

UP2DATE

COOL MACHINING RESULTS

Tool Holders with the
DirectCooling (DC) System
from CERATIZIT

... AND A SOME MORE PRODUCTS

- ▲ WTX – Micro: the drill for the
Use in micro dimensions
- ▲ Centering vice ZSG mini:
Clamp small parts with 16 kN

TEAM CUTTING TOOLS



CUTTING SOLUTIONS BY
CERATIZIT



KOMET



Klenk

CERATIZIT is a high-technology engineering group specialised in cutting tools and hard material solutions.

Tooling the Future

www.ceratizit.com

Welcome!



It couldn't be easier

**Ordering via the
Online Shop**

<http://cuttingtools.ceratizit.com>



On-site technical support

**Your Local Technical
Sales Engineer**

Your customer number

Tool Holders with DirectCooling (DC)

Targeted coolant application on the cutting edge



Targeted action is half the battle

Machining without cutting fluids? It's hard to imagine in many cases because they are so efficient at cooling, lubricating and evacuating chips. But CERATIZIT has an even better alternative in the form of its DirectCooling system: two nozzles in the holder apply the coolant directly on the cutting edge – for cool machining results! Whereas a hose applies coolant liberally to the cutting area, the DirectCooling (DC) system from CERATIZIT works in a different way. Tool holders with DirectCooling (DC) are equipped with two inner holes that guide the coolant to where it has the greatest impact: directly on the cutting edge. Why is this so important? Targeted cooling improves both the service life and general process security.

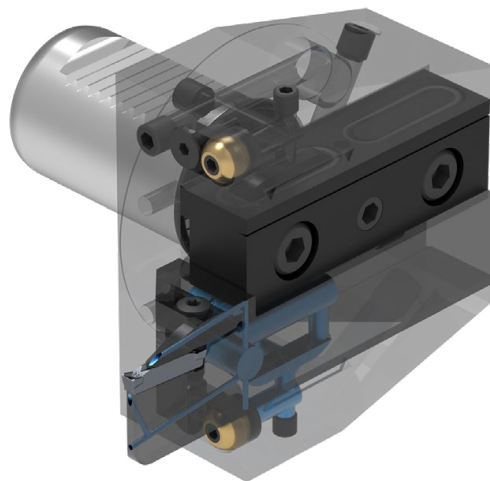


- ▲ Fewer trapped chips
- ▲ Reduced wear
- ▲ Universal application

Advantage/benefit

The lengths of all CERATIZIT DirectCooling holders are ideally matched to one another. As a result...

- ▲ Interference contours are eliminated
- ▲ A compact complete package is created
- ▲ Optimum stability is reached
- ▲ Unlimited flexibility is achieved



The DirectCooling system from CERATIZIT optimises cooling lubrication: two coolant holes trained on the cutting edge ensure efficient cooling, lubrication and chip evacuation.

MonoClamp – GX-DC Grooving Holder

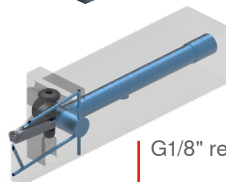
Two nozzles for the ultimate cooling effect



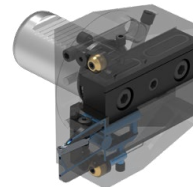
Further information on the product can be found on → Page 30–34



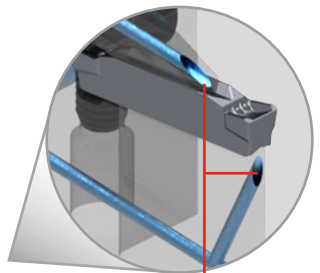
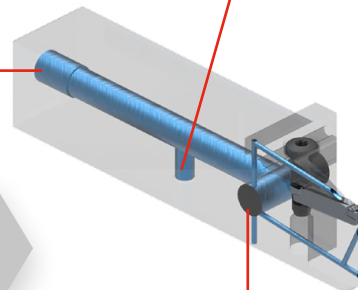
- ▲ Fewer trapped chips
- ▲ Reduced wear
- ▲ Universal application



G1/8" rear coolant connection



Coolant transfer from below via adapter possible



Dual cooling (rake face and flank)

G1/8" lateral coolant connection

Features

- ▲ The new MonoClamp GX-DC tool holders play to their strengths particularly when faced with deep grooves, using a high flow volume to reliably flush out any chips.
- ▲ The revamped insert seat clamps the grooving insert in the insert holder with even greater stability.
- ▲ Better handling: to simplify the process of changing inserts, the insert clamping screw can be turned from both above and below, depending on which is easier to access.



So, in terms of transfer, instead of emptying a bucketful into the machining zone, we target the cutting edges precisely.

CERATIZIT Product Manager, Paul Höckberg

VDI Adapter – DC

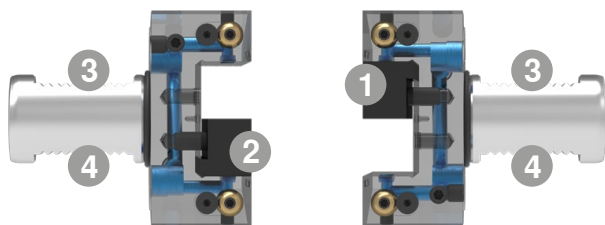
Universal, versatile and
with targeted cooling



Universal VDI holder with targeted cooling

- ▲ The VDI holder with DirectCooling is incredibly versatile owing to its 4-in-1 functionality.
- ▲ Thanks to its double tooth profile, only one holder is needed.
- ▲ Optional extra: the clamping rails can be attached at the top or bottom

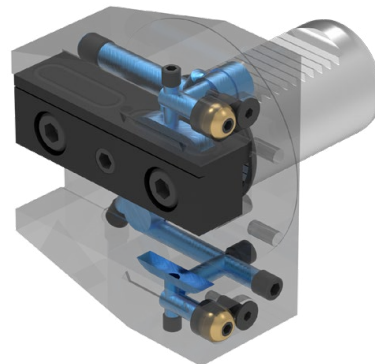
Cool type: VDI holder with 4-in-1 functionality



- 1 Top clamping rail
- 2 Bottom clamping rail
- 3 Top tooth profile (normal application)
- 4 Bottom tooth profile (overhead application)

Direct
DC
Cooling

- ▲ Fewer trapped chips
- ▲ Reduced wear
- ▲ Universal application



VDI square adapters – DC



Further information on the product can be found on → Page 70–75



WTX – Micro

Drill for use in micro dimensions.

Hole depths up to 30xD can be achieved in the accustomed high WTX Performance drilling quality.



Specialists in micro tools for universal application

The new drill series from the CERATIZIT Group's Team Cutting Tools might sound like a complete contradiction, but the WTX Micro from the WNT Performance range is both the specialist for micro and deep hole drilling and suitable for universal use – it is anything but choosy when it comes to materials. This means it can be used for many different applications in a diverse range of industries.



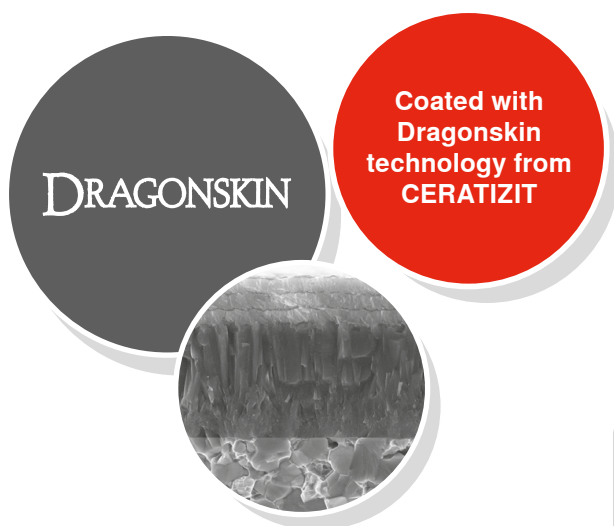
Whether it is steel, cast iron materials or heat-resistant materials/ alloys, our WTX Micro can take on anything!

CERATIZIT Product Manager, Felix Meggle

Reliable processes thanks to optimised geometry and tough coating

Advantage/benefit

- ▲ **Special drill point**
guarantees maximum positioning accuracy and outstanding centring properties
- ▲ **Lapped surfaces and patented chip space openings**
allow for rapid and reliable chip removal
- ▲ **Innovative Dragonskin DPX74-M**
makes the WTX Micro resistant to heat and wear
- ▲ **Spiral coolant holes and a Power chamber along the whole shank length**
ensure optimum cooling of the cutting edges, significantly extending tool life
- ▲ **Process security and tight tolerances**
are the priority in the performance specification – and the WTX Micro has been successfully engineered for this very purpose
- ▲ **Ultra-fine grain carbide from CERATIZIT**
ensures consistently outstanding tool quality



The WTX Micro drills are equipped with the innovative DPX74-M coating to make them even more resistant against wear and heat.



The WTX Micro comes in diameters ranging from 0.8 to 2.90 mm and lengths of 5xD, 8xD, 12xD, 16xD and 20xD. The WTX Micro deep hole drills are available in the 1.00 mm to 2.90 mm range in lengths of 25xD and 30xD.



Further information on the product
can be found on → Page 12–19

ZSG mini

Clamp small parts with 16 kN



Further information on the product can be found on → Page 90–94

Small, strong, robust – the ZSG mini packs a punch!

Extremely small but incredibly strong. The ZSG mini from the WNT Performance range is the ideal partner for clamping small workpieces.

Once you have used it, you will never want to be without it again: centric vices are little helpers that often make day-to-day machining activities much easier. To allow particularly small and delicate workpieces to also enjoy these benefits, CERATIZIT is adding the ZSG mini centric vice for small parts to its portfolio.

Extremely easy handling with quick jaw change!



The jaws can be replaced in a matter of seconds without any tools at all by extracting them at an angle through the centre. The integrated pull-down action via two spring pressure pins means that the jaws sit securely in the base body, ensuring total machining precision and robust connections.

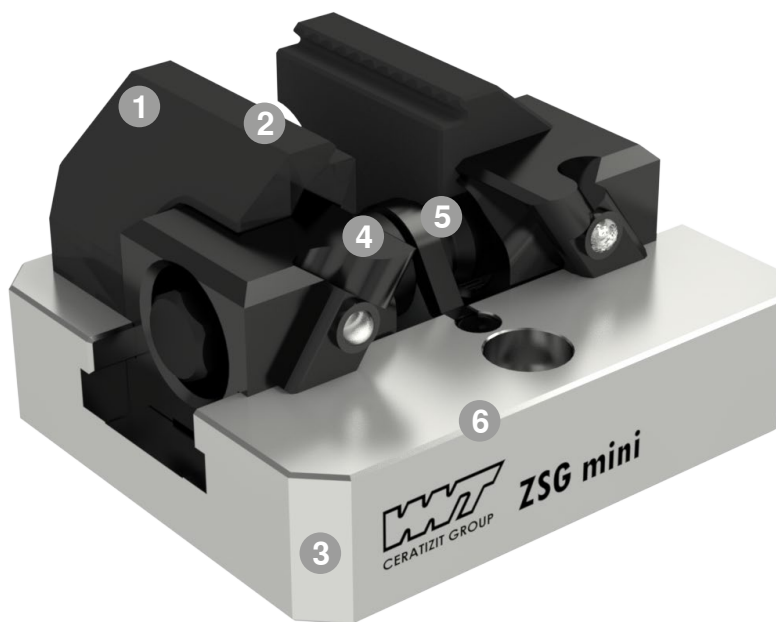
Advantage/benefit

1 Optimum accessibility

Quick and straightforward handling significantly reduces setup times. The ZSG mini can be easily accessed from all sides, making it ideal for the machining of blanks and finished parts, multi-clamping and automated applications.

2 Large clamping range – grip or smooth step

The centric vices for small parts are available in lengths of 80 mm and 100 mm with quick change jaws in widths of 45 mm and 70 mm – all case-hardened to between 54 and 56 HRC, with smooth step and grip variants.



3 Stainless, hardened base body

The stainless base body that is hardened to 45 HRC promises a long and reliable service life for the clamping system.

4 Fast jaw changeover without tools

The quick change system means the jaws can be changed in seconds without any tools at all.

5 High clamping force

Instead of complex pre-stamping, the ZSG mini delivers very high clamping forces of 16 kN with 50 Nm: clamp, lock, go!

6 Compact Design

The ZSG mini is suitable for a 4-axis and 5-axis indexing head and can be integrated directly in or on the pallet.

ZSG mini

WTX – Micro

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Turning Tools

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Base holder for replaceable head system (HSK-T) – vibration dampened



DirectCooling-System



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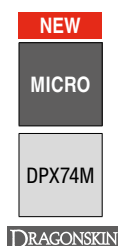
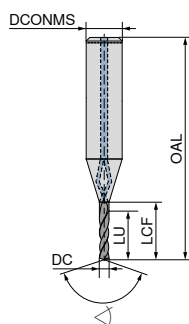
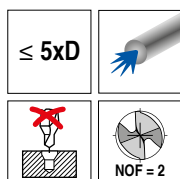


Vices

90–94 **ZSG mini**

WTX – High Performance Drills

- ▲ Specialised micro drill
- ▲ Universal application
- ▲ Extremely high process security
- ▲ Pilot drill for WTX Micro – high-performance deep hole drill



HA
135°
Solid carbide

10 693 ...

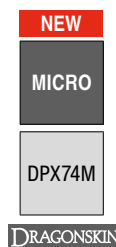
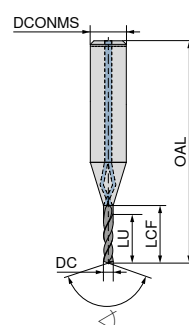
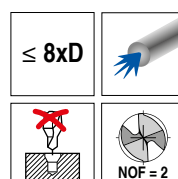
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0,9	3	39	6,3	4,5	00900
1,0	3	40	7,0	5,0	01000
1,1	3	41	7,7	5,5	01100
1,2	3	41	8,4	6,0	01200
1,3	3	42	9,1	6,5	01300
1,4	3	42	9,8	7,0	01400
1,5	3	43	10,5	7,5	01500
1,6	3	44	11,2	8,0	01600
1,7	3	44	11,9	8,5	01700
1,8	3	45	12,6	9,0	01800
1,9	3	45	13,3	9,5	01900
2,0	3	46	14,0	10,0	02000
2,1	3	47	14,7	10,5	02100
2,2	3	47	15,4	11,0	02200
2,3	3	48	16,1	11,5	02300
2,4	3	48	16,8	12,0	02400
2,5	3	49	17,5	12,5	02500
2,6	3	50	18,2	13,0	02600
2,7	3	50	18,9	13,5	02700
2,8	3	51	19,6	14,0	02800
2,9	3	51	20,3	14,5	02900

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Minimum coolant pressure: 30 bar

WTX – High Performance Drills

- ▲ Specialised micro drill
- ▲ Universal application
- ▲ Extremely high process security



HA
128°
Solid carbide

10 694 ...

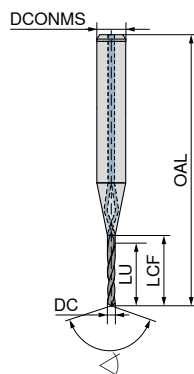
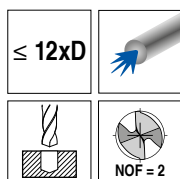
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1,1	3	44	11	8,8	01100
1,2	3	45	12	9,6	01200
1,3	3	46	13	10,4	01300
1,4	3	47	14	11,2	01400
1,5	3	47	15	12,0	01500
1,6	3	48	16	12,8	01600
1,7	3	49	17	13,6	01700
1,8	3	50	18	14,4	01800
1,9	3	51	19	15,2	01900
2,0	3	52	20	16,0	02000
2,1	3	53	21	16,8	02100
2,2	3	54	22	17,6	02200
2,3	3	55	23	18,4	02300
2,4	3	56	24	19,2	02400
2,5	3	56	25	20,0	02500
2,6	3	57	26	20,8	02600
2,7	3	58	27	21,6	02700
2,8	3	59	28	22,4	02800
2,9	3	60	29	23,2	02900

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Minimum coolant pressure: 30 bar

WTX – High Performance Drills

- ▲ Specialised micro drill
- ▲ Universal application
- ▲ Extremely high process security
- ▲ Pilot drill: 5xD WTX Micro – high-performance drill



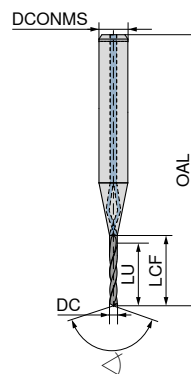
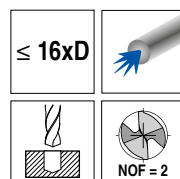
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0,9	3	46	12,6	10,8	00900
1,0	3	47	14,0	12,0	01000
1,1	3	48	15,4	13,2	01100
1,2	3	50	16,8	14,4	01200
1,3	3	51	18,2	15,6	01300
1,4	3	52	19,6	16,8	01400
1,5	3	53	21,0	18,0	01500
1,6	3	55	22,4	19,2	01600
1,7	3	56	23,8	20,4	01700
1,8	3	57	25,2	21,6	01800
1,9	3	59	26,6	22,8	01900
2,0	3	60	28,0	24,0	02000
2,1	3	61	29,4	25,2	02100
2,2	3	63	30,8	26,4	02200
2,3	3	64	32,2	27,6	02300
2,4	3	65	33,6	28,8	02400
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2,6	3	68	36,4	31,2	02600
2,7	3	69	37,8	32,4	02700
2,8	3	70	39,2	33,6	02800
2,9	3	72	40,6	34,8	02900

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Minimum coolant pressure: 30 bar

WTX – High performance deep hole drills

- ▲ Specialised micro deep hole drill
- ▲ Universal application
- ▲ Extremely high process security
- ▲ Pilot drill: 5xD WTX Micro – high-performance drill



HA $\angle 128^\circ$
Solid carbide
10 695 ...

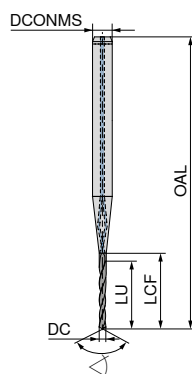
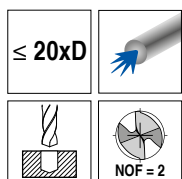
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1,2	3	54	21,6	19,2	01200
1,3	3	56	23,4	20,8	01300
1,4	3	58	25,2	22,4	01400
1,5	3	60	27,0	24,0	01500
1,6	3	61	28,8	25,6	01600
1,7	3	63	30,6	27,2	01700
1,8	3	65	32,4	28,8	01800
1,9	3	66	34,2	30,4	01900
2,0	3	68	36,0	32,0	02000
2,1	3	70	37,8	33,6	02100
2,2	3	71	39,6	35,2	02200
2,3	3	73	41,4	36,8	02300
2,4	3	75	43,2	38,4	02400
2,5	3	77	45,0	40,0	02500
2,6	3	78	46,8	41,6	02600
2,7	3	80	48,6	43,2	02700
2,8	3	82	50,4	44,8	02800
2,9	3	83	52,2	46,4	02900

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Minimum coolant pressure: 30 bar

WTX – High performance deep hole drills

- ▲ Specialised micro deep hole drill
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- ▲ Pilot drill: 5xD WTX Micro – high-performance drill



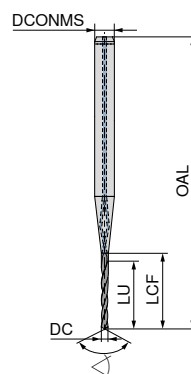
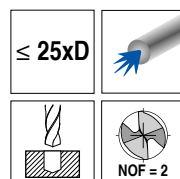
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1,1	3	57	24,2	22	01100
1,2	3	59	26,4	24	01200
1,3	3	61	28,6	26	01300
1,4	3	63	30,8	28	01400
1,5	3	66	33,0	30	01500
1,6	3	68	35,2	32	01600
1,7	3	70	37,4	34	01700
1,8	3	72	39,6	36	01800
1,9	3	74	41,8	38	01900
2,0	3	76	44,0	40	02000
2,1	3	78	46,2	42	02100
2,2	3	80	48,4	44	02200
2,3	3	82	50,6	46	02300
2,4	3	85	52,8	48	02400
2,5	3	87	55,0	50	02500
2,6	3	89	57,2	52	02600
2,7	3	91	59,4	54	02700
2,8	3	93	61,6	56	02800
2,9	3	95	63,8	58	02900

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Minimum coolant pressure: 30 bar

WTX – High performance deep hole drills

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- ▲ Pilot drill: 5xD WTX Micro – high-performance drill



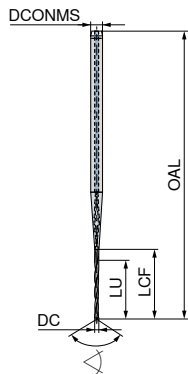
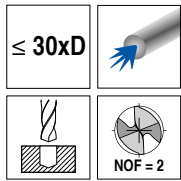
DC _{h6} mm	DCONMS _{h6} mm	OAL mm	LCF mm	LU mm	
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1,1	3	63	29,7	27,5	01100
1,2	3	65	32,4	30,0	01200
1,3	3	68	35,1	32,5	01300
1,4	3	71	37,8	35,0	01400
1,5	3	73	40,5	37,5	01500
1,6	3	76	43,2	40,0	01600
1,7	3	78	45,9	42,5	01700
1,8	3	81	48,6	45,0	01800
1,9	3	84	51,3	47,5	01900
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2,4	3	97	64,8	60,0	02400
2,5	3	99	67,5	62,5	02500
2,6	3	102	70,2	65,0	02600
2,7	3	104	72,9	67,5	02700
2,8	3	107	75,6	70,0	02800
2,9	3	110	78,3	72,5	02900

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Minimum coolant pressure: 30 bar

WTX – High performance deep hole drills

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- ▲ Pilot drill: 5xD WTX Micro – high-performance drill



Solid carbide

10 699 ...

DC _{h6} mm	DCONMS _{h6} mm	OAL mm	LCF mm	LU mm	
1,0	3	65	32,0	30	01000
1,1	3	68	35,2	33	01100
1,2	3	71	38,4	36	01200
1,3	3	74	41,6	39	01300
1,4	3	78	44,8	42	01400
1,5	3	81	48,0	45	01500
1,6	3	84	51,2	48	01600
1,7	3	87	54,4	51	01700
1,8	3	90	57,6	54	01800
1,9	3	93	60,8	57	01900
2,0	3	96	64,0	60	02000
2,1	3	99	67,2	63	02100
2,2	3	102	70,4	66	02200
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2,7	3	118	86,4	81	02700
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2,9	3	124	92,8	87	02900

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Minimum coolant pressure: 30 bar

Material examples for cutting data tables

	Material sub-group	Index	Composition / Structure / Heat treatment	Tensile strength N/mm ² / HB / HRC	Material number	Material designation	Material number	Material designation
P	Unalloyed steel	P.1.1	< 0,15 % C	Annealed	420 N/mm ² / 125 HB	1.0401	C15	1.1141 Ck15
		P.1.2	< 0,45 % C	Annealed	640 N/mm ² / 190 HB	1.1191	C45E	1.0718 9SMnPb28
		P.1.3		Tempered	840 N/mm ² / 250 HB	1.1191	C45E	1.0535 C55
		P.1.4	< 0,75 % C	Annealed	910 N/mm ² / 270 HB	1.1223	C60R	1.0535 C55
		P.1.5		Tempered	1010 N/mm ² / 300 HB	1.1223	C60R	1.0727 45S20
	Low-alloy steel	P.2.1		Annealed	610 N/mm ² / 180 HB	1.7131	16MnCr5	1.6587 17CrNiMo6
		P.2.2		Tempered	930 N/mm ² / 275 HB	1.7131	16MnCr5	1.6587 17CrNiMo6
		P.2.3		Tempered	1010 N/mm ² / 300 HB	1.7225	42CrMo4	1.3505 100Cr6
		P.2.4		Tempered	1200 N/mm ² / 375 HB	1.7225	42CrMo4	1.3505 100Cr6
	High-alloy steel and high-alloy tool steel	P.3.1		Annealed	680 N/mm ² / 200 HB	1.4021	X20Cr13	1.4034 X46Cr13
		P.3.2		Hardened and tempered	1100 N/mm ² / 300 HB	1.2343	X38CrMoV5-1	1.4034 X46Cr13
		P.3.3		Hardened and tempered	1300 N/mm ² / 400 HB	1.2343	X38CrMoV5-1	1.4034 X46Cr13
	Stainless steel	P.4.1	Ferritic / martensitic	Annealed	680 N/mm ² / 200 HB	1.4016	X6Cr17	1.2316 X36CrMo16
		P.4.2	Martensitic	Tempered	1010 N/mm ² / 300 HB	1.4112	X90CrMoV18	1.2316 X36CrMo16
M	Stainless steel	M.1.1	Austenitic / austenitic-ferritic	Quenched	610 N/mm ² / 180 HB	1.4301	X5CrNi18-10	1.4571 X6CrNiMoTi17-12-2
		M.2.1	Austenitic	Tempered	300 HB	1.4841	X15CrNiSi25-21	1.4539 X1NiCrMoCu25-20-5
		M.3.1	Austenitic / ferritic (Duplex)		780 N/mm ² / 230 HB	1.4462	X2CrNiMoN22-5-3	1.4501 X2CrNiMoCuWN25-7-4
K	Grey cast iron	K.1.1	Pearlitic / ferritic		350 N/mm ² / 180 HB	0.6010	GG-10	0.6025 GG-25
		K.1.2	Pearlitic (martensitic)		500 N/mm ² / 260 HB	0.6030	GG-30	0.6045 GG-45
	Spherulitic graphite cast iron	K.2.1	Ferritic		540 N/mm ² / 160 HB	0.7040	GGG-40	0.7060 GGG-60
		K.2.2	Pearlitic		845 N/mm ² / 250 HB	0.7070	GGG-70	0.7080 GGG-80
	Malleable iron	K.3.1	Ferritic		440 N/mm ² / 130 HB	0.8035	GTW-35-04	0.8045 GTW-45
		K.3.2	Pearlitic		780 N/mm ² / 230 HB	0.8165	GTS-65-02	0.8170 GTS-70-02
N	Aluminium wrought alloy	N.1.1	Non-hardenable		60 HB	3.0255	Al99,5	3.3315 AlMg1
		N.1.2	Hardenable	Age-hardened	340 N/mm ² / 100 HB	3.1355	AlCuMg2	3.2315 AlMgSi1
	Cast aluminium alloy	N.2.1	≤ 12 % Si, non-hardenable		250 N/mm ² / 75 HB	3.2581	G-AlSi12	3.2163 G-AlSi9Cu3
		N.2.2	≤ 12 % Si, hardenable	Age-hardened	300 N/mm ² / 90 HB	3.2134	G-AlSi5Cu1Mg	3.2373 G-AlSi9Mg
		N.2.3	> 12 % Si, non-hardenable		440 N/mm ² / 130 HB		G-AlSi17Cu4Mg	G-AlSi18CuNiMg
	Copper and copper alloys (bronze/brass)	N.3.1	Free-machining alloys, PB > 1 %		375 N/mm ² / 110 HB	2.0380	CuZn39Pb2 (Ms58)	2.0410 CuZn44Pb2
		N.3.2	CuZn, CuSnZn		300 N/mm ² / 90 HB	2.0331	CuZn15	2.4070 CuZn28Sn1As
		N.3.3	CuSn, lead-free copper and electrolytic copper		340 N/mm ² / 100 HB	2.0060	E-Cu57	2.0590 CuZn40Fe
	Magnesium alloys	N.4.1	Magnesium and magnesium alloys		70 HB	3.5612	MgAl6Zn	3.5312 MgAl3Zn
S	Heat-resistant alloys	S.1.1	Fe - basis	Annealed	680 N/mm ² / 200 HB	1.4864	X12NiCrSi 36-16	1.4865 G-X40NiCrSi38-18
		S.1.2		Age-hardened	950 N/mm ² / 280 HB	1.4980	X6NiCrTiMoVB25-15-2	1.4876 X10NiCrAlTi32-20
		S.2.1	Ni or Co basis	Annealed	840 N/mm ² / 250 HB	2.4631	NiCr20TiAl (Nimonic80A)	3.4856 NiCr22Mo9Nb
		S.2.2		Age-hardened	1180 N/mm ² / 350 HB	2.4668	NiCr19Nb5Mo3 (Inconel 718)	2.4955 NiFe25Cr20NbTi
		S.2.3		Cast	1080 N/mm ² / 320 HB	2.4765	CoCr20W15Ni	1.3401 G-X120Mn12
	Titanium alloys	S.3.1	Pure titanium		400 N/mm ²	3.7025	Ti99,8	3.7034 Ti99,7
		S.3.2	Alpha + beta alloys	Age-hardened	1050 N/mm ² / 320 HB	3.7165	TiAl6V4	Ti-6246 Ti-6Al-2Sn-4Zr-6Mo
		S.3.3	Beta alloys		1400 N/mm ² / 410 HB	Ti555.3	Ti-5Al-5V-5Mo-3Cr	R56410 Ti-10V-2Fe-3Al
H	Hardened steel	H.1.1		Hardened and tempered	46-55 HRC			
		H.1.2		Hardened and tempered	56-60 HRC			
		H.1.3		Hardened and tempered	61-65 HRC			
		H.1.4		Hardened and tempered	66-70 HRC			
	Chilled iron	H.2.1		Cast	400 HB			
	Hardened cast iron	H.3.1		Hardened and tempered	55 HRC			
O	Non-metal materials	O.1.1	Plastics, duroplastic		≤ 150 N/mm ²			
		O.1.2	Plastics, thermoplastic		≤ 100 N/mm ²			
		O.2.1	Aramid fibre-reinforced		≤ 1000 N/mm ²			
		O.2.2	Glass/carbon-fibre reinforced		≤ 1000 N/mm ²			
		O.3.1	Graphite					

* Tensile strength

Cutting data standard values – WTX – Micro

Index	Drilling depth 5xD Micro 10 693 ...							
	V _c m/min with through coolant	V _c m/min MMS	< Ø 1,0	> Ø 1,0–1,25	> Ø 1,25–1,5	> Ø 1,5–2,0	> Ø 2,0–2,5	> Ø 2,5–3,0
			f mm/rev.	f mm/rev.	f mm/rev.	f mm/rev.	f mm/rev.	f mm/rev.
P.1.1	60	50	0,024	0,028	0,034	0,05	0,07	0,095
P.1.2	50	45	0,024	0,028	0,034	0,05	0,07	0,095
P.1.3	50	45	0,024	0,028	0,034	0,05	0,07	0,095
P.1.4	50	45	0,024	0,028	0,034	0,05	0,07	0,095
P.1.5	50	45	0,024	0,028	0,034	0,05	0,07	0,095
P.2.1	60	50	0,024	0,028	0,034	0,05	0,07	0,095
P.2.2	50	45	0,024	0,028	0,034	0,05	0,07	0,095
P.2.3	50	45	0,024	0,028	0,034	0,05	0,07	0,095
P.2.4								
P.3.1	50	45	0,024	0,028	0,034	0,05	0,07	0,095
P.3.2	40	35	0,024	0,028	0,034	0,05	0,07	0,095
P.3.3								
P.4.1	40		0,012	0,015	0,018	0,028	0,04	0,06
P.4.2	25		0,012	0,015	0,018	0,028	0,04	0,06
M.1.1	30		0,012	0,015	0,018	0,028	0,04	0,06
M.2.1	30		0,012	0,015	0,018	0,028	0,04	0,06
M.3.1	30		0,012	0,015	0,018	0,028	0,04	0,06
K.1.1	60	50	0,024	0,028	0,034	0,05	0,07	0,095
K.1.2	60	50	0,024	0,028	0,034	0,05	0,07	0,095
K.2.1	60	50	0,024	0,028	0,034	0,05	0,07	0,095
K.2.2	60	50	0,024	0,028	0,034	0,05	0,07	0,095
K.3.1	60	50	0,024	0,028	0,034	0,05	0,07	0,095
K.3.2	60	50	0,024	0,028	0,034	0,05	0,07	0,095
N.1.1								
N.1.2								
N.2.1								
N.2.2								
N.2.3								
N.3.1								
N.3.2								
N.3.3								
N.4.1								
S.1.1	15		0,012	0,015	0,018	0,028	0,04	0,06
S.1.2	15		0,012	0,015	0,018	0,028	0,04	0,06
S.2.1	10		0,012	0,015	0,018	0,028	0,04	0,06
S.2.2	10		0,012	0,015	0,018	0,028	0,04	0,06
S.2.3								
S.3.1	20		0,012	0,015	0,018	0,028	0,04	0,06
S.3.2	10		0,012	0,015	0,018	0,028	0,04	0,06
S.3.3								
H.1.1								
H.1.2								
H.1.3								
H.1.4								
H.2.1								
H.3.1								
O.1.1								
O.1.2								
O.2.1								
O.2.2								
O.3.1								



The cutting data depends extremely on the external conditions, the material and machine type. The indicated values are possible values which have to be increased or reduced according to the application conditions.

Cutting data standard values – WTX – Micro

Index	Hole depth 8xD / 12xD Micro 10 694 ..., 10 695 ...								Hole depth 16xD / 20xD / 25xD / 30xD Micro 10 696 ..., 10 697 ..., 10 698 ..., 10 699 ...							
	V _c m/min	V _c m/min	< Ø 1,0		> Ø 1,0–1,25		> Ø 1,25–1,5		> Ø 1,5–2,0		> Ø 2,0–2,5		> Ø 2,5–3,0		> Ø 2,5–3,0	
	with through coolant	MMS	f mm/rev.	f mm/rev.	f mm/rev.	f mm/rev.	f mm/rev.	f mm/rev.	with through coolant	f mm/rev.	f mm/rev.	f mm/rev.	f mm/rev.	f mm/rev.	f mm/rev.	f mm/rev.
P.1.1	60	50	0,024	0,028	0,034	0,05	0,07	0,095	50	0,024	0,028	0,034	0,05	0,07	0,095	0,095
P.1.2	50	45	0,024	0,028	0,034	0,05	0,07	0,095	40	0,024	0,028	0,034	0,05	0,07	0,095	0,095
P.1.3	50	45	0,024	0,028	0,034	0,05	0,07	0,095	40	0,024	0,028	0,034	0,05	0,07	0,095	0,095
P.1.4	50	45	0,024	0,028	0,034	0,05	0,07	0,095	40	0,024	0,028	0,034	0,05	0,07	0,095	0,095
P.1.5	50	45	0,024	0,028	0,034	0,05	0,07	0,095	40	0,024	0,028	0,034	0,05	0,07	0,095	0,095
P.2.1	60	50	0,024	0,028	0,034	0,05	0,07	0,095	50	0,024	0,028	0,034	0,05	0,07	0,095	0,095
P.2.2	50	45	0,024	0,028	0,034	0,05	0,07	0,095	40	0,024	0,028	0,034	0,05	0,07	0,095	0,095
P.2.3	50	45	0,024	0,028	0,034	0,05	0,07	0,095	40	0,024	0,028	0,034	0,05	0,07	0,095	0,095
P.2.4																
P.3.1	50	45	0,024	0,028	0,034	0,05	0,07	0,095	40	0,024	0,028	0,034	0,05	0,07	0,095	0,095
P.3.2	40	35	0,024	0,028	0,034	0,05	0,07	0,095	30	0,024	0,028	0,034	0,05	0,07	0,095	0,095
P.3.3																
P.4.1	40		0,012	0,015	0,018	0,028	0,04	0,06	30	0,012	0,015	0,018	0,028	0,04	0,06	0,06
P.4.2	25		0,012	0,015	0,018	0,028	0,04	0,06	20	0,012	0,015	0,018	0,028	0,04	0,06	0,06
M.1.1	30		0,012	0,015	0,018	0,028	0,04	0,06	25	0,012	0,015	0,018	0,028	0,04	0,06	0,06
M.2.1	30		0,012	0,015	0,018	0,028	0,04	0,06	25	0,012	0,015	0,018	0,028	0,04	0,06	0,06
M.3.1	30		0,012	0,015	0,018	0,028	0,04	0,06	25	0,012	0,015	0,018	0,028	0,04	0,06	0,06
K.1.1	60	50	0,024	0,028	0,034	0,05	0,07	0,095	50	0,024	0,028	0,034	0,05	0,07	0,095	0,095
K.1.2	60	50	0,024	0,028	0,034	0,05	0,07	0,095	50	0,024	0,028	0,034	0,05	0,07	0,095	0,095
K.2.1	60	05	0,024	0,028	0,034	0,05	0,07	0,095	50	0,024	0,028	0,034	0,05	0,07	0,095	0,095
K.2.2	60	50	0,024	0,028	0,034	0,05	0,07	0,095	50	0,024	0,028	0,034	0,05	0,07	0,095	0,095
K.3.1	60	50	0,024	0,028	0,034	0,05	0,07	0,095	50	0,024	0,028	0,034	0,05	0,07	0,095	0,095
K.3.2	60	50	0,024	0,028	0,034	0,05	0,07	0,095	50	0,024	0,028	0,034	0,05	0,07	0,095	0,095
N.1.1																
N.1.2																
N.2.1																
N.2.2																
N.2.3																
N.3.1																
N.3.2																
N.3.3																
N.4.1																
S.1.1	15		0,012	0,015	0,018	0,028	0,04	0,06								
S.1.2	15		0,012	0,015	0,018	0,028	0,04	0,06								
S.2.1	10		0,012	0,015	0,018	0,028	0,04	0,06								
S.2.2	10		0,012	0,015	0,018	0,028	0,04	0,06								
S.2.3																
S.3.1	20		0,012	0,015	0,018	0,028	0,04	0,06								
S.3.2	10		0,012	0,015	0,018	0,028	0,04	0,06								
S.3.3																
H.1.1																
H.1.2																
H.1.3																
H.1.4																
H.2.1																
H.3.1																
O.1.1																
O.1.2																
O.2.1																
O.2.2																
O.3.1																



The cutting data depends extremely on the external conditions, the material and machine type. The indicated values are possible values which have to be increased or reduced according to the application conditions.

WTX – Micro – recommended application

General references

- ▲ During vertical machining, a pilot hole is not required for regular and straight surfaces from $\varnothing$ 1.0 mm up to a length of 12xD due to the excellent self-centring. During horizontal drilling, a pilot drill must be used for irregular and angled surfaces.
The WTX Micro 5xD is recommended as a pilot drill.
- ▲ To guarantee problem-free insertion of the deep hole twist drill in the pilot hole, during horizontal machining 90° countersinking with suitable NC countersink is recommended.
- ▲ During vertical machining, drills from $\varnothing$ 1.0 mm up to a length of 12xD can also be operated outside the pilot hole without a reduction in speed.
- ▲ For through holes, the feed per revolution must be reduced by 50% before exiting the hole.
- ▲ For long-chipping materials, pecking may be required every 3xD from a hole depth of 10xD. Peck drilling (retraction) should occur at the pilot hole depth.
- ▲ Due to the small thro' coolant $\varnothing$ during micro drilling, effective filtration of the cooling medium is of the utmost importance.
Drill $< \varnothing$ 2.0 mm Filter ≤ 0.010 mm
Drill $< \varnothing$ 3.0 mm Filter ≤ 0.020 mm
- ▲ The longer the coolant is in the machine, suspended particles and particulate matter in the cooling medium prevent effective coolant flow. Regular replacement of the coolant is therefore recommended.
- ▲ A suitable clamping device with maximum radial run-out accuracy and balance quality is required for process-secure production.
Radial run-out accuracy ≤ 0.003 mm
Suitable for high-speed areas
- ▲ To guarantee a process-secure drilling process, a minimum pressure of 30 bar must be present.

1 Producing the pilot hole



- ▲ Pilot hole depth: min. 3xD
- ▲ It must be ensured that the prepared pilot hole is free from chips to avoid blocking of the micro deep hole twist drill cutting edges

2 Entering the pilot hole with a deep hole twist drill



- ▲ Speed 300 rpm (reverse rotation sometimes possible)
- ▲ Entry speed approx. 1000 mm/min
- ▲ Switch on cooling
- ▲ Increase parameters 0.5-1.0 mm before reaching the bottom of the pilot hole

3 Deep hole drilling



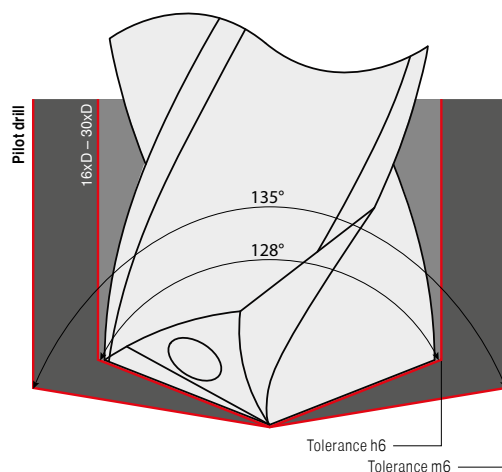
- ▲ At hole depth without pecking

4 Retracting the drill

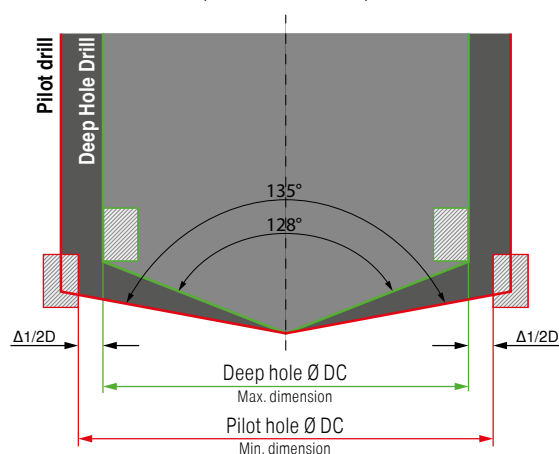


- ▲ Retract drill approx. 1xD
- ▲ Reduce speed to 300 rpm
- ▲ Exit speed approx. 1000 mm/min
- ▲ Switch off emulsion before exiting the hole

Tolerances and angles

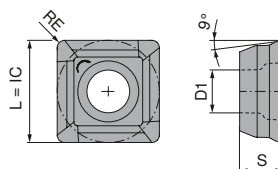


The following must apply to use the pilot and deep hole twist drill consecutively and without collisions:
 $\Delta D = \varnothing D (\text{pilot hole}) - \varnothing D (\text{deep hole}) > 0$

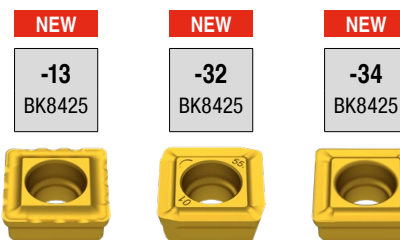


SOGX

Designation	L mm	IC mm	D1 mm	S mm
SOGX 0402..	4,8	4,8	2,05	2,20
SOGX 0502..	5,5	5,5	2,30	2,40
SOGX 0602..	6,2	6,2	2,60	2,75
SOGX 07T2..	7,1	7,1	2,60	2,97
SOGX 0803..	8,0	8,0	2,85	3,40
SOGX 09T3..	8,9	8,9	3,40	3,90
SOGX 1004..	9,8	9,8	4,10	4,20
SOGX 1104..	10,9	10,9	4,10	4,50
SOGX 1204..	12,0	12,0	5,20	4,80
SOGX 1305..	13,2	13,2	5,20	5,20



SOGX



SOGX
10 820 ...

ISO	KOMET no.	RE mm			
040204	W80 10130.048425	0,4			
040204	W80 10320.048425	0,4			
040204	W80 10340.048425	0,4			
050204	W80 12130.048425	0,4			
050204	W80 12320.048425	0,4			
050204	W80 12340.048425	0,4			
060206	W80 18130.068425	0,6			
060206	W80 18320.068425	0,6			
060206	W80 18340.068425	0,6			
07T208	W80 20130.088425	0,8			
07T208	W80 20320.088425	0,8			
07T208	W80 20340.088425	0,8			
080308	W80 24130.088425	0,8			
080308	W80 24320.088425	0,8			
080308	W80 24340.088425	0,8			
09T308	W80 28130.088425	0,8			
09T308	W80 28320.088425	0,8			
09T308	W80 28340.088425	0,8			
100408	W80 32130.088425	0,8			
100408	W80 32320.088425	0,8			
100408	W80 32340.088425	0,8			
110408	W80 38130.088425	0,8			
110408	W80 38320.088425	0,8			
110408	W80 38340.088425	0,8			
120408	W80 42130.088425	0,8			
120408	W80 42320.088425	0,8			
120408	W80 42340.088425	0,8			
130508	W80 46130.088425	0,8			
130508	W80 46320.088425	0,8			
130508	W80 46340.088425	0,8			
P			●	●	○
M			●	●	
K			●	●	●
N			○	○	
S			●	●	
H			○	○	
O					

Material examples for cutting data tables

	Material sub-group	Index	Composition / Structure / Heat treatment		Tensile strength N/mm ² / HB / HRC	Material number	Material designation	Material number	Material designation
P	Unalloyed steel	P.1.1	< 0,15 % C	Annealed	420 N/mm ² / 125 HB	1.0401	C15	1.1141	Ck15
		P.1.2	< 0,45 % C	Annealed	640 N/mm ² / 190 HB	1.1191	C45E	1.0718	9SMnPb28
		P.1.3		Tempered	840 N/mm ² / 250 HB	1.1191	C45E	1.0535	C55
		P.1.4	< 0,75 % C	Annealed	910 N/mm ² / 270 HB	1.1223	C60R	1.0535	C55
		P.1.5		Tempered	1010 N/mm ² / 300 HB	1.1223	C60R	1.0727	45S20
	Low-alloy steel	P.2.1		Annealed	610 N/mm ² / 180 HB	1.7131	16MnCr5	1.6587	17CrNiMo6
		P.2.2		Tempered	930 N/mm ² / 275 HB	1.7131	16MnCr5	1.6587	17CrNiMo6
		P.2.3		Tempered	1010 N/mm ² / 300 HB	1.7225	42CrMo4	1.3505	100Cr6
		P.2.4		Tempered	1200 N/mm ² / 375 HB	1.7225	42CrMo4	1.3505	100Cr6
	High-alloy steel and high-alloy tool steel	P.3.1		Annealed	680 N/mm ² / 200 HB	1.4021	X20Cr13	1.4034	X46Cr13
		P.3.2		Hardened and tempered	1100 N/mm ² / 300 HB	1.2343	X38CrMoV5-1	1.4034	X46Cr13
		P.3.3		Hardened and tempered	1300 N/mm ² / 400 HB	1.2343	X38CrMoV5-1	1.4034	X46Cr13
	Stainless steel	P.4.1	Ferritic / martensitic	Annealed	680 N/mm ² / 200 HB	1.4016	X6Cr17	1.2316	X36CrMo16
		P.4.2	Martensitic	Tempered	1010 N/mm ² / 300 HB	1.4112	X90CrMoV18	1.2316	X36CrMo16
M	Stainless steel	M.1.1	Austenitic / austenitic-ferritic	Quenched	610 N/mm ² / 180 HB	1.4301	X5CrNi18-10	1.4571	X6CrNiMoTi17-12-2
		M.2.1	Austenitic	Tempered	300 HB	1.4841	X15CrNiSi25-21	1.4539	X1NiCrMoCu25-20-5
		M.3.1	Austenitic / ferritic (Duplex)		780 N/mm ² / 230 HB	1.4462	X2CrNiMoN22-5-3	1.4501	X2CrNiMoCuWN25-7-4
K	Grey cast iron	K.1.1	Pearlitic / ferritic		350 N/mm ² / 180 HB	0.6010	GG-10	0.6025	GG-25
		K.1.2	Pearlitic (martensitic)		500 N/mm ² / 260 HB	0.6030	GG-30	0.6045	GG-45
	Spherulitic graphite cast iron	K.2.1	Ferritic		540 N/mm ² / 160 HB	0.7040	GGG-40	0.7060	GGG-60
		K.2.2	Pearlitic		845 N/mm ² / 250 HB	0.7070	GGG-70	0.7080	GGG-80
	Malleable iron	K.3.1	Ferritic		440 N/mm ² / 130 HB	0.8035	GTW-35-04	0.8045	GTW-45
		K.3.2	Pearlitic		780 N/mm ² / 230 HB	0.8165	GTS-65-02	0.8170	GTS-70-02
N	Aluminium wrought alloy	N.1.1	Non-hardenable		60 HB	3.0255	Al99,5	3.3315	AlMg1
		N.1.2	Hardenable	Age-hardened	340 N/mm ² / 100 HB	3.1355	AlCuMg2	3.2315	AlMgSi1
	Cast aluminium alloy	N.2.1	≤ 12 % Si, non-hardenable		250 N/mm ² / 75 HB	3.2581	G-AlSi12	3.2163	G-AlSi9Cu3
		N.2.2	≤ 12 % Si, hardenable	Age-hardened	300 N/mm ² / 90 HB	3.2134	G-AlSi5Cu1Mg	3.2373	G-AlSi9Mg
		N.2.3	> 12 % Si, non-hardenable		440 N/mm ² / 130 HB		G-AlSi17Cu4Mg		G-AlSi18CuNiMg
	Copper and copper alloys (bronze/brass)	N.3.1	Free-machining alloys, PB > 1 %		375 N/mm ² / 110 HB	2.0380	CuZn39Pb2 (Ms58)	2.0410	CuZn44Pb2
		N.3.2	CuZn, CuSnZn		300 N/mm ² / 90 HB	2.0331	CuZn15	2.4070	CuZn28Sn1As
		N.3.3	CuSn, lead-free copper and electrolytic copper		340 N/mm ² / 100 HB	2.0060	E-Cu57	2.0590	CuZn40Fe
	Magnesium alloys	N.4.1	Magnesium and magnesium alloys		70 HB	3.5612	MgAl6Zn	3.5312	MgAl3Zn
S	Heat-resistant alloys	S.1.1	Fe - basis	Annealed	680 N/mm ² / 200 HB	1.4864	X12NiCrSi 36-16	1.4865	G-X40NiCrSi38-18
		S.1.2		Age-hardened	950 N/mm ² / 280 HB	1.4980	X6NiCrTiMoVB25-15-2	1.4876	X10NiCrAlTi32-20
		S.2.1	Ni or Co basis	Annealed	840 N/mm ² / 250 HB	2.4631	NiCr20TiAl (Nimonic80A)	3.4856	NiCr22Mo9Nb
		S.2.2		Age-hardened	1180 N/mm ² / 350 HB	2.4668	NiCr19Nb5Mo3 (Inconel 718)	2.4955	NiFe25Cr20NbTi
		S.2.3		Cast	1080 N/mm ² / 320 HB	2.4765	CoCr20W15Ni	1.3401	G-X120Mn12
	Titanium alloys	S.3.1	Pure titanium		400 N/mm ²	3.7025	Ti99,8	3.7034	Ti99,7
		S.3.2	Alpha + beta alloys	Age-hardened	1050 N/mm ² / 320 HB	3.7165	TiAl6V4	Ti-6246	Ti-6Al-2Sn-4Zr-6Mo
		S.3.3	Beta alloys		1400 N/mm ² / 410 HB	Ti555.3	Ti-5Al-5V-5Mo-3Cr	R56410	Ti-10V-2Fe-3Al
H	Hardened steel	H.1.1		Hardened and tempered	46-55 HRC				
		H.1.2		Hardened and tempered	56-60 HRC				
		H.1.3		Hardened and tempered	61-65 HRC				
		H.1.4		Hardened and tempered	66-70 HRC				
	Chilled iron	H.2.1		Cast	400 HB				
	Hardened cast iron	H.3.1		Hardened and tempered	55 HRC				
O	Non-metal materials	O.1.1	Plastics, duroplastic		≤ 150 N/mm ²				
		O.1.2	Plastics, thermoplastic		≤ 100 N/mm ²				
		O.2.1	Aramid fibre-reinforced		≤ 1000 N/mm ²				
		O.2.2	Glass/carbon-fibre reinforced		≤ 1000 N/mm ²				
		O.3.1	Graphite						

* Tensile strength

Cutting data standard values for SOGX indexable inserts – topography -13 / -32

Index	KUB Pentron + KUB Pentron CS														
	ABS / PSC / C														
	-13 / -32 BK8425	Ø 14-15,5 mm	Ø 16-17,5 mm	Ø 18-19,5 mm	Ø 20-21,5 mm	Ø 22-23,5 mm	Ø 24-25,5 mm	Ø 26-27,5 mm	Ø 28-30 mm	Ø 31-33 mm	Ø 34-37 mm	Ø 38-42 mm	Ø 43-46 mm	Ø 46-52 mm	Ø 53-65 mm
	v_c m/min	f in mm/rev.													
P.1.1	260	0,08	0,08	0,09	0,10	0,10	0,10	0,10	0,10	0,10	0,10	0,10	0,10	0,10	0,10
P.1.2	260	0,10	0,13	0,13	0,15	0,16	0,15	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18
P.1.3	270	0,08	0,12	0,12	0,13	0,13	0,13	0,13	0,13	0,13	0,13	0,13	0,13	0,16	0,16
P.1.4	250	0,08	0,11	0,11	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,14	0,14
P.1.5	270	0,09	0,12	0,12	0,14	0,14	0,14	0,16	0,16	0,16	0,16	0,16	0,16	0,16	0,16
P.2.1	270	0,08	0,12	0,12	0,13	0,13	0,13	0,13	0,13	0,13	0,13	0,13	0,13	0,16	0,16
P.2.2	260	0,08	0,11	0,11	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,14	0,14
P.2.3	180	0,12	0,14	0,16	0,16	0,16	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18
P.2.4	150	0,10	0,11	0,13	0,13	0,13	0,14	0,14	0,14	0,14	0,14	0,14	0,14	0,14	0,14
P.3.1	160	0,08	0,12	0,12	0,16	0,16	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18
P.3.2	130	0,07	0,10	0,10	0,13	0,13	0,14	0,14	0,14	0,14	0,14	0,14	0,14	0,14	0,14
P.3.3	120	0,06	0,08	0,08	0,11	0,11	0,13	0,13	0,13	0,13	0,13	0,13	0,13	0,13	0,13
P.4.1	180	0,09	0,13	0,13	0,18	0,18	0,20	0,20	0,20	0,20	0,20	0,20	0,20	0,20	0,20
P.4.2	130	0,07	0,10	0,10	0,13	0,13	0,14	0,14	0,14	0,14	0,14	0,14	0,14	0,14	0,14
M.1.1	150	0,10	0,10	0,12	0,14	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,16	0,16
M.2.1	150	0,10	0,08	0,08	0,11	0,11	0,14	0,14	0,14	0,14	0,14	0,14	0,14	0,14	0,14
M.3.1	140	0,09	0,07	0,07	0,10	0,10	0,13	0,13	0,13	0,13	0,13	0,13	0,13	0,13	0,13
K.1.1	160	0,12	0,15	0,15	0,18	0,18	0,22	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25
K.1.2	120	0,09	0,11	0,11	0,14	0,14	0,17	0,19	0,19	0,19	0,19	0,19	0,19	0,19	0,19
K.2.1	160	0,12	0,15	0,15	0,18	0,18	0,22	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25
K.2.2	100	0,10	0,12	0,12	0,14	0,14	0,18	0,20	0,20	0,20	0,20	0,20	0,20	0,20	0,20
K.3.1	120	0,12	0,15	0,15	0,18	0,18	0,22	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25
K.3.2	100	0,10	0,12	0,12	0,14	0,14	0,18	0,20	0,20	0,20	0,20	0,20	0,20	0,20	0,20
N.1.1	400	0,10	0,11	0,11	0,11	0,13	0,13	0,13	0,13	0,13	0,13	0,13	0,13	0,14	0,14
N.1.2	400	0,10	0,11	0,11	0,11	0,13	0,13	0,13	0,13	0,13	0,13	0,13	0,13	0,14	0,14
N.2.1	250	0,10	0,13	0,13	0,13	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,18	0,18
N.2.2	250	0,10	0,13	0,13	0,13	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,18	0,18
N.2.3	230	0,09	0,12	0,12	0,12	0,14	0,14	0,14	0,14	0,14	0,14	0,14	0,14	0,16	0,16
N.3.1	200	0,10	0,12	0,13	0,13	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,16	0,16
N.3.2	220	0,11	0,13	0,14	0,14	0,17	0,17	0,17	0,17	0,17	0,17	0,17	0,17	0,18	0,18
N.3.3	330	0,11	0,12	0,12	0,14	0,14	0,14	0,14	0,14	0,14	0,14	0,14	0,14	0,18	0,18
N.4.1	200	0,10	0,12	0,13	0,13	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,16	0,16
S.1.1	60	0,03	0,03	0,03	0,03	0,04	0,06	0,06	0,06	0,06	0,06	0,06	0,06	0,06	0,06
S.1.2	50	0,03	0,03	0,03	0,03	0,04	0,04	0,06	0,06	0,06	0,06	0,06	0,06	0,06	0,06
S.2.1	60	0,03	0,03	0,03	0,03	0,04	0,06	0,06	0,06	0,06	0,06	0,06	0,06	0,06	0,06
S.2.2	50	0,03	0,03	0,03	0,03	0,04	0,04	0,06	0,06	0,06	0,06	0,06	0,06	0,06	0,06
S.2.3	30	0,02	0,02	0,02	0,02	0,03	0,03	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,04
S.3.1	100	0,05	0,05	0,05	0,05	0,06	0,08	0,10	0,10	0,10	0,10	0,10	0,10	0,10	0,10
S.3.2	80	0,04	0,04	0,04	0,04	0,05	0,07	0,09	0,09	0,09	0,09	0,09	0,09	0,09	0,09
S.3.3	50	0,03	0,03	0,03	0,03	0,04	0,04	0,06	0,06	0,06	0,06	0,06	0,06	0,06	0,06
H.1.1	100	0,05	0,05	0,05	0,05	0,06	0,06	0,06	0,06	0,06	0,06	0,06	0,06	0,06	0,06
H.1.2	80	0,03	0,03	0,03	0,03	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,04
H.1.3	50	0,03	0,03	0,03	0,03	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,04
H.1.4															
H.2.1	100	0,04	0,04	0,04	0,04	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
H.3.1	80	0,03	0,03	0,03	0,03	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,04
O.1.1															
O.1.2															
O.2.1															
O.2.2															
O.3.1															



During the drilling operation on through holes a sharp disk will be produced. Safety precautions must be observed. A safety guard has to be provided as protection.

Cutting data standard values for SOGX indexable inserts – topography -34

Index	KUB Pentron + KUB Pentron CS														
	ABS / PSC / C														
	-34 BK8425	Ø 14-15,5 mm	Ø 16-17,5 mm	Ø 18-19,5 mm	Ø 20-21,5 mm	Ø 22-23,5 mm	Ø 24-25,5 mm	Ø 26-27,5 mm	Ø 28-30 mm	Ø 31-33 mm	Ø 34-37 mm	Ø 38-42 mm	Ø 43-46 mm	Ø 46-52 mm	Ø 53-65 mm
	v_c m/min	f in mm/rev.													
P.1.1															
P.1.2	260	0,17	0,20	0,20	0,23	0,23	0,23	0,27	0,27	0,27	0,27	0,27	0,27	0,23	0,27
P.1.3															
P.1.4															
P.1.5	270	0,17	0,20	0,20	0,23	0,23	0,23	0,27	0,27	0,27	0,27	0,27	0,27	0,23	0,27
P.2.1															
P.2.2															
P.2.3	180	0,18	0,21	0,24	0,24	0,24	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27
P.2.4	150	0,17	0,2	0,23	0,23	0,23	0,26	0,26	0,26	0,26	0,26	0,26	0,26	0,26	0,26
P.3.1	160	0,12	0,18	0,18	0,24	0,24	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27
P.3.2	130	0,11	0,17	0,17	0,23	0,23	0,26	0,26	0,26	0,26	0,26	0,26	0,26	0,26	0,26
P.3.3	120	0,11	0,17	0,17	0,23	0,23	0,26	0,26	0,26	0,26	0,26	0,26	0,26	0,26	0,26
P.4.1															
P.4.2															
M.1.1															
M.2.1															
M.3.1															
K.1.1	160	0,18	0,23	0,23	0,27	0,27	0,33	0,38	0,38	0,38	0,38	0,38	0,38	0,33	0,38
K.1.2	120	0,14	0,18	0,18	0,22	0,22	0,26	0,30	0,30	0,30	0,30	0,30	0,30	0,26	0,30
K.2.1	160	0,18	0,23	0,23	0,27	0,27	0,33	0,38	0,38	0,38	0,38	0,38	0,38	0,33	0,38
K.2.2	100	0,14	0,18	0,18	0,22	0,22	0,26	0,30	0,30	0,30	0,30	0,30	0,30	0,26	0,30
K.3.1	120	0,18	0,23	0,23	0,27	0,27	0,33	0,38	0,38	0,38	0,38	0,38	0,38	0,33	0,38
K.3.2	100	0,14	0,18	0,18	0,22	0,22	0,26	0,30	0,30	0,30	0,30	0,30	0,30	0,26	0,30
N.1.1															
N.1.2															
N.2.1															
N.2.2															
N.2.3															
N.3.1															
N.3.2															
N.3.3															
N.4.1															
S.1.1															
S.1.2															
S.2.1															
S.2.2															
S.2.3															
S.3.1															
S.3.2															
S.3.3															
H.1.1															
H.1.2															
H.1.3															
H.1.4															
H.2.1															
H.3.1															
O.1.1															
O.1.2															
O.2.1															
O.2.2															
O.3.1															

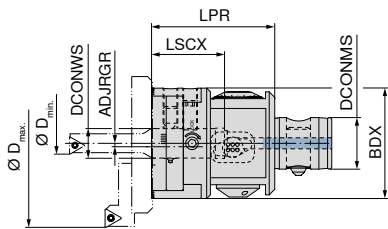


In order to ensure efficient chip evacuation, coolant pressure must be at least 5 bar. Optimum pressure is > 15 bar.

MicroKom – hi.flex – precision adjustment head

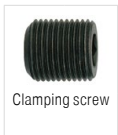
- ▲ for MicroKom boring bars with Ø 16 mm or ABS 32, MicroKom bridges, and serrated body
- ▲ with thro' coolant supply
- ▲ LSCX = Recess depth of boring bar

ABS

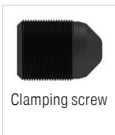


NEW
Digital
62 800 ...
16197

D _{min} - D _{max} mm	KOMET no.	Adapter	DCONWS mm	DCONMS mm	BDX mm	LPR mm	LSCX mm	ADJRGR mm
5,6 - 365	M04 10040	ABS 50	16	28	60	67	39,7	10,5



Clamping screw



Clamping screw



Clamping screw

Spare parts

62 800 16197	M8x8/SW4	14700	M8x1x12/SW4	13989	M8x1x20/SW4	13700
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1 Suitable ABS adapters can be found in → **Catalogue – Clamping technology, Chapter 16, Adaptors and Accessories.**

SpinTools – Digital Stick

- ▲ suitable for all SpinTools digital heads as well as for hi.flex Digital
- ▲ revised software for even more precise adjustment

Scope of supply:
incl. AAA Battery

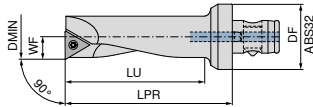


NEW
62 309 ...
00100

MicroKom – Boring bar

▲ With internal coolant supply

ABS



NEW

62 857 ...

DMIN mm	KOMET no.	WF mm	DF mm	LU mm	LPR mm	Insert	
7,9	B00 25610	3,95	32	28	42	TO.X 06T1..	07989
8,9	B00 25700	4,45	32	34	48	TO.X 06T1..	21989
9,9	B00 25620	4,95	32	34	48	TO.X 06T1..	08989
10,9	B00 25710	5,45	32	43	57	TO.X 0902..	23989
11,9	B00 25630	5,95	32	43	57	TO.X 0902..	09989
13,9	B00 25640	6,95	32	50	64	TO.X 0902..	10989
15,9	B00 25650	7,95	32	58	72	TO.X 0902..	11989
17,9	B00 25661	8,95	32	59	72	TO.X 0902..	13989
19,9	B00 25671	9,90	32	70	82	TO.X 0902..	15989
21,9	B00 25681	10,90	32	70	82	TO.X 0902..	17989
23,9	B00 25691	11,90	32	70	82	TO.X 0902..	19989



TORX® Screws

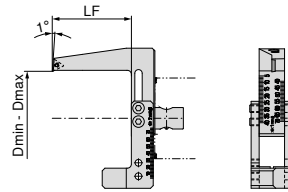
62 950 ...

Spare parts

Insert

TO.X 06T1..	12800
TO.X 0902..	12000

MicroKom – Spindle tool



NEW

62 866 ...

D _{min} - D _{max} mm	KOMET no.	LF mm	Insert
5 - 70	M05 90300	58	TO.X 0902..

07000



Cylindrical screw



TORX® Screws

62 950 ...

62 950 ...

Spare parts

Insert

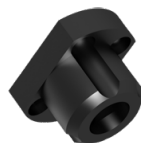
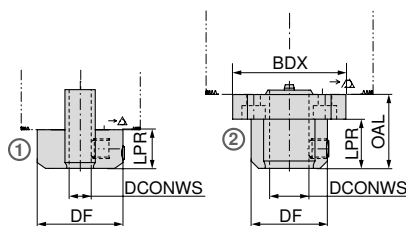
TO.X 0902..	26800	12000
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Suitable indexable inserts can be found in the main catalogue → **Chapter 05 Spindle tooling, pages 58–61.**

MicroKom – Adapter

▲ for 62 852 ..., 62 853 ..., 62 856 ... (essential for using the boring bar)



NEW

62 851 ...

DCONWS mm	KOMET no.	OAL mm	BDX mm	DF mm	LPR mm	Fig.	
6	M05 90200			31	16	1	00600
8	M05 90210			31	16	1	00800
10	M05 90220	25	46	31	15	2	01000
12	M05 90230	25	46	31	15	2	01200
16	M05 90240	30	46	31	20	2	01600



Cylindrical screw



Clamping screw

62 950 ...

62 950 ...

Spare parts

DCONWS

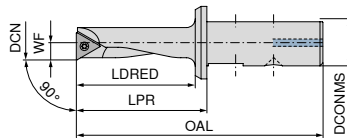
6 - 8	44800
10 - 12	44800
16	14700



Boring bars used in this adapter can be found on the following catalogue pages.

MicroKom – Boring bar

- ▲ can only be used with adapter 62 851 ...
- ▲ with internal coolant supply



NEW

62 856 ...

DCN mm	KOMET no.	OAL mm	LPR mm	DCONMS mm	WF mm	LDRED mm	Insert	
5,6	B00 37010	48	26	8	2,75	22	WOHX 02T0..	05600
6,5	B00 37020	52	30	8	3,20	26	WOHX 02T0..	06500
8,0	B00 15510	57	35	8	3,95	28	TO.X 06T1..	08000
8,0	B00 15610	75	35	16	3,95	30	TO.X 06T1..	08800
10,0	B00 15620	80	40	16	4,95	35	TO.X 0902..	01000
11,0	B00 15710	85	45	16	5,45	40	TO.X 0902..	01100
12,0	B00 15530	67	45	16	5,95	38	TO.X 0902..	11200
12,0	B00 15630	85	45	16	5,95	40	TO.X 0902..	01200
14,0	B00 15640	90	50	16	6,95	45	TO.X 0902..	01400
16,0	B00 15650	95	55	16	7,95	50	TO.X 0902..	01600
18,0	B00 15661	100	60	16	8,95	55	TO.X 0902..	01800
19,0	B00 15751	105	65	16	9,45	60	TO.X 0902..	01900
20,0	B00 15671	105	65	16	9,90	60	TO.X 0902..	02000
22,0	B00 15681	105	65	16	10,90	60	TO.X 0902..	02200
24,0	B00 15691	105	65	16	11,90	60	TO.X 0902..	02400



TORX® Screws

62 950 ...

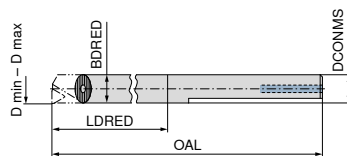
Spare parts

DCN

5,6-6,5	11800
8-10	12800
11-24	12000

MicroKom – Carbide boring shank

- ▲ for boring head 62 854 ...
- ▲ can only be used with adapter 62 851 ...
- ▲ with internal coolant supply



NEW

62 853 ...

D _{min} - D _{max} mm	KOMET no.	OAL mm	BDRED mm	LDRED mm	DCONMS mm	
13 - 17	G10 12060	120	12	75	12	01300
17 - 22	G10 12070	140	16	100	16	01700
22 - 26	G10 12080	140	16	100	16	02200



Fixing screw

62 950 ...

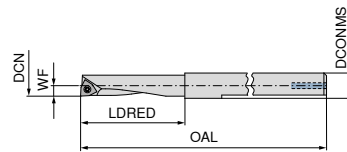
Spare parts

DCONMS

12	19700
16	19800

MicroKom – Boring bar, vibration-optimised

- ▲ can only be used with adapter 62 851 ...
- ▲ with internal coolant supply



NEW

62 852 ...

DCN mm	KOMET no.	OAL mm	LDRED mm	DCONMS mm	Insert	
5,6	B00 30280	65	22	6	WOHX 02T0..	10600
6,9	B00 30290	80	36	6	WOHX 02T0..	00600 ¹⁾
9,0	B00 00680	90	24	8	TO.X 06T1..	00800 ¹⁾
11,0	B00 00690	95	50	10	TO.X 06T1..	01000 ¹⁾

1) Carbide version



TORX® Screws

62 950 ...

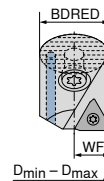
Spare parts

Insert

TO.X 06T1..	09700
WOHX 02T0..	11800

MicroKom – Boring head

- ▲ for boring shank 62 853 ...



NEW

62 854 ...

D _{min} - D _{max} mm	KOMET no.	WF mm	BDRED mm	Insert	
13 - 15	G10 12621	6,45	12	TO.X 0902..	01300
15 - 17	G10 12841	8,45	16	TO.X 0902..	01500
17 - 19	G10 12711	8,45	12	TO.X 0902..	01700
19 - 22	G10 12861	9,45	16	TO.X 0902..	01900
22 - 26	G10 12731	10,95	16	TO.X 0902..	02200



TORX® Screws

62 950 ...

Spare parts

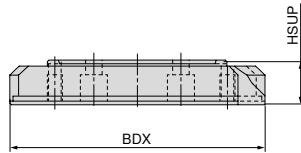
Insert

TO.X 0902..	12000
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Suitable indexable inserts can be found in the main catalogue
→ Chapter 05 Spindle tooling, pages 58–61.

MicroKom – Bridge for hi.flex, BluFlex 2



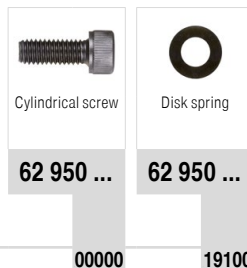
NEW

62 860 ...

D _{min} - D _{max} mm	KOMET no.	BDX mm	HSUP mm	WT kg	
90 - 125	M05 80101	85	12,00	0,147	12500
120 - 155	M05 80200	115	18,25	0,107	15500
150 - 185	M05 80300	145	20,25	0,152	18500
180 - 215	M05 80400	175	23,25	0,229	21500
210 - 245	M05 80500	205	25,00	0,309	24500
240 - 275	M05 80510	235	25,00	0,349	27500
270 - 305	M05 80520	265	25,00	0,394	30500
300 - 335	M05 80530	295	25,00	0,435	33500
330 - 365	M05 80540	325	25,00	0,478	36500



The associated filling piece (62 862 09300) and suitable insert holders (62 863 ...) can be found in the main catalogue on page 05/14



Cylindrical screw

Disk spring

62 950 ...

62 950 ...

Spare parts

BDX

85 - 325

00000

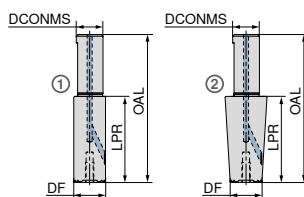
19100

MicroKom – Serrated body for hi.flex, BluFlex 2

▲ With internal coolant supply

Scope of supply:

without insert holder



NEW

62 861 ...

D _{min} - D _{max} mm	KOMET no.	DCONMS mm	OAL mm	LPR mm	DF mm	Fig.	
25 - 63	M05 90100	16	88,50	51,50	19	1	06300
25 - 63	M05 90110	16	129,12	92,12	24	2	16300



Suitable insert holders (62 863 ...) can be found in the main catalogue on page 05/14



Suitable indexable inserts can be found in the main catalogue → **Chapter 05 Spindle tooling, pages 58–61.**



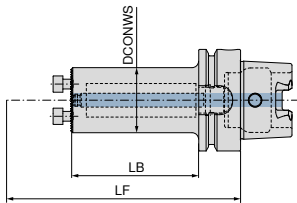
Other accessories for this spindle system can be found in the **main catalogue from page 05/12**

Base holders for the exchangeable head system – vibration-damped

▲ also available with Balluff chip on request

Scope of supply:

Includes clamping screws



NEW



right / left

84 195 ...

Adapter	LF mm	LB mm	DCONWS mm
HSK-T 63	150	89	25
HSK-T 63	185	124	32
HSK-T 63	225	159	40

02537
03237
04037



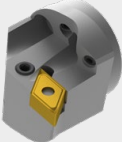
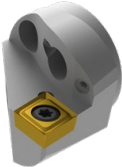
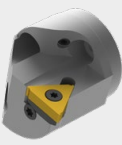
Clamping Screw

84 950 ...

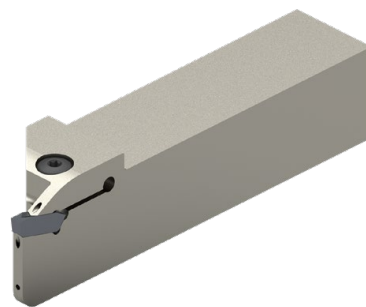
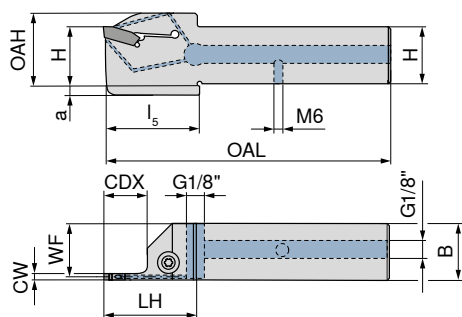
Spare parts
for Article no.

84 195 02537	M4X12 (SW3)	30000
84 195 03237	M4X12 (SW3)	30000
84 195 04037	M4X12 (SW3)	30000

Overview – exchangeable head system

Exchangeable heads		+		Basic holder
PCLN 95° CN.. 1204		Exchangeable head: main catalogue chapter 9 – Turning tools → Page 191		PSC 40 PSC 50 PSC 63
PDUN 93° DN.. 1104 DN.. 1506		Exchangeable head: main catalogue chapter 9 – Turning tools → Page 191		Main catalogue chapter 9 – Turning tools → Page 189
PDQN 107,5° DN.. 1104		Exchangeable head: main catalogue chapter 9 – Turning tools → Page 192		HSK-T 40 HSK-T 63 HSK-T 100
PWLN 95° WN.. 0804		Exchangeable head: main catalogue chapter 9 – Turning tools → Page 192		Main catalogue chapter 9 – Turning tools → Page 190
SCLC 95° CC.. 1204		Exchangeable head: main catalogue chapter 9 – Turning tools → Page 193		PSC 63 vibration-damped
SDUC 93° DC.. 11T3		Exchangeable head: main catalogue chapter 9 – Turning tools → Page 193		Main catalogue chapter 9 – Turning tools → Page 188
SDQC 107,5° DC.. 11T3		Exchangeable head: main catalogue chapter 9 – Turning tools → Page 194		HSK-T 63 vibration-damped
For internal thread 16..		Exchangeable head: main catalogue chapter 9 – Turning tools → Page 195		NEW
		Indexable inserts: main catalogue chapter 9 – Turning tools → Page 105-122		cylindrical
		Indexable inserts: main catalogue chapter 8 – Thread turning → Page 6-30		Main catalogue chapter 9 – Turning tools → Page 188

MonoClamp – Radial Monoholder GX-DC 16



Designation	H mm	B mm	CW mm	WF mm	OAH mm	OAL mm	LH mm	I _s mm	a mm	CDX mm	for grooving inserts	NEW Left-hand 70 842 ...		NEW Right-hand 70 842 ...	
E16 R/L 0013S2-1616X-S-DC-GX16	16	16	2	15,20	21	90	35	36	4	13	GX 16-1 E2..	21601		21600	
E16 R/L 0013S3-1616X-S-DC-GX16	16	16	3	14,85	21	90	35	36	4	13	GX 16-2 E3..	31601		31600	
E16 R/L 0013S4-1616X-S-DC-GX16	16	16	4	14,40	21	90	35	36	4	13	GX 16-3 E4..	41601		41600	
E16 R/L 0013S5-1616X-S-DC-GX16	16	16	5	14,00	21	90	35	36	4	13	GX 16-3 E5..	51601		51600	
E20 R/L 0013S2-2020X-S-DC-GX16	20	20	2	19,20	25	104	35			13	GX 16-1 E2..	22001		22000	
E20 R/L 0013S3-2020X-S-DC-GX16	20	20	3	18,85	25	104	35			13	GX 16-2 E3..	32001		32000	
E20 R/L 0013S4-2020X-S-DC-GX16	20	20	4	18,40	25	104	35			13	GX 16-3 E4..	42001		42000	
E20 R/L 0013S5-2020X-S-DC-GX16	20	20	5	18,00	25	104	35			13	GX 16-3 E5..	52001		52000	
E25 R/L 0013S3-2525X-S-DC-GX16	25	25	3	23,85	30	119	35			13	GX 16-2 E3..	32501		32500	
E25 R/L 0013S4-2525X-S-DC-GX16	25	25	4	23,40	30	119	35			13	GX 16-3 E4..	42501		42500	
E25 R/L 0013S5-2525X-S-DC-GX16	25	25	5	23,00	30	119	35			13	GX 16-3 E5..	52501		52500	



Key D



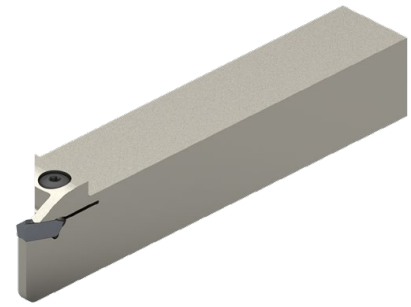
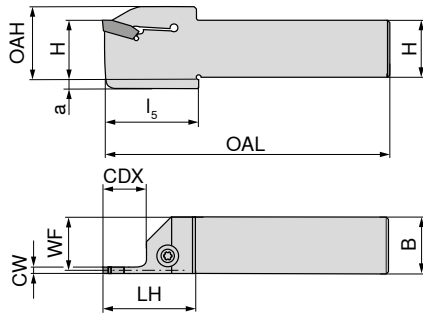
Clamping screw

Spare parts
for grooving inserts

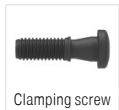
		80 950 ...		70 950 ...	
GX 16-1 E2..	T15 - IP	128	M5x18 - 15IP	865	
GX 16-2 E3..	T15 - IP	128	M5x18 - 15IP	865	
GX 16-3 E4..	T15 - IP	128	M5x18 - 15IP	865	
GX 16-3 E5..	T15 - IP	128	M5x18 - 15IP	865	

Suitable indexable inserts and cutting data can be found in the main catalogue **Chapter 11 – Grooving tools**

MonoClamp – Radial Monoholder GX 16



Designation	H mm	B mm	CW mm	WF mm	OAH mm	OAL mm	LH mm	l _s mm	a mm	CDX mm	for grooving inserts	NEW Left-hand 70 843 ...		NEW Right-hand 70 843 ...	
E12 R/L 0013S2-1212K-S-GX16	12	12	2	11,20	17	125	25	26	4	13	GX 16-1 E2..	21201		21200	
E12 R/L 0013S3-1212K-S-GX16	12	12	3	10,85	17	125	25	26	4	13	GX 16-2 E3..	31201		31200	
E16 R/L 0013S2-1616K-S-GX16	16	16	2	15,20	21	125	25	26	4	13	GX 16-1 E2..	21601		21600	
E16 R/L 0013S3-1616K-S-GX16	16	16	3	14,85	21	125	25	26	4	13	GX 16-2 E3..	31601		31600	
E16 R/L 0013S4-1616K-S-GX16	16	16	4	14,40	21	125	25	26	4	13	GX 16-3 E4..	41601		41600	
E16 R/L 0013S5-1616K-S-GX16	16	16	5	14,00	21	125	25	26	4	13	GX 16-3 E5..	51601		51600	
E20 R/L 0013S2-2020K-S-GX16	20	20	2	19,20	25	125	25			13	GX 16-1 E2..	22001		22000	
E20 R/L 0013S3-2020K-S-GX16	20	20	3	18,85	25	125	25			13	GX 16-2 E3..	32001		32000	
E20 R/L 0013S4-2020K-S-GX16	20	20	4	18,40	25	125	25			13	GX 16-3 E4..	42001		42000	
E20 R/L 0013S5-2020K-S-GX16	20	20	5	18,00	25	125	25			13	GX 16-3 E5..	52001		52000	
E25 R/L 0013S3-2525M-S-GX16	25	25	3	23,85	30	150	25			13	GX 16-2 E3..	32501		32500	
E25 R/L 0013S4-2525M-S-GX16	25	25	4	23,40	30	150	25			13	GX 16-3 E4..	42501		42500	
E25 R/L 0013S5-2525M-S-GX16	25	25	5	23,00	30	150	25			13	GX 16-3 E5..	52501		52500	

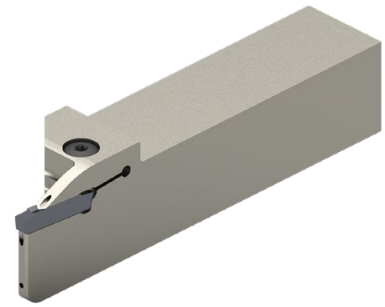
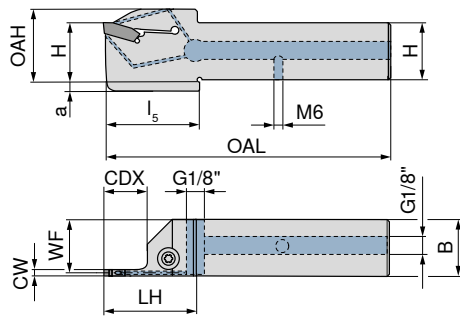
Spare parts
for grooving inserts

		80 950 ...		70 950 ...	
GX 16-1 E2..	T15 - IP	128	M5x18 - 15IP	865	
GX 16-2 E3..	T15 - IP	128	M5x18 - 15IP	865	
GX 16-3 E4..	T15 - IP	128	M5x18 - 15IP	865	
GX 16-3 E5..	T15 - IP	128	M5x18 - 15IP	865	



Suitable indexable inserts and cutting data can be found in the main catalogue **Chapter 11 – Grooving tools**

MonoClamp – Radial Monoholder GX-DC 24



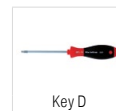
Designation	H mm	B mm	CW mm	WF mm	OAH mm	OAL mm	LH mm	I _s mm	a mm	CDX mm	for grooving inserts	NEW Left-hand 70 844 ...		NEW Right-hand 70 844 ...	
E16 R/L 0021S2-1616X-S-DC-GX24	16	16	2	15,2	22	94	39	40	4	21	GX 24-1 E2..		21601		21600
E16 R/L 0021S3-1616X-S-DC-GX24	16	16	3	14,8	22	94	39	40	4	21	GX 24-2 E3..		31601		31600
E20 R/L 0021S2-2020X-S-DC-GX24	20	20	2	19,2	26	109	40			21	GX 24-1 E2..		22001		22000
E20 R/L 0021S3-2020X-S-DC-GX24	20	20	3	18,8	26	109	40			21	GX 24-2 E3..		32001		32000
E20 R/L 0021S4-2020X-S-DC-GX24	20	20	4	18,3	26	109	40			21	GX 24-3 E4..		42001		42000
E20 R/L 0021S5-2020X-S-DC-GX24	20	20	5	18,0	26	109	40			21	GX 24-3 E5..		52001		52000
E25 R/L 0021S3-2525X-S-DC-GX24	25	25	3	23,8	31	124	40			21	GX 24-2 E3..		32501		32500
E25 R/L 0021S4-2525X-S-DC-GX24	25	25	4	23,3	31	124	40			21	GX 24-3 E4..		42501		42500
E25 R/L 0021S5-2525X-S-DC-GX24	25	25	5	23,0	31	124	40			21	GX 24-3 E5..		52501		52500
E25 R/L 0021S6-2525X-S-DC-GX24	25	25	6	22,5	31	124	40			21	GX 24-4 E6..		62501		62500

Spare parts for grooving inserts

GX 24-1 E2..	T15 - IP	128	M5x18 - 15IP	865
GX 24-2 E3..	T15 - IP	128	M5x18 - 15IP	865
GX 24-3 E4..	T15 - IP	128	M5x18 - 15IP	865
GX 24-3 E5..	T15 - IP	128	M5x18 - 15IP	865
GX 24-4 E6..	T15 - IP	128	M5x18 - 15IP	865



Suitable indexable inserts and cutting data can be found in the main catalogue **Chapter 11 – Grooving tools**



Key D

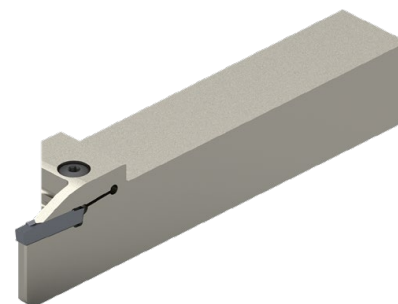
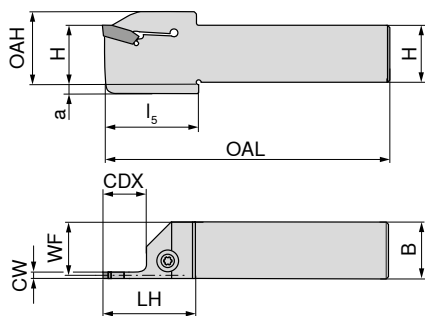


Clamping screw

80 950 ...

70 950 ...

MonoClamp – Radial Monoholder GX 24



Designation	H mm	B mm	CW mm	WF mm	OAH mm	OAL mm	LH mm	l _s mm	a mm	CDX mm	for grooving inserts	NEW Left-hand 70 845 ...		NEW Right-hand 70 845 ...	
E16 R/L 0021S2-1616K-S-GX24	16	16	2	15,2	22	125	39	40	4	21	GX 24-1 E2..	21601		21600	
E16 R/L 0021S3-1616K-S-GX24	16	16	3	14,8	22	125	39	40	4	21	GX 24-2 E3..	31601		31600	
E20 R/L 0021S2-2020K-S-GX24	20	20	2	19,2	26	125	40			21	GX 24-1 E2..	22001		22000	
E20 R/L 0021S3-2020K-S-GX24	20	20	3	18,8	26	125	40			21	GX 24-2 E3..	32001		32000	
E20 R/L 0021S4-2020K-S-GX24	20	20	4	18,3	26	125	40			21	GX 24-3 E4..	42001		42000	
E20 R/L 0021S5-2020K-S-GX24	20	20	5	18,0	26	125	40			21	GX 24-3 E5..	52001		52000	
E25 R/L 0021S3-2525M-S-GX24	25	25	3	23,8	31	150	40			21	GX 24-2 E3..	32501		32500	
E25 R/L 0021S4-2525M-S-GX24	25	25	4	23,3	31	150	40			21	GX 24-3 E4..	42501		42500	
E25 R/L 0021S5-2525M-S-GX24	25	25	5	23,0	31	150	40			21	GX 24-3 E5..	52501		52500	
E25 R/L 0021S6-2525M-S-GX24	25	25	6	22,5	31	150	40			21	GX 24-4 E6..	62501		62500	

Spare parts
for grooving inserts

			80 950 ...		70 950 ...	
GX 24-1 E2..	T15 - IP	128	M5x18 - 15IP	865		
GX 24-2 E3..	T15 - IP	128	M5x18 - 15IP	865		
GX 24-3 E4..	T15 - IP	128	M5x18 - 15IP	865		
GX 24-3 E5..	T15 - IP	128	M5x18 - 15IP	865		
GX 24-4 E6..	T15 - IP	128	M5x18 - 15IP	865		

Suitable indexable inserts and cutting data can be found in the main catalogue **Chapter 11 – Grooving tools**

Coding example

GX mono holder (old)

E	25	R	00	21		2525	M			GX24-3
---	----	---	----	----	--	------	---	--	--	--------

GX mono holder (new)

E	25	R	00	21	NEW S4	2525	M	NEW S		GX24
---	----	---	----	----	------------------	------	---	-----------------	--	------

GX mono holder (new with DC)

E	25	R	00	21	NEW S4	2525	X	NEW S	NEW DC	GX24
Application E = external I = internal	Size (25 mm)	Holder version R=Right Handed L=Left Handed	Approach angle 0°	Groove depth (21 mm)	Groove width (S4)	Shank type 25x25mm	Shank length L = sh. ISO X = special length	Insert clamping S = Screw	Cooling system DC = DirectCooling	Grooving system/ width

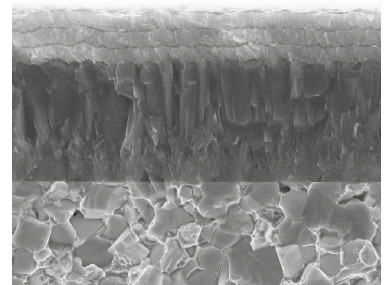
DRAGONSKIN

The coatings for
the highest performance



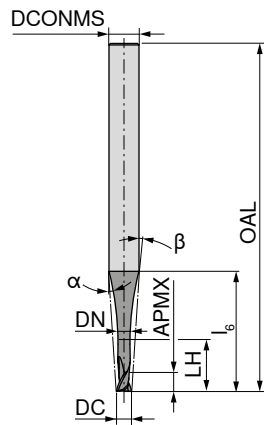
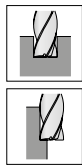
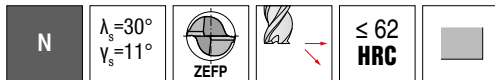
Machining without compromise

The product category Dragonskin is intended to help make tools easily recognizable and quick to find using CERATIZIT's high-performance coating technology. All products that are marked with the Dragonskin icon represent unmatched performance, maximum tool life and maximum process reliability.



Dragonskin Coating

Micro-end milling cutter

▲ T_x = maximum engagement depth

DPA72S

DRAGONSKIN



Factory standard

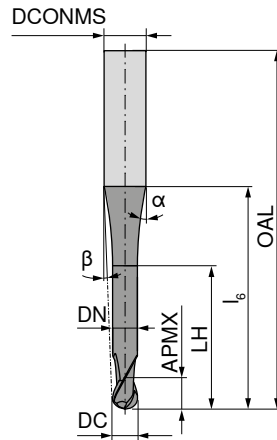
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52 802 ...

DC mm	APMX mm	DN mm	LH mm	l ₆ mm	OAL mm	α°	β°	DCONMS mm	^{ns}	T_x	ZEFP	
0,3	0,18	0,24	0,66	5,8	38	16,5	14	3		2,2 x DC	2	03100
0,3	0,30	0,24	1,50	6,9	38	16	11,5	3		5 x DC	2	03300
0,3	0,30	0,24	3,00	9,7	38	13,5	8,5	3		10 x DC	2	03500
0,4	0,24	0,32	0,88	5,8	38	16,5	13,5	3		2,2 x DC	2	04100
0,4	0,40	0,32	2,00	7,4	38	15,5	10,5	3		5 x DC	2	04300
0,4	0,40	0,32	4,00	10,2	38	14	8	3		10 x DC	2	04500
0,6	0,36	0,48	1,32	5,9	38	16,5	12	3		2,2 x DC	2	06100
0,6	0,60	0,48	3,00	8,3	38	15	9	3		5 x DC	2	06300
0,6	0,60	0,48	6,00	11,6	38	14	6,5	3		10 x DC	2	06500
0,7	0,42	0,56	1,54	5,9	38	16,5	11,5	3		2,2 x DC	2	07100
0,7	0,70	0,56	3,50	8,8	38	14,5	8	3		5 x DC	2	07300
0,7	0,70	0,56	7,00	12,5	38	14	6	3		10 x DC	2	07500
0,9	0,54	0,72	1,98	5,9	38	17	10,5	3		2,2 x DC	2	09100
0,9	0,90	0,72	4,50	9,5	38	14	7	3		5 x DC	2	09300
0,9	0,90	0,72	9,00	14,4	38	13	5	3		10 x DC	2	09500
1,1	0,66	0,88	2,42	6,0	38	17	9,5	3		2,2 x DC	2	11100
1,1	1,10	0,88	5,50	10,0	43	14	6	3		5 x DC	2	11300
1,1	1,10	0,88	11,00	15,9	43	13	4	3		10 x DC	2	11500
1,2	0,72	0,96	2,64	6,0	38	17	9	3		2,2 x DC	2	12100
1,2	1,20	0,96	6,00	10,5	43	13,5	5,5	3		5 x DC	2	12300
1,2	1,20	0,96	12,00	16,5	43	13,5	4	3		10 x DC	2	12500
1,3	0,78	1,04	2,86	6,0	38	17	8,5	3		2,2 x DC	2	13100
1,3	1,30	1,04	6,50	11,0	43	12,5	5	3		5 x DC	2	13300
1,3	1,30	1,04	13,00	17,1	43	14	3,5	3		10 x DC	2	13500
1,4	0,84	1,12	3,08	6,1	38	17	8	3		2,2 x DC	2	14100
1,4	1,40	1,12	7,00	11,5	43	12	4,5	3		5 x DC	2	14300
1,4	1,40	1,12	14,00	17,6	43	15	3,5	3		10 x DC	2	14500
1,6	0,96	1,28	3,52	6,2	38	16,5	7	3		2,2 x DC	2	16100
1,6	1,60	1,28	8,00	12,0	43	12	4	3		5 x DC	2	16300
1,6	1,60	1,28	16,00	18,7	43	17	3	3		10 x DC	2	16500
1,7	1,02	1,36	3,74	6,2	38	17	6,5	3		2,2 x DC	2	17100
1,7	1,70	1,36	8,50	12,5	43	11	3,5	3		5 x DC	2	17300
1,7	1,70	1,36	17,00	19,3	43	18,5	2,5	3		10 x DC	2	17500
1,9	1,14	1,52	4,18	6,2	38	17,5	5,5	3		2,2 x DC	2	19100
1,9	1,90	1,52	9,50	13,2	43	10	3	3		5 x DC	2	19300
1,9	1,90	1,52	19,00	20,5	43	23,5	2,5	3		10 x DC	2	19500

P	●
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Micro-ball nosed cutter

▲ T_x = maximum engagement depth

DPA72S

DRAGONSKIN



Factory standard

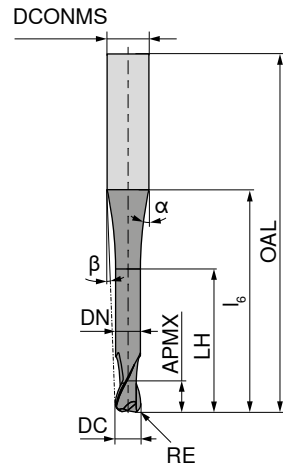
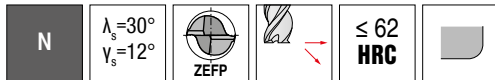
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52 804 ...

DC _{±0,01} mm	APMX mm	DN mm	LH mm	l ₆ mm	OAL mm	α°	β°	DCONMS _{n5} mm	T _x	ZEFP	
0,3	0,18	0,24	0,66	5,8	38	16,5	14	3	2,2 x DC	2	03100
0,3	0,30	0,24	1,50	6,9	38	16	11,5	3	5 x DC	2	03400
0,3	0,30	0,24	3,00	9,7	38	13,5	8,5	3	10 x DC	2	03700
0,4	0,24	0,32	0,88	5,8	38	16,5	13	3	2,2 x DC	2	04100
0,4	0,40	0,32	2,00	7,4	38	15,5	10,5	3	5 x DC	2	04400
0,4	0,40	0,32	4,00	10,2	38	14	8	3	10 x DC	2	04700
0,6	0,36	0,48	1,32	5,9	38	16,5	12	3	2,2 x DC	2	06100
0,6	0,60	0,48	3,00	8,3	38	15	9	3	5 x DC	2	06400
0,6	0,60	0,48	6,00	10,6	38	17	7	3	10 x DC	2	06700
0,7	0,42	0,56	1,54	5,9	38	16,5	11,5	3	2,2 x DC	2	07100
0,7	0,70	0,56	3,50	8,8	38	14	8	3	5 x DC	2	07400
0,7	0,70	0,56	7,00	10,6	38	20,5	7	3	10 x DC	2	07700
0,9	0,54	0,72	1,98	5,9	38	17	10,5	3	2,2 x DC	2	09100
0,9	0,90	0,72	4,50	9,5	38	14	7	3	5 x DC	2	09400
0,9	0,90	0,72	9,00	10,5	38	39,5	6,5	3	10 x DC	2	09700
1,1	0,66	0,88	2,42	7,9	43	16,5	11	4	2,2 x DC	2	11100
1,1	1,10	0,88	5,50	12,0	43	14,5	7,5	4	5 x DC	2	11400
1,1	1,10	0,88	11,00	18,3	43	13,5	5,5	4	10 x DC	2	11700
1,3	0,78	1,04	2,86	8,0	43	16,5	10,5	4	2,2 x DC	2	13100
1,3	1,30	1,04	6,50	12,8	43	14	6,5	4	5 x DC	2	13400
1,3	1,30	1,04	13,00	18,2	43	17	5	4	10 x DC	2	13700
1,4	0,84	1,12	3,08	8,0	43	16,5	10	4	2,2 x DC	2	14100
1,4	1,40	1,12	7,00	13,2	43	14	6,5	4	5 x DC	2	14400
1,4	1,40	1,12	14,00	18,1	43	20,5	5	4	10 x DC	2	14700
1,6	0,96	1,28	3,52	8,1	43	16,5	9	4	2,2 x DC	2	16100
1,6	1,60	1,28	8,00	14,1	43	13	5,5	4	5 x DC	2	16400
1,6	1,60	1,28	16,00	18,5	43	29,5	4,5	4	10 x DC	2	16700
1,7	1,02	1,36	3,74	8,1	43	16,5	9	4	2,2 x DC	2	17100
1,7	1,70	1,36	8,50	14,5	43	12,5	5	4	5 x DC	2	17400
1,7	1,70	1,36	17,00	18,9	43	35,5	4	4	10 x DC	2	17700
1,9	1,14	1,52	4,18	8,2	43	16,5	8	4	2,2 x DC	2	19100
1,9	1,90	1,52	9,50	15,5	43	11,5	4,5	4	5 x DC	2	19400
1,9	1,90	1,52	19,00	19,9	43	54,5	3,5	4	10 x DC	2	19700

P	●
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O	○

Micro-torus cutter

▲ T_x = maximum engagement depth

DPA72S

DRAGONSKIN



Factory standard

HA

52 806 ...

DC $\pm 0,01$ mm	RE $\pm 0,005$ mm	APMX mm	DN mm	LH mm	I ₆ mm	OAL mm	α°	β°	DCONMS $h5$ mm	T_x	ZEFP	
0,6	0,1	0,36	0,48	1,32	5,9	38	16,5	12	3	2,2 x DC	2	06101
0,6	0,1	0,60	0,48	3,00	8,3	38	15	9	3	5 x DC	2	06401
0,6	0,1	0,60	0,48	6,00	10,6	38	17	7	3	10 x DC	2	06701
0,8	0,2	0,48	0,64	1,76	5,9	38	16,5	11	3	2,2 x DC	2	08102
0,8	0,2	0,80	0,64	4,00	9,0	38	14,5	7,5	3	5 x DC	2	08402
0,8	0,2	0,80	0,64	8,00	10,5	38	27	6,5	3	10 x DC	2	08702
1,2	0,2	0,72	0,96	2,64	7,9	43	16,5	10,5	4	2,2 x DC	2	12102
1,2	0,2	1,20	0,96	6,00	12,4	43	14,5	7	4	5 x DC	2	12402
1,2	0,2	1,20	0,96	12,00	18,2	43	15	5	4	10 x DC	2	12702
1,6	0,3	0,96	1,28	3,52	8,1	43	16,5	9	4	2,2 x DC	2	16103
1,6	0,3	1,60	1,28	8,00	14,1	43	13	5,5	4	5 x DC	2	16403
1,6	0,3	1,60	1,28	16,00	18,5	43	29,5	4,5	4	10 x DC	2	16703
1,8	0,4	1,08	1,44	3,96	8,1	43	16,5	8,5	4	2,2 x DC	2	18104
1,8	0,4	1,80	1,44	9,00	15,0	43	12	5	4	5 x DC	2	18404
1,8	0,4	1,80	1,44	18,00	19,5	43	41	4	4	10 x DC	2	18704

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S	●
H	○
O	○

Material examples for cutting data tables

	Material sub-group	Index	Composition / Structure / Heat treatment		Tensile strength N/mm ² / HB / HRC	Material number	Material designation	Material number	Material designation
P	Unalloyed steel	P.1.1	< 0,15 % C	Annealed	420 N/mm ² / 125 HB	1.0401	C15	1.1141	Ck15
		P.1.2	< 0,45 % C	Annealed	640 N/mm ² / 190 HB	1.1191	C45E	1.0718	9SMnPb28
		P.1.3		Tempered	840 N/mm ² / 250 HB	1.1191	C45E	1.0535	C55
		P.1.4	< 0,75 % C	Annealed	910 N/mm ² / 270 HB	1.1223	C60R	1.0535	C55
		P.1.5		Tempered	1010 N/mm ² / 300 HB	1.1223	C60R	1.0727	45S20
	Low-alloy steel	P.2.1		Annealed	610 N/mm ² / 180 HB	1.7131	16MnCr5	1.6587	17CrNiMo6
		P.2.2		Tempered	930 N/mm ² / 275 HB	1.7131	16MnCr5	1.6587	17CrNiMo6
		P.2.3		Tempered	1010 N/mm ² / 300 HB	1.7225	42CrMo4	1.3505	100Cr6
		P.2.4		Tempered	1200 N/mm ² / 375 HB	1.7225	42CrMo4	1.3505	100Cr6
	High-alloy steel and high-alloy tool steel	P.3.1		Annealed	680 N/mm ² / 200 HB	1.4021	X20Cr13	1.4034	X46Cr13
		P.3.2		Hardened and tempered	1100 N/mm ² / 300 HB	1.2343	X38CrMoV5-1	1.4034	X46Cr13
		P.3.3		Hardened and tempered	1300 N/mm ² / 400 HB	1.2343	X38CrMoV5-1	1.4034	X46Cr13
	Stainless steel	P.4.1	Ferritic / martensitic	Annealed	680 N/mm ² / 200 HB	1.4016	X6Cr17	1.2316	X36CrMo16
		P.4.2	Martensitic	Tempered	1010 N/mm ² / 300 HB	1.4112	X90CrMoV18	1.2316	X36CrMo16
M	Stainless steel	M.1.1	Austenitic / austenitic-ferritic	Quenched	610 N/mm ² / 180 HB	1.4301	X5CrNi18-10	1.4571	X6CrNiMoTi17-12-2
		M.2.1	Austenitic	Tempered	300 HB	1.4841	X15CrNiSi25-21	1.4539	X1NiCrMoCu25-20-5
		M.3.1	Austenitic / ferritic (Duplex)		780 N/mm ² / 230 HB	1.4462	X2CrNiMoN22-5-3	1.4501	X2CrNiMoCuWN25-7-4
K	Grey cast iron	K.1.1	Pearlitic / ferritic		350 N/mm ² / 180 HB	0.6010	GG-10	0.6025	GG-25
		K.1.2	Pearlitic (martensitic)		500 N/mm ² / 260 HB	0.6030	GG-30	0.6045	GG-45
	Spherulitic graphite cast iron	K.2.1	Ferritic		540 N/mm ² / 160 HB	0.7040	GGG-40	0.7060	GGG-60
		K.2.2	Pearlitic		845 N/mm ² / 250 HB	0.7070	GGG-70	0.7080	GGG-80
	Malleable iron	K.3.1	Ferritic		440 N/mm ² / 130 HB	0.8035	GTW-35-04	0.8045	GTW-45
		K.3.2	Pearlitic		780 N/mm ² / 230 HB	0.8165	GTS-65-02	0.8170	GTS-70-02
N	Aluminium wrought alloy	N.1.1	Non-hardenable		60 HB	3.0255	Al99,5	3.3315	AlMg1
		N.1.2	Hardenable	Age-hardened	340 N/mm ² / 100 HB	3.1355	AlCuMg2	3.2315	AlMgSi1
	Cast aluminium alloy	N.2.1	≤ 12 % Si, non-hardenable		250 N/mm ² / 75 HB	3.2581	G-AlSi12	3.2163	G-AlSi9Cu3
		N.2.2	≤ 12 % Si, hardenable	Age-hardened	300 N/mm ² / 90 HB	3.2134	G-AlSi5Cu1Mg	3.2373	G-AlSi9Mg
		N.2.3	> 12 % Si, non-hardenable		440 N/mm ² / 130 HB		G-AlSi17Cu4Mg		G-AlSi18CuNiMg
	Copper and copper alloys (bronze/brass)	N.3.1	Free-machining alloys, PB > 1 %		375 N/mm ² / 110 HB	2.0380	CuZn39Pb2 (Ms58)	2.0410	CuZn44Pb2
		N.3.2	CuZn, CuSnZn		300 N/mm ² / 90 HB	2.0331	CuZn15	2.4070	CuZn28Sn1As
		N.3.3	CuSn, lead-free copper and electrolytic copper		340 N/mm ² / 100 HB	2.0060	E-Cu57	2.0590	CuZn40Fe
	Magnesium alloys	N.4.1	Magnesium and magnesium alloys		70 HB	3.5612	MgAl6Zn	3.5312	MgAl3Zn
S	Heat-resistant alloys	S.1.1	Fe - basis	Annealed	680 N/mm ² / 200 HB	1.4864	X12NiCrSi 36-16	1.4865	G-X40NiCrSi38-18
		S.1.2		Age-hardened	950 N/mm ² / 280 HB	1.4980	X6NiCrTiMoVB25-15-2	1.4876	X10NiCrAlTi32-20
		S.2.1	Ni or Co basis	Annealed	840 N/mm ² / 250 HB	2.4631	NiCr20TiAl (Nimonic80A)	3.4856	NiCr22Mo9Nb
		S.2.2		Age-hardened	1180 N/mm ² / 350 HB	2.4668	NiCr19Nb5Mo3 (Inconel 718)	2.4955	NiFe25Cr20NbTi
		S.2.3		Cast	1080 N/mm ² / 320 HB	2.4765	CoCr20W15Ni	1.3401	G-X120Mn12
	Titanium alloys	S.3.1	Pure titanium		400 N/mm ²	3.7025	Ti99,8	3.7034	Ti99,7
		S.3.2	Alpha + beta alloys	Age-hardened	1050 N/mm ² / 320 HB	3.7165	TiAl6V4	Ti-6246	Ti-6Al-2Sn-4Zr-6Mo
		S.3.3	Beta alloys		1400 N/mm ² / 410 HB	Ti555.3	Ti-5Al-5V-5Mo-3Cr	R56410	Ti-10V-2Fe-3Al
H	Hardened steel	H.1.1		Hardened and tempered	46-55 HRC				
		H.1.2		Hardened and tempered	56-60 HRC				
		H.1.3		Hardened and tempered	61-65 HRC				
		H.1.4		Hardened and tempered	66-70 HRC				
	Chilled iron	H.2.1		Cast	400 HB				
	Hardened cast iron	H.3.1		Hardened and tempered	55 HRC				
O	Non-metal materials	O.1.1	Plastics, duroplastic		≤ 150 N/mm ²				
		O.1.2	Plastics, thermoplastic		≤ 100 N/mm ²				
		O.2.1	Aramid fibre-reinforced		≤ 1000 N/mm ²				
		O.2.2	Glass/carbon-fibre reinforced		≤ 1000 N/mm ²				
		O.3.1	Graphite						

* Tensile strength

Cutting data standard values – Micro cutter – 2.2xDC

		52 802 ... / 52 804 ... / 52 806 ...																
		Ø DC = 0,2–0,4 mm						Ø DC = 0,5–0,7 mm						Ø DC = 0,8–0,9 mm				
a _e		0,1 x DC	0,2 x DC	0,3 x DC	0,4 x DC	0,6–1,0 x DC	a _e	0,1 x DC	0,2 x DC	0,3 x DC	0,4 x DC	0,6–1,0 x DC	a _e	0,1 x DC	0,2 x DC	0,3 x DC	0,4 x DC	0,6–1,0 x DC
a _{p max.}		0,02	0,02	0,02	0,01	0,01	a _{p max.}	0,1	0,1	0,1	0,1	0,05	a _{p max.}	0,2	0,2	0,2	0,2	0,12
n _{min.}		30.000					n _{min.}	12.000					n _{min.}	8.000				
Index	n	v _f mm/min.					n	v _f mm/min.					n	v _f mm/min.				
P.1.1	50.000	232	202	174	144	116	50.000	274	238	205	170	137	50.000	485	422	364	301	242
P.1.2	50.000	232	202	174	144	116	50.000	274	238	205	170	137	50.000	485	422	364	301	242
P.1.3	50.000	232	202	174	144	116	50.000	274	238	205	170	137	50.000	485	422	364	301	242
P.1.4	50.000	201	175	151	125	101	50.000	237	206	178	147	119	50.000	420	365	315	260	210
P.1.5	50.000	201	175	151	125	101	50.000	237	206	178	147	119	50.000	420	365	315	260	210
P.2.1	50.000	232	202	174	144	116	50.000	274	238	205	170	137	50.000	485	422	364	301	242
P.2.2	50.000	232	202	174	144	116	50.000	274	238	205	170	137	50.000	485	422	364	301	242
P.2.3	50.000	201	175	151	125	101	50.000	237	206	178	147	119	50.000	420	365	315	260	210
P.2.4	50.000	201	175	151	125	101	50.000	237	206	178	147	119	50.000	420	365	315	260	210
P.3.1	50.000	201	175	151	125	101	50.000	237	206	178	147	119	50.000	420	365	315	260	210
P.3.2	50.000	232	202	174	144	116	50.000	274	238	205	170	137	50.000	485	422	364	301	242
P.3.3	50.000	201	175	151	125	101	50.000	237	206	178	147	119	50.000	420	365	315	260	210
P.4.1	50.000	232	202	174	144	116	50.000	274	238	205	170	137	50.000	485	422	364	301	242
P.4.2	50.000	232	202	174	144	116	50.000	274	238	205	170	137	50.000	485	422	364	301	242
M.1.1	50.000	232	202	174	144	116	50.000	274	238	205	170	137	50.000	485	422	364	301	242
M.2.1	50.000	232	202	174	144	116	50.000	274	238	205	170	137	50.000	485	422	364	301	242
M.3.1	50.000	232	202	174	144	116	50.000	274	238	205	170	137	50.000	485	422	364	301	242
K.1.1	50.000	232	202	174	144	116	50.000	274	238	205	170	137	50.000	485	422	364	301	242
K.1.2	50.000	232	202	174	144	116	50.000	274	238	205	170	137	50.000	485	422	364	301	242
K.2.1	50.000	232	202	174	144	116	50.000	274	238	205	170	137	50.000	485	422	364	301	242
K.2.2	50.000	232	202	174	144	116	50.000	274	238	205	170	137	50.000	485	422	364	301	242
K.3.1	50.000	141	123	106	88	71	50.000	175	152	131	109	88	32.000	285	248	213	176	142
K.3.2	50.000	141	123	106	88	71	50.000	175	152	131	109	88	32.000	285	248	213	176	142
N.1.1	50.000	232	202	174	144	116	50.000	274	238	205	170	137	50.000	582	506	436	361	291
N.1.2	50.000	232	202	174	144	116	50.000	274	238	205	170	137	50.000	582	506	436	361	291
N.2.1																		
N.2.2																		
N.2.3																		
N.3.1	50.000	232	202	174	144	116	50.000	274	238	205	170	137	44.000	485	422	364	301	242
N.3.2	50.000	232	202	174	144	116	50.000	274	238	205	170	137	50.000	582	506	436	361	291
N.3.3	50.000	232	202	174	144	116	50.000	274	238	205	170	137	50.000	582	506	436	361	291
N.4.1	50.000	212	185	159	132	106	50.000	250	218	188	155	125	50.000	531	462	398	329	266
S.1.1	50.000	46	40	35	29	23	30.000	55	48	41	34	27	19.000	69	60	51	43	34
S.1.2	50.000	46	40	35	29	23	30.000	55	48	41	34	27	19.000	69	60	51	43	34
S.2.1	50.000	72	62	54	44	36	50.000	89	77	66	55	44	25.000	91	79	68	56	45
S.2.2	50.000	46	40	35	29	23	30.000	55	48	41	34	27	19.000	69	60	51	43	34
S.2.3	50.000	54	47	41	34	27	30.000	66	57	49	41	33	12.000	78	68	59	49	39
S.3.1	50.000	114	99	85	71	57	50.000	164	143	123	102	82	44.000	114	99	85	71	57
S.3.2	50.000	114	99	85	71	57	50.000	164	143	123	102	82	44.000	164	143	123	102	82
S.3.3	50.000	70	61	53	43	35	50.000	85	74	64	53	42	38.000	101	88	76	63	51
H.1.1	50.000	219	191	164	136	110	50.000	232	202	174	144	116	50.000	388	338	291	241	194
H.1.2	50.000	201	175	151	125	101	50.000	285	248	213	176	142	38.000	336	292	252	208	168
H.1.3	50.000	114	99	85	71	57	50.000	134	117	101	83	67	25.000	156	136	117	97	78
H.1.4	50.000	107	93	80	67	54	50.000	126	110	95	78	63	25.000	141	123	106	88	71
H.2.1	50.000	219	191	164	136	110	50.000	232	202	174	144	116	50.000	388	338	291	241	194
H.3.1	50.000	201	175	151	125	101	50.000	285	248	213	176	142	38.000	336	292	252	208	168
O.1.1	50.000	232	202	174	144	116	50.000	274	238	205	170	137	50.000	582	506	436	361	291
O.1.2	50.000	232	202	174	144	116	50.000	274	238	205	170	137	50.000	582	506	436	361	291
O.2.1	50.000	212	185	159	132	106	50.000	200	174	150	124	100	38.000	316	275	237	196	158
O.2.2	50.000	212	185	159	132	106	50.000	200	174	150	124	100	38.000	316	275	237	196	158
O.3.1																		

		52 802 ... / 52 804 ... / 52 806 ...															
		Ø DC = 1,0–1,4 mm								Ø DC = 1,5–1,7 mm						● 1st choice	
																○ suitable	
		a _e	0,1 x DC	0,2 x DC	0,3 x DC	0,4 x DC	0,6 –1,0 x DC	a _e	0,1 x DC	0,2 x DC	0,3 x DC	0,4 x DC	0,6–1,0 x DC	Emulsion	Compressed air	MMS	
		a _{p max.}	0,3	0,3	0,3	0,3	0,2	a _{p max.}	0,45	0,45	0,45	0,45	0,3				
		n _{min.}	6.500					n _{min.}	6.500								
Index	n	V _f mm/min.						n	V _f mm/min.								
	P.1.1	50.000	775	674	581	480	387	33.000	1200	1044	900	744	600	●	○	○	
	P.1.2	50.000	775	674	581	480	387	33.000	1200	1044	900	744	600	●	○	○	
	P.1.3	50.000	775	674	581	480	387	33.000	1200	1044	900	744	600	●	○	○	
	P.1.4	50.000	671	584	503	416	335	33.000	1039	904	779	644	520	●	○	○	
	P.1.5	50.000	671	584	503	416	335	33.000	1039	904	779	644	520	●	○	○	
	P.2.1	50.000	775	674	581	480	387	33.000	1200	1044	900	744	600		●	○	
	P.2.2	50.000	775	674	581	480	387	33.000	1200	1044	900	744	600		●	○	
	P.2.3	50.000	671	584	503	416	335	33.000	1039	904	779	644	520		●	○	
	P.2.4	50.000	671	584	503	416	335	33.000	1039	904	779	644	520		●	○	
	P.3.1	50.000	671	584	503	416	335	33.000	1039	904	779	644	520		●	○	
	P.3.2	50.000	775	674	581	480	387	33.000	1200	1044	900	744	600		●	○	
	P.3.3	50.000	671	584	503	416	335	33.000	1039	904	779	644	520		●	○	
	P.4.1	50.000	775	674	581	480	387	33.000	1200	1044	900	744	600		●	○	
	P.4.2	50.000	775	674	581	480	387	33.000	1200	1044	900	744	600		●	○	
	M.1.1	50.000	775	674	581	480	387	33.000	1200	1044	900	744	600	●		○	
	M.2.1	50.000	775	674	581	480	387	33.000	1200	1044	900	744	600	●		○	
	M.3.1	50.000	775	674	581	480	387	33.000	1200	1044	900	744	600	●		○	
	K.1.1	50.000	775	674	581	480	387	33.000	1200	1044	900	744	600	○	●		
	K.1.2	50.000	775	674	581	480	387	33.000	1200	1044	900	744	600	○	●		
	K.2.1	50.000	775	674	581	480	387	33.000	1200	1044	900	744	600	○	●		
	K.2.2	50.000	775	674	581	480	387	33.000	1200	1044	900	744	600	○	●		
	K.3.1	50.000	389	338	292	241	194	21.000	548	477	411	340	274		●		
	K.3.2	25000	389	338	292	241	194	21.000	548	477	411	340	274		●		
	N.1.1	50.000	930	809	697	576	465	50.000	1500	1305	1125	930	750	●		○	
	N.1.2	50.000	930	809	697	576	465	50.000	1500	1305	1125	930	750	●		○	
	N.2.1																
	N.2.2																
	N.2.3																
	N.3.1	44.000	775	674	581	480	387	29.000	1160	1009	870	719	580	●		○	
	N.3.2	50.000	930	809	697	576	465	38.000	1400	1218	1050	868	700	●		○	
	N.3.3	50.000	930	809	697	576	465	38.000	1400	1218	1050	868	700	●		○	
	N.4.1	50.000	849	738	636	526	424	38.000	1388	1207	1041	860	694	●		○	
		S.1.1	15.000	99	86	74	61	49	12.000	170	148	127	105	85	●		○
S.1.2		15.000	99	86	74	61	49	12.000	170	148	127	105	85	●		○	
S.2.1		25.000	152	132	114	94	76	16.000	294	256	220	182	147	●		○	
S.2.2		15.000	99	86	74	61	49	12.000	170	148	127	105	85	●		○	
S.2.3		12.000	131	114	99	82	66	8.000	255	221	191	158	127	●		○	
S.3.1		44.000	170	148	127	105	85	29.000	329	286	246	204	164	●		○	
S.3.2		44.000	247	215	186	153	124	29.000	365	318	274	226	183	●		○	
S.3.3		38.000	170	148	127	105	85	25.000	329	286	246	204	164	●		○	
H.1.1		50.000	620	539	465	384	310	33.000	850	740	638	527	425		●		
H.1.2	38.000	537	467	402	333	268	25.000	779	678	585	483	390		●			
H.1.3	25.000	235	204	176	146	117	16.000	346	301	260	215	173		●			
H.1.4	25.000	221	193	166	137	111	16.000	327	284	245	202	163		●			
H.2.1	50.000	620	539	465	384	310	33.000	850	740	638	527	425		●			
H.3.1	38.000	537	467	402	333	268	25.000	779	678	585	483	390		●			
	O.1.1	50.000	930	809	697	576	465	38.000	1520	1322	1140	942	760	●	○	○	
	O.1.2	50.000	930	809	697	576	465	33.000	1320	1148	990	818	660	●	○	○	
	O.2.1	38.000	495	431	371	307	247	25.000	685	596	513	424	342	●	○	○	
	O.2.2	38.000	495	431	371	307	247	25.000	685	596	513	424	342	●	○	○	
	O.3.1																

Cutting data standard values – Micro cutter – 2.2xDC

		52 802 ... / 52 804 ... / 52 806 ...													
		Ø DC = 1,8–1,9 mm						Ø DC = 2,0 mm					● 1st choice		
													○ suitable		
	a _g	0,1 x DC	0,2 x DC	0,3 x DC	0,4 x DC	0,6–1,0 x DC	a _g	0,1 x DC	0,2 x DC	0,3 x DC	0,4 x DC	0,6–1,0 x DC	Emulsion	Compressed air	MMS
	a _{p max.}	0,54	0,54	0,54	0,54	0,36	a _{p max.}	0,6	0,6	0,6	0,6	0,4			
	n _{min.}	5.500					n _{min.}	5.000							
Index	n	v _f mm/min.					n	v _f mm/min.							
P.1.1	29.000	1300	1131	975	806	650	25.000	1500	1300	1125	930	750	●	○	○
P.1.2	29.000	1300	1131	975	806	650	25.000	1500	1300	1125	930	750	●	○	○
P.1.3	29.000	1300	1131	975	806	650	25.000	1500	1300	1125	930	750	●	○	○
P.1.4	29.000	1300	1131	975	806	650	25.000	1500	1300	1125	930	750	●	○	○
P.1.5	29.000	1300	1131	975	806	650	25.000	1500	1300	1125	930	750	●	○	○
P.2.1	29.000	1300	1131	975	806	650	25.000	1500	1300	1125	930	750		●	○
P.2.2	29.000	1300	1131	975	806	650	25.000	1500	1300	1125	930	750		●	○
P.2.3	29.000	1300	1131	975	806	650	25.000	1500	1300	1125	930	750		●	○
P.2.4	29.000	1300	1131	975	806	650	25.000	1500	1300	1125	930	750		●	○
P.3.1	29.000	1300	1131	975	806	650	25.000	1500	1300	1125	930	750		●	○
P.3.2	29.000	1300	1131	975	806	650	25.000	1500	1300	1125	930	750		●	○
P.3.3	29.000	1300	1131	975	806	650	25.000	1500	1300	1125	930	750		●	○
P.4.1	29.000	1300	1131	975	806	650	25.000	1500	1300	1125	930	750		●	○
P.4.2	29.000	1300	1131	975	806	650	25.000	1500	1300	1125	930	750		●	○
M.1.1	29.000	1300	1131	975	806	650	25.000	1500	1300	1125	930	750	●		○
M.2.1	29.000	1300	1131	975	806	650	25.000	1500	1300	1125	930	750	●		○
M.3.1	29.000	1300	1131	975	806	650	25.000	1500	1300	1125	930	750	●		○
K.1.1	29.000	1300	1131	975	806	650	25.000	1500	1300	1125	930	750	○	●	
K.1.2	29.000	1300	1131	975	806	650	25.000	1500	1300	1125	930	750	○	●	
K.2.1	29.000	1300	1131	975	806	650	25.000	1500	1300	1125	930	750	○	●	
K.2.2	29.000	1300	1131	975	806	650	25.000	1500	1300	1125	930	750	○	●	
K.3.1	18.000	630	548	473	391	315	12.000	750	650	550	450	350		●	
K.3.2	18.000	630	548	473	391	315	12.000	750	650	550	450	350		●	
N.1.1	44.000	1800	1566	1350	1116	900	25.000	1500	1300	1125	930	750	●		○
N.1.2	44.000	1800	1566	1350	1116	900	25.000	1500	1300	1125	930	750	●		○
N.2.1															
N.2.2															
N.2.3															
N.3.1	25.000	1250	1088	938	775	625	19.000	1140	990	855	700	570	●		○
N.3.2	32.000	1520	1322	1140	942	760	25.000	1500	1300	1125	930	750	●		○
N.3.3	32.000	1520	1322	1140	942	760	25.000	1500	1300	1125	930	750	●		○
N.4.1	33.000	1560	1357	1170	967	780	25.000	1500	1300	1125	930	750	●		○
S.1.1	10.000	280	244	210	174	140	7.500	300	260	230	200	160	●		○
S.1.2	10.000	280	244	210	174	140	7.500	300	260	230	200	160	●		○
S.2.1	14.000	420	365	315	260	210	12.500	500	400	350	300	250	●		○
S.2.2	10.000	280	244	210	174	140	7.500	300	260	230	200	160	●		○
S.2.3	7.000	370	322	278	229	185	6.000	300	260	230	200	160	●		○
S.3.1	25.000	400	348	300	248	200	25.000	1500	1300	1125	930	750	●		○
S.3.2	25.000	480	418	360	298	240	25.000	1500	1300	1125	930	750	●		○
S.3.3	22.000	380	331	285	236	190	25.000	1500	1300	1125	930	750	●		○
H.1.1	29.000	1200	1044	900	744	600	25.000	1500	1300	1125	930	750		●	
H.1.2	22.000	1000	870	750	620	500	19.000	1140	990	855	700	570		●	
H.1.3	14.000	420	365	315	260	210	19.000	1140	990	855	700	570		●	
H.1.4	14.000	420	365	315	260	210	19.000	1140	990	855	700	570		●	
H.2.1	29.000	1200	1044	900	744	600	25.000	1500	1300	1125	930	750		●	
H.3.1	22.000	1000	870	750	620	500	19.000	1140	990	855	700	570		●	
O.1.1	33.000	1560	1357	1170	967	780	19.000	1140	990	855	700	570	●	○	○
O.1.2	28.000	1400	1218	1050	868	700	19.000	1140	990	855	700	570	●	○	○
O.2.1	22.000	800	696	600	496	400	12.000	720	630	540	450	360	●	○	○
O.2.2	22.000	800	696	600	496	400	12.000	720	630	540	450	360	●	○	○
O.3.1															

Cutting data standard values – Micro cutter – 5xDC

		52 802 ... / 52 804 ... / 52 806 ...																	1st choice		
		Ø DC = 0,2–0,4 mm					Ø DC = 0,5–0,7 mm					Ø DC = 0,8–0,9 mm							suitable		
		a _e	0,1 x DC	0,2 x DC	0,3 x DC	0,4 x DC	a _e	0,1 x DC	0,2 x DC	0,3 x DC	0,4 x DC	a _e	0,1 x DC	0,2 x DC	0,3 x DC	0,4 x DC	0,6–1,0 x DC	Emulsion	Compressed air	MMS	
		a _{p max.}	0,012	0,012	0,012	0,012	a _{p max.}	0,06	0,06	0,06	0,06	a _{p max.}	0,12	0,12	0,12	0,12	0,064				
		n _{min.}	30.000					n _{min.}	12.000					n _{min.}	8.000						
Index	n	V _f mm/min.					n	V _f mm/min.					n	V _f mm/min.							
P.1.1	50.000	232	202	174	144	50.000	274	238	205	170	44.000	485	422	364	301	242	●	○	○		
P.1.2	50.000	232	202	174	144	50.000	274	238	205	170	44.000	485	422	364	301	242	●	○	○		
P.1.3	50.000	232	202	174	144	50.000	274	238	205	170	44.000	485	422	364	301	242	●	○	○		
P.1.4	50.000	201	175	151	125	50.000	237	206	178	147	31.000	330	287	248	205	165	●	○	○		
P.1.5	50.000	201	175	151	125	50.000	237	206	178	147	31.000	330	287	248	205	165	●	○	○		
P.2.1	50.000	232	202	174	144	50.000	274	238	205	170	44.000	485	422	364	301	242		●	○		
P.2.2	50.000	232	202	174	144	50.000	274	238	205	170	44.000	485	422	364	301	242		●	○		
P.2.3	50.000	201	175	151	125	50.000	237	206	178	147	31.000	330	287	248	205	165		●	○		
P.2.4	50.000	201	175	151	125	50.000	237	206	178	147	31.000	330	287	248	205	165		●	○		
P.3.1	50.000	201	175	151	125	50.000	237	206	178	147	31.000	330	287	248	205	165		●	○		
P.3.2	50.000	232	202	174	144	50.000	274	238	205	170	44.000	485	422	364	301	242		●	○		
P.3.3	50.000	201	175	151	125	50.000	237	206	178	147	31.000	330	287	248	205	165		●	○		
P.4.1	50.000	232	202	174	144	50.000	274	238	205	170	44.000	485	422	364	301	242		●	○		
P.4.2	50.000	232	202	174	144	50.000	274	238	205	170	44.000	485	422	364	301	242		●	○		
M.1.1	50.000	232	202	174	144	50.000	219	191	164	136	31.000	346	301	260	215	173	●		○		
M.2.1	50.000	232	202	174	144	50.000	219	191	164	136	31.000	346	301	260	215	173	●		○		
M.3.1	50.000	232	202	174	144	50.000	219	191	164	136	31.000	346	301	260	215	173	●		○		
K.1.1	50.000	232	202	174	144	50.000	219	191	164	136	50.000	416	362	312	258	208	○	●			
K.1.2	50.000	232	202	174	144	50.000	219	191	164	136	50.000	416	362	312	258	208	○	●			
K.2.1	50.000	232	202	174	144	50.000	219	191	164	136	50.000	416	362	312	258	208	○	●			
K.2.2	50.000	232	202	174	144	50.000	219	191	164	136	50.000	416	362	312	258	208	○	●			
K.3.1	50.000	141	123	106	88	50.000	175	152	131	109	25.000	240	209	180	149	120		●			
K.3.2	50.000	141	123	106	88	50.000	175	152	131	109	25.000	240	209	180	149	120		●			
N.1.1	50.000	232	202	174	144	50.000	274	238	205	170	50.000	554	482	416	344	277	●		○		
N.1.2	50.000	232	202	174	144	50.000	274	238	205	170	50.000	554	482	416	344	277	●		○		
N.2.1																					
N.2.2																					
N.2.3																					
N.3.1	50.000	232	202	174	144	50.000	274	238	205	170	38.000	485	422	364	301	242	●		○		
N.3.2	50.000	232	202	174	144	50.000	274	238	205	170	50.000	554	482	416	344	277	●		○		
N.3.3	50.000	232	202	174	144	50.000	274	238	205	170	50.000	554	482	416	344	277	●		○		
N.4.1	50.000	212	185	159	132	50.000	250	218	188	155	50.000	506	440	379	314	253	●		○		
S.1.1	50.000	55	48	41	32	31.000	58	51	44	36	15.000	98	85	73	61	49	●		○		
S.1.2	50.000	55	48	41	32	31.000	58	51	44	36	15.000	98	85	73	61	49	●		○		
S.2.1	50.000	63	54	47	39	44.000	76	66	57	47	22.000	91	79	68	56	45	●		○		
S.2.2	50.000	55	47	40	32	31.000	58	51	44	36	15.000	98	85	73	61	49	●		○		
S.2.3	50.000	46	40	35	29	25.000	55	48	41	34	12.000	78	68	59	49	39	●		○		
S.3.1	50.000	60	61	48	41	50.000	71	62	53	44	38.000	114	99	85	71	57	●		○		
S.3.2	50.000	60	61	48	41	50.000	71	62	53	44	38.000	126	110	95	78	63	●		○		
S.3.3	50.000	60	52	45	37	50.000	71	62	49	39	31.000	89	77	66	55	44	●		○		
H.1.1	50.000	95	83	71	59	50.000	134	117	101	83	31.000	180	157	135	112	90		●			
H.1.2	50.000	95	83	71	59	44.000	134	117	101	83	22.000	180	157	135	112	90		●			
H.1.3	50.000	89	78	67	55	44.000	126	110	95	78	22.000	170	148	127	105	85		●			
H.1.4																					
H.2.1	50.000	155	135	116	96	50.000	164	143	123	102	44.000	346	301	260	215	173		●			
H.3.1	50.000	95	83	71	59	50.000	134	117	101	83	31.000	180	157	135	112	90		●			
O.1.1	50.000	232	202	174	144	50.000	274	238	205	170	50.000	554	482	416	344	277	●	○	○		
O.1.2	50.000	232	202	174	144	50.000	274	238	205	170	44.000	554	482	416	344	277	●	○	○		
O.2.1	50.000	141	123	106	88	50.000	200	174	150	124	31.000	316	275	237	196	158	●	○	○		
O.2.2	50.000	141	123	106	88	50.000	200	174	150	124	31.000	316	275	237	196	158	●	○	○		
O.3.1																					

Cutting data standard values – Micro cutter – 5xDC

		52 802 ... / 52 804 ... / 52 806 ...																	
		Ø DC = 1,0–1,4 mm						Ø DC = 1,5–1,7 mm						Ø DC = 1,8–1,9 mm					
a _e		0,1 x DC	0,2 x DC	0,3 x DC	0,4 x DC	0,6–1,0 x DC	a _e	0,1 x DC	0,2 x DC	0,3 x DC	0,4 x DC	0,6–1,0 x DC	a _e	0,1 x DC	0,2 x DC	0,3 x DC	0,4 x DC	0,6–1,0 x DC	
a _{p max.}		0,3	0,3	0,3	0,3	0,2	a _{p max.}	0,3	0,3	0,3	0,3	0,2	a _{p max.}	0,54	0,54	0,54	0,54	0,36	
n _{min.}		6.500					n _{min.}	6.500					n _{min.}	5.500					
Index	n	v _f mm/min.					n	v _f mm/min.					n	v _f mm/min.					
P.1.1	44.000	682	593	511	423	341	29.000	1160	1009	870	719	580	25.000	1250	1088	938	775	625	
P.1.2	44.000	682	593	511	423	341	29.000	1160	1009	870	719	580	25.000	1250	1088	938	775	625	
P.1.3	44.000	682	593	511	423	341	29.000	1160	1009	870	719	580	25.000	1250	1088	938	775	625	
P.1.4	31.000	416	362	312	258	208	21.000	693	603	520	430	346	18.000	850	740	638	527	425	
P.1.5	31.000	416	362	312	258	208	21.000	693	603	520	430	346	18.000	850	740	638	527	425	
P.2.1	44.000	682	593	511	423	341	29.000	1160	1009	870	719	580	25.000	1250	1088	938	775	625	
P.2.2	44.000	682	593	511	423	341	29.000	1160	1009	870	719	580	25.000	1250	1088	938	775	625	
P.2.3	31.000	416	362	312	258	208	21.000	693	603	520	430	346	18.000	850	740	638	527	425	
P.2.4	31.000	416	362	312	258	208	21.000	693	603	520	430	346	18.000	850	740	638	527	425	
P.3.1	31.000	416	362	312	258	208	21.000	693	603	520	430	346	18.000	850	740	638	527	425	
P.3.2	44.000	682	593	511	423	341	29.000	1160	1009	870	719	580	25.000	1250	1088	938	775	625	
P.3.3	31.000	416	362	312	258	208	21.000	693	603	520	430	346	18.000	850	740	638	527	425	
P.4.1	44.000	682	593	511	423	341	29.000	1160	1009	870	719	580	25.000	1250	1088	938	775	625	
P.4.2	44.000	682	593	511	423	341	29.000	1160	1009	870	719	580	25.000	1250	1088	938	775	625	
M.1.1	31.000	480	418	360	298	240	21.000	800	696	600	496	400	18.000	850	740	638	527	425	
M.2.1	31.000	480	418	360	298	240	21.000	800	696	600	496	400	18.000	850	740	638	527	425	
M.3.1	31.000	480	418	360	298	240	21.000	800	696	600	496	400	18.000	850	740	638	527	425	
K.1.1	50.000	620	539	465	384	310	33.000	1000	870	750	620	500	28.000	1320	1148	990	818	660	
K.1.2	50.000	620	539	465	384	310	33.000	1000	870	750	620	500	28.000	1320	1148	990	818	660	
K.2.1	50.000	620	539	465	384	310	33.000	1000	870	750	620	500	28.000	1320	1148	990	818	660	
K.2.2	50.000	620	539	465	384	310	33.000	1000	870	750	620	500	28.000	1320	1148	990	818	660	
K.3.1	25.000	297	258	223	184	148	16.000	411	357	308	255	205	14.000	480	418	360	298	240	
K.3.2	25.000	297	258	223	184	148	16.000	411	357	308	255	205	14.000	480	418	360	298	240	
N.1.1	50.000	775	674	581	480	387	42.000	1200	1044	900	744	600	36.000	1500	1305	1125	930	750	
N.1.2	50.000	775	674	581	480	387	42.000	1200	1044	900	744	600	36.000	1500	1305	1125	930	750	
N.2.1																			
N.2.2																			
N.2.3																			
N.3.1	38.000	697	607	523	432	349	25.000	1000	870	750	620	500	22.000	1100	957	825	682	550	
N.3.2	50.000	930	809	697	576	465	33.000	1320	1148	990	818	660	28.000	1400	1218	1050	868	700	
N.3.3	50.000	930	809	697	576	465	33.000	1320	1148	990	818	660	28.000	1400	1218	1050	868	700	
N.4.1	50.000	849	738	636	526	424	33.000	1205	1048	904	747	602	28.000	1400	1218	1050	868	700	
S.1.1	15.000	120	105	90	75	60	10.000	184	160	138	114	92	8.000	280	244	210	174	140	
S.1.2	15.000	120	105	90	75	60	10.000	184	160	138	114	92	8.000	280	244	210	174	140	
S.2.1	22.000	114	99	85	71	57	14.000	196	170	147	121	98	12.000	300	261	225	186	150	
S.2.2	15.000	120	105	90	75	60	10.000	184	160	138	114	92	8.000	280	244	210	174	140	
S.2.3	12.000	131	114	99	82	66	8.000	170	148	127	105	85	7.000	240	209	180	149	120	
S.3.1	38.000	156	135	117	96	78	25.000	274	238	205	170	137	22.000	380	331	285	236	190	
S.3.2	38.000	212	185	159	132	106	25.000	365	318	274	226	183	22.000	450	392	338	279	225	
S.3.3	31.000	127	111	95	79	64	21.000	201	175	151	125	100	18.000	300	261	225	186	150	
H.1.1	31.000	201	175	151	125	101	21.000	346	301	260	215	173	16.000	500	435	375	310	250	
H.1.2	22.000	235	204	176	146	117	14.000	346	301	260	215	173	12.000	450	392	338	279	225	
H.1.3	22.000	221	193	166	137	111	14.000	327	284	245	202	163	12.000	450	392	338	279	225	
H.1.4																			
H.2.1	44.000	426	371	320	264	213	29.000	600	522	450	372	300	25.000	800	696	600	496	400	
H.3.1	31.000	201	175	151	125	101	21.000	346	301	260	215	173	16.000	500	435	375	310	250	
O.1.1	50.000	930	809	697	576	465	33.000	1320	1148	990	818	660	28.000	1400	1218	1050	868	700	
O.1.2	44.000	813	708	610	504	407	29.000	1160	1009	870	719	580	25.000	1200	1044	900	744	600	
O.2.1	31.000	438	381	329	272	219	21.000	575	500	431	357	288	18.000	650	566	488	403	325	
O.2.2	31.000	438	381	329	272	219	21.000	575	500	431	357	288	18.000	650	566	488	403	325	
O.3.1																			

		52 802 ... / 52 804 ... / 52 806 ...								
		Ø DC = 2,0 mm						●	1st choice	
								○	suitable	
		a _e	0,1 x DC	0,2 x DC	0,3 x DC	0,4 x DC	0,6-1,0 x DC	Emulsion	Compressed air	MMS
a _{p max.}	0,6	0,6	0,6	0,6	0,4					
n _{min.}	5.000									
Index	n	V _f mm/min.								
	P.1.1	22.000	1320	1148	990	818	660	●	○	○
	P.1.2	22.000	1320	1148	990	818	660	●	○	○
	P.1.3	22.000	1320	1148	990	818	660	●	○	○
	P.1.4	15.000	900	783	675	558	450	●	○	○
	P.1.5	15.000	900	783	675	558	450	●	○	○
	P.2.1	22.000	1320	1148	990	818	660		●	○
	P.2.2	22.000	1320	1148	990	818	660		●	○
	P.2.3	15.000	900	783	675	558	450		●	○
	P.2.4	15.000	900	783	675	558	450		●	○
	P.3.1	15.000	900	783	675	558	450		●	○
	P.3.2	22.000	1320	1148	990	818	660		●	○
	P.3.3	15.000	900	783	675	558	450		●	○
	P.4.1	22.000	1320	1148	990	818	660		●	○
	P.4.2	22.000	1320	1148	990	818	660		●	○
	M.1.1	15.000	900	783	675	558	450	●		○
	M.2.1	15.000	900	783	675	558	450	●		○
	M.3.1	15.000	900	783	675	558	450	●		○
	K.1.1	25.000	1500	1305	1125	930	750	○	●	
	K.1.2	25.000	1500	1305	1125	930	750	○	●	
	K.2.1	25.000	1500	1305	1125	930	750	○	●	
	K.2.2	25.000	1500	1305	1125	930	750	○	●	
	K.3.1	12.000	520	452	390	322	260		●	
	K.3.2	12.000	520	452	390	322	260		●	
	N.1.1	31.000	1860	1618	1395	1153	930	●		○
	N.1.2	31.000	1860	1618	1395	1153	930	●		○
	N.2.1									
	N.2.2									
	N.2.3									
	N.3.1	19.000	1140	992	855	707	570	●		○
	N.3.2	25.000	1500	1305	1125	930	750	●		○
	N.3.3	25.000	1500	1305	1125	930	750	●		○
	N.4.1	25.000	1500	1305	1125	930	750	●		○
	S.1.1	7.000	300	261	225	186	150	●		○
	S.1.2	7.000	300	261	225	186	150	●		○
	S.2.1	11.000	400	348	300	248	200	●		○
	S.2.2	7.000	300	261	225	186	150	●		○
	S.2.3	6.000	260	226	195	161	130	●		○
	S.3.1	19.000	420	365	315	260	210	●		○
	S.3.2	19.000	500	435	375	310	250	●		○
	S.3.3	15.000	400	348	300	248	200	●		○
	H.1.1	15.000	500	435	375	310	250		●	
	H.1.2	11.000	480	418	360	298	240		●	
	H.1.3	11.000	480	418	360	298	240		●	
	H.1.4									
	H.2.1	22.000	1000	870	750	620	500		●	
	H.3.1	15.000	500	435	375	310	250		●	
	O.1.1	25.000	1500	1305	1125	930	750	●	○	○
	O.1.2	22.000	1320	1148	990	818	660	●	○	○
	O.2.1	15.000	660	574	495	409	330	●	○	○
	O.2.2	15.000	660	574	495	409	330	●	○	○
	O.3.1									

Cutting data standard values – Micro cutter – 10xDC

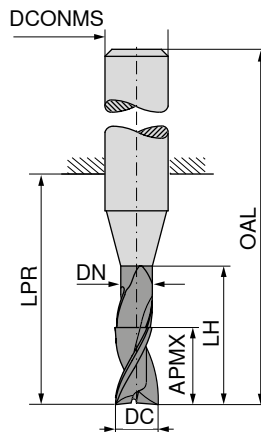
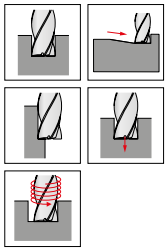
		52 802 ... / 52 804 ... / 52 806 ...																			
		Ø DC = 0,2–0,4 mm				Ø DC = 0,5–0,7 mm						Ø DC = 0,8–0,9 mm				Ø DC = 1,0–1,4 mm					
		0,1 x DC	0,2 x DC	0,3 x DC	0,4 x DC	0,1 x DC	0,2 x DC	0,3 x DC	0,4 x DC			0,1 x DC	0,2 x DC	0,3 x DC	0,4 x DC	0,1 x DC	0,2 x DC	0,3 x DC	0,4 x DC		
		a _e										a _e									
		a _{p max.}	0,006	0,006	0,006	0,006		0,015	0,015	0,015	0,015	a _{p max.}	0,024	0,024	0,024	0,024	0,03	0,03	0,03	0,03	
		n _{min.}	30.000				12.000						n _{min.}	8.000				6.500			
Index	n	V _f mm/min.				V _f mm/min.						n	V _f mm/min.				V _f mm/min.				
P.1.1	50.000	232	202	174	144	274	238	205	170			38.000	450	392	338	279	589	512	442	365	
P.1.2	50.000	232	202	174	144	274	238	205	170			38.000	450	392	338	279	589	512	442	365	
P.1.3	50.000	232	202	174	144	274	238	205	170			38.000	450	392	338	279	589	512	442	365	
P.1.4	50.000	201	175	151	125	190	165	142	118			25.000	300	261	225	186	335	292	252	208	
P.1.5	50.000	201	175	151	125	190	165	142	118			25.000	300	261	225	186	335	292	252	208	
P.2.1	50.000	232	202	174	144	274	238	205	170			38.000	450	392	338	279	589	512	442	365	
P.2.2	50.000	232	202	174	144	274	238	205	170			38.000	450	392	338	279	589	512	442	365	
P.2.3	50.000	201	175	151	125	190	165	142	118			25.000	300	261	225	186	335	292	252	208	
P.2.4	50.000	201	175	151	125	190	165	142	118			25.000	300	261	225	186	335	292	252	208	
P.3.1	50.000	201	175	151	125	190	165	142	118			25.000	300	261	225	186	335	292	252	208	
P.3.2	50.000	232	202	174	144	274	238	205	170			38.000	450	392	338	279	589	512	442	365	
P.3.3	50.000	201	175	151	125	190	165	142	118			25.000	300	261	225	186	335	292	252	208	
P.4.1	50.000	232	202	174	144	274	238	205	170			38.000	450	392	338	279	589	512	442	365	
P.4.2	50.000	232	202	174	144	274	238	205	170			38.000	450	392	338	279	589	512	442	365	
M.1.1	50.000	155	135	116	96	219	191	164	136			25.000	312	271	234	193	387	337	290	240	
M.2.1	50.000	155	135	116	96	219	191	164	136			25.000	312	271	234	193	387	337	290	240	
M.3.1	50.000	155	135	116	96	219	191	164	136			25.000	312	271	234	193	387	337	290	240	
K.1.1	50.000	232	202	174	144	274	238	205	170			44.000	485	422	364	301	682	593	511	423	
K.1.2	50.000	232	202	174	144	274	238	205	170			44.000	485	422	364	301	682	593	511	423	
K.2.1	50.000	232	202	174	144	274	238	205	170			44.000	485	422	364	301	682	593	511	423	
K.2.2	50.000	232	202	174	144	274	238	205	170			44.000	485	422	364	301	682	593	511	423	
K.3.1	50.000	141	123	106	88	150	131	113	93			19.000	215	187	161	133	269	234	202	167	
K.3.2	50.000	141	123	106	88	150	131	113	93			19.000	215	187	161	133	269	234	202	167	
N.1.1	50.000	232	202	174	144	438	381	329	272			50.000	693	603	520	430	930	809	697	576	
N.1.2	50.000	232	202	174	144	438	381	329	272			50.000	693	603	520	430	930	809	697	576	
N.2.1																					
N.2.2																					
N.2.3																					
N.3.1	50.000	232	202	174	144	274	238	205	170			31.000	402	350	301	249	480	418	360	298	
N.3.2	50.000	232	202	174	144	274	238	205	170			44.000	416	362	312	258	542	472	407	336	
N.3.3	50.000	232	202	174	144	274	238	205	170			44.000	416	362	312	258	542	472	407	336	
N.4.1	50.000	212	185	159	132	300	261	225	186			44.000	506	440	379	314	742	646	557	460	
S.1.1	50.000	46	40	35	29	55	48	41	34			12.000	69	60	51	43	88	76	66	54	
S.1.2	50.000	46	40	35	29	55	48	41	34			12.000	69	60	51	43	88	76	66	54	
S.2.1	50.000	54	47	40	33	63	55	47	39			19.000	102	89	76	63	126	110	95	78	
S.2.2	50.000	46	40	35	29	55	48	41	34			12.000	69	60	51	43	88	76	66	54	
S.2.3	50.000	46	40	35	29	55	48	41	34			12.000	59	51	44	36	82	71	62	51	
S.3.1	50.000	60	52	45	37	71	62	53	44			31.000	101	88	76	63	141	123	106	88	
S.3.2	50.000	60	52	45	37	71	62	53	44			31.000	101	88	76	63	177	154	133	110	
S.3.3	50.000	60	52	45	37	71	62	53	44			25.000	89	77	66	55	141	123	106	88	
H.1.1	50.000	47	41	36	29	67	58	50	42			25.000	90	78	68	56	101	88	75	62	
H.1.2	50.000	47	41	36	29	67	58	50	42			19.000	90	78	68	56	101	88	75	62	
H.1.3	50.000	45	39	34	28	63	55	47	39			19.000	85	74	64	53	95	83	71	59	
H.1.4																					
H.2.1	50.000	77	67	58	48	82	71	62	51			38.000	173	151	130	107	194	168	145	120	
H.3.1	50.000	47	41	36	29	67	58	50	42			25.000	90	78	68	56	101	88	75	62	
O.1.1	50.000	232	202	174	144	329	286	246	204			44.000	554	482	416	344	813	708	610	504	
O.1.2	50.000	232	202	174	144	329	286	246	204			38.000	554	482	416	344	705	613	529	437	
O.2.1	50.000	141	123	106	88	200	174	150	124			25.000	285	248	213	176	339	295	255	210	
O.2.2	50.000	141	123	106	88	200	174	150	124			25.000	285	248	213	176	339	295	255	210	
O.3.1																					



a_e = 0,6–1,0 x DC: Missing values only trochoidal slotting and milling is recommended. Otherwise there is the risk of tool breakage.

		52 802 ... / 52 804 ... / 52 806 ...																		1st choice		
		Ø DC = 1,5–1,7 mm			Ø DC = 1,8–1,9 mm					Ø DC = 2,0 mm					suitable							
		a _e	0,1 x DC	0,2 x DC	0,3 x DC	0,4 x DC	a _e	0,1 x DC	0,2 x DC	0,3 x DC	0,4 x DC	a _e	0,1 x DC	0,2 x DC	0,3 x DC	0,4 x DC	Emulsion	Compressed air	MMS			
		a _{p max.}	0,06	0,06	0,06	0,06	a _{p max.}	0,072	0,072	0,072	0,072	a _{p max.}	0,08	0,08	0,08	0,08						
		n _{min.}	6.500					n _{min.}	5.500					n _{min.}	5.000							
Index	n	V _f mm/min.					n	V _f mm/min.					n	V _f mm/min.								
	P.1.1	25.000	1000	870	750	620	22.000	1080	940	810	670	19.000	1140	992	855	707	●	○	○			
	P.1.2	25.000	1000	870	750	620	22.000	1080	940	810	670	19.000	1140	992	855	707	●	○	○			
	P.1.3	25.000	1000	870	750	620	22.000	1080	940	810	670	19.000	1140	992	855	707	●	○	○			
	P.1.4	16.000	554	482	416	344	14.000	680	592	510	422	12.000	720	626	540	446	●	○	○			
	P.1.5	16.000	554	482	416	344	14.000	680	592	510	422	12.000	720	626	540	446	●	○	○			
	P.2.1	25.000	1000	870	750	620	22.000	1080	940	810	670	19.000	1140	992	855	707		●	○			
	P.2.2	25.000	1000	870	750	620	22.000	1080	940	810	670	19.000	1140	992	855	707		●	○			
	P.2.3	16.000	554	482	416	344	14.000	680	592	510	422	12.000	720	626	540	446		●	○			
	P.2.4	16.000	554	482	416	344	14.000	680	592	510	422	12.000	720	626	540	446		●	○			
	P.3.1	16.000	554	482	416	344	14.000	680	592	510	422	12.000	720	626	540	446		●	○			
	P.3.2	25.000	1000	870	750	620	22.000	1080	940	810	670	19.000	1140	992	855	707		●	○			
	P.3.3	16.000	554	482	416	344	14.000	680	592	510	422	12.000	720	626	540	446		●	○			
P.4.1	25.000	1000	870	750	620	22.000	1080	940	810	670	19.000	1140	992	855	707		●	○				
P.4.2	25.000	1000	870	750	620	22.000	1080	940	810	670	19.000	1140	992	855	707		●	○				
	M.1.1	16.000	600	522	450	372	14.000	650	566	488	403	12.000	720	626	540	446	●		○			
	M.2.1	16.000	600	522	450	372	14.000	650	566	488	403	12.000	720	626	540	446	●		○			
	M.3.1	16.000	600	522	450	372	14.000	650	566	488	403	12.000	720	626	540	446	●		○			
	K.1.1	29.000	1160	1009	870	719	25.000	1240	1079	930	769	22.000	1320	1148	990	818	○	●				
	K.1.2	29.000	1160	1009	870	719	25.000	1240	1079	930	769	22.000	1320	1148	990	818	○	●				
	K.2.1	29.000	1160	1009	870	719	25.000	1240	1079	930	769	22.000	1320	1148	990	818	○	●				
	K.2.2	29.000	1160	1009	870	719	25.000	1240	1079	930	769	22.000	1320	1148	990	818	○	●				
	K.3.1	12.000	329	286	246	204	10.000	380	331	285	236	9.000	390	339	293	242		●				
	K.3.2	12.000	329	286	246	204	10.000	380	331	285	236	9.000	390	339	293	242		●				
	N.1.1	38.000	1520	1322	1140	942	33.000	1600	1392	1200	992	28.000	1680	1462	1260	1042	●		○			
	N.1.2	38.000	1520	1322	1140	942	33.000	1600	1392	1200	992	28.000	1680	1462	1260	1042	●		○			
	N.2.1																					
	N.2.2																					
	N.2.3																					
	N.3.1	21.000	800	696	600	496	18.000	850	740	638	527	15.000	900	783	675	558	●		○			
	N.3.2	29.000	900	783	675	558	25.000	1000	870	750	620	22.000	1140	992	855	707	●		○			
	N.3.3	29.000	900	783	675	558	25.000	1000	870	750	620	22.000	1140	992	855	707	●		○			
	N.4.1	29.000	1059	921	794	657	25.000	1200	1044	900	744	22.000	1320	1148	990	818	●		○			
	S.1.1	8.000	127	111	95	79	7.000	220	191	165	136	6.000	250	218	188	155	●		○			
	S.1.2	8.000	127	111	95	79	7.000	220	191	165	136	6.000	250	218	188	155	●		○			
	S.2.1	12.000	204	178	153	127	10.000	300	261	225	186	9.000	350	305	263	217	●		○			
	S.2.2	8.000	127	111	95	79	7.000	220	191	165	136	6.000	250	218	188	155	●		○			
	S.2.3	8.000	106	92	80	66	7.000	200	174	150	124	6.000	220	191	165	136	●		○			
	S.3.1	21.000	228	199	171	141	18.000	300	261	225	186	15.000	380	331	285	236	●		○			
	S.3.2	21.000	274	238	205	170	18.000	400	348	300	248	15.000	450	392	338	279	●		○			
S.3.3	16.000	237	206	178	147	14.000	300	261	225	186	12.000	380	331	285	236	●		○				
	H.1.1	16.000	173	151	130	107	14.000	200	174	150	124	12.000	240	209	180	149		●				
	H.1.2	12.000	173	151	130	107	10.000	200	174	150	124	9.000	240	209	180	149		●				
	H.1.3	12.000	163	142	122	101	10.000	200	174	150	124	9.000	240	209	180	149		●				
	H.1.4																					
	H.2.1	25.000	300	261	225	186	21.000	400	348	300	248	19.000	500	435	375	310		●				
H.3.1	16.000	173	151	130	107	14.000	200	174	150	124	12.000	240	209	180	149		●					
	O.1.1	29.000	1160	1009	870	719	25.000	1200	1044	900	744	22.000	1320	1148	990	818	●	○	○			
	O.1.2	25.000	1000	870	750	620	18.000	1000	870	750	620	19.000	1140	992	855	707	●	○	○			
	O.2.1	16.000	438	381	329	272	14.000	500	435	375	310	12.000	520	452	390	322	●	○	○			
	O.2.2	16.000	438	381	329	272	14.000	500	435	375	310	12.000	520	452	390	322	●	○	○			
	O.3.1																					

SilverLine – End milling cutter



NEW

DPB72S

DRAGONSKIN



≈DIN 6527

HB

50 558 ...

DC _{ø8} mm	APMX mm	DN mm	LH mm	LPR mm	OAL mm	DCONMS _{h6} mm	ZEFP	
3,0	8	2,8	15	21	57	6	2	03200
3,5	11	3,3	15	21	57	6	2	03700
4,0	11	3,8	15	21	57	6	2	04200
4,5	13	4,3	21	21	57	6	2	04700
5,0	13	4,8	21	21	57	6	2	05200
5,5	13	5,3	21	21	57	6	2	05700
6,0	13	5,8	21	21	57	6	2	06200
7,0	16	6,8	27	27	63	8	2	07200
8,0	19	7,8	27	27	63	8	2	08200
9,0	19	8,8	32	32	72	10	2	09200
10,0	22	9,8	32	32	72	10	2	10200
11,0	26	10,8	38	38	83	12	2	11200
12,0	26	11,8	38	38	83	12	2	12200
14,0	26	13,8	38	38	83	14	2	14200
15,0	32	14,7	44	44	92	16	2	15200
16,0	32	15,7	44	44	92	16	2	16200
17,0	32	16,7	44	44	92	18	2	17200
18,0	32	17,7	44	44	92	18	2	18200
19,0	38	18,7	54	54	104	20	2	19200
20,0	38	19,7	54	54	104	20	2	20200

P	•
M	•
K	•
N	○
S	•
H	
O	

Material examples for cutting data tables

	Material sub-group	Index	Composition / Structure / Heat treatment	Tensile strength N/mm ² / HB / HRC	Material number	Material designation	Material number	Material designation
P	Unalloyed steel	P.1.1	< 0,15 % C	Annealed	420 N/mm ² / 125 HB	1.0401	C15	1.1141 Ck15
		P.1.2	< 0,45 % C	Annealed	640 N/mm ² / 190 HB	1.1191	C45E	1.0718 9SMnPb28
		P.1.3		Tempered	840 N/mm ² / 250 HB	1.1191	C45E	1.0535 C55
		P.1.4	< 0,75 % C	Annealed	910 N/mm ² / 270 HB	1.1223	C60R	1.0535 C55
		P.1.5		Tempered	1010 N/mm ² / 300 HB	1.1223	C60R	1.0727 45S20
	Low-alloy steel	P.2.1		Annealed	610 N/mm ² / 180 HB	1.7131	16MnCr5	1.6587 17CrNiMo6
		P.2.2		Tempered	930 N/mm ² / 275 HB	1.7131	16MnCr5	1.6587 17CrNiMo6
		P.2.3		Tempered	1010 N/mm ² / 300 HB	1.7225	42CrMo4	1.3505 100Cr6
		P.2.4		Tempered	1200 N/mm ² / 375 HB	1.7225	42CrMo4	1.3505 100Cr6
	High-alloy steel and high-alloy tool steel	P.3.1		Annealed	680 N/mm ² / 200 HB	1.4021	X20Cr13	1.4034 X46Cr13
		P.3.2		Hardened and tempered	1100 N/mm ² / 300 HB	1.2343	X38CrMoV5-1	1.4034 X46Cr13
		P.3.3		Hardened and tempered	1300 N/mm ² / 400 HB	1.2343	X38CrMoV5-1	1.4034 X46Cr13
	Stainless steel	P.4.1	Ferritic / martensitic	Annealed	680 N/mm ² / 200 HB	1.4016	X6Cr17	1.2316 X36CrMo16
		P.4.2	Martensitic	Tempered	1010 N/mm ² / 300 HB	1.4112	X90CrMoV18	1.2316 X36CrMo16
M	Stainless steel	M.1.1	Austenitic / austenitic-ferritic	Quenched	610 N/mm ² / 180 HB	1.4301	X5CrNi18-10	1.4571 X6CrNiMoTi17-12-2
		M.2.1	Austenitic	Tempered	300 HB	1.4841	X15CrNiSi25-21	1.4539 X1NiCrMoCu25-20-5
		M.3.1	Austenitic / ferritic (Duplex)		780 N/mm ² / 230 HB	1.4462	X2CrNiMoN22-5-3	1.4501 X2CrNiMoCuWN25-7-4
K	Grey cast iron	K.1.1	Pearlitic / ferritic		350 N/mm ² / 180 HB	0.6010	GG-10	0.6025 GG-25
		K.1.2	Pearlitic (martensitic)		500 N/mm ² / 260 HB	0.6030	GG-30	0.6045 GG-45
	Spherulitic graphite cast iron	K.2.1	Ferritic		540 N/mm ² / 160 HB	0.7040	GGG-40	0.7060 GGG-60
		K.2.2	Pearlitic		845 N/mm ² / 250 HB	0.7070	GGG-70	0.7080 GGG-80
	Malleable iron	K.3.1	Ferritic		440 N/mm ² / 130 HB	0.8035	GTW-35-04	0.8045 GTW-45
		K.3.2	Pearlitic		780 N/mm ² / 230 HB	0.8165	GTS-65-02	0.8170 GTS-70-02
N	Aluminium wrought alloy	N.1.1	Non-hardenable		60 HB	3.0255	Al99,5	3.3315 AlMg1
		N.1.2	Hardenable	Age-hardened	340 N/mm ² / 100 HB	3.1355	AlCuMg2	3.2315 AlMgSi1
	Cast aluminium alloy	N.2.1	≤ 12 % Si, non-hardenable		250 N/mm ² / 75 HB	3.2581	G-AlSi12	3.2163 G-AlSi9Cu3
		N.2.2	≤ 12 % Si, hardenable	Age-hardened	300 N/mm ² / 90 HB	3.2134	G-AlSi5Cu1Mg	3.2373 G-AlSi9Mg
		N.2.3	> 12 % Si, non-hardenable		440 N/mm ² / 130 HB		G-AlSi17Cu4Mg	G-AlSi18CuNiMg
	Copper and copper alloys (bronze/brass)	N.3.1	Free-machining alloys, PB > 1 %		375 N/mm ² / 110 HB	2.0380	CuZn39Pb2 (Ms58)	2.0410 CuZn44Pb2
		N.3.2	CuZn, CuSnZn		300 N/mm ² / 90 HB	2.0331	CuZn15	2.4070 CuZn28Sn1As
		N.3.3	CuSn, lead-free copper and electrolytic copper		340 N/mm ² / 100 HB	2.0060	E-Cu57	2.0590 CuZn40Fe
	Magnesium alloys	N.4.1	Magnesium and magnesium alloys		70 HB	3.5612	MgAl6Zn	3.5312 MgAl3Zn
S	Heat-resistant alloys	S.1.1	Fe - basis	Annealed	680 N/mm ² / 200 HB	1.4864	X12NiCrSi 36-16	1.4865 G-X40NiCrSi38-18
		S.1.2		Age-hardened	950 N/mm ² / 280 HB	1.4980	X6NiCrTiMoVB25-15-2	1.4876 X10NiCrAlTi32-20
		S.2.1	Ni or Co basis	Annealed	840 N/mm ² / 250 HB	2.4631	NiCr20TiAl (Nimonic80A)	3.4856 NiCr22Mo9Nb
		S.2.2		Age-hardened	1180 N/mm ² / 350 HB	2.4668	NiCr19Nb5Mo3 (Inconel 718)	2.4955 NiFe25Cr20NbTi
		S.2.3		Cast	1080 N/mm ² / 320 HB	2.4765	CoCr20W15Ni	1.3401 G-X120Mn12
	Titanium alloys	S.3.1	Pure titanium		400 N/mm ²	3.7025	Ti99,8	3.7034 Ti99,7
		S.3.2	Alpha + beta alloys	Age-hardened	1050 N/mm ² / 320 HB	3.7165	TiAl6V4	Ti-6246 Ti-6Al-2Sn-4Zr-6Mo
		S.3.3	Beta alloys		1400 N/mm ² / 410 HB	Ti555.3	Ti-5Al-5V-5Mo-3Cr	R56410 Ti-10V-2Fe-3Al
H	Hardened steel	H.1.1		Hardened and tempered	46-55 HRC			
		H.1.2		Hardened and tempered	56-60 HRC			
		H.1.3		Hardened and tempered	61-65 HRC			
		H.1.4		Hardened and tempered	66-70 HRC			
	Chilled iron	H.2.1		Cast	400 HB			
	Hardened cast iron	H.3.1		Hardened and tempered	55 HRC			
O	Non-metal materials	O.1.1	Plastics, duroplastic		≤ 150 N/mm ²			
		O.1.2	Plastics, thermoplastic		≤ 100 N/mm ²			
		O.2.1	Aramid fibre-reinforced		≤ 1000 N/mm ²			
		O.2.2	Glass/carbon-fibre reinforced		≤ 1000 N/mm ²			
		O.3.1	Graphite					

* Tensile strength

Cutting data standard values – SilverLine – End mill

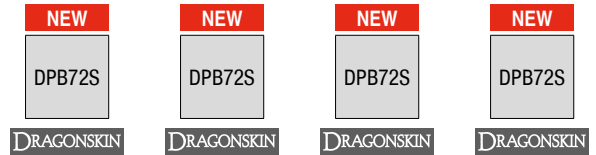
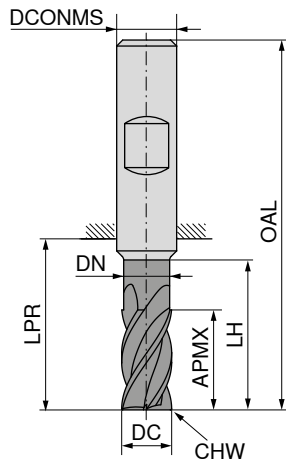
		50 558 ...																			
Index	Type long	V _c m/min	a _{p max} x DC	Ø DC = 3,0			Ø DC = 3,5–4,0 mm			Ø DC = 4,5–5,0 mm			Ø DC = 5,5–6,0 mm			Ø DC = 7,0–8,0 mm			Ø DC = 9,0–10,0mm		
				a _p 0,1–0,2 x DC	a _p 0,3–0,4 x DC	a _p 0,6–1,0 x DC	a _p 0,1–0,2 x DC	a _p 0,3–0,4 x DC	a _p 0,6–1,0 x DC	a _p 0,1–0,2 x DC	a _p 0,3–0,4 x DC	a _p 0,6–1,0 x DC	a _p 0,1–0,2 x DC	a _p 0,3–0,4 x DC	a _p 0,6–1,0 x DC	a _p 0,1–0,2 x DC	a _p 0,3–0,4 x DC	a _p 0,6–1,0 x DC	a _p 0,1–0,2 x DC	a _p 0,3–0,4 x DC	a _p 0,6–1,0 x DC
				f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm
P.1.1	110	1,0*		0,035	0,028	0,018	0,042	0,034	0,021	0,050	0,040	0,025	0,058	0,046	0,029	0,072	0,058	0,036	0,086	0,069	0,043
P.1.2	90	1,0*		0,027	0,022	0,014	0,034	0,027	0,017	0,041	0,033	0,021	0,048	0,038	0,024	0,062	0,050	0,031	0,075	0,060	0,038
P.1.3	90	1,0*		0,027	0,022	0,014	0,034	0,027	0,017	0,041	0,033	0,021	0,048	0,038	0,024	0,062	0,050	0,031	0,075	0,060	0,038
P.1.4	80	1,0*		0,027	0,022	0,014	0,034	0,027	0,017	0,041	0,033	0,021	0,048	0,038	0,024	0,062	0,050	0,031	0,075	0,060	0,038
P.1.5	80	1,0*		0,027	0,022	0,014	0,034	0,027	0,017	0,041	0,033	0,021	0,048	0,038	0,024	0,062	0,050	0,031	0,075	0,060	0,038
P.2.1	90	1,0*		0,027	0,022	0,014	0,034	0,027	0,017	0,041	0,033	0,021	0,048	0,038	0,024	0,062	0,050	0,031	0,075	0,060	0,038
P.2.2	70	1,0*		0,027	0,022	0,014	0,034	0,027	0,017	0,041	0,033	0,021	0,048	0,038	0,024	0,062	0,050	0,031	0,075	0,060	0,038
P.2.3	70	1,0*		0,027	0,022	0,014	0,034	0,027	0,017	0,041	0,033	0,021	0,048	0,038	0,024	0,062	0,050	0,031	0,075	0,060	0,038
P.2.4	55	1,0*		0,027	0,022	0,014	0,034	0,027	0,017	0,041	0,033	0,021	0,048	0,038	0,024	0,062	0,050	0,031	0,075	0,060	0,038
P.3.1																					
P.3.2																					
P.3.3																					
P.4.1	50	1,0*		0,022	0,018	0,011	0,028	0,022	0,014	0,034	0,027	0,017	0,041	0,033	0,021	0,054	0,043	0,027	0,066	0,053	0,033
P.4.2	40	1,0*		0,022	0,018	0,011	0,028	0,022	0,014	0,034	0,027	0,017	0,041	0,033	0,021	0,054	0,043	0,027	0,066	0,053	0,033
M.1.1	40	1,0*		0,022	0,018	0,011	0,028	0,022	0,014	0,034	0,027	0,017	0,041	0,033	0,021	0,054	0,043	0,027	0,066	0,053	0,033
M.2.1	50	1,0*		0,022	0,018	0,011	0,028	0,022	0,014	0,034	0,027	0,017	0,041	0,033	0,021	0,054	0,043	0,027	0,066	0,053	0,033
M.3.1	50	1,0*		0,022	0,018	0,011	0,028	0,022	0,014	0,034	0,027	0,017	0,041	0,033	0,021	0,054	0,043	0,027	0,066	0,053	0,033
K.1.1	130	1,0*		0,056	0,045	0,028	0,068	0,054	0,034	0,080	0,064	0,040	0,092	0,074	0,046	0,116	0,093	0,058	0,140	0,112	0,070
K.1.2	120	1,0*		0,056	0,045	0,028	0,068	0,054	0,034	0,080	0,064	0,040	0,092	0,074	0,046	0,116	0,093	0,058	0,140	0,112	0,070
K.2.1	130	1,0*		0,040	0,032	0,020	0,048	0,038	0,024	0,056	0,045	0,028	0,064	0,051	0,032	0,079	0,063	0,040	0,095	0,076	0,048
K.2.2	120	1,0*		0,040	0,032	0,020	0,048	0,038	0,024	0,056	0,045	0,028	0,064	0,051	0,032	0,079	0,063	0,040	0,095	0,076	0,048
K.3.1	130	1,0*		0,056	0,045	0,028	0,068	0,054	0,034	0,080	0,064	0,040	0,092	0,074	0,046	0,116	0,093	0,058	0,140	0,112	0,070
K.3.2	120	1,0*		0,056	0,045	0,028	0,068	0,054	0,034	0,080	0,064	0,040	0,092	0,074	0,046	0,116	0,093	0,058	0,140	0,112	0,070
N.1.1																					
N.1.2																					
N.2.1																					
N.2.2																					
N.2.3																					
N.3.1	200	1,0*		0,040	0,032	0,020	0,050	0,040	0,025	0,060	0,048	0,030	0,070	0,056	0,035	0,090	0,072	0,045	0,110	0,088	0,055
N.3.2	200	1,0*		0,040	0,032	0,020	0,050	0,040	0,025	0,060	0,048	0,030	0,070	0,056	0,035	0,090	0,072	0,045	0,110	0,088	0,055
N.3.3	140	1,0*		0,040	0,032	0,020	0,050	0,040	0,025	0,060	0,048	0,030	0,070	0,056	0,035	0,090	0,072	0,045	0,110	0,088	0,055
N.4.1																					
S.1.1	30	1,0*		0,015	0,012	0,008	0,020	0,016	0,010	0,025	0,020	0,013	0,030	0,024	0,015	0,040	0,032	0,020	0,050	0,040	0,025
S.1.2	30	1,0*		0,015	0,012	0,008	0,020	0,016	0,010	0,025	0,020	0,013	0,030	0,024	0,015	0,040	0,032	0,020	0,050	0,040	0,025
S.2.1	30	1,0*		0,015	0,012	0,008	0,020	0,016	0,010	0,025	0,020	0,013	0,030	0,024	0,015	0,040	0,032	0,020	0,050	0,040	0,025
S.2.2	30	1,0*		0,015	0,012	0,008	0,020	0,016	0,010	0,025	0,020	0,013	0,030	0,024	0,015	0,040	0,032	0,020	0,050	0,040	0,025
S.2.3	30	1,0*		0,015	0,012	0,008	0,020	0,016	0,010	0,025	0,020	0,013	0,030	0,024	0,015	0,040	0,032	0,020	0,050	0,040	0,025
S.3.1	50	1,0*		0,022	0,018	0,011	0,028	0,022	0,014	0,034	0,027	0,017	0,041	0,033	0,021	0,054	0,043	0,027	0,066	0,053	0,033
S.3.2	20	1,0*		0,022	0,018	0,011	0,028	0,022	0,014	0,034	0,027	0,017	0,041	0,033	0,021	0,054	0,043	0,027	0,066	0,053	0,033
S.3.3																					
H.1.1																					
H.1.2																					
H.1.3																					
H.1.4																					
H.2.1																					
H.3.1																					
O.1.1																					
O.1.2																					
O.2.1																					
O.2.2																					
O.3.1																					

* = long version: a_{p max} = 1.5 x DC at f_z x 0.75

Plunging angle for ramping and helical milling = 6-10°

		50 558 ...																	
		Ø DC = 11,0–12,0 mm			Ø DC = 14,0 mm			Ø DC = 15,0–16,0 mm			Ø DC = 17,0–18,0 mm			Ø DC = 19,0–20,0 mm			○	1st choice	
																	●	suitable	
		a _e 0,1–0,2 x DC	a _e 0,3–0,4 x DC	a _e 0,6–1,0 x DC	a _e 0,1–0,2 x DC	a _e 0,3–0,4 x DC	a _e 0,6–1,0 x DC	a _e 0,1–0,2 x DC	a _e 0,3–0,4 x DC	a _e 0,6–1,0 x DC	a _e 0,1–0,2 x DC	a _e 0,3–0,4 x DC	a _e 0,6–1,0 x DC	a _e 0,1–0,2 x DC	a _e 0,3–0,4 x DC	a _e 0,6–1,0 x DC	Emulsion	Compressed air	MMS
Index	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm					
	P.1.1	0,102	0,082	0,051	0,116	0,093	0,058	0,124	0,099	0,062	0,131	0,105	0,066	0,139	0,111	0,070	●	○	○
	P.1.2	0,089	0,071	0,045	0,103	0,082	0,052	0,110	0,088	0,055	0,117	0,094	0,059	0,123	0,098	0,062	●	○	○
	P.1.3	0,089	0,071	0,045	0,103	0,082	0,052	0,110	0,088	0,055	0,117	0,094	0,059	0,123	0,098	0,062	●	○	○
	P.1.4	0,089	0,071	0,045	0,103	0,082	0,052	0,110	0,088	0,055	0,117	0,094	0,059	0,123	0,098	0,062	●	○	○
	P.1.5	0,089	0,071	0,045	0,103	0,082	0,052	0,110	0,088	0,055	0,117	0,094	0,059	0,123	0,098	0,062	●	○	○
	P.2.1	0,089	0,071	0,045	0,103	0,082	0,052	0,110	0,088	0,055	0,117	0,094	0,059	0,123	0,098	0,062	●	○	○
	P.2.2	0,089	0,071	0,045	0,103	0,082	0,052	0,110	0,088	0,055	0,117	0,094	0,059	0,123	0,098	0,062	●	○	○
	P.2.3	0,089	0,071	0,045	0,103	0,082	0,052	0,110	0,088	0,055	0,117	0,094	0,059	0,123	0,098	0,062	●	○	○
	P.2.4	0,089	0,071	0,045	0,103	0,082	0,052	0,110	0,088	0,055	0,117	0,094	0,059	0,123	0,098	0,062	●	○	○
	P.3.1																●	○	○
	P.3.2																		
	P.3.3																		
	P.4.1	0,079	0,063	0,040	0,092	0,074	0,046	0,099	0,079	0,050	0,105	0,084	0,053	0,111	0,089	0,056	●		
P.4.2	0,079	0,063	0,040	0,092	0,074	0,046	0,099	0,079	0,050	0,105	0,084	0,053	0,111	0,089	0,056	●			
	M.1.1	0,079	0,063	0,040	0,092	0,074	0,046	0,099	0,079	0,050	0,105	0,084	0,053	0,111	0,089	0,056	●		
	M.2.1	0,079	0,063	0,040	0,092	0,074	0,046	0,099	0,079	0,050	0,105	0,084	0,053	0,111	0,089	0,056	●		
	M.3.1	0,079	0,063	0,040	0,092	0,074	0,046	0,099	0,079	0,050	0,105	0,084	0,053	0,111	0,089	0,056	●		
	K.1.1	0,164	0,131	0,082	0,188	0,150	0,094	0,200	0,160	0,100	0,212	0,170	0,106	0,224	0,179	0,112	●	○	○
	K.1.2	0,164	0,131	0,082	0,188	0,150	0,094	0,200	0,160	0,100	0,212	0,170	0,106	0,224	0,179	0,112	●	○	○
	K.2.1	0,110	0,088	0,055	0,126	0,101	0,063	0,134	0,107	0,067	0,142	0,114	0,071	0,150	0,120	0,075	●	○	○
	K.2.2	0,110	0,088	0,055	0,126	0,101	0,063	0,134	0,107	0,067	0,142	0,114	0,071	0,150	0,120	0,075	●	○	○
	K.3.1	0,164	0,131	0,082	0,188	0,150	0,094	0,200	0,160	0,100	0,212	0,170	0,106	0,224	0,179	0,112	●	○	○
	K.3.2	0,164	0,131	0,082	0,188	0,150	0,094	0,200	0,160	0,100	0,212	0,170	0,106	0,224	0,179	0,112	●	○	○
	N.1.1																		
	N.1.2																		
	N.2.1																		
	N.2.2																		
	N.2.3																		
	N.3.1	0,130	0,104	0,065	0,150	0,120	0,075	0,160	0,128	0,080	0,170	0,136	0,085	0,180	0,144	0,090	●		
	N.3.2	0,130	0,104	0,065	0,150	0,120	0,075	0,160	0,128	0,080	0,170	0,136	0,085	0,180	0,144	0,090	●		
	N.3.3	0,130	0,104	0,065	0,150	0,120	0,075	0,160	0,128	0,080	0,170	0,136	0,085	0,180	0,144	0,090	●		
N.4.1																			
	S.1.1	0,060	0,048	0,030	0,070	0,056	0,035	0,075	0,060	0,038	0,079	0,063	0,040	0,084	0,067	0,042	●		
	S.1.2	0,060	0,048	0,030	0,070	0,056	0,035	0,075	0,060	0,038	0,079	0,063	0,040	0,084	0,067	0,042	●		
	S.2.1	0,060	0,048	0,030	0,070	0,056	0,035	0,075	0,060	0,038	0,079	0,063	0,040	0,084	0,067	0,042	●		
	S.2.2	0,060	0,048	0,030	0,070	0,056	0,035	0,075	0,060	0,038	0,079	0,063	0,040	0,084	0,067	0,042	●		
	S.2.3	0,060	0,048	0,030	0,070	0,056	0,035	0,075	0,060	0,038	0,079	0,063	0,040	0,084	0,067	0,042	●		
	S.3.1	0,079	0,063	0,040	0,092	0,074	0,046	0,099	0,079	0,050	0,105	0,084	0,053	0,111	0,089	0,056	●		
	S.3.2	0,079	0,063	0,040	0,092	0,074	0,046	0,099	0,079	0,050	0,105	0,084	0,053	0,111	0,089	0,056	●		
	S.3.3																		
	H.1.1																		
	H.1.2																		
	H.1.3																		
	H.1.4																		
	H.2.1																		
	H.3.1																		
		O.1.1																	
O.1.2																			
O.2.1																			
O.2.2																			
	O.3.1																		

SilverLine – End milling cutter



≈DIN 6527



50 993 ...



≈DIN 6527



50 995 ...



≈DIN 6527



50 994 ...



≈DIN 6527



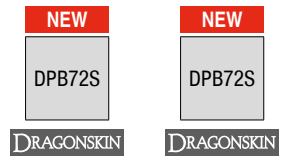
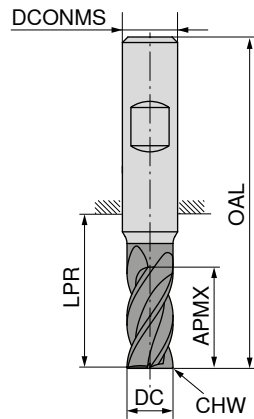
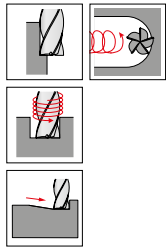
50 996 ...

DC _{es} mm	APMX mm	DN mm	LH mm	LPR mm	OAL mm	DCONMS _{h6} mm	CHW mm	ZEFP				
6	10			18	54	6	0,1	5		06100	06100	
6	13	5,8	19	21	57	6	0,1	5				06200
8	12			22	58	8	0,2	5		08100	08100	08200
8	21	7,7	25	27	63	8	0,2	5			08200	08200
10	14			26	66	10	0,2	5		10100	10100	10200
10	22	9,7	30	32	72	10	0,2	5			10200	10200
12	16			28	73	12	0,3	5		12100	12100	12200
12	26	11,6	36	38	83	12	0,3	5			12200	12200
16	22			34	82	16	0,3	5		16100	16100	16200
16	36	15,5	42	44	92	16	0,3	5			16200	16200
20	26			42	92	20	0,3	5		20100	20100	20200
20	41	19,5	52	54	104	20	0,3	5			20200	20200

P	•	•	•	•
M	•	•	•	•
K	•	•	•	•
N	○	○	○	○
S	•	•	•	•
H				
O				

SilverLine – End milling cutter

▲ Cutting depth: 3 x DC



≈DIN 6527



50 999 ...



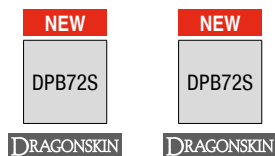
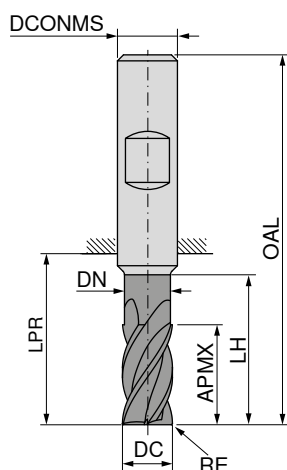
≈DIN 6527



50 949 ...

DC _{ø8} mm	APMX mm	LPR mm	OAL mm	DCONMS _{h6} mm	CHW mm	ZEFP		
6	19	26	62	6	0,1	5		
8	25	32	68	8	0,2	5		
10	31	40	80	10	0,2	5		
12	37	48	93	12	0,3	5		
16	49	60	108	16	0,3	5		
20	61	76	126	20	0,3	5		
P							●	●
M							●	●
K							●	●
N							○	○
S							●	●
H								
O								

SilverLine – End milling cutter with corner radius



Factory standard

Factory standard

HA

HB

50 997 ...

50 998 ...

DC _{es} mm	RE _{±0.01} mm	APMX mm	DN mm	LH mm	LPR mm	OAL mm	DCONMS _{h6} mm	ZEFP
6	0,2	13	5,8	19	21	57	6	5
6	0,5	13	5,8	19	21	57	6	5
6	1,0	13	5,8	19	21	57	6	5
8	0,2	21	7,7	25	27	63	8	5
8	0,5	21	7,7	25	27	63	8	5
8	1,0	21	7,7	25	27	63	8	5
8	1,5	21	7,7	25	27	63	8	5
10	0,2	22	9,7	30	32	72	10	5
10	0,5	22	9,7	30	32	72	10	5
10	1,0	22	9,7	30	32	72	10	5
10	1,5	22	9,7	30	32	72	10	5
10	1,6	22	9,7	30	32	72	10	5
10	2,0	22	9,7	30	32	72	10	5
12	0,3	26	11,6	36	38	83	12	5
12	0,5	26	11,6	36	38	83	12	5
12	1,0	26	11,6	36	38	83	12	5
12	1,5	26	11,6	36	38	83	12	5
12	1,6	26	11,6	36	38	83	12	5
12	2,0	26	11,6	36	38	83	12	5
12	2,5	26	11,6	36	38	83	12	5
16	0,3	36	15,5	42	44	92	16	5
16	0,5	36	15,5	42	44	92	16	5
16	1,0	36	15,5	42	44	92	16	5
16	1,5	36	15,5	42	44	92	16	5
16	1,6	36	15,5	42	44	92	16	5
16	2,0	36	15,5	42	44	92	16	5
16	2,5	36	15,5	42	44	92	16	5
16	3,0	36	15,5	42	44	92	16	5
20	0,3	41	19,5	52	54	104	20	5
20	0,5	41	19,5	52	54	104	20	5
20	1,0	41	19,5	52	54	104	20	5
20	1,5	41	19,5	52	54	104	20	5
20	1,6	41	19,5	52	54	104	20	5
20	2,0	41	19,5	52	54	104	20	5
20	2,5	41	19,5	52	54	104	20	5
20	3,0	41	19,5	52	54	104	20	5
20	4,0	41	19,5	52	54	104	20	5

P	●	●
M	●	●
K	●	●
N	○	○
S	●	●
H		
O		

Material examples for cutting data tables

	Material sub-group	Index	Composition / Structure / Heat treatment		Tensile strength N/mm ² / HB / HRC	Material number	Material designation	Material number	Material designation
P	Unalloyed steel	P.1.1	< 0,15 % C	Annealed	420 N/mm ² / 125 HB	1.0401	C15	1.1141	Ck15
		P.1.2	< 0,45 % C	Annealed	640 N/mm ² / 190 HB	1.1191	C45E	1.0718	9SMnPb28
		P.1.3		Tempered	840 N/mm ² / 250 HB	1.1191	C45E	1.0535	C55
		P.1.4	< 0,75 % C	Annealed	910 N/mm ² / 270 HB	1.1223	C60R	1.0535	C55
		P.1.5		Tempered	1010 N/mm ² / 300 HB	1.1223	C60R	1.0727	45S20
	Low-alloy steel	P.2.1		Annealed	610 N/mm ² / 180 HB	1.7131	16MnCr5	1.6587	17CrNiMo6
		P.2.2		Tempered	930 N/mm ² / 275 HB	1.7131	16MnCr5	1.6587	17CrNiMo6
		P.2.3		Tempered	1010 N/mm ² / 300 HB	1.7225	42CrMo4	1.3505	100Cr6
		P.2.4		Tempered	1200 N/mm ² / 375 HB	1.7225	42CrMo4	1.3505	100Cr6
	High-alloy steel and high-alloy tool steel	P.3.1		Annealed	680 N/mm ² / 200 HB	1.4021	X20Cr13	1.4034	X46Cr13
		P.3.2		Hardened and tempered	1100 N/mm ² / 300 HB	1.2343	X38CrMoV5-1	1.4034	X46Cr13
		P.3.3		Hardened and tempered	1300 N/mm ² / 400 HB	1.2343	X38CrMoV5-1	1.4034	X46Cr13
	Stainless steel	P.4.1	Ferritic / martensitic	Annealed	680 N/mm ² / 200 HB	1.4016	X6Cr17	1.2316	X36CrMo16
		P.4.2	Martensitic	Tempered	1010 N/mm ² / 300 HB	1.4112	X90CrMoV18	1.2316	X36CrMo16
M	Stainless steel	M.1.1	Austenitic / austenitic-ferritic	Quenched	610 N/mm ² / 180 HB	1.4301	X5CrNi18-10	1.4571	X6CrNiMoTi17-12-2
		M.2.1	Austenitic	Tempered	300 HB	1.4841	X15CrNiSi25-21	1.4539	X1NiCrMoCu25-20-5
		M.3.1	Austenitic / ferritic (Duplex)		780 N/mm ² / 230 HB	1.4462	X2CrNiMoN22-5-3	1.4501	X2CrNiMoCuWN25-7-4
K	Grey cast iron	K.1.1	Pearlitic / ferritic		350 N/mm ² / 180 HB	0.6010	GG-10	0.6025	GG-25
		K.1.2	Pearlitic (martensitic)		500 N/mm ² / 260 HB	0.6030	GG-30	0.6045	GG-45
	Spherulitic graphite cast iron	K.2.1	Ferritic		540 N/mm ² / 160 HB	0.7040	GGG-40	0.7060	GGG-60
		K.2.2	Pearlitic		845 N/mm ² / 250 HB	0.7070	GGG-70	0.7080	GGG-80
	Malleable iron	K.3.1	Ferritic		440 N/mm ² / 130 HB	0.8035	GTW-35-04	0.8045	GTW-45
		K.3.2	Pearlitic		780 N/mm ² / 230 HB	0.8165	GTS-65-02	0.8170	GTS-70-02
N	Aluminium wrought alloy	N.1.1	Non-hardenable		60 HB	3.0255	Al99,5	3.3315	AlMg1
		N.1.2	Hardenable	Age-hardened	340 N/mm ² / 100 HB	3.1355	AlCuMg2	3.2315	AlMgSi1
	Cast aluminium alloy	N.2.1	≤ 12 % Si, non-hardenable		250 N/mm ² / 75 HB	3.2581	G-AlSi12	3.2163	G-AlSi9Cu3
		N.2.2	≤ 12 % Si, hardenable	Age-hardened	300 N/mm ² / 90 HB	3.2134	G-AlSi5Cu1Mg	3.2373	G-AlSi9Mg
		N.2.3	> 12 % Si, non-hardenable		440 N/mm ² / 130 HB		G-AlSi17Cu4Mg		G-AlSi18CuNiMg
	Copper and copper alloys (bronze/brass)	N.3.1	Free-machining alloys, PB > 1 %		375 N/mm ² / 110 HB	2.0380	CuZn39Pb2 (Ms58)	2.0410	CuZn44Pb2
		N.3.2	CuZn, CuSnZn		300 N/mm ² / 90 HB	2.0331	CuZn15	2.4070	CuZn28Sn1As
		N.3.3	CuSn, lead-free copper and electrolytic copper		340 N/mm ² / 100 HB	2.0060	E-Cu57	2.0590	CuZn40Fe
	Magnesium alloys	N.4.1	Magnesium and magnesium alloys		70 HB	3.5612	MgAl6Zn	3.5312	MgAl3Zn
S	Heat-resistant alloys	S.1.1	Fe - basis	Annealed	680 N/mm ² / 200 HB	1.4864	X12NiCrSi 36-16	1.4865	G-X40NiCrSi38-18
		S.1.2		Age-hardened	950 N/mm ² / 280 HB	1.4980	X6NiCrTiMoVB25-15-2	1.4876	X10NiCrAlTi32-20
		S.2.1	Ni or Co basis	Annealed	840 N/mm ² / 250 HB	2.4631	NiCr20TiAl (Nimonic80A)	3.4856	NiCr22Mo9Nb
		S.2.2		Age-hardened	1180 N/mm ² / 350 HB	2.4668	NiCr19Nb5Mo3 (Inconel 718)	2.4955	NiFe25Cr20NbTi
		S.2.3		Cast	1080 N/mm ² / 320 HB	2.4765	CoCr20W15Ni	1.3401	G-X120Mn12
	Titanium alloys	S.3.1	Pure titanium		400 N/mm ²	3.7025	Ti99,8	3.7034	Ti99,7
		S.3.2	Alpha + beta alloys	Age-hardened	1050 N/mm ² / 320 HB	3.7165	TiAl6V4	Ti-6246	Ti-6Al-2Sn-4Zr-6Mo
		S.3.3	Beta alloys		1400 N/mm ² / 410 HB	Ti555.3	Ti-5Al-5V-5Mo-3Cr	R56410	Ti-10V-2Fe-3Al
H	Hardened steel	H.1.1		Hardened and tempered	46-55 HRC				
		H.1.2		Hardened and tempered	56-60 HRC				
		H.1.3		Hardened and tempered	61-65 HRC				
		H.1.4		Hardened and tempered	66-70 HRC				
	Chilled iron	H.2.1		Cast	400 HB				
	Hardened cast iron	H.3.1		Hardened and tempered	55 HRC				
O	Non-metal materials	O.1.1	Plastics, duroplastic		≤ 150 N/mm ²				
		O.1.2	Plastics, thermoplastic		≤ 100 N/mm ²				
		O.2.1	Aramid fibre-reinforced		≤ 1000 N/mm ²				
		O.2.2	Glass/carbon-fibre reinforced		≤ 1000 N/mm ²				
		O.3.1	Graphite						

* Tensile strength

Cutting data standard values – SilverLine – End mill

			50 993 ... / 50 994 ... / 50 995 ... / 50 996 ... / 50 997 ... / 50 998 ...																				
Index	Type short / long v _c m/min	a _{p max} x DC	Ø DC = 6 mm			Ø DC = 8 mm			Ø DC = 10 mm			Ø DC = 12 mm			Ø DC = 16 mm			Ø DC = 20 mm			1st choice		
			a _p 0,1-0,2 x DC	a _p 0,3-0,4 x DC	a _p 0,6 x DC	a _p 0,1-0,2 x DC	a _p 0,3-0,4 x DC	a _p 0,6 x DC	a _p 0,1-0,2 x DC	a _p 0,3-0,4 x DC	a _p 0,6 x DC	a _p 0,1-0,2 x DC	a _p 0,3-0,4 x DC	a _p 0,6 x DC	a _p 0,1-0,2 x DC	a _p 0,3-0,4 x DC	a _p 0,6 x DC	a _p 0,1-0,2 x DC	a _p 0,3-0,4 x DC	a _p 0,6 x DC	●	suitable	
			f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	Emulsion	Compressed air	MMS			
P.1.1	205	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
P.1.2	200	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
P.1.3	200	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
P.1.4	190	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
P.1.5	190	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
P.2.1	200	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
P.2.2	190	1,0	0,060	0,048	0,030	0,080	0,064	0,040	0,100	0,080	0,050	0,120	0,096	0,060	0,150	0,120	0,075	0,170	0,136	0,085	●	○	○
P.2.3	180	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
P.2.4	170	1,0	0,060	0,048	0,030	0,080	0,064	0,040	0,100	0,080	0,050	0,120	0,096	0,060	0,150	0,120	0,075	0,170	0,136	0,085	●	○	○
P.3.1	180	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
P.3.2	170	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
P.3.3	145	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
P.4.1	100	1,0	0,038	0,030	0,019	0,052	0,042	0,026	0,066	0,053	0,033	0,080	0,064	0,040	0,101	0,081	0,051	0,115	0,092	0,058	●		
P.4.2	80	1,0	0,038	0,030	0,019	0,052	0,042	0,026	0,066	0,053	0,033	0,080	0,064	0,040	0,101	0,081	0,051	0,115	0,092	0,058	●		
M.1.1	100	1,0	0,038	0,030	0,019	0,052	0,042	0,026	0,066	0,053	0,033	0,080	0,064	0,040	0,101	0,081	0,051	0,115	0,092	0,058	●		
M.2.1	100	1,0	0,038	0,030	0,019	0,052	0,042	0,026	0,066	0,053	0,033	0,080	0,064	0,040	0,101	0,081	0,051	0,115	0,092	0,058	●		
M.3.1	100	1,0	0,038	0,030	0,019	0,052	0,042	0,026	0,066	0,053	0,033	0,080	0,064	0,040	0,101	0,081	0,051	0,115	0,092	0,058	●		
K.1.1	200	1,0	0,094	0,075	0,047	0,126	0,101	0,063	0,160	0,128	0,080	0,192	0,154	0,096	0,240	0,192	0,120	0,274	0,219	0,137	●	○	○
K.1.2	180	1,0	0,094	0,075	0,047	0,126	0,101	0,063	0,160	0,128	0,080	0,192	0,154	0,096	0,240	0,192	0,120	0,274	0,219	0,137	●	○	○
K.2.1	190	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
K.2.2	170	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
K.3.1	180	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
K.3.2	160	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
N.1.1																							
N.1.2																							
N.2.1																							
N.2.2																							
N.2.3																							
N.3.1	315	1,0	0,094	0,075	0,047	0,126	0,101	0,063	0,160	0,128	0,080	0,192	0,154	0,096	0,240	0,192	0,120	0,274	0,219	0,137	●	○	○
N.3.2	315	1,0	0,094	0,075	0,047	0,126	0,101	0,063	0,160	0,128	0,080	0,192	0,154	0,096	0,240	0,192	0,120	0,274	0,219	0,137	●	○	○
N.3.3	250	1,0	0,094	0,075	0,047	0,126	0,101	0,063	0,160	0,128	0,080	0,192	0,154	0,096	0,240	0,192	0,120	0,274	0,219	0,137	●	○	○
N.4.1																							
S.1.1	25	1,0	0,030	0,024	0,015	0,040	0,032	0,020	0,050	0,040	0,025	0,060	0,048	0,030	0,075	0,060	0,038	0,084	0,067	0,042	●		
S.1.2	25	1,0	0,030	0,024	0,015	0,040	0,032	0,020	0,050	0,040	0,025	0,060	0,048	0,030	0,075	0,060	0,038	0,084	0,067	0,042	●		
S.2.1	25	1,0	0,030	0,024	0,015	0,040	0,032	0,020	0,050	0,040	0,025	0,060	0,048	0,030	0,075	0,060	0,038	0,084	0,067	0,042	●		
S.2.2	25	1,0	0,030	0,024	0,015	0,040	0,032	0,020	0,050	0,040	0,025	0,060	0,048	0,030	0,075	0,060	0,038	0,084	0,067	0,042	●		
S.2.3	25	1,0	0,030	0,024	0,015	0,040	0,032	0,020	0,050	0,040	0,025	0,060	0,048	0,030	0,075	0,060	0,038	0,084	0,067	0,042	●		
S.3.1	80	1,0	0,060	0,048	0,030	0,080	0,064	0,040	0,100	0,080	0,050	0,120	0,096	0,060	0,150	0,120	0,075	0,170	0,136	0,085	●		
S.3.2																							
S.3.3																							
H.1.1																							
H.1.2																							
H.1.3																							
H.1.4																							
H.2.1																							
H.3.1																							
O.1.1																							
O.1.2																							
O.2.1																							
O.2.2																							
O.3.1																							



Plunging angle for ramping and helical milling = 2-3°

Cutting data standard values – SilverLine – End mill

			50 949 ... / 50 999 ...																				
	Type long		Ø DC = 6 mm			Ø DC = 8 mm			Ø DC = 10 mm			Ø DC = 12 mm			Ø DC = 16 mm			Ø DC = 20 mm			○	1st choice	
			a _p 0,1-0,2 x DC	a _p 0,3-0,4 x DC	a _p 0,6 x DC	a _p 0,1-0,2 x DC	a _p 0,3-0,4 x DC	a _p 0,6 x DC	a _p 0,1-0,2 x DC	a _p 0,3-0,4 x DC	a _p 0,6 x DC	a _p 0,1-0,2 x DC	a _p 0,3-0,4 x DC	a _p 0,6 x DC	a _p 0,1-0,2 x DC	a _p 0,3-0,4 x DC	a _p 0,6 x DC	a _p 0,1-0,2 x DC	a _p 0,3-0,4 x DC	a _p 0,6 x DC	●	suitable	
Index			v _c m/min	a _{p max} x DC	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	f _z mm	Emulsion	Compressed air	MMS
P.1.1	165	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
P.1.2	160	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
P.1.3	160	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
P.1.4	150	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
P.1.5	150	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
P.2.1	160	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
P.2.2	150	1,0	0,060	0,048	0,030	0,080	0,064	0,040	0,100	0,080	0,050	0,120	0,096	0,060	0,150	0,120	0,075	0,170	0,136	0,085	●	○	○
P.2.3	145	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
P.2.4	135	1,0	0,060	0,048	0,030	0,080	0,064	0,040	0,100	0,080	0,050	0,120	0,096	0,060	0,150	0,120	0,075	0,170	0,136	0,085	●	○	○
P.3.1	145	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
P.3.2	135	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
P.3.3	115	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
P.4.1	80	1,0	0,038	0,030	0,019	0,052	0,042	0,026	0,066	0,053	0,033	0,080	0,064	0,040	0,101	0,081	0,051	0,115	0,092	0,058	●		
P.4.2	65	1,0	0,038	0,030	0,019	0,052	0,042	0,026	0,066	0,053	0,033	0,080	0,064	0,040	0,101	0,081	0,051	0,115	0,092	0,058	●		
M.1.1	80	1,0	0,038	0,030	0,019	0,052	0,042	0,026	0,066	0,053	0,033	0,080	0,064	0,040	0,101	0,081	0,051	0,115	0,092	0,058	●		
M.2.1	80	1,0	0,038	0,030	0,019	0,052	0,042	0,026	0,066	0,053	0,033	0,080	0,064	0,040	0,101	0,081	0,051	0,115	0,092	0,058	●		
M.3.1	80	1,0	0,038	0,030	0,019	0,052	0,042	0,026	0,066	0,053	0,033	0,080	0,064	0,040	0,101	0,081	0,051	0,115	0,092	0,058	●		
K.1.1	160	1,0	0,094	0,075	0,047	0,126	0,101	0,063	0,160	0,128	0,080	0,192	0,154	0,096	0,240	0,192	0,120	0,274	0,219	0,137	●	○	○
K.1.2	145	1,0	0,094	0,075	0,047	0,126	0,101	0,063	0,160	0,128	0,080	0,192	0,154	0,096	0,240	0,192	0,120	0,274	0,219	0,137	●	○	○
K.2.1	150	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
K.2.2	135	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
K.3.1	145	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
K.3.2	130	1,0	0,070	0,056	0,035	0,094	0,075	0,047	0,116	0,093	0,058	0,140	0,112	0,070	0,173	0,138	0,087	0,196	0,157	0,098	●	○	○
N.1.1																							
N.1.2																							
N.2.1																							
N.2.2																							
N.2.3																							
N.3.1	250	1,0	0,094	0,075	0,047	0,126	0,101	0,063	0,160	0,128	0,080	0,192	0,154	0,096	0,240	0,192	0,120	0,274	0,219	0,137	●	○	○
N.3.2	250	1,0	0,094	0,075	0,047	0,126	0,101	0,063	0,160	0,128	0,080	0,192	0,154	0,096	0,240	0,192	0,120	0,274	0,219	0,137	●	○	○
N.3.3	200	1,0	0,094	0,075	0,047	0,126	0,101	0,063	0,160	0,128	0,080	0,192	0,154	0,096	0,240	0,192	0,120	0,274	0,219	0,137	●	○	○
N.4.1																							
S.1.1	20	1,0	0,030	0,024	0,015	0,040	0,032	0,020	0,050	0,040	0,025	0,060	0,048	0,030	0,075	0,060	0,038	0,084	0,067	0,042	●		
S.1.2	20	1,0	0,030	0,024	0,015	0,040	0,032	0,020	0,050	0,040	0,025	0,060	0,048	0,030	0,075	0,060	0,038	0,084	0,067	0,042	●		
S.2.1	20	1,0	0,030	0,024	0,015	0,040	0,032	0,020	0,050	0,040	0,025	0,060	0,048	0,030	0,075	0,060	0,038	0,084	0,067	0,042	●		
S.2.2	20	1,0	0,030	0,024	0,015	0,040	0,032	0,020	0,050	0,040	0,025	0,060	0,048	0,030	0,075	0,060	0,038	0,084	0,067	0,042	●		
S.2.3	20	1,0	0,030	0,024	0,015	0,040	0,032	0,020	0,050	0,040	0,025	0,060	0,048	0,030	0,075	0,060	0,038	0,084	0,067	0,042	●		
S.3.1	65	1,0	0,060	0,048	0,030	0,080	0,064	0,040	0,100	0,080	0,050	0,120	0,096	0,060	0,150	0,120	0,075	0,170	0,136	0,085	●		
S.3.2																							
S.3.3																							
H.1.1																							
H.1.2																							
H.1.3																							
H.1.4																							
H.2.1																							
H.3.1																							
O.1.1																							
O.1.2																							
O.2.1																							
O.2.2																							
O.3.1																							



Plunging angle for ramping and helical milling = 2-3°

Cutting data standard values – SilverLine – End mills – Trochoidal machining

			50 949 ... / 50 999 ...															
	Type long v _c m/min	max. angle of engagement	Ø DC = 6 mm				Ø DC = 8 mm				Ø DC = 10 mm				Ø DC = 12 mm			
			a _e 0,05 x DC	a _e 0,1 x DC	a _e 0,15 x DC	h _m	a _e 0,05 x DC	a _e 0,1 x DC	a _e 0,15 x DC	h _m	a _e 0,05 x DC	a _e 0,1 x DC	a _e 0,15 x DC	h _m	a _e 0,05 x DC	a _e 0,1 x DC	a _e 0,15 x DC	h _m
Index			f _z mm	f _z mm	f _z mm		f _z mm	f _z mm	f _z mm		f _z mm							
P.1.1	280	50°	0,15	0,10	0,09	0,033	0,17	0,12	0,10	0,039	0,20	0,14	0,12	0,045	0,23	0,16	0,13	0,051
P.1.2	280	50°	0,11	0,08	0,07	0,025	0,14	0,10	0,08	0,032	0,17	0,12	0,10	0,039	0,20	0,14	0,12	0,045
P.1.3	280	50°	0,11	0,08	0,07	0,025	0,14	0,10	0,08	0,032	0,17	0,12	0,10	0,039	0,20	0,14	0,12	0,045
P.1.4	260	50°	0,11	0,08	0,07	0,025	0,14	0,10	0,08	0,032	0,17	0,12	0,10	0,039	0,20	0,14	0,12	0,045
P.1.5	260	50°	0,11	0,08	0,07	0,025	0,14	0,10	0,08	0,032	0,17	0,12	0,10	0,039	0,20	0,14	0,12	0,045
P.2.1	280	50°	0,15	0,10	0,09	0,033	0,17	0,12	0,10	0,039	0,20	0,14	0,12	0,045	0,23	0,16	0,13	0,051
P.2.2	280	50°	0,15	0,10	0,09	0,033	0,17	0,12	0,10	0,039	0,20	0,14	0,12	0,045	0,23	0,16	0,13	0,051
P.2.3	260	50°	0,11	0,08	0,07	0,025	0,14	0,10	0,08	0,032	0,17	0,12	0,10	0,039	0,20	0,14	0,12	0,045
P.2.4	260	50°	0,11	0,08	0,07	0,025	0,14	0,10	0,08	0,032	0,17	0,12	0,10	0,039	0,20	0,14	0,12	0,045
P.3.1	220	50°	0,11	0,08	0,07	0,025	0,14	0,10	0,08	0,032	0,17	0,12	0,10	0,039	0,20	0,14	0,12	0,045
P.3.2	220	45°	0,11	0,08	0,07	0,025	0,14	0,10	0,08	0,032	0,17	0,12	0,10	0,039	0,20	0,14	0,12	0,045
P.3.3	200	45°	0,11	0,08	0,07	0,025	0,14	0,10	0,08	0,032	0,17	0,12	0,10	0,039	0,20	0,14	0,12	0,045
P.4.1	180	45°	0,09	0,07	0,05	0,021	0,11	0,08	0,07	0,026	0,14	0,10	0,08	0,031	0,16	0,11	0,09	0,035
P.4.2	160	45°	0,09	0,07	0,05	0,021	0,11	0,08	0,07	0,026	0,14	0,10	0,08	0,031	0,16	0,11	0,09	0,035
M.1.1	140	45°	0,09	0,07	0,05	0,021	0,11	0,08	0,07	0,026	0,14	0,10	0,08	0,031	0,16	0,11	0,09	0,035
M.2.1	140	45°	0,09	0,07	0,05	0,021	0,11	0,08	0,07	0,026	0,14	0,10	0,08	0,031	0,16	0,11	0,09	0,035
M.3.1	140	45°	0,09	0,07	0,05	0,021	0,11	0,08	0,07	0,026	0,14	0,10	0,08	0,031	0,16	0,11	0,09	0,035
K.1.1	300	50°	0,15	0,10	0,09	0,033	0,17	0,12	0,10	0,039	0,20	0,14	0,12	0,045	0,23	0,16	0,13	0,051
K.1.2	300	50°	0,15	0,10	0,09	0,033	0,17	0,12	0,10	0,039	0,20	0,14	0,12	0,045	0,23	0,16	0,13	0,051
K.2.1	300	50°	0,15	0,10	0,09	0,033	0,17	0,12	0,10	0,039	0,20	0,14	0,12	0,045	0,23	0,16	0,13	0,051
K.2.2	260	50°	0,11	0,08	0,07	0,025	0,14	0,10	0,08	0,032	0,17	0,12	0,10	0,039	0,20	0,14	0,12	0,045
K.3.1	260	50°	0,11	0,08	0,07	0,025	0,14	0,10	0,08	0,032	0,17	0,12	0,10	0,039	0,20	0,14	0,12	0,045
K.3.2	200	50°	0,11	0,08	0,07	0,025	0,14	0,10	0,08	0,032	0,17	0,12	0,10	0,039	0,20	0,14	0,12	0,045
N.1.1																		
N.1.2																		
N.2.1																		
N.2.2																		
N.2.3																		
N.3.1																		
N.3.2																		
N.3.3																		
N.4.1																		
S.1.1	80	40°	0,05	0,03	0,03	0,010	0,06	0,04	0,04	0,014	0,08	0,05	0,04	0,017	0,09	0,06	0,05	0,021
S.1.2	80	40°	0,05	0,03	0,03	0,010	0,06	0,04	0,04	0,014	0,08	0,05	0,04	0,017	0,09	0,06	0,05	0,021
S.2.1	60	40°	0,05	0,03	0,03	0,010	0,06	0,04	0,04	0,014	0,08	0,05	0,04	0,017	0,09	0,06	0,05	0,021
S.2.2	60	40°	0,05	0,03	0,03	0,010	0,06	0,04	0,04	0,014	0,08	0,05	0,04	0,017	0,09	0,06	0,05	0,021
S.2.3																		
S.3.1	140	40°	0,06	0,04	0,04	0,014	0,08	0,06	0,05	0,018	0,10	0,07	0,06	0,023	0,12	0,09	0,07	0,028
S.3.2	100	40°	0,06	0,04	0,04	0,014	0,08	0,06	0,05	0,018	0,10	0,07	0,06	0,023	0,12	0,09	0,07	0,028
S.3.3																		
H.1.1																		
H.1.2																		
H.1.3																		
H.1.4																		
H.2.1																		
H.3.1																		
O.1.1																		
O.1.2																		
O.2.1																		
O.2.2																		
O.3.1																		



Plunging angle for ramping and helical milling = 2-3°



Cutting depth corresponding to the cutting length

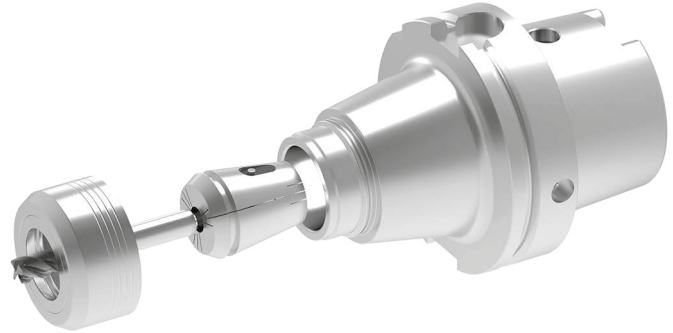
		50 949 ... / 50 999 ...										
		Ø DC = 16 mm				Ø DC = 20 mm				○ 1st choice		
										● suitable		
		a _e 0,05 x DC	a _e 0,1 x DC	a _e 0,15 x DC	h _m	a _e 0,05 x DC	a _e 0,1 x DC	a _e 0,15 x DC	h _m	Emulsion	Compressed air	MMS
Index	f _z mm			f _z mm								
	P.1.1	0,27	0,19	0,16	0,060	0,30	0,21	0,17	0,066	○	●	○
	P.1.2	0,25	0,18	0,14	0,055	0,28	0,20	0,16	0,062	○	●	○
	P.1.3	0,25	0,18	0,14	0,055	0,28	0,20	0,16	0,062	○	●	○
	P.1.4	0,25	0,18	0,14	0,055	0,28	0,20	0,16	0,062	○	●	○
	P.1.5	0,25	0,18	0,14	0,055	0,28	0,20	0,16	0,062	○	●	○
	P.2.1	0,27	0,19	0,16	0,060	0,30	0,21	0,17	0,066	○	●	○
	P.2.2	0,27	0,19	0,16	0,060	0,30	0,21	0,17	0,066	○	●	○
	P.2.3	0,25	0,18	0,14	0,055	0,28	0,20	0,16	0,062	○	●	○
	P.2.4	0,25	0,18	0,14	0,055	0,28	0,20	0,16	0,062	○	●	○
	P.3.1	0,25	0,18	0,14	0,055	0,28	0,20	0,16	0,062	○	●	○
	P.3.2	0,25	0,18	0,14	0,055	0,28	0,20	0,16	0,062	○	●	○
	P.3.3	0,25	0,18	0,14	0,055	0,28	0,20	0,16	0,062	○	●	○
	P.4.1	0,19	0,13	0,11	0,042	0,21	0,15	0,12	0,047	●		
	P.4.2	0,19	0,13	0,11	0,042	0,21	0,15	0,12	0,047	●		
	M.1.1	0,19	0,13	0,11	0,042	0,21	0,15	0,12	0,047	●		
	M.2.1	0,19	0,13	0,11	0,042	0,21	0,15	0,12	0,047	●		
	M.3.1	0,19	0,13	0,11	0,042	0,21	0,15	0,12	0,047	●		
	K.1.1	0,27	0,19	0,16	0,060	0,30	0,21	0,17	0,066	○	●	○
	K.1.2	0,27	0,19	0,16	0,060	0,30	0,21	0,17	0,066	○	●	○
	K.2.1	0,27	0,19	0,16	0,060	0,30	0,21	0,17	0,066	○	●	○
	K.2.2	0,25	0,18	0,14	0,055	0,28	0,20	0,16	0,062	○	●	○
	K.3.1	0,25	0,18	0,14	0,055	0,28	0,20	0,16	0,062	○	●	○
	K.3.2	0,25	0,18	0,14	0,055	0,28	0,20	0,16	0,062	○	●	○
	N.1.1											
	N.1.2											
	N.2.1											
	N.2.2											
	N.2.3											
	N.3.1											
	N.3.2											
	N.3.3											
	S.1.1	0,11	0,08	0,07	0,026	0,13	0,09	0,08	0,029	●		
	S.1.2	0,11	0,08	0,07	0,026	0,13	0,09	0,08	0,029	●		
	S.2.1	0,11	0,08	0,07	0,026	0,13	0,09	0,08	0,029	●		
	S.2.2	0,11	0,08	0,07	0,026	0,13	0,09	0,08	0,029	●		
	S.2.3											
	S.3.1	0,16	0,11	0,09	0,035	0,18	0,12	0,10	0,040	●		
	S.3.2	0,16	0,11	0,09	0,035	0,18	0,12	0,10	0,040	●		
	S.3.3											
	H.1.1											
	H.1.2											
	H.1.3											
	H.1.4											
	H.2.1											
	H.3.1											
	O.1.1											
	O.1.2											
	O.2.1											
	O.2.2											
	O.3.1											

HDC – Heavy Duty Chuck

“The precision collet chuck for heavy-duty machining”

Pull-out of milling cutters is an issue that every machine operator is familiar with. Our tools are being constantly further refined and becoming ever more powerful. Adapters are therefore becoming increasingly important and must be able to cope with these forces. The clamping forces in particular play a major role here. These should counter pull-out of the tool and ensure reliable machining. The well-known Weldon chuck is still a popular clamping device, but brings with it some disadvantages in terms of flexibility, damping and accuracy.

CERATIZIT is expanding its product range to include a chuck specially developed for heavy-duty machining/rough machining, known as the **HDC – Heavy Duty Chuck**. This is a precision collet chuck, the focus of which is on excellent damping and a stable chuck body. The HDC is a universal precision collet chuck for everything from finishing and roughing operations through to trochoidal milling or process-secure machining of high strength, extremely tough materials.

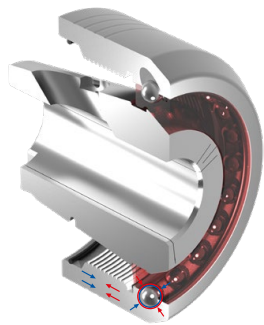


Advantages of the HDC chuck:

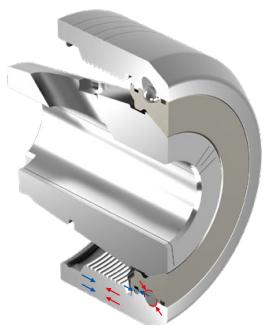
- ▲ Optimum clamping force, so that the collet cannot turn in its seat
- ▲ Stable base body design for the fewest possible vibrations
- ▲ Maximum damping so that vibrations can be effectively suppressed
- ▲ Runout accuracy $\leq 3 \mu\text{m}$ at 3xD overhang length

Maximum performance thanks to angular contact ball bearings:

Despite excellent damping properties, the disadvantages of ball-bearing lock nuts have always outweighed the advantages - until now. The HDC lock nut with its specially developed and patent-pending angular contact ball bearings is the first to do away with these weaknesses.



Conventional deep-groove ball bearings: positive engagement during clamping (red) or release (blue)



Angular ball bearings for the HDC-chuck: positive engagement during clamping (red) or release (blue)

The unique arrangement of the bearing shells allows for:

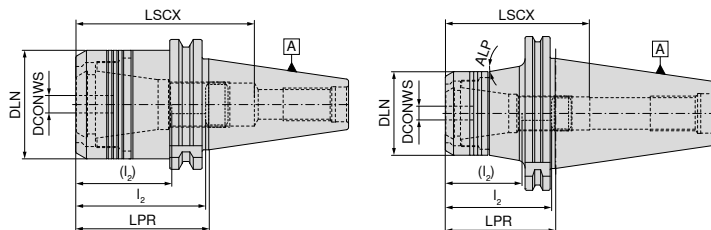
- ▲ The use of balls with a considerably smaller diameter. This doubles the number of balls and increases the resulting contact surface. The surface pressure decreases accordingly and indenting into the raceways is reduced.
- ▲ Decoupling of the clamping and release function through a special circlip, which absorbs all the (sometimes jerky) forces that occur when opening the nut and pulling out the collet. The bearing shells are not damaged by the application of force during opening.
- ▲ The use of fully hardened bearing steel, which, unlike case-hardened steel in other solutions, counteracts embedding of the balls.
- ▲ Assembly of the bearing without additional feed opening for the balls. This means that the balls cannot become jammed or move into the feed opening.
- ▲ Design of the raceways without interrupting hole. This has a positive effect on the residual imbalance and runout properties.

ER precision collet chuck – HDC

- ▲ HDC = Heavy Duty Chuck, an adapter specially designed for rough machining
- ▲ For heavy duty lock nut
- ▲ Maximum clamping range covered according to ISO tolerance field H10
- ▲ Roll key required for clamping
- ▲ $p_{max} = 80$ bar
- ▲ also available with Balluff chip **on request**

Scope of supply:

Base body **including** lock nut, **without** backstop screw



cylindrical

Conical



NEW



AD

G 6,3 n_{max} 18000

cylindrical

84 400 ...

NEW



AD

G 6,3 n_{max} 18000

conical

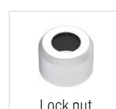
84 400 ...

Adapter	DCONWS mm	LPR mm	DLN mm	LSCX mm	I_2 (I_2) mm	ALP °	for collet		
SK 40	2 - 20	65	53	85	41 - 65 (27 - 47)		470E (ER32)		12079
SK 50	2 - 20	70	53	91	41 - 71 (27 - 53)	10	470E (ER32)		12078
SK 50	2 - 20	100	53	121	41 - 74 (27 - 56)	10	470E (ER32)		22078



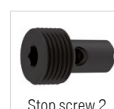
LSCX = Clamping depth without backstop screw

I_2 = Clamping depth backstop screw 1, dimension in brackets (I_2) = Clamping depth backstop screw 2



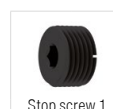
Lock nut

84 950 ...



Stop screw 2

83 950 ...



Stop screw 1

83 950 ...

Spare parts

DCONWS

2 - 20

30100

M22x1,5 - SW6

402

M22x1,5 - SW6

401

Accessories



ER collet

→ 256-266



Pull stud

→ 111+112



Others

→ 273



Roll key

→ 65



Roll key head

→ 65

All accessories can be found in our new clamping technology catalogue
→ Chapter 16, Adapters and accessories

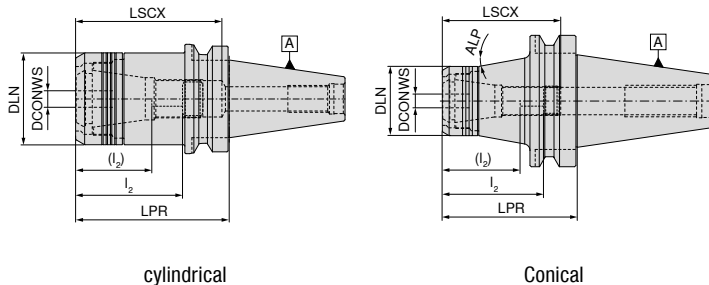
Both these accessories can be found here in
→ UP2DATE 07/2021

ER precision collet chuck – HDC

- ▲ HDC = Heavy Duty Chuck, an adapter specially designed for rough machining
- ▲ For heavy duty lock nut
- ▲ Maximum clamping range covered according to ISO tolerance field H10
- ▲ Roll key required for clamping
- ▲ $p_{max} = 80$ bar
- ▲ also available with Balluff chip **on request**

Scope of supply:

Base body **including** lock nut, **without** backstop screw



NEW



AD
G 6,3 n_{max} 18000
cylindrical

84 400 ...

NEW



AD
G 6,3 n_{max} 18000
conical

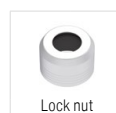
84 400 ...

Adapter	DCONWS mm	LPR mm	DLN mm	LSCX mm	l_2 (l_2) mm	ALP °	for collet		
BT 40	2 - 20	60	53	80	41 - 63 (27 - 45)		470E (ER32)		
BT 40	2 - 20	90	53	85	41 - 63 (27 - 45)		470E (ER32)	12069	
								22069	
BT 50	2 - 20	75	53	114	41 - 80 (27 - 62)	10	470E (ER32)		12068
BT 50	2 - 20	105	53	140	41 - 80 (27 - 62)	10	470E (ER32)		22068



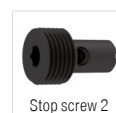
LSCX = Clamping depth without backstop screw

l_2 = Clamping depth backstop screw 1, dimension in brackets (l_2) = Clamping depth backstop screw 2



Lock nut

84 950 ...



Stop screw 2

83 950 ...



Stop screw 1

83 950 ...

Spare parts

DCONWS

2 - 20

30100

M22x1,5 - SW6

402

M22x1,5 - SW6

401

Accessories



ER collet

→ 256-266



Pull stud

→ 111+112



Others

→ 273



Roll key

→ 65



Roll key head

→ 65

All accessories can be found in our new clamping technology catalogue
→ Chapter 16, Adapters and accessories

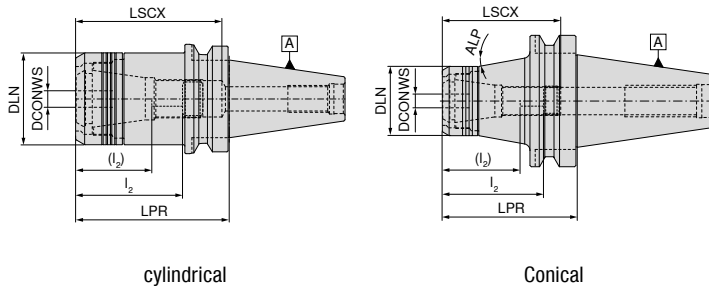
Both these accessories can be found here in
→ UP2DATE 07/2021

ER precision collet chuck – HDC – BT-FC

- ▲ HDC = Heavy Duty Chuck, an adapter specially designed for rough machining
- ▲ For heavy duty lock nut
- ▲ Maximum clamping range covered according to ISO tolerance field H10
- ▲ Roll key required for clamping
- ▲ $p_{\max} = 80$ bar
- ▲ also available with Balluff chip **on request**

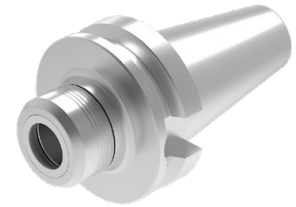
Scope of supply:

Base body **including** lock nut, **without** backstop screw



cylindrical

Conical



NEW



AD

G 6,3 $n_{\max}$ 18000

cylindrical

84 400 ...

NEW



AD

G 6,3 $n_{\max}$ 18000

conical

84 400 ...

Adapter	DCONWS mm	LPR mm	DLN mm	LSCX mm	l_2 (l_2) mm	ALP °	for collet		
BT-FC 40	2 - 20	60	53	80	41 - 63 (27 - 45)		470E (ER32)		12064
BT-FC 40	2 - 20	90	53	95	41 - 65 (27 - 47)		470E (ER32)		22064
BT-FC 50	2 - 20	75	53	114	41 - 81 (27 - 63)	10	470E (ER32)		12063
BT-FC 50	2 - 20	105	53	144	41 - 81 (27 - 63)	10	470E (ER32)		22063



LSCX = Clamping depth without backstop screw

l_2 = Clamping depth backstop screw 1, dimension in brackets (l_2) = Clamping depth backstop screw 2

Accessories

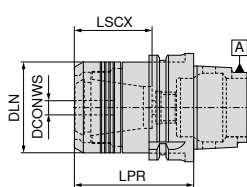
ER collet	Pull stud	Others	Roll key	Roll key head
→ 256–266	→ 111+112	→ 273	→ 65	→ 65
All accessories can be found in our new clamping technology catalogue → Chapter 16, Adapters and accessories			Both these accessories can be found here in → UP2DATE 07/2021	

ER precision collet chuck – HDC

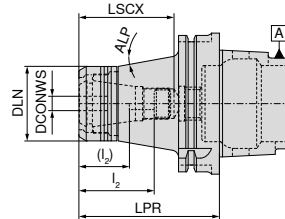
- ▲ HDC = Heavy Duty Chuck, an adapter specially designed for rough machining
- ▲ For heavy duty lock nut
- ▲ Maximum clamping range covered according to ISO tolerance field H10
- ▲ Roll key required for clamping
- ▲ $p_{\max} = 80$ bar
- ▲ also available with Balluff chip **on request**

Scope of supply:

Base body **including** lock nut, **without** backstop screw



cylindrical



Conical



G 6,3 $n_{\max}$ 18000

cylindrical

84 400 ...



G 6,3 $n_{\max}$ 18000

conical

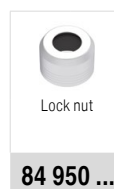
84 400 ...

Adapter	DCONWS mm	LPR mm	DLN mm	LSCX mm	l_2 (l_2) mm	ALP °	for collet		
HSK-A 63	2 - 20	70	53	45	41 - 57 (27 - 39)		470E (ER32)	12057	
HSK-A 63	2 - 20	100	53	72	41 - 57 (27 - 39)		470E (ER32)	22057	
HSK-A 100	2 - 20	100	53	68	41 - 54 (27 - 36)	10	470E (ER32)		22055

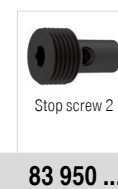


LSCX = Clamping depth without backstop screw

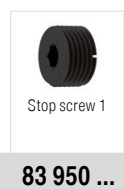
l_2 = Clamping depth backstop screw 1, dimension in brackets (l_2) = Clamping depth backstop screw 2



30100



402



401

Spare parts

DCONWS

2 - 20

M22x1,5 - SW6

M22x1,5 - SW6

Accessories



ER collet

→ 256-266

All accessories can be found in our new clamping technology catalogue → **Chapter 16, Adapters and accessories**



Others

→ 273



Roll key

→ 65



Roll key head

→ 65

Both these accessories can be found here in → **UP2DATE 07/2021**

Accessories/clamping keys for ER precision collet chucks – HDC

Roll key

- ▲ Version CP = for Centro-P lock nuts
- ▲ Version STD = for standard lock nuts
- ▲ Version HDC = for HDC lock nuts



for lock nut		DLN mm	84 950 ...
470E / ER 32 HDC		53	30200

Additional roll key device for torque key

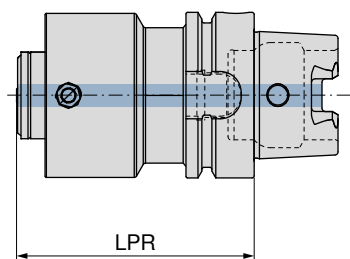
- ▲ Version CP = for Centro-P lock nuts
- ▲ Version STD = for standard lock nuts
- ▲ Version HDC = for HDC lock nuts



for lock nut		DLN mm	TQX Nm	Square mm	84 950 ...
470E / ER 32 HDC		53	20 - 200	14 x 18	30300

HSK-T extension

- ▲ For mounting HSK-T adapters according to ISO 12164-3
- ▲ Also suitable for HSK-A and HSK-C
- ▲ Also available with Balluff chip **on request**



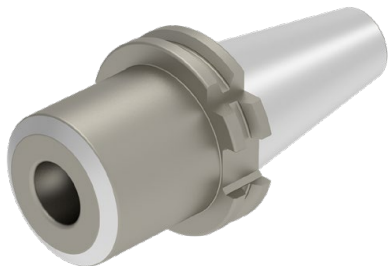
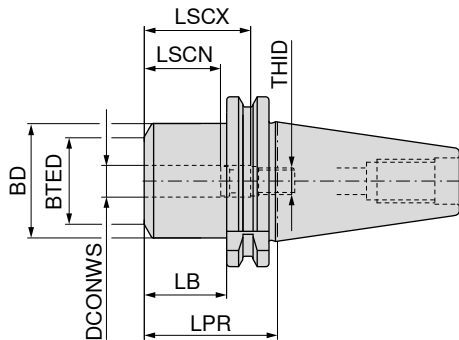
Adapter	LPR mm	84 621 ...
HSK-T 63	80	08037
HSK-T 63	120	12037
HSK-T 100	125	12535
HSK-T 100	160	16035
HSK-T 100	200	20035

Hydraulic chuck, short and stable version

- ▲ for solid carbide and HSS shanks to h6 tolerance or better
- ▲ also available with Balluff chip **on request**

Scope of supply:

Base body with backstop screw and pressure screw



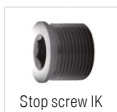
AD
G 2,5 n_{max} 25000

83 430 ...

Adapter	DCONWS mm	LPR mm	BD mm	BTED mm	LB mm	LSCN mm	LSCX mm	THID	
SK 40	12	50,0	42	32	31,0	46	56	M8x1	01279
SK 40	20	64,5	49	38	45,5	41	51	M16x1	02079
SK 50	20	64,5	49	38	45,5	41	51	M16x1	02078



Pressure screw



Stop screw IK

83 950 ...

83 950 ...

Spare parts
DCONWS

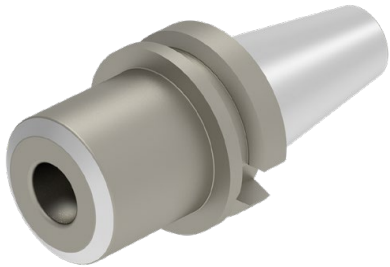
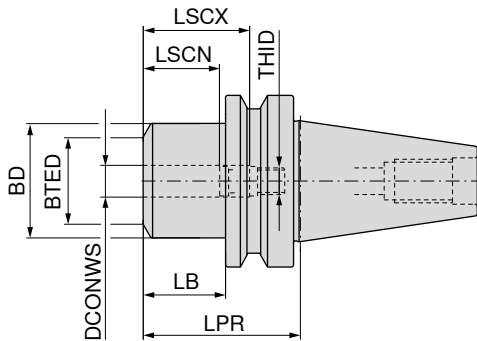
12	M10x1x12	440	M8x1x13,5 - SW3	420
20	M10x1x12	440	M16x1x13,5 - SW8	424

Hydraulic chuck, short and stable version

- ▲ for solid carbide and HSS shanks to h6 tolerance or better
- ▲ also available with Balluff chip **on request**

Scope of supply:

Base body with backstop screw and pressure screw



NEW



AD
G 2,5 n_{max} 25000

83 430 ...

Adapter	DCONWS mm	LPR mm	BD mm	BTED mm	LB mm	LSCN mm	LSCX mm	THID	
BT 40	12	58,0	42	32	31,0	36	46	M8x1	01269
BT 40	20	72,5	49	38	45,5	41	51	M16x1	02069
BT 50	20	83,5	49	38	45,5	41	51	M16x1	02068



Pressure screw



Stop screw IK

83 950 ...

83 950 ...

Spare parts

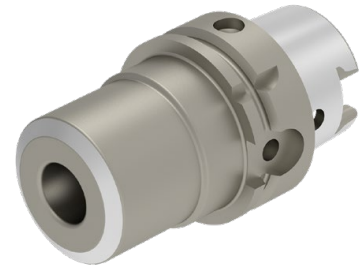
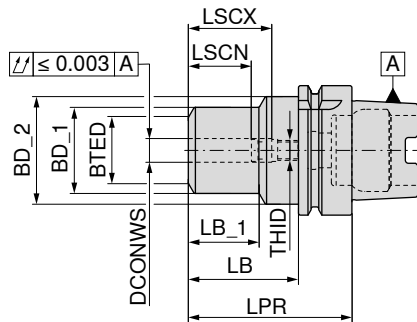
DCONWS				
12	M10x1x12	440	M8x1x13,5 - SW3	420
20	M10x1x12	440	M16x1x13,5 - SW8	424

Hydraulic chuck, short and stable version

- ▲ for solid carbide and HSS shanks to h6 tolerance or better
- ▲ also available with Balluff chip **on request**

Scope of supply:

Base body with backstop screw and pressure screw



NEW



AD

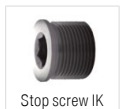
G 2,5 n_{max} 25000

83 430 ...

Adapter	DCONWS mm	LPR mm	BD_1 mm	BD_2 mm	BTED mm	LB mm	LB_1 mm	LSCN mm	LSCX mm	THID	
HSK-A 63	12	80	42	52,5	32	54	34	36	46	M8x1	01257
HSK-A 63	20	80	49	52,5	38	54	36	41	51	M8x1	02057
HSK-A 100	12	85	42	52,5	32	51	34	36	46	M8x1	01255
HSK-A 100	20	85	49	52,5	38	51	36	41	51	M8x1	02055



83 950 ...



83 950 ...

Spare parts

DCONWS

12	M10x1x12	440	M8x1x13,5 - SW3	420
20	M10x1x12	440	M8x1x13,5 - SW3	420



Full process control with ToolScope

Digital monitoring for your production



cutting.tools/int/toolscope

Process control

Machine protection

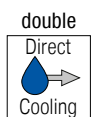
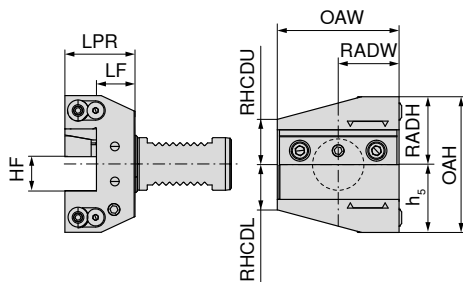
Documentation & digitalisation



Radial square section tool holder with DirectCooling – B1 / B2 / B3 / B4

- ▲ Double tooth profile for normal and overhead applications
- ▲ The clamping rails can be attached at the top or bottom (left or right application).
- ▲ For turning tool holders with DirectCooling
- ▲ Can be used up to 100 bar

NEW



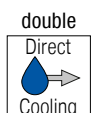
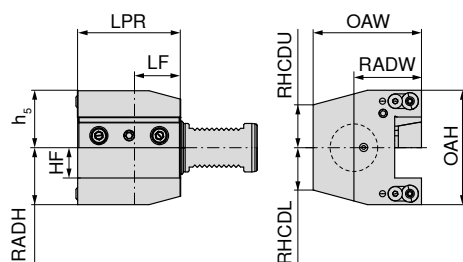
82 245 ...

Adapter	HF _{0/-0,1} mm	LF _{0/+0,5} mm	LPR mm	OAW mm	RADH mm	RADW mm	h ₅ mm	OAH mm	RHCDL mm	RHCDU mm	
VDI 20	16	16	30	55	30	30,0	30	60	22	22	01629
VDI 20	16	26	40	55	30	30,0	30	60	22	22	51629
VDI 25	16	16	30	55	30	30,0	30	60	22	22	01628
VDI 30	20	22	40	70	39	35,0	39	78	26	26	02027
VDI 40	25	22	44	85	47	42,5	47	94	33	33	02526
VDI 50	25	22	44	98	55	50,0	55	110	42	42	02525

Axial square section tool holder with DirectCooling – C1 / C2 / C3 / C4

- ▲ Double tooth profile for normal and overhead applications
- ▲ The clamping rails can be attached at the top or bottom (left or right application).
- ▲ For turning tool holders with DirectCooling
- ▲ Can be used up to 100 bar

NEW



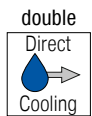
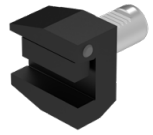
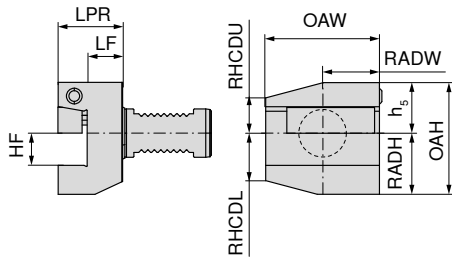
82 246 ...

Adapter	HF _{0/-0,1} mm	LF mm	LPR mm	OAW mm	RADH mm	RADW mm	h ₅ mm	OAH mm	RHCDL mm	RHCDU mm	
VDI 30	20	30	70	74	39	39,0	39	78	26	26	02027
VDI 40	25	30	85	94	47	52,5	47	94	35	35	02526
VDI 50	25	30	85	105	50	63,0	50	100	42	42	02525

Radial square section tool holder with DirectCooling – B1 / B4

- ▲ Double tooth profile for normal and overhead applications
- ▲ For turning tool holders with DirectCooling
- ▲ Can be used up to 100 bar

NEW



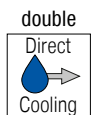
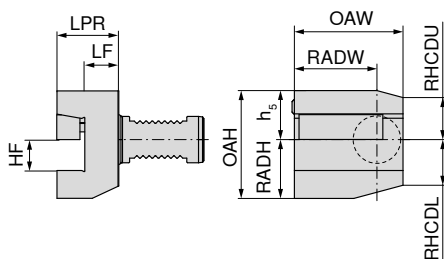
82 247 ...

Adapter	HF _{0/-0,1} mm	LF _{0/+0,5} mm	LPR mm	OAW mm	RADH mm	RADW mm	h ₅ mm	OAH mm	RHCDL mm	RHCDU mm	
VDI 30	20	22	40	70,0	38	35,0	31,5	69,5	29,5	22	02027
VDI 40	25	22	44	85,0	48	42,5	38,0	86,0	35,0	30	02526
VDI 50	25	22	44	92,5	48	50,0	43,0	91,0	43,0	30	02525

Radial square section tool holder with DirectCooling – B2 / B3

- ▲ Double tooth profile for normal and overhead applications
- ▲ For turning tool holders with DirectCooling
- ▲ Can be used up to 100 bar

NEW



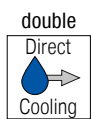
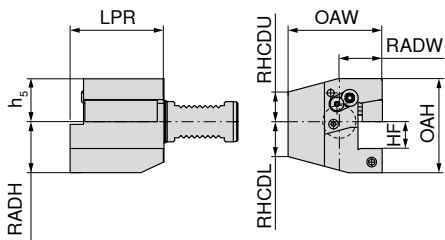
82 247 ...

Adapter	HF _{0/-0,1} mm	LF _{0/+0,5} mm	LPR mm	OAW mm	RADH mm	RADW mm	h ₅ mm	OAH mm	RHCDL mm	RHCDU mm	
VDI 30	20	22	40	70,0	38	35,0	31,5	69,5	29,5	27	12027
VDI 40	25	22	44	85,0	48	42,5	38,0	86,0	35,0	30	12526
VDI 50	25	22	44	92,5	48	50,0	43,0	91,0	35,0	38	12525

Axial square section tool holder with DirectCooling – C1 / C4

- ▲ Double tooth profile for normal and overhead applications
- ▲ For turning tool holders with DirectCooling
- ▲ Can be used up to 100 bar

NEW



82 248 ...

Adapter	HF 0/-0,1 mm	LPR mm	OAW mm	RADH mm	RADW mm	h ₅ mm	OAH mm	RHCDL mm	RHCDU mm
VDI 30	20	70	70,0	38	35,0	32	70	26	22
VDI 40	25	85	85,0	48	42,5	38	86	35	30
VDI 50	25	85	90,5	48	48,0	44	92	42	35

02027

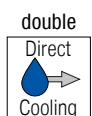
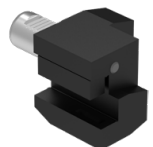
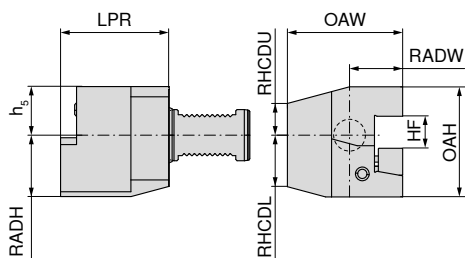
02526

02525

Axial square section tool holder with DirectCooling – C2 / C3

- ▲ Double tooth profile for normal and overhead applications
- ▲ For turning tool holders with DirectCooling
- ▲ Can be used up to 100 bar

NEW



82 248 ...

Adapter	HF 0/-0,1 mm	LPR mm	OAW mm	RADH mm	RADW mm	h ₅ mm	OAH mm	RHCDL mm	RHCDU mm
VDI 30	20	70	76	38	41,0	32	70	26	26
VDI 40	25	85	90	48	47,5	38	86	35	30
VDI 50	25	85	95	48	52,5	44	92	42	37

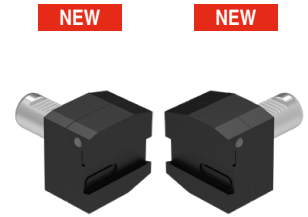
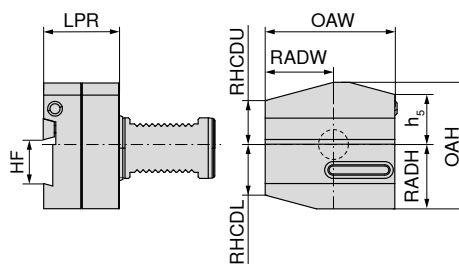
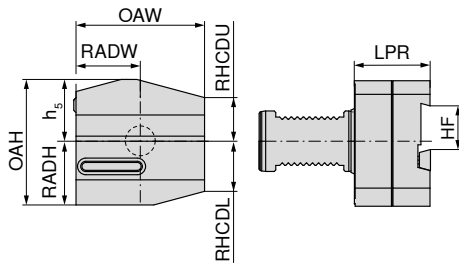
12027

12526

12525

Parting blade holder for parting blades with DirectCooling

- ▲ Double tooth profile for normal and overhead applications
- ▲ For parting blades with DirectCooling
- ▲ Can be used up to 100 bar



Left-hand

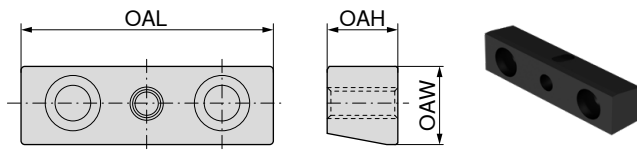
Right-hand

82 249 ...

82 249 ...

Adapter	HF mm	LPR mm	OAW mm	RADH mm	RADW mm	h ₅ mm	OAH mm	RHCDL mm	RHCDU mm		
VDI 30	26	50	70	37	35,0	32	69	30	25	12627	02627
VDI 40	32	50	85	40	42,5	43	83	31	31	13226	03226
VDI 40	26	50	85	40	42,5	43	83	31	31	12626	02626
VDI 50	32	50	100	45	50,0	43	88	37	35	13225	03225

Clamping rail



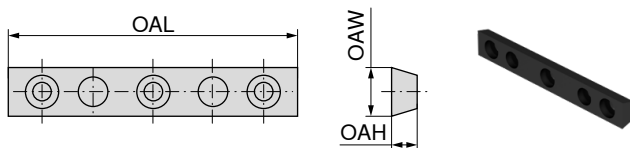
OAL mm	OAW mm	OAH mm	82 250 ...
53,0	12,7	11,5	05300
54,0	16,0	15,0	05400
67,5	16,0	15,0	06750
68,0	21,0	19,0	06800
83,0	20,5	19,0	08300
90,0	20,5	19,0	09000

Screw for ball-shaped spray nozzle



THOD	82 950 ...
M3x10	31000
M4x10	31300
M5x12	31100
M6x12	31200

Clamping wedge



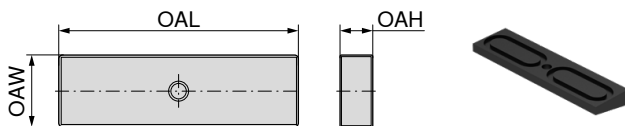
OAL mm	OAW mm	OAH mm	82 250 ...
70	14	7,3	07000
85	14	7,3	08500
100	14	7,3	10000

Ball-shaped spray nozzle



THID	BD mm	82 950 ...
M5	8	30600
M6	10	30900
M6	12	30700
M6	14	30800

Levelling plates



OAL mm	OAW mm	OAH mm	82 250 ...
53,0	14	6,1	15300
67,5	18	6,3	16750
83,0	22	7,5	18300
90,0	22	7,5	19000

O ring for clamping wedge



Size	82 950 ...
Ø13 x Ø2	32600
Ø18 x Ø2	32700
Ø22 x Ø2	32800

O ring for ball-shaped spray nozzle



Size		82 950 ...
Ø5 x Ø1,5		31400
Ø7 x Ø1,5		31700
Ø7 x Ø2,5		31500
Ø10 x Ø2		31600

Screw for clamping wedge



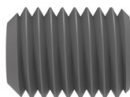
THOD		82 950 ...
M5x12		31800
M6x16		32200
M6x20		31900
M8x20		32300
M8x25		32100

Quad ring



Size		82 950 ...
Ø21,95 x Ø1,78		32400
Ø28,3 x Ø1,78		32500

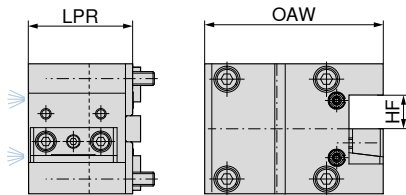
Screw plug for ball-shaped spray nozzle



THOD		OAL mm	82 950 ...
M5		6	32900
M6		6	33000

Doosan/Spinner – BMT 45 – axial square section tool holder

▲ Directly screwed version



Left-hand

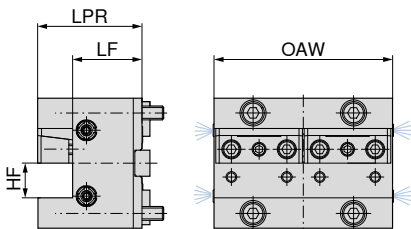
82 480 ...

00001

Adapter	Hole pattern	HF mm	LPR mm	OAW mm
BMT 45	58 x 58	20	60	99,5

Doosan/Spinner – BMT 45 – radial square section tool holder

▲ Directly screwed version



Left-hand

82 480 ...

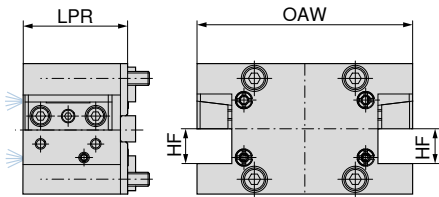
01002

Adapter	Hole pattern	HF mm	LF mm	LPR mm	OAW mm
BMT 45	58 x 58	20	40	60	103

Doosan/Spinner – BMT 45 – multi square section tool holder

▲ Directly screwed version

NEW



Adapter	Hole pattern	HF mm	LPR mm	OAW mm
BMT 45	58 x 58	20	60	124

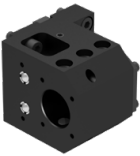
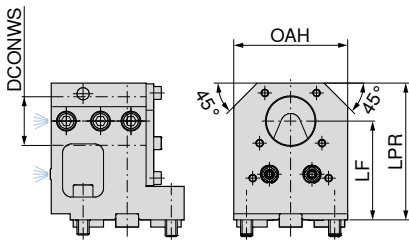
82 480 ...

02003

Doosan – BMT 45 – combi tool holder

▲ Directly screwed version

NEW



IC

Adapter	Hole pattern	DCONWS mm	LF mm	OAH mm	LPR mm
BMT 45	58 x 58	32	65	75	90
BMT 45	58 x 58	32	85	75	110

82 480 ...

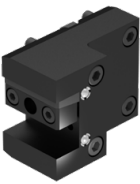
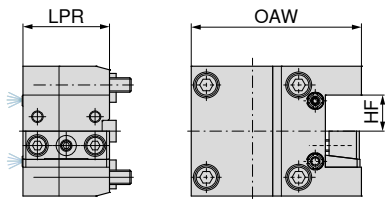
03004

03005

Doosan – BMT 55 – axial square section tool holder

▲ Directly screwed version

NEW



Left-hand

82 481 ...

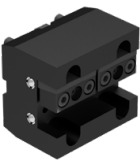
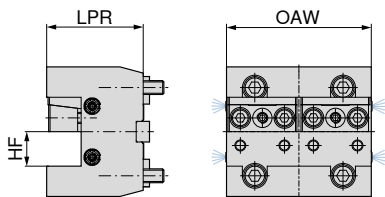
00001

Adapter	Hole pattern	HF mm	LPR mm	OAW mm
BMT 55	64 x 64	25	60	118

Doosan – BMT 55 – radial square section tool holder

▲ Directly screwed version

NEW



Left-hand

82 481 ...

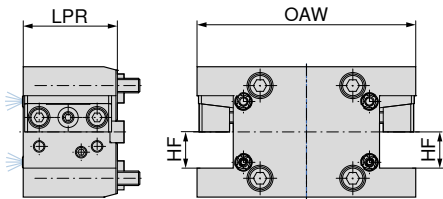
01002

Adapter	Hole pattern	HF mm	LPR mm	OAW mm
BMT 55	64 x 64	25	70	105

Doosan – BMT 55 – multi square section tool holder

▲ Directly screwed version

NEW



82 481 ...

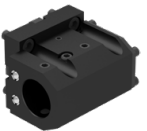
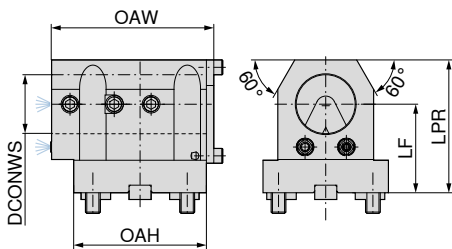
Adapter	Hole pattern	HF mm	LPR mm	OAW mm
BMT 55	64 x 64	25	65	151

02003

Doosan – BMT 55 – boring bar holder

▲ Directly screwed version

NEW



IC

82 481 ...

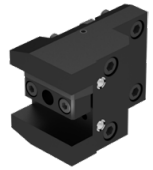
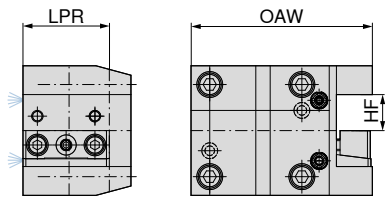
Adapter	Hole pattern	DCONWS mm	LF mm	LPR mm	OAH mm	OAW mm
BMT55	64 x 64	40	60	90	90	110

04004

EMAG – BMT 55 – axial square section tool holder

▲ Directly screwed version

NEW



Left-hand

82 482 ...

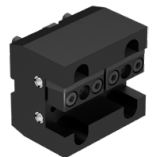
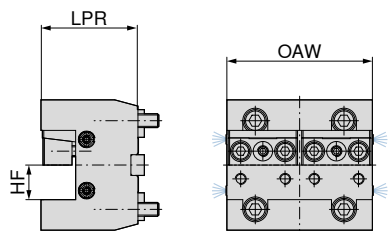
00001

Adapter	Hole pattern	HF mm	LPR mm	OAW mm
BMT 55	64 X 64	25	60	126

EMAG – BMT 55 – radial square section tool holder

▲ Directly screwed version

NEW



Left-hand

82 482 ...

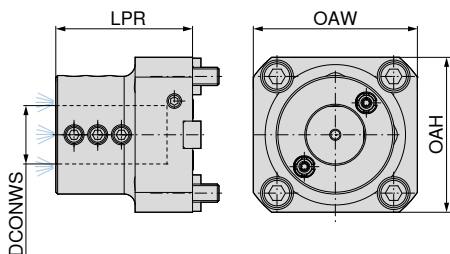
01002

Adapter	Hole pattern	HF mm	LPR mm	OAW mm
BMT 55	64 x 64	25	70	105

EMAG – BMT 55 – boring bar holder

▲ Directly screwed version

NEW



IC

82 482 ...

04003

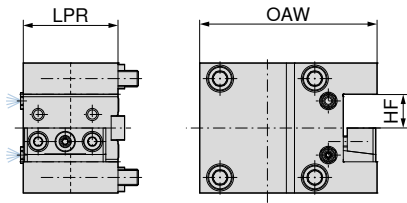
Adapter	Hole pattern	DCONWS mm	LPR mm	OAW mm	OAH mm
BMT55	64 x 64	32	75	85	90



HAAS/Doosan – BMT 65 – axial square section tool holder

▲ Directly screwed version

NEW



Left-hand

82 483 ...

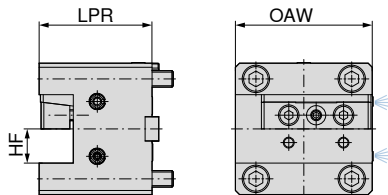
00001

Adapter	Hole pattern	HF mm	LPR mm	OAW mm
BMT 65	70 x 73	25	70	131

HAAS/Doosan – BMT 65 – radial square section tool holder

▲ Directly screwed version

NEW



Right-hand

82 483 ...

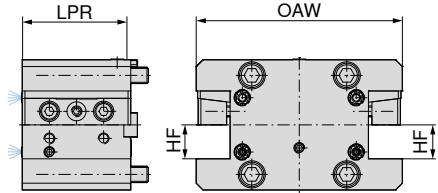
05002

Adapter	Hole pattern	HF mm	LPR mm	OAW mm
BMT 65	70 x 73	25	82,5	100

HAAS/Doosan – BMT 65 – multi square section tool holder

- ▲ Directly screwed version
- ▲ For right and left direction of rotation

NEW



82 483 ...

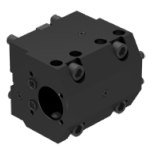
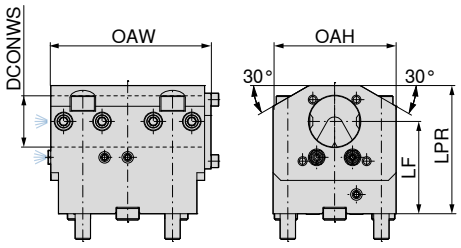
Adapter	Hole pattern	HF mm	LPR mm	OAW mm
BMT 65	70 x 73	25	80	152

02003

HAAS/Doosan – BMT 65 – combi tool holder

- ▲ Directly screwed version
- ▲ Double-sided version

NEW



IC

82 483 ...

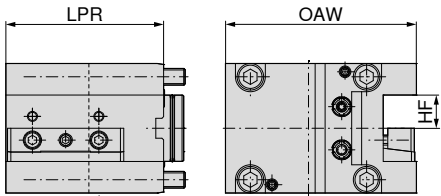
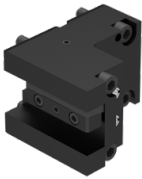
Adapter	Hole pattern	DCONWS mm	LF mm	OAH mm	LPR mm	OAW mm
BMT 65	70 x 73	40	72	96	100	125

03004

Mori/Seiki – BMT 40 – axial square section tool holder

- ▲ Directly screwed version
- ▲ For right and left direction of rotation

NEW



Left-hand

82 484 ...

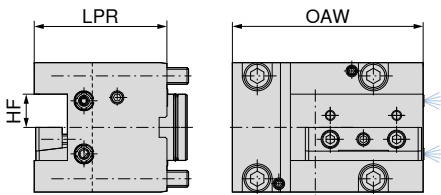
00001

Adapter	Hole pattern	HF mm	LPR mm	OAW mm
BMT 40	70 x 62	20	95	115

Mori/Seiki – BMT 40 – radial square section tool holder

- ▲ Directly screwed version
- ▲ For right and left direction of rotation

NEW



Left-hand

82 484 ...

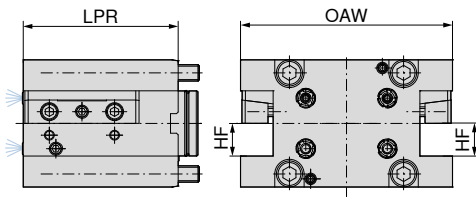
01002

Adapter	Hole pattern	HF mm	LPR mm	OAW mm
BMT 40	70 x 62	20	80	115

Mori/Seiki – BMT 40 – multi square section tool holder

- ▲ Directly screwed version
- ▲ For right and left direction of rotation

NEW



82 484 ...

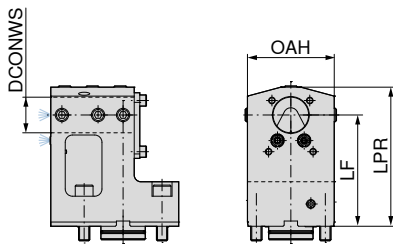
Adapter	Hole pattern	HF mm	LPR mm	OAW mm
BMT 40	70 x 62	20	95	130

02003

Mori/Seiki – BMT 40 – combi tool holder

- ▲ Directly screwed version

NEW



IC

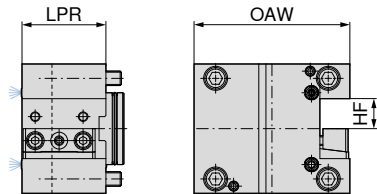
82 484 ...

Adapter	Hole pattern	DCONWS mm	OAH mm	LF mm	LPR mm
BMT 40	70 x 62	32	78	100	125

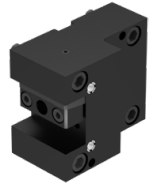
03004

Mori/Seiki – BMT 60 – axial square section tool holder

- ▲ Directly screwed version
- ▲ For right and left direction of rotation



NEW



Left-hand

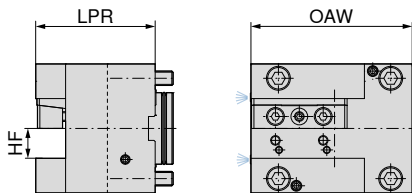
82 485 ...

00001

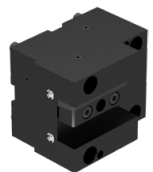
Adapter	Hole pattern	HF mm	LPR mm	OAW mm
BMT 60	94 x 84	25	70	130

Mori/Seiki – BMT 60 – radial square section tool holder

- ▲ Directly screwed version
- ▲ For right and left direction of rotation



NEW



Left-hand

82 485 ...

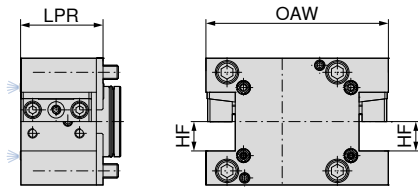
01002

Adapter	Hole pattern	HF mm	LPR mm	OAW mm
BMT 60	94 x 84	25	100	135

Mori/Seiki – BMT 60 – multi square section tool holder

- ▲ Directly screwed version
- ▲ For right and left direction of rotation

NEW



82 485 ...

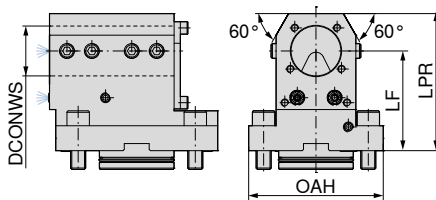
Adapter	Hole pattern	HF mm	LPR mm	OAW mm
BMT 60	94 x 84	25	70	155,5

02003

Mori/Seiki – BMT 60 – combi tool holder

- ▲ Directly screwed version

NEW



IC

82 485 ...

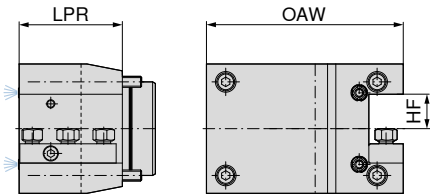
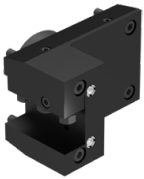
Adapter	Hole pattern	DCONWS mm	LF mm	OAH mm	LPR mm
BMT 60	94 x 84	40	80	108	110

03004

Mazak – BMT 68 – axial square section tool holder

- ▲ Directly screwed version
- ▲ For right and left direction of rotation

NEW



Left-hand

82 486 ...

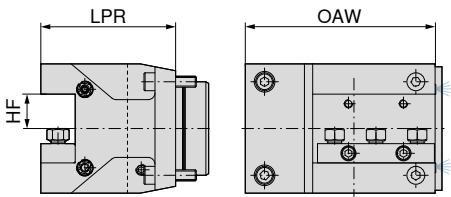
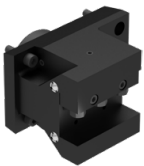
00001

Adapter	Hole pattern	HF mm	LPR mm	OAW mm
BMT 68	110 x 68	25	75	143

Mazak – BMT 68 – radial square section tool holder

- ▲ Directly screwed version
- ▲ For right and left direction of rotation

NEW



Left-hand

82 486 ...

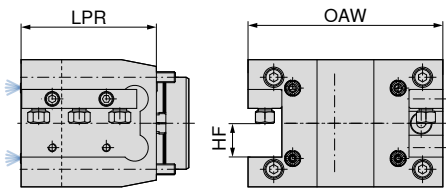
01002

Adapter	Hole pattern	HF mm	LPR mm	OAW mm
BMT 68	110 x 68	25	98	143

EMAG – BMT 68 – multi square section tool holder

▲ Directly screwed version

NEW



Adapter	Hole pattern	HF mm	LPR mm	OAW mm
BMT 68	110 x 68	25	100	144

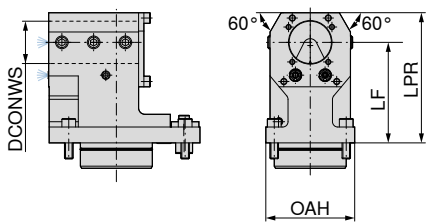
82 486 ...

02003

Mazak – BMT 68 – combi tool holder

▲ Directly screwed version

NEW



IC

Adapter	Hole pattern	DCONWS mm	OAH mm	LF mm	LPR mm
BMT 68	110 x 68	40	84	95	123

82 486 ...

03004

PROJECTS IN THE BEST OF HANDS

Smart solutions for efficient machining processes

Benefit from our innovative tool concepts, many years of experience and professional advice to increase your productivity. You can rely on us to implement your project successfully!



ZSG mini



Centric vice for small parts

ZSG mini in mechanical version with high clamping force and quick change jaws. Ideal for blank and finished part machining, multi-clamping and automation.

Your benefits:

- ▲ Fast jaw changeover without tools
- ▲ Compact and precise
- ▲ Optimum accessibility from all sides
- ▲ Exchangeable jaw widths (45 mm and 70 mm)
- ▲ High clamping force and large clamping range
- ▲ Clamping system for automation

Clamping/aligning:



Clamping with two M6 screws from above through the base body.



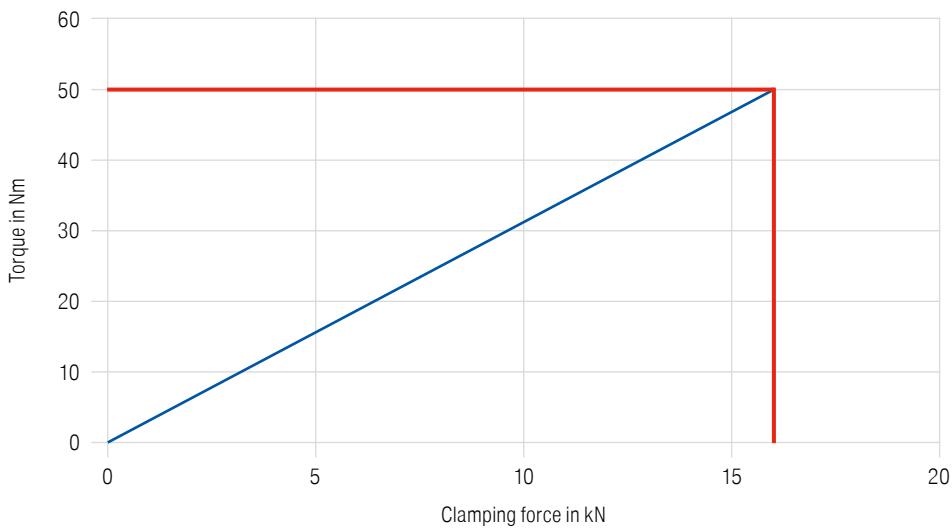
Clamping with two M6 screws from above through the base body. Alignment can be performed using $\varnothing 12^{H7}$ precision holes.



Both versions come with mounting holes for the LANG zero point clamping system, Quick Point 52 x 52.

Clamping force:

ZSG mini tightening torque/clamping force

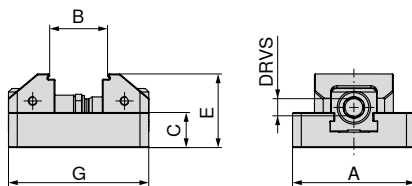


Centric vice for small parts

- ▲ Fast jaw changeover without tools
- ▲ Compact and precise
- ▲ Optimum accessibility from all sides
- ▲ Exchangeable jaw widths (45 mm and 70 mm)
- ▲ Stainless, hardened base body

Scope of supply:

ZSG mini base body with spindle without system jaws

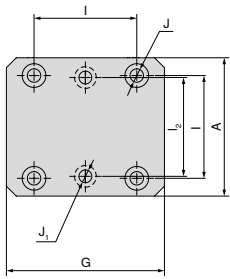
**NEW****80 912 ...**

A mm	B mm	C mm	E mm	G mm	MXC kN	DRVS mm	WT kg
70	7 - 57	20	42	80	16	11	0,9
70	7 - 77	20	42	100	16	11	1,1

07000
07100

ZSG mini underside dimensions

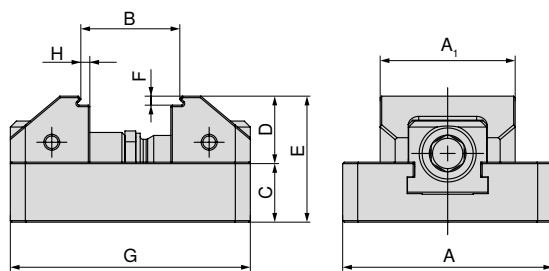
Base width 70 mm



A mm	J ₁ mm	J _{H7} mm	L _{2 ±0,015} mm	L _{±0,015} mm	G mm
70	6,5	12	50	52	80
70	6,5	12	50	52	100

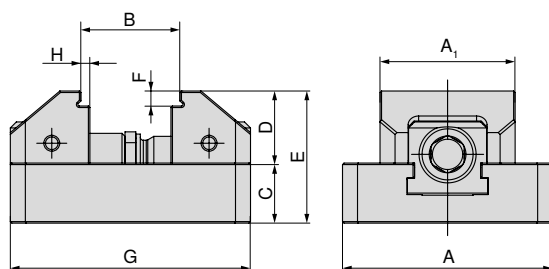
ZSG Mini – structural dimension table for the different jaws

With quick change jaw, grip 3 mm



A mm	A ₁ mm	B mm	C mm	D mm	E mm	F mm	G mm	H mm	Article no. System jaws
70	45	7-33	20	22	42	3	80	3	80 912 30100
70	70	7-33	20	22	42	3	80	3	80 912 30200
70	45	7-53	20	22	42	3	100	3	80 912 30100
70	70	7-53	20	22	42	3	100	3	80 912 30200

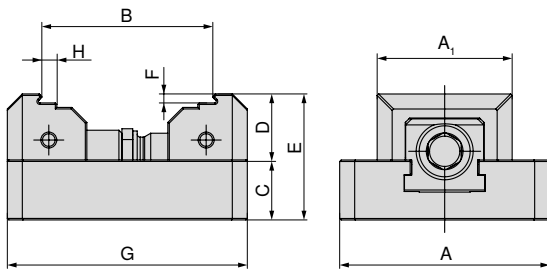
With quick change jaw, smooth step 5 mm



A mm	A ₁ mm	B mm	C mm	D mm	E mm	F mm	G mm	H mm	Article no. System jaws
70	45	7-33	20	24	44	5	80	5	80 912 30300
70	70	7-33	20	24	44	5	80	5	80 912 30400
70	45	7-53	20	24	44	5	100	5	80 912 30300
70	70	7-53	20	24	44	5	100	5	80 912 30400

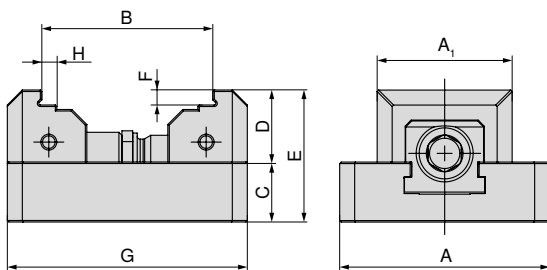
ZSG Mini - structural dimension table for the different jaws

with quick change jaw, VS, grip 3 mm



A mm	A ₁ mm	B mm	C mm	D mm	E mm	F mm	G mm	H mm	Article no. System jaws
70	45	31 - 57	20	22	42	3	80	5	80 912 30500
70	70	31 - 57	20	22	42	3	80	5	80 912 30600
70	45	31 - 77	20	22	42	3	100	5	80 912 30500
70	70	31 - 77	20	22	42	3	100	5	80 912 30600

Quick change jaw, VS, smooth 5 mm

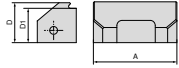


A mm	A ₁ mm	B mm	C mm	D mm	E mm	F mm	G mm	H mm	Article no. System jaws
70	45	31 - 56	20	24	44	5	80	5	80 912 30700
70	70	31 - 56	20	24	44	5	80	5	80 912 30800
70	45	31 - 76	20	24	44	5	100	5	80 912 30700
70	70	31 - 76	20	24	44	5	100	5	80 912 30800

System jaws overview

Description	A	D	D ₁	price	Article no.	Type association
-------------	---	---	----------------	-------	-------------	------------------

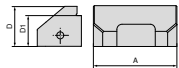
Quick change jaw, grip 3 mm



▲ Price per piece

					NEW	NCG	H5G / -S / -Z	X5G-Z / -S	ESG 4	ESG 5	ESG mini	HDG 2	ZSG 4	ZSG mini	DSG 4	MSG 2
45	22	19			80 912 30100										●	
70	22	19			80 912 30200										●	

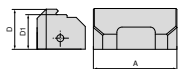
Quick change jaw, smooth step 5 mm



▲ Price per piece

					NEW	NCG	H5G / -S / -Z	X5G-Z / -S	ESG 4	ESG 5	ESG mini	HDG 2	ZSG 4	ZSG mini	DSG 4	MSG 2
45	24	19			80 912 30300										●	
70	24	19			80 912 30400										●	

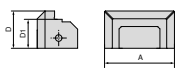
Quick change jaw, VS, grip 3 mm



▲ Price per piece

					NEW	NCG	H5G / -S / -Z	X5G-Z / -S	ESG 4	ESG 5	ESG mini	HDG 2	ZSG 4	ZSG mini	DSG 4	MSG 2
45	22	19			80 912 30500										●	
70	22	19			80 912 30600										●	

Quick change jaw, VS, smooth 5 mm



▲ Price per piece

					NEW	NCG	H5G / -S / -Z	X5G-Z / -S	ESG 4	ESG 5	ESG mini	HDG 2	ZSG 4	ZSG mini	DSG 4	MSG 2
45	24	19			80 912 30700										●	
70	24	19			80 912 30800										●	

System accessories overview

Socket

▲ Suitable for 3/8" square drive



Square	DRVS mm	80 875 ...
3/8"	11	11100



A suitable "magnetic workpiece stop" and "torque key" can be found in our new clamping technology catalogue
→ **Chapter 17 Workpiece clamping, pages 144 and 147**
(article numbers 80 892 23800 and 80 884 402)



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