3-3-145HA-HP835	31053671
M16	14,15	17,6	18	123	73	38,5	48	SCD561-1415-3-3-145HA-HP835	31053672

Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

Tritan-Drill-Iron and Tritan-Drill-Alu

Application-specific custom solutions for aluminium and cast iron materials

The new Tritan-Drill-Alu and Tritan-Drill-Iron are newly available for use in aluminium and cast materials.

The Tritan-Drill-Alu has a matched, polished groove profile. Large chip spaces and a special, sharp cutting edge preparation ensure optimum chip formation and reliable chip removal.

The Tritan-Drill-Iron is impressive with its corner radius design, which means more stability and wear resistance of the cutting edge, and has a special, wear-resistant coating.

AT A GLANCE

- In the diameter range from ø 4 - 20 mm
- Available in 3xD to 12xD
- Application-specific custom solutions for use in aluminium and cast materials
- With internal cooling

ADVANTAGES

- Very high cost-effectiveness and performance thanks to high feed rates and long tool lives

Tool features in detail

Tritan-Drill-Iron

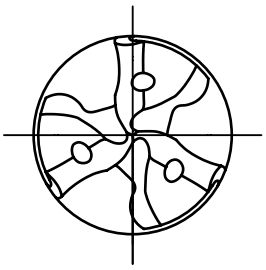
K

1 Special corner radii design
- More stability and greater wear resistance of the cutting edge

2 Wear-resistant coating
- Longer tool life
- Optimally matched to cast machining

3 Self-centring chisel edge
- Highest positioning accuracy

4 Chip flow optimised point thinning
- Best chip breaking properties



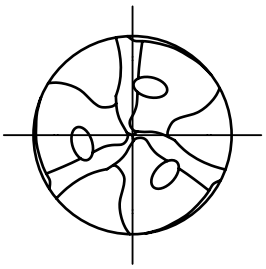
Tritan-Drill-Alu

N

5 Extra-large chip spaces
- Highly cost-effective for drilling aluminium from solid
- Reliable chip removal

6 Sharp cutting edge preparation
- Optimal chip formation

7 Polished chip spaces
- No built-up edge
- No build-up of heat due to chips

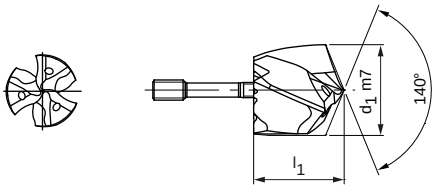


Replaceable drill head TTD-Tritan

Made of solid carbide, internal coolant supply
Type 01 - Uni

Design:

Drill diameter:	12.00 – 32.40 mm
Bore tolerance:	IT 9 (achievable)
Cutting material:	HP926
Number of cutting edges:	3
Number of guiding chamfers:	3
Tip angle:	140°



d_1 from 12.00 to 15.40			
d_1 m7	Connection	Specification	Order No.
12,00	TTS-B1200	TTD300-3F01-1200-HP926	30871158
12,10	TTS-B1210	TTD300-3F01-1210-HP926	30871159
12,20	TTS-B1220	TTD300-3F01-1220-HP926	30871160
12,30	TTS-B1230	TTD300-3F01-1230-HP926	30871161
12,40	TTS-B1240	TTD300-3F01-1240-HP926	30871162
12,50	TTS-B1250	TTD300-3F01-1250-HP926	30871163
12,60	TTS-B1260	TTD300-3F01-1260-HP926	30871164
12,70	TTS-B1270	TTD300-3F01-1270-HP926	30871165
12,80	TTS-B1280	TTD300-3F01-1280-HP926	30871166
12,90	TTS-B1290	TTD300-3F01-1290-HP926	30871167
13,00	TTS-B1300	TTD300-3F01-1300-HP926	30871168
13,10	TTS-B1310	TTD300-3F01-1310-HP926	30871169
13,20	TTS-B1320	TTD300-3F01-1320-HP926	30871170
13,30	TTS-B1330	TTD300-3F01-1330-HP926	30871171
13,40	TTS-B1340	TTD300-3F01-1340-HP926	30871172
13,50	TTS-B1350	TTD300-3F01-1350-HP926	30871173
13,60	TTS-B1360	TTD300-3F01-1360-HP926	30871174
13,70	TTS-B1370	TTD300-3F01-1370-HP926	30871175
13,80	TTS-B1380	TTD300-3F01-1380-HP926	30871176
13,90	TTS-B1390	TTD300-3F01-1390-HP926	30871177
14,00	TTS-B1400	TTD300-3F01-1400-HP926	30871178
14,10	TTS-B1410	TTD300-3F01-1410-HP926	30871179
14,20	TTS-B1420	TTD300-3F01-1420-HP926	30871180
14,30	TTS-B1430	TTD300-3F01-1430-HP926	30871181
14,40	TTS-B1440	TTD300-3F01-1440-HP926	30871182
14,50	TTS-B1450	TTD300-3F01-1450-HP926	30871183
14,60	TTS-B1460	TTD300-3F01-1460-HP926	30871184
14,70	TTS-B1470	TTD300-3F01-1470-HP926	30871185
14,80	TTS-B1480	TTD300-3F01-1480-HP926	30871186
14,90	TTS-B1490	TTD300-3F01-1490-HP926	30871187
15,00	TTS-B1500	TTD300-3F01-1500-HP926	30871188
15,10	TTS-B1510	TTD300-3F01-1510-HP926	30871189
15,20	TTS-B1520	TTD300-3F01-1520-HP926	30871190
15,30	TTS-B1530	TTD300-3F01-1530-HP926	30871191
15,40	TTS-B1540	TTD300-3F01-1540-HP926	30871192

d_1 from 15.50 to 18.90			
d_1 m7	Connection	Specification	Order No.
15,50	TTS-B1550	TTD300-3F01-1550-HP926	30871193
15,60	TTS-B1560	TTD300-3F01-1560-HP926	30871194
15,70	TTS-B1570	TTD300-3F01-1570-HP926	30871195
15,80	TTS-B1580	TTD300-3F01-1580-HP926	30871196
15,90	TTS-B1590	TTD300-3F01-1590-HP926	30871197
16,00	TTS-B1600	TTD300-3F01-1600-HP926	30871198
16,10	TTS-B1610	TTD300-3F01-1610-HP926	30871199
16,20	TTS-B1620	TTD300-3F01-1620-HP926	30871200
16,30	TTS-B1630	TTD300-3F01-1630-HP926	30871201
16,40	TTS-B1640	TTD300-3F01-1640-HP926	30871202
16,50	TTS-B1650	TTD300-3F01-1650-HP926	30871203
16,60	TTS-B1660	TTD300-3F01-1660-HP926	30871204
16,70	TTS-B1670	TTD300-3F01-1670-HP926	30871205
16,80	TTS-B1680	TTD300-3F01-1680-HP926	30871206
16,90	TTS-B1690	TTD300-3F01-1690-HP926	30871207
17,00	TTS-B1700	TTD300-3F01-1700-HP926	30871209
17,10	TTS-B1710	TTD300-3F01-1710-HP926	30871210
17,20	TTS-B1720	TTD300-3F01-1720-HP926	30871211
17,30	TTS-B1730	TTD300-3F01-1730-HP926	30871212
17,40	TTS-B1740	TTD300-3F01-1740-HP926	30871213
17,50	TTS-B1750	TTD300-3F01-1750-HP926	30871214
17,60	TTS-B1760	TTD300-3F01-1760-HP926	30871215
17,70	TTS-B1770	TTD300-3F01-1770-HP926	30871216
17,80	TTS-B1780	TTD300-3F01-1780-HP926	30871217
17,90	TTS-B1790	TTD300-3F01-1790-HP926	30871218
18,00	TTS-B1800	TTD300-3F01-1800-HP926	30871219
18,10	TTS-B1810	TTD300-3F01-1810-HP926	30871220
18,20	TTS-B1820	TTD300-3F01-1820-HP926	30871221
18,30	TTS-B1830	TTD300-3F01-1830-HP926	30871222
18,40	TTS-B1840	TTD300-3F01-1840-HP926	30871223
18,50	TTS-B1850	TTD300-3F01-1850-HP926	30871224
18,60	TTS-B1860	TTD300-3F01-1860-HP926	30871225
18,70	TTS-B1870	TTD300-3F01-1870-HP926	30871226
18,80	TTS-B1880	TTD300-3F01-1880-HP926	30871227
18,90	TTS-B1890	TTD300-3F01-1890-HP926	30871228

d_1 from 19.00 to 22.40			
d_1 m7	Connection	Specification	Order No.
19,00	TTS-B1900	TTD300-3F01-1900-HP926	30871229
19,10	TTS-B1910	TTD300-3F01-1910-HP926	30871230
19,20	TTS-B1920	TTD300-3F01-1920-HP926	30871231
19,30	TTS-B1930	TTD300-3F01-1930-HP926	30871232
19,40	TTS-B1940	TTD300-3F01-1940-HP926	30871233
19,50	TTS-B1950	TTD300-3F01-1950-HP926	30871234
19,60	TTS-B1960	TTD300-3F01-1960-HP926	30871235
19,70	TTS-B1970	TTD300-3F01-1970-HP926	30871236
19,80	TTS-B1980	TTD300-3F01-1980-HP926	30871237
19,90	TTS-B1990	TTD300-3F01-1990-HP926	30871238
20,00	TTS-B2000	TTD300-3F01-2000-HP926	30871239
20,10	TTS-B2010	TTD300-3F01-2010-HP926	30871240
20,20	TTS-B2020	TTD300-3F01-2020-HP926	30871241
20,30	TTS-B2030	TTD300-3F01-2030-HP926	30871242
20,40	TTS-B2040	TTD300-3F01-2040-HP926	30871243
20,50	TTS-B2050	TTD300-3F01-2050-HP926	30871244
20,60	TTS-B2060	TTD300-3F01-2060-HP926	30871245
20,70	TTS-B2070	TTD300-3F01-2070-HP926	30871246
20,80	TTS-B2080	TTD300-3F01-2080-HP926	30871247
20,90	TTS-B2090	TTD300-3F01-2090-HP926	30871248
21,00	TTS-B2100	TTD300-3F01-2100-HP926	30871249
21,10	TTS-B2110	TTD300-3F01-2110-HP926	30871250
21,20	TTS-B2120	TTD300-3F01-2120-HP926	30871251
21,30	TTS-B2130	TTD300-3F01-2130-HP926	30871252
21,40	TTS-B2140	TTD300-3F01-2140-HP926	30871253
21,50	TTS-B2150	TTD300-3F01-2150-HP926	30871254
21,60	TTS-B2160	TTD300-3F01-2160-HP926	30871255
21,70	TTS-B2170	TTD300-3F01-2170-HP926	30871256
21,80	TTS-B2180	TTD300-3F01-2180-HP926	30871257
21,90	TTS-B2190	TTD300-3F01-2190-HP926	30871258
22,00	TTS-B2200	TTD300-3F01-2200-HP926	30871259
22,10	TTS-B2210	TTD300-3F01-2210-HP926	30871260
22,20	TTS-B2220	TTD300-3F01-2220-HP926	30871261
22,30	TTS-B2230	TTD300-3F01-2230-HP926	30871262
22,40	TTS-B2240	TTD300-3F01-2240-HP926	30871263

Replaceable drill head TTD-Tritan made of solid carbide, internal coolant supply – type 01

d_1 from 22.50 to 25.70			
d_1 m7	Connection	Specification	Order No.
22,50	TTS-B2250	TTD300-3F01-2250-HP926	30871264
22,60	TTS-B2260	TTD300-3F01-2260-HP926	30871265
22,70	TTS-B2270	TTD300-3F01-2270-HP926	30871266
22,80	TTS-B2280	TTD300-3F01-2280-HP926	30871267
22,90	TTS-B2290	TTD300-3F01-2290-HP926	30871268
23,00	TTS-B2300	TTD300-3F01-2300-HP926	30871269
23,10	TTS-B2310	TTD300-3F01-2310-HP926	30871270
23,20	TTS-B2320	TTD300-3F01-2320-HP926	30871271
23,30	TTS-B2330	TTD300-3F01-2330-HP926	30871272
23,40	TTS-B2340	TTD300-3F01-2340-HP926	30871273
23,50	TTS-B2350	TTD300-3F01-2350-HP926	30871274
23,60	TTS-B2360	TTD300-3F01-2360-HP926	30871275
23,70	TTS-B2370	TTD300-3F01-2370-HP926	30871276
23,80	TTS-B2380	TTD300-3F01-2380-HP926	30871277
23,90	TTS-B2390	TTD300-3F01-2390-HP926	30871278
24,00	TTS-B2400	TTD300-3F01-2400-HP926	30871279
24,10	TTS-B2410	TTD300-3F01-2410-HP926	30871280
24,20	TTS-B2420	TTD300-3F01-2420-HP926	30871281
24,30	TTS-B2430	TTD300-3F01-2430-HP926	30871282
24,40	TTS-B2440	TTD300-3F01-2440-HP926	30871283
24,50	TTS-B2450	TTD300-3F01-2450-HP926	30871285
24,60	TTS-B2460	TTD300-3F01-2460-HP926	30871286
24,70	TTS-B2470	TTD300-3F01-2470-HP926	30871287
24,80	TTS-B2480	TTD300-3F01-2480-HP926	30871288
24,90	TTS-B2490	TTD300-3F01-2490-HP926	30871289
25,00	TTS-B2500	TTD300-3F01-2500-HP926	30871290
25,10	TTS-B2510	TTD300-3F01-2510-HP926	30871291
25,20	TTS-B2520	TTD300-3F01-2520-HP926	30871292
25,30	TTS-B2530	TTD300-3F01-2530-HP926	30871293
25,40	TTS-B2540	TTD300-3F01-2540-HP926	30871294
25,50	TTS-B2550	TTD300-3F01-2550-HP926	30871295
25,60	TTS-B2560	TTD300-3F01-2560-HP926	30871296
25,70	TTS-B2570	TTD300-3F01-2570-HP926	30871297

d_1 from 25.80 to 29.00			
d_1 m7	Connection	Specification	Order No.
25,80	TTS-B2580	TTD300-3F01-2580-HP926	30871298
25,90	TTS-B2590	TTD300-3F01-2590-HP926	30871299
26,00	TTS-B2600	TTD300-3F01-2600-HP926	30871300
26,10	TTS-B2610	TTD300-3F01-2610-HP926	30871301
26,20	TTS-B2620	TTD300-3F01-2620-HP926	30871302
26,30	TTS-B2630	TTD300-3F01-2630-HP926	30871303
26,40	TTS-B2640	TTD300-3F01-2640-HP926	30871304
26,50	TTS-B2650	TTD300-3F01-2650-HP926	30871305
26,60	TTS-B2660	TTD300-3F01-2660-HP926	30871306
26,70	TTS-B2670	TTD300-3F01-2670-HP926	30871307
26,80	TTS-B2680	TTD300-3F01-2680-HP926	30871308
26,90	TTS-B2690	TTD300-3F01-2690-HP926	30871309
27,00	TTS-B2700	TTD300-3F01-2700-HP926	30871310
27,10	TTS-B2710	TTD300-3F01-27010-HP926	30871311
27,20	TTS-B2720	TTD300-3F01-2720-HP926	30871312
27,30	TTS-B2730	TTD300-3F01-2730-HP926	30871313
27,40	TTS-B2740	TTD300-3F01-2740-HP926	30871314
27,50	TTS-B2750	TTD300-3F01-2750-HP926	30871315
27,60	TTS-B2760	TTD300-3F01-2760-HP926	30871316
27,70	TTS-B2770	TTD300-3F01-2770-HP926	30871317
27,80	TTS-B2780	TTD300-3F01-2780-HP926	30871318
27,90	TTS-B2790	TTD300-3F01-2790-HP926	30871319
28,00	TTS-B2800	TTD300-3F01-2800-HP926	30871320
28,10	TTS-B2810	TTD300-3F01-2810-HP926	30871321
28,20	TTS-B2820	TTD300-3F01-2820-HP926	30871322
28,30	TTS-B2830	TTD300-3F01-2830-HP926	30871323
28,40	TTS-B2840	TTD300-3F01-2840-HP926	30871324
28,50	TTS-B2850	TTD300-3F01-2850-HP926	30871325
28,60	TTS-B2860	TTD300-3F01-2860-HP926	30871326
28,70	TTS-B2870	TTD300-3F01-2870-HP926	30871327
28,80	TTS-B2880	TTD300-3F01-2880-HP926	30871328
28,90	TTS-B2890	TTD300-3F01-2890-HP926	30871329
29,00	TTS-B2900	TTD300-3F01-2900-HP926	30871330

d_1 from 29.10 to 32.40			
d_1 m7	Connection	Specification	Order No.
29,10	TTS-B2910	TTD300-3F01-2910-HP926	30871331
29,20	TTS-B2920	TTD300-3F01-2920-HP926	30871332
29,30	TTS-B2930	TTD300-3F01-2930-HP926	30871333
29,40	TTS-B2940	TTD300-3F01-2940-HP926	30871334
29,50	TTS-B2950	TTD300-3F01-2950-HP926	30871335
29,60	TTS-B2960	TTD300-3F01-2960-HP926	30871336
29,70	TTS-B2970	TTD300-3F01-2970-HP926	30871337
29,80	TTS-B2980	TTD300-3F01-2980-HP926	30871338
29,90	TTS-B2990	TTD300-3F01-2990-HP926	30871339
30,00	TTS-B3000	TTD300-3F01-3000-HP926	30871340
30,10	TTS-B3010	TTD300-3F01-3010-HP926	30871341
30,20	TTS-B3020	TTD300-3F01-3020-HP926	30871342
30,30	TTS-B3030	TTD300-3F01-3030-HP926	30871343
30,40	TTS-B3040	TTD300-3F01-3040-HP926	30871344
30,50	TTS-B3050	TTD300-3F01-3050-HP926	30871345
30,60	TTS-B3060	TTD300-3F01-3060-HP926	30871346
30,70	TTS-B3070	TTD300-3F01-3070-HP926	30871347
30,80	TTS-B3080	TTD300-3F01-3080-HP926	30871348
30,90	TTS-B3090	TTD300-3F01-3090-HP926	30871349
31,00	TTS-B3100	TTD300-3F01-3100-HP926	30871350
31,10	TTS-B3110	TTD300-3F01-3110-HP926	30871351
31,20	TTS-B3120	TTD300-3F01-3120-HP926	30871352
31,30	TTS-B3130	TTD300-3F01-3130-HP926	30871353
31,40	TTS-B3140	TTD300-3F01-3140-HP926	30871354
31,50	TTS-B3150	TTD300-3F01-3150-HP926	30871355
31,60	TTS-B3160	TTD300-3F01-3160-HP926	30871356
31,70	TTS-B3170	TTD300-3F01-3170-HP926	30871357
31,80	TTS-B3180	TTD300-3F01-3180-HP926	30871358
31,90	TTS-B3190	TTD300-3F01-3190-HP926	30871359
32,00	TTS-B3200	TTD300-3F01-3200-HP926	30871360
32,40	TTS-B3240	TTD300-3F01-3240-HP926	30871361

Accessories

	Replaceable head holder TTS TTS300, 3xD	Page 72
	Replaceable head holder TTS TTS300, 5xD	Page 73
	Replaceable head holder TTS TTS300, 8xD	Page 74

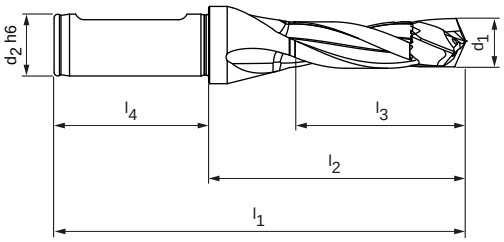
Dimensions in mm.
You will find handling and application notes from page 76.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

Replaceable head holder TTS

TTS300 with axial clamping system for replaceable head drill TTD-Tritan (3xD), internal coolant supply

Design:
Drill diameter: 12.00 – 32.49 mm
Changing system: Central clamping through the coolant bore

Note:
Assembly tool included.



Dimensions						Shank form HB	
d_1	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
12,00 - 12,49						TTS300B-1200-DR03-ZYL16-MN	30839680
12,50 - 12,99	16	113	65	43	48	TTS300B-1250-DR03-ZYL16-MN	30839681
13,00 - 13,49	16	115	67	45	48	TTS300B-1300-DR03-ZYL16-MN	30839682
13,50 - 13,99	16	117	69	46	48	TTS300B-1350-DR03-ZYL16-MN	30839683
14,00 - 14,49	16	120	72	48	48	TTS300B-1400-DR03-ZYL16-MN	30839684
14,50 - 14,99	16	122	74	49	48	TTS300B-1450-DR03-ZYL16-MN	30839685
15,00 - 15,49	16	124	76	51	48	TTS300B-1500-DR03-ZYL16-MN	30839686
15,50 - 16,49	20	131	81	54	50	TTS300B-1550-DR03-ZYL20-MN	30839687
16,50 - 17,49	20	135	85	58	50	TTS300B-1650-DR03-ZYL20-MN	30839688
17,50 - 18,49	20	140	90	61	50	TTS300B-1750-DR03-ZYL20-MN	30839689
18,50 - 19,49	25	150	94	64	56	TTS300B-1850-DR03-ZYL25-MN	30839690
19,50 - 20,49	25	155	99	68	56	TTS300B-1950-DR03-ZYL25-MN	30839691
20,50 - 21,49	25	159	103	71	56	TTS300B-2050-DR03-ZYL25-MN	30839692
21,50 - 22,49	25	164	108	74	56	TTS300B-2150-DR03-ZYL25-MN	30839693
22,50 - 23,49	25	168	112	78	56	TTS300B-2250-DR03-ZYL25-MN	30839694
23,50 - 24,49	25	173	117	81	56	TTS300B-2350-DR03-ZYL25-MN	30839695
24,50 - 25,49	32	182	122	84	60	TTS300B-2450-DR03-ZYL32-MN	30839696
25,50 - 26,49	32	186	126	87	60	TTS300B-2550-DR03-ZYL32-MN	30839697
26,50 - 27,49	32	191	131	91	60	TTS300B-2650-DR03-ZYL32-MN	30839698
27,50 - 28,49	32	195	135	94	60	TTS300B-2750-DR03-ZYL32-MN	30839699
28,50 - 29,49	32	200	140	97	60	TTS300B-2850-DR03-ZYL32-MN	30839700
29,50 - 30,49	32	204	144	101	60	TTS300B-2950-DR03-ZYL32-MN	30839701
30,50 - 31,49	32	209	149	104	60	TTS300B-3050-DR03-ZYL32-MN	30839702
31,50 - 32,49	32	213	153	107	60	TTS300B-3150-DR03-ZYL32-MN	30839703

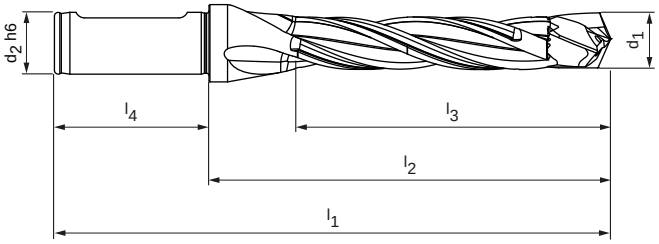
Dimensions in mm.
Special designs on request.

Replaceable head holder TTS

TTS300 with axial clamping system for replaceable head drill TTD-Tritan (5xD), internal coolant supply

Design:
Drill diameter: 12.00 – 32.49 mm
Changing system: Central clamping through the coolant bore

Note:
Assembly tool included.



Dimensions						Shank form HB	
d_1	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
12,00 - 12,49	16	136	88	66	48	TTS300B-1200-DR05-ZYL16-MN	30839704
12,50 - 12,99	16	139	91	69	48	TTS300B-1250-DR05-ZYL16-MN	30839705
13,00 - 13,49	16	142	94	71	48	TTS300B-1300-DR05-ZYL16-MN	30839706
13,50 - 13,99	16	145	97	74	48	TTS300B-1350-DR05-ZYL16-MN	30839707
14,00 - 14,49	16	149	101	77	48	TTS300B-1400-DR05-ZYL16-MN	30839708
14,50 - 14,99	16	152	104	79	48	TTS300B-1450-DR05-ZYL16-MN	30839709
15,00 - 15,49	16	155	107	82	48	TTS300B-1500-DR05-ZYL16-MN	30839710
15,50 - 16,49	20	164	114	87	50	TTS300B-1550-DR05-ZYL20-MN	30839711
16,50 - 17,49	20	170	120	93	50	TTS300B-1650-DR05-ZYL20-MN	30839712
17,50 - 18,49	20	177	127	98	50	TTS300B-1750-DR05-ZYL20-MN	30839713
18,50 - 19,49	25	189	133	103	56	TTS300B-1850-DR05-ZYL25-MN	30839714
19,50 - 20,49	25	196	140	109	56	TTS300B-1950-DR05-ZYL25-MN	30839715
20,50 - 21,49	25	202	146	114	56	TTS300B-2050-DR05-ZYL25-MN	30839716
21,50 - 22,49	25	209	153	119	56	TTS300B-2150-DR05-ZYL25-MN	30839717
22,50 - 23,49	25	215	159	124	56	TTS300B-2250-DR05-ZYL25-MN	30839718
23,50 - 24,49	25	222	166	130	56	TTS300B-2350-DR05-ZYL25-MN	30839719
24,50 - 25,49	32	233	173	135	60	TTS300B-2450-DR05-ZYL32-MN	30839720
25,50 - 26,49	32	239	179	140	60	TTS300B-2550-DR05-ZYL32-MN	30839721
26,50 - 27,49	32	246	186	146	60	TTS300B-2650-DR05-ZYL32-MN	30839722
27,50 - 28,49	32	252	192	151	60	TTS300B-2750-DR05-ZYL32-MN	30839723
28,50 - 29,49	32	259	199	156	60	TTS300B-2850-DR05-ZYL32-MN	30839724
29,50 - 30,49	32	265	205	162	60	TTS300B-2950-DR05-ZYL32-MN	30839725
30,50 - 31,49	32	272	212	167	60	TTS300B-3050-DR05-ZYL32-MN	30839726
31,50 - 32,49	32	278	218	172	60	TTS300B-3150-DR05-ZYL32-MN	30839727

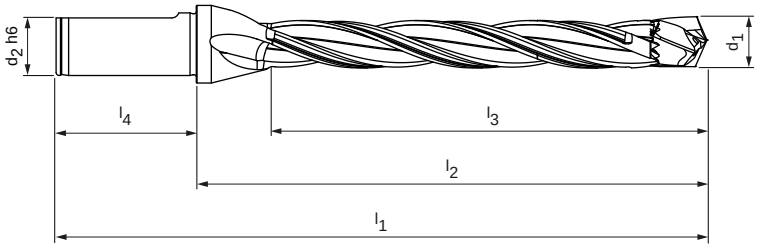
Dimensions in mm.
Special designs on request.

Replaceable head holder TTS

TTS300 with axial clamping system for replaceable head drill TTD-Tritan (8xD), Internal coolant supply

Design:
Drill diameter: 12.00 – 32.49 mm
Changing system: Central clamping through the coolant bore

Note:
Assembly tool included.



Dimensions						Shank form HB	
d_1	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order No.
12,00 - 12,49	16	173	125	104	48	TTS300B-1200-DR08-ZYL16-MN	30867695
12,50 - 12,99	16	178	130	108	48	TTS300B-1250-DR08-ZYL16-MN	30867696
13,00 - 13,49	16	183	135	112	48	TTS300B-1300-DR08-ZYL16-MN	30867697
13,50 - 13,99	16	187	139	116	48	TTS300B-1350-DR08-ZYL16-MN	30867698
14,00 - 14,49	16	192	144	120	48	TTS300B-1400-DR08-ZYL16-MN	30867699
14,50 - 14,99	16	197	149	124	48	TTS300B-1450-DR08-ZYL16-MN	30867700
15,00 - 15,49	16	202	154	129	48	TTS300B-1500-DR08-ZYL16-MN	30867701
15,50 - 16,49	20	213	163	137	50	TTS300B-1550-DR08-ZYL20-MN	30867702
16,50 - 17,49	20	223	173	145	50	TTS300B-1650-DR08-ZYL20-MN	30867703
17,50 - 18,49	20	232	182	153	50	TTS300B-1750-DR08-ZYL20-MN	30867704
18,50 - 19,49	25	248	192	162	56	TTS300B-1850-DR08-ZYL25-MN	30867705
19,50 - 20,49	25	257	201	170	56	TTS300B-1950-DR08-ZYL25-MN	30867706
20,50 - 21,49	25	267	211	178	56	TTS300B-2050-DR08-ZYL25-MN	30867707
21,50 - 22,49	25	276	220	187	56	TTS300B-2150-DR08-ZYL25-MN	30867708
22,50 - 23,49	25	286	230	195	56	TTS300B-2250-DR08-ZYL25-MN	30867709
23,50 - 24,49	25	295	239	203	56	TTS300B-2350-DR08-ZYL25-MN	30867710
24,50 - 25,49	32	309	249	212	60	TTS300B-2450-DR08-ZYL32-MN	30867711
25,50 - 26,49	32	319	259	220	60	TTS300B-2550-DR08-ZYL32-MN	30867712
26,50 - 27,49	32	328	268	228	60	TTS300B-2650-DR08-ZYL32-MN	30867713
27,50 - 28,49	32	338	278	236	60	TTS300B-2750-DR08-ZYL32-MN	30867714
28,50 - 29,49	32	342	282	245	60	TTS300B-2850-DR08-ZYL32-MN	30867715
29,50 - 30,49	32	352	292	253	60	TTS300B-2950-DR08-ZYL32-MN	30867716
30,50 - 31,49	32	361	301	261	60	TTS300B-3050-DR08-ZYL32-MN	30867717
31,50 - 32,49	32	371	311	270	60	TTS300B-3150-DR08-ZYL32-MN	30867718

Dimensions in mm.
Special designs on request.

Accessories and spare parts for TTD-Tritan

TORX® wrench

Diameter range Replaceable drill head TTD-Tritan	Torx	Order No. for holder lengths 3xD, 5xD and 8xD
12,00 - 12,49	6	30890316
12,50 - 12,99		
13,00 - 13,49		
13,50 - 13,99		
14,00 - 14,49	7	30890318
14,50 - 14,99		
15,00 - 15,49		
15,50 - 16,49		
16,50 - 17,49		
17,50 - 18,49	8	30890321
18,50 - 19,49		
19,50 - 20,49	10	30890323
20,50 - 21,49		
21,50 - 22,49		
22,50 - 23,49		
23,50 - 24,49		
24,50 - 25,49	15	30890326
25,50 - 26,49		
26,50 - 27,49		
27,50 - 28,49		
28,50 - 29,49		
29,50 - 30,49		
30,50 - 31,49		
31,50 - 32,49		

Torque wrench

Accessories	Tightening torque range [Nm]	Order No.
Torque wrench 	0,2 – 1,2	30911425
Torque wrench 	1,0 - 6,0	30911426

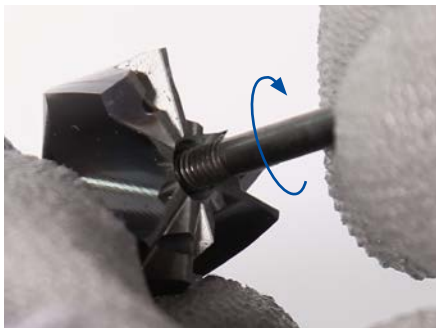
Handle for TORX® wrench

Spare part	Attachment shank	Order No.
Multi-grip 	Internal hexagon 1/4"	30918896

Dimensions in mm.

Handling notes for replaceable head drills TTD-Tritan

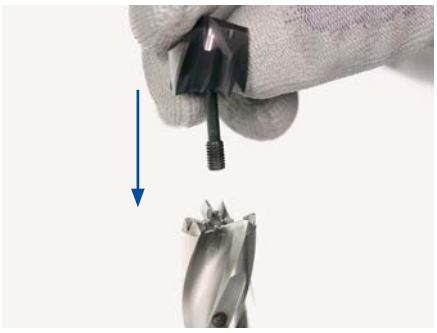
Tool assembly



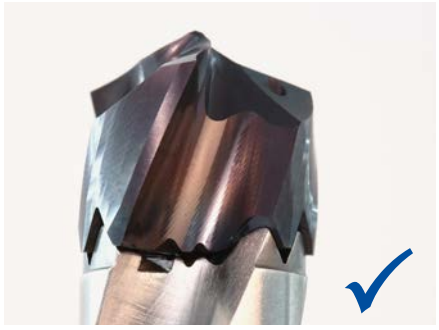
1. Insert and tighten special clamping screw
Fit the special clamping screw into the bore on the replaceable drill head with the small thread end facing forward. Then screw in the special clamping screw clockwise to the stop.

Note:
The special clamping screw is already installed on the replaceable drill head on delivery. If removed, the special clamping screw can be installed again by screwing into the replaceable drill head.

2. Clean with compressed air
Clean the replaceable head holder and replaceable drill head using compressed air.



3. Fit the replaceable drill head
Fit replaceable drill head to replaceable head holder.

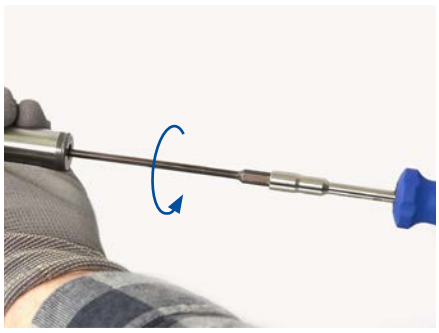


4. Check positioning of the drill head
Check whether chip flute and serrations of replaceable drill head and replaceable head holder are aligned.
If they are not aligned, turn the replaceable drill head until chip flute and serrations are aligned.

Comparison:
Chip flute and serrations are aligned (left) | are not aligned (right)

1 Handle for TORX® wrench
2 Replaceable head holder TTS
3 TORX® wrench
4 Replaceable drill head with special clamping screw

5. Tighten the special clamping screw up to the stop
Hold the replaceable drill head lightly against the replaceable head holder so that it maintains its fitted position. Then insert the TORX® wrench in the central bore of the replaceable head holder on to the threaded bore of the special clamping screw. Hand-tighten the special clamping screw using the TORX® wrench by turning counter-clockwise to the stop.



6. Tighten the special clamping screw to the specified tightening torque
Using a suitable torque wrench with internal hexagon bit in combination with the TORX® wrench, tighten the special clamping screw to the stipulated tightening torque.

Note:
The stipulated tightening torque for the special clamping screw is noted on the underside of the replaceable head holder.

Result:
The special clamping screw is tightened to the specified tightening torque and the replaceable drill head is securely connected to the replaceable head holder. Installation is completed.

Items included:
1 Handle for TORX® wrench
2 Replaceable head holder TTS
3 TORX® wrench

Tightening torques for the special clamping screw

Diameter range [mm]	Replaceable head holder thread	TORX® size	Permissible transferable tightening torque [Nm]
12,00 - 13,99	M3 x 0,5	T6	0,40
14,00 - 17,49	M3,5 x 0,6	T7	0,70
17,50 - 19,49	M4 x 0,7	T8	1,30
19,50 - 24,49	M5 x 0,8	T10	2,00
24,50 - 28,49	M6 x 1,0	T15	3,10
28,50 - 32,49	M6 x 1,0	T15	5,60

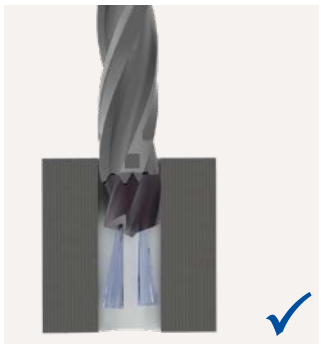
Application notes for replaceable head drill TTD-Tritan

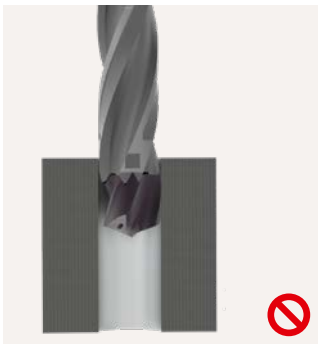
The replaceable head drill TTD-Tritan with three cutting edges guarantees optimal torque transmission at the connection with high changeover and radial run-out accuracy at the same time. The replaceable head can be changed quickly and reliably, incorrect positioning is excluded. A suitable TORX® wrench and handle are included with the tool for exactly clamping the replaceable head to the replaceable head holder via the special clamping screw.

PILOTING

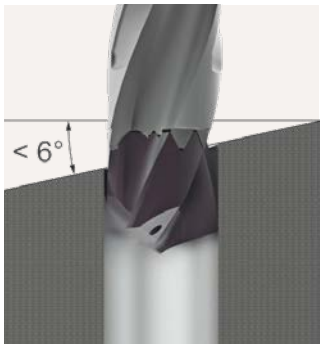
- A pilot bore is recommended from drilling depths of 8xD
- Entry into the pilot bore is with the same drill head geometry and reduced machining values (recommendation: v_c = 50 % and f = 50 %) up to 1 mm before the bottom of the bore
- Drilling after piloting is then undertaken using the recommended machining values (see end of section)

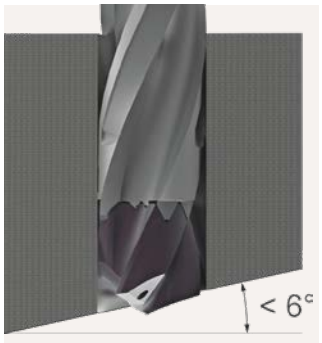
Coolant situation:
Coolant pressure in relation to the drilling depth: 3xD: 8 bar | 5xD: 12 bar | 8xD: 25 bar





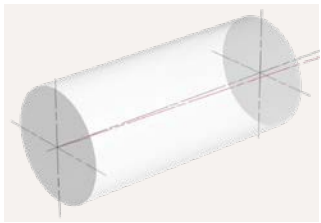
Maximum entry and exit angle:
At the start of drilling and at the outlet from inclined surfaces, reduce v_f by 50%.



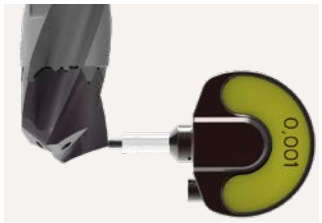


Through bore:
Do not reduce the cutting data at the bore outlet.

Radial run-out accuracy:

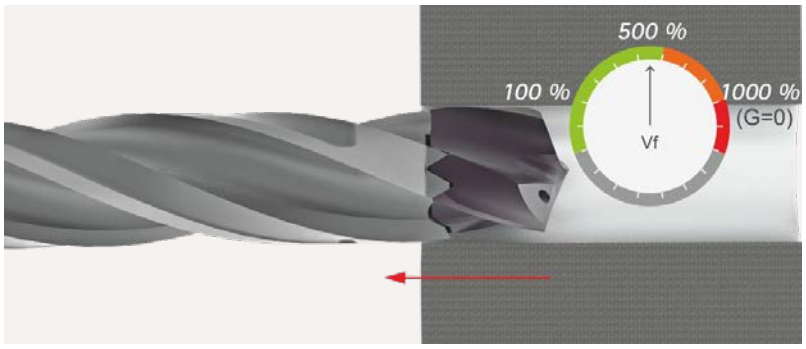


Max. 0.02 mm

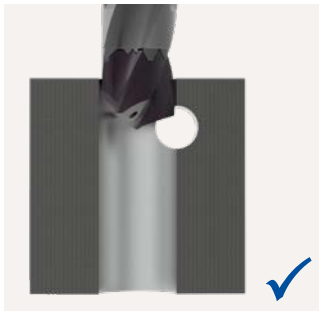


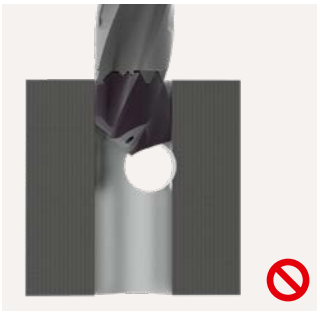
Max. 0.04 mm

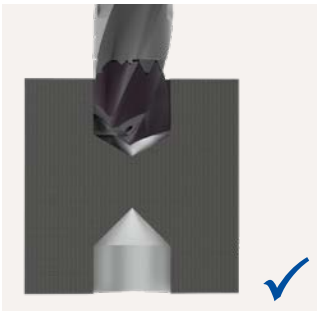
No rapid traverse on withdrawal:
Five times the feed rate is recommended for the withdrawal speed.

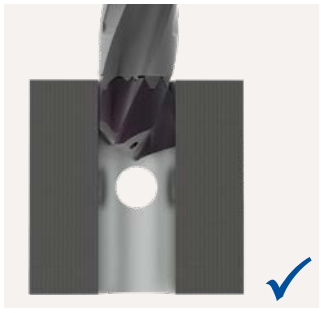


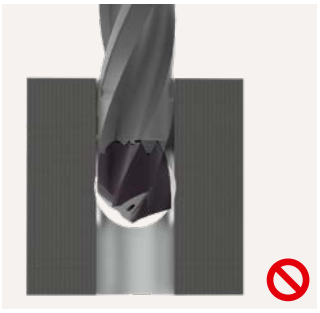
Machining situations:


Bore off-centre;
Chisel edge cutting


Bore off-centre;
Chisel edge not cutting


Breakthrough to bore in opposite direction;
v_f = -50 %


Bore centred and << D


Bore centred and ≅ D


Bore centred and >> D

Drilling aluminium from solid

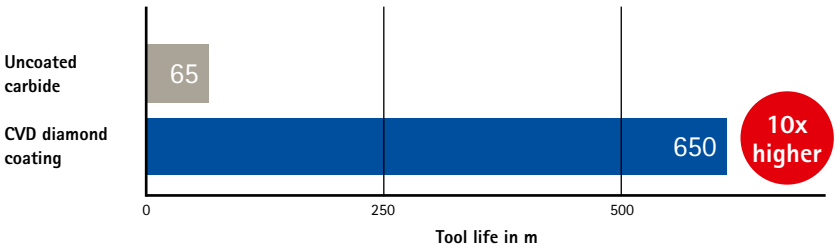
The new indexable inserts for drilling aluminium from solid impress with three usable cutting edges and a high-performance CVD diamond coating. The availability of the inserts in five sizes makes it possible to use the indexable insert drill for a very broad range of applications. The single or multi-stepped custom tools are characterised by extremely high cost-effectiveness and simple handling.

From practice

Material: AlSi1
Diameter: 39.0 mm
Drilling depth: 65 mm

v_c: 800 - 1000 m/min
f: 0.30 - 0.45 mm/rev

Tool life per cutting edge



Five indexable insert sizes for the diameter range 16 to 54.9 mm.

AT A GLANCE

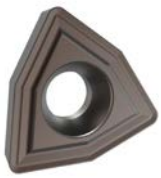
- Customer-specific solutions for: ø 16 - 54.9 mm
- Drilling AlSi1 to AlSi12 from solid
- With internal cooling, MQL also possible
- Single or multi-stepped with indexable insert or PCD boring stage
- Drilling depths up to 3xD possible

ADVANTAGES

- Extremely economical with highest productivity
- Wide range of applications
- Easy handling

WOGT

Radial indexable insert, three cutting edges

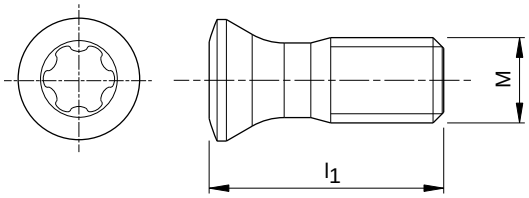


		Carbide
Material		N Wear-resistant ← → Ductile
Cutting material types		HC698
Cutting edge design		X40
	ø range [mm]	
WOGT030206N-...-...	16.0 - 20.9	31033174
WOGT040206N-...-...	21.0 - 25.9	31033175
WOGT053006N-...-...	26.0 - 30.9	31033177
WOGT063008N-...-...	31.0 - 44.9	30787196
WOGT073808N-...-...	45.0 - 54.9	31033178

For designation key see page 102.

For cutting material overview see page 100.

Accessories for tangential indexable inserts



Indexable insert	Indexable insert size	Clamping screw					Screwdriver
		Dimension [Mxl]	Designation	Tightening torque [Nm]	Torx size	Order No.	Order No.
WOGT... 	0302	M2x4.95	MN659 M2x4.95-TX6-IP	0,4	TX6-IP	10002712	30414758
	0402	M2.2x6	MN659 M2.2x6-TX7-IP	0,9	TX7-IP	31074485	30414759
	0530	M3x8.5	MN659 M3x8.5-TX8-IP	1,5	TX8-IP	31074486	30414760
	0630	M3.5x9	MN659 M3.5x9-TX15-IP	2,8	TX15-IP	10105078	30414764
	0738	M4x9.4	MN659 M4x9.4-TX15-IP	3,5	TX15-IP	30480629	30414764

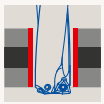
Application notes, indexable insert drills

NOTES

- Maximum tool length 5xD
- On the usage of drills with a length/diameter ratio of more than three, the following reductions are recommended during drilling as well as during drill exit in relation to the cutting speed v_c and feed f:
  - 3xD: v_c -20 % | f -30 %
  - 4xD: v_c -30 % | f -40 %
  - 5xD: v_c -40 % | f -50 %

Ideally the situation for drilling is flat, countersunk or pre-milled.
For this reason, a feed reduction of 30 to 60 percent is necessary in the following cases:

- During drilling and during drill exit on inclined and concave surfaces
- At the bore entry into cross bores
- Stack bores
- Drilling on uneven surfaces
- Drilling on an edge
- Drilling on a spherical surface
- Drilling on a pointed contour
- Series of bores with overlaps
- Drilling a centring
- Boring not possible


Drilling in packages

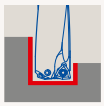

Drilling a spherical surface


Through drilling with cross bore


Drilling a pointed contour


Drilling on uneven surface


Series of bores are possible to a limited extent depending on the material


Drilling on an edge

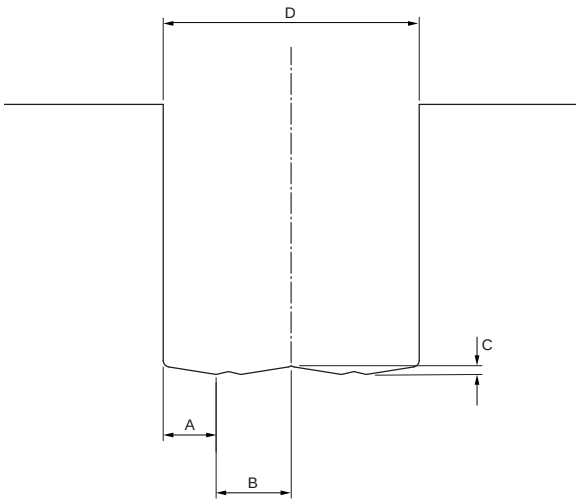

Drilling a centring or recess bore


Drilling inclined surfaces / inclined bore outlet


Boring not possible

Topography at the bottom of the bore for blind bores

	Diameter D [mm]	A* [mm]	B* [mm]	C* [mm]
WOGT030206N-X40-HC698	16.00 - 20.90	3.61 (at ø 16) - 3.52 (at ø 20.9)	3.89 (at ø 16) - 6.93 (at ø 20.9)	0.40 (at ø 16) - 0.71 (at ø 20.9)
WOGT040206N-X40-HC698	21.00 - 25.90	4.06 (at ø 21) - 4.00 (at ø 25.9)	6.44 (at ø 21) - 8.95 (at ø 25.9)	0.76 (at ø 21) - 0.98 (at ø 25.9)
WOGT053006N-X40-HC698	26.00 - 30.90	5.18 (at ø 26) - 5.11 (at ø 30.9)	7.82 (at ø 26) - 10.34 (at ø 30.9)	0.81 (at ø 26) - 1.04 (at ø 30.9)
WOGT063008N-X40-HC698	31.00 - 44.90	6.41 (at ø 31) - 6.28 (at ø 44.9)	9.09 (at ø 31) - 16.18 (at ø 44.9)	1.06 (at ø 31) - 1.62 (at ø 44.9)
WOGT073808N-X40-HC698	45.00 - 54.90	7.70 (at ø 45) - 7.63 (at ø 54.9)	14.80 (at ø 45) - 19.82 (at ø 54.9)	1.57 (at ø 45) - 7.63 (at ø 54.9)



Safety instruction:

On drilling through bores, a sharp-edged bore cover or disc falls off as the drill leaves the bore. There is a danger that this disc will be thrown off and cause damage and injuries. To prevent this situation arising, appropriate safety precautions are to be taken.

* A, B and C vary due to the installation position and contact angle of the indexable inserts.

Cutting data recommendation for solid carbide drills

Feed and cutting speed

Tritan-Drill-Uni-Plus | SCD63

MMG*			Material	Strength/hardness [N/mm²] [HRC]	
P	P1	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700 N/mm²	
		P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200 N/mm²	
	P2	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900 N/mm²	
		P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400 N/mm²	
	P3	P3.1	Tool, bearing, spring and high-speed steels	< 900 N/mm²	
		P3.2	Tool, bearing, spring and high-speed steels	< 1500 N/mm²	
	P4	P4.1	Stainless steels, ferritic and martensitic		
	P5	P5.1	Cast steel		
	P6	P6.1	Stainless cast steel, ferritic and martensitic		
M	M1	M1.1	Stainless steels, austenitic	< 700 N/mm²	
		M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000 N/mm²	
	M2	M2.1	Stainless cast steel, austenitic	< 700 N/mm²	
	M3	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000 N/mm²	
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300 N/mm²	
	K2	K2.1	Cast iron with spheroidal graphite, GJS	< 500 N/mm²	
		K2.2	Cast iron with spheroidal graphite, GJS	500-800 N/mm²	
		K2.3	Cast iron with spheroidal graphite, GJS	> 800 N/mm²	
	K3	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500 N/mm²	
		K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500 N/mm²	
N	N1	N1.1	Aluminium, non-alloy and alloy < 3 % Si		
		N1.2	Aluminium, alloy ≤ 7 % Si		
		N1.3	Aluminium, alloy > 7-12 % Si		
		N1.4	Aluminium, alloy > 12 % Si		
	N2	N2.1	Copper, non-alloy and low-alloy	< 300 N/mm²	
		N2.2	Copper, alloy	> 300 N/mm²	
		N2.3	Brass, bronze, gunmetal	< 1200 N/mm²	
	N3	N3.1	Graphite		
	N4	N4.1	Plastic, thermoplastics		
		N4.2	Plastic, thermosets		
		N4.3	Plastic, foams		

* MAPAL machining groups

Cutting speed v_c [m/min]				Feed f [mm] for drill diameter					
Internal cooling	External cooling	MQL	Air	4.00	5.50	7.50	10.50	14.50	20.00
115	**105**	**105**		0.22	0.27	0.33	0.41	0.51	0.60
105	**85**	**85**		0.27	0.33	0.41	0.52	0.63	0.75
115	**100**	**100**		0.26	0.32	0.39	0.49	0.60	0.71
80	**70**	**70**		0.22	0.26	0.32	0.39	0.48	0.56
85	**75**	**75**		0.23	0.28	0.35	0.44	0.54	0.64
70	**65**	**65**		0.19	0.24	0.29	0.36	0.44	0.52
70	**50**	**60**		0.15	0.19	0.23	0.29	0.35	0.42
115	**100**	**100**		0.26	0.32	0.39	0.49	0.60	0.71
70	**50**	**60**		0.15	0.19	0.23	0.29	0.35	0.42
55	**35**	**35**		0.11	0.14	0.17	0.22	0.27	0.32
50	**30**	**30**		0.10	0.12	0.15	0.19	0.23	0.27
55	**35**	**35**		0.11	0.14	0.17	0.22	0.27	0.32
50	**30**	**30**		0.10	0.12	0.15	0.19	0.23	0.27
140	**100**	**100**	**100**	0.31	0.40	0.51	0.66	0.83	1.00
185	**115**	**140**	**140**	0.31	0.39	0.49	0.62	0.77	0.92
115	**85**	**85**		0.27	0.34	0.42	0.54	0.66	0.79
70	**45**	**60**		0.15	0.18	0.22	0.27	0.33	0.39
105	**90**	**90**		0.30	0.37	0.46	0.58	0.71	0.85
90	**80**	**80**		0.25	0.30	0.37	0.46	0.57	0.67
345	**230**	**290**		0.22	0.27	0.33	0.41	0.51	0.60
290	**205**	**230**		0.27	0.34	0.42	0.54	0.66	0.79
255	**175**	**205**		0.27	0.34	0.42	0.54	0.66	0.79
205	**140**	**175**		0.27	0.34	0.42	0.54	0.66	0.79
140	**105**			0.21	0.26	0.32	0.40	0.50	0.59
230	**185**	**185**	**140**	0.31	0.40	0.51	0.66	0.83	1.00

The cutting data stated are indicative.
The optimal data for the specific machining case should be determined in trials or during the machining.

Cutting data recommendation for solid carbide drills

Feed and cutting speed

Tritan-Drill-Steel | SCD66
Tritan-Step-Drill-Steel | SCD56

MMG*			Material	Strength/hardness [N/mm²] [HRC]	
P	P1	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700 N/mm²	
		P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200 N/mm²	
	P2	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900 N/mm²	
		P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400 N/mm²	
	P3	P3.1	Tool, bearing, spring and high-speed steels	< 900 N/mm²	
		P3.2	Tool, bearing, spring and high-speed steels	< 1500 N/mm²	
	P4	P4.1	Stainless steels, ferritic and martensitic		
	P5	P5.1	Cast steel		
	P6	P6.1	Stainless cast steel, ferritic and martensitic		
M	M1	M1.1	Stainless steels, austenitic	< 700 N/mm²	
		M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000 N/mm²	
	M2	M2.1	Stainless cast steel, austenitic	< 700 N/mm²	
	M3	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000 N/mm²	
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300 N/mm²	
	K2	K2.1	Cast iron with spheroidal graphite, GJS	< 500 N/mm²	
		K2.2	Cast iron with spheroidal graphite, GJS	500-800 N/mm²	
		K2.3	Cast iron with spheroidal graphite, GJS	> 800 N/mm²	
	K3	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500 N/mm²	
		K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500 N/mm²	

Tritan-Spot-Drill-Steel | SCD67

MMG*			Material	Strength/hardness [N/mm²] [HRC]	
P	P1	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700 N/mm²	
		P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200 N/mm²	
	P2	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900 N/mm²	
		P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400 N/mm²	
	P3	P3.1	Tool, bearing, spring and high-speed steels	< 900 N/mm²	
		P3.2	Tool, bearing, spring and high-speed steels	< 1500 N/mm²	
	P4	P4.1	Stainless steels, ferritic and martensitic		
	P5	P5.1	Cast steel		
	P6	P6.1	Stainless cast steel, ferritic and martensitic		
M	M1	M1.1	Stainless steels, austenitic	< 700 N/mm²	
		M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000 N/mm²	
	M2	M2.1	Stainless cast steel, austenitic	< 700 N/mm²	
	M3	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000 N/mm²	
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300 N/mm²	
	K2	K2.1	Cast iron with spheroidal graphite, GJS	< 500 N/mm²	
		K2.2	Cast iron with spheroidal graphite, GJS	500-800 N/mm²	
		K2.3	Cast iron with spheroidal graphite, GJS	> 800 N/mm²	

* MAPAL machining groups

Cutting speed v_c [m/min]				Feed f [mm] for drill diameter [mm]					
Internal cooling	External cooling	MQL	Air	4.00	5.50	7.50	10.50	14.50	20.00
115	**105**	**105**		0.24	0.29	0.36	0.45	0.56	0.66
105	**85**	**85**		0.30	0.37	0.45	0.57	0.70	0.83
115	**100**	**100**		0.28	0.35	0.43	0.54	0.66	0.78
80	**70**	**70**		0.24	0.29	0.35	0.43	0.52	0.62
85	**75**	**75**		0.25	0.31	0.38	0.48	0.59	0.70
70	**65**	**65**		0.21	0.26	0.32	0.40	0.48	0.57
70	**50**	**60**		0.17	0.21	0.25	0.32	0.39	0.46
115	**100**	**100**		0.28	0.35	0.43	0.54	0.66	0.78
70	**50**	**60**		0.17	0.21	0.25	0.32	0.39	0.46
55	**35**	**35**		0.11	0.14	0.17	0.22	0.27	0.32
50	**30**	**30**		0.10	0.12	0.15	0.19	0.23	0.27
55	**35**	**35**		0.11	0.14	0.17	0.22	0.27	0.32
50	**30**	**30**		0.10	0.12	0.15	0.19	0.23	0.27
140	**100**	**100**	**100**	0.34	0.44	0.56	0.73	0.91	1.10
185	**115**	**140**	**140**	0.34	0.43	0.54	0.68	0.85	1.01
115	**85**	**85**		0.30	0.38	0.47	0.59	0.73	0.87
70	**45**	**60**		0.17	0.20	0.25	0.31	0.37	0.44
105	**90**	**90**		0.32	0.40	0.50	0.64	0.79	0.94
90	**80**	**80**		0.27	0.33	0.41	0.51	0.62	0.74

Cutting speed v_c [m/min]				Feed f [mm] for drill diameter [mm]				
Internal cooling	External cooling	MQL	Air	8.00	10.00	12.00	16.00	20.00
	160			0.080	0.097	0.113	0.141	0.164
	130			0.075	0.090	0.105	0.132	0.153
	145			0.080	0.097	0.113	0.141	0.164
	100			0.067	0.081	0.094	0.118	0.136
	95			0.076	0.092	0.107	0.134	0.155
	80			0.069	0.084	0.098	0.122	0.142
	65			0.053	0.065	0.075	0.094	0.109
	95			0.077	0.094	0.109	0.136	0.158
	65			0.037	0.045	0.053	0.066	0.076
	45			0.047	0.056	0.066	0.082	0.095
	40			0.039	0.047	0.055	0.068	0.079
	50			0.051	0.061	0.071	0.089	0.104
	45			0.040	0.048	0.056	0.071	0.082
	175			0.133	0.161	0.188	0.235	0.273
	160			0.113	0.137	0.160	0.200	0.232
	130			0.093	0.113	0.132	0.165	0.191
	70			0.053	0.065	0.075	0.094	0.109

The cutting data stated are indicative.
The optimal data for the specific machining case should be determined in trials or during the machining.

Cutting data recommendation for solid carbide drills

Feed and cutting speed

MEGA-Speed-Drill-Steel | SCD62

MMG*			Material	Strength/hardness [N/mm²] [HRC]	
P	P1	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700 N/mm²	
		P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200 N/mm²	
	P2	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900 N/mm²	
		P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400 N/mm²	
	P3	P3.1	Tool, bearing, spring and high-speed steels	< 900 N/mm²	
		P3.2	Tool, bearing, spring and high-speed steels	< 1500 N/mm²	
	P4	P4.1	Stainless steels, ferritic and martensitic		
	P5	P5.1	Cast steel		
	P6	P6.1	Stainless cast steel, ferritic and martensitic		
M	M1	M1.1	Stainless steels, austenitic	< 700 N/mm²	
		M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000 N/mm²	
	M2	M2.1	Stainless cast steel, austenitic	< 700 N/mm²	
	M3	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000 N/mm²	
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300 N/mm²	
	K2	K2.1	Cast iron with spheroidal graphite, GJS	< 500 N/mm²	
		K2.2	Cast iron with spheroidal graphite, GJS	500-800 N/mm²	
		K2.3	Cast iron with spheroidal graphite, GJS	> 800 N/mm²	
	K3	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500 N/mm²	
		K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500 N/mm²	

MEGA-Quadro-Drill-Plus | SCD16

MMG*			Material	Strength/hardness [N/mm²] [HRC]	
P	P1	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700 N/mm²	
		P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200 N/mm²	
	P2	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900 N/mm²	
		P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400 N/mm²	
	P3	P3.1	Tool, bearing, spring and high-speed steels	< 900 N/mm²	
		P3.2	Tool, bearing, spring and high-speed steels	< 1500 N/mm²	
	P4	P4.1	Stainless steels, ferritic and martensitic		
	P5	P5.1	Cast steel		
	P6	P6.1	Stainless cast steel, ferritic and martensitic		
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300 N/mm²	
	K2	K2.1	Cast iron with spheroidal graphite, GJS	< 500 N/mm²	
		K2.2	Cast iron with spheroidal graphite, GJS	500-800 N/mm²	
		K2.3	Cast iron with spheroidal graphite, GJS	> 800 N/mm²	
	K3	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500 N/mm²	
		K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500 N/mm²	

* MAPAL machining groups

Cutting speed v_c [m/min]				Feed f [mm] for drill diameter [mm]					
Internal cooling	External cooling	MQL	Air	3.00	4.50	6.50	9.50	14.00	20.00
170	**155**	**155**		0.13	0.17	0.22	0.28	0.36	0.44
155	**130**	**130**		0.17	0.21	0.27	0.35	0.45	0.54
170	**145**	**145**		0.16	0.20	0.26	0.33	0.42	0.51
120	**100**	**100**		0.13	0.17	0.21	0.27	0.34	0.41
130	**110**	**110**		0.14	0.18	0.23	0.30	0.38	0.46
100	**95**	**95**		0.12	0.15	0.19	0.25	0.31	0.38
100	**75**	**85**		0.09	0.12	0.15	0.20	0.25	0.30
170	**145**	**145**		0.16	0.20	0.26	0.33	0.42	0.51
100	**75**	**85**		0.09	0.12	0.15	0.20	0.25	0.30
65	**40**	**40**		0.07	0.09	0.12	0.15	0.19	0.23
60	**35**	**35**		0.06	0.08	0.10	0.13	0.16	0.20
65	**40**	**40**		0.07	0.09	0.12	0.15	0.19	0.23
60	**35**	**35**		0.06	0.08	0.10	0.13	0.16	0.20
150	**105**	**105**	**105**	0.15	0.21	0.28	0.37	0.49	0.60
200	**125**	**150**	**150**	0.15	0.20	0.26	0.35	0.45	0.55
125	**95**	**95**		0.14	0.18	0.23	0.30	0.39	0.47
115	**100**	**100**		0.15	0.19	0.25	0.32	0.42	0.51
100	**90**	**90**		0.13	0.16	0.20	0.26	0.33	0.40

Cutting speed v_c [m/min]				Feed f [mm] for drill diameter					
Internal cooling	External cooling	MQL	Air	3.00	4.50	6.50	9.50	14.00	20.00
110	**100**	**100**		0.10	0.13	0.16	0.21	0.27	0.33
100	**85**	**85**		0.13	0.16	0.21	0.27	0.34	0.41
110	**95**	**95**		0.12	0.15	0.19	0.25	0.32	0.39
75	**65**	**65**		0.10	0.13	0.16	0.20	0.26	0.31
85	**70**	**70**		0.11	0.14	0.17	0.23	0.29	0.35
65	**60**	**60**		0.09	0.12	0.15	0.19	0.24	0.29
65	**50**	**55**		0.07	0.09	0.12	0.15	0.19	0.23
110	**95**	**95**		0.12	0.15	0.19	0.25	0.32	0.39
65	**50**	**55**		0.07	0.09	0.12	0.15	0.19	0.23
130	**95**	**95**	**95**	0.14	0.19	0.25	0.34	0.45	0.55
175	**110**	**130**	**130**	0.14	0.18	0.24	0.32	0.41	0.51
110	**85**	**85**		0.12	0.16	0.21	0.28	0.36	0.43
65	**45**	**55**		0.09	0.12	0.15	0.19	0.24	0.29
100	**90**	**90**		0.13	0.18	0.23	0.30	0.38	0.47
90	**75**	**75**		0.12	0.15	0.19	0.24	0.31	0.37

The cutting data stated are indicative.
The optimal data for the specific machining case should be determined in trials or during the machining.

Cutting data recommendation for replaceable head drills and drills with indexable insert

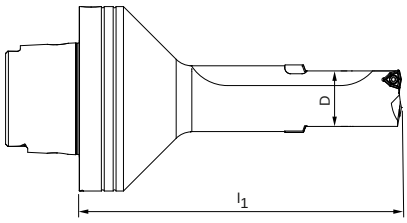
Feed and cutting speed

TTD-Tritan | type 01 – Uni

MMG*			Material	Strength/hardness [N/mm²] [HRC]	
P	P1	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700 N/mm²	
		P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200 N/mm²	
	P2	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900 N/mm²	
		P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400 N/mm²	
	P3	P3.1	Tool, bearing, spring and high-speed steels	< 900 N/mm²	
		P3.2	Tool, bearing, spring and high-speed steels	< 1500 N/mm²	
	P4	P4.1	Stainless steels, ferritic and martensitic		
	P5	P5.1	Cast steel		
	P6	P6.1	Stainless cast steel, ferritic and martensitic		
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300 N/mm²	
	K2	K2.1	Cast iron with spheroidal graphite, GJS	< 500 N/mm²	
		K2.2	Cast iron with spheroidal graphite, GJS	500-800 N/mm²	
		K2.3	Cast iron with spheroidal graphite, GJS	> 800 N/mm²	
	K3	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500 N/mm²	
		K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500 N/mm²	

Correction factor:
Drilling/drill exit

l_1	v_c	f_z
3xD	0.8	0.7
4xD	0.7	0.6
5xD	0.6	0.5



Indexable insert drills

Starting values for cutting speed and feed with WOGT...-X40-HC698

MMG*			Material	Strength/hardness [N/mm²] [HRC]	
N	N1	N1.1	Aluminium, non-alloy and alloy < 3 % Si		
		N1.2	Aluminium, alloy ≤ 7 % Si		
		N1.3	Aluminium, alloy > 7-12 % Si		
		N1.4	Aluminium, alloy > 12 % Si		
	N2	N2.1	Copper, non-alloy and low-alloy	< 300 N/mm²	
		N2.2	Copper, alloy	> 300 N/mm²	
		N2.3	Brass, bronze, gunmetal	< 1200 N/mm²	
	N3	N3.1	Graphite		
	N4	N4.1	Plastic, thermoplastics		
		N4.2	Plastic, thermosets		
		N4.3	Plastic, foams		

* MAPAL machining groups

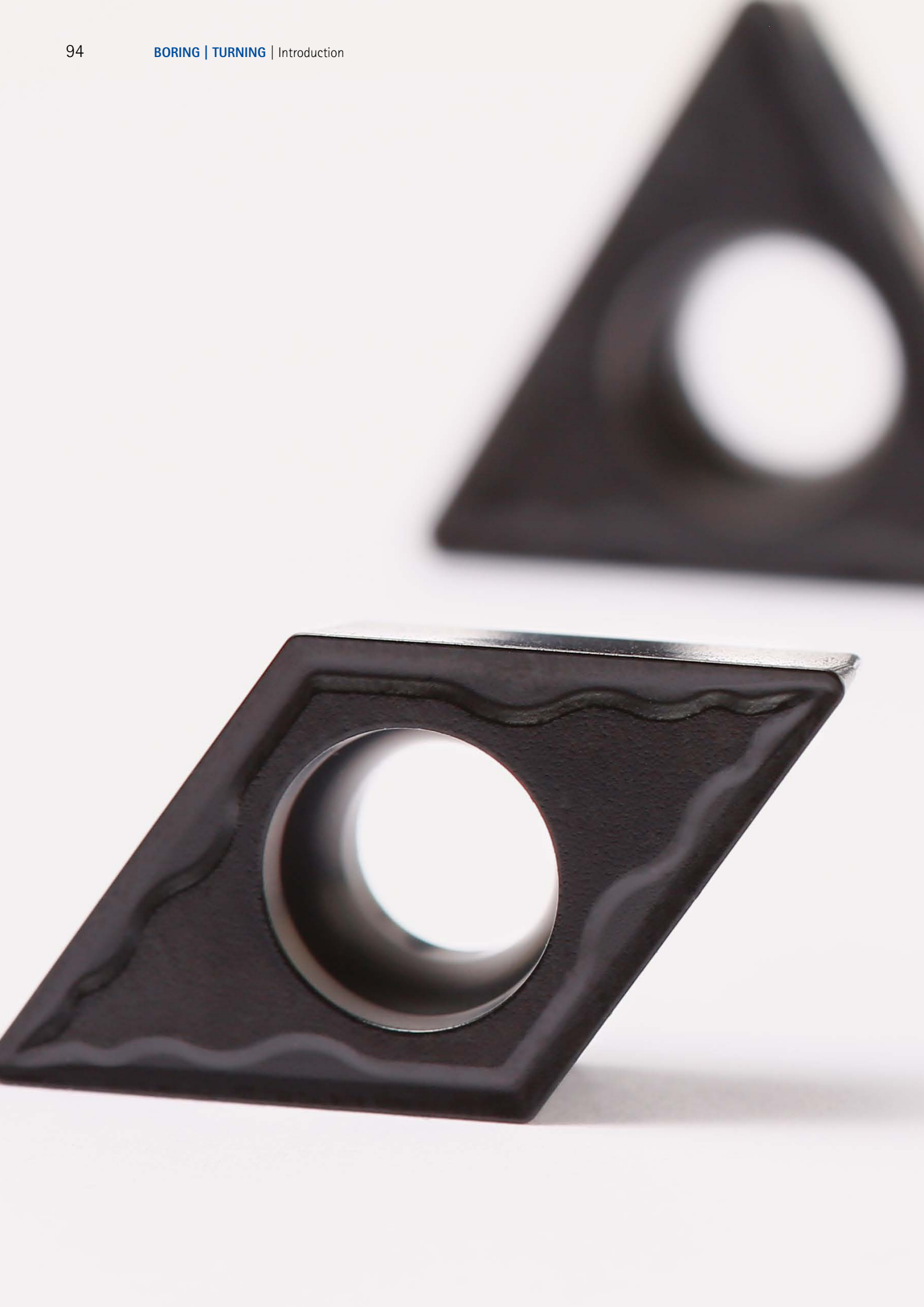
Cutting speed v_c [m/min]				Feed f [mm] for drill diameter [mm]					
Internal cooling	External cooling	MQL	Air	12.00	14.50	17.50	21.50	26.00	32.00
90	**80**	**80**		0.37	0.42	0.46	0.51	0.54	0.55
80	**70**	**70**		0.46	0.52	0.58	0.64	0.68	0.69
90	**75**	**75**		0.44	0.49	0.55	0.60	0.64	0.66
65	**55**	**55**		0.35	0.39	0.43	0.48	0.50	0.51
70	**60**	**60**		0.39	0.44	0.49	0.54	0.58	0.59
55	**50**	**50**		0.32	0.36	0.40	0.44	0.47	0.48
55	**40**	**45**		0.26	0.29	0.32	0.36	0.38	0.39
90	**75**	**75**		0.44	0.49	0.55	0.60	0.64	0.66
55	**40**	**45**		0.26	0.29	0.32	0.36	0.38	0.39
110	**75**	**75**	**75**	0.60	0.69	0.77	0.85	0.91	0.93
145	**90**	**110**	**110**	0.56	0.64	0.71	0.78	0.83	0.85
90	**70**	**70**		0.49	0.55	0.61	0.67	0.72	0.73
55	**35**	**45**		0.32	0.36	0.40	0.44	0.47	0.48
80	**70**	**70**		0.52	0.59	0.66	0.72	0.77	0.78
70	**65**	**65**		0.42	0.47	0.52	0.57	0.61	0.62

Cutting speed v_c [m/min]	Feed f [mm] for drill diameter range [mm]				
	16.00 - 20.90	21.00 - 25.90	26.00 - 30.90	31.00 - 44.90	45.00 - 54.90
300 – 1000	0.08 - 0.20	0.12 - 0.22	0.14 - 0.30	0.16 - 0.40	0.20 - 0.45
230 – 900	0.06 - 0.18	0.10 - 0.20	0.12 - 0.25	0.14 - 0.30	0.18 - 0.35
220 – 800	0.05 - 0.15	0.08 - 0.18	0.10 - 0.20	0.12 - 0.25	0.15 - 0.30
200 – 700	0.05 - 0.15	0.08 - 0.18	0.10 - 0.20	0.12 - 0.25	0.15 - 0.30

The cutting data stated are indicative.
The optimal data for the specific machining case should be determined in trials or during the machining.

BORING TURNING

Positive radial indexable inserts for boring and turning.



BORING AND TURNING

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ADDITIONS TO PROGRAMME

New cutting material series for boring and turning P M K

The new programme of positive radial inserts for boring and turning impress due to an excellent price/performance ratio. For machining cast iron, steel and stainless steel, new CVD and PVD-coated cutting materials are available that cover a very broad spectrum between wear resistance and ductility. So it is possible to select the optimal indexable insert for every application.

Depending on the machining, different basic shapes are available with three different chip guiding stages for roughing, for medium machining and for finishing.

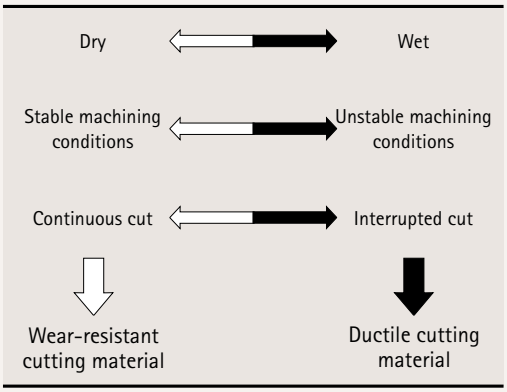
Selection of the correct cutting material

The new cutting materials cover a very broad spectrum between wear resistance and ductility. The cutting material identifier is designed such that the ductility increases as the number increases.

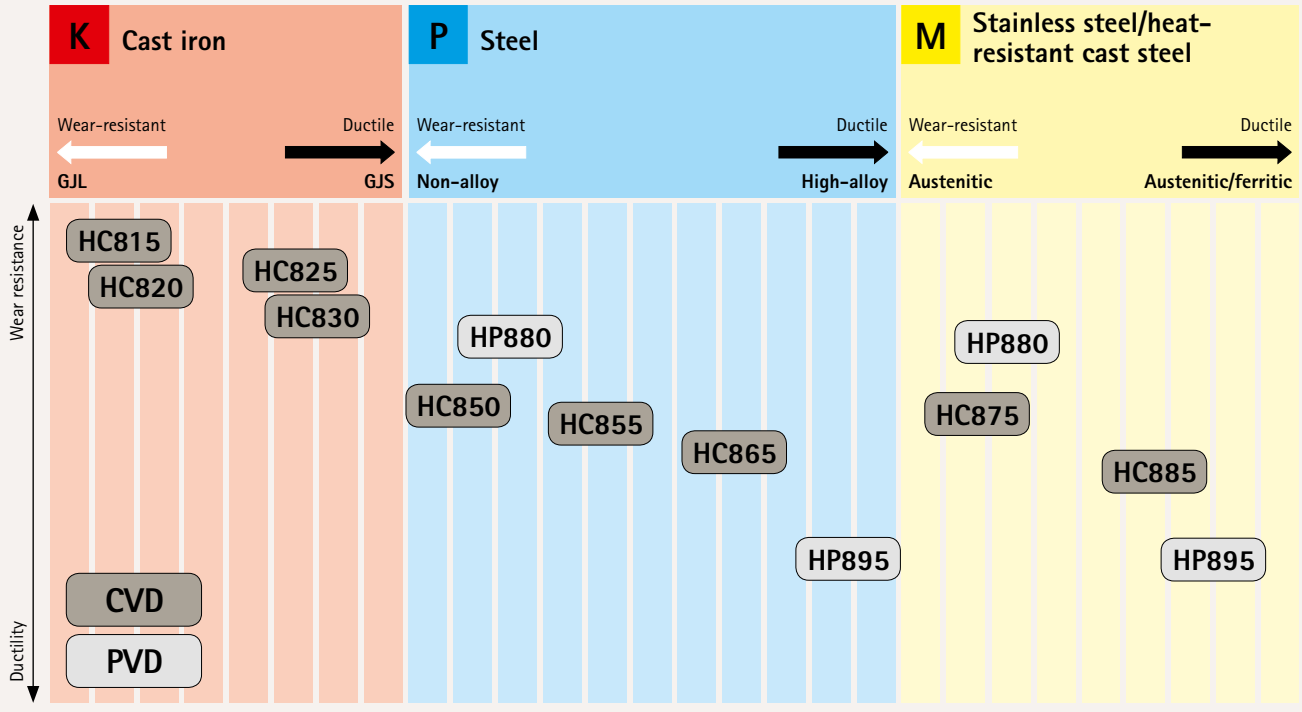
Example: HC860 is more ductile than HC845 (the more ductile a cutting material, the lower the wear resistance).

1. CVD-coated cutting materials (HC...) are the first choice for boring or turning K, P and M workpiece materials. The highest tool life can be achieved by using these cutting materials.
2. Choose your workpiece material using the MMGs (MAPAL Machining Groups, see fold-out on the back cover).
3. From the **"Cutting material overview" table,** choose the grade underneath the required workpiece material.
4. Depending on the general conditions (see **table "General conditions"**) a more wear-resistant or more ductile CVD-coated cutting material is to be selected.
5. If general conditions in the direction of the black arrow predominate and breakages cannot be prevented despite a ductile CVD grade, you should change to PVD-coated cutting materials.

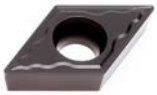
General conditions



Cutting material overview



Overview of indexable inserts

	Insert type	Radial technology			
		CCGT	CCMT	DCMT	
		P M	P M K	P M K	
					
Features	Number of cutting edges	2	2	2	
	Insert size	06 / 09 / 12	06 / 09 / 12	07 / 11 / 15	
	Diameter range	from 17 mm	from 17 mm	from 18.6 mm	
	Cutting direction	N	N	N	
	Boring – neutral	■	■	■	
	Boring – arc shaped land				
	Countersinking / chamfering	■	■	■	
Application	Roughing		■	■	
	Medium machining	■	■	■	
	Finishing		■	■	
Cutting material	Carbide	■	■	■	
	PCD				
	PcBN				
	Ceramic				
	Cermet				
	Page	105	106	108	

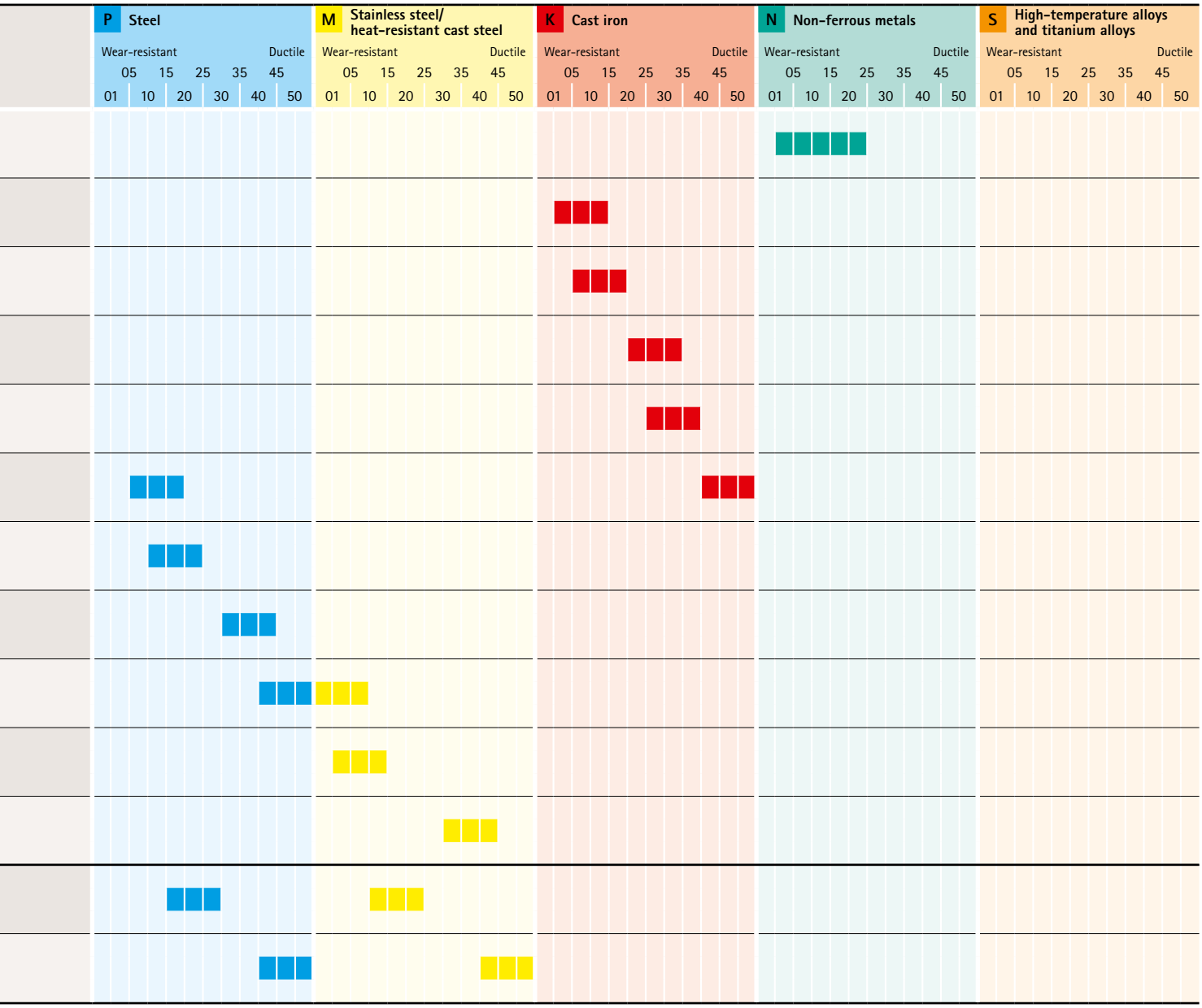
	Radial technology			
	SCMT | SPMT	**TCMT**	**VCGT**	**VCMT**
	P M K 	P M K 	P M 	P K 
	4	3	2	2
	06 / 09 / 12	09 / 11 / 16 / 22	11 / 16	11 / 16
	from 17 mm	from 17 mm		
	N	N	N	N
	■	■	■	■
	■	■		
	■	■		■
	■	■	■	■
	■	■		
	■	■	■	■
	110	112	114	115

Cutting material overview: Grades and grade description

Cutting material	Cutting material code	Coating composition	Coating colour	Applications	Recommended application
CVD-coated	**HC698 ***	Diamond	Black-anthracite	●	Carbide with CVD diamond coating for machining aluminium.
	HC815	TiCN+Al_2O_3	Black	●	Wear-resistant fine grain carbide grade with Al_2O_3 coating. Suitable for machining cast iron materials in stable conditions.
	HC820	TiCN+Al_2O_3	Black	●	Al_2O_3-coated carbide with optimised post-treatment to increase the edge stability. Suitable for machining GJL in stable conditions and with slightly interrupted cuts.
	HC825	TiCN+Al_2O_3	Black	●	Increased wear resistance due to thicker CVD coating. Suitable for machining cast iron in unstable conditions.
	HC830	TiCN+Al_2O_3	Black	●	Fine grain carbide grade with thick coating and improved edge stability. Suitable for heavily interrupted cuts in cast iron.
	HC850	TiCN+Al_2O_3 +TiN	Gold	●	Gradient carbide with MT-TiCN and Al_2O_3 coating and TiN surface layer. Suitable for machining steel due to reduced surface roughness.
	HC855	TiCN+Al_2O_3 +TiN	Gold	●	Gradient carbide with balanced relationship between ductility and wear resistance. Suitable for semi-finishing and for medium machining of steel.
	HC865	TiCN+Al_2O_3 +TiN	Gold	✱	Ductile gradient carbide grade with Al_2O_3 coating and smooth TiN surface layer. Suitable for semi-finishing and for medium machining of steel and alloyed steel.
	HC870	TiCN+Al_2O_3 +TiN	Gold	✱	Gradient carbide with very fine MT-TiCN-Al_2O_3 coating with TiN surface layer. Combined with a very ductile carbide, the substrate is suitable for a strongly interrupted cut in steel and alloyed steel.
	HC875	TiCN+Al_2O_3 +TiN	Gold	●	Fine grain gradient carbide grade with thin CVD coating. Suitable for machining high-alloy steel and stainless steel.
	HC885	TiCN+Al_2O_3 +TiN	Gold	✱	Carbide grade with increased ductility and CVD coating. Suitable for machining stainless steel.
PVD-coated	**HP880**	TiAlN	Anthracite	●	Outstanding wear resistance and heat-resistance due to new PVD coating. Suitable for finishing stainless steel.
	HP895	TiAlN	Anthracite	✱	TiAlN-coated finest grade carbide with high binder content. Optimised interaction of wear resistance and ductility. Suitable for semi-finishing stainless steel.

* Cutting material for drilling aluminium from solid.

Applications: ✱ Unstable machining ● General machining ● Stable machining

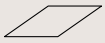

P Steel
Wear-resistant
Ductile
05 15 25 35 45
01 10 20 30 40 50
M Stainless steel/ heat-resistant cast steel
Wear-resistant
Ductile
05 15 25 35 45
01 10 20 30 40 50
K Cast iron
Wear-resistant
Ductile
05 15 25 35 45
01 10 20 30 40 50
N Non-ferrous metals
Wear-resistant
Ductile
05 15 25 35 45
01 10 20 30 40 50
S High-temperature alloys and titanium alloys
Wear-resistant
Ductile
05 15 25 35 45
01 10 20 30 40 50

Designation key

Radial indexable inserts

S	C	M	T	0	9	T	3

Insert form

S (90°) 
C (80°) 
T (60°) 
D (55°) 
V (35°) 
W (82°) ** 

Tolerance

	d [mm]	m [mm]	s [mm]
H	±0.013	±0.013	±0.025
G	±0.025	±0.025	from ±0.05 to ±0.13 *
M	from ±0.05 to ±0.15 *	from ±0.08 to ±0.20 *	from ±0.05 to ±0.13 *

Insert type

40° - 60°  W
40° - 60°  T

Insert size

Incircle	d	d	d	d	d
d [mm]	S	C	T	D	V	W **
5.56	–	05	09	–	–	03
6.35	06	06	11	07	11	04
6.70	–	–	–	–	–	–
7.938	07	08	–	–	–	–
8.00	–	–	–	–	–	05
9.525	09	09	16	11	16	–
9.60	–	–	–	–	–	–
10.00	–	–	–	–	–	06
12.00	–	–	–	–	–	07
12.70	12	12	22	15	–	–
15.00	–	–	–	–	–	10
15.875	15	–	–	–	–	–

Clearance angle

B	5°
C	7°
P	11°
O	Custom

Insert thickness

Code	s [mm]
T1	1.98
02	2.38
03	3.18
T3	3.97
04	4.76
30	3.00
38	3.80
43	4.30

* Tolerance dependent on the insert size
** Drilling from solid

Not required
with sintered inserts

0	4		E	0	4		N	-	M	G	P	-	H	C	8	3	0	-	P

Ground indexable insert

Cutting edge design

Code letter	Design
F 01	Sharp edged
E 01 02 04	Rounded
T 51	Chamfered

Cutting direction

L	Left
R	Right
N	Neutral
X	right/left

Cutting material

HC830

(Example)

Only with polished inserts

Code letter	Design
P	Polished insert

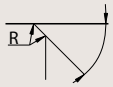
Ground chip guiding stage

Sintered chip guiding stage

2	L		A		M	G	P

Only with tipped cutting edges

Chamfer lead with radius



Code	Chamfer	r [mm]
FB	0.8 x 45°	0.2
FC	0.8 x 45°	0.4

Corner radius

Code	r [mm]
02	0.2
04	0.4
06	0.6
08	0.8
12	1.2

Chip guiding stage

Code letter
0A
1R
2R
1L
2L
5L
6L
1W
2W
X11
X21

Tipping

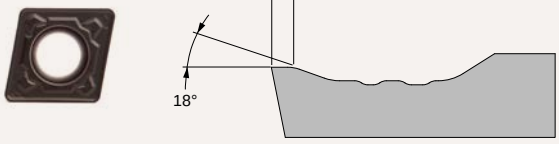
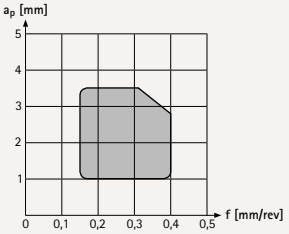
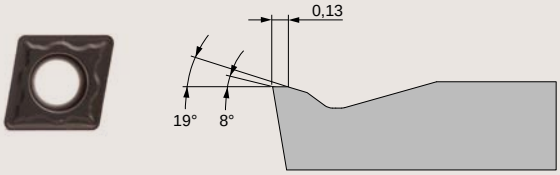
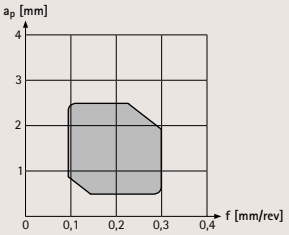
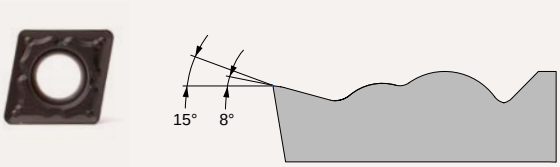
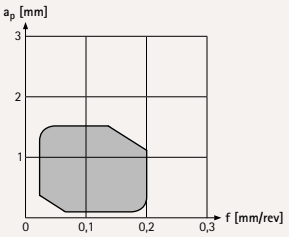
Code letter	Design
A	One corner or one cutting edge

Cutting edge design

Code letter	Design
U 01...99	Chip guiding stage finishing
MMM	
M 01...99	Chip guiding stage medium machining
MGP	
R 01...99	Chip guiding stage roughing
MKM	
X 01...99	Chip guiding stage custom

Overview of chip guiding stages - boring

Radial indexable inserts

Machining	Type	Material group	Edge rounding	Diagram
Roughing	**MKM** 	P M K N S H	+++	
Medium machining	**MGP** 	P M K N S H	++	
Finishing	**MMM** 	P M K N S H	++	

0 = sharp edged | + = slightly rounded | ++ = medium rounded | +++ = heavily rounded

CCGT

Radial indexable insert, two cutting edges, neutral design

			Carbide	Carbide
Material			P Non-alloy ← Alloy Wear-resistant ← Ductile	M Austenitic ← Ferritic Wear-resistant ← Ductile
Coating			PVD	PVD
Cutting material type			HP895	HP895
Cutting edge design			MGP	MGP
	CCGT06	**a_p max. [mm]**		
Medium machining	CCGT060202N-...-	0.5 - 2.0	30985376	30985376
	CCGT060204N-...-	0.5 - 2.0	30985378	30985378
	CCGT060208N-...-	0.5 - 2.0	30985393	30985393
	CCGT09			
	CCGT09T302N-...-	0.5 - 2.0	30985398	30985398
	CCGT09T304N-...-	0.5 - 2.0	30985400	30985400
	CCGT09T308N-...-	0.5 - 2.0	30985406	30985406
	CCGT12			
	CCGT120404N-...-	0.5 - 2.0	30985410	30985410
	CCGT120408N-...-	0.5 - 2.0	30985411	30985411

For reference values for the minimum boring diameter in dependence of the number of teeth, see catalogue Drilling from solid | Boring | Countersinking (page 448).
For clamping screws, screwdriver and tightening torques for indexable inserts, see catalogue Drilling from solid | Boring | Countersinking (page 431).

CCMT

Radial indexable insert, two cutting edges, neutral design

			Carbide					
			P					
Material			Non-alloy ← Wear-resistant		Alloy → Ductile	Non-alloy ← Wear-resistant		Alloy → Ductile
Coating			CVD			PVD		
Cutting material type			HC850	HC855	HC865	HP880	HP895	
Cutting edge design					MKM			
	CCMT06	**a_p max. [mm]**						
Roughing	CCMT060204N-...-	1.5 - 3.0						
	CCMT09							
	CCMT09T304N-...-	1.5 - 3.0			30966062			
		1.5 - 4.0						
	CCMT09T308N-...-	1.5 - 3.0			30985462			
		1.5 - 4.0						
	CCMT12							
	CCMT120408N-...-	1.5 - 3.0			30985477			
		1.5 - 5.0						
	CCMT120412N-...-	1.5 - 3.0			30985485			
		1.5 - 5.0						

	Cutting edge design		MGP	MGP	MGP	MGP	MGP	
	CCMT06	**a_p max. [mm]**						
Medium machining	CCMT060202N-...-	0.5 - 2.0						
	CCMT060204N-...-	0.5 - 2.0		30985423			30985422	
	CCMT060208N-...-	0.5 - 2.0	30985443				30985442	
	CCMT09							
	CCMT09T302N-...-	0.5 - 2.0	30985451					
	CCMT09T304N-...-	0.5 - 2.0		30985455	31092654	30966057	30966058	
	CCMT09T308N-...-	0.5 - 2.0		30985892	30985461	30985891	30985460	
	CCMT12							
	CCMT120404N-...-	0.5 - 2.0	30985470					
	CCMT120408N-...-	0.5 - 2.0	30985473		30985474			
	CCMT120412N-...-	0.5 - 2.0			31092655			

	Cutting edge design		MMM		MMM	MMM	MMM	
	CCMT06	**a_p max. [mm]**						
Finishing	CCMT060202N-...-	0.5 - 2.0	30985415				30985414	
	CCMT060204N-...-	0.5 - 2.0	30985435		30985436	30985432	30985433	
	CCMT060208N-...-	0.5 - 2.0					30985448	
	CCMT09							
	CCMT09T302N-...-	0.5 - 2.0	30985453				30985452	
	CCMT09T304N-...-	0.5 - 2.0	30985887		30966053	30966070	30955706	
	CCMT09T308N-...-	0.5 - 2.0	30985465		30985896	30985894	30985895	

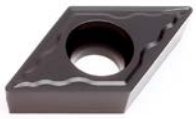
	Carbide							
	M				K			
	Austenitic ← Wear-resistant	Ferritic → Ductile	Austenitic ← Wear-resistant	Ferritic → Ductile	GJL ← Wear-resistant			GJS → Ductile
	CVD		PVD		CVD			
	HC875	HC885	HP880	HP895	HC815	HC820*	HC825	HC830*
					MKM	MKM	MKM	MKM
					30985424	30985425	30985426	30985427
					30966119	30966120	30966121	30985884
					30966112	30966113	30966114	30985893
					30985900	30985475	30985901	30985476
						30985481	30985482	30985483
	MGP	MGP	MGP	MGP	MGP	MGP	MGP	MGP
					30985412	30985413		
	30985420	30985421		30985422	30985416	30985417	30985418	30985419
				30985442	30985438	30985439	30985440	30985441
					30985449	30985450		
	30985883	30966056	30966057	30966058	30966117	30985882	30966118	30985454
	30985459	30985890	30985891	30985460	30966110	30985888	30966111	30985889
					30985466	30985467	30985468	30985469
	30985899				30985471	30985472	30985897	30985898
					30985478	30985479		
			MMM	MMM	MMM	MMM	MMM	MMM
				30985414				
			30985432	30985433	30985428	30985429	30985430	30985431
				30985448	30985444	30985445	30985446	30985447
				30985452				
			30966070	30955706	30966115	30985885	30966116	30985886
			30985894	30985895	30966108	30985463	30966109	30985464

* 1st choice

For reference values for the minimum boring diameter in dependence of the number of teeth, see catalogue Drilling from solid | Boring | Countersinking (page 448).
For clamping screws, screwdriver and tightening torques for indexable inserts, see catalogue Drilling from solid | Boring | Countersinking (page 431).

DCMT

Radial indexable insert, two cutting edges, neutral design



			Carbide					
			P					
Material			Non-alloy ← Wear-resistant		Alloy → Ductile	Non-alloy ← Wear-resistant	Alloy → Ductile	
Coating			CVD			PVD		
Cutting material type			HC850	HC855	HC865	HP880	HP895	
Cutting edge design					MKM			
	DCMT11	a_p max. [mm]						
Roughing	DCMT11T304N-...-	1.5 - 3.0			30966087			
		1.5 - 4.0						
	DCMT11T308N-...-	1.5 - 3.0			30966078			
		1.5 - 4.0						
	Cutting edge design		MGP	MGP	MGP	MGP	MGP	
	DCMT07	a_p max. [mm]						
Medium machining	DCMT070202N-...-	0.5 - 2.0						
	DCMT070204N-...-	0.5 - 2.0	30985499				30985498	
	DCMT070208N-...-	0.5 - 2.0			31092658			
	DCMT11							
	DCMT11T302N-...-	0.5 - 2.0	30966099					
	DCMT11T304N-...-	0.5 - 2.0	31092656	30985510	30966101	30966092	30966093	
	DCMT11T308N-...-	0.5 - 2.0	30966103	30985518		30966082	30966083	
	DCMT15							
	DCMT150404N-...-	0.5 - 2.0						
	DCMT150408N-...-	0.5 - 2.0						
	DCMT150412N-...-	0.5 - 2.0						
	Cutting edge design		MMM		MMM	MMM	MMM	
	DCMT07	a_p max. [mm]						
Finishing	DCMT070202N-...-	0.5 - 2.0			30985495		30985494	
	DCMT070204N-...-	0.5 - 2.0	30986033				30985500	
	DCMT11							
	DCMT11T302N-...-	0.5 - 2.0	30966100				30985505	
	DCMT11T304N-...-	0.5 - 2.0	30985902		30966088	30966095	30966096	
	DCMT11T308N-...-	0.5 - 2.0	30966104		30966079	30966085	30966086	

	Carbide					
	M				K	
	Austenitic ← Wear-resistant	Ferritic → Ductile	Austenitic ← Wear-resistant	Ferritic → Ductile	GJL ← Wear-resistant	GJS → Ductile
	CVD		PVD		CVD	
	HC875	HC885	HP880	HP895	HC815	HC825
					MKM	MKM
					30985511	30985512
					30985519	30985520
	MGP	MGP	MGP	MGP	MGP	MGP
					30985493	
				30985498	30985496	30985497
					30985501	30985502
					30985504	
	30985508	30966091	30966092	30966093	30985506	30985507
	30985517		30966082	30966083	30985515	30985516
					30985522	
					30985523	
					30985524	
	MMM		MMM	MMM	MMM	
	30966105			30985494		
	30966107			30985500		
				30985505		
			30966095	30966096	30985513	
	30985903		30966085	30966086		

For clamping screws, screwdriver and tightening torques for indexable inserts, see catalogue Drilling from solid | Boring | Countersinking (page 431).

SCMT | SPMT

Radial indexable inserts, four cutting edges, neutral design

			Carbide					
Material			P					
			Non-alloy ← Wear-resistant		Alloy → Ductile	Non-alloy ← Wear-resistant	Alloy → Ductile	
Coating			CVD			PVD		
Cutting material type			HC850	HC855	HC865	HP880	HP895	
Cutting edge design					MKM			
	SCMT09	a_p max. [mm]						
Roughing	SCMT09T308N-...-	1.5 - 3.0			30966072			
		1.5 - 4.0						
	SCMT12							
	SCMT120408N-...-	1.5 - 3.0			30985564			
		1.5 - 5.0						
	SCMT120412N-...-	1.5 - 3.0						
		1.5 - 5.0						
	Cutting edge design		MGP	MGP	MGP		MGP	
	SPMT06	a_p max. [mm]						
Medium machining	SPMT060304N-...-	0.5 - 2.0	30985573		30985575			
	SPMT060308N-...-	0.5 - 2.0						
	SCMT09							
	SCMT09T304N-...-	0.5 - 2.0	31085129		31085141		30985536	
	SCMT09T308N-...-	0.5 - 2.0	31085140	30985543	30966127			
	SCMT12							
	SCMT120404N-...-	0.5 - 2.0						
	SCMT120408N-...-	0.5 - 2.0	31085142	30985560	31085143			
	Cutting edge design		MMM		MMM	MMM	MMM	
	SPMT06	a_p max. [mm]						
Finishing	SPMT060304N-...-	0.5 - 2.0	30985579		30985580	30985913		
	SCMT09							
	SCMT09T304N-...-	0.5 - 2.0	31085144		31085145		30985540	
	SCMT09T308N-...-	0.5 - 2.0	30983531		30966073	30966076	30955704	

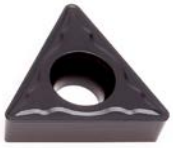
	Carbide							
	M				K			
	Austenitic ← Wear-resistant	→ Ferritic Ductile	Austenitic ← Wear-resistant	→ Ferritic Ductile	GJL ← Wear-resistant			GJS → Ductile
	CVD		PVD		CVD			
	HC875	HC885	HP880	HP895	HC815	HC820*	HC825	HC830*
					MKM	MKM	MKM	MKM
					30985544	30985545	30985546	31092659
					30985561	30985562	30985563	31092660
					30985565	30985566		31092661
	MGP			MGP	MGP	MGP	MGP	MGP
						30985574		30985576
						30985914		30985915
	30985535			30985536	30985533	30985908	30985909	30985534
	31092662				30985541	30985911	30985542	30985912
					30985551	30985552	30985553	30985554
	30985559				30985555	30985556	30985557	30985558
		MMM	MMM	MMM	MMM	MMM	MMM	MMM
		30972033	30985577	30985913		30985578		31084646
				30985540	30985537	30985538	30985910	30985539
			30966076	30955704	30985547	30985548	30985549	30985550

* 1st choice

For reference values for the minimum boring diameter in dependence of the number of teeth, see catalogue Drilling from solid | Boring | Countersinking (page 448).
For clamping screws, screwdriver and tightening torques for indexable inserts, see catalogue Drilling from solid | Boring | Countersinking (page 431).

TCMT

Radial indexable insert, three cutting edges, neutral design



			Carbide				
Material			P				
			Non-alloy ← Wear-resistant	Alloy → Ductile	Non-alloy ← Wear-resistant	Alloy → Ductile	
Coating			CVD		PVD		
Cutting material type			HC850	HC865	HP880	HP895	
Cutting edge design				MKM			
	TCMT11	**a_p max. [mm]**					
Roughing	TCMT110204N-...-	1.5 - 3.0		30985591			
		1.5 - 4.0					
	TCMT16						
	TCMT16T304N-...-	1.5 - 3.0		30985608			
		1.5 - 5.0					
	TCMT16T308N-...-	1.5 - 3.0		30985615			
		1.5 - 5.0					

	Cutting edge design		MGP	MGP		MGP	
	TCMT09	**a_p max. [mm]**					
Medium machining	TCMT090204N-...-	0.5 - 2.0	30985582				
	TCMT11						
	TCMT110204N-...-	0.5 - 2.0	30945048	30985589		30985588	
	TCMT110208N-...-	0.5 - 2.0	30985599	30985600		30985601	
	TCMT16						
	TCMT16T304N-...-	0.5 - 2.0	30985605	31092663		30985604	
	TCMT16T308N-...-	0.5 - 2.0	30985613	31092665		30985612	
	TCMT16T312N-...-	0.5 - 2.0		31092666			
	TCMT22						
	TCMT220408N-...-	0.5 - 2.0					

	Cutting edge design		MMM	MMM	MMM	MMM	
	TCMT11	**a_p max. [mm]**					
Roughing	TCMT110202N-...-	0.5 - 2.0	30985584	30985585		30985583	
	TCMT110204N-...-	0.5 - 2.0	30985595	30985596	30985593	30985594	
	TCMT16						
	TCMT16T304N-...-	0.5 - 2.0				30985609	
	TCMT16T308N-...-	0.5 - 2.0				30985617	

	Carbide				
	M			K	
	Austenitic ← Wear-resistant	→ Ferritic Ductile	Austenitic ← Wear-resistant	→ Ferritic Ductile	GJL ← Wear-resistant	→ GJS Ductile
	CVD		PVD		CVD	
	HC875		HP880	HP895	HC815	HC825
					MKM	
					30985590	
					30985607	
					30985614	
	MGP			MGP	MGP	MGP
					30985917	
	30985587			30985588	30985586	
	30985598			30985601	30985597	
				30985604	30985602	30985603
				30985612	30985610	30985611
					30985618	30985619
					30985622	30985623
	MMM		MMM	MMM	MMM	
				30985583		
			30985593	30985594	30985592	
				30985609		
	30985616			30985617		

For reference values for the minimum boring diameter in dependence of the number of teeth, see catalogue Drilling from solid | Boring | Countersinking (page 448).
For clamping screws, screwdriver and tightening torques for indexable inserts, see catalogue Drilling from solid | Boring | Countersinking (page 431).

VCGT

Radial indexable insert, two cutting edges, neutral design

			Carbide	
Material			P Non-alloy → Alloy Wear-resistant → Ductile	M Austenitic → Ferritic Wear-resistant → Ductile
Coating			PVD	PVD
Cutting material type			HP880	HP880
Cutting edge design			MGP	MGP
	VCGT11	**a_p max. [mm]**		
*	VCGT110304N-...-	0.5 - 2.0	30966122	30966122

*** = Medium machining**

For clamping screws, screwdriver and tightening torques for indexable inserts, see catalogue Drilling from solid | Boring | Countersinking (page 431).

VCMT

Radial indexable insert, two cutting edges, neutral design

			Carbide		
Material			P		K
			Non-alloy → Wear-resistant	Alloy → Ductile	GJL → Wear-resistant / GJS → Ductile
Coating			CVD		
Cutting material type			HC850	HC865	HC815
Cutting edge design				MKM	
	VCMT16	**a_p max. [mm]**			
*	VCMT160408N-...-	1.5 - 3.0		30985630	

	Cutting edge design		MGP	MGP	MGP
	VCMT16	**a_p max. [mm]**			
**	VCMT160404N-...-	0.5 - 2.0	30966097	30966098	30985627
	VCMT160408N-...-	0.5 - 2.0	31093307	30985629	30985628

*** = Roughing**
**** = Medium machining**

For clamping screws, screwdriver and tightening torques for indexable inserts, see catalogue Drilling from solid | Boring | Countersinking (page 431).

Cutting data recommendation for boring tools with ISO elements

Cutting speed [m/min]

MMG*			Material	Strength/hardness [N/mm²] [HRC]	
P	P1	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700 N/mm²	
		P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200 N/mm²	
	P2	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900 N/mm²	
		P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400 N/mm²	
	P3	P3.1	Tool, bearing, spring and high-speed steels	< 900 N/mm²	
		P3.2	Tool, bearing, spring and high-speed steels	< 1500 N/mm²	
	P4	P4.1	Stainless steels, ferritic and martensitic		
	P5	P5.1	Cast steel		
	P6	P6.1	Stainless cast steel, ferritic and martensitic		
M	M1	M1.1	Stainless steels, austenitic	< 700 N/mm²	
		M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000 N/mm²	
	M2	M2.1	Stainless/heat-resistant cast steel, austenitic (turbocharger materials)	< 700 N/mm²	
	M3	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000 N/mm²	
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300 N/mm²	
	K2	K2.1	Cast iron with spheroidal graphite, GJS	< 500 N/mm²	
		K2.2	Cast iron with spheroidal graphite, GJS	500-800 N/mm²	
		K2.3	Cast iron with spheroidal graphite, GJS	> 800 N/mm²	
	K3	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500 N/mm²	
		K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500 N/mm²	

* MAPAL machining groups

	Carbide CVD-coated										Carbide PVD-coated	
	HC815	HC820	HC825	HC830	HC850	HC855	HC865	HC870	HC875	HC885	HP880	HP895
					180-300	170-280	120-220	100-200			100-220	100-220
					170-280	160-250	120-200	80-180			100-220	100-220
					150-270	150-250	100-180	80-170			100-220	100-220
					150-260	150-240	80-170	80-160			100-200	100-200
					150-260	140-240	80-160	80-140			80-200	80-200
					140-240	140-230	80-140	80-140			80-200	80-200
					140-240	130-230	80-140	80-140			80-200	80-200
					140-240	120-220	80-140	80-140			80-200	80-200
									200-300	180-280	150-220	150-220
									200-280	160-260	120-200	120-200
									180-260	140-240	100-180	100-180
									160-240	120-220	100-180	100-180
	200-380	200-380	180-300	180-300								
	150-280	150-280	130-260	130-260								
	150-220	150-220	130-200	130-200								
	150-200	150-200	130-200	130-200								
	150-200	150-200	130-200	130-200								
	150-200	150-200	130-200	130-200								

The machining values shown are indicative values.
The optimal data for the specific machining case should be determined in trials or during the machining.

MILLING

End milling cutters for roughing, finishing, ramping and trochoidal milling.
PCD face milling cutters for the highest surface finishes in aluminium.
Radial milling range with pressed ISO indexable inserts.

MILLING

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ADDITIONS TO PROGRAMME

End milling cutters with fixed cutting edges and milling cutters with replaceable inserts

MAPAL is expanding its range of high-performance milling cutters with milling cutters made of solid carbide, PCD face milling cutters as well as milling cutters with radial ISO indexable inserts.
The new OptiMill-Alu-HPC-Pocket is the first choice during ramping processes in aluminium. In addition, the trochoidal milling cutters OptiMill-Tro-Uni, OptiMill-Tro-PM and OptiMill-Tro-H have been further developed and are now available with new geometry. The series "Uni-HPC-Plus" and "Uni-HPC-Finish" have been expanded with new designs. The OptiMill-Uni-Wave is now also available in overlong and 3xD.

The new PCD face milling cutter generation PowerMill-Blue with milling cartridges that can be reground and optimised chip guiding geometry is the cutter of choice to achieve the best surfaces when machining aluminium in the automotive industry. More flexibility during face milling is offered by the new FaceMill-Diamond, which is now also available as a milling cutter head. Both series have direct coolant outlets at the cutting edge.

The portfolio of standard milling tools is rounded off with a particularly cost-effective milling range with pressed, radial ISO indexable inserts. The new powerful face, shoulder, slot and shell end face milling cutters are designed for roughing and for medium machining of cast iron, steel and stainless steel.

Basic Line:
Universal tools, broad application area, low procurement costs

Performance Line:
High-performance tools, broad application area, high productivity in series production manufacturing

Expert Line:
Specialist tools for selected applications, maximum precision and productivity

End milling cutters with fixed cutting edges

OptiMill-Alu-HPC-Pocket

Ideal for milling pockets in aluminium.

- Unique milling cutter face geometry with integrated drill tip
- Convex hollow grinding of the face cutting edges
- Suitable for angled entry at up to 45°, for helix milling and for grooving
- High infeed rates up to 2xD possible

ø range: 5.00 - 20.00 mm

Design:

N

OptiMill-Uni-HPC-Plus

Excellently suited for grooving.

- New in overlong design with various corner radii
- Excellent chip removal due to particularly large chip spaces
- Cutting edge rounding for low wear and good surfaces
- Unequal spacing and unequal pitch ensure very smooth running

ø range: 4.00 - 20.00 mm

Design:

P M K

OptiMill-Uni-HPC-Wave

Ideal for roughing with high feeds.

- New in the designs overlong and 3xD
- Optimal chip removal due to short, tightly rolled chips
- Low radial forces due to newly developed roughing profile
- High-performance roughing milling cutter for groove milling up to 2xD
- Shoulder milling or trochoidal milling up to 3xD

ø range: 5.00 - 25.00 mm

Design:

3xD

P M K

OptiMill-Uni-HPC-Finish

Highest surface finishes in the shortest time.

- Seven cutting edges, individually adapted substrate
- Shorter machining times due to significantly higher total feed
- Adapted groove profile for optimal chip removal
- New in the lengths 3xD and 5xD with sharp corner design

ø range: 4.00 - 25.00 mm

Design:

3xD 5xD

P M K

OptiMill-Trochoid

Highest material removal rate with low cutting force.

- More chip breakers for shorter chips
- Maximum efficiency
- High cost-effectiveness due to high machining rate with large cutting depths and thin-walled parts

ø range: 4.00 - 25.00 mm

Design:

3xD 4xD 5xD

P M K S H

Page 124

PCD face milling cutters

PowerMill-Blue

Ideal for producing the highest surface finishes on parts made of aluminium.

- Integrated chip guiding geometry
- For roughing
- PCD milling cartridges can be reground
- Cutting depths up to a_p = 5 mm

ø range: 50.00 - 400.00 mm

N

FaceMill-Diamond

For face milling with high stock removal.

- New as modular milling cutter head variant
- Direct coolant supply allows machining with MQL
- Brazed PCD cutting edges
- Available for different surface finish requirements (≤10 µm / >10 µm)
- Cutting depths up to a_p = 10 mm

ø range: 50.00 – 125.00 mm

N

Page 168

Milling cutters with indexable inserts

Face milling cutters

Roughing and semi-machining face surfaces.

- Highly cost-effective due to sintered, radial indexable inserts
- Cutting depths up to a_p = 5 mm
- Indexable insert with eight cutting edges and positive basic shape for parts susceptible to vibration
- Highly cost-effective indexable insert with 16 cutting edges and negative basic shape
- Contact angle 45°

ø range: 63.00 - 400.00 mm

P M K

Shoulder milling cutters

Ideal for milling 90° shoulder surfaces.

- Radial indexable inserts with two, four and eight cutting edges
- Indexable inserts with positive basic shape for parts susceptible to vibration
- Cutting depths up to a_p = 11 mm
- Contact angle 90°

ø range: 20.00 - 200.00 mm

P M K

Shell end face milling cutters

For roughing with high cutting depths. Ideal for deep shoulder milling and for trimming.

- Radial indexable inserts with two and four cutting edges for small diameters from 25 mm
- Cutting depths up to a_p = 62 mm
- Contact angle 90°

ø range: 25.00 - 105.00 mm

P M K

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END MILLING CUTTERS WITH FIXED CUTTING EDGES

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Shoulder milling – roughing

OptiMill-Uni-Wave 142

Shoulder milling – finishing

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Trochoidal milling

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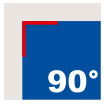
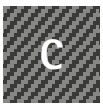
SELECTION OF A MILLING CUTTER

Step-by-step to the right milling cutter

You are looking for an end milling cutter especially for the trochoidal milling of difficult-to-machine materials such as titanium alloys? This selection aid will lead you step-by-step to the right milling cutter.

1	**Application**	Select your main application.		Groove milling and general applications		Shoulder milling – roughing
2	**Design**	Select your preferred design.		Monolithic		Modular
3	**Product class**	Decide for a product class.		**Basic Line:** Universal tools, broad application area, low procurement costs		
4	**Material suitability**	Identify your workpiece material as per the MAPAL machining groups (MMG).		Steel		Stainless steel
5.1	**Cutting edge design**	Select the required cutting edge design.		45° chamfer		Sharp edged
5.2	**Other geometry features**	Check whether the geometric features meet your requirements.		Diameter range		Number of teeth
6	**Product**	Select your milling cutter. If there are several possible selections, select the milling cutter that is marked as 1st choice (★) for material suitability.				

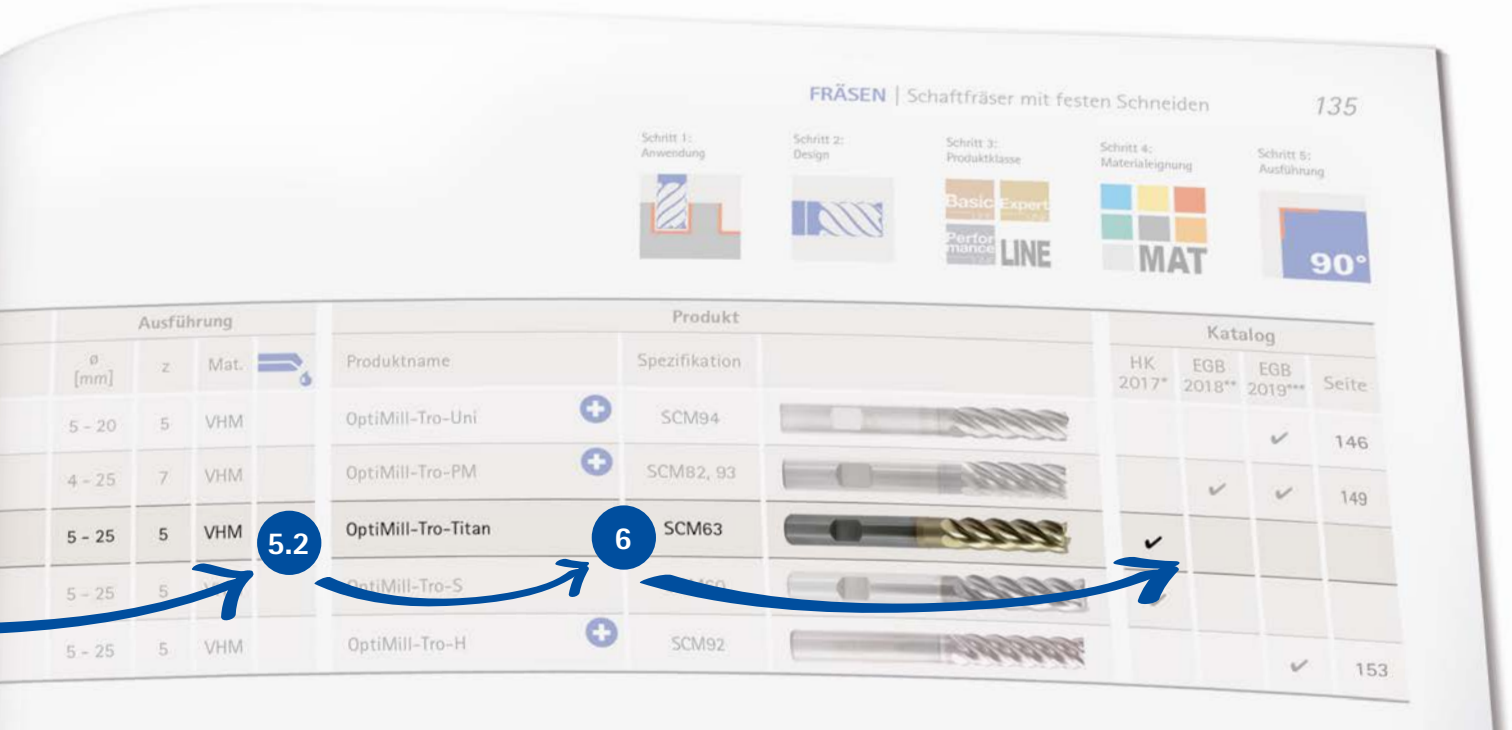
	Shoulder milling – finishing		Trochoidal milling		High feed milling		Profile milling		Chamfering and deburring

	**Performance Line:** High-performance tools, broad application area, high productivity in series production manufacturing		**Expert Line:** Specialist tools for selected applications, maximum precision and productivity						
	Cast iron		Non-ferrous metals and plastics		Composite materials		Super alloys and titanium		Hardened steel and cast steel
	Corner radius		Full radius		Drill tip				

Axis/helix angle

Cutting material

Coolant supply



Shoulder milling cutters | Groove milling and general applications

Design	Product class	Material suitability																					Edge design					
		P	M	K		N						C									S		H					
		1-6	1-3	1-2	3	1.1	1.2-2.3	3.1	4.1	4.2	4.3	1.1	1.2	1.3	2.1	3.1	4.1	4.2	4.3	4.4	1-2	3-5	1-2	45°	90°	CR	FR	D
	Basic LINE	■	■	■	■																			✔				
		■	⬓	■	⬓	⬓	⬓																	✔	✔			
		■	⬓	■	⬓	⬓	⬓																		✔			
		■	⬓	■																				✔	✔			
			■																		■	■			✔			
						■	■	⬓	⬓	⬓	⬓														✔	✔			
						■	■	⬓	⬓	⬓	⬓													✔					
									■	■															✔				
										■	⬓														✔				
	Performance LINE	★	★	★	★																			✔		✔		
		■	⬓	■	■																			✔	✔			
		■	■	■	■																					✔		
		■	■	■	■																			✔				
																					★	⬓		✔		✔		
						⬓	■	⬓	⬓	⬓	⬓													✔				
						■	■		⬓	⬓	⬓															✔			
						■	■	■	⬓	⬓	⬓		■	⬓	■									✔					
						■	■	■	⬓	⬓	⬓		■	⬓	■									✔					
						■	■	■	⬓	⬓	⬓		■	⬓	■											✔			
						■	■	■	⬓	⬓	⬓		■	⬓	■									✔					

★ 1st choice ■ highly suitable ⬓ suitable in some situations

Step 1: Application | Step 2: Design | Step 3: Product class | Step 4: Material suitability | Step 5: Design

Design				Product			Catalogue			
ø [mm]	z	Mat.		Product name	Specification		MC 2017*	SV 2018**	SV 2019***	Page
3 - 20	4	Solid carbide		ECU-Mill-Uni-LV	SCM78,79		✔			
1 - 20	2	Solid carbide		OptiMill-Uni	SCM10		✔			
2,8 - 20	3	Solid carbide		OptiMill-Uni	SCM13		✔			
1 - 20	3	Solid carbide		OptiMill-Uni	SCM15,16,17		✔			
2 - 20	4	Solid carbide		OptiMill-Inox	SCM29		✔			
2 - 12,7	1	Solid carbide		OptiMill-Mono-Alu	SCM28		✔			
2 - 20	2	Solid carbide		OptiMill-Alu	SCM26		✔			
2 - 12,7	1	Solid carbide		OptiMill-Mono-Plastic	SCM33		✔			
4 - 20	VZ	Solid carbide		OptiMill-Composite-MT	SCM40,41,42,43		✔			
2,5 - 25	4	Solid carbide		OptiMill-Uni-HPC-Plus ⊕	SCM72,74,76,77		✔		✔	141
1 - 20	3	Solid carbide		OptiMill-Uni-HPC-Slot	SCM25		✔			
5,7 - 20	3	Solid carbide		OptiMill-Uni-HPC-Pocket	SCM81,84			✔		
6 - 25	5	Solid carbide		OptiMill-Uni-HPC-Silent	SCM57		✔			
6 - 20	4	Solid carbide	✔	OptiMill-Titan-HPC	SCM39		✔			
3 - 20	3	Solid carbide		OptiMill-Alu-HPC	SCM27		✔			
5 - 20	3	Solid carbide		OptiMill-Alu-HPC-Pocket N	SCM85				✔	140
4 - 5	1	PCD		OptiMill-Diamond-Typ 50	SHM50		✔			
3 - 16	2	PCD	✔	OptiMill-Diamond-Typ 51	SHM51,61,71		✔			
6 - 20	2 / 3	PCD	✔	OptiMill-Diamond-Typ 53	SHM53		✔			
16 - 63	3 / 4	PCD	✔	OptiMill-Diamond-Typ 57	SHM57		✔			

* Main catalogue 2017
** Supplementary volume 2018
*** Supplementary volume 2019

N New ⊕ Additions to programme

Shoulder milling cutters | Groove milling and general applications

Design	Product class	Material suitability																				Edge design					
		P	M	K		N						C									S		H						
		1-6	1-3	1-2	3	1.1	1.2-2.3	3.1	4.1	4.2	4.3	1.1	1.2	1.3	2.1	3.1	4.1	4.2	4.3	4.4	1-2	3-5	1-2	45°	90°	CR	FR	D
	Performance LINE										★														✔				
											■									■				✔					
									★	★														✔					
														★					■	■				✔					
										■			★						■	⬓				✔		✔			
										■			★												✔				
													■											✔					
												★													✔				
																		★	★					✔					
	Expert LINE					■	■																			✔			
						■	■																			✔			
										■			■	⬓	★				■	■				✔					
	Performance LINE	★	★	★	★																			✔					
		■	⬓	■	■																			✔					
						■	■	⬓	⬓	⬓	⬓		■	⬓	■									✔					
						■	■	⬓	⬓	⬓	⬓		■	⬓	■											✔			
	Expert LINE					■	■																			✔			
						■	■																			✔			

★ 1st choice ■ highly suitable ⬓ suitable in some situations

Step 1: Application | Step 2: Design | Step 3: Product class | Step 4: Material suitability | Step 5: Design

Design				Product			Catalogue			
ø [mm]	z	Mat.		Product name	Specification		MC 2017*	SV 2018**	SV 2019***	Page
4 - 16	4	Solid carbide		OptiMill-Softfoam	SCM50		✔			
6 - 20	8	Solid carbide	✔	OptiMill-Hardfoam	SCM64		✔			
3 - 20	4	Solid carbide		OptiMill-Thermoplastic	SCM51		✔			
4 - 20	4	Solid carbide		OptiMill-Thermoplastic-FR	SCM61		✔			
4 - 20	8	Solid carbide	✔	OptiMill-Composite-Speed	SCM45,46,47		✔	✔		
1 - 3	VZ	Solid carbide		OptiMill-Composite-Micro	SCM56		✔			
3-20	2	Solid carbide		OptiMill-Composite-Duo	SCM73		✔			
4 - 20	2	Solid carbide		OptiMill-Composite-TwinCut	SCM49		✔			
4 - 20	6 / 8	Solid carbide		OptiMill-Honeycomb	SCM62		✔			
6 - 32	3	Solid carbide	✔	OptiMill-SPM	SCM68,69		✔			
6 - 50	3 / 4	PCD	✔	OptiMill-Diamond-SPM	SHM10,11,12		✔			
4 - 20	2	Solid carbide		OptiMill-Composite-UD	SCM65,66		✔			
8 - 25	4	Solid carbide		CPMill-Uni-HPC	CPM10		✔			
8 - 25	3	Solid carbide		CPMill-Uni-HPC-Slot	CPM11		✔			
8 - 16	2	PCD	✔	CPMill-Diamond-Typ 21/22/23	CPM21,22,23		✔			
8 - 25	2 / 3	PCD	✔	CPMill-Diamond-Typ 20	CPM20		✔			
14 - 25	3	Solid carbide	✔	CPMill-SPM	CPM27		✔			
14 - 25	3	PCD	✔	CPMill-Diamond-SPM	CPM26		✔			

* Main catalogue 2017
** Supplementary volume 2018
*** Supplementary volume 2019

N New

Additions to programme

Shoulder milling cutters | Shoulder milling – roughing

Design	Product class	Material suitability																				Edge design				
		P	M	K		N						C									S	H					
		1-6	1-3	1-2	3	1.1	1.2-2.3	3.1	4.1	4.2	4.3	1.1	1.2	1.3	2.1	3.1	4.1	4.2	4.3	4.4	1-2	3-5	1-2	45°	90°	CR	FR	D
	Basic LINE	■	⬓	■	⬓	⬓	⬓																	✔	✔			
	Performance LINE	■	■	■	■																			✔				
		■	⬓	■	■																			✔				
	Basic LINE	■	⬓	■	⬓	⬓	⬓																	✔				
	Performance LINE	★	★	★	★																			✔				

Shoulder milling cutters | Shoulder milling – finishing

Design	Product class	Material suitability																				Edge design				
		P	M	K		N						C									S	H					
		1-6	1-3	1-2	3	1.1	1.2-2.3	3.1	4.1	4.2	4.3	1.1	1.2	1.3	2.1	3.1	4.1	4.2	4.3	4.4	1-2	3-5	1-2	45°	90°	CR	FR	D
	Basic LINE	■	⬓	■	⬓	⬓	⬓																	✔				
																							■		✔			
	Performance LINE	★	★	★	★																			✔				
	Performance LINE	★	★	★	★																				✔			

★ 1st choice ■ highly suitable ⬓ suitable in some situations

Step 1: Application | Step 2: Design | Step 3: Product class | Step 4: Material suitability | Step 5: Design

Design				Product			Catalogue			
ø [mm]	z	Mat.		Product name	Specification		MC 2017*	SV 2018**	SV 2019***	Page
6 - 20	3 / 4	Solid carbide		OptiMill-Uni-Rough&Finish	SCM22		✔			
4 - 25	3 - 5	Solid carbide		OptiMill-Uni-HPC-Rough	SCM70, 71		✔			
4-25	5	Solid carbide		OptiMill-Uni-Wave	SCM88, 89, 90			✔	✔	142
8 - 25	4 - 6	Solid carbide		CPMill-Uni-Rough&Finish	CPM14		✔			
8 - 25	4	Solid carbide		CPMIll-Uni-HPC	CPM10		✔			

Design				Product			Catalogue			
ø [mm]	z	Mat.		Product name	Specification		MC 2017*	SV 2018**	SV 2019***	Page
4 - 32	6 / 8	Solid carbide		OptiMill-Uni-Finish	SCM18, 19		✔			
4 - 20	6 / 8	Solid carbide		OptiMill-Hardened	SCM30, 31		✔			
4 - 25	7	Solid carbide		OptiMill-Uni-HPC-Finish	SCM83			✔	✔	144
8 - 25	6	Solid carbide		CPMill-Uni-HPC-Finish	CPM13		✔			

* Main catalogue 2017
** Supplementary volume 2018
*** Supplementary volume 2019

N New

Additions to programme

Shoulder milling cutters | Trochoidal milling

Design	Product class	Material suitability																				Edge design				
		P	M	K		N						C									S		H					
		1-6	1-3	1-2	3	1.1	1.2-2.3	3.1	4.1	4.2	4.3	1.1	1.2	1.3	2.1	3.1	4.1	4.2	4.3	4.4	1-2	3-5	1-2	45°	90°	CR	FR	D
	Expert LINE	■	⬓	■	■																			✔				
		★	★	■	■																			✔				
																					★	⬓				✔		
			⬓																		⬓	★				✔		
																							★			✔		

High feed milling

Design	Product class	Material suitability																				Edge design				
		P	M	K		N						C									S		H					
		1-6	1-3	1-2	3	1.1	1.2-2.3	3.1	4.1	4.2	4.3	1.1	1.2	1.3	2.1	3.1	4.1	4.2	4.3	4.4	1-2	3-5	1-2	45°	90°	CR	FR	D
	Performance LINE	■	⬓	■	■																					✔		

★ 1st choice ■ highly suitable ⬓ suitable in some situations

Step 1: Application | Step 2: Design | Step 3: Product class | Step 4: Material suitability | Step 5: Design

Design				Product			Catalogue			
ø [mm]	z	Mat.		Product name	Specification		MC 2017*	SV 2018**	SV 2019***	Page
5 - 20	5	Solid carbide		OptiMill-Tro-Uni	SCM94				✔	146
4 - 25	7	Solid carbide		OptiMill-Tro-PM	SCM82, 93			✔	✔	149
5 - 25	5	Solid carbide		OptiMill-Tro-Titan	SCM63		✔			
5 - 25	5	Solid carbide		OptiMill-Tro-S	SCM60		✔			
5 - 25	5	Solid carbide		OptiMill-Tro-H	SCM92				✔	153

Design				Product			Catalogue			
ø [mm]	z	Mat.		Product name	Specification		MC 2017*	SV 2018**	SV 2019***	Page
8 - 25	6	Solid carbide	✔	CPMill-Uni-FeedPlus	CPM17		✔			

* Main catalogue 2017
** Supplementary volume 2018
*** Supplementary volume 2019

N New | Additions to programme

Profile milling

Design	Product class	Material suitability																						Edge design				
		P	M	K		N						C									S		H	45°	90°	CR	FR	D
		1-6	1-3	1-2	3	1.1	1.2-2.3	3.1	4.1	4.2	4.3	1.1	1.2	1.3	2.1	3.1	4.1	4.2	4.3	4.4	1-2	3-5	1-2					
	Basic LINE	■	⬓	■	⬓	⬓	⬓																				✔	
																							■				✔	
										■	⬓		■														✔	
	Performance LINE									■			■		■		⬓	⬓									✔	
						■	■	⬓	⬓	⬓	⬓		■	⬓	■												✔	
						■	■	⬓	⬓	⬓	⬓		■	⬓	■											✔		
	Basic LINE	■	⬓	■	⬓	⬓	⬓																				✔	
		■	⬓	■	■	⬓	⬓	⬓	⬓	⬓	⬓															✔		
	Performance LINE					■	■	⬓	⬓	⬓	⬓		■	⬓	■												✔	
						■	■	⬓	⬓	⬓	⬓		■	⬓	■											✔		

Chamfering, deburring and drill milling

Design	Product class	Material suitability																						Edge design				
		P	M	K		N						C									S		H	45°	90°	CR	FR	D
		1-6	1-3	1-2	3	1.1	1.2-2.3	3.1	4.1	4.2	4.3	1.1	1.2	1.3	2.1	3.1	4.1	4.2	4.3	4.4	1-2	3-5	1-2					
	Basic LINE	■	⬓	■		■	■																	✔				
		■	⬓	■		■	■																					✔
	Basic LINE	■	⬓	■		■	■																	✔				
		■	⬓	■		■	■																	✔				
		■	⬓	■		■	■																					✔

★ 1st choice ■ highly suitable ⬓ suitable in some situations

Step 1: Application | Step 2: Design | Step 3: Product class | Step 4: Material suitability | Step 5: Design

Design				Product			Catalogue			
ø [mm]	z	Mat.		Product name	Specification		MC 2017*	SV 2018**	SV 2019***	Page
2 - 20	2	Solid carbide		OptiMill-Uni-Radius	SCM23		✔			
1 - 20	2	Solid carbide		OptiMill-Hardened-Radius	SCM32		✔			
4 - 20	VZ	Solid carbide		OptiMill-Composite-MT-Radius	SCM44		✔			
4 - 20	8	Solid carbide		OptiMill-Composite-Speed-Radius	SCM87			✔		
3 - 16	2	PCD		OptiMill-Diamond-Radius	SCM52		✔			
3 - 12	2	PCD		OptiMill-Diamond-Torus	SCM24		✔			
8 - 25	4	Solid carbide		CPMill-Uni-Radius	CPM15		✔			
8 - 25	4	Solid carbide		CPMill-Uni-Torus	CPM16		✔			
8 - 16	2	PCD		CPMill-Diamond-Radius	CPM25		✔			
8 - 12	2	PCD		CPMill-Diamond-Torus	CPM24		✔			

Design				Product			Catalogue			
ø [mm]	z	Mat.		Product name	Specification		MC 2017*	SV 2018**	SV 2019***	Page
4 - 20	4	Solid carbide		OptiMill-Chamfer	SCM34		✔			
3 - 16	2	Solid carbide		OptiMill-DrillMill	SCM35		✔			
8 - 20	4 / 6	Solid carbide		CPMill-Chamfer	CPM18		✔			
10 - 20	3 + 3	Solid carbide		CPMill-Chamfer-Twin	CPM19		✔			
8 - 20	2	Solid carbide		CPD-Spot-Drill	CPD10		✔			

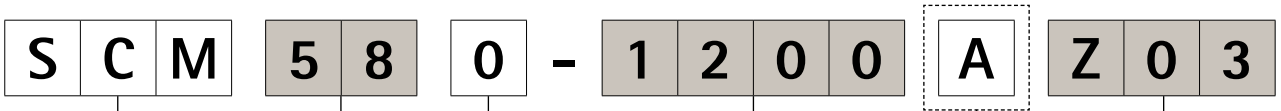
* Main catalogue 2017
** Supplementary volume 2018
*** Supplementary volume 2019

N New

Additions to programme

Designation key

End milling cutters with fixed cutting edges



Milling cutter type

CPM	Replaceable head milling cutters Complete Performance Milling
SCM	Solid carbide milling cutters Solid Carbide Milling
SHM	Milling cutters with extremely hard cutting materials, superhard milling

Series

	Specific code

Tool diameter x 0.01 mm

0800	8.00 mm
...	...

Coolant supply

0	External coolant supply
1	Internal coolant supply

Number of teeth

Z01	Number of teeth = 1
Z02	Number of teeth = 2
Z03	Number of teeth = 3
Z07	Number of teeth = 7
ZMV	Multiple teeth, medium tooth
ZGV	Multiple teeth, coarse tooth

Cutting length *

A	0 - 5 mm
B	5.1 - 10 mm
C	10.1 - 15 mm
D	15.1 - 20 mm
E	20.1 - 25 mm
...	...

* Only with milling cutter type SHM
** Information not required for milling cutter type CPM
*** For milling cutter type CPM shank form corresponds to CFS connection size

R	-	F	0	0	3	2	H	B	4	-	H	P	9	1	3

Cutting direction **

L	Left
R	Right

Size of the CED x 0.01 mm

0400	4.00 mm (example)
	For sharp only "S"; no information on size

Machining depth

3	3xD
4	4xD
5	5xD

Cutting material

HC	Carbide CVD-coated
HP	Carbide PVD-coated
HU	Uncoated carbide
PU	Polycrystalline diamond (PCD/CVD)

Cutting edge design (CED)

R	Radius
F	Chamfer
S	Sharp

Shank form ***

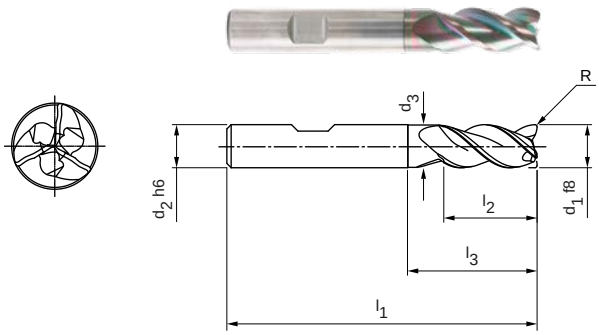
HA	Cylindrical shank Form HA
HB	Cylindrical shank Form HB
A6	HSK-A63
S4	SK40
B4	BT40
06	CFS connection size 06

OptiMill®-Alu-HPC-Pocket

Long design with neck
SCM85

Design:

Milling cutter diameter:	5.00 - 20.00 mm
Cutting material:	HP913
Number of cutting edges:	3
Helix angle:	42°
Special features:	Face geometry with integrated drill tip. Ideal for angled entry at up to 45°, for helix milling and for grooving.



N	1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1	4.1	4.2	4.3	C	1.1	1.2	1.3	2.1	3.1	4.1	4.2	5.1	5.2	5.3
	■	■	■	■	■	■	■		⬓	⬓	⬓											

Dimensions							z	Specification	Order No.
d_1 f8	d_2 h6	d_3	l_1	l_2	l_3	R			
5,00	6	4,8	57	13	-	0,20	3	SCM850-0500Z03R-R0020HB-HP913	31054950
5,70	6	5,5	57	13	19	0,20	3	SCM850-0570Z03R-R0020HB-HP913	31054951
6,00	6	5,8	57	13	19	0,20	3	SCM850-0600Z03R-R0020HB-HP913	31054952
6,70	8	6,5	63	16	25	0,20	3	SCM850-0670Z03R-R0020HB-HP913	31054953
7,00	8	6,8	63	16	25	0,20	3	SCM850-0700Z03R-R0020HB-HP913	31054954
7,70	8	7,5	63	19	25	0,20	3	SCM850-0770Z03R-R0020HB-HP913	31054955
8,00	8	7,8	63	19	25	0,20	3	SCM850-0800Z03R-R0020HB-HP913	31054956
8,70	10	8,5	72	22	30	0,32	3	SCM850-0870Z03R-R0032HB-HP913	31054957
9,00	10	8,8	72	22	30	0,32	3	SCM850-0900Z03R-R0032HB-HP913	31054958
9,70	10	9,5	72	22	30	0,32	3	SCM850-0970Z03R-R0032HB-HP913	31054959
10,00	10	9,8	72	22	30	0,32	3	SCM850-1000Z03R-R0032HB-HP913	31054960
11,70	12	11,5	83	26	36	0,32	3	SCM850-1170Z03R-R0032HB-HP913	31054961
12,00	12	11,8	83	26	36	0,32	3	SCM850-1200Z03R-R0032HB-HP913	31054962
13,70	14	13,5	83	26	36	0,32	3	SCM850-1370Z03R-R0032HB-HP913	31054963
14,00	14	13,8	83	26	36	0,32	3	SCM850-1400Z03R-R0032HB-HP913	31054964
15,50	16	15,3	92	31	42	0,32	3	SCM850-1550Z03R-R0032HB-HP913	31054965
16,00	16	15,8	92	31	42	0,32	3	SCM850-1600Z03R-R0032HB-HP913	31054966
17,50	18	17,3	92	31	42	0,32	3	SCM850-1750Z03R-R0032HB-HP913	31054967
18,00	18	17,8	92	31	42	0,32	3	SCM850-1800Z03R-R0032HB-HP913	31054968
19,50	20	19,3	104	41	52	0,50	3	SCM850-1950Z03R-R0050HB-HP913	31054969
20,00	20	19,8	104	41	52	0,50	3	SCM850-2000Z03R-R0050HB-HP913	31054970

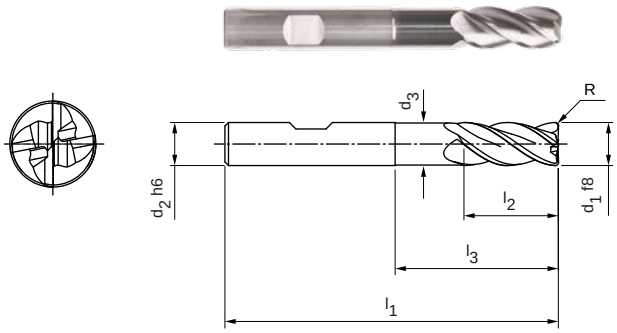
Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

OptiMill®-Uni-HPC-Plus

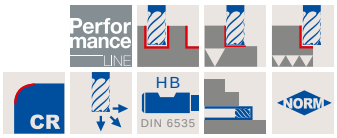
Overlong design with neck, with corner radius
SCM72

Design:

Milling cutter diameter:	4.00 - 20.00 mm
Cutting material:	HP920
Number of cutting edges:	4
Helix angle:	36° / 38°
Special features:	Unequal spacing, cutting edge rounding.



P 1 2 3 4 5 6 M 1 2 3 K 1 2 3 N 1 2 3 4 S 1 2 3 4 5 H 1 2



Dimensions							z	Specification	Order No.
d_1 f8	d_2 h6	d_3	l_1	l_2	l_3	R			
4,00	6	3,8	62	11	22	0,50	4	SCM720-0400Z04R-R0050HB-HP920	31046163
4,00	6	3,8	62	11	22	1,00	4	SCM720-0400Z04R-R0100HB-HP920	31046164
5,00	6	4,8	62	13	24	0,50	4	SCM720-0500Z04R-R0050HB-HP920	31046165
5,00	6	4,8	62	13	24	1,00	4	SCM720-0500Z04R-R0100HB-HP920	31046166
6,00	6	5,8	62	13	25	0,50	4	SCM720-0600Z04R-R0050HB-HP920	31046167
6,00	6	5,8	62	13	25	1,00	4	SCM720-0600Z04R-R0100HB-HP920	31046168
6,00	6	5,8	62	13	25	2,00	4	SCM720-0600Z04R-R0200HB-HP920	31046169
8,00	8	7,7	68	21	30	1,00	4	SCM720-0800Z04R-R0100HB-HP920	31046170
8,00	8	7,7	68	21	30	2,00	4	SCM720-0800Z04R-R0200HB-HP920	31046171
10,00	10	9,7	80	22	38	0,50	4	SCM720-1000Z04R-R0050HB-HP920	31046172
10,00	10	9,7	80	22	38	1,00	4	SCM720-1000Z04R-R0100HB-HP920	31046173
10,00	10	9,7	80	22	38	1,50	4	SCM720-1000Z04R-R0150HB-HP920	31046174
10,00	10	9,7	80	22	38	2,00	4	SCM720-1000Z04R-R0200HB-HP920	31046175
10,00	10	9,7	80	22	38	3,00	4	SCM720-1000Z04R-R0300HB-HP920	31046176
12,00	12	11,6	93	26	46	0,50	4	SCM720-1200Z04R-R0050HB-HP920	31046177
12,00	12	11,6	93	26	46	1,00	4	SCM720-1200Z04R-R0100HB-HP920	31046178
12,00	12	11,6	93	26	46	1,50	4	SCM720-1200Z04R-R0150HB-HP920	31046179
12,00	12	11,6	93	26	46	2,00	4	SCM720-1200Z04R-R0200HB-HP920	31046180
12,00	12	11,6	93	26	46	3,00	4	SCM720-1200Z04R-R0300HB-HP920	31046181
16,00	16	15,5	108	36	58	0,50	4	SCM720-1600Z04R-R0050HB-HP920	31046182
16,00	16	15,5	108	36	58	1,00	4	SCM720-1600Z04R-R0100HB-HP920	31046183
16,00	16	15,5	108	36	58	2,00	4	SCM720-1600Z04R-R0200HB-HP920	31046184
16,00	16	15,5	108	36	58	4,00	4	SCM720-1600Z04R-R0400HB-HP920	31046185
20,00	20	19,5	126	41	74	1,00	4	SCM720-2000Z04R-R0100HB-HP920	31046186
20,00	20	19,5	126	41	74	2,00	4	SCM720-2000Z04R-R0200HB-HP920	31046187
20,00	20	19,5	126	41	74	4,00	4	SCM720-2000Z04R-R0400HB-HP920	31046188

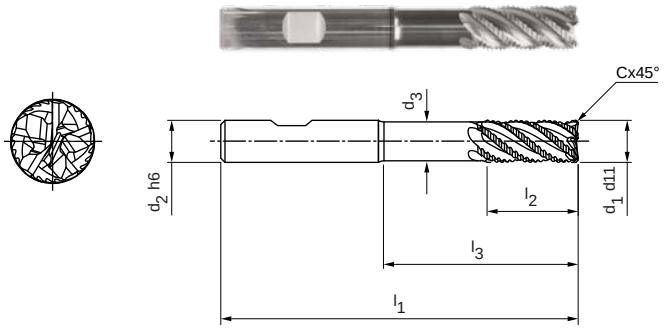
Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

OptiMill®-Uni-Wave

Overlong design with neck
SCM90

Design:

Milling cutter diameter:	5.00 - 25.00 mm
Cutting material:	HP723
Number of cutting edges:	5
Helix angle:	~41.5°
Special features:	Unequal spacing. Newly developed roughing profile.



P 1 2 3 4 5 6 M 1 2 3 K 1 2 3 N 1 2 3 4 S 1 2 3 4 5 H 1 2

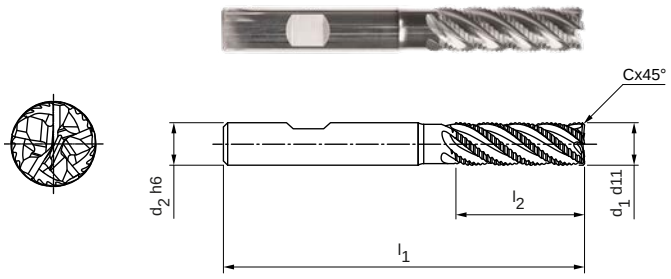
45° HB DIN 6535

Dimensions							z	Specification	Order No.
d_1 d11	d_2 h6	d_3	l_1	l_2	l_3	Cx45°			
5,00	6	4,6	62	13	24	0,25	5	SCM900-0500Z05R-F0025HB-HP210	31054574
6,00	6	5,6	62	13	25	0,30	5	SCM900-0600Z05R-F0030HB-HP210	31054575
8,00	8	7,4	68	21	30	0,40	5	SCM900-0800Z05R-F0040HB-HP210	31054576
10,00	10	9,3	80	22	38	0,50	5	SCM900-1000Z05R-F0050HB-HP210	31054577
12,00	12	11,1	93	26	46	0,60	5	SCM900-1200Z05R-F0060HB-HP210	31054578
14,00	14	13	99	26	52	0,70	5	SCM900-1400Z05R-F0070HB-HP210	31054579
16,00	16	14,8	108	36	58	0,80	5	SCM900-1600Z05R-F0080HB-HP210	31054580
18,00	18	16,7	117	36	67	0,90	5	SCM900-1800Z05R-F0090HB-HP210	31054581
20,00	20	18,5	126	41	74	1,00	5	SCM900-2000Z05R-F0100HB-HP210	31054582
25,00	25	23,1	150	50	92	1,25	5	SCM900-2500Z05R-F0125HB-HP210	31054583

Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

OptiMill®-Uni-Wave

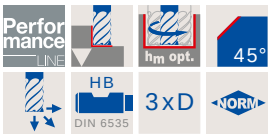
Design 3xD
SCM90



Design:

Milling cutter diameter:	5.00 - 25.00 mm
Cutting material:	HP723
Number of cutting edges:	5
Helix angle:	~ 42°
Special features:	Unequal spacing. Newly developed roughing profile.

Application:
Suitable for shoulder milling up to a maximum contact width of 0.25xD. Also suitable for trochoidal milling.



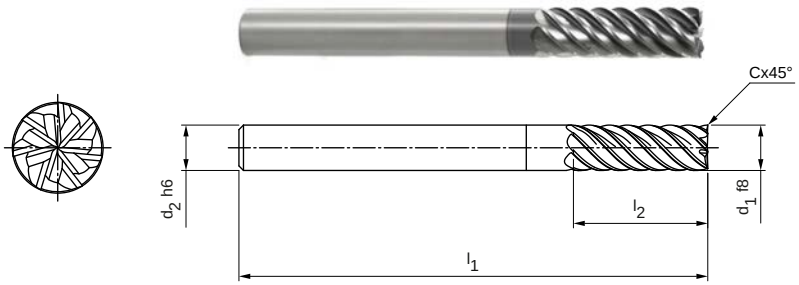
Dimensions						z	Specification	Order No.
d_1 f8	d_2 h6	l_1	l_2	l_3	Cx45°			
5,00	6	62	17	24	0,25	5	SCM900-0500Z05R-F0025HB3-HP210	31054554
6,00	6	62	18	25	0,30	5	SCM900-0600Z05R-F0030HB3-HP210	31054555
8,00	8	68	24	30	0,40	5	SCM900-0800Z05R-F0040HB3-HP210	31054556
10,00	10	80	30	35	0,50	5	SCM900-1000Z05R-F0050HB3-HP210	31054557
12,00	12	93	36	45	0,60	5	SCM900-1200Z05R-F0060HB3-HP210	31054558
14,00	14	99	42	50	0,70	5	SCM900-1400Z05R-F0070HB3-HP210	31054559
16,00	16	108	48	55	0,80	5	SCM900-1600Z05R-F0080HB3-HP210	31054570
18,00	18	117	54	67	0,90	5	SCM900-1800Z05R-F0090HB3-HP210	31054571
20,00	20	126	60	70	1,00	5	SCM900-2000Z05R-F0100HB3-HP210	31054572
25,00	25	150	75	92	1,25	5	SCM900-2500Z05R-F0125HB3-HP210	31054573

Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

OptiMill®-Uni-HPC-Finish

Design 3xD
SCM83, successor product to OptiMill®-Uni-HPC-Finish (SCM37)

Design:
Milling cutter diameter: 4.00 - 25.00 mm
Cutting material: HP213
Number of cutting edges: 7
Helix angle: ~ 45°
Special features: Unequal spacing



P 1 2 3 4 5 6 M 1 2 3 K 1 2 3 N 1 2 3 4 S 1 2 3 4 5 H 1 2

Performance LINE | 45° | 90° | HA DIN 6535 | 3xD | NORM

Design with corner radius

Dimensions					z	Specification	Order No.
d_1 f8	d_2 h6	l_1	l_2	Cx45°			
4,00	6	62	16	0,04	7	SCM830-0400Z07R-F0004HA3-HP213	30936093
5,00	6	62	17	0,05	7	SCM830-0500Z07R-F0005HA3-HP213	30936094
6,00	6	62	18	0,06	7	SCM830-0600Z07R-F0006HA3-HP213	30936095
8,00	8	68	24	0,08	7	SCM830-0800Z07R-F0008HA3-HP213	30936096
10,00	10	80	30	0,10	7	SCM830-1000Z07R-F0010HA3-HP213	30936098
12,00	12	93	36	0,12	7	SCM830-1200Z07R-F0012HA3-HP213	30936099
14,00	14	99	42	0,14	7	SCM830-1400Z07R-F0014HA3-HP213	30936110
16,00	16	108	48	0,16	7	SCM830-1600Z07R-F0016HA3-HP213	30936111
18,00	18	117	54	0,18	7	SCM830-1800Z07R-F0018HA3-HP213	30936112
20,00	20	126	60	0,20	7	SCM830-2000Z07R-F0020HA3-HP213	30936114
25,00	25	150	75	0,25	7	SCM830-2500Z07R-F0025HA3-HP213	30936115

Design with sharp edge

4,00	6	62	16	-	7	SCM830-0400Z07R-S-HA3-HP213	31046210
5,00	6	62	17	-	7	SCM830-0500Z07R-S-HA3-HP213	31046211
6,00	6	62	18	-	7	SCM830-0600Z07R-S-HA3-HP213	31046212
8,00	8	68	24	-	7	SCM830-0800Z07R-S-HA3-HP213	31046213
10,00	10	80	30	-	7	SCM830-1000Z07R-S-HA3-HP213	31046214
12,00	12	93	36	-	7	SCM830-1200Z07R-S-HA3-HP213	31046215
14,00	14	99	42	-	7	SCM830-1400Z07R-S-HA3-HP213	31046216
16,00	16	108	48	-	7	SCM830-1600Z07R-S-HA3-HP213	31046217
18,00	18	117	54	-	7	SCM830-1800Z07R-S-HA3-HP213	31046218
20,00	20	126	60	-	7	SCM830-2000Z07R-S-HA3-HP213	31046219
25,00	25	150	75	-	7	SCM830-2500Z07R-S-HA3-HP213	31046220

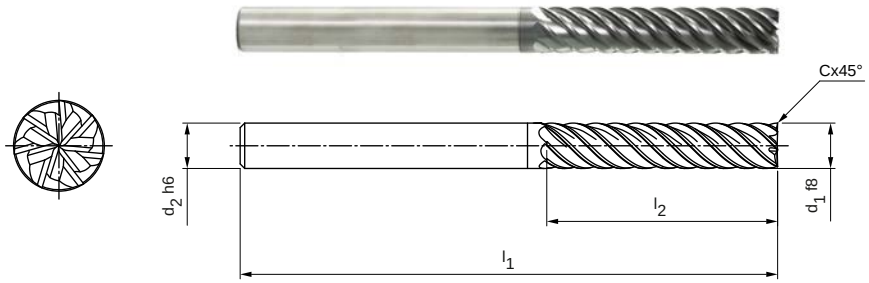
Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

OptiMill®-Uni-HPC-Finish

Design 5xD
SCM83

Design:

Milling cutter diameter:	8.00 - 25.00 mm
Cutting material:	HP213
Number of cutting edges:	7
Helix angle:	~ 45°
Special features:	Unequal spacing



P 1 2 3 4 5 6 M 1 2 3 K 1 2 3 N 1 2 3 4 S 1 2 3 4 5 H 1 2

Performance LINE | 45° | 90° | HA DIN 6535 | 5xD | NORM

Edge design with corner radius

Dimensions					z	Specification	Order No.
d_1 f8	d_2 h6	l_1	l_2	Cx45°			
8,00	8	81	40	0,08	7	SCM830-0800Z07R-F0008HA5-HP209	30936137
10,00	10	96	50	0,10	7	SCM830-1000Z07R-F0010HA5-HP209	30936138
12,00	12	112	60	0,12	7	SCM830-1200Z07R-F0012HA5-HP209	30936139
14,00	14	122	70	0,14	7	SCM830-1400Z07R-F0014HA5-HP209	30936150
16,00	16	136	80	0,16	7	SCM830-1600Z07R-F0016HA5-HP209	30936151
18,00	18	147	90	0,18	7	SCM830-1800Z07R-F0018HA5-HP209	30936152
20,00	20	160	100	0,20	7	SCM830-2000Z07R-F0020HA5-HP209	30936153
25,00	25	195	125	0,25	7	SCM830-2500Z07R-F0025HA5-HP209	30936154

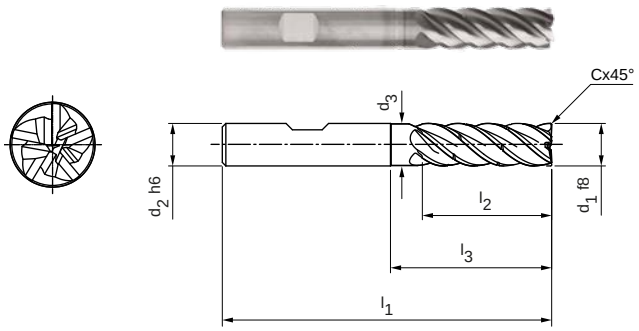
Edge design with sharp edge

8,00	8	81	40	-	7	SCM830-0800Z07R-S-HA5-HP209	31046449
10,00	10	96	50	-	7	SCM830-1000Z07R-S-HA5-HP209	31046470
12,00	12	112	60	-	7	SCM830-1200Z07R-S-HA5-HP209	31046471
14,00	14	122	70	-	7	SCM830-1400Z07R-S-HA5-HP209	31046473
16,00	16	136	80	-	7	SCM830-1600Z07R-S-HA5-HP209	31046474
18,00	18	147	90	-	7	SCM830-1800Z07R-S-HA5-HP209	31046475
20,00	20	160	100	-	7	SCM830-2000Z07R-S-HA5-HP209	31046476
25,00	25	195	125	-	7	SCM830-2500Z07R-S-HA5-HP209	31046477

Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

OptiMill®-Tro-Uni

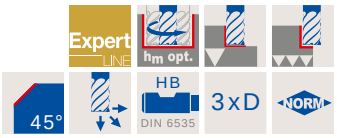
Design 3xD with neck, 2 chip breakers
SCM94



Design:

Milling cutter diameter:	12.00 - 20.00 mm
Cutting material:	HP213
Number of cutting edges:	5
Helix angle:	~ 41°
Balancing value:	Cutting edge portion balanced to G2.5 in acc. with DIN ISO1940-G2.5
Special features:	Unequal spacing

Application:
Design with additional chip breaker for optimal chip control. Ensures shortened chips.

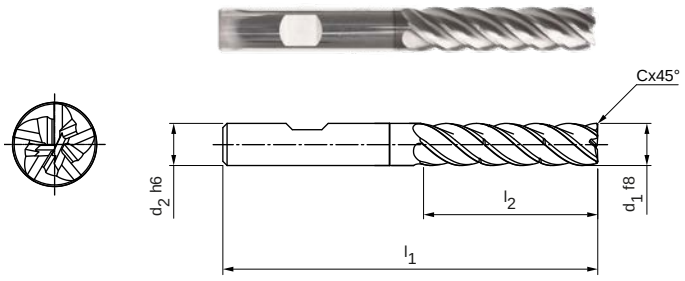


Dimensions							z	Specification	Order No.
d_1 f8	d_2 h6	d_3	l_1	l_2	l_3	Cx45°			
12,00	12	11,8	93	36	45	0,24	5	SCM940-1200Z05R-F0024HB3-HP213	31054530
14,00	14	13,8	99	42	50	0,28	5	SCM940-1400Z05R-F0028HB3-HP213	31054531
16,00	16	15,8	108	48	55	0,32	5	SCM940-1600Z05R-F0032HB3-HP213	31054532
20,00	20	19,8	126	60	70	0,40	5	SCM940-2000Z05R-F0040HB3-HP213	31054533

Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

OptiMill®-Tro-Uni

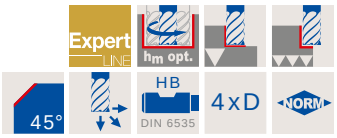
Design 4xD, 2 chip breakers
SCM94



Design:

Milling cutter diameter:	5.00 - 20.00 mm
Cutting material:	HP209
Number of cutting edges:	5
Helix angle:	~ 41°
Balancing value:	Cutting edge portion balanced to G2.5 in acc. with DIN ISO1940-G2.5
Special features:	Unequal spacing

Application:
Design with additional chip breaker for optimal chip control. Ensures shortened chips.

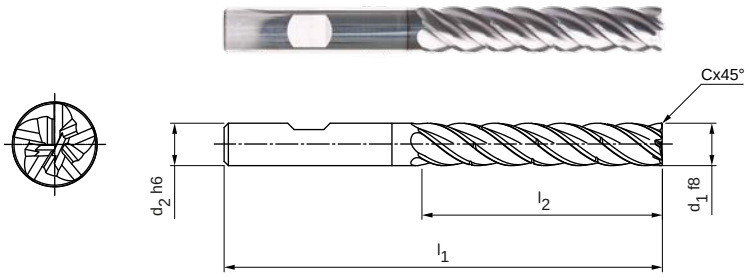


Dimensions					z	Specification	Order No.
d_1 f8	d_2 h6	l_1	l_2	Cx45°			
5,00	6	66	20	0,10	5	SCM940-0500Z05R-F0010HB4-HP209	31054534
6,00	6	66	24	0,12	5	SCM940-0600Z05R-F0012HB4-HP209	31054535
8,00	8	74	32	0,16	5	SCM940-0800Z05R-F0016HB4-HP209	31054536
10,00	10	89	40	0,20	5	SCM940-1000Z05R-F0020HB4-HP209	31054537
12,00	12	100	48	0,24	5	SCM940-1200Z05R-F0024HB4-HP209	31054538
14,00	14	108	56	0,28	5	SCM940-1400Z05R-F0028HB4-HP209	31054539
16,00	16	123	64	0,32	5	SCM940-1600Z05R-F0032HB4-HP209	31054540
20,00	20	140	80	0,40	5	SCM940-2000Z05R-F0040HB4-HP209	31054541

Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

OptiMill®-Tro-Uni

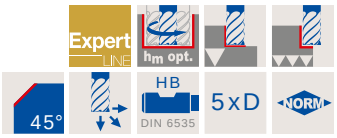
Design 5xD, 3 chip breakers
SCM94



Design:

Milling cutter diameter:	8.00 - 20.00 mm
Cutting material:	HP209
Number of cutting edges:	5
Helix angle:	~ 41°
Balancing value:	Cutting edge portion balanced to G2.5 in acc. with DIN ISO1940-G2.5
Special features:	Unequal spacing

Application:
Design with additional chip breaker for optimal chip control. Ensures shortened chips.

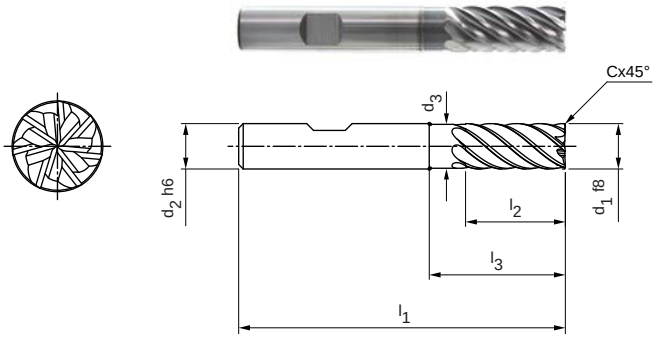


Dimensions					z	Specification	Order No.
d_1 f8	d_2 h6	l_1	l_2	Cx45°			
8,00	8	81	40	0,16	5	SCM940-0800Z05R-F0016HB5-HP209	31054542
10,00	10	96	50	0,20	5	SCM940-1000Z05R-F0020HB5-HP209	31054543
12,00	12	112	60	0,24	5	SCM940-1200Z05R-F0024HB5-HP209	31054544
14,00	14	122	70	0,28	5	SCM940-1400Z05R-F0028HB5-HP209	31054545
16,00	16	136	80	0,32	5	SCM940-1600Z05R-F0032HB5-HP209	31054546
20,00	20	160	100	0,40	5	SCM940-2000Z05R-F0040HB5-HP209	31054547

Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

OptiMill®-Tro-PM

Design 2xD with neck
SCM82

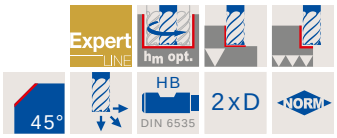


Design:

Milling cutter diameter:	4.00 - 25.00 mm
Cutting material:	HP723
Number of cutting edges:	7
Helix angle:	~ 40°
Balancing value:	Cutting edge portion balanced to G2.5 in acc. with DIN ISO1940-G2.5
Special features:	Unequal spacing

Application:
Especially for trochoidal milling – part-contact cutting/trimming. For cutting depths up to 2xD.

P 1 2 3 4 5 6 M 1 2 3 K 1 2 3 N 1 2 3 4 S 1 2 3 4 5 H 1 2



Dimensions						z	Specification	Order No.
d_1 f8	d_2 h6	l_1	l_2	l_3	Cx45°			
4,00	6	57	11	-	0,08	7	SCM820-0400Z07R-F0008HB2-HP723	30855545
5,00	6	57	13	-	0,10	7	SCM820-0500Z07R-F0010HB2-HP723	30855546
6,00	6	57	13	19	0,12	7	SCM820-0600Z07R-F0012HB2-HP723	30855547
8,00	8	63	19	25	0,16	7	SCM820-0800Z07R-F0016HB2-HP723	30855548
10,00	10	72	22	30	0,20	7	SCM820-1000Z07R-F0020HB2-HP723	30855549
12,00	12	83	26	36	0,24	7	SCM820-1200Z07R-F0024HB2-HP723	30855550
14,00	14	83	26	36	0,28	7	SCM820-1400Z07R-F0028HB2-HP723	30855551
16,00	16	92	32	42	0,32	7	SCM820-1600Z07R-F0032HB2-HP723	30855552
18,00	18	92	32	42	0,36	7	SCM820-1800Z07R-F0036HB2-HP723	30855553
20,00	20	104	41	52	0,40	7	SCM820-2000Z07R-F0040HB2-HP723	30855554
25,00	25	125	50	65	0,50	7	SCM820-2500Z07R-F0050HB2-HP723	30855555

Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

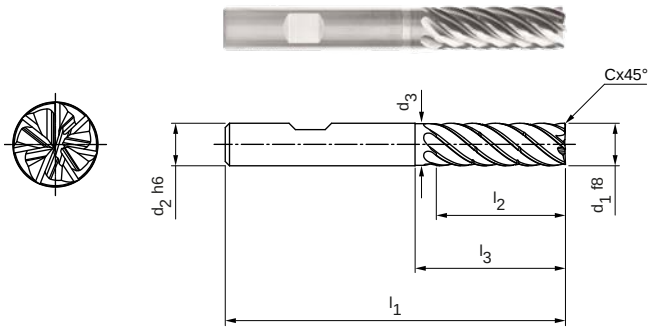
OptiMill®-Tro-PM

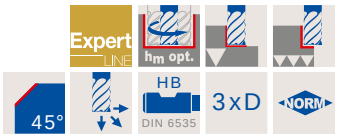
Design 3xD with neck, 2 chip breakers
SCM93

Design:

Milling cutter diameter:	12.00 - 20.00 mm
Cutting material:	HP723
Number of cutting edges:	7
Helix angle:	~ 40°
Dimensions:	Works standard
Special features:	Unequal spacing

Application:
Design with additional chip breaker for optimal chip control. Ensures shortened chips.





Dimensions							z	Specification	Order No.
d_1 f8	d_2 h6	d_3	l_1	l_2	l_3	Cx45°			
12,00	12	11,8	93	36	45	0,24	7	SCM930-1200Z07R-F0024HB3-HP723	31054500
14,00	14	13,8	99	42	50	0,28	7	SCM930-1200Z07R-F0028HB3-HP723	31054501
16,00	16	15,8	108	48	55	0,32	7	SCM930-1200Z07R-F0032HB3-HP723	31054502
20,00	20	19,8	126	60	70	0,40	7	SCM930-1200Z07R-F0040HB3-HP723	31054503

Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

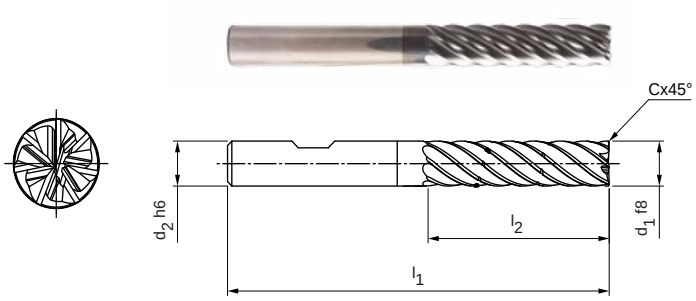
OptiMill®-Tro-PM

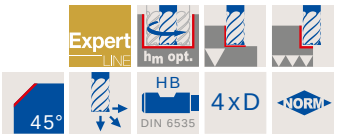
Design 4xD, 2 chip breakers
SCM93

Design:

Milling cutter diameter:	5.00 - 20.00 mm
Cutting material:	HP210
Number of cutting edges:	7
Helix angle:	~ 38°
Dimensions:	Works standard
Special features:	Unequal spacing

Application:
Design with additional chip breaker for optimal chip control. Ensures shortened chips.





Dimensions					z	Specification	Order No.
d_1 f8	d_2 h6	l_1	l_2	Cx45°			
5,00	6	66	20	0,10	7	SCM930-0500Z07R-F0010HB4-HP210	31054504
6,00	6	66	24	0,12	7	SCM930-0600Z07R-F0012HB4-HP210	31054505
8,00	8	74	32	0,16	7	SCM930-0800Z07R-F0016HB4-HP210	31054506
10,00	10	89	40	0,20	7	SCM930-1000Z07R-F0020HB4-HP210	31054507
12,00	12	100	48	0,24	7	SCM930-1200Z07R-F0024HB4-HP210	31054508
14,00	14	108	56	0,28	7	SCM930-1400Z07R-F0028HB4-HP210	31054509
16,00	16	123	64	0,32	7	SCM930-1600Z07R-F0032HB4-HP210	31054510
20,00	20	140	80	0,40	7	SCM930-2000Z07R-F0040HB4-HP210	31054511

Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

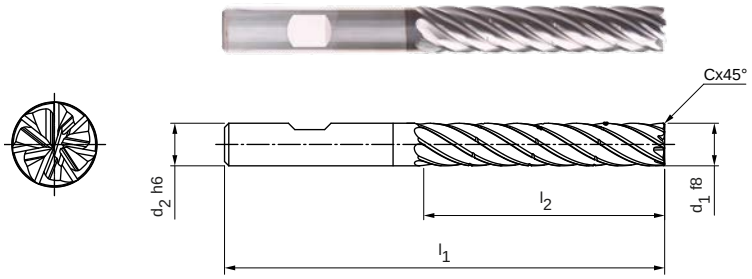
OptiMill®-Tro-PM

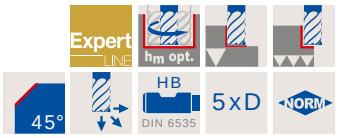
Design 5xD, 3 chip breakers
SCM93

Design:

Milling cutter diameter:	8.00 - 20.00 mm
Cutting material:	HP210
Number of cutting edges:	7
Helix angle:	~ 36°
Dimensions:	Works standard
Special features:	Unequal spacing

Application:
Design with additional chip breaker for optimal chip control. Ensures shortened chips.



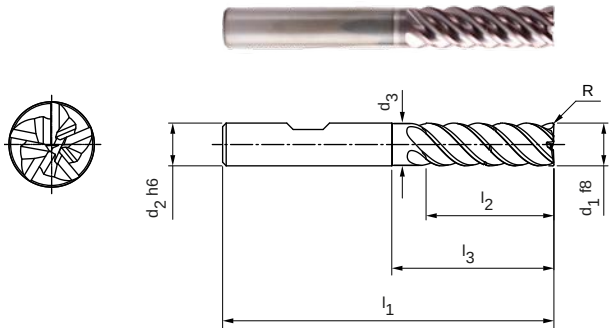


Dimensions					z	Specification	Order No.
d_1 f8	d_2 h6	l_1	l_2	Cx45°			
8,00	8	81	40	0,16	7	SCM930-0800Z07R-F0016HB5-HP210	31054512
10,00	10	96	50	0,20	7	SCM930-1000Z07R-F0020HB5-HP210	31054513
12,00	12	112	60	0,24	7	SCM930-1200Z07R-F0024HB5-HP210	31054514
14,00	14	122	70	0,28	7	SCM930-1400Z07R-F0028HB5-HP210	31054515
16,00	16	136	80	0,32	7	SCM930-1600Z07R-F0032HB5-HP210	31054516
20,00	20	160	100	0,40	7	SCM930-2000Z07R-F0040HB5-HP210	31054517

Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

OptiMill®-Tro-H

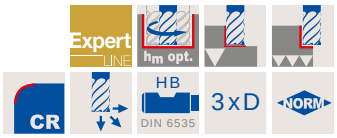
Design 3xD with neck, 1 chip breaker
SCM92



Design:

Milling cutter diameter:	5.00 - 25.00 mm
Cutting material:	HP827
Number of cutting edges:	5
Helix angle:	41° - 42°
Balancing value:	Cutting edge portion balanced to G2.5 in acc. with DIN ISO1940-G2.5
Special features:	Unequal spacing

Application:
Design with chip breaker for optimal chip control. Ensures shortened chips.

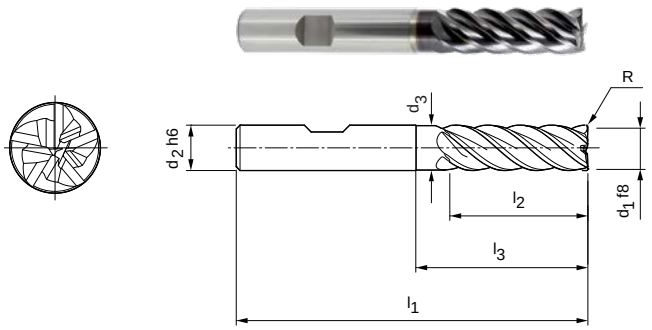


Dimensions							z	Specification	Order No.
d_1 f8	d_2 h6	d_3	l_1	l_2	l_3	R			
5,00	6	–	62	17	-	0,10	5	SCM920-0500Z05R-R0010HB-HP827	31053920
6,00	6	5,8	62	18	25	0,10	5	SCM920-0600Z05R-R0010HB-HP827	31053921
8,00	8	7,8	68	24	30	0,20	5	SCM920-0800Z05R-R0020HB-HP827	31053922
10,00	10	9,8	80	30	35	0,20	5	SCM920-1000Z05R-R0020HB-HP827	31053923
12,00	12	11,8	93	36	45	0,30	5	SCM920-1200Z05R-R0030HB-HP827	31053924
14,00	14	13,8	99	42	50	0,30	5	SCM920-1400Z05R-R0030HB-HP827	31053925
16,00	16	15,8	108	48	55	0,30	5	SCM920-1600Z05R-R0030HB-HP827	31053926
18,00	18	17,8	117	54	67	0,30	5	SCM920-1800Z05R-R0030HB-HP827	31053927
20,00	20	19,8	126	60	70	0,30	5	SCM920-2000Z05R-R0030HB-HP827	31053928
25,00	25	24,5	150	75	92	0,40	5	SCM920-2500Z05R-R0040HB-HP827	31053929

Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

OptiMill®-Tro-S

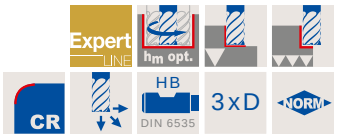
Design 3xD with neck
SCM60



Design:

Milling cutter diameter:	5.00 - 25.00 mm
Cutting material:	HP219
Number of cutting edges:	5
Helix angle:	41° - 42°
Balancing value:	Cutting edge portion balanced to G2.5 in acc. with DIN ISO1940-G2.5
Special features:	Unequal spacing

Application:
Especially for trochoidal milling – part-contact cutting/trimming. For cutting depths up to 3xD.

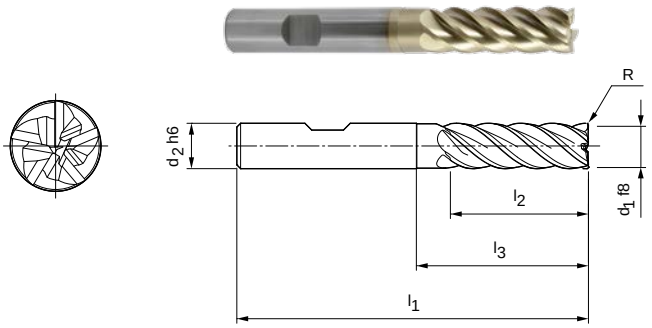


Dimensions							z	Specification	Order No.
d_1 f8	d_2 h6	d_3	l_1	l_2	l_3	R			
5,00	6	4,8	62	17	24	0,10	5	SCM600-0500Z05R-R0010HB-HP219	30564633
6,00	6	5,8	62	18	25	0,10	5	SCM600-0600Z05R-R0010HB-HP219	30564634
8,00	8	7,8	68	24	30	0,20	5	SCM600-0800Z05R-R0020HB-HP219	30564635
10,00	10	9,8	80	30	35	0,20	5	SCM600-1000Z05R-R0020HB-HP219	30564636
12,00	12	11,8	93	36	45	0,30	5	SCM600-1200Z05R-R0030HB-HP219	30564637
14,00	14	13,8	99	42	50	0,30	5	SCM600-1400Z05R-R0030HB-HP219	30564638
16,00	16	15,8	108	48	55	0,30	5	SCM600-1600Z05R-R0030HB-HP219	30564639
18,00	18	17,8	117	54	67	0,30	5	SCM600-1800Z05R-R0030HB-HP219	30605011
20,00	20	19,8	126	60	70	0,30	5	SCM600-2000Z05R-R0030HB-HP219	30564640
25,00	25	24,5	150	75	92	0,40	5	SCM600-2500Z05R-R0040HB-HP219	30605016

Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

OptiMill®-Tro-Titan

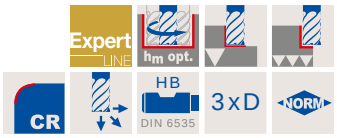
Design 3xD with neck
SCM63



Design:

Milling cutter diameter:	5.00 - 25.00 mm
Cutting material:	HP620
Number of cutting edges:	5
Helix angle:	41° - 42°
Balancing value:	Cutting edge portion balanced to G2.5 in acc. with DIN ISO1940-G2.5
Special features:	Unequal spacing

Application:
Especially for trochoidal milling – part-contact cutting/trimming. For cutting depths up to 3xD.



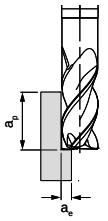
Dimensions						z	Specification	Order No.
d_1 f8	d_2 h6	l_1	l_2	l_3	R			
5,00	6	62	17	24	0,10	5	SCM630-0500Z05R-R0010HB-HP620	30651031
6,00	6	62	18	25	0,10	5	SCM630-0600Z05R-R0010HB-HP620	30651032
8,00	8	68	24	30	0,20	5	SCM630-0800Z05R-R0020HB-HP620	30651033
10,00	10	80	30	35	0,20	5	SCM630-1000Z05R-R0020HB-HP620	30651034
12,00	12	93	36	45	0,30	5	SCM630-1200Z05R-R0030HB-HP620	30651035
14,00	14	99	42	50	0,30	5	SCM630-1400Z05R-R0030HB-HP620	30651036
16,00	16	108	48	55	0,30	5	SCM630-1600Z05R-R0030HB-HP620	30651037
18,00	18	117	54	67	0,30	5	SCM630-1800Z05R-R0030HB-HP620	30651038
20,00	20	126	60	70	0,30	5	SCM630-2000Z05R-R0030HB-HP620	30651039
25,00	25	150	75	92	0,40	5	SCM630-2500Z05R-R0040HB-HP620	30651040

Dimensions in mm.
For cutting data recommendation, see end of section.
Special designs and other coatings on request.

Cutting data recommendation for shoulder milling cutters

Feed and cutting speed

Part-contact cutting



a_p = 1.5xD
a_e = 0.25xD

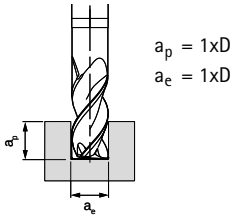
OptiMill-Alu-HPC-Pocket | SCM85

MMG*			Material	Strength/hardness [N/mm²] [HRC]	Cooling			v_c [m/min]	f_z [mm/tooth]					
									Milling cutter diameter [mm]					
					MQL/air	Dry	Wet		5.00	8.00	10.00	12.00	16.00	20.00
N	N1	N1.1	Aluminium, non-alloy and alloy < 3 % Si		✓	✓	✓	**945**	0.080	0.120	0.145	0.169	0.210	0.243
		N1.2	Aluminium, alloy ≤ 7 % Si		✓	✓	✓	**625**	0.084	0.126	0.152	0.177	0.221	0.256
		N1.3	Aluminium, alloy > 7-12 % Si		✓	✓	✓	**500**	0.088	0.132	0.160	0.186	0.231	0.268
		N1.4	Aluminium, alloy > 12 % Si		✓	✓	✓	**360**	0.096	0.144	0.174	0.202	0.252	0.292
	N2	N2.1	Copper, non-alloy and low-alloy	< 300 N/mm²	✓	✓	✓	**360**	0.064	0.096	0.116	0.135	0.168	0.195
		N2.2	Copper, alloy	> 300 N/mm²	✓	✓	✓	**270**	0.064	0.096	0.116	0.135	0.168	0.195
		N2.3	Brass, bronze, gunmetal	< 1200 N/mm²	✓	✓	✓	**450**	0.040	0.060	0.073	0.084	0.105	0.122
	N3	N3.1	Graphite											
	N4	N4.1	Plastic, thermoplastics		✓	✓	✓	**125**	0.040	0.060	0.073	0.084	0.105	0.122
		N4.2	Plastic, thermosets		✓	✓	✓	**185**	0.040	0.060	0.073	0.084	0.105	0.122
		N4.3	Plastic, foams		✓	✓		**565**	0.024	0.036	0.044	0.051	0.063	0.073

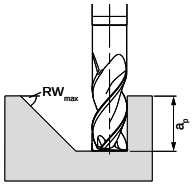
Note:
The cutting data stated are indicative.
The optimal data for the specific machining case should be determined in trials or during the machining.

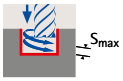
* MAPAL machining groups

Full cut



a_p = 1xD
a_e = 1xD





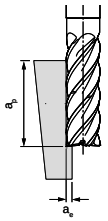
	v_c [m/min]	f_z [mm/tooth]						Ramping	Helix milling			Drilling
		Milling cutter diameter [mm]						RW_{max}	S_{max}	EW_{max}		f_z factor
		5.00	8.00	10.00	12.00	16.00	20.00			G = 1.5	G = 1.8	
	610	0.047	0.071	0.086	0.099	0.124	0.144	45°	0.75xD	25°	16°	0.8
	405	0.049	0.074	0.090	0.104	0.130	0.151	45°	0.75xD	25°	16°	0.8
	325	0.052	0.078	0.094	0.109	0.136	0.158	45°	0.75xD	25°	16°	0.8
	235	0.057	0.085	0.103	0.119	0.149	0.172	45°	0.75xD	25°	16°	0.8
	235	0.038	0.057	0.068	0.080	0.099	0.115	45°	0.75xD	25°	16°	0.8
	175	0.038	0.057	0.068	0.080	0.099	0.115	45°	0.75xD	25°	16°	0.8
	295	0.024	0.035	0.043	0.050	0.062	0.072	45°	0.75xD	25°	16°	0.8
	80	0.024	0.035	0.043	0.050	0.062	0.072	45°	0.75xD	25°	16°	0.8
	120	0.024	0.035	0.043	0.050	0.062	0.072	45°	0.75xD	25°	16°	0.8
	365	0.014	0.021	0.026	0.030	0.037	0.043	45°	0.75xD	25°	16°	0.8

Cutting data recommendation for shoulder milling cutters

Feed and cutting speed

Tool length/correction factor:		
Length	v_c	f_z
Short	1	1
Long	1	1
Overlong	0.8	0.9
3xD	0.8	0.7

Trochoidal milling



OptiMill-Uni-Wave | SCM88,89.90

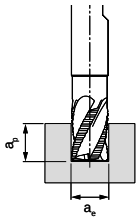
Please note: The use of the SCM90 design with 3xD is only recommended up to a maximum contact width of 0.25xD.

MMG*			Material	Strength/ hardness [N/mm²] [HRC]	Cooling			v_c [m/min]	f_z [mm/tooth] in % of D	a_e [mm] in % of D	h_m [mm] in % of D	
					MQL/air	Dry	Wet					
P	P1	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓	On request				
		P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓					
	P2	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓					
		P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓		✓					
	P3	P3.1	Tool, bearing, spring and high-speed steels	< 900	✓	✓	✓					
		P3.2	Tool, bearing, spring and high-speed steels	< 1500	✓		✓					
	P4	P4.1	Stainless steels, ferritic and martensitic		✓		✓					
	P5	P5.1	Cast steel				✓					
	P6	P6.1	Stainless cast steel, ferritic and martensitic				✓					
M	M1	M1.1	Stainless steels, austenitic	< 700	✓		✓	On request				
		M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000			✓					
	M2	M2.1	Stainless cast steel, austenitic	< 700	✓		✓					
	M3	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000			✓					
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	On request				
	K2	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓					
		K2.2	Cast iron with spheroidal graphite, GJS	500-800	✓	✓	✓					
		K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓					
	K3	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓					
		K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓					

Note:
The cutting data stated are indicative.
The optimal data for the specific machining case should be determined in trials or during the machining.

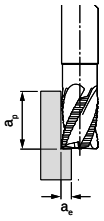
* MAPAL machining groups

Groove milling



a_p = 1xD
a_e = 1xD

Roughing



a_p = 1.5xD
a_e = 0.25xD

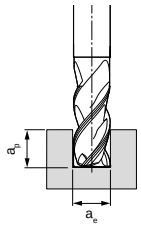
v_c [m/min]	f_z [mm/tooth]							v_c [m/min]	f_z [mm/tooth]						
	Milling cutter diameter [mm]								Milling cutter diameter [mm]						
	6.00	8.00	10.00	12.00	16.00	20.00	25.00		6.00	8.00	10.00	12.00	16.00	20.00	25.00
200	0.036	0.046	0.056	0.066	0.082	0.095	0.106	**405**	0.061	0.079	0.096	0.111	0.139	0.162	0.179
160	0.034	0.043	0.053	0.061	0.077	0.089	0.098	**330**	0.057	0.074	0.089	0.104	0.130	0.151	0.167
180	0.036	0.046	0.056	0.066	0.082	0.095	0.106	**370**	0.061	0.079	0.096	0.111	0.139	0.162	0.179
125	0.030	0.039	0.047	0.055	0.068	0.079	0.088	**260**	0.051	0.066	0.080	0.093	0.116	0.135	0.149
115	0.034	0.044	0.054	0.062	0.078	0.090	0.100	**240**	0.058	0.075	0.091	0.106	0.132	0.153	0.170
100	0.031	0.040	0.049	0.057	0.071	0.083	0.091	**200**	0.053	0.068	0.083	0.097	0.121	0.140	0.155
80	0.024	0.031	0.038	0.044	0.055	0.063	0.070	**165**	0.041	0.053	0.064	0.074	0.093	0.108	0.119
120	0.035	0.045	0.054	0.063	0.079	0.092	0.102	**245**	0.059	0.076	0.092	0.108	0.135	0.156	0.173
80	0.017	0.022	0.026	0.031	0.038	0.044	0.049	**165**	0.029	0.037	0.045	0.052	0.065	0.075	0.084
55	0.021	0.027	0.033	0.038	0.048	0.056	0.062	**110**	0.036	0.046	0.056	0.065	0.081	0.094	0.104
50	0.017	0.022	0.027	0.032	0.040	0.046	0.051	**105**	0.030	0.038	0.046	0.054	0.067	0.078	0.087
60	0.023	0.029	0.036	0.042	0.052	0.060	0.067	**120**	0.039	0.050	0.061	0.071	0.088	0.102	0.113
55	0.018	0.023	0.028	0.033	0.041	0.048	0.053	**110**	0.031	0.039	0.048	0.056	0.070	0.081	0.090
215	0.060	0.077	0.094	0.109	0.137	0.159	0.176	**440**	0.102	0.131	0.159	0.186	0.232	0.269	0.298
200	0.051	0.066	0.080	0.093	0.116	0.135	0.149	**405**	0.087	0.112	0.135	0.158	0.198	0.229	0.254
160	0.042	0.054	0.066	0.077	0.096	0.111	0.123	**330**	0.072	0.092	0.112	0.130	0.163	0.189	0.209
90	0.024	0.031	0.038	0.044	0.055	0.063	0.070	**185**	0.041	0.053	0.064	0.074	0.093	0.108	0.119
145	0.042	0.054	0.066	0.077	0.096	0.111	0.123	**295**	0.072	0.092	0.112	0.130	0.163	0.189	0.209
135	0.036	0.046	0.056	0.066	0.082	0.095	0.106	**275**	0.061	0.079	0.096	0.111	0.139	0.162	0.179

Cutting data recommendation for shoulder milling cutters

Feed and cutting speed

Tool length/correction factor:	
Length	f_z & v_c
Short	1
Long	0,9
Overlong	0,8
Extra long	0,6

Groove milling



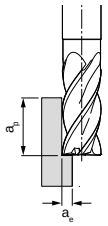
a_p = 1xD
a_e = 1xD

OptiMill-Uni-HPC-Plus | SCM72

MMG*			Material	Strength/ hardness [N/mm²] [HRC]	Cooling			v_c [m/ min]	f_z [mm/tooth]							
					MQL/air	Dry	Wet		Milling cutter diameter [mm]							
									2,00	4,00	6,00	8,00	10,00	12,00	16,00	20,00
P	P1	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓	**220**	0,016	0,029	0,041	0,053	0,064	0,075	0,093	0,108
		P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓	**180**	0,015	0,027	0,038	0,049	0,06	0,07	0,087	0,101
	P2	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓	**200**	0,016	0,029	0,041	0,053	0,064	0,075	0,093	0,108
		P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓		✓	**140**	0,014	0,024	0,034	0,044	0,053	0,062	0,078	0,09
	P3	P3.1	Tool, bearing, spring and high-speed steels	< 900	✓	✓	✓	**130**	0,015	0,027	0,039	0,05	0,061	0,071	0,089	0,103
		P3.2	Tool, bearing, spring and high-speed steels	< 1500	✓		✓	**110**	0,014	0,025	0,036	0,046	0,056	0,065	0,081	0,094
	P4	P4.1	Stainless steels, ferritic and martensitic		✓		✓	**90**	0,011	0,019	0,027	0,035	0,043	0,05	0,062	0,072
	P5	P5.1	Cast steel					**135**	0,016	0,028	0,04	0,051	0,062	0,072	0,09	0,105
	P6	P6.1	Stainless cast steel, ferritic and martensitic				✓	**90**	0,008	0,013	0,019	0,025	0,03	0,035	0,044	0,051
M	M1	M1.1	Stainless steels, austenitic	< 700	✓		✓	**60**	0,01	0,017	0,024	0,031	0,037	0,044	0,054	0,063
		M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000			✓	**55**	0,008	0,014	0,02	0,026	0,031	0,036	0,045	0,052
	M2	M2.1	Stainless cast steel, austenitic	< 700	✓		✓	**65**	0,01	0,018	0,026	0,033	0,041	0,047	0,059	0,069
	M3	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000			✓	**60**	0,008	0,014	0,021	0,026	0,032	0,037	0,047	0,054
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	**240**	0,027	0,048	0,068	0,088	0,107	0,124	0,156	0,18
	K2	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	**220**	0,023	0,041	0,058	0,075	0,091	0,106	0,132	0,153
		K2.2	Cast iron with spheroidal graphite, GJS	500-800	✓	✓	✓	**180**	0,019	0,034	0,048	0,062	0,075	0,087	0,109	0,126
		K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	**100**	0,011	0,019	0,027	0,035	0,043	0,05	0,062	0,072
	K3	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	**160**	0,019	0,034	0,048	0,062	0,075	0,087	0,109	0,126
		K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	**150**	0,016	0,029	0,041	0,053	0,064	0,075	0,093	0,108

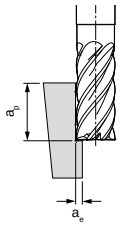
* MAPAL machining groups

Roughing



a_p = 1.5xD
a_e = 0.25xD

Finishing



a_p = 1.5xD
a_e = 0.1xD

v_c [m/min]	f_z [mm/tooth] Milling cutter diameter [mm]								v_c [m/min]	f_z [mm/tooth] Milling cutter diameter [mm]							
	2,00	4,00	6,00	8,00	10,00	12,00	16,00	20,00		2,00	4,00	6,00	8,00	10,00	12,00	16,00	20,00
445	0,028	0,049	0,07	0,09	0,109	0,127	0,158	0,184	**655**	0,044	0,077	0,11	0,142	0,172	0,2	0,251	0,29
365	0,026	0,046	0,065	0,084	0,101	0,118	0,148	0,171	**535**	0,041	0,072	0,103	0,132	0,16	0,187	0,234	0,271
405	0,028	0,049	0,07	0,09	0,109	0,127	0,158	0,184	**595**	0,044	0,077	0,11	0,142	0,172	0,2	0,251	0,29
285	0,023	0,041	0,058	0,075	0,091	0,106	0,132	0,153	**415**	0,036	0,064	0,092	0,118	0,143	0,167	0,209	0,242
265	0,026	0,046	0,066	0,085	0,103	0,12	0,151	0,174	**385**	0,042	0,073	0,105	0,135	0,163	0,19	0,238	0,276
225	0,024	0,042	0,06	0,078	0,094	0,11	0,137	0,159	**325**	0,038	0,067	0,095	0,123	0,149	0,174	0,217	0,252
180	0,018	0,033	0,046	0,06	0,072	0,084	0,106	0,122	**265**	0,029	0,052	0,073	0,094	0,115	0,133	0,167	0,194
270	0,027	0,047	0,067	0,087	0,105	0,122	0,153	0,177	**400**	0,042	0,075	0,106	0,137	0,166	0,194	0,242	0,281
180	0,013	0,023	0,033	0,042	0,051	0,059	0,074	0,086	**265**	0,02	0,036	0,051	0,066	0,08	0,093	0,117	0,135
120	0,016	0,029	0,041	0,052	0,063	0,074	0,092	0,107	**180**	0,026	0,045	0,064	0,083	0,1	0,117	0,146	0,169
115	0,013	0,024	0,034	0,043	0,053	0,061	0,077	0,089	**165**	0,021	0,037	0,053	0,068	0,083	0,097	0,121	0,14
135	0,018	0,031	0,044	0,057	0,069	0,08	0,1	0,116	**195**	0,028	0,049	0,07	0,09	0,109	0,127	0,159	0,184
120	0,014	0,024	0,035	0,045	0,054	0,063	0,079	0,092	**180**	0,022	0,039	0,055	0,071	0,086	0,1	0,125	0,145
485	0,046	0,082	0,116	0,149	0,181	0,211	0,264	0,306	**715**	0,073	0,129	0,184	0,236	0,286	0,334	0,418	0,484
445	0,039	0,069	0,099	0,127	0,154	0,179	0,224	0,26	**655**	0,062	0,11	0,156	0,201	0,243	0,284	0,355	0,411
365	0,032	0,057	0,081	0,105	0,127	0,148	0,185	0,214	**535**	0,051	0,09	0,128	0,165	0,2	0,234	0,292	0,339
200	0,018	0,033	0,046	0,06	0,072	0,084	0,106	0,122	**295**	0,029	0,052	0,073	0,094	0,115	0,133	0,167	0,194
325	0,032	0,057	0,081	0,105	0,127	0,148	0,185	0,214	**475**	0,051	0,09	0,128	0,165	0,2	0,234	0,292	0,339
305	0,028	0,049	0,07	0,09	0,109	0,127	0,158	0,184	**445**	0,044	0,077	0,11	0,142	0,172	0,2	0,251	0,29

Cutting data recommendation for shoulder milling cutters

Feed and cutting speed

Factors for tool lengths 3xD/4xD/5xD **

Max. machining depth a_p	a_e max.	Correction factors	
		v_c	f_z
3xD	0,1xD	0,9	0,9
4xD	0,05xD	0,9	0,7
5xD	0,05xD	0,8	0,6

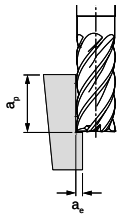
OptiMill-Uni-HPC-Finish | SCM83

MMG*			Material	Strength/hardness [N/mm²] [HRC]	Cooling			
					MQL/air	Dry	Wet	
P	P1	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓	
		P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓	
	P2	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓	
		P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓	✓	✓	
	P3	P3.1	Tool, bearing, spring and high-speed steels	< 900	✓	✓	✓	
		P3.2	Tool, bearing, spring and high-speed steels	< 1500	✓		✓	
	P4	P4.1	Stainless steels, ferritic and martensitic		✓		✓	
	P5	P5.1	Cast steel				✓	
	P6	P6.1	Stainless cast steel, ferritic and martensitic				✓	
M	M1	M1.1	Stainless steels, austenitic	< 700	✓		✓	
		M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000			✓	
	M2	M2.1	Stainless cast steel, austenitic	< 700	✓		✓	
	M3	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000			✓	
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	
	K2	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	
		K2.2	Cast iron with spheroidal graphite, GJS	500-800	✓	✓	✓	
		K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	
	K3	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	
		K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	

* MAPAL machining groups

** For very good surface finish results, the feed must be further reduced!

Finishing



a_p = 1.5xD
a_e = 0.1xD

	v_c [m/min]	f_z [mm/tooth]							
		Milling cutter diameter [mm]							
		4.00	6.00	8.00	10.00	12.00	16.00	20.00	25.00
	475	0.040	0.057	0.074	0.089	0.104	0.130	0.151	0.167
	390	0.038	0.053	0.069	0.083	0.097	0.122	0.141	0.156
	430	0.040	0.057	0.074	0.089	0.104	0.130	0.151	0.167
	300	0.034	0.048	0.061	0.074	0.087	0.109	0.126	0.139
	280	0.038	0.054	0.070	0.085	0.099	0.124	0.143	0.159
	240	0.035	0.050	0.064	0.077	0.090	0.113	0.131	0.145
	195	0.027	0.038	0.049	0.060	0.069	0.087	0.101	0.111
	290	0.039	0.055	0.071	0.086	0.101	0.126	0.146	0.162
	195	0.019	0.027	0.034	0.042	0.049	0.061	0.070	0.078
	130	0.023	0.033	0.043	0.052	0.061	0.076	0.088	0.098
	120	0.019	0.028	0.036	0.043	0.050	0.063	0.073	0.081
	145	0.025	0.036	0.047	0.057	0.066	0.083	0.096	0.106
	130	0.020	0.029	0.037	0.045	0.052	0.065	0.075	0.084
	520	0.067	0.095	0.123	0.149	0.174	0.217	0.252	0.279
	475	0.057	0.081	0.104	0.127	0.147	0.185	0.214	0.237
	390	0.047	0.067	0.086	0.104	0.121	0.152	0.176	0.195
	215	0.027	0.038	0.049	0.060	0.069	0.087	0.101	0.111
	345	0.047	0.067	0.086	0.104	0.121	0.152	0.176	0.195
	325	0.040	0.057	0.074	0.089	0.104	0.130	0.151	0.167

Cutting data recommendation for trochoidal milling cutters

Feed and cutting speed

Correction factors

Factor	v_c		a_e	h_m max.
	P K	M		
2xD	1,10	1,05	1,05	1,05
3xD	1,00	1,00	1,00	1,00
4xD	0,85	0,92	0,90	0,94
5xD	0,60	0,80	0,80	0,87

OptiMill-Tro-Uni | SCM58
OptiMill-Tro-PM | SCM82

MMG*			Material	Strength/hardness [N/mm²] [HRC]	Cooling			
					MQL/air	Dry	Wet	
P	P1	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓	
		P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓	
	P2	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓	
		P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓		✓	
	P3	P3.1	Tool, bearing, spring and high-speed steels	< 900	✓	✓	✓	
		P3.2	Tool, bearing, spring and high-speed steels	< 1500	✓		✓	
	P4	P4.1	Stainless steels, ferritic and martensitic		✓		✓	
	P5	P5.1	Cast steel				✓	
	P6	P6.1	Stainless cast steel, ferritic and martensitic				✓	
M	M1	M1.1	Stainless steels, austenitic	< 700	✓		✓	
		M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000			✓	
	M2	M2.1	Stainless cast steel, austenitic	< 700	✓		✓	
	M3	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000			✓	
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	
	K2	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	
		K2.2	Cast iron with spheroidal graphite, GJS	500-800	✓	✓	✓	
		K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	
	K3	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	
		K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	

Calculation example for 42CrMo4 ø 12 mm:

$f_z \mid a_e \mid h_m$ max. $= \frac{D}{100} \cdot$ value, see table

								①	②	③
P2.2	Nitrier-, Einsatz- und Vergütungsstähle, legiert	< 1400	✓		✓	280-380		1,0-1,6	8-12	0,56-0,68

① $f_z = \frac{12\ mm}{100} \cdot 1.2 - 0.144\ mm$

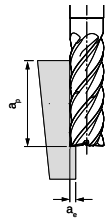
② $a_e = \frac{12\ mm}{100} \cdot 10 = 1.2\ mm$

③ h_m max. $= \frac{12\ mm}{100} \cdot 0.6 - 0.072\ mm$

Note:
With trochoidal milling, the cutting conditions indicated change during the machining process. This is also dependent on the CAM software used and the machining position of the tool in the workpiece. Feed rate and contact width or contact angle change constantly during the machining process in order to achieve the most constant average chip thickness possible, depending on the contour.

* MAPAL machining groups

Trochoidal milling



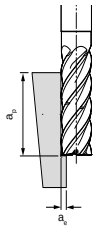
a_p = Dependent on max. machining depth of the tool
a_e = Dependent on the material

	v_c [m/min]	f_z [mm/tooth] in % of D	a_e [mm] in % of D	h_m max. [mm] in % of D	Machining example	
	380 – 520	1.4 - 2.0	14 - 18	0.66 - 0.80		
	320 – 460	1.2 - 1.8	12 - 16	0.62 - 0.76		
	340 – 480	1.2 - 1.8	10 - 14	0.58 - 0.71	**16MnCr5**	**42CrMo4**
	280 – 380	1.0 - 1.6	8 - 12	0.56 - 0.68	ø = 12 mm v_c = 480 m/min f_z = 0.22 mm a_e = 1.7 mm a_p = 32 mm	ø = 12 mm v_c = 375 m/min f_z = 0.17 mm a_e = 1.2 mm a_p = 32 mm
	240 – 350	1.0 - 1.6	8 - 14	0.54 - 0.65		
	210 – 320	0.8 - 1.4	6 - 12	0.52 - 0.62		
	180 – 260	0.8 - 1.2	6 - 12	0.50 - 0.60		
	220 – 300	1.2 - 1.8	8 - 12	0.54 - 0.62		
	160 – 240	0.8 - 1.4	6 - 12	0.50 - 0.60		
	140 – 220	0.6 - 1.0	5 - 10	0.48 - 0.60	**X5CrNi18-8**	
	110 – 180	0.6 - 1.0	5 - 10	0.46 - 0.58	ø = 12 mm v_c = 180 m/min f_z = 0.09 mm	a_e = 1.2 mm a_p = 32 mm
	130 – 200	0.8 - 1.2	6 - 12	0.52 - 0.60		
	120 – 180	0.8 - 1.2	5 - 10	0.46 - 0.56		
	400 – 500	2.0 - 2.6	15 - 20	0.64 - 0.78		
	340 – 500	1.8 - 2.4	12 - 16	0.62 - 0.70		
	300 – 440	1.6 - 2.2	10 - 14	0.58 - 0.68		
	180 – 260	1.4 - 2.0	8 - 12	0.56 - 0.68		
	280 – 360	1.6 - 2.2	10 - 16	0.60 - 0.68		
	210 – 340	1.4 - 2.0	10 - 16	0.58 - 0.66		

Cutting data recommendation for trochoidal milling cutters

Feed and cutting speed

Trochoidal milling



a_p = max. 3xD
a_e = dependent on the material

OptiMill-Tro-S | SCM60
OptiMill-Tro-Titan | SCM63

MMG*			Material	Strength/ hardness [N/mm²] [HRC]	Cooling			v_c [m/min]	f_z [mm/tooth] in % of D	a_e [mm] in % of D	h_m max. [mm] in % of D
					MQL/air	Dry	Wet				
S	S1	S1.1	Titanium, titanium alloys	< 400			✓	**110 – 170**	0.65 - 1.3	6 - 12	0.52 - 0.6
	S2	S2.1	Titanium, titanium alloys	< 1200			✓	**90 – 150**	0.6 - 1.2	5 - 10	0.46 - 0.56
		S2.2	Titanium, titanium alloys	> 1200			✓	**70 – 130**	0.4 - 1.0	5 - 10	0.42 - 0.54
	S3	S3.1	Nickel, non-alloy and alloy	< 900			✓	**60 – 120**	0.4 - 1.0	5 - 10	0.4 - 0.52
		S3.2	Nickel, non-alloy and alloy	> 900			✓	**50 – 100**	0.3 - 0.9	5 - 10	0.4 - 0.52
	S4	S4.1	High-temperature super alloy Ni, Co and Fe-based				✓	**35 – 90**	0.3 - 0.8	4 - 8	0.38 - 0.46
	S5	S5.1	Tungsten and molybdenum alloys				✓	**35 – 90**	0.3 - 0.8	4 - 8	0.38 - 0.46

OptiMill-Tro-H | SCM92

H	H1	H1.1	Hardened steel/cast steel	45 - 55	✓	✓		**80 – 140**	0.45 - 0.65	4 - 8	0.28 - 0.36
		H1.2	Hardened steel/cast steel	55 - 64	✓	✓		**60 – 120**	0.4 - 0.52	3 - 6	0.27 - 0.34
		H1.3	Hardened steel/cast steel	64 - 70	✓	✓		**50 – 100**	0.3 - 0.5	2 - 5	0.25 - 0.32
	H2	H2.1	Wear-resistant cast iron/chilled cast iron, GJN		✓			**60 – 120**	0.35 - 0.55	3 - 6	0.28 - 0.34

Note:
With trochoidal milling, the cutting conditions indicated change during the machining process. This is also dependent on the CAM software used and the machining position of the tool in the workpiece. Feed rate and contact width or contact angle change constantly during the machining process in order to achieve the most constant average chip thickness possible, depending on the contour.

* MAPAL machining groups

	Machining example		
	TiAl6V4	ø = 12 mm v_c = 140 m/min f_z = 0.09 mm a_e = 1.2 mm a_p = 30 mm	
	90MnCrV8	ø = 12 mm v_c = 110 m/min f_z = 0.052 mm h_m = 0.04 mm a_e = 1 mm	

PCD FACE MILLING CUTTERS

Introduction

Selection aid 170
Designation key 174
Introduction to technology – PowerMill-Blue 176
Introduction to technology – FaceMill-Diamond 178

PowerMill-Blue

PowerFeed-Blue 180
PowerFix-Blue 181
PowerSpeed-Blue 182
PowerMill-Blue – milling cartridge PBC 183

FaceMill

FaceMill-Diamond 184

Accessories and spare parts

Milling cutters with PCD milling cartridges – System Power 186

Technical appendix

Handling notes, PCD face milling cutters - System Power 188
Cutting data recommendation 190

SELECTION OF A MILLING CUTTER

Step-by-step to the right milling cutter

You are looking for a PCD face milling cutter with milling cartridges that can be reground for finishing aluminium?
This selection aid will lead you step-by-step to the right milling cutter.

1	**Material suitability**	Identify your workpiece material as per the MAPAL machining groups (MMG).	>	N	Non-ferrous metals and plastics	C Composite materials
2	**Manufacturing processes**	Select your manufacturing process.	>		Roughing	 Medium machining
3	**Geometry features**	Check whether the geometric features meet your requirements.	>	Maximum cutting depth		Milling cutter system and milling cartridge
4.1	**Product**	Select your milling cutter. If designs with different spacing are available, please note the optional step 4.2 "Process conditions".	>			
4.2	**Optional: Process conditions**	Select your process conditions. In unfavourable conditions, select a milling cutter with a wide spacing, in good conditions a milling cutter with a close spacing.	>		**Process conditions good:** - Stable conditions - Low contact width	

Finishing

Chip removal	Coolant supply	Suitability for regrinding	Diameter range

Process conditions unfavourable:
- Ratio a_e / D > 0.6
- High stock removal
- Part/clamping fixture/machine susceptible to vibration

PCD face milling cutters

Material suitability						Application			Technical design							
P	M	K	N	C	S				a_p max. [mm]	System	Milling cartridge	Chip removal	Coolant supply		Can be reground	ø [mm]
													Insert	Central		
			■	⬓		⬓	■	■	5	 Power	 PMC	Replaceable chip deflector		✔	✔	50-500
			■	⬓		■	■	■	5	 Power	 PBC	Integrated chip deflector	✔		✔	50-400
			■	⬓			⬓	■	3	 Eco	 EMC	Integrated chip deflector		✔		50-400
			■	⬓				■	2	 Eco	 EBC	Integrated chip guiding geometry	✔			32-400
			■	⬓				■	1	 Eco	 RBC	Integrated chip guiding geometry	✔			32-200
			■	⬓			⬓	■	3	 Eco	 FMC			✔		63-160
			■	⬓		⬓	■	■	10	 SHM	Brazed		✔	✔	✔	40-125

■ highly suitable ⬓ suitable in some situations

Step 1: Material suitability

Step 2: Application

Step 3: Geometry features

Step 4: Process conditions

Product				Catalogue			
Series	Design			MC 2017*	SV 2018**	SV 2019***	Page
	Wide spacing	Close spacing	Monolithic				
PowerMill				✔			
PowerMill-Blue	N 	N 	N 			✔	180
EcoMill				✔			
EcoMill-Blue				✔			
RapidMill-Blue				✔			
FlyCutter				✔			
FaceMill-Diamond		+ 		✔		✔	184

* Main catalogue 2017
** Supplementary volume 2018
*** Supplementary volume 2019

Process conditions good

Process conditions unfavourable

N New

\+ Additions to programme

Designation key

Face milling cutters with PCD milling cartridges

C	F	M	9	0	1	-	1	2	5	-	C	A	4	0	-

Milling cutter type

CFM	Face milling cutter with milling cartridges Cartridge Face Mill

Contact angle/installation position

90	90°

Cooling

0	External coolant supply
1	Internal coolant supply

Tool diameter

125	Milling cutter ø = 125 mm

Connection (examples)

CA22	Milling cutter arbor ø = 22 mm
CA27	Milling cutter arbor ø = 27 mm
CA32	Milling cutter arbor ø = 32 mm
CA40	Milling cutter arbor ø = 40 mm
CA60	Milling cutter arbor ø = 60 mm
A063	HSK-A63
S040	SK40

PCD milling cartridges

P	B	C	-	6	1	1	-	1	-	P	U	6	1	1

Milling cartridge

PBC	PowerMill-Blue
PMC	PowerMill
EMC	EcoMill
FMC	FlyCutter
EBC	EcoMill-Blue
RBC	RapidMill-Blue

Type

6	Corner milling insert
7	Face milling insert
8	Wide finishing milling insert
9	PT milling insert

Rake angle

1	6°
2	3°
3	0°
4	10°
5	15°
X	Custom

Cutting edge form

1	R_z value ≤ 5 µm / radius*
2	R_z value ≤ 10 µm
3	R_z value ≤ 20 µm
4	R_z value > 20 µm

Running direction

0	Clockwise
1	Counter-clockwise

Cutting material

PU	PCD

* Only with wide finishing milling insert type.

Z	1	4	R	-	P	B	C	-	A

Effective number of cutting edges (eff.) (Examples)

Z05	Eff. number of teeth = 5
Z14	Eff. number of teeth = 14

Direction of rotation

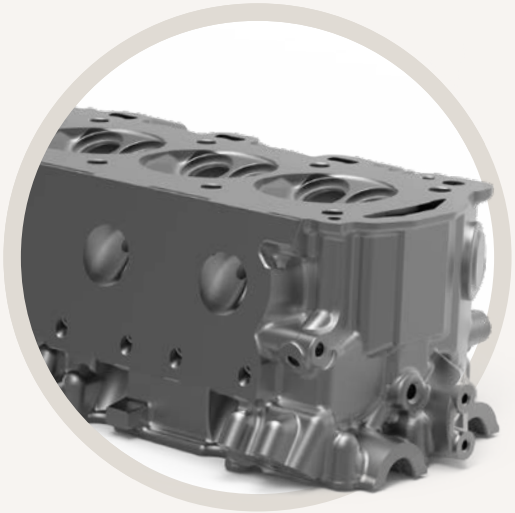
R	Right
L	Left

Milling cartridge

PBC	PowerMill-Blue
PMC	PowerMill
EBC	EcoMill-Blue
EMC	EcoMill
FMC	FlyCutter
RBC	RapidMill-Blue

Body material

A	Tool body made of aluminium
S	Tool body made of steel



New generation of PCD face milling cutters for the highest surface finish

The face milling cutter from MAPAL with replaceable PCD milling cartridges is the cutter of choice to achieve the best surfaces when machining aluminium. The setting and clamping system for the milling cartridges has also proven itself in innumerable applications. Now MAPAL is presenting a new, optimised generation of these milling cutters for cutting depths of a_p = 5 mm.

The chip guiding geometry was optimised for the new "PowerMill-Blue" series. The chip former is no longer integrated into the tool body but directly into the milling cartridges. The chips are reliably removed outside and scratches on the surface as well as transport scoring is virtually excluded. The result is even better surface finishes.

Instead of a central coolant supply, the cutting edges are directly supplied with cooling lubricant at the cutting point. The coolant outlet is integrated into the milling cartridge. As a result, the new milling cutter is also suited for MQL machining (up to ø 125 mm recommended). Compared with the previous generation, noise is minimised due to a low cutting edge overhang.

The PCD milling cartridges can be reground for the highest level of cost-effectiveness.

AT A GLANCE

- Means of choice for aluminium machining
- Proven setting and clamping system
- Cutting depths up to a_p = 5 mm
- Optimised chip guiding geometry
- Optimised coolant supply

ADVANTAGES

- Better surface finishes
- Minimised noise
- Highest cost-effectiveness
- PCD milling cartridges
- Can be reground

Tool features in detail

1 Special cutting edge geometry
- Face milling insert
- Corner milling insert
- Wide finishing milling insert
- PT milling insert for defined roughness depths

2 Replaceable PCD milling cartridges
- PCD cutting edges for very long tool lives
- Special chip guiding geometry for targeted chip removal

3 Safety screw
- Perfect seating of milling cartridge in tool body

4 Adjusting screw
- Exact, reliable adjustment of the axial run-out even in extreme conditions
- Simple handling

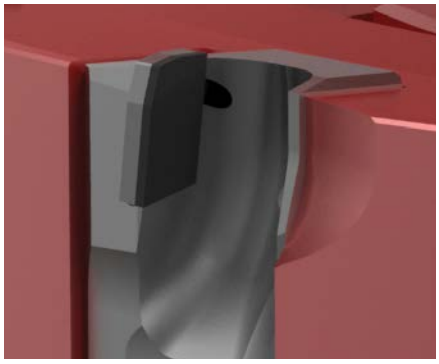
5 Tool body made of steel or aluminium
- Lightweight design allows use at very high spindle speeds (from ø 160 mm)

6 Balancing screws
- Perfect radial run-out due to balanced milling body

Innovative chip guiding geometry

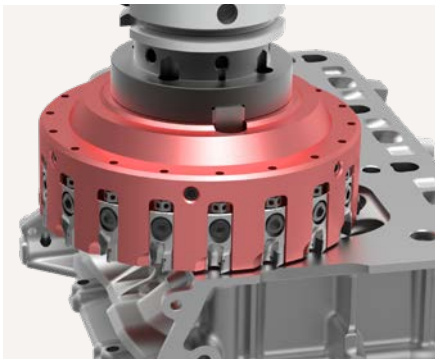
- Chip former directly integrated into milling cartridge
- Significantly better surface finish
- Reliable chip removal
- No transport scoring on the part surface as the chips are discharged to the outside

Integrated coolant outlets



- Direct cooling and lubrication of the cutting edges
- Suitable for dry and MQL machining
- Reduced noise level due to minimisation of the cutting edge overhang

Robust basic set-up



- Simple, robust construction
- Milling cartridges can be reground for high cost-effectiveness
- Proven setting system ensures exact, reliable adjustment of the axial run-out even in extreme application conditions
- Cutting depths up to a_p = 5 mm

Controlled chip removal for more quality, productivity, process reliability and tool life.

FaceMill-Diamond – Greater flexibility for face milling

The FaceMill-Diamond PCD face milling cutter has been successfully in use worldwide for many years. It demonstrates its particular strength, however, during HPC applications or when machining unstable parts – and that with cutting depths up to 10 mm. The monolithic design with brazed PCD cutting edges allows large numbers of teeth, thus enabling high feeds and higher material removal rates. Machining with the FaceMill-Diamond results in very good surface finishes and long lives of the tool.

The FaceMill-Diamond has now been overhauled with the goal of making the proven solution even better. For optimum cooling and lubrication of the PCD cutting edges, the coolant outlets are positioned directly at the cutting edges in the new model. This ensures improved chip removal and offers significant benefits, particularly in applications with minimum quantity lubrication or air cooling.

The most apparent change in the new FaceMill-Diamond results from the demand for greater flexibility and independence of the machine interface. The face milling cutter is now designed as a modular milling head variant. The milling cutter can now be flexibly used particularly for small series with machinery with different connections or even for large series that are produced on another machine and then relocated.

AT A GLANCE

- Large number of fixed brazed PCD cutting edges
- Proven geometry variants available for different surface finish demands (≤ 10 µm / > 10 µm)
- Cutting depths of up to a_p = 10 mm possible

ADVANTAGES

- Improved chip removal and longer tool lives thanks to cooling directly at the cutting edge
- Cutter head variant for flexible use with different machine connections

Tool features in detail

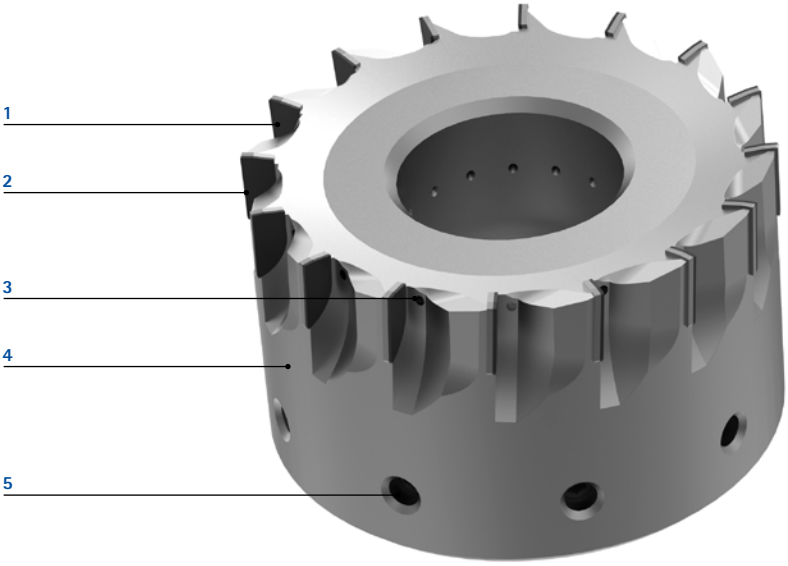
1 Brazed PCD cutting edges
- Cutting edges made of PCD for long tool lives
- Large cutting depth up to 10 mm possible

2 Proven cutting edge geometry
- Available for different surface finish requirements ($R_z \leq 10$ µm / > 10 µm)

3 Integrated coolant outlets
- Direct cooling and lubrication of the cutting edges
- Improved chip removal

4 Tool body made of steel
- Wear-resistant and ductile
- Multiple reconditioning possible

5 Balancing screws
- Perfect radial run-out due to balanced milling body



Largest number of cutting edges

- Highest symmetry and smooth running make extreme cutting speeds possible
- High feed rates possible, thus highest possible productivity

Direct coolant supply

- Cooling directly at the cutting edge ensures improved chip removal
- Significantly reduced risk of chips between workpiece and tool

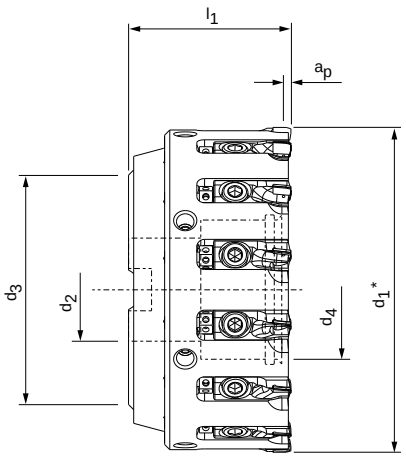
Modular construction

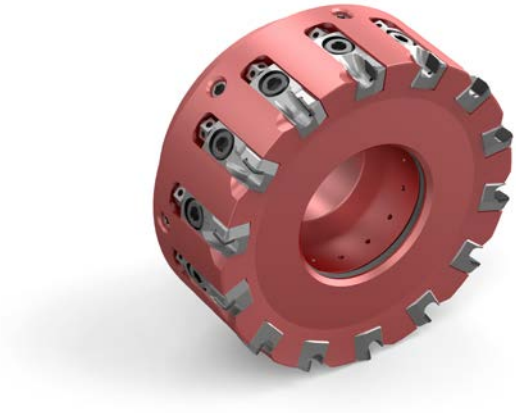
- Highest flexibility due to modularity and independence if there is machine park with different connections
- Especially for small series with different machinery
- Reduced noise level due to minimum cutting edge overhang and compact design

Highest flexibility for more productivity in manufacturing.

PowerFeed-Blue

PCD face milling head, close spacing
PowerMill-Blue





Tool body made of steel

Dimensions					z_{eff}	a_p max.	Weight incl. milling cartridges [kg]	Max. operating speed [rpm]	Specification	Order No.
d_1*	d_2	d_3	d_4	l_1						
63	22	48	26	48	8	5	0,9	25.000	CFM901-063-CA22-Z08R-PBC-S	30940668
80	27	60	34	50	8	5	1,5	20.000	CFM901-080-CA27-Z08R-PBC-S	30940702
100	32	78	43	50	10	5	2,4	18.000	CFM901-100-CA32-Z10R-PBC-S	30940704
125	40	89	54	63	14	5	4,7	16.000	CFM901-125-CA32-Z14R-PBC-S	30982045

Tool body made of aluminium

100	32	78	43	50	10	5	1,2	18.000	CFM901-100-CA32-Z10R-PBC-A	30982042
125	40	89	54	63	14	5	2,2	16.000	CFM901-125-CA40-Z14R-PBC-A	30940706
160	40	96	-	63	18	5	2,7	13.000	CFM901-160-CA40-Z18R-PBC-A	30940708
200	60	134	-	63	24	5	4,0	10.000	CFM901-200-CA60-Z24R-PBC-A	30940721
250	60	134	-	63	30	5	6,4	8.000	CFM901-250-CA60-Z30R-PBC-A	30940725
315	60	232	-	80	36	5	12,3	7.000	CFM901-315-CA60-Z36R-PBC-A	30940727
400	60	232	-	80	48	5	19,4	5.500	CFM901-400-CA60-Z48R-PBC-A	30982049

Accessories

	PBC	Milling cartridge	Page 183
		Milling cutter arbor see MAPAL catalogue "CLAMPING"	
	d_1	Fastening screws for milling cutter arbor	Order No.
	160 - 180 200 - 400	ISO 4762 - M12x45-12.9 ISO 4762 - M16x50-12.9	10006594 10007775

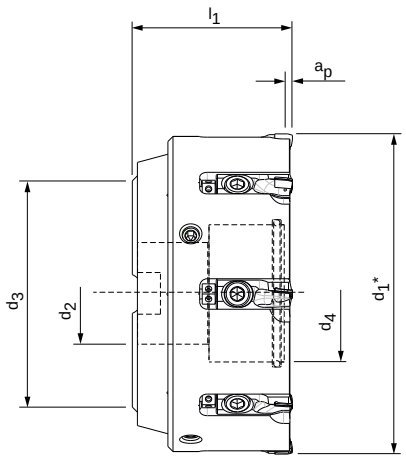
Spare parts**

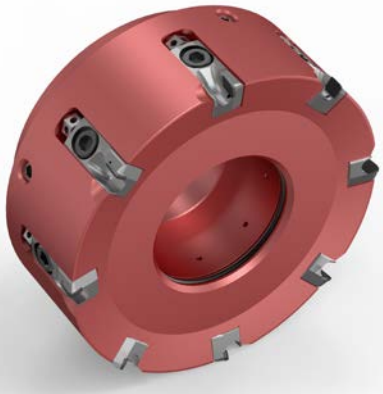
		Clamping screw for milling cartridge M6x13	Order No. 30696520
		Adjusting screw M5x8	Order No. 30696523
	d_1 63 - 125	Fastening screw with coolant delivery	Page 187
	d_1 160 - 400	Coolant cover and fastening screw M6x18	Page 187
		Coolant sealing ring	Page 187
		Balancing screw	Page 186

Dimensions in mm.
Counter-clockwise design on request.
Special design with increased number of teeth on request.
* d_1 depending on the milling cartridge type, see page 183.
** Included.

PowerSpeed-Blue

PCD face milling head, wide spacing
PowerMill-Blue





Tool body made of steel

Dimensions					z_{eff}	a_p max.	Weight incl. milling cartridges [kg]	Max. operating speed [rpm]	Specification	Order No.
d_1*	d_2	d_3	d_4	l_1						
63	22	48	26	48	5	5	1,0	25.000	CFM901-063-CA22-Z05R-PBC-S	30940667
80	27	60	34	50	6	5	1,5	22.000	CFM901-080-CA27-Z06R-PBC-S	30940669
100	32	78	43	50	6	5	2,5	18.000	CFM901-100-CA32-Z06R-PBC-S	30940703
125	40	89	54	63	8	5	4,7	18.000	CFM901-125-CA32-Z08R-PBC-S	30982043

Tool body made of aluminium

100	32	78	43	50	6	5	1,1	20.000	CFM901-100-CA32-Z06R-PBC-A	30982041
125	40	89	54	63	8	5	2,1	18.000	CFM901-125-CA40-Z08R-PBC-A	30940705
160	40	130	-	63	10	5	2,6	14.000	CFM901-160-CA40-Z10R-PBC-A	30982047
200	60	134	-	63	12	5	3,8	11.000	CFM901-200-CA60-Z12R-PBC-A	30940720
250	60	134	-	63	15	5	6,1	8.500	CFM901-250-CA60-Z15R-PBC-A	30940724
315	60	232	-	80	18	5	12,0	7.250	CFM901-315-CA60-Z18R-PBC-A	30940726
400	60	232	-	80	24	5	19,0	6.100	CFM901-400-CA60-Z24R-PBC-A	30982048

Accessories

	PBC	Milling cartridge	Page 183
		Milling cutter arbor see MAPAL catalogue "CLAMPING"	
	d_1	Fastening screws for milling cutter arbor	Order No.
	160 - 180 200 - 400	ISO 4762 - M12x45-12.9 ISO 4762 - M16x50-12.9	10006594 10007775

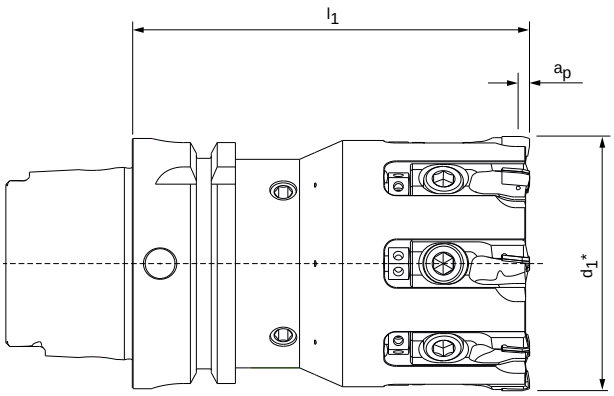
Spare parts**

		Clamping screw for milling cartridge M6x13	Order No. 30696520
		Adjusting screw M5x8	Order No. 30696523
	d_1 63 - 125	Fastening screw with coolant delivery	Page 187
	d_1 160 - 400	Coolant cover and fastening screw M6x20	Page 187
		Coolant sealing ring	Page 187
		Balancing screw	Page 186

Dimensions in mm.
Counter-clockwise design on request.
Special design with increased number of teeth on request.
* d_1 depending on the milling cartridge type, see page 183.
** Included.

PowerFix-Blue

PCD face milling cutter, monolithic design
PowerMill -Blue



Body material with HSK-A connection

Dimensions			z_{eff}	a_p max.	Weight incl. milling cartridges [kg]	Max. operating speed [rpm]	Specification	Order No.
d_1*	Nominal size HSK-A	l_1						
50	63	100	4	5	1,7	25.000	CFM901-050-A063-Z04R-PBC-S	30940663
63	63	100	8	5	2,1	25.000	CFM901-063-A063-Z08R-PBC-S	30940664
80	63	100	8	5	2,8	22.000	CFM901-080-A063-Z08R-PBC-S	30940665
100	63	100	10	5	3,8	18.000	CFM901-100-A063-Z10R-PBC-S	30940666

Accessories

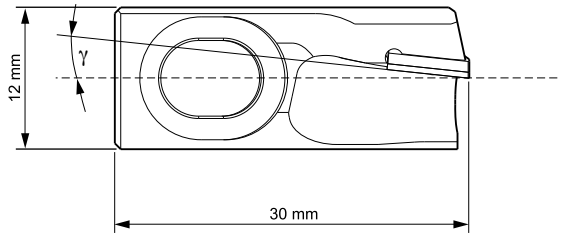
	PBC	Milling cartridge	Page 183

Spare parts**

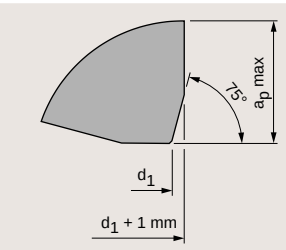
	d_1 50 - 100	Clamping screw for milling cartridge M6x12 (flat head screw) M6x13	Order No. 30696520
		Adjusting screw M5x8	Order No. 30696523
	Connection HSK	Coolant tube HSK-A63	Order No. 30326006
		Balancing screw M8x10	Order No. 10012538

Dimensions in mm.
Counter-clockwise design on request.
Special design with increased number of teeth on request.
* d_1 depending on the milling cartridge type, see page 183.
** Included.

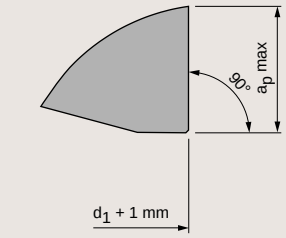
Milling cartridge PowerMill-Blue Cartridge (PBC)



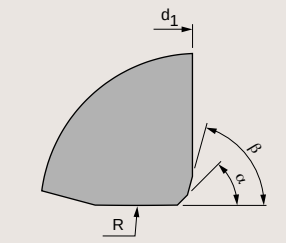
Milling cartridge face milling insert

	Rake angle γ [°]	R_z value [µm]	a_p max.	Running direction	Cutting material	Specification	Order No.
	6	≤ 5	5	Right	PU611	PBC-711-0-PU611	30956576
	6	≤ 10	5	Right	PU611	PBC-712-0-PU611	30956577
	6	≤ 20	5	Right	PU611	PBC-713-0-PU611	30956578
	6	> 20	5	Right	PU611	PBC-714-0-PU611	30956579
	0	≤ 5	5	Right	PU611	PBC-731-0-PU611	30956572
	0	≤ 10	5	Right	PU611	PBC-732-0-PU611	30956573
	0	≤ 20	5	Right	PU611	PBC-733-0-PU611	30956574
	0	> 20	5	Right	PU611	PBC-734-0-PU611	30956575

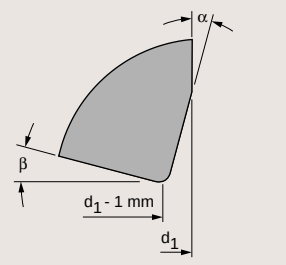
Milling cartridge corner milling insert

	6	≤ 5	5	Right	PU611	PBC-611-0-PU611	30956584
	6	≤ 10	5	Right	PU611	PBC-612-0-PU611	30956585
	6	≤ 20	5	Right	PU611	PBC-613-0-PU611	30956586
	6	> 20	5	Right	PU611	PBC-614-0-PU611	30956587
	0	≤ 5	5	Right	PU611	PBC-631-0-PU611	30956580
	0	≤ 10	5	Right	PU611	PBC-632-0-PU611	30956581
	0	≤ 20	5	Right	PU611	PBC-633-0-PU611	30956582
	0	> 20	5	Right	PU611	PBC-634-0-PU611	30956583

Milling cartridge wide finishing milling insert

	0	< 3	2	Right	PU611	PBC-831-0-PU611	30961943

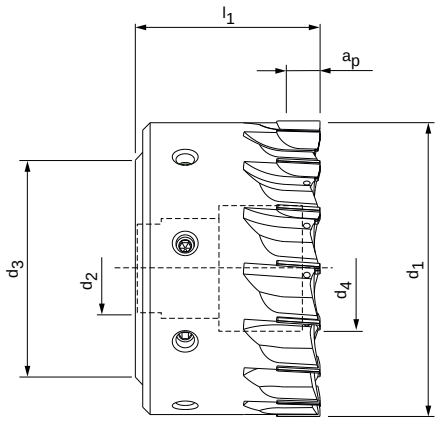
Milling cartridge PT milling insert

	0	-	2	Right	PU611	PBC-931-0-PU611	30961944

Dimensions in mm.

FaceMill-Diamond

PCD face milling head with internal cooling
SHM58/59



Design:

Milling cutter diameter:	50.00 – 125.00 mm
Cutting material:	PU611
Number of cutting edges:	12-22
Helix angle:	4°
Special features:	Coolant outlets directly at the cutting edge

Application:
For face milling, especially with high stock removal. For cutting depths of up to 10 mm.

SHM58: Surface quality $R_z \leq 10$ µm
SHM59: Surface quality $R_z > 10$ µm

Tool body as milling cutter head | SHM58 ($R_z \leq 10$ µm)

Dimensions					z_{eff}	a_p max.	Weight [kg]	Max. spindle speed [rpm]	Specification*	Order number			
d_1	d_2	d_3	d_4	l_1						Chamfer	Radius		
										0.1 mm	0.2 mm	0.4 mm	0.6 mm
50	22	45	16	48	12	10	2,0	30.000	SHM581-050BZ12R-[Form]CA-PU611	30932481	30995659	30995680	30995681
63	22	48	26	48	14	10	2,2	30.000	SHM581-063BZ14R-[Form]CA-PU611	30995682	30995683	30995685	30995686
80	27	60	34	50	16	10	2,6	29.000	SHM581-080BZ16R-[Form]CA-PU611	30995687	30995716	30995688	30995689
100	32	78	43	50	18	10	3,2	27.000	SHM581-100BZ18R-[Form]CA-PU611	30932465	30995690	30995692	30995693
125	40	89	54	63	22	10	4,5	22.000	SHM581-125BZ22R-[Form]CA-PU611	30995694	30995695	30995696	30995697

Tool body as milling cutter head | SHM59 ($R_z > 10$ µm)

50	22	48	28	48	12	10	2,0	30.000	SHM591-050BZ12R-[Form]CA-PU611	30995698	30995699	30995700	30995701
63	22	48	28	48	14	10	2,2	30.000	SHM591-063BZ14R-[Form]CA-PU611	30995702	30995684	30995703	30995704
80	27	60	36	50	16	10	2,6	29.000	SHM591-080BZ16R-[Form]CA-PU611	30995705	30995706	30995707	30995708
100	32	78	45	50	18	10	3,2	27.000	SHM591-100BZ18R-[Form]CA-PU611	30995709	30995691	30995710	30995711
125	40	89	56	63	22	10	4,5	22.000	SHM591-125BZ22R-[Form]CA-PU611	30995712	30995713	30995714	30995715

Accessories

		Milling cutter arbor see MAPAL catalogue "CLAMPING"	

Spare parts**

		Clamping screw for milling cartridge M6x13	Order No. 30696520
		Adjusting screw M5x8	Order No. 30696523
	d_1	Fastening screw with coolant delivery	Order No.
	50	SW8 - 20 Nm	30984018
	63	SW10 - 50 Nm	30984019
	80	SW12 - 80 Nm	30984030
	100	SW14 - 100 Nm	30984031
	125	SW14 - 200 Nm	30984032
		Coolant sealing ring	Page 187

Dimensions in mm.
Counter-clockwise design on request.
Special design with increased number of teeth on request.
* Specification plus required cutting edge design.
** Included.

Selection of the cutting edge design

Edge design	Chamfer	Radius		
Size [mm]	0,1	0,2	0,4	0,6
Shape	F0010	R0020	R0040	R0060

Corner design: chamfer
Chamfer size 0.1x45°

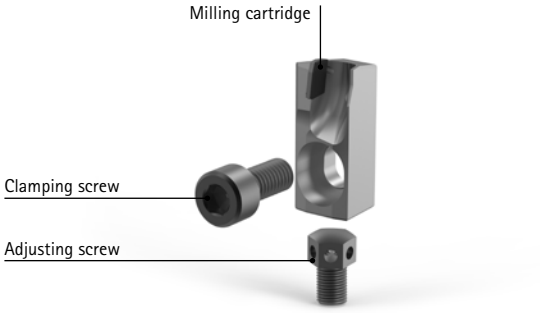
Example:
SHM581-050BZ12R-**F0010**CA-PU611

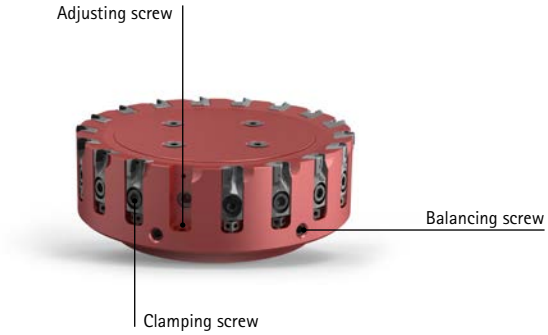
or

Corner design: radius
Radius 0.4 mm

Example:
SHM581-050BZ12R-**R0040**CA-PU611

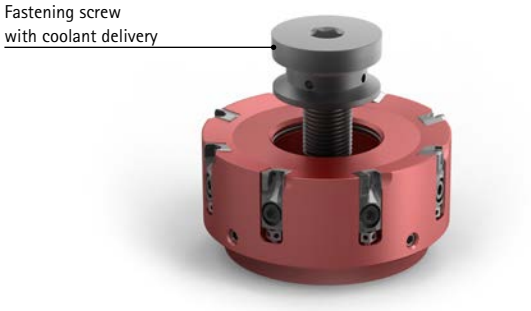
Accessories and spare parts for milling cutters with PCD milling cartridges – System Power



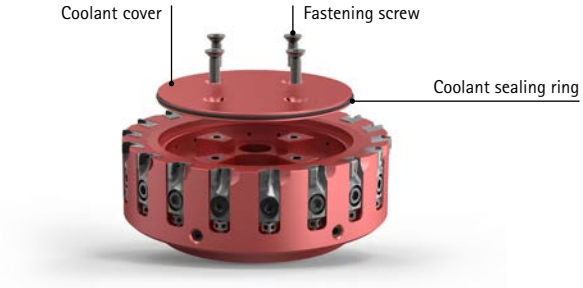


	d*	Dimension	Model	Wrench size SW / Torx size	Tightening torque [Nm]	Weight [g]	Order No.
Clamping screw for milling cartridge							
	50 - 400	M6x13	Cylinder head screw	SW 5	14	5	30696520**
Adjusting screw for milling cartridge							
	50 - 400	M5x8				2,5	30696523
Balancing screw							
	50 - 100	M6x10	Balancing screw			1,4	10012533
	125 - 400	M8x10	Balancing screw			2,7	10012538

* Face milling cutter diameter.
** Only suitable for usage once.



Series PBC



Series PBC

	d*	Dimension	Model	Wrench size SW / Torx size	Tightening torque [Nm]	Weight [g]	Order No.
Fastening screw with coolant delivery incl. coolant sealing ring							
	50	M10	Coolant screw	SW 8	20	23,6	30543340
	63	M10	Coolant screw	SW 10	50	82,3	30543341
	80	M12	Coolant screw	SW 12	80	176,2	30543342
	100	M16	Coolant screw	SW 14	100	263	30543344
	125	M20	Coolant screw	SW 14	200	595	30543345
Coolant cover incl. coolant sealing ring							
	160		Coolant cover			200	30569889
	200		Coolant cover			500	30569890
	250		Coolant cover			700	30569891
	315		Coolant cover			1.300	30569892
	400		Coolant cover			2.300	30569893
Coolant sealing ring							
	50		Coolant sealing ring				10075917
	63		Coolant sealing ring				10002569
	80		Coolant sealing ring				10009260
	100		Coolant sealing ring				10009270
	125		Coolant sealing ring				10030938
	160		Coolant sealing ring				30989005
	200		Coolant sealing ring				30989006
	250		Coolant sealing ring				30989007
	315		Coolant sealing ring				30989008
	400		Coolant sealing ring				30989009
Fastening screw for coolant cover							
	160 - 400	M6x18	Countersunk screw	SW 4		4,3	30670137

Accessories

Fastening screw for milling cutter arbors							
	160 - 180	M12x45	Cylinder screw in acc. with ISO 4762	SW 10	70	84	10006594
	≥ 200	M16x50	Cylinder screw in acc. with ISO 4762	SW 14	70	140	10007775

* Face milling cutter diameter.

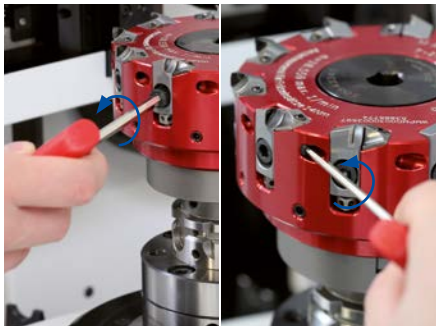
Handling notes for PCD face milling cutters – System Power

Applicable to milling cutters with PowerMill and PowerMill-Blue milling cartridges. The milling cartridges for the milling cutters PowerSpeed and PowerFix are additionally secured using a locking screw. On this aspect pay attention to the optional actions.

Note:
- Only for trained personnel.
- Clean the cutting edges on the milling cartridges using a cleaning compound to prevent measurement inaccuracies.
- Clamping screws are only to be used once.
- The fastening screw with coolant delivery is to be used with screw locking.

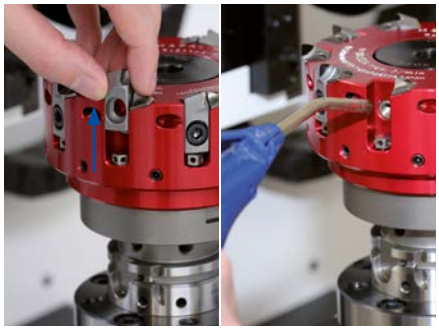
Changing and setting PCD milling cartridges

Requirements:
The HSK face connection is checked for good condition and the milling cutter clamping screw/ fastening screw with coolant delivery is tightened (for tightening torque, see page 187). The milling cutter is clamped on the setting fixture.



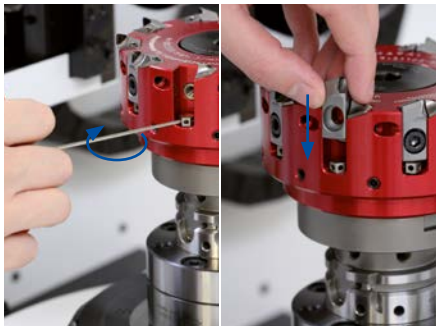
1. Undo and remove the milling cartridge clamping screw.

Optional:
Turn the locking screw a few turns in the counter-clockwise direction.



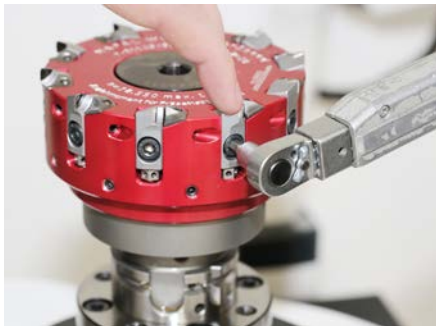
2. Remove the milling cartridge upward out of the seat for the milling cartridge. Then clean the seat for the milling cartridge using compressed air so the seat is free of residue.

3. Optional:
If the locking screw is not yet screwed in, check whether the flat side of the locking screw (2) is pointing in the direction of the milling cartridge. If a spherical shape can be seen (1), use your finger or a magnet to turn this to the flat position.



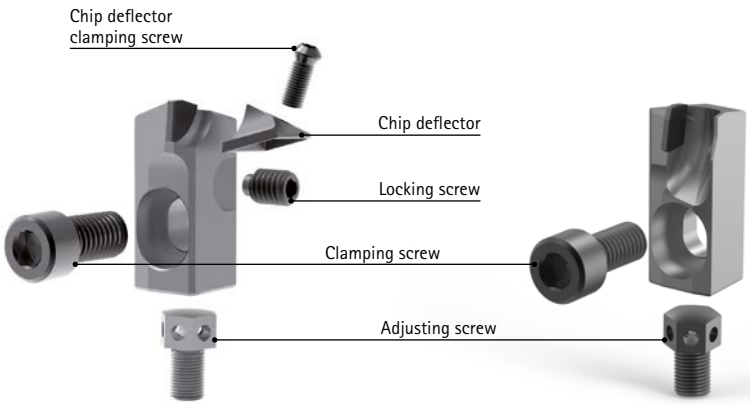
4. If the adjusting screw is not yet fitted, fit it and screw in to the stop using a hex-wrench. Then turn back the adjusting screw two turns in the counter-clockwise direction.

Note:
If the adjusting screw is already fitted, screw in the adjusting screw one half of a turn in the clockwise direction.
Then fit the new milling cartridge in the seat from above.



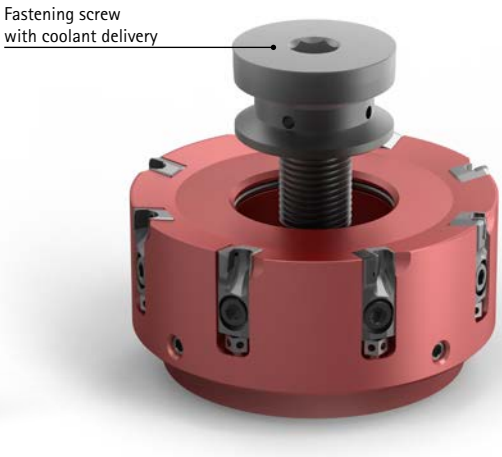
5. Fit the milling cartridge clamping screw and screw in lightly using a hex-wrench.
Then carefully press down the milling cartridge using a finger and at the same tighten the clamping screw to 4 Nm using a torque wrench.

6. Optional:
Screw in the locking screw clockwise to the stop using a hex-wrench and then screw back half a turn.



Milling cartridge PowerMill (PMC)

Milling cartridge PowerMill-Blue (PBC)



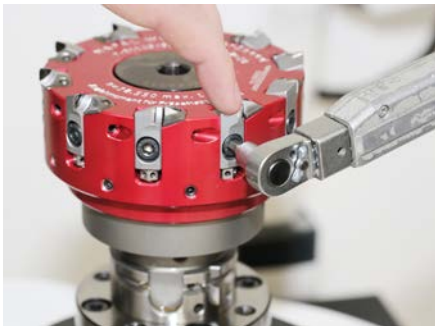
Series PBC

7. Setting using a setting fixture (optical)
Acquire the cutting edge using the optical measuring device and using a hex-wrench turn the adjusting screw counter-clockwise until EM = -0.015 mm is reached. For purely optical setting, repeat this process for the remaining milling cartridges (then continue with step 9).

Note:
To ensure the correct preload, after reaching the setting dimension undo the adjusting screw again and then adjust to the target value (0.015 mm before EM).

8. Setting using a dial gauge (measuring plate)
Note:
The measuring probe should have a low measuring force, max. 0.3 N, with a flat probe made of aluminium, brass or carbide.

Position the measuring probe against the milling cartridge at the highest point and set the dial gauge to zero. Turn the milling cartridge upward with the aid of the adjusting screw until EM = -0.015 mm is reached. Repeat this action for all milling cartridges.



9. Note:
The measuring probe must not rest on the milling cartridge during this action.

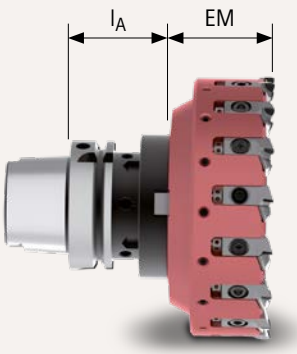
Tighten the clamping screw for the milling cartridges to 14 Nm using a torque wrench.

Optional:
Tighten the locking screws to approx. 2 Nm using a torque wrench.

10. Using either optical or tactile measurement, identify the milling cartridge with the highest protruding cutting edge and set the dial gauge to zero.
Set all milling cartridges in relation to the highest protruding cutting edge using a dial gauge: For this purpose turn clockwise the adjusting screw using a hex-wrench until the zero dimension is reached (tolerance ±2 µm).

General information:
- Each time after changing the milling cartridges, the axial run-out and the permissible residual imbalance according to DIN ISO 1940-G2.5 should be checked.
- Ideally the cutting edge measurement should be checked again after balancing.
- The setting screw must be in light contact on the milling cartridge with generally even clamping to avoid axial movement of the cutting edges in use.

Setting dimension EM:
Refer to the related product pages for the setting dimensions. The setting dimension EM relates only to the milling cutter's tool body incl. milling cartridges. If a milling cutter with connection is set, the height of the connection l_A must always be taken into account. In this situation the setting dimension is l_A + EM.



Cutting data recommendation for face milling cutters with PCD milling cartridges

Feed and cutting speed

PowerMill-Blue

MMG*			Material	Strength/hardness [N/mm²] [HRC]	v_c [m/min]	f_z [mm/tooth]	
						Cutting depth a_p max. 3 mm	Cutting depth a_p max. 5 mm
N	N1	N1.1	Aluminium, non-alloy and alloy < 3 % Si		max. 6,000	to 0.2	Not recommended
		N1.2	Aluminium, alloy ≤ 7 % Si		max. 6,000		to 0.1
		N1.3	Aluminium, alloy > 7-12 % Si		max. 6,000		
		N1.4	Aluminium, alloy > 12 % Si		max. 2,000		
	N2	N2.1	Copper, non-alloy and low-alloy	< 300 N/mm²	max. 6,000		
		N2.2	Copper, alloy	> 300 N/mm²	max. 2,000		
		N2.3	Brass, bronze, gunmetal	< 1200 N/mm²	max. 2,000		
	N3	N3.1	Graphite		max. 2,000		
	N4	N4.1	Plastic, thermoplastics		max. 2,000		
		N4.2	Plastic, thermosets		max. 2,000		
C	C1	C1.1	Plastic matrix, aramide fibre-reinforced (AFRP)		max. 2,000	to 0.2	to 0.1
		C1.2	Plastic matrix (thermosetting), CFRP/GFRP		max. 2,000		
		C1.3	Plastic matrix (thermoplastic), CFRP/GFRP		max. 2,000		
	C2	C2.1	Carbon matrix, carbon fibre-reinforced (CFC)		max. 2,000		

Notes:
- High power consumption possible
- Material removal rate machine-dependent

Machining example for AlSi7 (N1.2)

PowerFeed-Blue ø 100 (30982042) with Z = 10 (30956584; corner milling insert)

v_c	n	f_z	a_p	a_e
2,500 m/min	8,000	0.1 mm	4 mm	90 mm

Note:

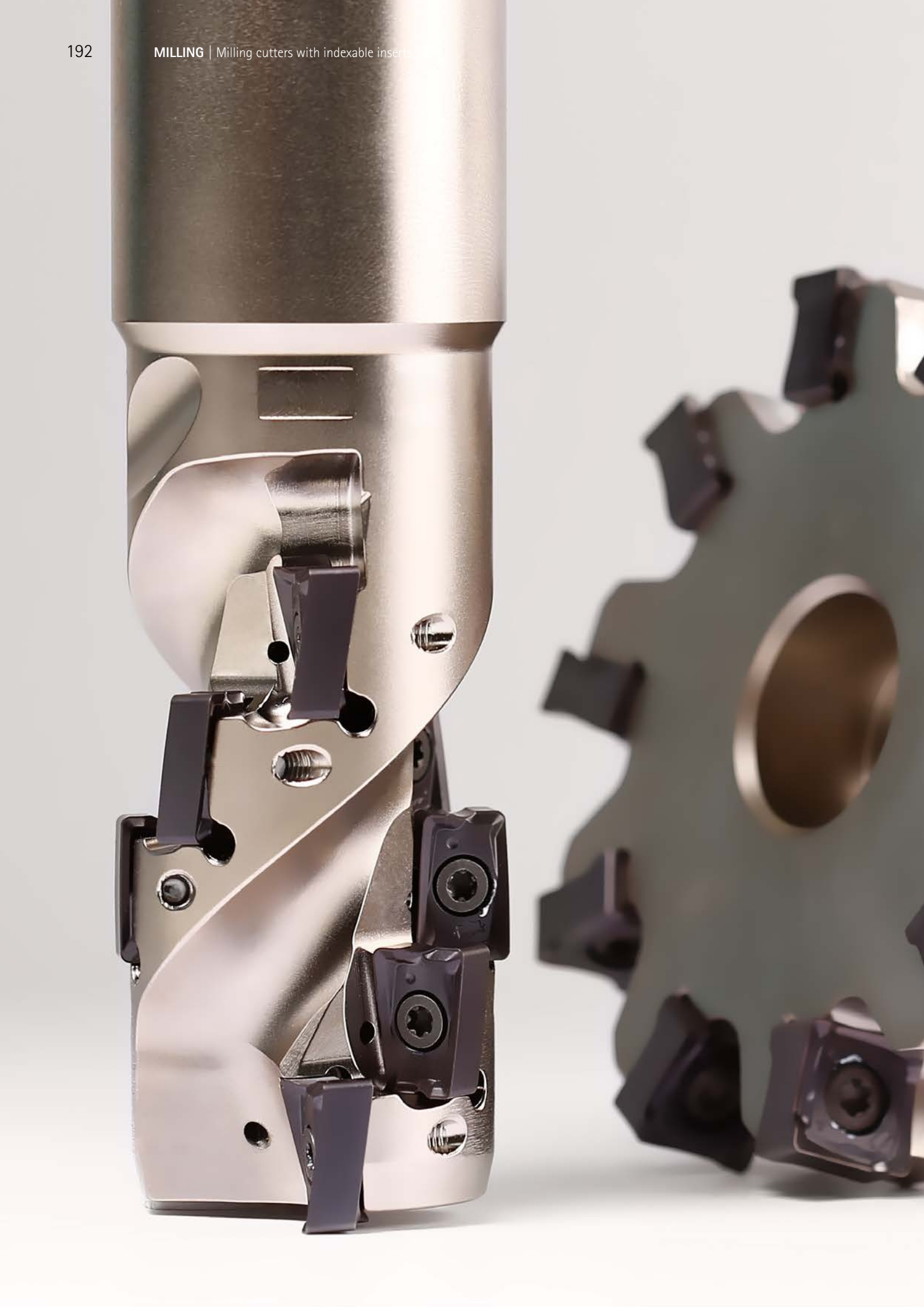
The machine must have adequate performance and rigidity.

* MAPAL machining groups

FaceMill-Diamond

MMG*			Material	Strength/hardness [N/mm²] [HRC]	v_c [m/min]	f_z [mm/tooth] Cutting depth a_p max. 10 mm
N	N1	N1.1	Aluminium, non-alloy and alloy < 3 % Si		max. 6,000	to 0.2
		N1.2	Aluminium, alloy ≤ 7 % Si		max. 6,000	
		N1.3	Aluminium, alloy > 7-12 % Si		max. 6,000	
		N1.4	Aluminium, alloy > 12 % Si		max. 2,000	
	N2	N2.1	Copper, non-alloy and low-alloy	< 300 N/mm²	max. 6,000	
		N2.2	Copper, alloy	> 300 N/mm²	max. 2,000	
		N2.3	Brass, bronze, gunmetal	< 1,200 N/mm²	max. 2,000	
	N3	N3.1	Graphite		max. 2,000	
	N4	N4.1	Plastic, thermoplastics		max. 2,000	
		N4.2	Plastic, thermosets		max. 2,000	
C	C1	C1.1	Plastic matrix, aramide fibre-reinforced (AFRP)		max. 2,000	to 0.2
		C1.2	Plastic matrix (thermosetting), CFRP/GFRP		max. 2,000	
		C1.3	Plastic matrix (thermoplastic), CFRP/GFRP		max. 2,000	
	C2	C2.1	Carbon matrix, carbon fibre-reinforced (CFC)		max. 2,000	

* MAPAL machining groups



MILLING CUTTERS WITH INDEXABLE INSERTS

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Designation key 206

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Shoulder milling cutters

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Shell end face milling cutters

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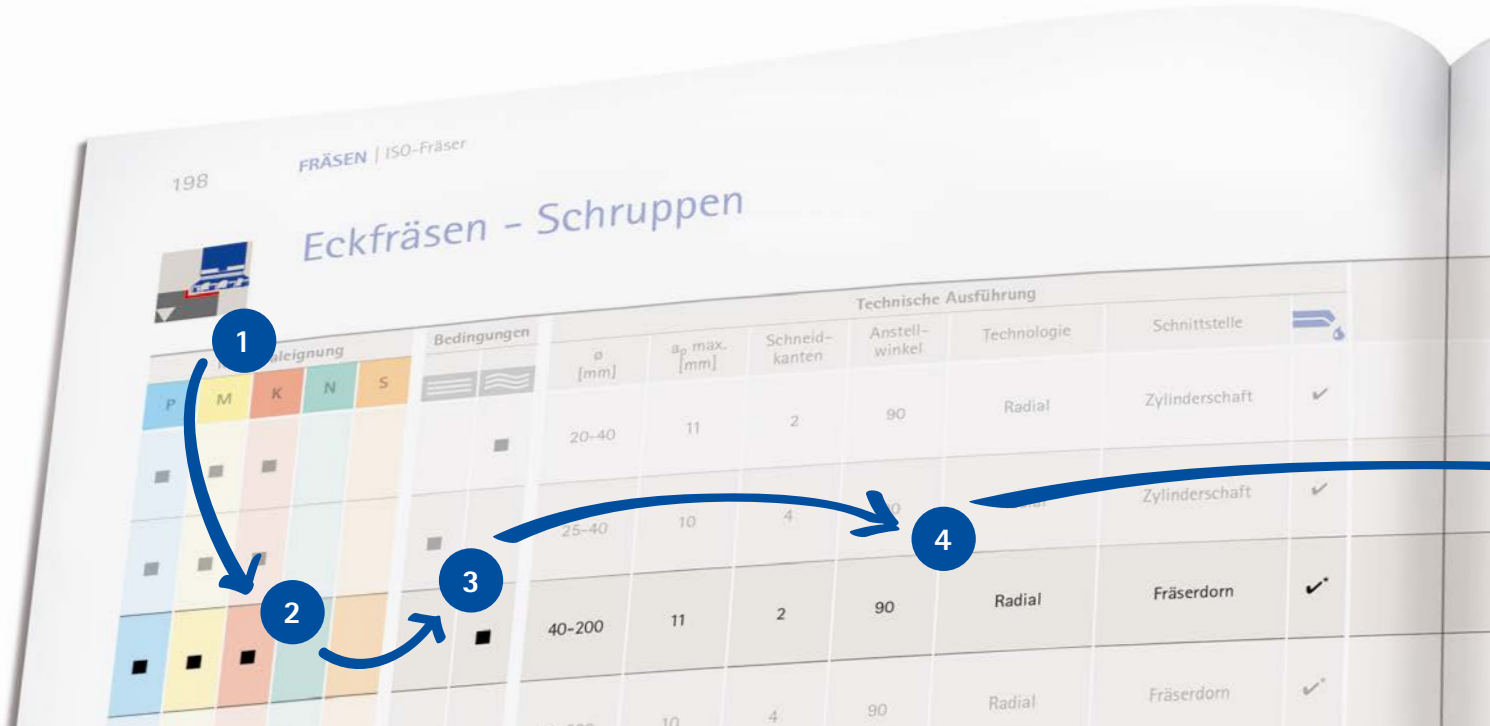
SELECTION OF A MILLING CUTTER

Step-by-step to the right milling cutter

You are looking for a milling cutter with indexable inserts for shoulder milling stainless steel with a diameter of 125 mm in unfavourable machining conditions? This selection aid will lead you step-by-step to the right milling cutter.

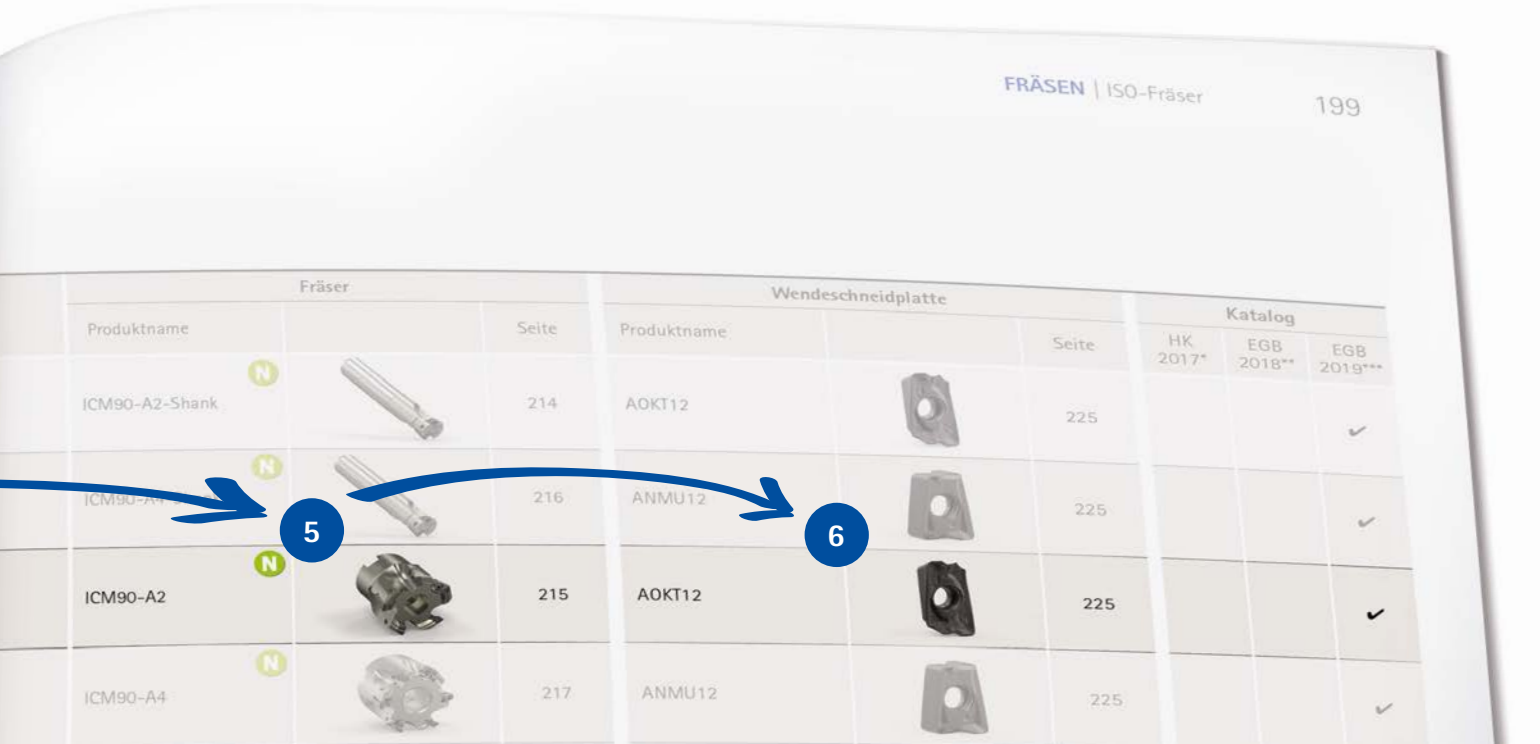
1	**Application**	Select your main application.		Face milling		Shoulder milling – roughing
2	**Material suitability**	Identify your workpiece material as per the MAPAL machining groups (MMG).	P	Steel	M	Stainless steel
3	**Machining conditions**	Assess your machining conditions.		**Good:** - Stable conditions - Low contact width		
4	**Geometry features**	Check whether the geometric features meet your requirements.		Diameter range		Max. cutting depth
5	**Tool body**	Select your milling cutter. If there are several possible selections, select the milling cutter that is marked as ★ 1st choice for material suitability.		If designs with different spacing are available, please note the information on the related product pages		
6	**Indexable insert**	Select your indexable insert. For the selection of the correct cutting material, pay attention to the cutting material overview on page 204.				



Shoulder milling – finishing	Shell end face milling	Helix milling	Disc milling
K Cast iron	N Non-ferrous metals and plastics	S Super alloys and titanium	

Unfavourable:
- Ratio a_e / D > 0.6
- High stock removal
- Part/clamping fixture/machine susceptible to vibration

Number of cutting edges	Contact angle	Installation position	Connection	Coolant supply

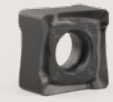
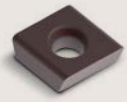


Face milling with indexable inserts

Material suitability					Conditions		Technical design						
P	M	K	N	S			ø [mm]	a_p max. [mm]	Cutting edges	Contact angle	Technology	Connection	
■	■	■				■	20-40	11	2	90°	Radial	Cylindrical shank	✔
■	■	■			■		25-40	11	4	90°	Radial	Cylindrical shank	✔
■	■					■	40-50	9	4	90°	Radial	Milling cutter arbor	✔
■	■	■			■		50	8	8	90°	Radial	Milling cutter arbor	✔*
★	★					■	63-400	5	8	45°	Radial	Milling cutter arbor	✔*
■	■	★			■		63-400	4	16	45°	Radial	Milling cutter arbor	✔*
■	■	■			■		80-200	8	4	45°	Tangential	Milling cutter arbor	✔
			■			■	63-200	7	2	75°	Tangential	Milling cutter arbor	✔
			■			■	63-200	7	4	75°	Tangential	Milling cutter arbor	✔

★ 1st choice ■ highly suitable ⬓ suitable in some situations * up to ø 125 mm

Step 1: Application | Step 2: Material suitability | Step 3: Machining conditions | Step 4: Geometry features | Step 5: Tool body | Step 6: Indexable insert

Milling cutters			Indexable insert			Catalogue		
Product name		Page	Product name		Page	MC 2017*	SV 2018**	SV 2019***
N ICM90-A2-Shank		214	N AOKT12		225			✔
N ICM90-A4-Shank		216	N ANMU12		225			✔
N ICM90-S4		218	N SDKT10		226			✔
N ICM90-S8		218	N SNMU12		226			✔
N IFM45-08		210	N OFMT07		224			✔
N IFM45-016		212	N ONKU07		224			✔
IFM45-L4			LTHU15			✔		
IFM75-C2			CTHD09			✔		
IFM75-C4			CTHQ09			✔		

* Main catalogue 2017
** Supplementary volume 2018
*** Supplementary volume 2019

N New | ⊕ Additions to programme

Shoulder milling – roughing

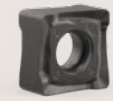
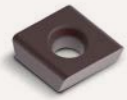
Material suitability					Conditions		Technical design						
P	M	K	N	S			ø [mm]	a_p max. [mm]	Cutting edges	Contact angle	Technology	Connection	
■	■	■				■	20-40	11	2	90°	Radial	Cylindrical shank	✔
■	■	■			■		25-40	10	4	90°	Radial	Cylindrical shank	✔
■	■	■				■	40-200	11	2	90°	Radial	Milling cutter arbor	✔*
■	■	■			■		40-200	10	4	90°	Radial	Milling cutter arbor	✔*
★	★					■	40-200	7	4	90°	Radial	Milling cutter arbor	✔*
■	■	★			■		50-200	8	8	90°	Radial	Milling cutter arbor	✔*
		⬓	■			■	63-200	7	2	90°	Tangential	Milling cutter arbor	✔
⬓	⬓	⬓	■			■	63-200	7	4	90°	Tangential	Milling cutter arbor	✔

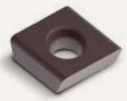
Shoulder milling – finishing

Material suitability					Conditions		Technical design						
P	M	K	N	S			ø [mm]	a_p max. [mm]	Cutting edges	Contact angle	Technology	Connection	
		⬓	■		■	⬓	63-200	3	2	90°	Tangential	Milling cutter arbor	✔
⬓	⬓	⬓	■		■	⬓	63-200	3	4	90°	Tangential	Milling cutter arbor	✔

★ 1st choice ■ highly suitable ⬓ suitable in some situations * up to ø 125 mm

Step 1: Application | Step 2: Material suitability | Step 3: Machining conditions | Step 4: Geometry features | Step 5: Tool body | Step 6: Indexable insert

Milling cutters			Indexable insert			Catalogue		
Product name		Page	Product name		Page	MC 2017*	SV 2018**	SV 2019***
N ICM90-A2-Shank		214	N AOKT12		225			✔
N ICM90-A4-Shank		216	N ANMU12		225			✔
N ICM90-A2		215	N AOKT12		225			✔
N ICM90-A4		217	N ANMU12		225			✔
N ICM90-S4		218	N SDKT10		226			✔
N ICM90-S8		219	N SNMU12		226			✔
ICM90-C2			CTHD09			✔		
ICM90-C4			CT_Q09			✔		

Milling cutters			Indexable insert			Catalogue		
Product name		Page	Product name		Page	MC 2017*	SV 2018**	SV 2019***
ICM90-C2-Finishing			CTHD09, CTHA09			✔		
ICM90-C4-Finishing			CTHQ09, CTHH09			✔		

* Main catalogue 2017
** Supplementary volume 2018
*** Supplementary volume 2019

N New

Additions to programme

Shell end face milling

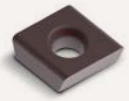
Material suitability					Conditions		Technical design						
P	M	K	N	S			ø [mm]	a_p max. [mm]	Cutting edges	Contact angle	Technology	Connection	
★	★	★			■		32-40	62	4	90°	Radial	Cylindrical shank	✔
■	■	■			■		40-105	62	4	90°	Radial	Milling cutter arbor	
■	■	■				■	25-40	62	2	90°	Radial	Cylindrical shank	✔
■	■	★	⬓	⬓		■	63-100	75	4	90°	Tangential	HSK, SK	✔
		⬓	■			■	63-100	75	2	90°	Tangential	HSK, SK	✔

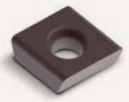
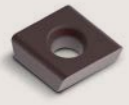
Helix milling

Material suitability					Conditions		Technical design						
P	M	K	N	S			ø [mm]	a_p max. [mm]	Cutting edges	Contact angle	Technology	Connection	
■	■	■	⬓	⬓	■		125-160	35	4	90°	Tangential	Milling cutter arbor	✔
★	★	★	⬓	⬓		■	80-160	35	4	90°	Tangential	HSK	✔
		⬓	■		■		125-160	35	2	90°	Tangential	Milling cutter arbor	✔
		⬓	■			⬓	80-160	35	2	90°	Tangential	HSK	✔

★ 1st choice ■ highly suitable ⬓ suitable in some situations

Step 1: Application | Step 2: Material suitability | Step 3: Machining conditions | Step 4: Geometry features | Step 5: Tool body | Step 6: Indexable insert

Milling cutters			Indexable insert			Catalogue		
Product name		Page	Product name		Page	MC 2017*	SV 2018**	SV 2019***
N ISM90-A4-Shank		222	N ANMU12		225			✔
N ISM90-A4		223	N ANMU12		225			✔
N ISM90-A2-Shank		221	N AOKT12		225			✔
ISM90-C4-HSK/SK			CTHQ09			✔		
ISM90-C2-HSK/SK			CTHD09			✔		

Milling cutters			Indexable insert			Catalogue		
Product name		Page	Product name		Page	MC 2017*	SV 2018**	SV 2019***
IHM90-C4			CTHQ09			✔		
IHM90-C4-HSK			CTHQ09			✔		
IHM90-C2			CTHD09			✔		
IHM90-C2-HSK			CTHD09			✔		

* Main catalogue 2017
** Supplementary volume 2018
*** Supplementary volume 2019

N New

Additions to programme

Disc milling

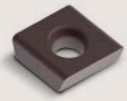
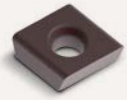
Material suitability					Conditions		Technical design						
P	M	K	N	S			ø [mm]	a_p max. [mm]	Cutting edges	Contact angle	Technology	Connection	
■	■	■	⬓	⬓	■		100-200	7	4	90°	Tangential	Milling cutter arbor	
★	★	★	⬓	⬓	■		100-200	17	4	90°	Tangential	Milling cutter arbor	
■	■	■			■		100-200	11	4	88°	Tangential	Milling cutter arbor	
		⬓	■		■		100-200	7	2	90°	Tangential	Milling cutter arbor	
		⬓	■		■		100-200	17	2	90°	Tangential	Milling cutter arbor	

★ 1st choice ■ highly suitable ⬓ suitable in some situations

Step 1: Application | Step 2: Material suitability | Step 3: Machining conditions | Step 4: Geometry features | Step 5: Tool body | Step 6: Indexable insert





	Milling cutters			Indexable insert			Catalogue		
	Product name		Page	Product name		Page	MC 2017*	SV 2018**	SV 2019***
	IDM90-C4-L/R			CTHQ09			✔		
	IDM90-C4-LR			CTHQ09			✔		
	IDM88-L8-L/R			LTHU09			✔		
	IDM90-C2-L/R			CTHD09			✔		
	IDM90-C2-LR			CTHD09			✔		

* Main catalogue 2017
** Supplementary volume 2018
*** Supplementary volume 2019

N New

Additions to programme

Cutting material overview: Selection of the correct cutting material

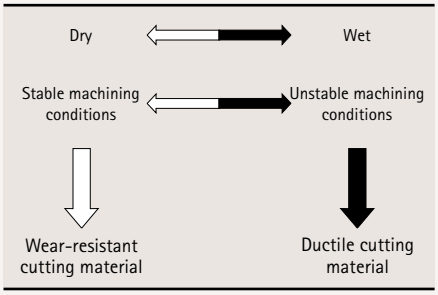
The new cutting materials cover a very broad spectrum between wear resistance and ductility. The cutting material designation is designed such that the ductility increases as the number increases.

PVD-coated cutting materials (HP...) are the first choice for milling K, P and M workpiece materials. The highest tool life can be achieved using these cutting materials.

Example: HP980 is more ductile than HP965 (the more ductile a cutting material, the lower the wear resistance).

1. Choose your workpiece material using the MMGs (MAPAL Machining Groups).
2. From the **"Cutting material overview" table,** choose the grade underneath the required workpiece material.
3. Depending on the general conditions (see **table "General conditions"**) a more wear-resistant or more ductile PVD-coated cutting material is to be selected.

General conditions

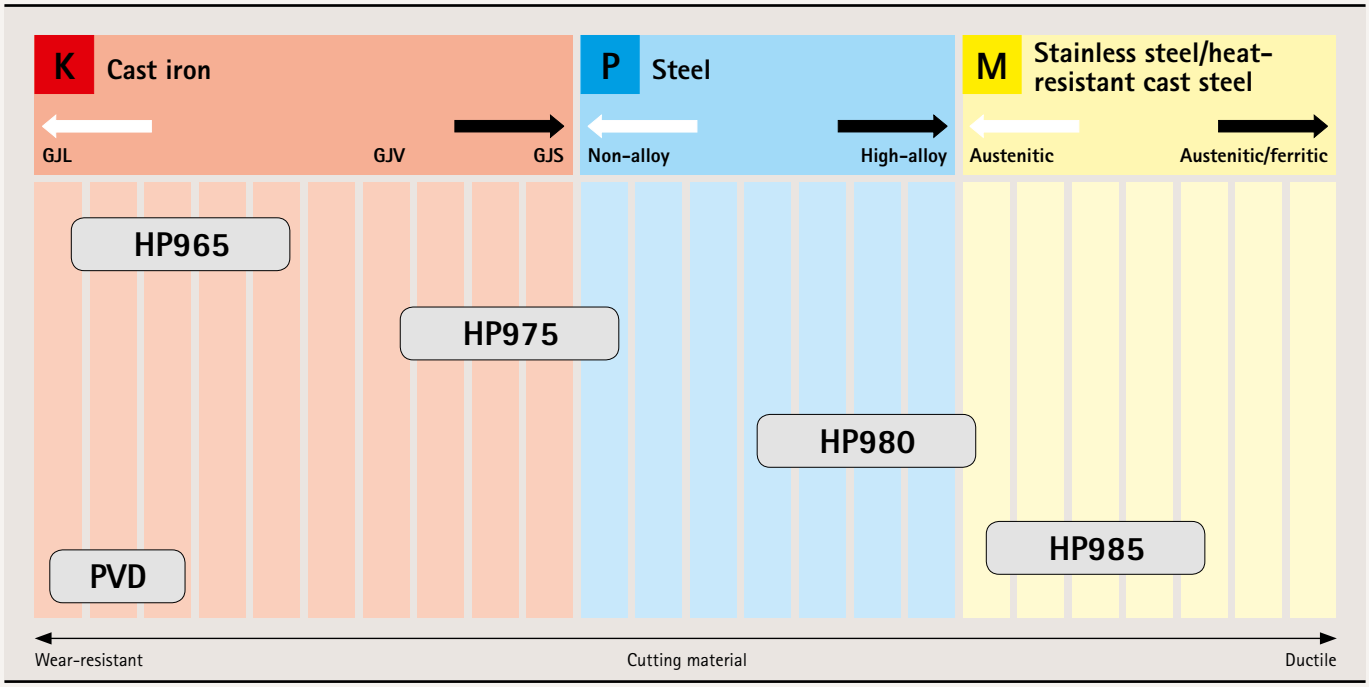


Cutting material overview: Grades and grade description

Cutting material	Cutting material code	Coating composition	Coating colour	Applications	Recommended application
PVD-coated carbide	**HP965**	AlTiN	Black-anthracite	●	PVD-coated fine grain carbide grade for medium machining and for roughing GJL, GJV and GJS. Suitable for wet or dry machining at medium to high cutting speeds.
	HP975	AlTiN	Black-anthracite	✱	Ductile carbide grade with PVD layer for challenging milling machining in cast materials. Particularly suitable for spheroidal graphite cast iron or ADI material in unstable conditions.
	HP980	AlTiN	Black-anthracite	✱	Ductile, coated carbide grade for the general machining of steel and alloyed steel. Increased wear resistance with good impact resistance at the same time.
	HP985	AlTiN	Black-anthracite	✱	Coated carbide grade for milling stainless and heat-resistant steels. Combination of good ductility and heat-resistant coating.

Applications: ✱ Unstable machining ● General machining ● Stable machining

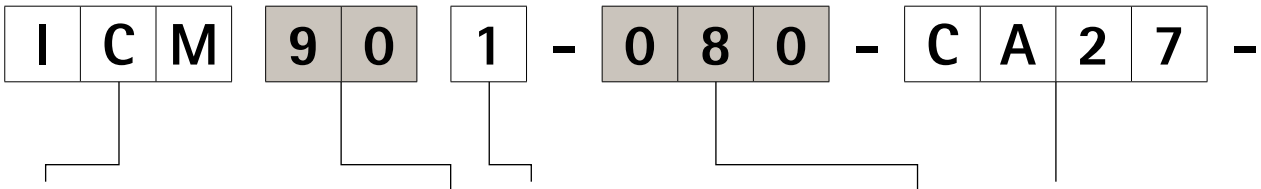
Cutting material overview



P Steel	M Stainless steel	M Cast iron	K Cast iron	N Non-ferrous metals	S High-temperature alloys and titanium alloys
Wear-resistant … Ductile	Wear-resistant … Ductile	Wear-resistant … Ductile	Wear-resistant … Ductile	Wear-resistant … Ductile	Wear-resistant … Ductile
05 15 25 35 45	05 15 25 35 45	05 15 25 35 45	05 15 25 35 45	05 15 25 35 45	05 15 25 35 45
01 10 20 30 40 50	01 10 20 30 40 50	01 10 20 30 40 50	01 10 20 30 40 50	01 10 20 30 40 50	01 10 20 30 40 50
			■■■		
■■■			■■■		
■■■	■■■				
■■■	■■■				

Designation key

Milling cutters with ISO elements



Milling cutter type

IFM	Face milling cutters with indexable inserts Indexable Face Mill
ICM	Shoulder milling cutters with indexable inserts Indexable Corner Mill
ISM	Shell end face milling cutters with indexable inserts Indexable Shell Mill
IHM	Helix milling cutters with indexable inserts Indexable Helix Mill
IDM	Disc milling cutters with indexable inserts Indexable Disc Mill

Cooling

0	External coolant supply
1	Internal coolant supply

Contact angle/installation position

45	45°
75	75°
88	88°
90	90°

Tool diameter

080	Milling cutter ø = 80 mm

Connection (examples)

HA32	Cylindrical shank ø = 32 mm Form HA
HB32	Cylindrical shank ø = 32 mm Form HB
HE32	Cylindrical shank ø = 32 mm Form HE
CA16	Milling cutter arbor ø = 16 mm
CA22	Milling cutter arbor ø = 22 mm
CA27	Milling cutter arbor ø = 27 mm
CA32	Milling cutter arbor ø = 32 mm
CA40	Milling cutter arbor ø = 40 mm
CA60	Milling cutter arbor ø = 60 mm
A063	HSK-A63
A080	HSK-A80
A100	HSK-A100
C063	HSK-C63
C080	HSK-C80
C100	HSK-C100
M010	Thread M10
M012	Thread M12
M016	Thread M16
T063	HSK-T63
S040	SK40 Form AD/AF ISO 7388-1
S050	SK50 Form AD/AF ISO 7388-1

Z	0	8	A	R	-	S	N	_	U	1	2	-	M

Effective number of cutting edges (eff.)
(Examples)

Z5	Eff. number of teeth = 5
Z10	Eff. number of teeth = 10
Z9+3	Eff. number of teeth = 12 of these three adjustable inserts
Z12+4	Eff. number of teeth = 16 of these four adjustable inserts
Z6+6	Disc milling cutters Eff. number of teeth = 6 (both sides, 3-sided cutting)
Z7+7	Face milling cutter LT_U Eff. number of teeth =14 (alternating installation)

Indexable insert/milling cartridge

2. Digit "T"	CT... Tangential LT... Tangential
2. Digit "D, E, F, N, O"	AN... Radial AO... Radial BD... Radial OF... Radial ON... Radial SD... Radial SE... Radial SN... Radial

Optional

Modified tool body / type M

Adjustable number of inserts

A	All teeth adjustable

Direction of rotation

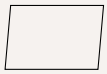
R	Right
L	Left
R1	Right | Disc milling cutter (left-side cutting)
R2	Right | Disc milling cutter (right-side cutting)
R3	Right | Disc milling cutter (both sides, 3-sided cutting)

Designation key

Radial indexable inserts

S	N	M	U	1	2	0	5	0	8

Insert form

S (90°) 
O (135°) 
A (85°) 

Tolerance

	d [mm]	m [mm]	s [mm]
M	from ±0.05 to ±0.15*	from ±0.08 to ±0.20 *	from ±0.05 to ±0.13*
K	from ±0.05 to ±0.15*	±0.013	±0.013
H	±0.013	±0.013	±0.025

* Tolerance dependent on the insert size

Insert size

Incircle	d	d	d
d [mm]	S	O	A
7.5	–	–	12
7.5	–	–	12
10	10	–	–
11.5	12	–	–
19	–	07	–
20	–	07	–

Insert thickness

Code	s [mm]
T3	3.97
04	4.76
05	5.56

Clearance angle

N	0°
D	15°
O	Custom
F	25°

Insert type

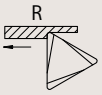
T
U
Custom X

Corner radius

Code	r [mm]
08	0.8
12	1.2

R	-	M	0	5	-	H	P	9	7	5

Cutting direction



Right

Cutting edge design (sintered chip guiding stage)

Code letter	Design
U 01...99	Chip guiding stage finishing
M 01...99	Chip guiding stage medium machining
R 01...99	Chip guiding stage roughing

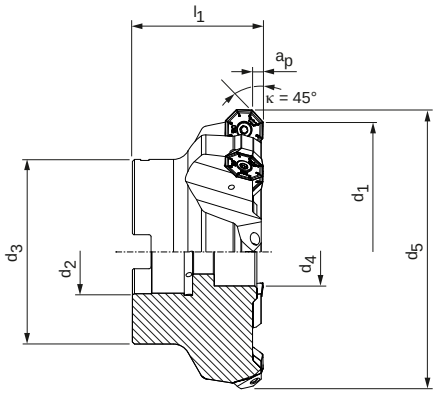
Cutting material

HP975

(Example)

IFM45-08

Face cutter head with radial technology



OFMT 07, medium spacing

Dimensions						z_{eff}	a_p max.	Weight [kg]	Max. operating speed [rpm]	Internal cooling	Specification	Order No.
d_1	d_2	d_3	d_4	d_5	l_1							
63	22	48	18	75,5	40	4	5	0,6	15.800	✔	IFM451-063-CA22-Z04R-OF_T07	31002108*
80	27	60	20	92,4	50	5	5	1,1	14.300	✔	IFM451-080-CA27-Z05R-OF_T07	31002109*
100	32	78	27	111,3	55	6	5	2,0	12.900	✔	IFM451-100-CA32-Z06R-OF_T07	31002120*
125	40	89	33	137,3	63	7	5	3,4	11.700	✔	IFM451-125-CA40-Z07R-OF_T07	31002121*
140	40	89	65	152,3	63	8	5	4,0	11.100	-	IFM450-140-CA40-Z08R-OF_T07	31002122*
160	40	89	65	172,3	63	9	5	5,1	10.400	-	IFM450-160-CA40-Z09R-OF_T07	31002123*
200	60	140	-	212,3	63	10	5	8,6	9.400	-	IFM450-200-CA60-Z10R-OF_T07	31002124*
250	60	140	-	262.2	63	12	5	12,8	8.400	-	IFM450-250-CA60-Z12R-OF_T07	31002125*
315	60	140	-	327,2	80	14	5	21,2	7.500	-	IFM450-315-CA60-Z14R-OF_T07	31002127*
350	60	140	-	362,2	80	16	5	27,0	7.200	-	IFM450-350-CA60-Z16R-OF_T07	31002128*
400	60	140	-	412,2	80	18	5	33,8	6.700	-	IFM450-400-CA60-Z18R-OF_T07	31002129*

OFMT 07, close spacing

63	22	48	18	75,5	40	5	3	0,6	15.800	✔	IFM451-063-CA22-Z05R-OF_T07	31002131
80	27	60	20	92,4	50	6	3	1,2	14.300	✔	IFM451-080-CA27-Z06R-OF_T07	31002132
100	32	78	27	111,3	55	8	3	2,1	12.900	✔	IFM451-100-CA32-Z08R-OF_T07	31002133
125	40	89	33	137,3	63	10	3	3,6	11.700	✔	IFM451-125-CA40-Z10R-OF_T07	31002134
140	40	89	65	152,3	63	11	3	4,3	11.100	-	IFM450-140-CA40-Z11R-OF_T07	31002135*
160	40	89	65	172	63	13	3	5,4	10.400	-	IFM450-160-CA40-Z13R-OF_T07	31002136
200	60	140	-	212,3	63	15	3	9,1	9.400	-	IFM450-200-CA60-Z15R-OF_T07	31002137
250	60	140	-	262.2	63	19	3	13,3	8.400	-	IFM450-250-CA60-Z19R-OF_T07	31002138*
315	60	140	-	327,2	80	24	3	22,0	7.500	-	IFM450-315-CA60-Z24R-OF_T07	31002139*
350	60	140	-	362,2	80	25	3	27,6	7.200	-	IFM450-350-CA60-Z25R-OF_T07	31002140*
400	60	140	-	412,2	80	28	3	34,5	6.700	-	IFM450-400-CA60-Z28R-OF_T07	31002141*

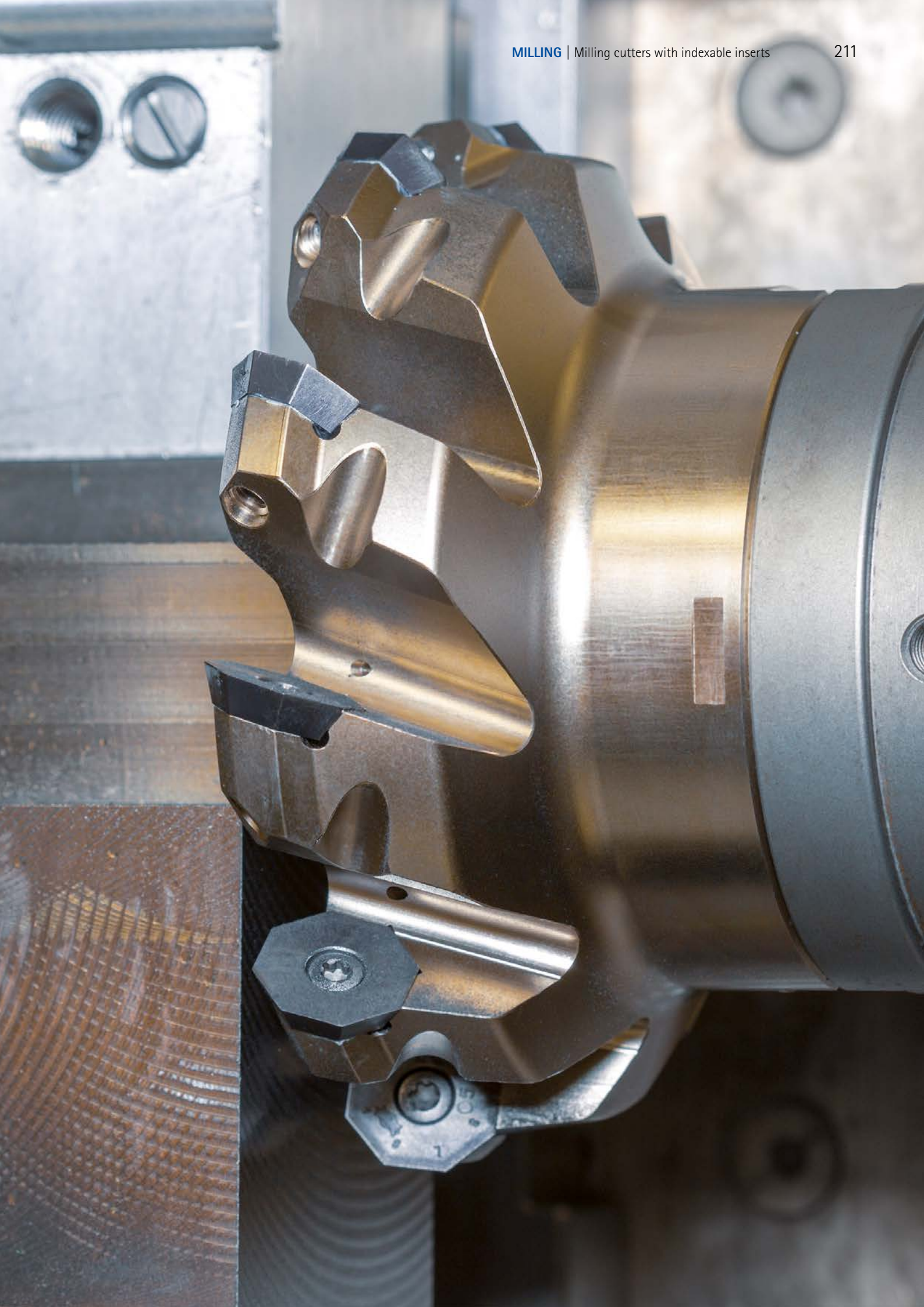
Accessories

	OFMT0704	Indexable inserts	Page 224
		Milling cutter arbor see MAPAL catalogue "CLAMPING"	
		For milling cutter clamping screws see section Accessories - Allocation of milling cutter clamping screws	Page 228

Spare parts**

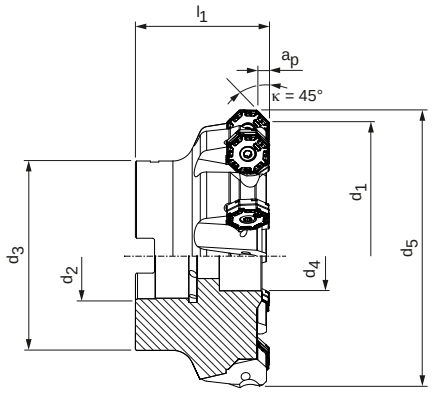
			Order No.
	OFMT0704	Clamping screw for indexable insert TORX PLUS® M5x13-TX20-IP	10105084

Dimensions in mm.
Maximum operating speeds refer only to the cutting system.
* On request.
** Included.



IFM45-016

Face cutter head with radial technology
Medium spacing



ONKU 07, medium spacing

Dimensions						z_{eff}	a_p max.	Weight [kg]	Max. operating speed [rpm]	Internal cooling	Specification	Order No.
d_1	d_2	d_3	d_4	d_5	l_1							
63	22	48	18	75,1	50	6	4	0,8	6.800	✔	IFM451-063-CA22-Z06R-ON_U07	31002143
80	27	60	20	92,1	50	7	4	1,2	6.100	✔	IFM451-080-CA27-Z07R-ON_U07	31002144
100	32	78	27	112,1	55	9	4	2,2	5.500	✔	IFM451-100-CA32-Z09R-ON_U07	31002145
125	40	89	33	137,1	63	10	4	3,7	5.000	✔	IFM451-125-CA40-Z10R-ON_U07	31002146
140	40	89	65	152,1	63	11	4	4,3	4.700	-	IFM450-140-CA40-Z11R-ON_U07	31002147*
160	40	89	65	172,1	63	12	4	5,4	4.400	-	IFM450-160-CA40-Z12R-ON_U07	31002148
200	60	140	-	212,1	63	14	4	9,1	4.000	-	IFM450-200-CA60-Z14R-ON_U07	31002149*
250	60	140	-	262,1	63	17	4	13,6	3.600	-	IFM450-250-CA60-Z17R-ON_U07	31002150*
315	60	140	-	327,1	80	20	4	23,5	3.200	-	IFM450-315-CA60-Z20R-ON_U07	31002151*
350	60	140	-	362,1	80	21	4	28,6	3.000	-	IFM450-350-CA60-Z21R-ON_U07	31002152*
400	60	140	-	412,1	80	23	4	36,6	2.900	-	IFM450-400-CA60-Z23R-ON_U07	31002153*

Accessories

	ONKU0705	Indexable inserts	Page 224
		Milling cutter arbor see MAPAL catalogue "CLAMPING"	
		For milling cutter clamping screws see section Accessories - Allocation of milling cutter clamping screws	Page 228

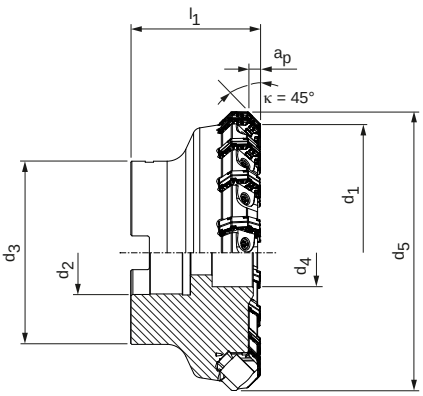
Spare parts**

			Order No.
	ONKU0705 (wide spacing)	Clamping screw for indexable insert TORX PLUS® M5x13-TX20-IP	10105084

Dimensions in mm.
Maximum operating speeds refer only to the cutting system.
* On request.
** Included.

IFM45-016

Face cutter head with radial technology
Close spacing



ONKU 07, close spacing

Dimensions						z_{eff}	a_p max.	Weight [kg]	Max. operating speed [rpm]	Internal cooling	Specification	Order No.
d_1	d_2	d_3	d_4	d_5	l_1							
63	22	48	18	75,1	55	7	3	1,1	9.000	-	IFM450-063-CA22-Z07R-ON_U07	31002155
80	27	60	20	92,1	50	11	3	1,5	7.800	-	IFM450-080-CA27-Z11R-ON_U07	31002156
100	32	78	27	112,1	55	14	3	2,5	6.800	-	IFM450-100-CA32-Z14R-ON_U07	31002157
125	40	89	33	137,1	63	18	3	4,1	5.900	-	IFM450-125-CA40-Z18R-ON_U07	31002158
140	40	89	65	152,1	63	20	3	4,8	5.500	-	IFM450-140-CA40-Z20R-ON_U07	31002159*
160	40	89	65	172,1	63	23	3	6,1	5.000	-	IFM450-160-CA40-Z23R-ON_U07	31002160
200	60	140	-	212,1	63	30	3	10,1	4.200	-	IFM450-200-CA60-Z30R-ON_U07	31002161
250	60	140	-	262,1	63	38	3	14,8	3.500	-	IFM450-250-CA60-Z38R-ON_U07	31002162*
315	60	140	-	327,1	80	47	3	25,2	2.800	-	IFM450-315-CA60-Z47R-ON_U07	31002163*
350	60	140	-	362,1	80	52	3	30,0	2.500	-	IFM450-350-CA60-Z52R-ON_U07	31002164*
400	60	140	-	412,1	80	60	3	40,5	2.200	-	IFM450-400-CA60-Z60R-ON_U07	31002165*

Accessories

	ONKU0705	Indexable inserts	Page 224
		Milling cutter arbor see MAPAL catalogue "CLAMPING"	
		For milling cutter clamping screws see section Accessories - Allocation of milling cutter clamping screws	Page 228

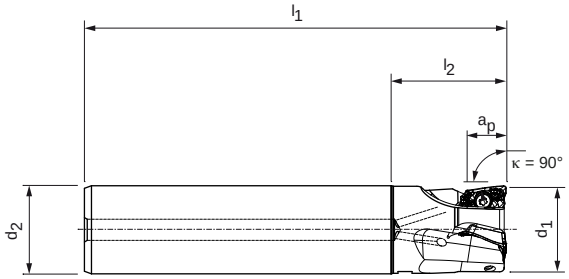
Spare parts**

	ONKU0705 (close spacing)	Indexable insert clamping wedge	Order No. 31071645
	ONKU0705 (close spacing)	Threaded spindle M6x0.75 LH/RHx23.4 Tx15 - IP	Order No. 31041869

Dimensions in mm.
Maximum operating speeds refer only to the cutting system.
* On request.
** Included.

ICM90-A2-Shank

End milling cutter with radial technology



AOKT12, close spacing

Dimensions				z_{eff}	a_p max.	Weight [kg]	Max. operating speed [rpm]	Cylindrical shank form	Internal cooling	Specification	Order No.
d_1	d_2	l_1	l_2								
20	20	110	30	2	11	0,2	55.000	HA	✔	ICM901-020-HA20-Z02R-AO_T12	31002166
20	20	81	30	2	11	0,2	55.000	HB	✔	ICM901-020-HB20-Z02R-AO_T12	31002167*
25	25	120	32	3	11	0,4	49.000	HA	✔	ICM901-025-HA25-Z03R-AO_T12	31002168
25	25	88	32	3	11	0,3	49.000	HB	✔	ICM901-025-HB25-Z03R-AO_T12	31002169*
32	32	130	40	4	11	0,7	43.000	HA	✔	ICM901-032-HA32-Z04R-AO_T12	31002170
32	32	100	40	4	11	0,5	43.000	HB	✔	ICM901-032-HB32-Z04R-AO_T12	31002171*
36	32	130	68	5	11	0,8	41.000	HA	✔	ICM901-036-HA32-Z05R-AO_T12	31002172*
36	32	100	38	5	11	0,6	41.000	HB	✔	ICM901-036-HB32-Z05R-AO_T12	31002173*
40	32	150	88	5	11	0,9	39.000	HA	✔	ICM901-040-HA32-Z05R-AO_T12	31002174
40	32	110	48	5	11	0,7	39.000	HB	✔	ICM901-040-HB32-Z05R-AO_T12	31002175*

Accessories

	AOKT12T3	Indexable inserts	Page 225
		Chuck see MAPAL catalogue "CLAMPING"	

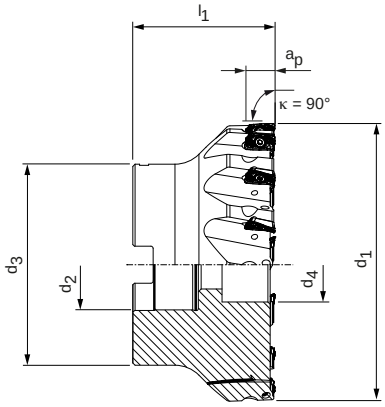
Spare parts**

			Order No.
	AOKT12T3	Clamping screw for indexable insert TORX® M3x6.5-TX8-IP	10105074

Dimensions in mm.
Maximum operating speeds refer only to the cutting system.
* On request.
** Included.

ICM90-A2

Shoulder cutter head with radial technology



AOKT12, close spacing

Dimensions					z_{eff}	a_p max.	Weight [kg]	Max. operating speed [rpm]	Internal cooling	Specification	Order No.
d_1	d_2	d_3	d_4	l_1							
40	16	32	14	40	5	11	0,2	39.000	✔	ICM901-040-CA16-Z05R-A0_T12	31002184
50	22	48	18,5	40	6	11	0,4	35.000	✔	ICM901-050-CA22-Z06R-A0_T12	31002185
55	22	48	18,5	40	7	11	0,5	33.000	✔	ICM901-055-CA22-Z07R-A0_T12	31002186*
63	22	48	18,5	40	8	11	0,6	31.000	✔	ICM901-063-CA22-Z08R-A0_T12	31002187
80	27	60	20,5	50	10	11	1,2	27.000	✔	ICM901-080-CA27-Z10R-A0_T12	31002188*
100	32	78	27	55	12	11	2,1	24.000	✔	ICM901-100-CA32-Z12R-A0_T12	31002189*
125	40	89	33	63	14	11	3,5	22.000	✔	ICM901-125-CA40-Z14R-A0_T12	31002190*
140	40	89	65	63	15	11	4,2	20.000	-	ICM900-140-CA40-Z15R-A0_T12	31002191*
160	40	89	65	63	17	11	5,2	19.000	-	ICM900-160-CA40-Z17R-A0_T12	31002192*
200	60	140	-	63	19	11	9,0	17.000	-	ICM900-200-CA60-Z19R-A0_T12	31002193*

Accessories

	AOKT12T3	Indexable inserts	Page 225
		Milling cutter arbor see MAPAL catalogue "CLAMPING"	
		For milling cutter clamping screws see section Accessories - Allocation of milling cutter clamping screws	Page 228

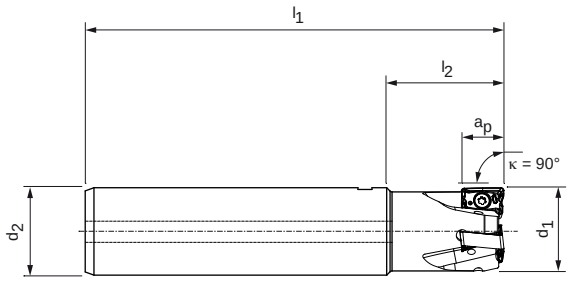
Spare parts**

			Order No.
	AOKT12T3	Clamping screw for indexable insert TORX® M3x7.5-TX8-IP	10105075

Dimensions in mm.
Maximum operating speeds refer only to the cutting system.
* On request.
** Included.

ICM90-A4-Shank

End milling cutter with radial technology



ANMU12, close spacing

Dimensions				z_{eff}	a_p max.	Weight [kg]	Max. operating speed [rpm]	Cylindrical shank form	Internal cooling	Specification	Order No.
d_1	d_2	l_1	l_2								
25	25	120	32	3	10	0,41	42.000	HA	✔	ICM901-025-HA25-Z03R-AN_U12	31002200
25	25	88	32	3	10	0,29	42.000	HB	✔	ICM901-025-HB25-Z03R-AN_U12	31002201*
32	32	130	40	4	10	0,74	31.500	HA	✔	ICM901-032-HA32-Z04R-AN_U12	31002202
32	32	100	40	4	10	0,55	31.500	HB	✔	ICM901-032-HB32-Z04R-AN_U12	31002203*
36	32	130	40	4	10	0,78	28.000	HA	✔	ICM901-036-HA32-Z04R-AN_U12	31002204*
36	32	100	40	4	10	0,59	28.000	HB	✔	ICM901-036-HB32-Z04R-AN_U12	31002205*
40	32	150	50	5	10	0,98	25.000	HA	✔	ICM901-040-HA32-Z05R-AN_U12	31002206
40	32	110	50	5	10	0,73	25.000	HB	✔	ICM901-040-HB32-Z05R-AN_U12	31002207*

Accessories

	ANMU1205	Indexable inserts	Page 225
		Chuck see MAPAL catalogue "CLAMPING"	

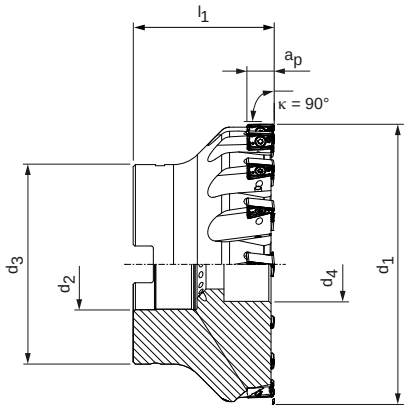
Spare parts**

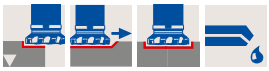
			Order No.
	ANMU1205	Clamping screw for indexable insert TORX® M3x8.5-TX8-IP	10105076

Dimensions in mm.
Maximum operating speeds refer only to the cutting system.
* On request.
** Included.

ICM90-A4

Shoulder cutter head with radial technology





ANMU12, medium spacing

Dimensions					z_{eff}	a_p max.	Weight [kg]	Max. operating speed [rpm]	Internal cooling	Specification	Order No.
d_1	d_2	d_3	d_4	l_1							
40	16	32	14	40	5	10	0,2	26.000	✔	ICM901-040-CA16-Z05R-AN_U12	31018837*
50	22	48	18,5	40	6	10	0,4	23.000	✔	ICM901-050-CA22-Z06R-AN_U12	31018838*
55	22	48	18,5	40	6	10	0,5	22.000	✔	ICM901-055-CA22-Z06R-AN_U12	31018839*
63	22	48	18,5	40	8	10	0,6	21.000	✔	ICM901-063-CA22-Z08R-AN_U12	31018870*
80	27	60	20,5	50	10	10	1,2	18.000	✔	ICM901-080-CA27-Z10R-AN_U12	31018871*
100	32	78	27,5	55	12	10	2,1	16.000	✔	ICM901-100-CA32-Z12R-AN_U12	31018872*
125	40	89	33	63	14	10	3,6	15.000	✔	ICM901-125-CA40-Z14R-AN_U12	31018873*
140	40	89	65	63	15	10	3,9	14.000	-	ICM900-140-CA40-Z15R-AN_U12	31018874*
160	40	89	65	63	18	10	5,0	13.000	-	ICM900-160-CA40-Z18R-AN_U12	31018875*
200	60	140	-	63	23	10	8,8	11.000	-	ICM900-200-CA60-Z23R-AN_U12	31018876*

ANMU12, close spacing

40	16	32	14	40	6	6	0,2	26.000	✔	ICM901-040-CA16-Z06R-AN_U12	31002214
50	22	48	18,5	40	8	6	0,5	23.000	✔	ICM901-050-CA22-Z08R-AN_U12	31002215
55	22	48	18,5	40	8	6	0,5	22.000	✔	ICM901-055-CA22-Z08R-AN_U12	31002216*
63	22	48	18,5	40	10	6	0,6	21.000	✔	ICM901-063-CA22-Z10R-AN_U12	31002217
80	27	60	20,5	50	12	6	1,2	18.000	✔	ICM901-080-CA27-Z12R-AN_U12	31002218*
100	32	78	27,5	55	14	6	2,2	16.000	✔	ICM901-100-CA32-Z14R-AN_U12	31002219*
125	40	89	33	63	16	6	3,7	15.000	✔	ICM901-125-CA40-Z16R-AN_U12	31002220*
140	40	89	65	63	17	6	3,9	14.000	-	ICM900-140-CA40-Z17R-AN_U12	31002221*
160	40	89	65	63	20	6	5,0	13.000	-	ICM900-160-CA40-Z20R-AN_U12	31002222*
200	60	140	-	63	25	6	8,8	11.000	-	ICM900-200-CA60-Z25R-AN_U12	31002223*

Accessories

	ANMU1205	Indexable inserts	Page 225
		Milling cutter arbor see MAPAL catalogue "CLAMPING"	
		For milling cutter clamping screws see section Accessories - Allocation of milling cutter clamping screws	Page 229

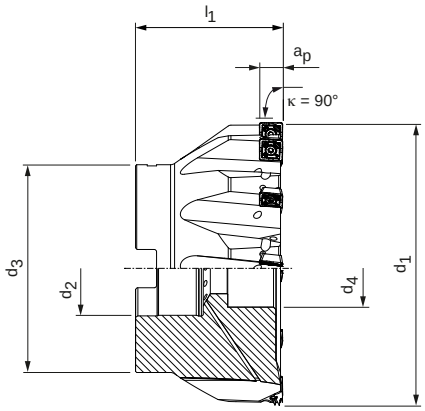
Spare parts**

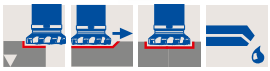
			Order No.
	ANMU1205	Clamping screw for indexable insert TORX® M3x8.5-TX8-IP	10105076

Dimensions in mm.
Maximum operating speeds refer only to the cutting system.
* On request.
** Included.

ICM90-S4

Shoulder cutter head with radial technology





SDKT10, medium spacing

Dimensions					z_{eff}	a_p max.	Weight [kg]	Max. operating speed [rpm]	Internal cooling	Specification	Order No.
d_1	d_2	d_3	d_4	l_1							
40	16	32	13,8	40	4	7	0,2	37.000	✔	ICM901-040-CA16-Z04R-SD_T10	31002253*
50	22	48	18,5	40	5	7	0,4	33.000	✔	ICM901-050-CA22-Z05R-SD_T10	31002254*
63	22	48	18,5	40	6	7	0,6	30.000	✔	ICM901-063-CA22-Z06R-SD_T10	31002255*
80	27	60	20	50	8	7	1,1	26.000	✔	ICM901-080-CA27-Z08R-SD_T10	31002256*
100	32	78	27	55	9	7	2,0	23.000	✔	ICM901-100-CA32-Z09R-SD_T10	31002257*
125	40	89	33	63	10	7	3,5	21.000	✔	ICM901-125-CA40-Z10R-SD_T10	31002258*
140	40	89	65	63	11	7	3,9	20.000	-	ICM900-140-CA40-Z11R-SD_T10	31002259*
160	40	89	65	63	13	7	4,8	18.000	-	ICM900-160-CA40-Z13R-SD_T10	31002260*
200	60	140	-	63	15	7	8,9	16.000	-	ICM900-200-CA60-Z15R-SD_T10	31002261*

SDKT10, close spacing

40	16	32	13,8	40	5	5	0,2	37.000	✔	ICM901-040-CA16-Z05R-SD_T10	31002262
50	22	48	18,5	40	6	5	0,4	33.000	✔	ICM901-050-CA22-Z06R-SD_T10	31002263
63	22	48	18,5	40	7	5	0,6	30.000	✔	ICM901-063-CA22-Z07R-SD_T10	31002264
80	27	60	20	50	9	5	1,1	26.000	✔	ICM901-080-CA27-Z09R-SD_T10	31002265
100	32	78	27	55	10	5	2,1	23.000	✔	ICM901-100-CA32-Z10R-SD_T10	31002266
125	40	89	33	63	12	5	3,5	21.000	✔	ICM901-125-CA40-Z12R-SD_T10	31002267
140	40	89	65	63	13	5	4,0	20.000	-	ICM900-140-CA40-Z13R-SD_T10	31002268*
160	40	89	65	63	15	5	5,0	18.000	-	ICM900-160-CA40-Z15R-SD_T10	31002269
200	60	140	-	63	17	5	9,1	16.000	-	ICM900-200-CA60-Z17R-SD_T10	31002270*

Accessories

	SDKT10T3	Indexable inserts	Page 226
		Milling cutter arbor see MAPAL catalogue "CLAMPING"	
		For milling cutter clamping screws see section Accessories - Allocation of milling cutter clamping screws	Page 229

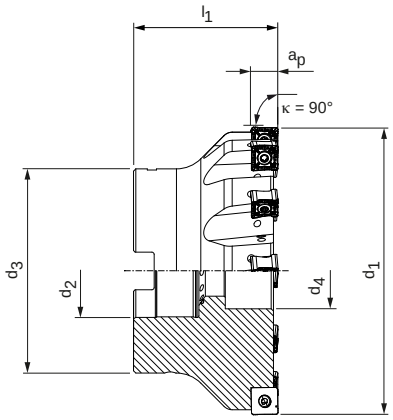
Spare parts**

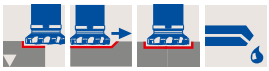
			Order No.
	SDKT10T3	Clamping screw for indexable insert TORX® M3x7.5-TX8-IP	10105075

Dimensions in mm.
Maximum operating speeds refer only to the cutting system.
* On request.
** Included.

ICM90-S8

Shoulder cutter head with radial technology





SNMU12, medium spacing

Dimensions					z_{eff}	a_p max.	Weight [kg]	Max. operating speed [rpm]	Internal cooling	Specification	Order No.
d_1	d_2	d_3	d_4	l_1							
50	22	48	18,5	40	4	8	0,4	17.000	✔	ICM901-050-CA22-Z04R-SN_U12	31002271
63	22	48	18,5	40	6	8	0,5	15.000	✔	ICM901-063-CA22-Z06R-SN_U12	31002272
80	27	60	20,5	50	8	8	1,2	13.000	✔	ICM901-080-CA27-Z08R-SN_U12	31002273
100	32	78	27,5	55	10	8	2,2	12.000	✔	ICM901-100-CA32-Z10R-SN_U12	31002274
125	40	89	33	63	12	8	3,7	11.000	✔	ICM901-125-CA40-Z12R-SN_U12	31002275
140	40	89	65	63	14	8	4,0	10.000	-	ICM900-140-CA40-Z14R-SN_U12	31002276*
160	40	89	65	63	16	8	4,9	9.000	-	ICM900-160-CA40-Z16R-SN_U12	31002277
200	60	89	-	63	18	8	8,5	8.000	-	ICM900-200-CA60-Z18R-SN_U12	31002278*

SNMU12, close spacing

50	22	48	18,5	40	6	6	0,4	17.000	✔	ICM901-050-CA22-Z06R-SN_U12	31002279
63	22	48	18,5	40	8	6	0,6	15.000	✔	ICM901-063-CA22-Z08R-SN_U12	31002280
80	27	60	20,5	50	10	6	1,1	13.000	✔	ICM901-080-CA27-Z10R-SN_U12	31002281
100	32	78	27,5	55	12	6	2,2	12.000	✔	ICM901-100-CA32-Z12R-SN_U12	31002282
125	40	89	33	63	14	6	3,6	11.000	✔	ICM901-125-CA40-Z14R-SN_U12	31002283
140	40	89	65	63	16	6	4,0	10.000	-	ICM900-140-CA40-Z16R-SN_U12	31002284*
160	40	89	65	63	18	6	4,8	9.000	-	ICM900-160-CA40-Z18R-SN_U12	31002285
200	60	89	-	63	20	6	8,6	8.000	-	ICM900-200-CA60-Z20R-SN_U12	31002286*

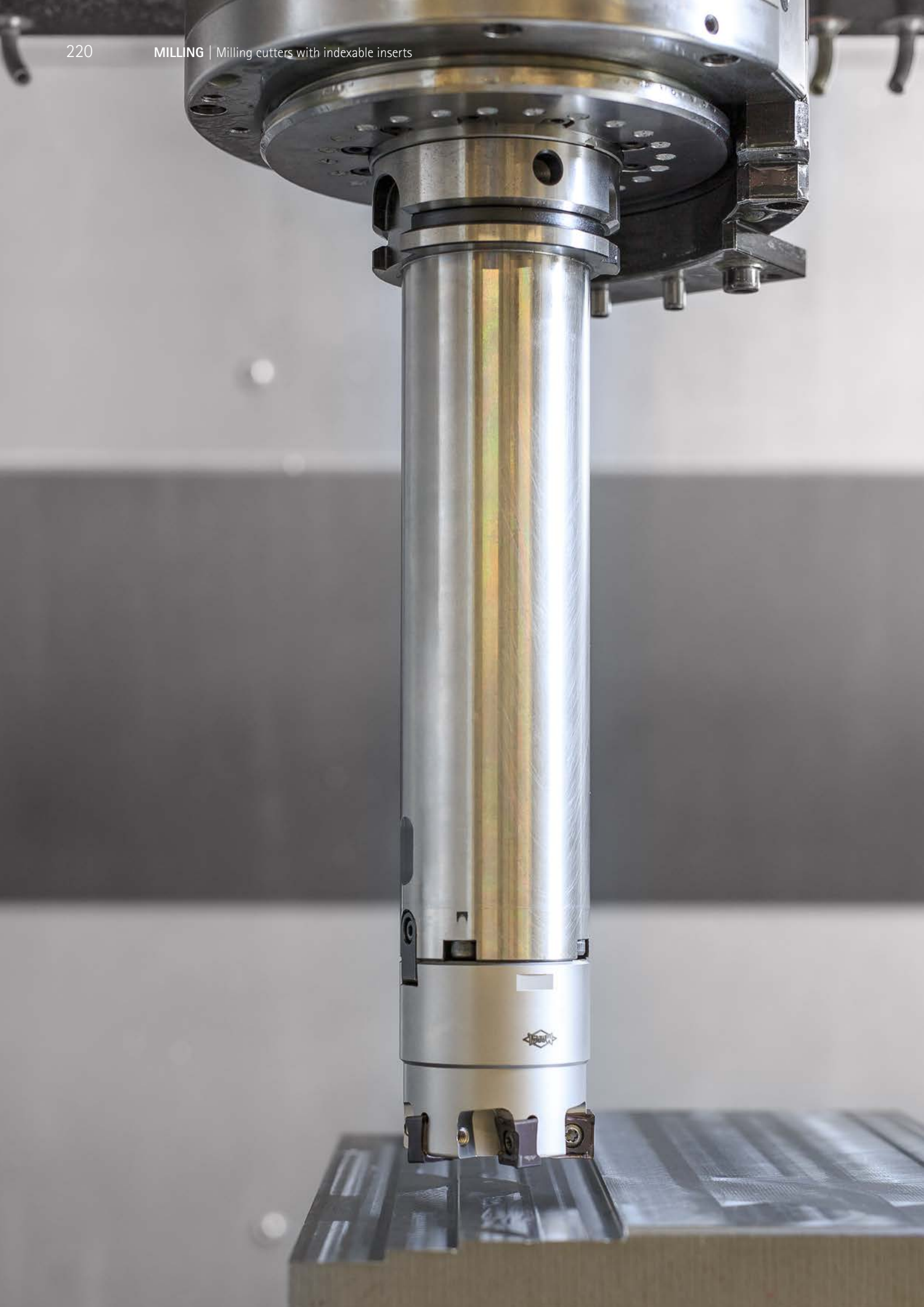
Accessories

	SNMU1205	Indexable inserts	Page 226
		Milling cutter arbor see MAPAL catalogue "CLAMPING"	
		For milling cutter clamping screws see section Accessories - Allocation of milling cutter clamping screws	Page 229

Spare parts**

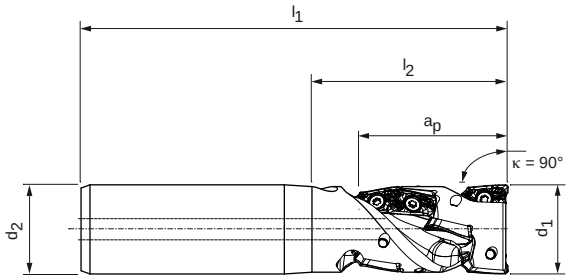
			Order No.
	SNMU1205	Clamping screw for indexable insert TORX PLUS® M4x11-TX15-IP	10018468

Dimensions in mm.
Maximum operating speeds refer only to the cutting system.
* On request.
** Included.



ISM90-A2-Shank

Shell end face milling cutter with radial technology



AOKT12

Dimensions				z_{eff}	Number of indexable inserts	a_p max.	Weight [kg]	Max. operating speed [rpm]	Cylindrical shank form	Internal cooling	Specification	Order No.
d_1	d_2	l_1	l_2									
25	25	120	55	2	8	41	0,4	49.000	HA	✔	ISM901-025-HA25-Z02R-AO_T12	31002194
25	25	104	46	2	8	41	0,3	49.000	HB	✔	ISM901-025-HB25-Z02R-AO_T12	31002195*
32	32	140	75	3	15	51	0,7	43.000	HA	✔	ISM901-032-HA32-Z03R-AO_T12	31002196*
32	32	120	57	3	15	51	0,6	43.000	HB	✔	ISM901-032-HB32-Z03R-AO_T12	31002197*
40	32	150	80	4	20	51	1,0	39.000	HA	✔	ISM901-040-HA32-Z04R-AO_T12	31002198*
40	32	126	64	4	20	51	0,8	39.000	HB	✔	ISM901-040-HB32-Z04R-AO_T12	31002199*

Accessories

	AOKT12T3	Indexable inserts	Page 225
		Chuck see MAPAL catalogue "CLAMPING"	

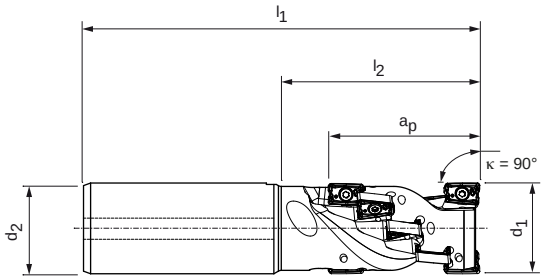
Spare parts**

			Order No.
	AOKT12T3	Clamping screw for indexable insert TORX® M3x7.5-TX8-IP	10105075

Dimensions in mm.
Maximum operating speeds refer only to the cutting system.
* On request.
** Included.

ISM90-A4-Shank

Shell end face milling cutter with radial technology



ANMU12

Dimensions				z_{eff}	Number of indexable inserts	a_p max.	Weight [kg]	Max. operating speed [rpm]	Cylindrical shank form	Internal cooling	Specification	Order No.
d_1	d_2	l_1	l_2									
32	32	140	70	2	10	52	0,7	29.000	HA	✔	ISM901-032-HA32-Z02R-AN_U12	31002236
32	32	125	61	2	10	52	0,6	29.000	HB	✔	ISM901-032-HB32-Z02R-AN_U12	31002237*
40	32	150	80	3	18	62	0,9	26.000	HA	✔	ISM901-040-HA32-Z03R-AN_U12	31002238
40	32	135	73	3	18	62	0,8	26.000	HB	✔	ISM901-040-HB32-Z03R-AN_U12	31002239*

Accessories

	ANMU1205	Indexable inserts	Page 225
		Chuck see MAPAL catalogue "CLAMPING"	

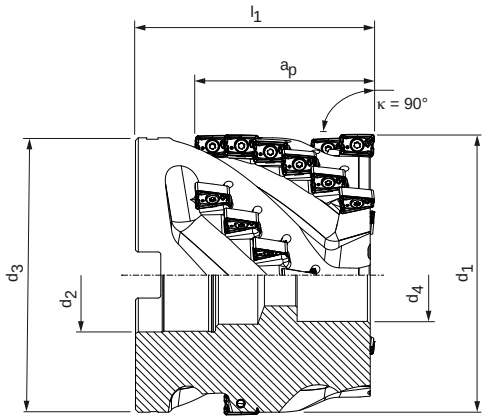
Spare parts**

			Order No.
	ANMU1205	Clamping screw for indexable insert TORX® M3x8.5-TX8-IP	10105076

Dimensions in mm.
Maximum operating speeds refer only to the cutting system.
* On request.
** Included.

ISM90-A4

Shell end face milling cutter head with radial technology



ANMU12*

Dimensions					z_{eff}	Number of indexable inserts	a_p max.	Weight [kg]	Max. operating speed [rpm]	Internal cooling	Specification	Order No.
d_1	d_2	d_3	d_4	l_1								
40	16	38	14	60	3	12	42	0,4	26.000	-	ISM900-040-CA16-Z03R-AN_U12	31002240**
50	22	48	18,5	70	4	20	52	0,7	23.000	-	ISM900-050-CA22-Z04R-AN_U12	31002241
63	27	60,6	20,5	75	4	20	52	1,2	21.000	-	ISM900-063-CA27-Z04R-AN_U12	31002242**
68	27	65,6	20,5	75	4	20	52	1,5	20.000	-	ISM900-068-CA27-Z04R-AN_U12	31002243**
80	32	77,6	27,5	85	6	36	62	2,4	18.000	-	ISM900-080-CA32-Z06R-AN_U12	31002244**
85	32	82,6	27,5	85	6	36	62	2,8	18.000	-	ISM900-085-CA32-Z06R-AN_U12	31002245**
100	40	97,6	33	85	6	36	62	3,8	16.000	-	ISM900-100-CA40-Z06R-AN_U12	31002246**
105	40	102,6	33	85	6	36	62	4,3	16.000	-	ISM900-105-CA40-Z06R-AN_U12	31002247**

Accessories

	ANU1205	Indexable inserts	Page 225
		Milling cutter arbor see MAPAL catalogue "CLAMPING"	
		For milling cutter clamping screws see section Accessories - Allocation of milling cutter clamping screws	Page 228

Spare parts***

	ANU1205	Clamping screw for indexable insert TORX® M3x8.5-TX8-IP	Order No. 10105076

Dimensions in mm.
Maximum operating speeds refer only to the cutting system.
* Design with internal cooling on request.
** On request.
*** Included.

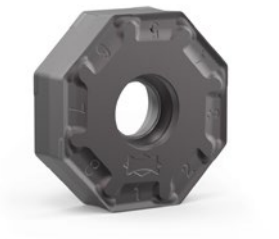
OFMT07

Radial indexable insert, eight cutting edges

		Carbide							
Material		P			M		K		
Cutting material type			HP980		HP980	HP985			
Cutting edge design			M03		M03	M03			
	a_p max. [mm]								
OFMT070405R-...-	*		31029307		31029307	31029341			

ONKU07

Radial indexable inserts, 16 cutting edges



		Carbide								
Material		P			M		K			
Cutting material type		HP975		HP980	HP980	HP985	HP965		HP975	
Cutting edge design		M03	M05	M03	M03	M03	M03	M05	M03	M05
	a_p max. [mm]									
ONKU070508R-...-	*	31116780	31029344	31029345	31029345	31029346	31116769	31029347	31116780	31029344
Cutting edge design								R05		R05
ONKU070508R-...-	*							31029363		31029360

* a_p max. is dependent on milling cutter type and specific application.
For related clamping screw and screwdriver see page 227.
For cutting data recommendation see page 234 f.

AOKT12

Radial indexable insert, two cutting edges

		Carbide							
Material		P			M			K	
Cutting material type		HP975				HP985		HP975	
Cutting edge design		M05				M03		M05	
	a_p max. [mm]								
AOKT12T304R-...-	*	31029366				31029367		31029366	
AOKT12T308R-...-	*	31029368				31029369		31029368	

ANMU12

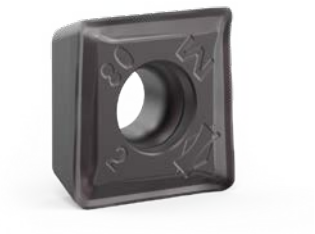
Radial indexable insert, four cutting edges

		Carbide							
Material		P			M			K	
Cutting material type		HP975	HP980		HP980	HP985	HP965	HP975	
Cutting edge design		M05	M03		M03	M03	M05	M05	
	a_p max. [mm]								
ANMU120504R-...-	*	31029427						31029427	
ANMU120508R-...-	*	30968178	31027000		31027000	31029429	31029430	30968178	

* a_p max. is dependent on milling cutter type and specific application.
For related clamping screw and screwdriver see page 227.
For cutting data recommendation see page 234 f.

SDKT10

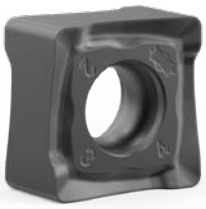
Radial indexable insert, four cutting edges



		Carbide							
Material		P			M		K		
Cutting material type			HP980		HP980	HP985			
Cutting edge design			M03		M03	M03			
	a_p max. [mm]								
SDKT10T308R-...-	*		31029463		31029463	31029465			

SNMU12

Radial indexable insert, eight cutting edges

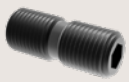


		Carbide							
Material		P			M		K		
Cutting material type		HP975	HP980		HP980	HP985	HP965	HP975	
Cutting edge design		M05	M03		M03	M03	M05	M05	
	a_p max. [mm]								
SNMU120508R-...-	*	30968200	31029466		31029466	31029469	31029480	30968200	
SNMU120512R-...-	*	31029482					31029483	31029482	

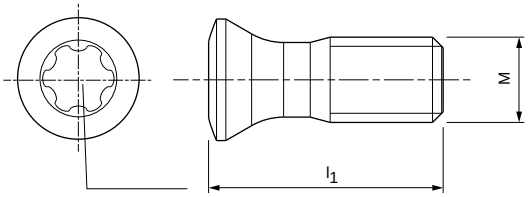
* a_p max. is dependent on milling cutter type and specific application.
For related clamping screw and screwdriver see page 227.
For cutting data recommendation see page 234 f.

Accessories for milling cutters with indexable inserts

Series IFM45-O16, close spacing with wedge clamping

	Dimension	Model	Wrench size SW / Torx size	Order No.
	M6x0,75LH	Clamping wedge		31071645
	TORX PLUS® M6x0,75LH/RHx23,4 TX15-IP	Threaded spindle	15IP	31041869

Accessories for radial indexable inserts



Accessories for radial indexable inserts

Indexable insert	Indexable insert size	Clamping screw					Screwdriver
		Dimension	Model	Tightening torque [Nm]	Torx size	Order No.	Order No.
OFMT	0704	M5x13	TORX PLUS® - M5x13-TX20IP	7,5 Nm	20IP	10105084	30414766
ONKU	0705	M5x13	TORX PLUS® - M5x13-TX20IP	7,5 Nm	20IP	10105084	30414766
AOKT*	12T3	M3x6.5	TORX PLUS® - M3x6.5-TX8IP	1,8 Nm	8IP	10105074	30414760
AOKT	12T3	M3x7.5	TORX® - M3x7,5-TX8IP	1,8 Nm	8IP	10105075	30414760
ANMU	1205	M3x8.5	TORX® - M3x8,5-TX8IP	1,8 Nm	8IP	10105076	30414760
SDKT	10T3	M3x7.5	TORX® - M3x7,5-TX8IP	1,8 Nm	8IP	10105075	30414760
SNMU	1205	M4x11	TORX PLUS® - M4x11-TX15IP	4 Nm	15IP	10018468	30414764

* For ICM90-A2-Shank and ISM90-A2-Shank ø 20 - 40 mm.

Allocation of milling cutter clamping screws for milling cutters with indexable inserts

Series	Milling cutter diameter	Milling cutter arbor diameter 	Milling cutter clamping screw  Without internal cooling*	 Without internal cooling**	 With internal cooling
IFM45-08 	63	22	10003660		31006800
	80	27	10003677		31008546
	100	32	10003690		31008547
	125	40	10111521		31009716
	140	40	10006594 (x4)	10004066	
	160	40	10006594 (x4)	10004066	
	200	60	10022995 (x4)		
	250	60	10022995 (x4)		
	315	60	10022995 (x4)		
	350	60	10022995 (x4)		
	400	60	10022995 (x4)		
IFM45-016 	63	22	10003660		31006800
	80	27	10003677		31008546
	100	32	10003690		31008547
	125	40	10111521		31009716
	140	40	10006594 (x4)	10004066	
	160	40	10006594 (x4)	10004066	
	200	60	10022995 (x4)		
	250	60	10022995 (x4)		
	315	60	10022995 (x4)		
	350	60	10022995 (x4)		
	400	60	10022995 (x4)		
ICM90-A2 	40	16	10003638		31006779
	50	22	10003660		31006800
	55	22	10003660		31006800
	63	22	10003660		31006800
	80	27	10003677		31008546
	100	32	10003690		31008547
	125	40	10111521		31009716
	140	40	10006594 (x4)	10004066	
	160	40	10006594 (x4)	10004066	
	200	60	10022995 (x4)		

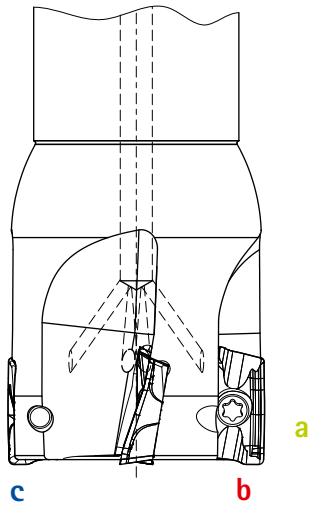
Dimensions in mm.
* Included with the tool body.
** Optional for clamping via central thread.

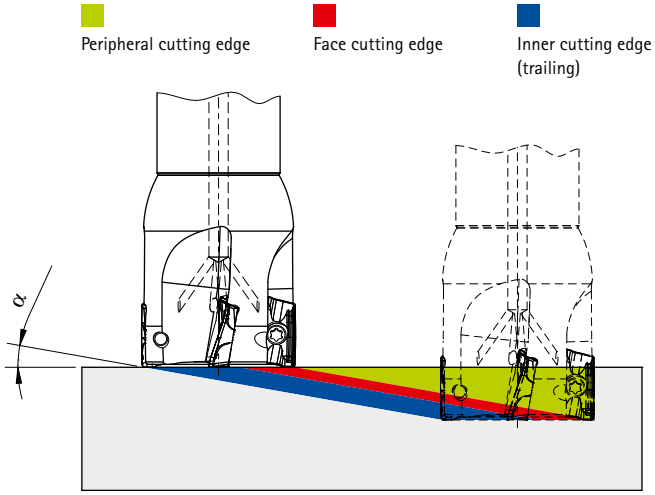
Series	Milling cutter diameter	Milling cutter arbor diameter 	Milling cutter clamping screw  Without internal cooling*	 Without internal cooling**	 With internal cooling
ICM90-A4 	40	16	10003638		31006779
	50	22	10003660		31006800
	55	22	10003660		31006800
	63	22	10003660		31006800
	80	27	10003677		31008546
	100	32	10003690		31008547
	125	40	10111521		31009716
	140	40	10006594 (x4)	10004066	
	160	40	10006594 (x4)	10004066	
	200	60	10022995 (x4)		
ISM90-A4 	40	16	10003640		
	50	22	10003663		
	63	27	10003679		
	80	32	10007775		
	100	40	10015925		
ICM90-S4 	40	16	10003638		31006779
	50	22	10003660		31006800
	63	22	10003660		31006800
	80	27	10003677		31008546
	100	32	10003690		31008547
	125	40	10111521		31009716
	140	40	10006594 (x4)	10004066	
	160	40	10006594 (x4)	10004066	
	200	60	10022995 (x4)		
ICM90-S8 	50	22	10003660		31006800
	63	22	10003660		31006800
	80	27	10003677		31008546
	100	32	10003690		31008547
	125	40	10111521		31009716
	140	40	10006594 (x4)	10004066	
	160	40	10006594 (x4)	10004066	
	200	60	10022995 (x4)		

Dimensions in mm.
* Included with the tool body.
** Optional for clamping via central thread.

Application notes

Two-axis inclined entry – linear (full slot)

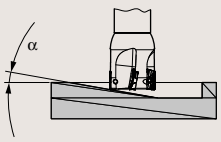




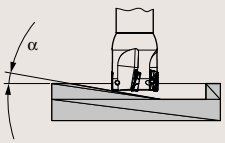
Ramp angle α:
The maximum plunge angle α is dependent on the tool.

In case of two-axis inclined entry, various machining processes take place at the same time:
a) Machining at the entire periphery of the tool (peripheral machining) with leading indexable insert.
b) Machining at the face of the milling cutter with leading insert.
c) Machining at the face of the milling cutter with trailing insert.

Application notes
For end milling cutter ICM90-A2-Shank

Plunge milling	Milling cutter diameter [mm]	Applicable indexable insert	Maximum ramp angle α [°]
	ø 20	AOKT12T3	6,0
	ø 25		4,2
	ø 32		3,0
	ø 36		2,6
	ø 40		2,2

For shoulder cutter head ICM90-A2

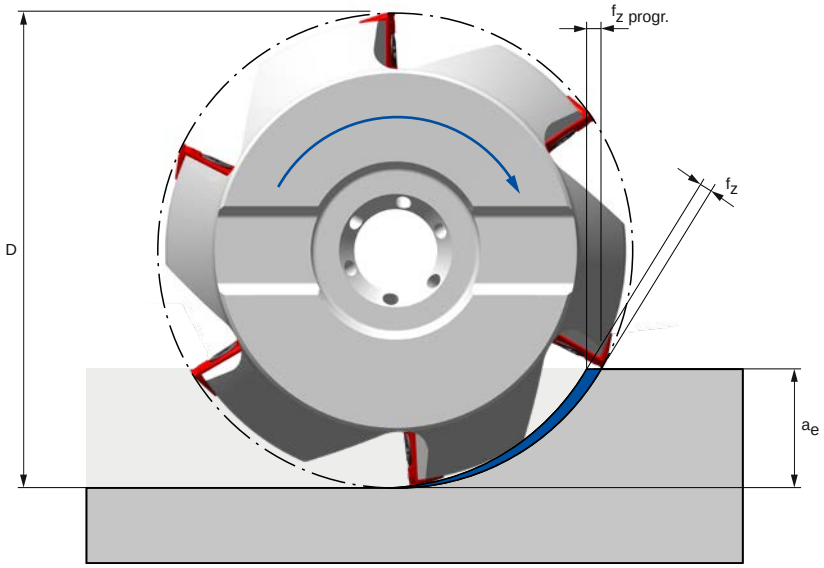
Plunge milling	Milling cutter diameter [mm]	Applicable indexable insert	Maximum ramp angle α [°]
	ø 40	AOKT12T3	2,2
	ø 50		1,7
	ø 55		1,5
	ø 63		1,3
	ø 80		1,0
	ø 100 and more		Not recommended

Face and shoulder milling

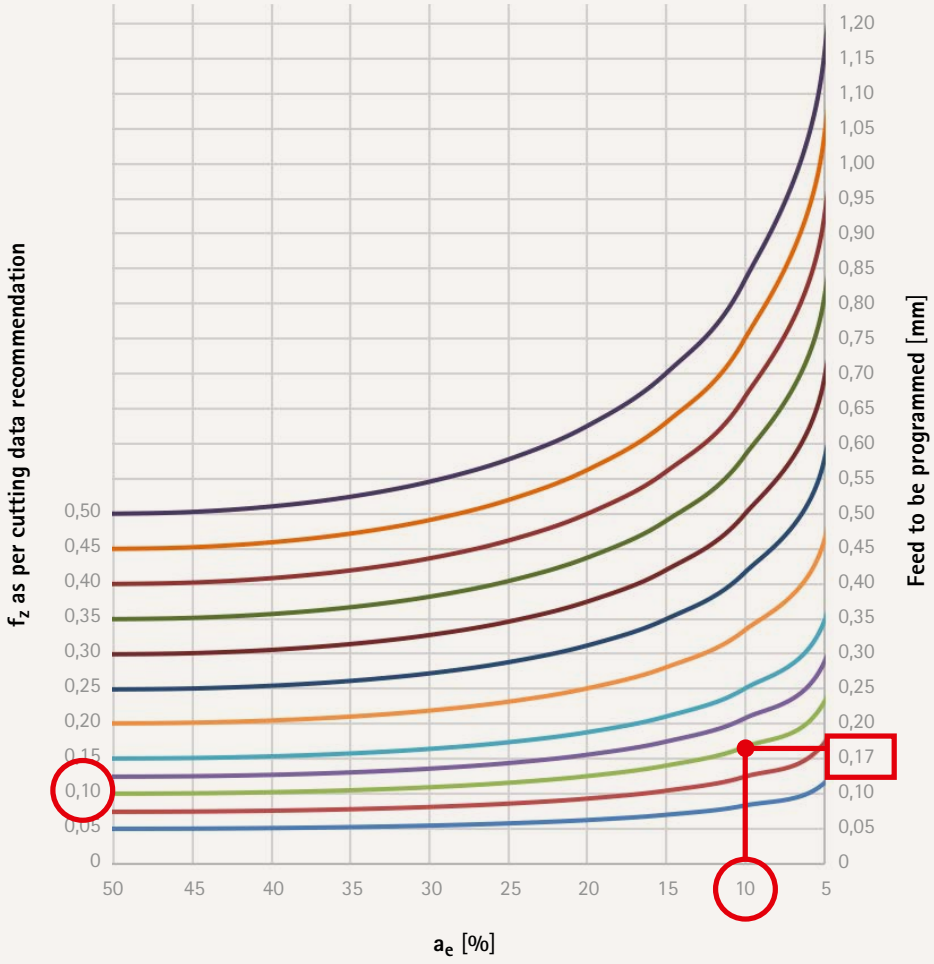
Feed value compensation

Machining steps with low radial cutting depth, such as milling a shoulder, require correction of the feed at the cutting edge as it enters the workpiece.

The recommended feed per tooth f_z varies depending on milling cutter diameter and operational time, that is the radial contact ratio of the milling cutter a_e/D. If this is less than 50 percent, the maximum chip thickness reduces relative to the feed f_z. The feed can be increased with the aid of the correction factor in the following diagram, depending on the a_e/D ratio.



Feed value compensation



Example:

D	= 20 mm
a_e	= 2 mm
f_z	= 0.1 mm/tooth
a_e/D	= 10 %
$f_{z\ progr.}$	= 0.17 mm/tooth

Handling notes for face milling cutters with radial indexable inserts

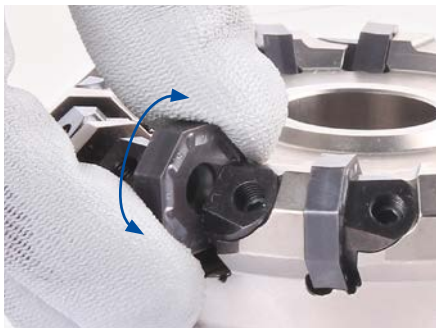
Applicable to milling cutters with ONKU and OFMT indexable inserts.

Note:
- Only for trained personnel.
- Clean the index-able inserts using cleaning compound.

Replacing the indexable inserts

Requirement:
The face milling cutter and the indexable inserts have been checked for good condition and cleanliness.

ONKU indexable inserts

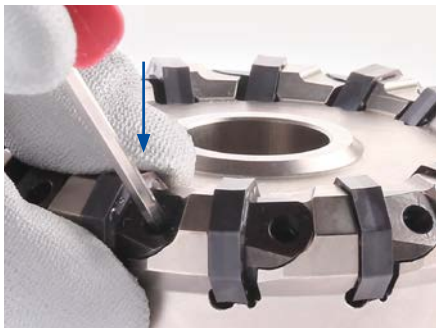


Note:
Before and during the replacement procedure, check the indexable inserts and insert seats for good condition and cleanliness.

1. Loosen the clamping wedge. To do this, use a TORX PLUS® wrench to turn the threaded spindle counter-clockwise by a few turns.

Note:
When inserting the indexable inserts, pay attention to the numbering of the chip guiding stages. The numbering should be identical in each insert seat.

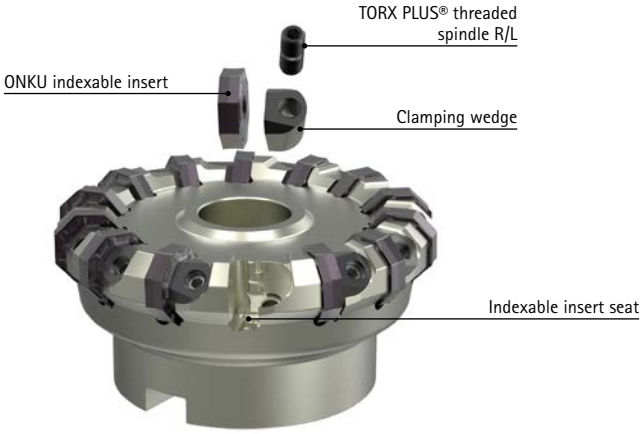
2. Insert the indexable insert into the insert seat with slight rocking movements.



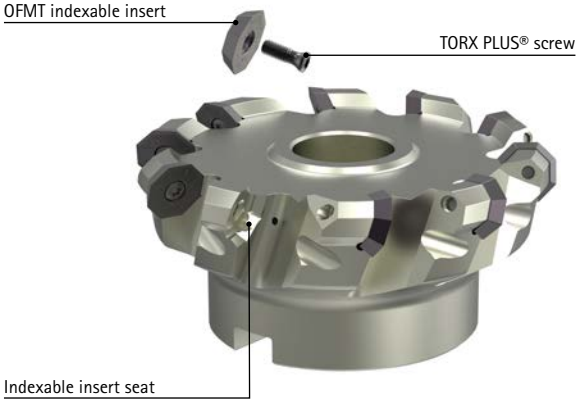
3. Press the indexable insert downwards and make sure that the indexable insert is in contact with the circum-ference on both contact surfaces.
4. Hold the indexable insert and turn the threaded spindle clockwise with a TORX PLUS® wrench until the clamping wedge is slightly in contact with the indexable insert and fixes it.

Note:
Before applying the tightening torque to the threaded spindle, all indexable inserts must first be mounted.

5. Tighten the threaded spindle at all clamping wedges to 7.5 Nm using a torque wrench.

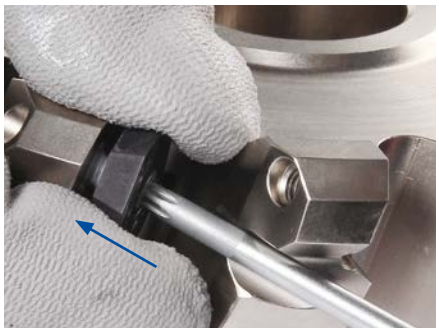


Series ONKU



Series OFMT

OFMT indexable inserts



Note:
Before and during the replacement procedure, check the indexable inserts and insert seats for good condition and cleanliness.

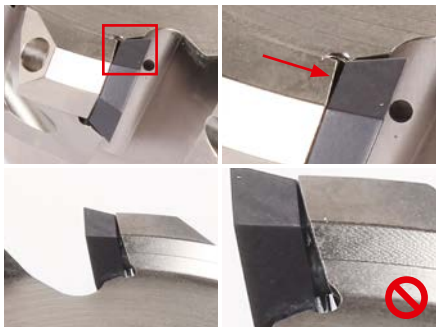
1. Put the TORX PLUS® screw through the location bore of the indexable insert.

Note:
When inserting the indexable inserts, pay attention to the numbering of the chip guiding stages.
The numbering should be identical in each insert seat.

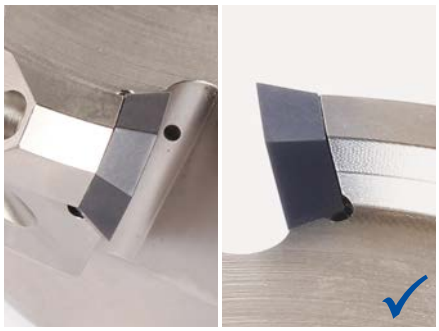
2. Insert the TORX PLUS® screw together with the indexable insert in the location bore of the insert seat. The indexable insert must not yet be in contact with the insert seat.

3. Using a TORX PLUS® wrench, screw in the TORX PLUS® screw clockwise and simultaneously insert the indexable insert into the insert seat with slight rocking movements.

4. Pull the indexable insert outwards at a 45° angle and simultaneously screw in the TORX PLUS® screw as far as it will go.
5. Make sure that the indexable insert is flat and free of gaps.
6. Tighten the TORX PLUS® screw to 7.5 Nm using a torque wrench.



Note:
If the indexable insert is not flat, the indexable insert must be loosened and remounted.



Result:
The indexable insert is correctly mounted and flat.

Cutting data recommendation for milling cutters with indexable inserts

Cutting speed (selection based on cutting material type and contact ratio a_e/D)

MMG*			Material	Strength/hardness [N/mm²] [HRC]	Carbide PVD-coated							
					HP965		HP975		HP980		HP985	
					>0.6	<0.6	>1.6	<1.6	>1.6	<1.6	>1.6	<1.6
P	P1	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700 N/mm²			180	220	180	220		
		P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200 N/mm²			150	180	150	180		
	P2	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900 N/mm²			160	200	160	200		
		P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400 N/mm²					130	160		
	P3	P3.1	Tool, bearing, spring and high-speed steels	< 900 N/mm²					150	180		
		P3.2	Tool, bearing, spring and high-speed steels	< 1500 N/mm²					110	140		
	P4	P4.1	Stainless steels, ferritic and martensitic						120	150		
	P5	P5.1	Cast steel						130	160		
	P6	P6.1	Stainless cast steel, ferritic and martensitic						110	140		
M	M1	M1.1	Stainless steels, austenitic	< 700 N/mm²					160	180	140	170
		M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000 N/mm²					140	160	120	150
	M2	M2.1	Stainless cast steel, austenitic	< 700 N/mm²							100	120
	M3	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000 N/mm²							90	110
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300 N/mm²	220	270	200	240				
	K2	K2.1	Cast iron with spheroidal graphite, GJS	< 500 N/mm²	200	240	180	220				
		K2.2	Cast iron with spheroidal graphite, GJS	500-800 N/mm²	180	220	160	200				
		K2.3	Cast iron with spheroidal graphite, GJS	> 800 N/mm²	160	200	140	170				
	K3	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500 N/mm²	170	210	150	180				
		K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500 N/mm²	160	200	140	170				

* MAPAL machining groups

Cutting data recommendation for milling cutters with indexable inserts

Feed per tooth (selection by chip guiding stage)

Face milling cutter head with radial technology

IFM45-008

Indexable insert			
Chip guiding stage		OFMT07	
Edge rounding		M03	
		++	
Feed/tooth [mm]	P	0,1 - 0,35	
	M	0,1 - 0,25	
	K		
	N		
	S		

IFM45-016

Indexable insert				
Chip guiding stage		ONKU07		
		M03	M05	R05
Edge rounding		++	+++	+++
Feed/tooth [mm]	P	0,1 - 0,3	0,12 - 0,35	0,15 - 0,4
	M	0,1 - 0,25		
	K		0,12 - 0,4	0,15 - 0,5
	N			
	S			

Shoulder milling cutter head with radial technology

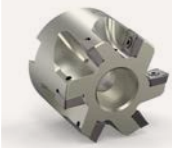
ICM90-A2

Indexable insert			
Chip guiding stage		AOKT12	
		M03	M05
Edge rounding		++	+++
Feed/tooth [mm]	P	0,08 - 0,25	0,1 - 0,25
	M	0,08 - 0,2	
	K		0,1 - 0,3
	N		
	S		

ICM90-A4

Indexable insert			
Chip guiding stage		ANMU12	
		M03	M05
Edge rounding		++	++
Feed/tooth [mm]	P	0,08 - 0,25	0,1 - 0,25
	M	0,08 - 0,2	
	K		0,1 - 0,3
	N		
	S		

ICM90-S4



Indexable insert			
Chip guiding stage		SDKT10	
		M03	M05
Edge rounding		++	+++
Feed/tooth [mm]	P	0,08 - 0,25	0,1 - 0,25
	M	0,08 - 0,2	
	K		
	N		
	S		

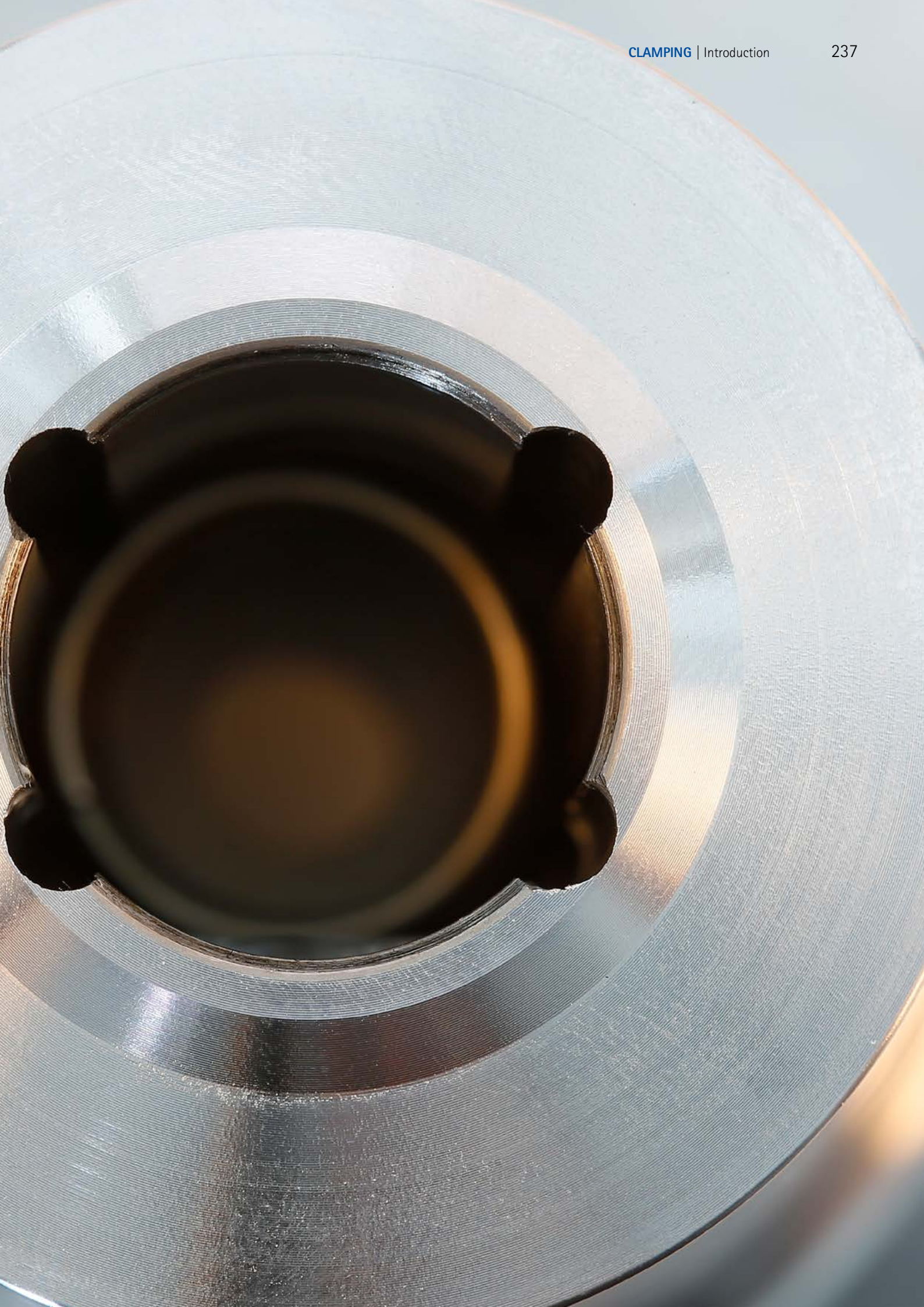
ICM90-S8

Indexable insert			
Chip guiding stage		SNMU12	
		M03	M05
Edge rounding		++	+++
Feed/tooth [mm]	P	0,08 - 0,25	0,1 - 0,25
	M	0,08 - 0,2	
	K		0,1 - 0,3
	N		
	S		

0 = sharp edged | + = slightly rounded | ++ = medium rounded | +++ = heavily rounded

CLAMPING

Vibration-damped milling cutter arbors.
MillChuck, System HB.
Additions to hydraulic chuck series.



CLAMPING

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Milling cutter arbors

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Milling cutter arbor, vibration-damped, HSK 248

Milling cutter arbor, vibration-damped, SK 249

Spare parts for milling cutter arbors 250

Chucks

Mechanical tool clamping

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Hydraulic chucks HighTorque Chuck HTC

- HighTorque Chuck HTC, HSK, slender design 3° 252
- HighTorque Chuck HTC, HSK, long heavy-duty design 253
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Hydraulic chucks HydroChuck MHC

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Technical appendix

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Handling notes, MillChuck, System HB 262

ADDITIONS TO PROGRAMME

New mechanical tool chuck and additions to series

The new power MillChuck impresses with strong clamping, simple handling and very good radial run-out. The location bore is manufactured in the single-digit µm range. A patented spring element in the connection ensures a defined form closure between tools with HB shank and the connection.

In order to minimise vibrations and their consequences, MAPAL has developed an innovative system for vibration damping in the tool shank, as particularly tools for boring and milling with very long projection length tend to vibrate due to an inadequate dynamic rigidity of the overall system.

The connection BT30 has been added to the existing hydraulic chuck HydroChuck Compensation.

The handling during machining with tool restrictions is significantly improved with the long HydroDrillReamChuck. Tools of standard length can be used due to the long chuck. This reduces the tendency to vibration and significantly higher cutting data can be used.

Mechanical tool clamping:
- Simple construction and uncomplicated handling
- Safe clamping independent of direction of rotation
- High spindle speed strength

Hydraulic clamping technology:
- High torque transmission
- Process reliability up to 170 °C
- Increased tool life due to very high radial run-out accuracy and accuracy of repetition

Mechanical tool clamping

Milling cutter arbor, vibration-damped

- Smooth, steady running despite long projection length
- Higher cutting speeds, higher material removal rates
- Better surface finish

- HSK-A: 63 | 100
- SK: 40 | 50
- Lengths l_1 [mm]: 200 | 300

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MillChuck, System HB

- Reliable tool clamping
- Significantly improved radial run-out thanks to highly accurate location bore
- Simple handling using differential screw
- Ideally matched to high-performance milling cutters with HB clamping surface
- Decentralised coolant outlets

- HSK-A: 63 | 100
- Lengths l_1 [mm]: 65 | 70 | 80 | 85 | 100 | 110

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Hydraulic clamping technology

HighTorque Chuck

- High torque transmission
- Process reliability up to 170 °C
- Suitable for MQL
- New lengths for mould making 126 | 176 | 226

- HSK-A: 40 | 50 | 63
- BT: 40 | 50
- Lengths l_1 [mm]: 58 | 72.5 | 69 | 83.5 | 85 | 90 | 105 | 126 | 176 | 226

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HydroChuck

- No reduction in the clamping forces at high spindle speeds, as a result high process reliability
- Increased tool life due to very high radial run-out accuracy and accuracy of repetition
- Suitable for MQL

- HSK-A: 50 | 100
- Lengths l_1 [mm]: 70 | 75 | 85 | 90 | 150 | 200

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HydroDrillReamChuck

- Save costs thanks to long hydraulic chuck and standard solid carbide tool
- Machining in the contour-critical area
- Better surface finish with longer tool life of the tool
- Shorter set-up times and lower tool costs

- HSK-A: 63 | 100
- Lengths l_1 [mm]: 200

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HydroChuck Compensation

- Compensation of errors on the overall system
- Simple handling
- No jamming of the tool
- Better surface quality and tool life
- New for machines with BT30 connection

- BT: 30
- Lengths l_1 [mm]: 105 | 115

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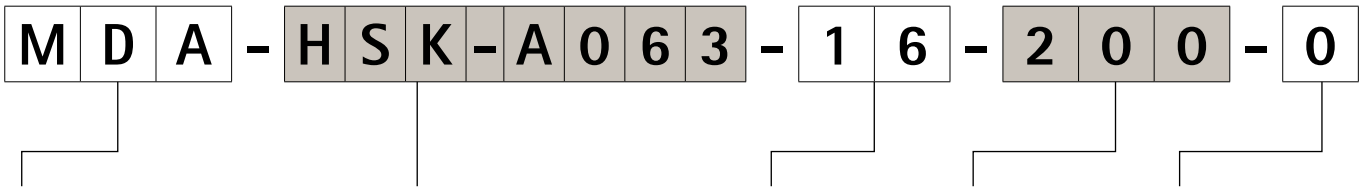
Designation key

Chuck



Type

HTC	HighTorque Chuck
MHC	Hydraulic chuck (HydroChuck)
MHA	Hydraulic clamping arbor
MTC	Shrink chuck (ThermoChuck)
MWC	Weldon chuck
MNC	Chuck Whistle Notch
MCC	Chuck for collets
MCA	Milling cutter arbor
MDA	Milling cutter arbor, vibration-damped
MPC	Precision drill chuck (Precision-DrillChuck)
MSC	Synchro tapping chuck
MFH	Floating holder

Locating shank

HSK-A	Hollow shank taper Form A
HSK-C	Hollow shank taper Form C
HSK-E	Hollow shank taper Form E
HSK-F	Hollow shank taper Form F
MOD	Module connection
ZYL	Cylindrical shank
SK	Steep taper Form A in acc. with ISO
AD-FC	Steep taper Form A in acc. with ISO
BT	Steep taper Form J in acc. with ISO
JD-FC	Steep taper Form J similar to ISO with face connection
CAT	Steep taper in acc. with ASME
VDI	VDI connection
STH	Shank of adjusting bushing

Clamping diameter (max.)

Projection length

Internal cooling/MQL - general conditions

0	Without
1	Internal
2	Lateral (SK)
3	Internal and lateral combined
	Only with MQL:
A	MQL 1-channel system automatic tool change
B	MQL 1-channel system manual tool change
C	MQL 2-channel system automatic tool change
D	MQL 2-channel system manual tool change
E	MQL 1-channel system Tool change not specified
F	MQL 2-channel system Tool change not specified
G	MQL not specified Tool change not specified

Extension
with MQL

- **0** - **W** - **A** **A** **A** **3**

Alignment

0	Without alignment
1	Radial alignment
2	Radial and angular alignment

Length adjustment

A	Axial length adjustment
R	Radial length adjustment
W	Without length adjustment

Body
(BDY)

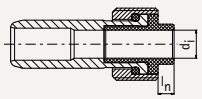
A	MAPAL standard range
B	MAPAL Semi-standard MTC long design Thread for LS differs
C	MAPAL Semi-standard MTC short design HSK 32

Length adjustment screw
(LS)

A	MAPAL Standard range
B	MAPAL Semi-standard MTC 2-channel applications Sealing diameter d_a reduced for wrench size 2
C	MAPAL Semi-standard for body material designs B and C

Coolant supply unit
(CU)

A	MAPAL Standard range
B	MAPAL Semi-standard l_n reduced
C	MAPAL Semi-standard $l_n = 0$
D	MAPAL Semi-standard Sealing diameter d_i differs
E	MAPAL Semi-standard l_n reduced Sealing diameter d_i differs
F	MAPAL Semi-standard $l_n = 0$ Sealing diameter d_i differs



Wrench size AF
(only for 2-channel)

1	Wrench size 1.5
2	Wrench size 2
3	Wrench size 3
4	Wrench size 4
5	Wrench size 5
6	Wrench size 6
7	Wrench size 2.5

The following items of information are appended to the specification:

VS: Foolproofing
FB: Fine balanced
BC: Chip version with Balluff chip
FAS: Milling cutter clamping screw
CT: Coolant tube

Vibration damping – significantly improved surface finishes

Vibration often occurs during machining. It causes a dynamic instability of the system. Inadequate surface finishes, insufficient accuracy, high machining noises, shortened tool lives and, in extreme cases, broken tools and cutting edges can be the result.

In order to minimise these vibrations and their consequences, MAPAL has now developed an innovative system for vibration damping in the tool shank, as particularly tools for boring and milling with very long projection length tend to vibrate due to an inadequate dynamic rigidity of the overall system. When designing the new system, the developers took into account all factors arising from the interaction of the machine tool, the tool and type of clamping as well as the part. The result: A system for vibration damping tailored to the rigidity of all common machine types. It can be used for machining different materials with different tools.

The self-contained system of auxiliary mass and several steel spring packages counteracts the deflection of the tool body and minimises it. Compared with tools without absorber system, the vibration amplitudes can be up to 1,000 times lower. Despite the long projection length, quiet, stable running is achieved. This makes it possible to work at higher cutting speeds and significantly increases the material removal rate. In addition, significantly better surface finishes are achieved thanks to vibration damping.

AT A GLANCE

- System for vibration suppression directly in the tool shank for tools with long projection length
- Tailored to the rigidity of all common machine types
- Available with internal coolant supply for clamping diameters 16, 22 and 27 mm with a length of 200 and 300 mm for SK40, SK50, HSK-A63 and HSK-A100 connections

ADVANTAGES

- Smooth, steady running despite long projection length
- Higher cutting speeds, higher material removal rates
- Better surface finishes

Tool features in detail

1 Internal coolant channels
– Optimal coolant supply

2 Standardised connection according to DIN 69882-3
– Suitable for standard milling cutters with cross slot

3 Hard-turned surface
– Improved corrosion resistance

4 Cylindrical contour
– Best accessibility

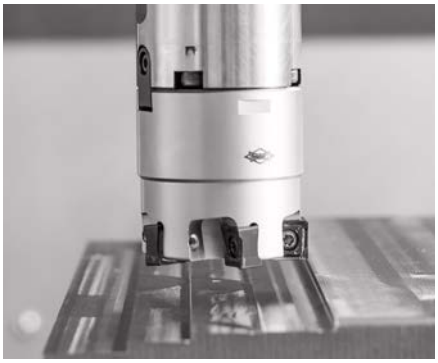
Vibration damping in the milling cutter arbor

- Smooth, steady running despite long projection length
- Protection of spindle and machine with low energy consumption
- Minimisation of noise during the machining process

Internal coolant supply

- Higher cutting speeds thanks to internal cooling with better material removal rate
- Less cutting edge chipping
- Optimal cooling of the cutting edge makes possible deep machining positions

Better surface finishes thanks to vibration damping



- Significantly improved surface finish with identical cutting data
- Optimal chip breaking, no scratching of the surface finish

MillChuck, System HB

Power chucks for high-performance milling operations

MAPAL's new power chuck impresses with its strong clamping capacity, easy handling and significantly improved radial run-out. The location bore is manufactured in the single digit µm range and therefore with significantly more precision than before. This reduces the radial play of the clamped tool and significantly improves radial run-out. The large tolerance on the lateral clamping surface is also compensated. Here MAPAL relies on a spring element in the connection that makes possible a defined form closure between tool and connection. Cooling channels parallel to the axis in the clamping range also ensure improved coolant supply.

To simplify the handling, a two-piece clamping element is used. This reduces the tightening torque while maintaining the same clamping force, enabling the tool to be reliably clamped in the connection manually.

AT A GLANCE

- Significantly more accurate location bore
- Available with clamping diameters from 6 to 32 mm for HSK-A100 and HSK-A63
- Balancing value G2.5 at 16,000 min^{-1}
- Can be combined excellently with MAPAL high-performance milling cutters

ADVANTAGES

- Very simple handling thanks to differential screw
- Maximum cost-effectiveness and precision
- Defined axial tool positioning thanks to spring system
- Decentral coolant outlets for maximum process reliability

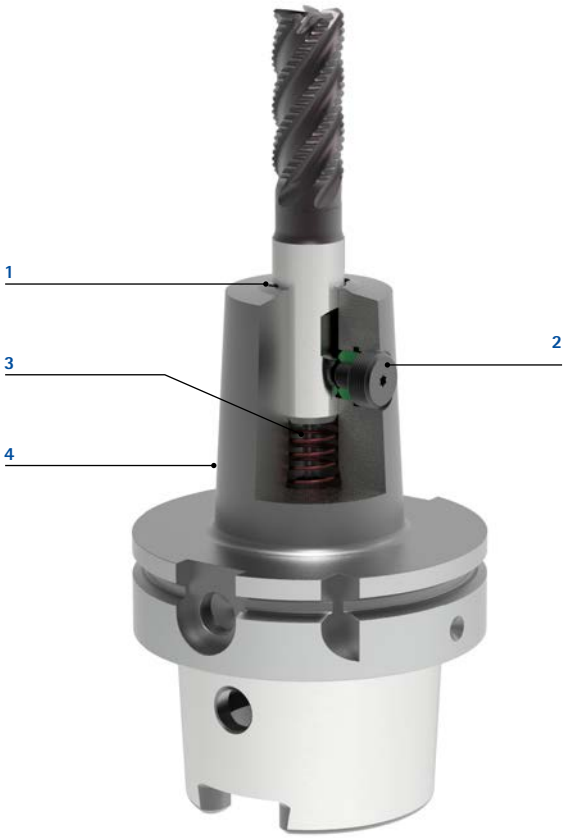
Tool features in detail

1 Decentral coolant channels
– Optimal coolant supply

2 Differential screw
– Easy handling

3 Spring assembly
– Perfect contact against HB clamping surface

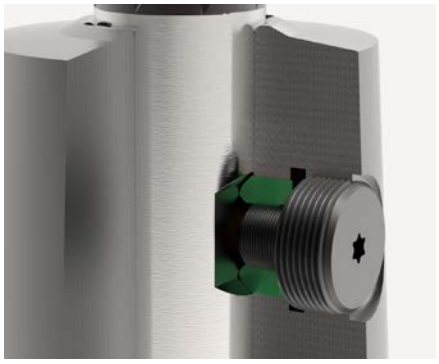
4 Contour
– Application-optimised contour for maximum rigidity



Optimal coolant supply

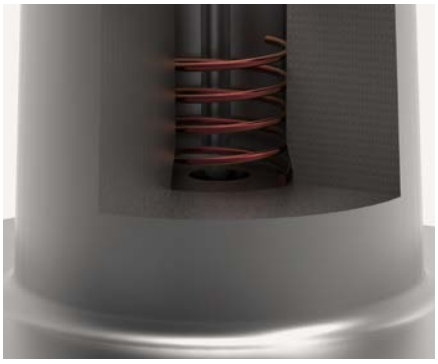
- Decentral coolant channels
- Use of standard tool without internal cooling
- Improved tool life due to optimised cooling

Reliable tool clamping



- High clamping force thanks to two-piece clamping element
- Maximum torque 20 Nm (with diameter 32)
- Reliable clamping due to self-locking

Defined milling cutter positioning

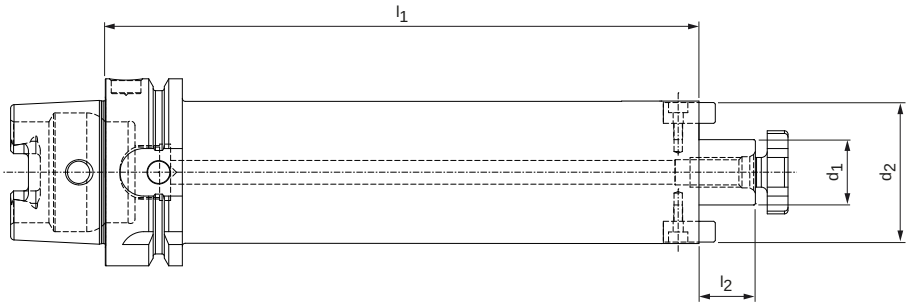


- Perfect contact against HB clamping surface
- Form closure between tool and connection
- Defined axial positioning of the tools

Simple handling and strong clamping with significantly improved radial run-out.

Milling cutter arbor

Mechanical tool clamping
For milling cutters with cross slot in accordance with DIN 69882-3
Shank HSK-A in accordance with DIN 69893-1



Vibration-damped design

HSK-A	Dimensions				Weight [kg]	Specification	Order No.	Order No. chip version
	d_1	d_2	l_1	l_2				
63	16	38	200	17	2,3	MDA-HSK-A063-16-200-1-0-W	31045047	On request
63	22	48	200	19	3,5	MDA-HSK-A063-22-200-1-0-W	31045048	On request
63	16	38	300	17	3,2	MDA-HSK-A063-16-300-1-0-W	31045049	On request
63	22	48	300	19	4,9	MDA-HSK-A063-22-300-1-0-W	31045120	On request
100	16	38	200	17	3,6	MDA-HSK-A100-16-200-1-0-W	31045121	On request
100	22	48	200	19	4,7	MDA-HSK-A100-22-200-1-0-W	31045122	On request
100	27	58	200	21	5,8	MDA-HSK-A100-27-200-1-0-W	31045123	On request
100	16	38	300	17	4,5	MDA-HSK-A100-16-300-1-0-W	31045124	On request
100	22	48	300	19	6	MDA-HSK-A100-22-300-1-0-W	31045125	On request
100	27	58	300	21	8	MDA-HSK-A100-27-300-1-0-W	31045126	On request

Technical data of the milling cutter arbor with HSK connection

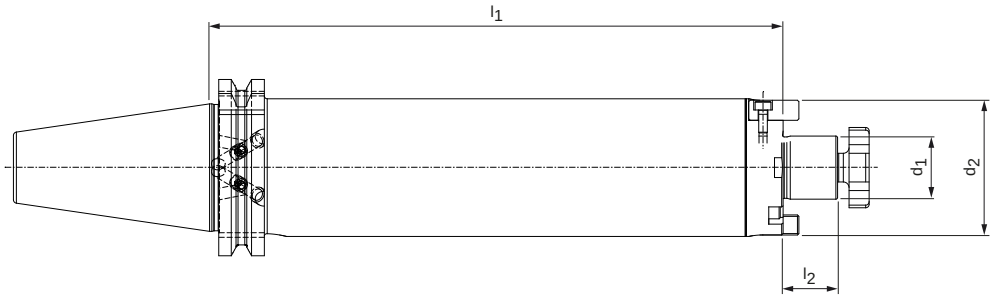
HSK	l_1 [mm]	d_1 [mm]	d_2 [mm]	Max. operating speed [rpm]	Recommended weight for milling cutter [kg]	Total weight [kg]	Moment of tilt with milling cutter nominal weight [Nm]	Permissible transferable torque [Nm]	Max. cutting force [N]
63	200	16	38	8.000	0,2 (±0,1)	2,3	1,89	200	1.300
63	200	22	48	8.000	0,6 (±0,15)	3,5	4,08	270	1.300
63	300	16	38	5.000	0,2 (±0,1)	3,2	4,22	200	900
63	300	22	48	5.500	0,6 (±0,15)	4,9	8,32	270	900
100	200	16	38	8.000	0,2 (±0,1)	3,6	1,57	200	3.400
100	200	22	48	8.000	0,6 (±0,15)	4,7	3,65	270	3.400
100	200	27	58	8.000	0,9 (±0,2)	5,8	5,23	500	3.400
100	300	16	38	5.800	0,2 (±0,1)	4,5	3,95	200	2.400
100	300	22	48	6.000	0,6 (±0,15)	6	7,61	270	2.400
100	300	27	58	6.000	0,9 (±0,2)	8	11,37	500	2.400

Dimensions in mm.
Items included: With attached key blocks and milling cutter clamping screw in accordance with DIN 6367. Without coolant tube.
Design: Permissible run-out deviation on the taper in relation to the arbor diameter d_1 = 5 µm.
Note: Included milling cutter clamping screw without internal cooling.

For spare parts see page 250. For coolant tubes and assembly tools, see section "Accessories, spare parts and measuring equipment".
Chip version: Equipped with Balluff code carrier, see the catalogue "Clamping".
Further code carriers on request.

Milling cutter arbor

Mechanical tool clamping
For milling cutters with cross slot in accordance with DIN 69882-3
Shank SK in accordance with ISO 7388-1 Form AD/AF



Vibration-damped design

SK	Dimensions				Weight [kg]	Specification	Order No.	Order No. chip version
	d_1	d_2	l_1	l_2				
40	16	38	200	17	2,3	MDA-SK040-16-200-3-0-W	31045127	On request
40	22	48	200	19	3,5	MDA-SK040-22-200-3-0-W	31045128	On request
40	16	38	300	17	3,2	MDA-SK040-16-300-3-0-W	31045129	On request
40	22	48	300	19	4,9	MDA-SK040-22-300-3-0-W	31045130	On request
50	16	38	200	17	3,6	MDA-SK050-16-200-3-0-W	31045131	On request
50	22	48	200	19	4,7	MDA-SK050-22-200-3-0-W	31045132	On request
50	27	58	200	21	5,8	MDA-SK050-27-200-3-0-W	31045133	On request
50	16	38	300	17	4,5	MDA-SK050-16-300-3-0-W	31045134	On request
50	22	48	300	19	6	MDA-SK050-22-300-3-0-W	31045135	On request
50	27	58	300	21	8	MDA-SK050-27-300-3-0-W	31045136	On request

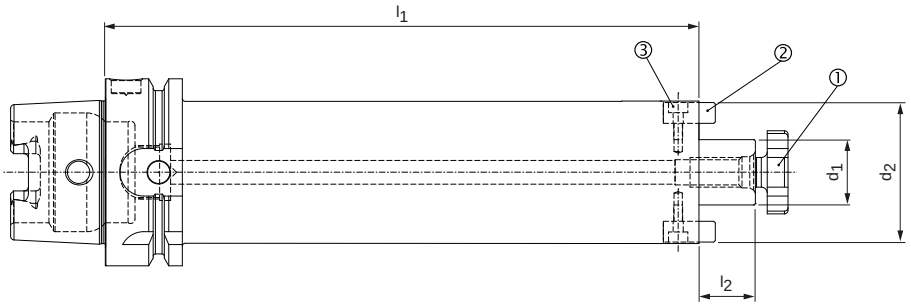
Technical data of the milling cutter arbor with SK connection

SK	l_1 [mm]	d_1 [mm]	d_2 [mm]	Max. operating speed [rpm]	Recommended weight for milling cutter [kg]	Total weight [kg]	Moment of tilt with milling cutter nominal weight [Nm]	Permissible transferable torque [Nm]	Max. cutting force [N]
40	200	16	38	8.000	0,2 (±0,1)	2,5	1,90	200	650
40	200	22	48	5.500	0,6 (±0,15)	3,7	4,19	270	650
40	300	16	38	4.500	0,2 (±0,1)	3,4	4,32	200	450
40	300	22	48	3.500	0,6 (±0,15)	5,1	8,85	270	450
50	200	16	38	8.000	0,2 (±0,1)	4,2	1,22	200	1.700
50	200	22	48	8.000	0,6 (±0,15)	5,3	3,34	270	1.700
50	200	27	58	8.000	0,9 (±0,2)	6,6	5,13	500	1.700
50	300	16	38	6.000	0,2 (±0,1)	5,1	3,67	200	1.200
50	300	22	48	5.500	0,6 (±0,15)	6,9	7,87	270	1.200
50	300	27	58	5.000	0,9 (±0,2)	8,8	11,59	500	1.200

Dimensions in mm.
Items included: With attached key blocks and milling cutter clamping screw in accordance with DIN 6367. Without pull stud.
Design: Permissible run-out deviation on the taper in relation to the arbor diameter d_1 = 5 µm.
Standard setting Form AD, if Form AF is required, please state with the order.

Note: Included milling cutter clamping screw without internal cooling.
For spare parts see page 250.
Chip version: Equipped with Balluff code carrier, see the catalogue "Clamping".
Further code carriers on request.

Spare parts for milling cutter arbors



For milling cutter arbors for milling cutters with longitudinal/cross slot in accordance with DIN 69882-2

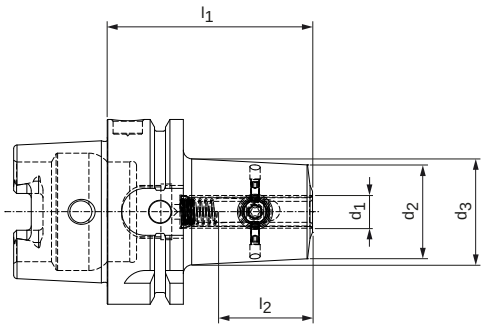
Connection HSK-A	For arbor diameter d_1	① Milling cutter clamping screw in accordance with DIN 6367		② Key block (2x)		③ Cylinder screw in accordance with ISO 4762 (2x)	
		Size	Order No.	Size	Order No.	Size	Order No.
63	16	M12	10005164	12x10x20	30924965	M4x12-12.9	10003584
63	22	M10	10006016	10x7x17.5	30924964	M3x8-12.9	10003570
63	16	M12	10005164	12x10x20	30924965	M4x12-12.9	10003584
63	22	M10	10006016	10x7x17.5	30924964	M3x8-12.9	10003570
100	16	M12	10005164	12x10x20	30924965	M4x12-12.9	10003584
100	22	M10	10006016	10x7x17.5	30924964	M3x8-12.9	10003570
100	27	M8	10007286	8x7x16	30924963	M3x8-12.9	10003570
100	16	M12	10005164	12x10x20	30924965	M4x12-12.9	10003584
100	22	M10	10006016	10x7x17.5	30924964	M3x8-12.9	10003570
100	27	M8	10007286	8x7x16	30924963	M3x8-12.9	10003570

For milling cutter arbors with enlarged face connection diameter in accordance with DIN 69882-3

Connection SK	For arbor diameter d_1	① Milling cutter clamping screw in accordance with DIN 6367		② Key block (2x)		③ Cylinder screw in accordance with ISO 4762 (2x)	
		Size	Order No.	Size	Order No.	Size	Order No.
40	16	M12	10005164	12x10x20	30924965	M4x12-12.9	10003584
40	22	M10	10006016	10x7x17.5	30924964	M3x8-12.9	10003570
40	16	M12	10005164	12x10x20	30924965	M4x12-12.9	10003584
40	22	M10	10006016	10x7x17.5	30924964	M3x8-12.9	10003570
50	16	M12	10005164	12x10x20	30924965	M4x12-12.9	10003584
50	22	M10	10006016	10x7x17.5	30924964	M3x8-12.9	10003570
50	27	M8	10007286	8x7x16	30924963	M3x8-12.9	10003570
50	16	M12	10005164	12x10x20	30924965	M4x12-12.9	10003584
50	22	M10	10006016	10x7x17.5	30924964	M3x8-12.9	10003570
50	27	M8	10007286	8x7x16	30924963	M3x8-12.9	10003570

MillChuck, System HB

Shank HSK-A in accordance with DIN 69893-1



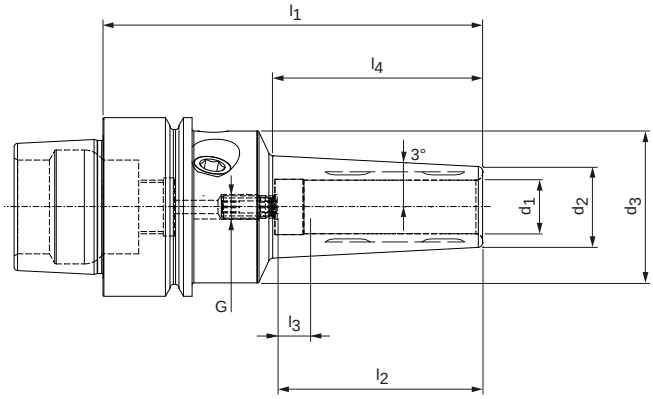
HSK-A	Dimensions					Weight [kg]	Specification	Order No.	Order No. chip version
	d_1	d_2	d_3	l_1	l_2				
63	6	22,5	26,5	65	36	0,8	MWC-HSK-A063-06-065-1-0-W	30941344	On request
63	8	25	29	65	36	0,8	MWC-HSK-A063-08-065-1-0-W	30941345	On request
63	10	32	36,5	70	40	0,9	MWC-HSK-A063-10-070-1-0-W	30941346	On request
63	12	37,5	43	80	45	1,1	MWC-HSK-A063-12-080-1-0-W	30941347	On request
63	16	43	48,5	80	48	1,2	MWC-HSK-A063-16-080-1-0-W	30941349	On request
63	20	46,5	52	80	50	1,3	MWC-HSK-A063-20-080-1-0-W	30941371	On request
63	25	62	65	110	56	2,3	MWC-HSK-A063-25-110-1-0-W	30941372	On request
63	32	69	72	110	60	2,4	MWC-HSK-A063-32-110-1-0-W	30941373	On request
100	6	22,5	27,5	80	36	2,2	MWC-HSK-A100-06-080-1-0-W	30941374	On request
100	8	25	30	80	36	2,2	MWC-HSK-A100-08-080-1-0-W	30941375	On request
100	10	32	37	80	40	2,3	MWC-HSK-A100-10-080-1-0-W	30941376	On request
100	12	37,5	43	85	45	2,5	MWC-HSK-A100-12-085-1-0-W	30941377	On request
100	16	43	50	100	48	2,8	MWC-HSK-A100-16-100-1-0-W	30941379	On request
100	20	46,5	53,5	100	50	2,9	MWC-HSK-A100-20-100-1-0-W	30941381	On request
100	25	62	65	100	56	3,4	MWC-HSK-A100-25-100-1-0-W	30941382	On request
100	32	69	72	110	60	3,9	MWC-HSK-A100-32-110-1-0-W	30925430	On request

Dimensions in mm.
Use: For mounting milling cutters with cylindrical shank and lateral drive area in accordance with DIN 1835 Form B and in accordance with DIN 6535 Form HB.
Items included: Built-in clamping screw, without coolant tube.
Design: Permissible run-out deviation on the taper in relation to the location bore d_1 = 3 µm. The bore tolerance is much tighter than DIN 1835 to obtain machining accuracies of the highest quality.

Note: From clamping diameter d_1 = 25 mm two clamping screw are provided.
Balancing value: G 2.5 at 16,000 rpm as delivered.
Chip version: Equipped with Balluff code carrier, see the catalogue "Clamping". Further code carriers on request.

HighTorque Chuck HTC

With axial tool length adjustment
Shank HSK-E in accordance with DIN 69893-5



Slender design, 3 degrees

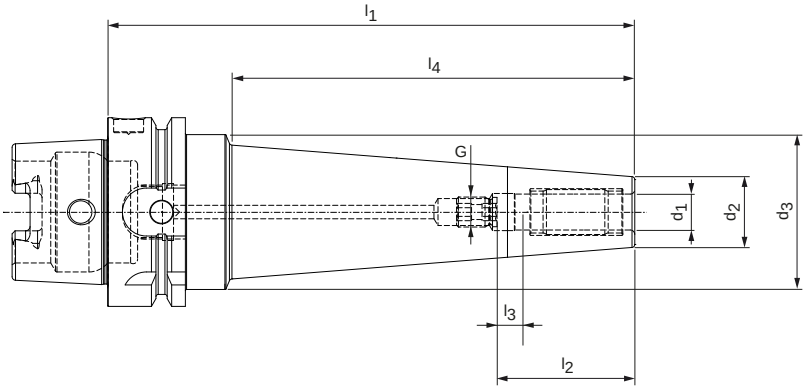
HSK-E	Dimensions							G	Weight [kg]	Specification	Order No.	Order No. chip version
	d_1	d_2	d_3	l_1	l_2	l_3	l_4					
40	3	9	34	85	28	16	45	M2.5	0,4	HTC-HSK-E040-03-85-1-0-A	30817965	On request
40	4	10	34	85	28	12	45	M2.5	0,4	HTC-HSK-E040-04-85-1-0-A	30817966	On request
40	5	11	34	85	28	8	45	M2.5	0,4	HTC-HSK-E040-05-85-1-0-A	30817967	On request
40	6	12	34	85	37	10	46	M5	0,4	HTC-HSK-E040-06-85-1-0-A	30817968	On request
40	8	14	34	85	37	10	46	M6	0,4	HTC-HSK-E040-08-85-1-0-A	30817969	On request
40	10	16	34	85	41	10	47	M5	0,4	HTC-HSK-E040-10-85-1-0-A	30817970	On request
40	12	18	34	85	46	10	47	M5	0,4	HTC-HSK-E040-12-85-1-0-A	30817971	On request
50	3	9	42	85	28	16	37	M2.5	0,6	HTC-HSK-E050-03-85-1-0-A	30817972	On request
50	4	10	42	85	28	12	37	M2.5	0,6	HTC-HSK-E050-04-85-1-0-A	30817973	On request
50	5	11	42	85	28	8	37	M2.5	0,6	HTC-HSK-E050-05-85-1-0-A	30817974	On request
50	6	12	42	85	37	10	38	M5	0,6	HTC-HSK-E050-06-85-1-0-A	30817975	On request
50	8	14	42	85	37	10	38	M6	0,6	HTC-HSK-E050-08-85-1-0-A	30817976	On request
50	10	16	42	85	41	10	39	M8x1	0,6	HTC-HSK-E050-10-85-1-0-A	30817977	On request
50	12	18	42	85	46	10	39	M8x1	0,6	HTC-HSK-E050-12-85-1-0-A	30817978	On request

Dimensions in mm.
Use: For clamping tools with smooth cylindrical shanks in accordance with DIN 1835 Form A, DIN 6535 Form HA up to clamping diameter d_1 = 12 mm as well as with recesses in accordance with DIN 1835 Form B, E and DIN 6535 Form HB, HE directly and without reducing sleeve in the clamping diameter. The clamping diameter is designed for a shank tolerance of h6.
Items included: With length adjustment screw, without coolant tube.

Design: Longest tool lives and highest manufacturing quality on usage of smooth cylindrical shanks in accordance with DIN 1835 Form A and DIN 6535 Form HA. With a projection length of 2.5xD (max. 50 mm) radial run-out accuracy 3 µm. On usage of cylindrical shanks with angled clamping surface (Form E and Form HE) the accuracy may be affected.
Note: Chuck with axial tool length adjustment. Coolant supply via central through bore.
Balancing value: G 2.5 at 25,000 rpm as delivered.

HighTorque Chuck HTC

With axial tool length adjustment
Shank HSK-A in accordance with DIN 69893-1



Long heavy-duty design

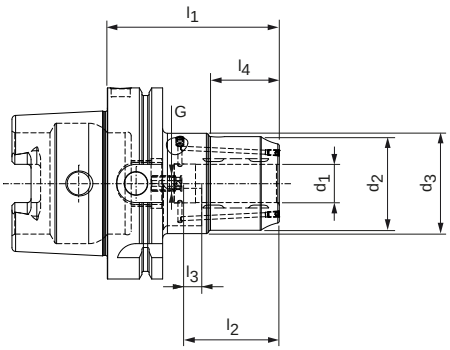
HSK-A	Dimensions							G	Weight [kg]	Specification	Order No.	Order No. chip version
	d_1	d_2	d_3	l_1	l_2	l_3	l_4					
63	3	9	51,7	126	28	16	80	M3	1,0	HTC-HSK-A063-03-126-1-0-A	30832804	On request
63	4	10	51,7	126	28	12	80	M3	1,0	HTC-HSK-A063-04-126-1-0-A	30832805	On request
63	5	11	51,7	126	28	8	80	M3	1,1	HTC-HSK-A063-05-126-1-0-A	30832806	On request
63	6	12	51,7	126	37	10	80	M5	1,1	HTC-HSK-A063-06-126-1-0-A	30832807	On request
63	6	12	51,7	176	37	10	132	M5	1,4	HTC-HSK-A063-06-176-1-0-A	30832808	On request
63	6	12	51,7	226	37	10	184	M5	1,9	HTC-HSK-A063-06-226-1-0-A	30832809	On request
63	8	14,2	51,7	126	37	10	80	M6	1,1	HTC-HSK-A063-08-126-1-0-A	30832810	On request
63	8	13,9	51,7	176	37	10	132,5	M6	1,5	HTC-HSK-A063-08-176-1-0-A	30832811	On request
63	8	13,9	51,7	226	37	10	184,5	M6	2,1	HTC-HSK-A063-08-226-1-0-A	30832812	On request
63	10	17,7	51,7	126	41	10	80	M8x1	1,2	HTC-HSK-A063-10-126-1-0-A	30832813	On request
63	10	18,4	51,7	176	41	10	133,5	M8x1	1,6	HTC-HSK-A063-10-176-1-0-A	30832814	On request
63	10	18,1	51,7	226	41	10	184,5	M8x1	2,2	HTC-HSK-A063-10-226-1-0-A	30832815	On request
63	12	23,4	51,7	126	46	10	82,5	M10x1	1,3	HTC-HSK-A063-12-126-1-0-A	30832816	On request
63	12	23,5	51,7	176	46	10	134,5	M10x1	1,8	HTC-HSK-A063-12-176-1-0-A	30832817	On request
63	12	23,7	51,7	226	46	10	184,5	M10x1	2,4	HTC-HSK-A063-12-226-1-0-A	30832818	On request
63	16	25,1	51,7	126	49	10	84	M12x1	1,5	HTC-HSK-A063-16-126-1-0-A	30832819	On request
63	16	27,6	51,7	176	49	10	134,5	M12x1	2,0	HTC-HSK-A063-16-176-1-0-A	30832820	On request
63	16	27,9	51,7	226	49	10	185	M12x1	2,5	HTC-HSK-A063-16-226-1-0-A	30832821	On request

Dimensions in mm.
Use: For clamping tools with smooth cylindrical shanks in accordance with DIN 1835 Form A, DIN 6535 Form HA up to clamping diameter d_1 = 16 mm as well as with recesses in accordance with DIN 1835 Form B, E and DIN 6535 Form HB, HE directly and without reducing sleeve in the clamping diameter. The clamping diameter is designed for a shank tolerance of h6.
Items included: With length adjustment screw, without coolant tube.

Design: Longest tool lives and highest manufacturing quality on usage of smooth cylindrical shanks in accordance with DIN 1835 Form A and DIN 6535 Form HA. With a projection length of 2.5xD (max. 50 mm) radial run-out accuracy 3 µm. On usage of cylindrical shanks with angled clamping surface (Form E and Form HE) the accuracy may be affected.
Note: Chuck with axial tool length adjustment. Coolant supply via central through bore.
Chip version: Equipped with Balluff code carrier, see the catalogue "Clamping".
Further code carriers on request.
Balancing value: G 2.5 at 25,000 rpm as delivered.

HighTorque Chuck HTC

With axial tool length adjustment
Shank HSK-A in accordance with DIN 69893-1



Short heavy-duty design with two cooling channel bores, resealable

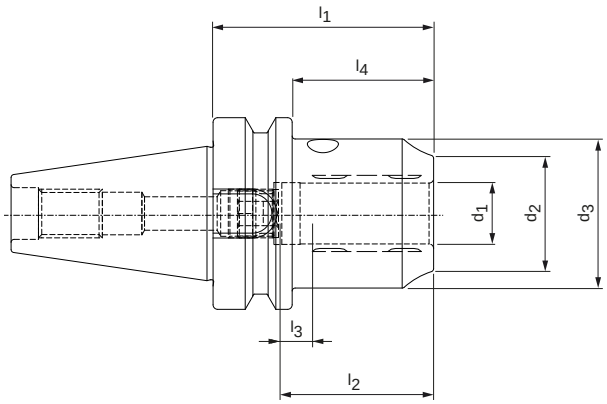
HSK-A	Dimensions							G	Weight [kg]	Specification	Order No.	Order No. chip version
	d_1	d_2	d_3	l_1	l_2	l_3	l_4					
100	12	42	52,5	90	46	10	34	M8x1	2,7	HTC-HSK-A100-12-090-1-0-A	31038802	On request
100	20	49	52,5	90	51	10	36	M8x1	2,8	HTC-HSK-A100-20-090-1-0-A	31038803	On request
100	32	68	72	105	61	10	42	M8X1	3,8	HTC-HSK-A100-32-105-1-0-A	31038804	On request

Dimensions in mm.
Use: For clamping tools with smooth cylindrical shanks in accordance with DIN 1835 Form A, DIN 6535 Form HA up to clamping diameter d_1 = 32 mm as well as with recesses in accordance with DIN 1835 Form B, E and DIN 6535 Form HB, HE directly and without reducing sleeve in the clamping diameter. The clamping diameter is designed for a shank tolerance of h6.
Items included: With length adjustment screw, without coolant tube.
Design: Longest tool lives and highest manufacturing quality on usage of smooth cylindrical shanks in accordance with DIN 1835 Form A and DIN 6535 Form HA. With a projection length of 2.5xD (max. 50 mm) radial run-out accuracy 3 µm. On usage of cylindrical shanks with angled clamping surface (Form E and Form HE) the accuracy may be affected.

Note: Chuck with axial tool length adjustment. Coolant supply via central through bore. Coolant tubes, Balluff code carriers, reducing sleeves for reducing the clamping diameter (on the usage of the reducing sleeve the accuracy may be degraded) see catalogue "Clamping", section Accessories, spare parts and measuring equipment. Length adjustment screws available on request.
Chip version: Equipped with Balluff code carrier, see the catalogue "Clamping". Further code carriers on request.
Balancing value: G 2.5 at 25,000 rpm as delivered.

HighTorque Chuck HTC

With axial tool length adjustment



Short heavy-duty design

SK	Dimensions								G	Weight [kg]	Specification	Order No.
	d_1	d_2	d_3	d_4	l_1	l_2	l_3	l_4				
40	32	57	63	70	81	61	10	26	M16x1	1,7	HTC-SK040-32-081-3-0-A	30986272

BT	Dimensions								G	Weight [kg]	Specification	Order No.
	d_1	d_2	d_3	d_4	l_1	l_2	l_3	l_4				
30*	12	32	42	-	58	46	10	36	M8x1	0,7	HTC-BT030-12-058-1-0-A	30986273
30*	20	38	42	-	72,5	51	10	27,5	M16x1	0,9	HTC-BT030-20-073-1-0-A	30986274
30*	12	32	42	-	58	46	10	37	M8x1	0,7	HTC-BT-FC030-12-058-1-0-A	30986275
30*	20	38	42	57	72,5	51	10	27,5	M16x1	0,9	HTC-BT-FC030-20-073-1-0-A	30986276
40	12	32	42	-	58	46	10	32	M8x1	1,2	HTC-JD-FC040-12-058-1-0-A	30970592
40	20	38	49	-	72,5	51	10	46,5	M16x1	1,4	HTC-JD-FC040-20-073-1-0-A	30717002
40	32	54	63	-	90	61	10	48	M16x1	2,0	HTC-JD-FC040-32-090-1-0-A	30717003
50	12	32	42	-	69	46	10	32,5	M8x1	2,2	HTC-JD-FC050-12-069-1-0-A	30970593
50	20	38	49	-	83,5	51	10	47	M16x1	2,8	HTC-JD-FC050-20-084-1-0-A	30728340
50	32	57	68	72	90	61	10	35	M16x1	4,0	HTC-JD-FC050-32-090-1-0-A	30970594

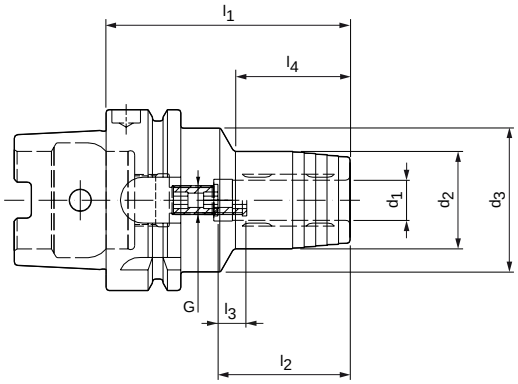
* Design: Steep taper size SK30 is not available in combined design JD/JF.

SK40
Dimensions in mm.
Use: For clamping tools with smooth cylindrical shanks in accordance with DIN 1835 Form A, DIN 6535 Form HA up to clamping diameter d_1 = 32 mm as well as with recesses in accordance with DIN 1835 Form B, E and DIN 6535 Form HB, HE directly and without reducing sleeve in the clamping diameter. The clamping diameter is designed for a shank tolerance of h6.
Items included: With length adjustment screws, including hexagonal T-key.
Without pull stud.
Design: Normal setting Form AD, if Form AF is required, please state with the order.
Note: Chuck with axial tool length adjustment. For pull studs and reducing sleeves for reducing the clamping diameter (on the usage of the reducing sleeve the accuracy may be degraded) see catalogue "Clamping", section "Accessories, spare parts and measuring equipment".
Balancing value: G 2.5 at 25,000 rpm as delivered.

BT
Dimensions in mm.
Use: For clamping tools with smooth cylindrical shanks in accordance with DIN 1835 Form A, DIN 6535 Form HA up to clamping diameter d_1 = 32 mm as well as with recesses in accordance with DIN 1835 Form B, E and DIN 6535 Form HB, HE directly and without reducing sleeve in the clamping diameter. The clamping diameter is designed for a shank tolerance of h6.
Items included: With length adjustment screws, including hexagonal T-key.
Without pull stud.
Design: Normal setting Form JD, if Form JF is required, please state with the order.
Note: Chuck with axial tool length adjustment. For pull studs and reducing sleeves for reducing the clamping diameter (on the usage of the reducing sleeve the accuracy may be degraded) see catalogue "Clamping", section "Accessories, spare parts and measuring equipment". Length adjustment screws available on request.
Balancing value: G 2.5 at 25,000 rpm as delivered.

Hydraulic chucks HydroChuck

In accordance with DIN 69882-7 with axial tool length adjustment
Shank HSK-A in accordance with DIN 69893-1



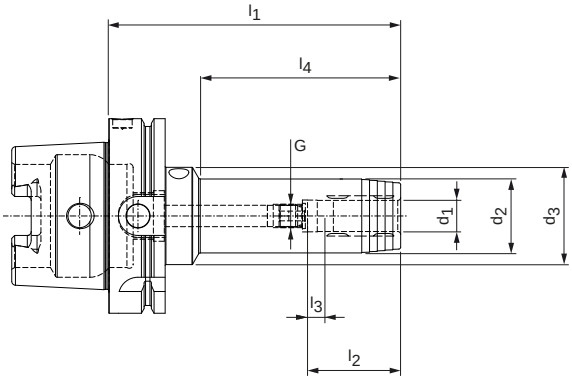
HSK-A	Dimensions							G	Weight [kg]	Specification	Order No.	Order No. chip version
	d_1	d_2	d_3	l_1	l_2	l_3	l_4					
50	6	26	40	70	37	10	28	M5	0,6	MHC-HSK-A050-06-070-1-0-A	30984932	On request
50	8	28	40	70	37	10	28	M6	0,6	MHC-HSK-A050-08-070-1-0-A	30984933	On request
50	10	30	40	75	41	10	34	M6	0,7	MHC-HSK-A050-10-075-1-0-A	30984934	On request
50	12	32	40	85	46	10	44	M10X1	0,7	MHC-HSK-A050-12-085-1-0-A	30984935	On request
50	14	34	40	85	46	10	44	M10X1	0,7	MHC-HSK-A050-14-085-1-0-A	30984936	On request
50	16	38	53	90	49	10	30	M12X1	1,0	MHC-HSK-A050-16-090-1-0-A	30984937	On request
50	18	40	53	90	49	10	30	M12X1	1,0	MHC-HSK-A050-18-090-1-0-A	30984938	On request
50	20	42	57	90	51	10	29	M16X1	1,0	MHC-HSK-A050-20-090-1-0-A	30984939	On request

Dimensions in mm.
Use: For clamping tools with smooth cylindrical shanks in accordance with DIN 6535 Form HA up to clamping diameter d_1 = 20 mm as well as with recesses in accordance with DIN 1835 Form B, E and DIN 6535 Form HB, HE directly and without reducing sleeve in the clamping diameter. The clamping diameter is designed for a tool tolerance of h6.
Items included: With length adjustment screw and screws for sealing the cooling channel bores. Without coolant tube.
Design: Longest tool lives and highest manufacturing quality on usage of smooth cylindrical shanks in accordance with DIN 1835 Form A and DIN 6535 Form HA.
With a projection length of 2.5xD (max. 50 mm) radial run-out accuracy 3 µm.

On usage of cylindrical shanks with angled clamping surface (Form E and Form HE) the accuracy may be affected.
Note: Chuck with axial tool length adjustment. Coolant supply via central through bore. Coolant tubes, Balluff code carriers, reducing sleeves for reducing the clamping diameter (on the usage of the reducing sleeve the accuracy may be degraded) see catalogue "Clamping", section Accessories, spare parts and measuring equipment. Length adjustment screws available on request.
Chip version: Equipped with Balluff code carrier, see the catalogue "Clamping". Further code carriers on request.
Balancing value: G 2.5 at 25,000 rpm as delivered.

Hydraulic chucks HydroChuck

In accordance with DIN 69882-7 with axial tool length adjustment
Shank HSK-A in accordance with DIN 69893-1



Long slim design

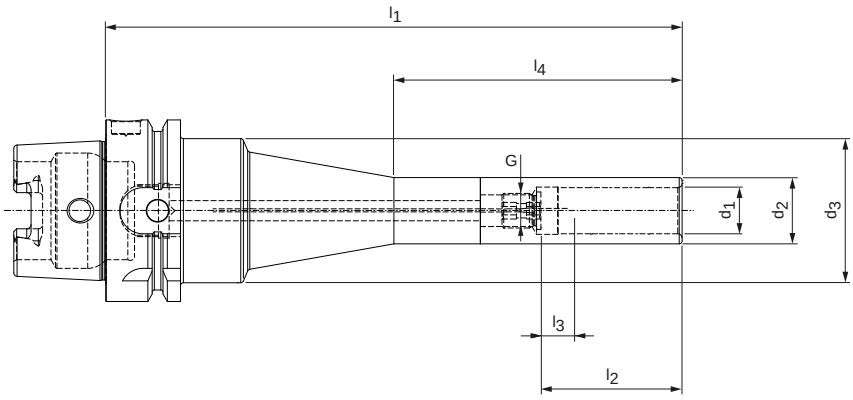
HSK-A	Dimensions							G	Weight [kg]	Specification	Order No.	Order No. chip version
	d_1	d_2	d_3	l_1	l_2	l_3	l_4					
100	6	26	50	150	37	10	101	M5	2,6	MHC-HSK-A100-06-150-1-0-A	30812117	On request
100	8	28	50	150	37	10	101	M6	2,6	MHC-HSK-A100-08-150-1-0-A	30264930	On request
100	10	30	50	150	41	10	102	M8X1	2,7	MHC-HSK-A100-10-150-1-0-A	30786081	On request
100	12	32	50	150	46	10	102	M10X1	2,8	MHC-HSK-A100-12-150-1-0-A	30812139	On request
100	14	34	50	150	46	10	102	M10X1	2,9	MHC-HSK-A100-14-150-1-0-A	30812171	On request
100	16	38	50	150	49	10	103	M12X1	3,0	MHC-HSK-A100-16-150-1-0-A	30786084	On request
100	18	40	50	150	49	10	103	M12X1	3,1	MHC-HSK-A100-18-150-1-0-A	30786085	On request
100	20	42	50	150	51	10	97	M16X1	3,1	MHC-HSK-A100-20-150-1-0-A	30338205	On request
100	25	57	63	150	57	10	102	M16X1	4,1	MHC-HSK-A100-25-150-1-0-A	30812180	On request
100	32	63	67	150	61	10	102	M16X1	4,5	MHC-HSK-A100-32-150-1-0-A	30812192	On request
100	6	26	50	200	37	10	151	M5	2,8	MHC-HSK-A100-06-200-1-0-A	30781350	On request
100	8	28	50	200	37	10	151	M6	3,1	MHC-HSK-A100-08-200-1-0-A	30717916	On request
100	10	30	50	200	41	10	152	M8X1	3,6	MHC-HSK-A100-10-200-1-0-A	30781353	On request
100	12	32	50	200	46	10	152	M10X1	3,0	MHC-HSK-A100-12-200-1-0-A	30781356	On request
100	14	34	50	200	46	10	152	M10X1	3,2	MHC-HSK-A100-14-200-1-0-A	30781359	On request
100	16	38	50	200	49	10	153	M12X1	3,4	MHC-HSK-A100-16-200-1-0-A	30772914	On request
100	18	40	50	200	49	10	153	M12X1	3,5	MHC-HSK-A100-18-200-1-0-A	30717637	On request
100	20	42	50	200	51	10	154	M16X1	3,7	MHC-HSK-A100-20-200-1-0-A	30772917	On request
100	25	57	63	200	57	10	152	M16X1	5,1	MHC-HSK-A100-25-200-1-0-A	30781361	On request
100	32	63	67	200	61	10	152	M16X1	5,7	MHC-HSK-A100-32-200-1-0-A	30781363	On request

Dimensions in mm.
Use: For clamping tools with smooth cylindrical shanks in accordance with DIN 6535 Form HA up to clamping diameter d_1 = 32 mm as well as with recesses in accordance with DIN 1835 Form B, E and DIN 6535 Form HB, HE directly and without reducing sleeve in the clamping diameter. The clamping diameter is designed for a tool tolerance of h6.
Items included: With length adjustment screw, without coolant tube.
Design: Longest tool lives and highest manufacturing quality on usage of smooth cylindrical shanks in accordance with DIN 1835 Form A and DIN 6535 Form HA.
With a projection length of 2.5xD (max. 50 mm) radial run-out accuracy 3 µm.
On usage of cylindrical shanks with angled clamping surface (Form E and Form HE) the accuracy may be affected.

Note: Chuck with axial tool length adjustment. Coolant supply via central through bore. Coolant tubes, Balluff code carriers, reducing sleeves for reducing the clamping diameter (on the usage of the reducing sleeve the accuracy may be degraded) see catalogue "Clamping", section Accessories, spare parts and measuring equipment. Length adjustment screws available on request.
Chip version: Equipped with Balluff code carrier, see the catalogue "Clamping".
Further code carriers on request.
Balancing value: G 2.5 at 25,000 rpm as delivered.

Hydraulic chucks HydroDrillReamChuck

With axial tool length adjustment
Shank HSK-A in accordance with DIN 69893-1



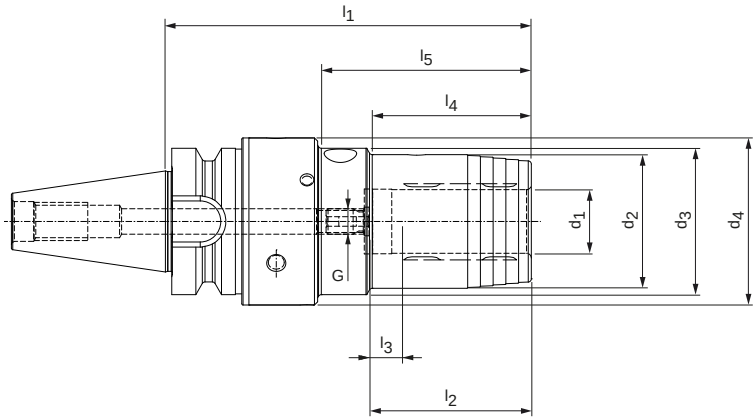
HSK-A	Dimensions							G	Weight [kg]	Specification	Order No.	Order No. chip version
	d_1	d_2	d_3	l_1	l_2	l_3	l_4					
63	6	15	50	200	37	10	100	M5	1,3	MHC-HSK-A063-06-200-1-0-A	30887670	On request
63	8	17	50	200	37	10	100	M6	1,3	MHC-HSK-A063-08-200-1-0-A	30887671	On request
63	10	19	50	200	41	10	100	M8x1	1,4	MHC-HSK-A063-10-200-1-0-A	30887012	On request
63	12	21	50	200	46	10	100	M10x1	1,4	MHC-HSK-A063-12-200-1-0-A	30887014	On request
63	14	23	50	200	46	10	100	M10x1	1,5	MHC-HSK-A063-14-200-1-0-A	31015415	On request
63	16	25	50	200	49	10	100	M12x1	1,6	MHC-HSK-A063-16-200-1-0-A	31015417	On request
63	18	27	50	200	49	10	100	M12x1	1,6	MHC-HSK-A063-18-200-1-0-A	31015516	On request
63	20	29	50	200	51	10	100	M16x1	1,8	MHC-HSK-A063-20-200-1-0-A	30887015	On request
100	6	15	50	200	37	10	100	M5	2,6	MHC-HSK-A100-06-200-1-0-A	30887016	On request
100	8	17	50	200	37	10	100	M6	2,6	MHC-HSK-A100-08-200-1-0-A	30887017	On request
100	10	19	50	200	41	10	100	M8x1	2,7	MHC-HSK-A100-10-200-1-0-A	30887019	On request
100	12	21	50	200	46	10	100	M10x1	2,8	MHC-HSK-A100-12-200-1-0-A	30887020	On request
100	14	23	50	200	46	10	100	M10x1	2,8	MHC-HSK-A100-14-200-1-0-A	31015418	On request
100	16	25	50	200	49	10	100	M12x1	2,9	MHC-HSK-A100-16-200-1-0-A	31015420	On request
100	18	27	50	200	49	10	100	M12x1	3,0	MHC-HSK-A100-18-200-1-0-A	31015519	On request
100	20	29	50	200	51	10	100	M16x1	3,1	MHC-HSK-A100-20-200-1-0-A	30887021	On request

Dimensions in mm.
Use: For clamping tools with smooth cylindrical shanks in accordance with DIN 1835 Form A, DIN 6535 Form HA up to clamping diameter d_1 = 20 mm as well as with recesses in accordance with DIN 1835 Form B, E and DIN 6535 Form HB, HE directly and without reducing sleeve in the clamping diameter. The clamping diameter is designed for a shank tolerance of h6.
Items included: With length adjustment screw, without coolant tube.
Design: Longest tool lives and highest manufacturing quality on usage of smooth cylindrical shanks in accordance with DIN 1835 Form A and DIN 6535 Form HA. With a projection length of 2.5xD (max. 50 mm) radial run-out accuracy 3 µm. On usage of cylindrical shanks with angled clamping surface (Form E and Form HE) the accuracy may be affected.

Note: Chuck with axial tool length adjustment. Coolant supply via central through bore. Coolant tubes, Balluff code carriers, reducing sleeves for reducing the clamping diameter (on the usage of the reducing sleeve the accuracy may be degraded) see catalogue "Clamping", section Accessories, spare parts and measuring equipment. Length adjustment screws available on request.
Chip version: Equipped with Balluff code carrier, see the catalogue "Clamping". Further code carriers on request.
Balancing value: G 2.5 at 25,000 rpm as delivered.

Hydraulic chucks HydroChuck Compensation

With axial tool length adjustment and radial alignment feature
Shank BT in accordance with ISO7388-2 Form JD/JF (JIS B 6339)



BT	Dimensions									G	Weight [kg]	Specification	Order No.
	d_1	d_2	d_3	d_4	l_1	l_2	l_3	l_4	l_5				
30*	12	32	46	52,5	105	46	10	40	56	M8x1	1,1	MHC-BT030-12-105-3-1-A	30998200
30*	20	38	46	52,5	115	51	10	50	66	M8x1	1,3	MHC-BT030-20-115-3-1-A	30998202

* Design: Steep taper size SK30 is not available in combined design JD/JF.

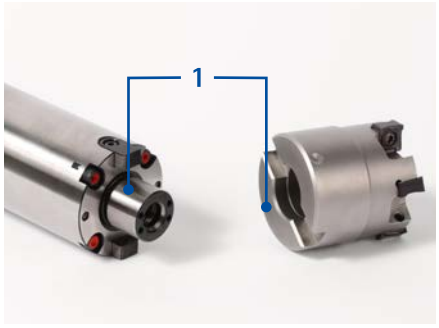
Dimensions in mm.
Use: For clamping tools with smooth cylindrical shanks in accordance with DIN 6535 Form HA up to clamping diameter d_1 = 20 mm as well as with recesses in accordance with DIN 1835 Form B, E and DIN 6535 Form HB, HE directly and without reducing sleeve in the clamping diameter. The clamping diameter is designed for a tool tolerance of h6.
Items included: With length adjustment screw, without coolant tube.
Design: Longest tool lives and highest manufacturing quality on usage of smooth cylindrical shanks in accordance with DIN 1835 Form A and DIN 6535 Form HA. (Radial run-out adjustable <3 µm possible) On usage of cylindrical shanks with angled clamping surface (Form E and Form HE) the accuracy may be degraded.

Note: Chuck with axial tool length adjustment. For pull studs and reducing sleeves for reducing the clamping diameter (on the usage of the reducing sleeve the accuracy may be degraded) see catalogue "Clamping", section "Accessories, spare parts and measuring equipment".
Length adjustment screws available on request.
Balancing value: G 2.5 at 16,000 rpm as delivered.

Handling notes for milling cutter arbors with vibration damper

Fitting a tool

Information:
During each tool change, make sure that all components of the milling cutter arbor and tool are free of dirt and grease and are not damaged.



1. Clean the connection area on the milling cutter arbor and the tool (1).

2. Clamp the milling cutter arbor in a changing device.

3. Fit the tool, with bore and face connection facing forwards, to the face connection on the milling cutter arbor.
➔ The key block slot of the tool is positioned on the key block of the milling cutter arbor.

4. Screw the milling cutter clamping screw into the threaded bore of the milling cutter arbor lightly by hand.

5. Set a torque wrench to the tightening torque specified by the milling cutter manufacturer.

6. Tighten the milling cutter clamping screw to the stop with the aid of the torque wrench.

Result:
The tool is now fully clamped on the milling cutter arbor with the milling cutter clamping screw and can be used.

Removing a tool

1. Loosen the milling cutter clamping screw, for example using the torque wrench.

2. Undo and remove the milling cutter clamping screw from the threaded bore.

3. Remove the tool from the milling cutter arbor.

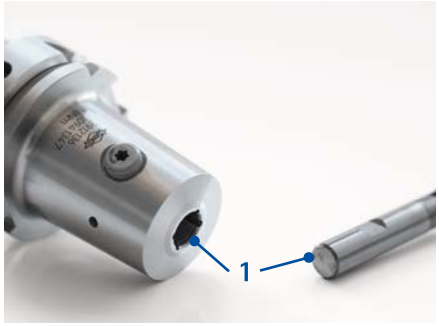
Result:
The tool has been removed.

Handling notes for power chucks MillChuck, System HB

Note:
- Only for trained personnel.
- Wear protective gloves.
- Handling of the tool with protective cap recommended.

Clamping a tool

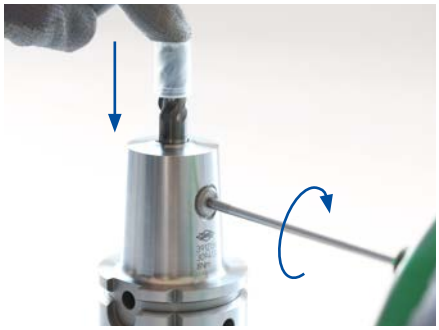
Information:
Clamp only undamaged and burr-free tools.



1. Clean the location bore and the tool shank (item 1).

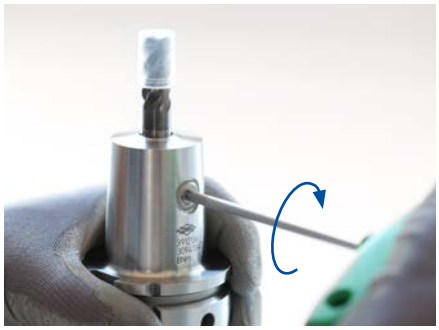
Information:
For correct tool clamping, the HB surface on the tool must be aligned with the clamping screw.

2. Push the tool, shank first, into the location bore on the power chuck. The recess on the tool is aligned with the clamping screw.



3. Press on the tool from above. At the same time, turn the clamping screw clockwise to the stop.
➔ The clamping screw is in contact with the HB surface on the tool.

4. Turn back the clamping screw one half of a turn.



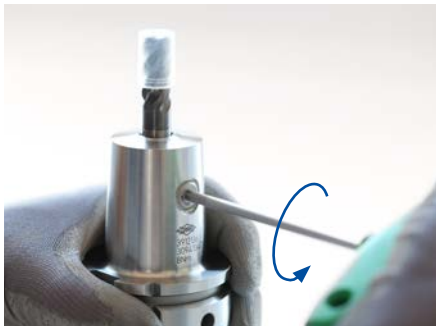
5. Set a torque wrench to the stated tightening torque (see table "Tightening torques for the clamping screw" on page 263).

6. Tighten the clamping screw to the stop with the aid of the torque wrench.

Result:
The tool is fully clamped in the power chuck and can be used.

Unclamping a tool

Information:
The clamping screw is not captive.



1. Loosen the clamping screw by turning counter-clockwise.

2. Remove the tool from the location bore on the power chuck.

Result:
The tool has been removed.

Tightening torques for the clamping screw

Tool shank diameter [mm]	Tightening torque [Nm]
6	10
8	10
10	6
12	8
16	10,5
20	12,5
25	16
32	20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UNIBASE-S

SETTING MEASURING DISPENSING

UNIBASE-S as decentral storage system in your manufacturing.


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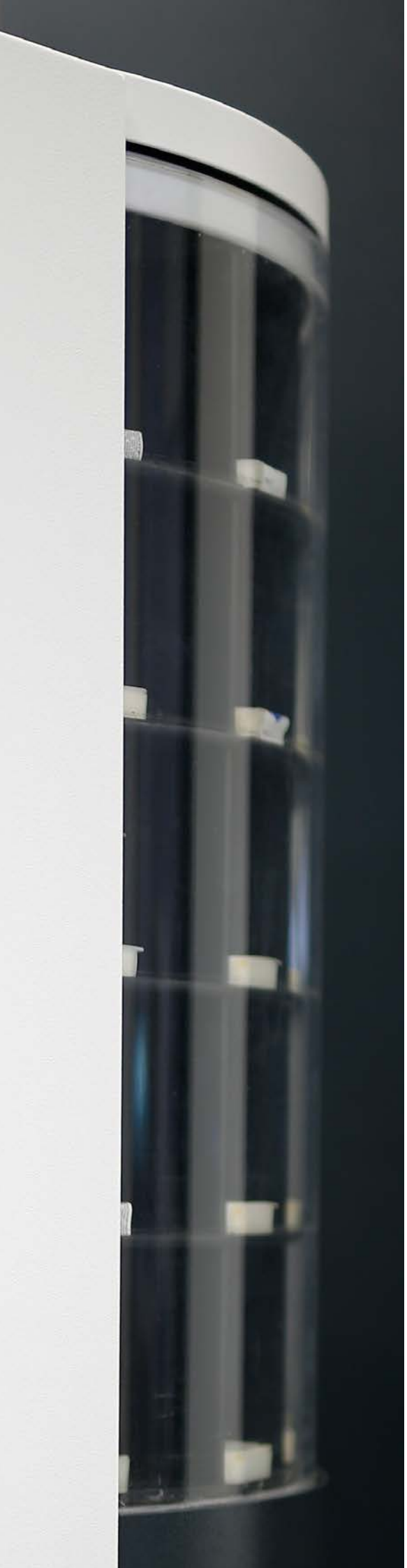


UNIBASE-S

Save time due to short distances in manufacturing

MAPAL offers various UNIBASE dispensing systems for optimum storage and management of tools, components and accessories, which can be individually networked with one another according to a modular principle. These systems are often situated in a central location in the production hall. To store and manage frequently required consumables in a decentralised and space-saving manner, MAPAL has developed the UNIBASE-S single automatic dispenser. This can be connected to existing UNIBASE systems or used as an individual solution.

Thanks to the compact dimensions, the UNIBASE-S stock dispensing systems can be installed directly on the workbench. For example, the 96 or 192 compartments are ideal for storing indexable inserts, tools, chucks or personal protective equipment. This saves the employee a trip to the central warehouse and ensures production-related article procurement. In addition, logistics costs are reduced.

Article removal is quick and uncomplicated in just a few steps. To do this, the employee logs on directly to the device via the integrated touchscreen. Optionally, logging in is even quicker via RFID chip or fingerprint. Only registered employees can remove articles. If an employee is not logged in, it is not possible to turn the dispensing drum and the dispensing compartments are closed. After the desired article has been selected via the pre-installed software (supported by the search function of the software), an LED illumination identifies the compartment with the corresponding article. The dispensing drum is rotated manually so that it is at the withdrawal position. After opening the dispensing compartment, the system automatically registers the removal of an article. As such the inventories in the system are always up-to-date. The employee logs off again after withdrawal using the Logout function.

Technical features UNIBASE-S

1 Storage drum
The storage drum can be turned easily by hand. LEDs integrated into the housing mark articles required and help with quick article withdrawal.

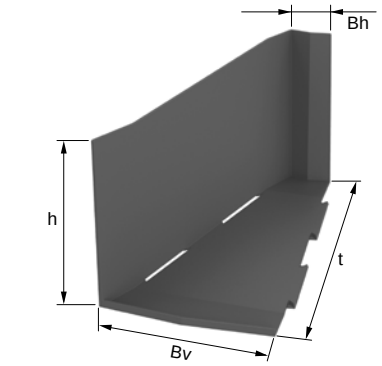
2 Software UNIBASE
The modified, easy to use software UNIBASE can be operated conveniently using a touch monitor and supports quick article withdrawal. Optionally, the system can be monitored using external administration.

3 Dispensing compartment
The dispensing compartment can only be opened by registered employees to ensure a reliable, controlled withdrawal process. The article withdrawal is registered automatically after closing the compartment.

UNIBASE-S

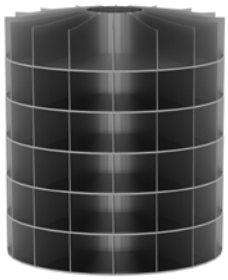
MAPAL offers the UNIBASE-S automatic individual dispensers with two different drum designs. To address individual requirements and article sizes, the storage drum is available with either 96 or 192 storage compartments.

UNIBASE-S compartment versions



UNIBASE-S compartment versions		
Compartment features	Compartment A	Compartment B
Height (H)	103 mm	50 mm
Width front (Bv)	110 mm	110 mm
Width rear (Bh)	28 mm	28 mm
Depth (t)	200 mm	200 mm

UNIBASE-S drum designs

Total number of compartments	96 compartments (compartment A)	192 compartments (compartment B)
		
Number of dispensing compartments	6	12

Cabinet features

Cabinet features	Dimension
Height	800 mm
Diameter	635 mm
Weight	approx. 90 kg

Options

Base

The robust, ergonomic base offers high stability and is optimally designed for the operating height of the UNIBASE-S.

Full version of software UNIBASE

The full version offers comprehensive functions including the Remote function using which the UNIBASE-S can be operated conveniently from the user's workplace.

Accessories

1D barcode scanner
For scanning barcodes.

	Order No.
1D barcode scanner	30551669

2D barcode scanner
For scanning barcodes and 2D codes, for example QR codes.

	Order No.
2D barcode scanner	30607281

User logon – readers
The user can log on to UNIBASE-S using an RFID chip or a fingerprint system. All common RFID standards are supported.

	Order No.
RFID reader 1 - Admitto 1200	30599972
RFID reader 2 - Admitto 3100	30604647
RFID reader 3 - Admitto 2000	30604649
USB fingerprint reader	30606059

Watch our video: MAPAL Toolmanagement 4.0
https://www.mapal.com/ToolManagement

Pictograms

1 Drilling from solid


Drilling from solid


Deep hole drilling


Drilling


Stepped drilling


Interrupted cut


Inclined bore entrances


Inclined bore outlets

Flat 180° bottom of the bore

Achievable bore tolerance

Maximum drilling depth


Internal cooling


Monolithic


Connection QTS

Connection TTS


With indexable insert

Shank form HA in accordance with DIN

In accordance with works standard

2 End milling cutters with fixed cutting edges


Groove milling and general applications


Shoulder milling – roughing


Shoulder milling – finishing

Trochoidal milling


Ramping


Helix milling


Vertical plunging/ grooving

High feed milling


Chamfering and deburring


Profile milling

45° chamfer

Sharp edged

Corner radius

Full radius

Drill tip


Internal cooling


For lateral material removal rates, for inclined entry and recessing


For lateral material removal rates

Shank form HB in accordance with DIN

Shank form HA in accordance with DIN


Monolithic


Modular


Long


Overlong

Maximum machining depth

In accordance with works standard

Milling cutters with replaceable inserts


Face milling


Roughing


Medium machining


Finishing


Groove milling


Shoulder milling – roughing


Shoulder milling – finishing


Inclined entry


Plunge milling


Shell end face milling


Deep shoulder milling


Trimming


Groove milling


Helix milling


Disc milling


Unfavourable process conditions


Good process conditions


Internal cooling

Shank form HB in accordance with DIN

Shank form HA in accordance with DIN

3 Clamping


Mechanical tool clamping


Hydraulic clamping technology

4 Product class

Basic Line:
Universal tools, broad application area, low procurement costs

Performance Line:
High-performance tools, broad application area, high productivity in series production manufacturing

Expert Line:
Specialist tools for selected applications, maximum precision and productivity

5 Material suitability

■ Highly suitable

◒ Suitable in some situations

Example standard material suitability table

P	1	2	3	4	5	6	M	1	2	3	K	1	2	3	N	1	2	3	4	S	1	2	3	4	5	H	1	2
■	■	■	■	■								◒	◒															

Example material suitability table for non-ferrous metals and lightweight materials

N	1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1	4.1	4.2	4.3	C	1.1	1.2	1.3	2.1	3.1	4.1	4.2	5.1	5.2	5.3
										■				■		■		◒	◒			

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NOTE:
On request we would be pleased to provide you with information on prices and availability for the products in this catalogue.

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E-mail: customer-service@mapal.com

MAPAL machining groups

The MAPAL machining groups make it possible to provide precise information on the suitability of a tool for certain workpiece materials. Crucial for the categorisation of the groups is the machinability in relation to the cutting data (cutting speed and feed) for a material. It is necessary to sub-divide certain workpiece material groups based on the strength/hardness of the related workpiece material.

Machining group			Material	Strength - hardness [N/mm² - HRC]	Frequently machined workpiece materials
P	P1	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700 N/mm²	1.0122 (S235/St 37), 1.0401 (C15), 1.0503 (C45), 1.0570 (S355/St 52), 1.1213 (Cf53)
		P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200 N/mm²	1.1249 (Cf70)
	P2	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900 N/mm²	1.7131 (16MnCr5)
		P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400 N/mm²	1.7227 (42CrMoS4)
	P3	P3.1	Tool, bearing, spring and high-speed steels	< 900 N/mm²	1.2343 (X38CrMoV5-1)
		P3.2	Tool, bearing, spring and high-speed steels	< 1500 N/mm²	1.3505 (100Cr6)
	P4	P4.1	Stainless steels, ferritic and martensitic		1.4510 (X3CrTi17), 1.4589 (X5CrNiMoTi15-2)
	P5	P5.1	Cast steel		1.7231 (G42CrMo4)
	P6	P6.1	Stainless cast steel, ferritic and martensitic		
M	M1	M1.1	Stainless steels, austenitic	< 700 N/mm²	1.4301 (V2A), 1.4571 (V4A)
		M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000 N/mm²	1.4362 (Alloy 2304), 1.4501, 1.4662 (LDX 2404)
	M2	M2.1	Stainless/heat-resistant cast steel, austenitic	< 700 N/mm²	1.4849 (GX40NiCrSiNb38-19), 1.4848, 1.4837
	M3	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000 N/mm²	
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300 N/mm²	GJL-250 (GG-25), GJL-260 (GG-26 Cr)
	K2	K2.1	Cast iron with spheroidal graphite, GJS	< 500 N/mm²	GJS-400 (GGG-40), GJS-450 (GGG-45)
		K2.2	Cast iron with spheroidal graphite, GJS	500-800 N/mm²	GJS-600 (GGG-60), GJS-800-2 (GGG-80), GJS-800-8 (ADI 800)
		K2.3	Cast iron with spheroidal graphite, GJS	> 800 N/mm²	GJS-900-2 (GGG-90), GJS-1000-5 (ADI 1000), GJS-1200-2 (ADI 1200), GJS-1400-1 (ADI 1400)
	K3	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500 N/mm²	GJV-300, GJV-400, GJMW-400-5 (GTW-40)
		K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500 N/mm²	GJV-500
N	N1	N1.1	Aluminium, non-alloy and alloy < 3 % Si		Alloy 2024, Alloy 7075, Al99
		N1.2	Aluminium, alloy ≤ 7 % Si		AlSi7
		N1.3	Aluminium, alloy > 7-12 % Si		AlSi9, AlSi9Cu
		N1.4	Aluminium, alloy > 12 % Si		AlSi12, AlSi17
	N2	N2.1	Copper, non-alloy and low-alloy	< 300 N/mm²	SE-Cu
		N2.2	Copper, alloy	> 300 N/mm²	CuSn6
		N2.3	Brass, bronze, gunmetal	< 1200 N/mm²	CuZn33, CuAl9Mn3
	N3	N3.1	Graphite		
	N4	N4.1	Plastic, thermoplastics		PA, PE, PC, PS, PVC, PP, PTFE, POM, PMMA
		N4.2	Plastic, thermosets		PU, PF, EP, UP, VE, CR
		N4.3	Plastic, foams		EPS, PUR, PVC-E, PS-E, PP-E
C	C1	C1.1	Plastic matrix, aramide fibre-reinforced (AFRP)		Nomex, Kevlar, Twaron, KOREX
		C1.2	Plastic matrix (thermosetting), CFRP/GFRP		IMS, HTA
		C1.3	Plastic matrix (thermoplastic), CFRP/GFRP		GMT-PP, PEEK
	C2	C2.1	Carbon matrix, carbon fibre-reinforced (CFC)		CF222, CF225, CF226, CF227, CF260
	C3	C3.1	Metal matrix (MMC)		CeramTec AO-403 (AlSi9MgMn-Al2O3), Al/Cu/Mg-SiO2/Al2O3/AlN/TiC/SiC/BN/TiB2
	C4	C4.1	Sandwich construction, honeycomb core		
		C4.2	Sandwich construction, foam core		PLASCORE PAMG-XR1 5052, PCGA-XR1 3003, PAMG-XR1 5056, micro-cell (core made out of alloy 5052/5056)
	C5	C5.1	Composite (stack), non-metal - non-ferrous metal composite		CFRP-aluminium, IMS/HTA + Alloy 2024/6061/7075
		C5.2	Composite (stack), non-metal - metal composite		CFRP-titanium, IMS/HTA + TiAl6V4/AMS4905
		C5.3	Composite (stack), non-metal - non-metallic composite		CFRP-CFRP
		C5.4	Composite (stack), non-ferrous metal - non-ferrous metal composite		Aluminium-aluminium
		C5.5	Composite (stack), non-ferrous metal - metal composite		Aluminium-titanium
		C5.6	Composite (stack), metal - metal composite		Titanium-inox
S	S1	S1.1	Titanium, titanium alloys	< 400 N/mm²	
	S2	S2.1	Titanium, titanium alloys	< 1200 N/mm²	TiAl6V4
		S2.2	Titanium, titanium alloys	> 1200 N/mm²	
	S3	S3.1	Nickel, non-alloy and alloy	< 900 N/mm²	1.3912 (invar, Ni36)
		S3.2	Nickel, non-alloy and alloy	> 900 N/mm²	
	S4	S4.1	High-temperature super alloy Ni, Co and Fe-based		Hardox, Hastelloy, Incoloy, Inconel, NIMONIC, Stellite, Waspaloy
	S5	S5.1	Tungsten and molybdenum alloys		
H	H1	H1.1	Hardened steel/cast steel	45-55 HRC	
		H1.2	Hardened steel/cast steel	55-64 HRC	
		H1.3	Hardened steel/cast steel	64-70 HRC	
	H2	H2.1	Wear-resistant cast iron/chilled cast iron, GJN		

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