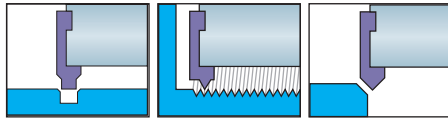
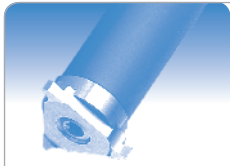


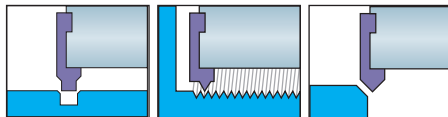
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PolyMILL



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TriMILL

 Connectable in accordance with
BLUECOMPETENCE

 » mimatic mi
 » Driven Tool Holders

Circular Milling Tools for Contours and Threads



The circular milling principle allows outside and inside contours to be manufactured to individual requirements on all CNC machining centers and milling machines. High efficiency is achieved by short machining times, extended tool life, and by reducing or eliminating with expensive special tools.

- **High-Precision Free Contours**
 - **High-Precision Plunge Cuts**
 - **True-to-Gauge Threads**
- can be executed with the utmost ease and without chip obstruction problems.

Blind holes can be tapped practically to the base without under-cutting. The use of uniform pitches also reduces storage and purchasing costs. As long as maximum dimensions are maintained, insert profiles can be customized to your specifications.

PolyMILL

 Connectable in accordance with
BLUECOMPETENCE

 » mimatic mi
 » Driven Tool Holders

Circular Milling Tools with Polygonal Insert Seat and 6 Cutting Edges for a High Chipping Volume



The new generation of circular cutters allows,

- **Guard Ring Slots**
- **Metric Internal Threads acc. to DIN**
- **Whitworth Threads**

to be milled in components with great precision. The polygonal connection between the insert and cutter body improves the economy and quality of the machining process.

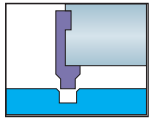
- **Longer Tool Lifetimes**
- **Higher Chipping Volume**
- **Higher Feeds**
- **Shorter Machining Times**

P16, P20 and P26 are the designations of the three basic types. They are available with various shank and insert dimensions that extend the application scope.

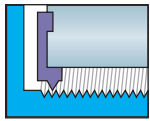
The milling cutters are available in various lengths. The carbide variants are made with a tool-steel head.



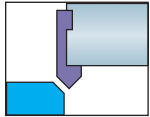
Symbols



Cutting, profile cutting,
Guardring slots, O-Ring slots



Thread milling



Chamfering and deburring



Type designation



Tool shank without clamping surface



Tool shank with Weldon clamping surface



Tool with Conical tool shank



Tool with tightening thread



Cutter with cross groove



Smallest necessary bore-diameter



Maximum cutting depth



Internal coolant supply



Blank inserts must be equipped with a clearance angle!



Inserts without profile, ready for use with clearance angle.



Inserts for guard ring slots



Inserts for O-ring slots



DIN standard



Thread standard



Thread with undercut (Trio-Cut)



for right- and left hand internal thread
for left hand thread modify your NC-program!



for right- and left hand external thread
for left hand thread modify your NC-program!



Full form thread milling



Partial form thread milling



Drill milling (Trio-Cut)



Inserts with chamfered edges



Inserts with chipbreakers from 5 mm cutting width



For chamfering and deburring



Number of inserts (Polygon Cutter)



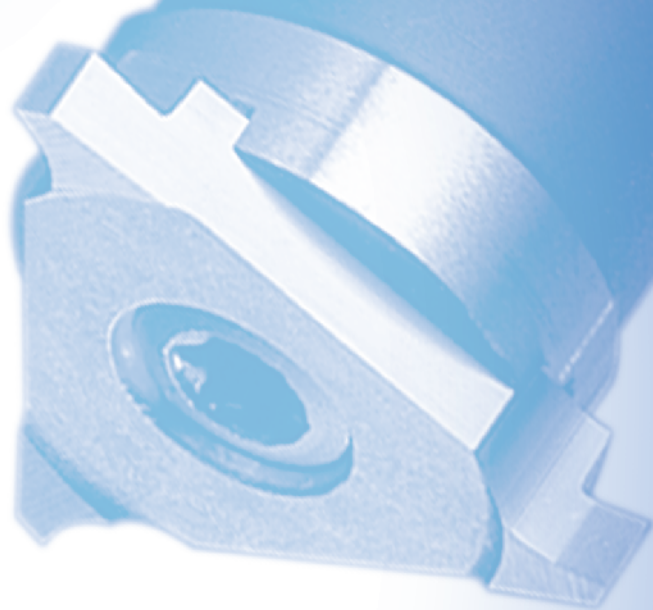
Thread depth max.

TriMILL



Circular Milling Tools

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<ul style="list-style-type: none"> • Circular Milling • Circlip Grooves • O-Ring Grooves • Thread Milling • Chamfering and Deburring 	



mimatic[®] Tool Systems
for Sustainability and Efficiency

BLUeCOMPETENCE

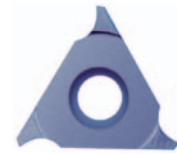
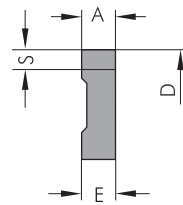
Alliance Member

Partner of the Engineering Industry
 Sustainability Initiative

Tools according to the policy of BLUeCOMPETENCE are marked in this catalogue. More information on the program (Initiative) of the VDMA see pages 74-75.

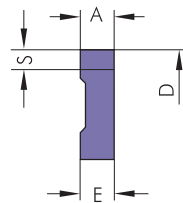
Grooving

- Cutting Insert Holder Page 14-17
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Must be equipped with a clearance angle.

Type	A mm	D mm	E mm	S _{max.} mm	Order No.	
					K10	FKN
04	2,00	7,9	2,34	0,35	141702	141622
	2,34	10,6	2,34	1,60	141636	141637
03	3,00	10,6	3,00	1,60	141649	141700
	4,00	10,6	4,00	1,60	141588	141708
02	3,50	17,5	3,50	2,60	141553	141564
	5,00	17,5	5,00	2,60	141590	141576
01	6,00	17,5	6,00	2,60	141591	141577
	4,00	23,0	4,00	3,45	141373	141389
	6,50	23,0	6,50	3,45	141356	141390

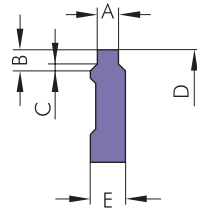


Ready for use with clearance angle

Type	A mm	D mm	E mm	S _{max.} mm	Order No.	
					K10	TINAMATIC
04	2,00	7,9	2,34	0,35	141737	141719
03	2,34	10,6	2,34	1,60	141634	141642
	3,00	10,6	3,00	1,60	141621	141669
02	3,50	17,5	3,50	2,60	141563	141533
	5,00	17,5	5,00	2,60	141582	141535
01	6,00	17,5	6,00	2,60	141571	141544
	4,00	23,0	4,00	3,45	141372	141361
	6,50	23,0	6,50	3,45	141386	141396
023	5,00	17,5	5,00	4,00	142016	142060
013	6,50	23,0	6,50	6,00	141963	141972

Circlip Grooves

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With chamfered edge

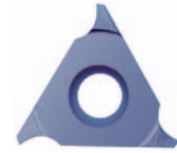
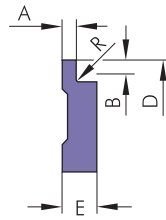
Type	G-Ring	D mm	E mm	A _{-0,03} mm	B mm	Cx45° mm	Order No.	
							K10	TINAMATIC
03	1,10	10,6	2,34	1,18	0,50	0,10	141605	141556
	1,10	17,5	3,5	1,18	0,50	0,10	141392	141427
02	1,30	17,5	3,5	1,38	0,85	0,15	141374	141387
	1,60	17,5	3,5	1,68	1,00	0,15	141430	141399
	1,85	17,5	3,5	1,93	1,25	0,20	141419	141409
	2,15	17,5	3,5	2,23	1,50	0,20	141420	141333
	2,65	17,5	3,5	2,73	1,50	0,20	141446	141388
	1,10	23,0	4,0	1,18	0,50	0,10	141177	141161
01	1,30	23,0	4,0	1,38	0,70	0,15	141230	141209
	1,30	23,0	4,0	1,38	0,85	0,15	141198	141199
	1,60	23,0	4,0	1,68	0,85	0,15	141210	141237
	1,60	23,0	4,0	1,68	1,00	0,15	141207	141180
	1,85	23,0	4,0	1,93	1,25	0,20	141170	141193
	2,15	23,0	4,0	2,23	1,50	0,20	141217	141215
	2,65	23,0	4,0	2,73	1,50	0,20	141225	141222
	2,65	23,0	4,0	2,73	1,75	0,20	141227	141048
	3,15	23,0	4,0	3,23	1,75	0,20	141224	141186
	4,15	23,0	6,5	4,23	2,00	0,20	141171	141212
023	1,85	17,5	5,0	1,93	1,25	0,20	141977	141946
	2,15	17,5	5,0	2,23	1,50	0,20	141952	141949
	2,65	17,5	5,0	2,73	1,50	0,20	141992	141997
	2,65	17,5	5,0	2,73	1,75	0,20	141985	141970
	3,15	17,5	5,0	3,23	1,75	0,20	141984	141993
	4,15	17,5	5,0	4,23	2,50	0,20	141967	141973
013	1,85	23,0	6,5	1,93	1,25	0,20	141913	141914
	2,15	23,0	6,5	2,23	1,50	0,20	141867	141892
	2,65	23,0	6,5	2,73	1,50	0,20	141895	141915
	2,65	23,0	6,5	2,73	1,75	0,20	141906	141907
	3,15	23,0	6,5	3,23	1,75	0,20	141893	141924
	4,15	23,0	6,5	4,23	2,00	0,20	141904	141905
	4,15	23,0	6,5	4,23	2,50	0,20	141896	141927

Circlip Grooves

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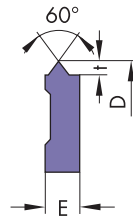
Without chamfered edge



Type	G-Ring	D mm	E mm	A _{-0,03} mm	B mm	R mm	Order No.	
							K10	TINAMATIC
04	0,90	7,9	2,34	0,98	0,30	0,3	141671	141726
	0,90	10,6	2,34	0,98	0,30	0,3	141623	141611
03	1,10	10,6	2,34	1,18	0,60	0,3	141558	141567
	1,30	10,6	2,34	1,38	0,80	0,3	141592	141609
	1,60	10,6	2,34	1,68	1,00	0,3	141638	141630
	1,85	10,6	2,34	1,93	1,40	0,3	141581	141574
	0,90	17,5	3,50	0,98	0,70	0,3	141414	141416
02	1,10	17,5	3,50	1,18	0,90	0,3	141447	141435
	1,30	17,5	3,50	1,38	1,10	0,3	141462	141431
	1,60	17,5	3,50	1,68	1,25	0,3	141474	141454
	1,85	17,5	3,50	1,93	1,25	0,3	141432	141436
	2,15	17,5	3,50	2,23	1,75	0,3	141445	141437
	2,65	17,5	3,50	2,73	1,75	0,3	141463	141477
	3,15	17,5	3,50	3,23	2,20	0,3	141438	141440
01	0,90	23,0	4,00	0,98	0,70	0,3	141229	141254
	1,10	23,0	4,00	1,18	0,90	0,3	141226	141245
	1,30	23,0	4,00	1,38	1,10	0,3	141249	141261
	1,60	23,0	4,00	1,68	1,25	0,3	141250	141255
	1,85	23,0	4,00	1,93	1,25	0,3	141263	141269
	2,15	23,0	4,00	2,23	1,75	0,3	141252	141258
	2,65	23,0	4,00	2,73	1,75	0,3	141275	141264
	3,15	23,0	4,00	3,23	2,20	0,3	141267	141293
023	4,15	23,0	6,50	4,23	2,50	0,3	141253	141305
	1,85	17,5	5,00	1,93	1,25	0,3	141990	141994
	2,15	17,5	5,00	2,23	1,75	0,3	142004	141980
	2,65	17,5	5,00	2,73	1,75	0,3	142011	141968
013	3,15	17,5	5,00	3,23	2,20	0,3	142008	142014
	2,15	23,0	6,50	2,23	1,75	0,3	141894	141937
	2,65	23,0	6,50	2,73	1,75	0,3	141922	141925
	3,15	23,0	6,50	3,23	2,20	0,3	141928	141930
	4,15	23,0	6,50	4,23	2,50	0,3	141933	141934
	5,15	23,0	6,50	5,23	3,50	0,3	141940	141932

Thread Milling

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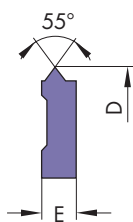
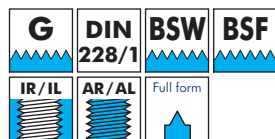
Type	Pitch	D mm	E mm	t mm	Thread	Order No.	
						K10	TINAMATIC
03	1,0	10,6	2,34	0,578	≥ M 12	141620	141613
	1,5	10,6	2,34	0,864	≥ M 14	141632	141674
	2,0	10,6	3,00	1,159	≥ M 16	141675	141647
02	1,0	17,5	3,50	0,578		141471	141443
	1,5	17,5	3,50	0,864		141501	141482
	2,0	17,5	3,50	1,159		141461	141484
	2,5	17,5	3,50	1,444		141538	141514
	2,5	16,0	3,50	1,444	only M20	141499	141516
	3,0	17,5	3,50	1,728		141493	141494
	1,0	23,0	4,00	0,578		141265	141317
01	1,5	23,0	4,00	0,864		141311	141291
	2,0	23,0	4,00	1,159		141284	141312
	2,5	23,0	4,00	1,444		141286	141287
	3,0	23,0	4,00	1,728		141303	141339
	3,5	23,0	4,00	2,023		141344	141300
	4,0	23,0	4,00	2,308		141335	141347
	4,5	23,0	6,50	2,602		141359	141365
	5,0*	23,0	6,50	2,887		141349	141342
	5,5*	23,0	6,50	3,182		106874	141350
	6,0*	23,0	6,50	3,467		141338	141369
023	1,5	17,5	5,00	0,864		142005	142020
	2,0	17,5	5,00	1,159		141975	142003
	2,5	17,5	5,00	1,444		142027	141989
	3,0	17,5	5,00	1,728		141987	141988
	4,0	17,5	5,00	2,308		142015	142028
	4,5* **	17,5	5,00	2,602		141971	141998
	5,0* **	17,5	6,00	2,887		142040	142009
	5,5* **	17,5	6,00	3,128		141999	142032
	6,0* **	17,5	6,00	3,467		142021	142000
013	1,5	23,0	6,50	0,864		141923	141920
	2,0	23,0	6,50	1,159		141950	141910
	2,5	23,0	6,50	1,444		141953	141935
	3,0	23,0	6,50	1,728		141959	141943
	3,5	23,0	6,50	2,023		141960	141961
	4,0	23,0	6,50	2,308		141945	141947
	4,5	23,0	6,50	2,602		141936	141964
	5,0	23,0	6,50	2,887		141962	141955
	6,0	23,0	6,50	3,467		141944	141976

* Caution: Not suitable for cutters no. 123415, 170320, 123416, 123441.

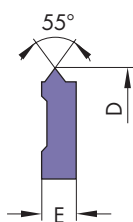
** Caution: Not suitable for cutters no. 123462.

Thread Milling

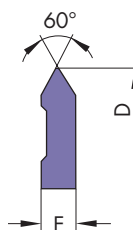
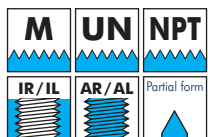
- Cutting Insert Holder Page 14-17
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Type	Pitch / "	D mm	E mm	Thread	Order No.	
					K10	TINAMATIC
03	19	10,6	2,34	G 1/4"	141651	141652
	19	10,6	2,34	G 3/8"	141687	141682
02	11	17,5	3,50	G 1/2"	141539	141522
	14	17,5	3,50		141540	141488
	14	16,0	3,50		141490	141508
01	11	23,0	4,00	141384	141381	
023	11	17,5	5,00	107104	142022	
013	11	23,0	6,50	107098	141941	



Type	Pitch / "	D mm	t mm	Thread	Order No.	
					K10	TINAMATIC
03	10	10,6	1,470	3/4-10		149732
	11	10,6	1,349	5/8-11		149204
	13	10,0	1,099	1/2-13		149460



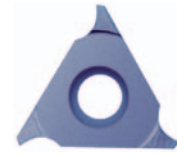
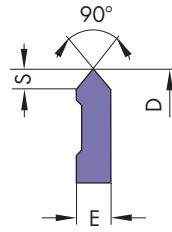
Type	Pitch	D mm	E mm	G mm	Order No.	
					K10	TINAMATIC
03	1-2,0	10,6	3,0	0,10		141677
02	1-3,5	17,5	3,5	0,10		141528
01	1-4,0	23,0	4,0	0,10		141366
023	1-3,5	17,5	5,0	0,10		141996
	3-6,0**	17,5	6,0	0,25		142010
013	1-3,0	23,0	6,5	0,10	141969	
	3,5-6	23,0	6,5	0,40	141951	

** Caution: For cutter no. 123462 - only up to pitch 4,0 mm.



Chamfering and Deburring

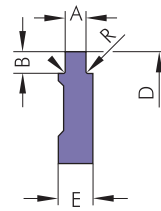
- Cutting Insert Holder Page 14-17
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Type	S _{max.} x 45° mm	D mm	E mm	Order No.	
				K10	TINAMATIC
04	0,90	7,9	2,34		141690
03	1,50	10,6	3,00	141688	141694
02	2,50	17,5	5,00	141529	141495
01	3,25	23,0	6,50	141354	141382
023	2,30	17,5	5,00		142033

O-Ring Grooves

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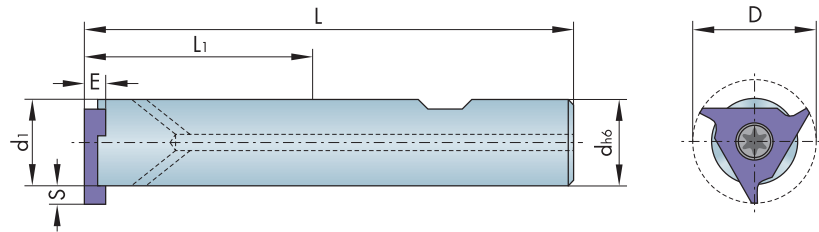
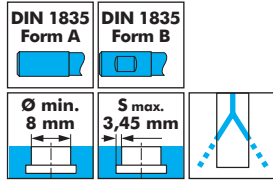


Type	G-Ring	D mm	E mm	A _{-0,03} mm	B mm	R mm	Order No.	
							K10	TINAMATIC
03	1,80	10,6	3,0	2,28	1,45	0,2	141661	141654
02	1,80	17,5	3,5	2,28	1,45	0,2	141509	141510
	2,65	17,5	5,0	3,08	2,30	0,2	141512	141470
01	1,80	23,0	4,0	2,28	1,45	0,2	141239	141236
	2,65	23,0	4,0	3,08	2,30	0,2	141310	141277
	3,55	23,0	6,5	4,08	3,10	0,2	141294	141306
023	1,80	17,5	5,0	2,28	1,45	0,2	141986	142012
	2,65	17,5	5,0	3,08	2,30	0,2	141974	142019
013	2,65	23,0	6,5	3,08	2,30	0,2	141897	141919
	3,55	23,0	6,5	4,08	3,10	0,2	141929	141916



Circular Milling Tools

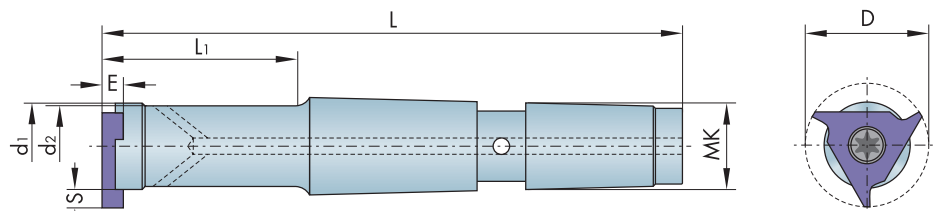
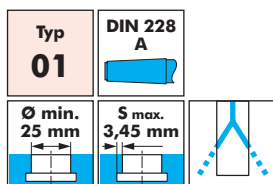
- Inserts Page 8-31
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Type	Order No.	Form	Bore Ø min.	dh6 mm	d1 mm	Smax. mm	E mm	*L mm	*L1 mm	Shaft	Spare part No.	
											Screw-driver	Screw
04	123491*	B	8	10	7,1	0,35	2,00	59,20	19,20	Steel	T6 IP 111705	107530 (0,9 Nm)
	123477*	B	11	10	7,4	1,60	2,34	59,54	19,54	Steel		
03	123478*	B	11	12	7,4	1,60	2,34	67,00	19,54	Steel		
	123479*	A	11	12	7,4	1,60	2,34	67,00	19,54	Steel		
	123480	B	11	10	7,4	1,60	2,34	76,54	36,54	Carbide		
123489	A	11	8	8,0	1,25	2,34	80,00	-	Carbide			
02	123445	B	20	12	12,0	2,60	3,50	77,55	32,20	Steel	T15 IP 111671	107547 (3,8 Nm)
	123446	B	20	16	12,0	2,60	3,50	82,10	32,20	Steel		
	123447	A	20	16	12,0	2,60	3,50	82,10	32,20	Steel		
	123448	B	20	12	12,0	2,60	3,50	112,20	67,20	Carbide		
	123470	A	20	12	12,0	2,60	3,50	82,80	-	Carbide		
	123471	A	20	12	12,0	2,60	3,50	100,00	-	Carbide		
01	123474	A	20	12	12,0	2,60	3,50	125,00	-	Carbide		
	123412	B	25	16	16,0	3,45	4,00	91,00	42,50	Steel	T20 IP 111594	107551 (5,5 Nm)
	123414	B	25	16	16,0	3,45	4,00	120,00	71,50	Steel		
	123415**	A	25	20	17,0	3,00	4,00	97,00	45,00	Steel		
	170320	A	25	16	17,0	3,00	4,00	141,00	92,50	Carbide		
	123416	B	25	16	17,0	3,00	4,00	141,00	92,50	Carbide		
123440	A	25	16	16,0	3,45	4,00	115,00	-	Carbide			
123441	A	25	16	16,0	3,00	4,00	152,50	-	Carbide			

* Without internal coolant supply

** Also suitable as basic body for a tandem cutter.



Order No.	Bore Ø min.	D mm	MK	d1 mm	d2 mm	Smax. mm	E mm	*L mm	*L1 mm	Shaft	Spare part No.	
											T20 IP Screw-driver	Screw
123421	25	23	MK 2	16,1	15	3,45	4	106,5	34,5	Steel	111594	107551
123422	25	23	MK 2	16,1	15	3,45	4	135,5	63,5	Steel	111594	107551

Screw torque 5,5 Nm

Circular Milling Tools

- Inserts Page 8-31
- Cutting Data Page 31
- Carbide Grades Page 30

 **Please adapt cutting data to overhangs length**

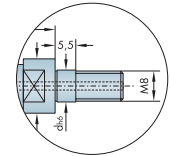
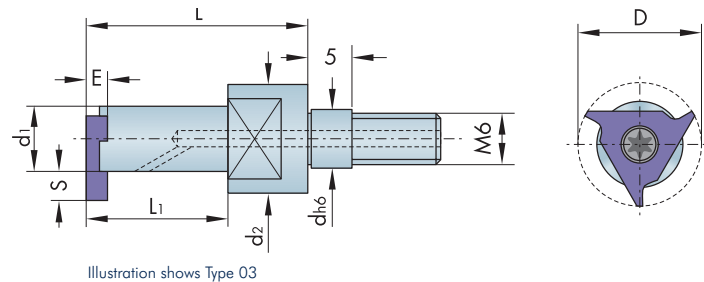
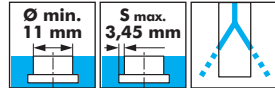


Illustration shows Type 02

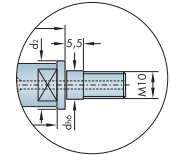


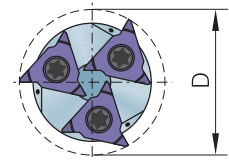
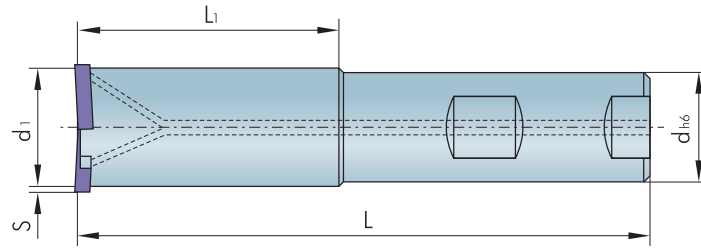
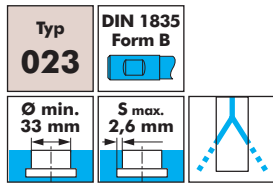
Illustration shows Type 01

Type	Order No.	Bore Ø min.	D mm	dh6 mm	d1 mm	d2 mm	Smax. mm	E mm	*L mm	*L1 mm	Shaft	Spare part No.	
												Screw-driver	Screw
03	123481	11	10,6	6,5	7,4	10,0	1,60	2,34	25	16	Steel	111705	107530
02	123450	20	17,5	8,5	12,2	15,4	2,60	3,50	31	22	Steel	111671	107547
01	123419	25	23,0	10,5	16,1	18,0	3,45	4,00	36	33	Steel	111594	107551

Screw torques
 Type 03 = 0,9 Nm, Size T6 IP
 Type 02 = 3,8 Nm, Size T15 IP
 Type 01 = 5,5 Nm, Size T20 IP

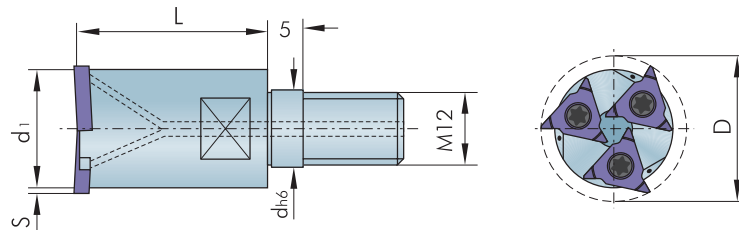
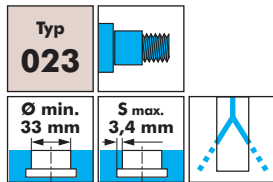
Circular Milling Tools

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- Cutting Data Page 31
- Carbide Grades Page 30



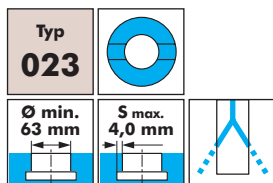
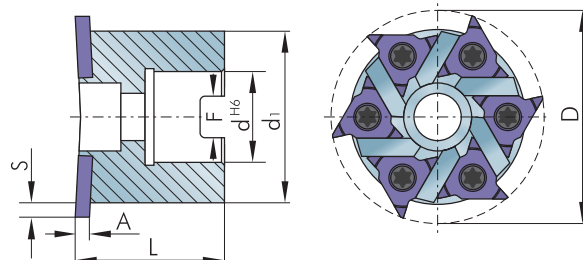
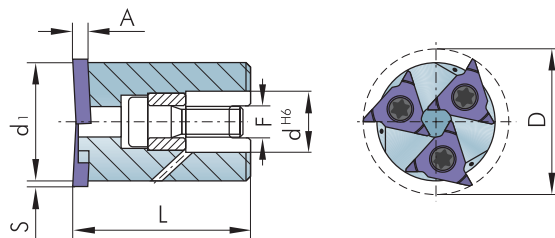
Order No.	Bore Ø min.	D mm	dh6 mm	d1 mm	Smax. mm	A mm	L mm	L1 mm	Inserts	Shaft
123462	33	32	25	26,8	2,6	5	125	67	3	Steel

Spare part No.	
T15 IP Screw-driver	Screw
111671	107547
Screw torque 3,8 Nm	



Order No.	Bore Ø min.	D mm	dh6 mm	d1 mm	Smax. mm	A mm	L mm	Inserts	Shaft
123465	33	32	12,5	24,3	3,8	5	40	3	Steel

Spare part No.	
T15 IP Screw-driver	Screw
111671	107547
Screw torque 3,8 Nm	



Order No.	Bore Ø min.	D mm	dh6 mm	d1 mm	Smax. mm	A mm	F mm	L mm	Inserts
123464	40	38	16	31	3,4	5,0	8,4	46	3
123461*	55	50	22	42	3,9	5,0	10,4	40	6

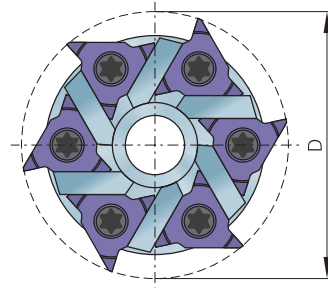
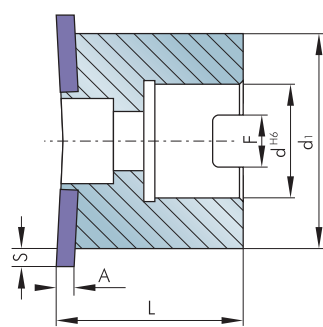
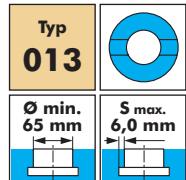
Accessories	Spare part No.	
Key	T15 IP Screw-driver	Screw
134984	111671	107547
Screw torque 3,8 Nm		

* Cutter clamping screw internal hexagon

Order No.	114684
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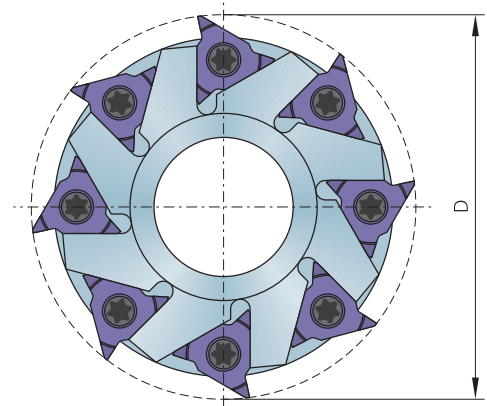
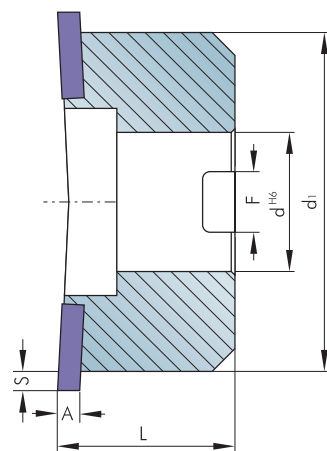
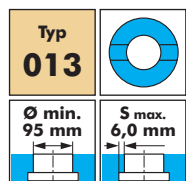
Circular Milling Tools

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Order No.	Bore Ø min.	D mm	dH6 mm	d1 mm	Smax. mm	A mm	F mm	L mm	Inserts	Spare part No.	
										T20 IP Screw-driver	Screw
123435	65	63	27	51	6	6,5	12,4	44	6	111594	107551

Screw torque 5,5 Nm
Cutter clamping screw internal hexagon
Order No. 114695



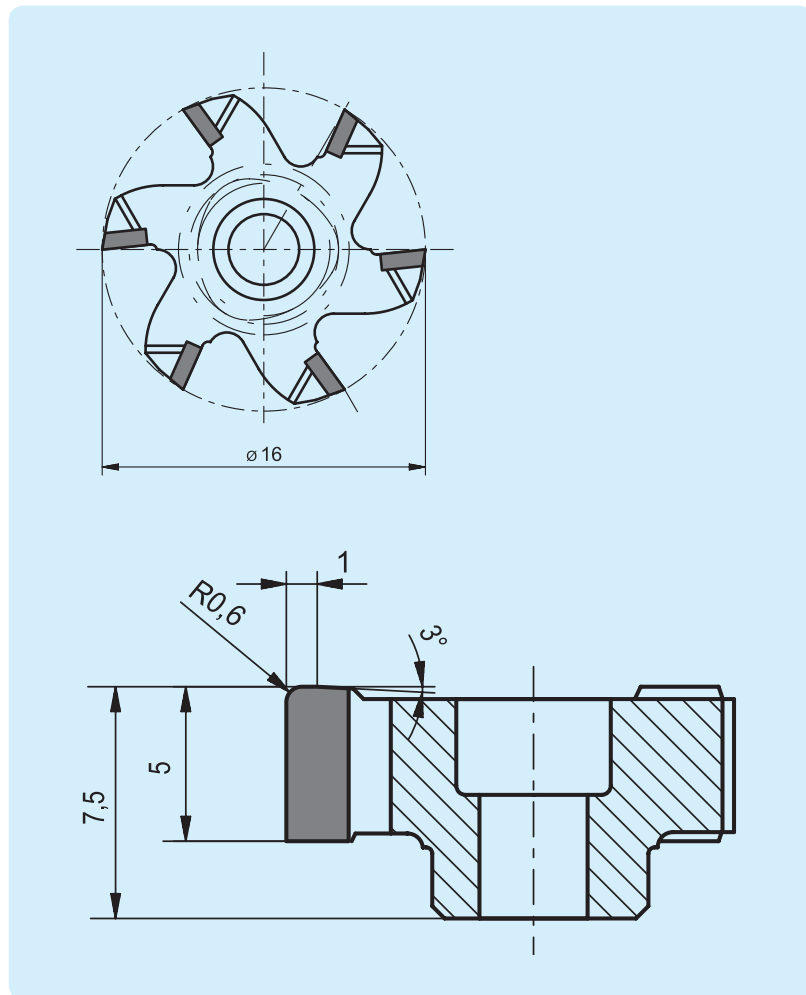
Order No.	Bore Ø min.	D mm	dH6 mm	d1 mm	Smax. mm	A mm	F mm	L mm	Inserts	Spare part No.	
										T20 IP Screw-driver	Screw
123436	95	90	32	78	6	6,5	14,4	40	8	111594	107551

Screw torque 5,5 Nm

PolyMILL- and TriMILL-Tools with PCD-Inserts

The established mimatic PolyMILL- and TriMILL tools for creating threads, grooves and special geometries are also available in PCD quality.

For machining of silicium-containing aluminum alloys or carbon-fibre reinforced composite materials, PCD (polycrystalline diamond) has proven itself.

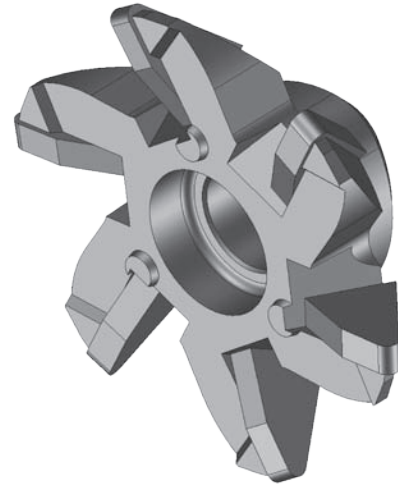
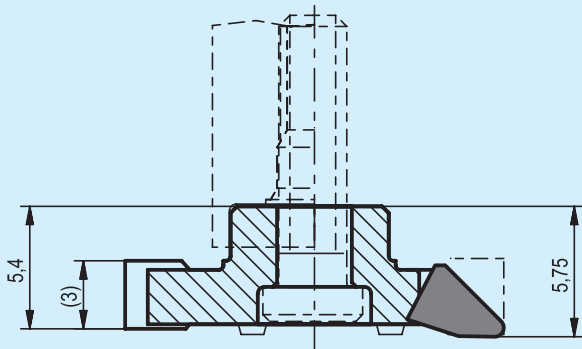


Today, amazing components are manufactured from CFK materials, for example the wings of the A380.

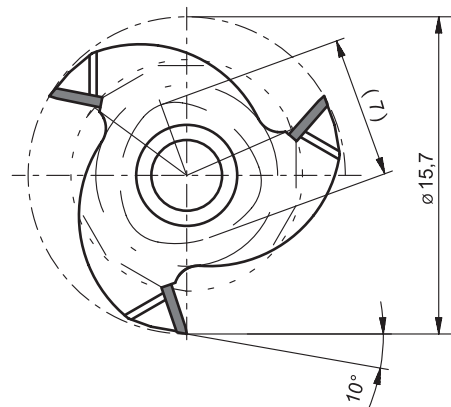
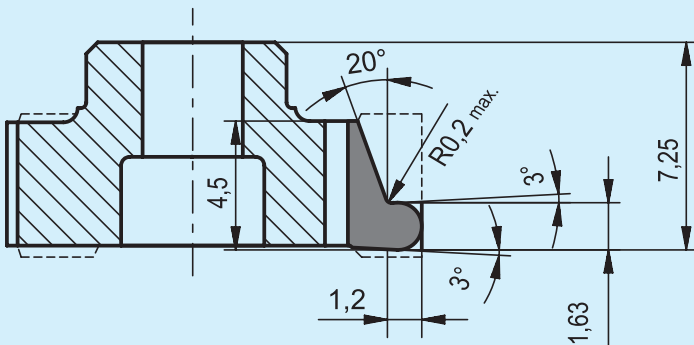
With rising energy costs, machining with these special materials, **you will be well prepared using mimatic cutting tools!**



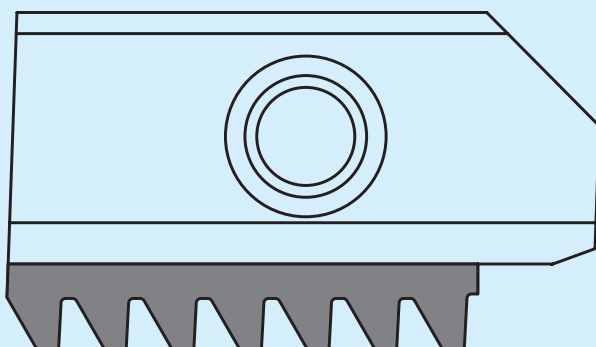
Examples of realized mimatic tools with mit PCD inserts: The tools are designed on demand.



PolyMILL-tool with 6 PCD cutting edges for a special contour milling application



PolyMILL-tool with 3 PCD cutting edges for a special profile application

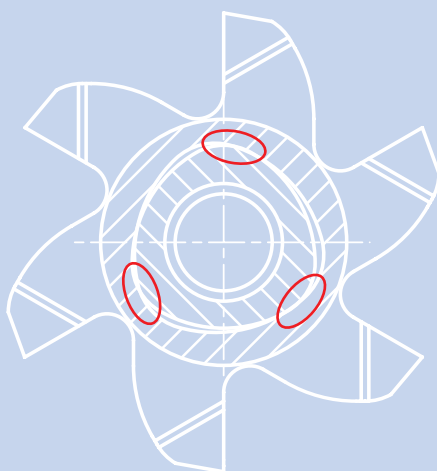
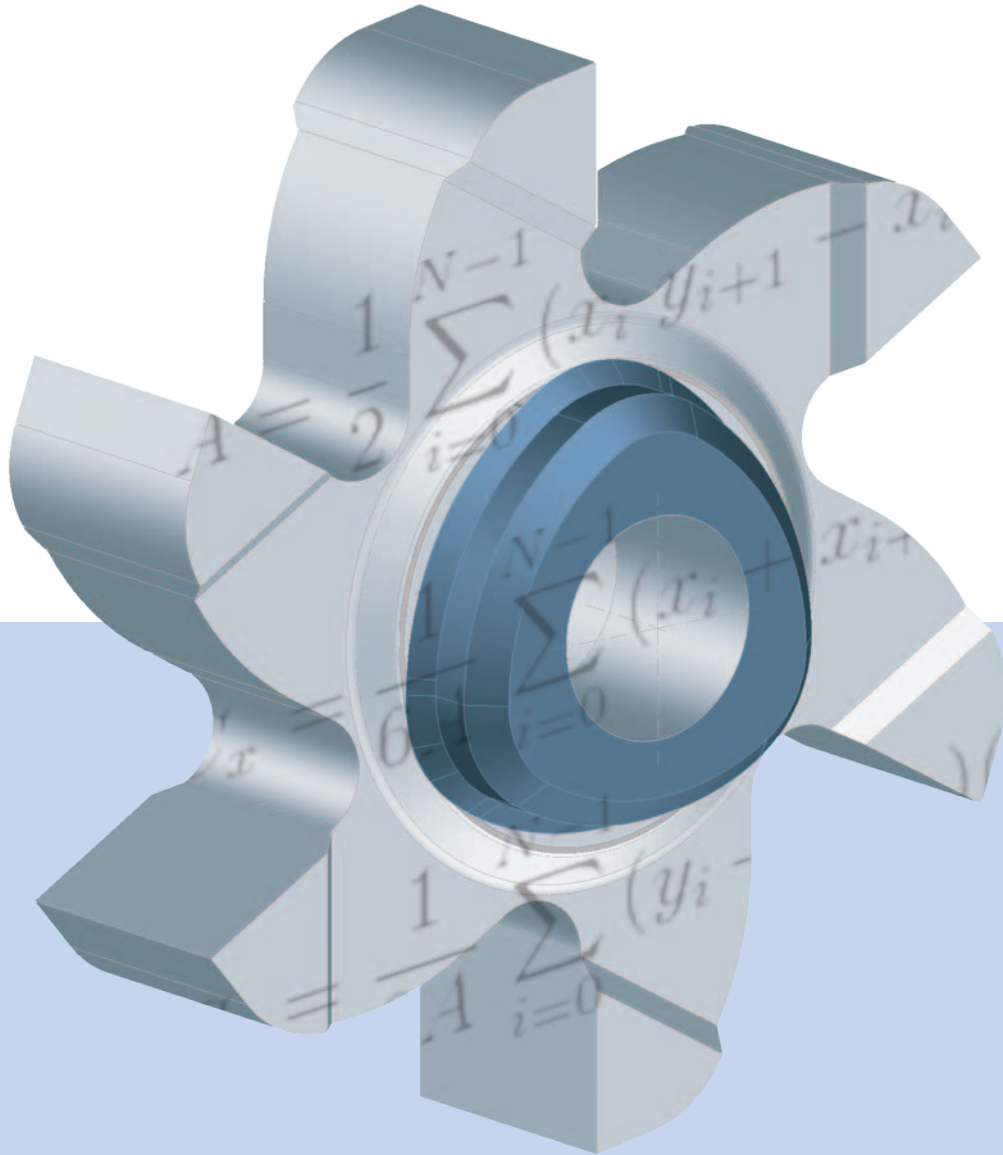


Insert with PCD cutting edge profile for thread milling application




PolyMILL

The Polygon in the mimatic[®] P-Interface



Advantages

- Concentricity over 3-point polygon
- Power transmission by 3-point polygon
- High stability through closed circular ring
- High resistance against breakage during interrupted cut

 = Transmission zones

PolyMILL



Circular Milling Tools

Inserts / Operation	Page
Grooving	22
Circlip Grooves	23
Thread Milling	24-25
Radius Milling	25
Chamfering and Deburring	26
Basic Holders	26-28

- **Polygonal Insert Seat for High Chip Volume**
- **Circular Milling**
- **Slots and T-Slots**
- **Circlip Grooves**
- **O-Ring Grooves**
- **Thread Milling**
- **Chamfering and Deburring**
- **High Precision**
- **High Service Life**
- **High Stability**

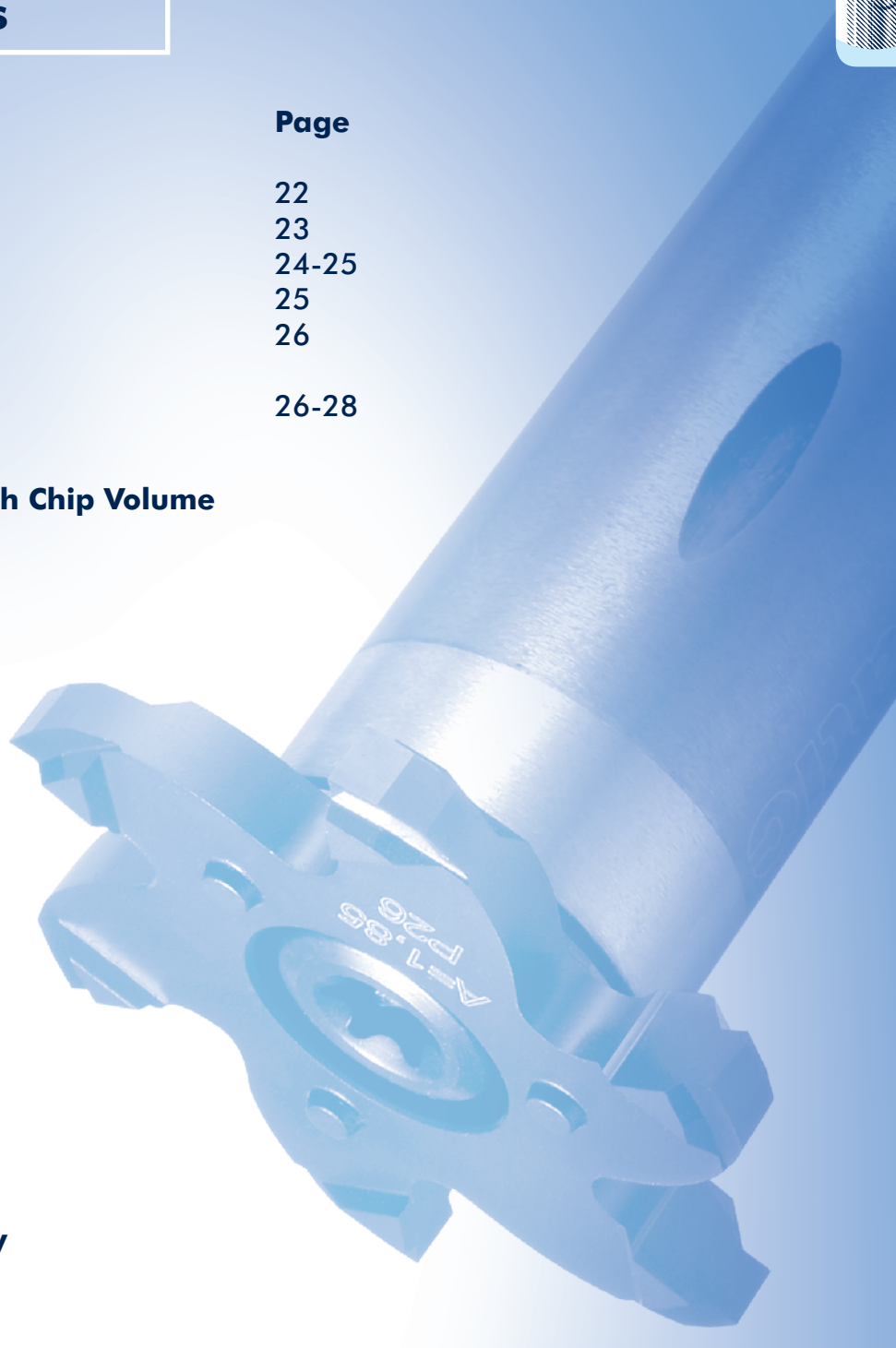
mimatic[®] Tool Systems
for Sustainability and Efficiency

BLUeCOMPETENCE

Alliance Member

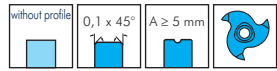
Partner of the Engineering Industry
 Sustainability Initiative

Tools according to the policy of
 BLUeCOMPETENCE are signed
 in this catalogue.
 More information on the initiative
 of the VDMA on pages 74-75.

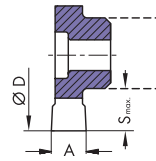


Grooving

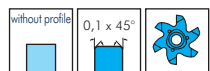
- Cutting Insert Holder Page 26-28
- Cutting Data Page 31



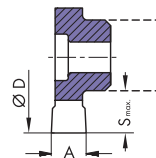
Ready for use with clearance angle



Type	A mm	D mm	Rake Angle	R mm	Smax. mm	Number of teeth	Order No.	
							FKN	TINAMATIC
P12	P1212	1,0	9,6	6°	0,10	1,20		171917
	P1212	1,5	11,7	6°	0,10	2,25		171862
	P1212	2,0	11,7	6°	0,15	2,25		171863
	P1212	2,5	11,7	6°	0,15	2,25		171865
	P1212	3,0	11,7	6°	0,15	2,25		171866
P16	P1616	3,5	16	0°	0,10	3,50		142531
	P1616	3,5	16	8°	0,10	3,50		142486
	P1616	3,5	16	12°	0,10	3,50		142526
	P1616	5,0	16	0°	0,10	3,50	142397	142511
	P1616	5,0	16	8°	0,10	3,50	142502	142541
P25	P2525	4,0	25	0°	0,10	5,70	142519	142457
	P2525	4,0	25	8°	0,10	5,70	142514	142556
	P2525	4,0	25	12°	0,10	5,70	142551	142546
	P2525	5,0	25	8°	0,10	5,70	142585	142579
	P2525	5,0	25	0°	0,10	5,70	107258	142538
	P2525	6,5	25	0°	0,10	5,70	142522	142582
	P2525	6,5	25	8°	0,10	5,70	142609	142610
	P2525	6,5	25	12°	0,10	5,70	142631	142574
	P2525	8,0	25	0°	0,10	5,70		142558
	P2525	8,0	25	8°	0,10	5,70		142578
P2525	8,0	25	12°	0,10	5,70		142588	



Ready for use with clearance angle



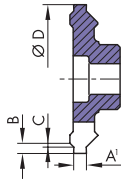
Type	A mm	D mm	Rake Angle	R mm	Smax. mm	Number of teeth	cross toothed	straight toothed
							TINAMATIC	TINAMATIC
P16	P1616	3,0	16,0	6°	0,10	3,5		142494
	P1616	4,0	16,0	6°	0,10	3,5		142565
	P1616	5,0	16,0	6°	0,10	3,5	171699	142586
	P1618	1,5	17,7	6°	0,10	4,0		171939
	P1618	2,0	17,7	6°	0,10	4,0		171941
P20	P2020	2,5	17,7	6°	0,15	4,0		171943
	P2020	3,0	20,0	6°	0,10	4,2		168673
	P2020	4,0	20,0	6°	0,10	4,2		168674
	P2020	5,0	20,0	6°	0,10	4,0 / 4,2	171700	142655
	P2022	1,5	21,7	6°	0,10	5,0		171957
P25	P2022	2,0	21,7	6°	0,15	5,0		171959
	P2022	2,5	21,7	6°	0,20	5,0		171961
	P2022	3,0	21,7	6°	0,20	5,0		171962
	P2526	3,0	26,0	6°	0,10	6,2		142601
	P2526	4,0	26,0	6°	0,10	6,2		142677
	P2526	5,0	26,0	6°	0,10	6,0 / 6,2	171701	142589
	P2526	6,5	26,0	6°	0,10	6,0 / 6,2	171702	142618
	P2528	1,5	27,7	6°	0,10	6,8		171981
	P2528	2,0	27,7	6°	0,15	6,8		171982
	P2528	2,5	27,7	6°	0,20	6,8		171984
P2528	3,0	27,7	6°	0,20	6,8		171985	

Circlip Grooves

- Cutting Insert Holder Page 26-28
- Cutting Data Page 31



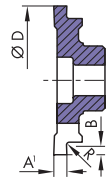
With chamfered edge



Type	DIN Width	D mm	A ¹ _{-0,03} mm	B mm	Cx45° mm	Number of teeth	Order No TINAMATIC	
P16	P1616	1,10	16	1,18	0,50	0,10	6	142423
	P1616	1,30	16	1,38	0,85	0,15	6	142528
	P1616	1,60	16	1,68	1,00	0,15	6	142561
	P1616	1,85	16	1,93	1,25	0,20	6	142562
P20	P2020	1,10	20	1,18	0,50	0,10	6	168675
	P2020	1,30	20	1,38	0,85	0,15	6	168676
	P2020	1,60	20	1,68	1,00	0,15	6	168677
	P2020	1,85	20	1,93	1,25	0,20	6	168678
	P2022	1,60	21,7	1,68	1,00	0,15	6	171968
	P2022	1,85	21,7	1,93	1,25	0,20	6	171969
	P2022	2,15	21,7	2,23	1,50	0,20	6	171970
	P2022	2,65	21,7	2,73	1,75	0,20	6	171971
P25	P2526	1,30	26	1,38	0,85	0,15	6	142646
	P2526	1,60	26	1,68	1,00	0,15	6	142660
	P2526	1,85	26	1,93	1,25	0,20	6	142607
	P2526	2,15	26	2,23	1,50	0,20	6	142591
	P2526	2,65	26	2,73	1,75	0,20	6	142597
	P2526	3,15	26	3,23	1,75	0,20	6	142661



Without chamfered edge



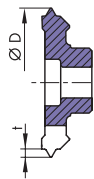
Type	DIN Width	D mm	A ¹ _{-0,03} mm	B mm	R mm	Number of teeth	Order No TINAMATIC	
P12	P1210	0,90	9,6	0,98	1,20	0,3	3	172125
	P1212	1,10	11,7	1,18	1,00	0,3	3	171868
	P1212	1,30	11,7	1,38	1,00	0,3	3	171869
	P1212	1,60	11,7	1,68	1,00	0,3	3	171870
P16	P1616	1,10	16	1,18	0,90	0,3	6	142548
	P1616	1,30	16	1,38	1,10	0,3	6	142509
	P1616	1,60	16	1,68	1,25	0,3	6	142533
	P1616	1,85	16	1,93	1,25	0,3	6	142536
	P1618	1,10	17,7	1,18	0,90	0,3	6	171945
	P1618	1,30	17,7	1,38	1,10	0,3	6	171946
	P1618	1,60	17,7	1,68	1,25	0,3	6	171947
	P1618	1,85	17,7	1,93	1,25	0,3	6	171948
P20	P2020	1,10	20	1,18	0,90	0,3	6	168679
	P2020	1,30	20	1,38	1,10	0,3	6	168680
	P2020	1,60	20	1,68	1,25	0,3	6	168681
	P2020	1,85	20	1,93	1,25	0,3	6	168682
	P2022	1,60	21,7	1,68	1,25	0,3	6	171964
	P2022	1,85	21,7	1,93	1,25	0,3	6	171965
	P2022	2,15	21,7	2,23	1,75	0,3	6	171966
	P2022	2,65	21,7	2,73	1,75	0,3	6	171967
P25	P2526	1,30	26	1,38	1,10	0,3	6	142598
	P2526	1,60	26	1,68	1,25	0,3	6	142653
	P2526	1,85	26	1,93	1,25	0,3	6	142616
	P2526	2,15	26	2,23	1,75	0,3	6	142637
	P2526	2,65	26	2,73	1,75	0,3	6	142662
	P2526	3,15	26	3,23	2,20	0,3	6	142643

PolyMILL

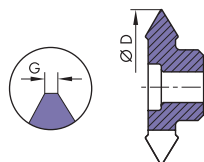
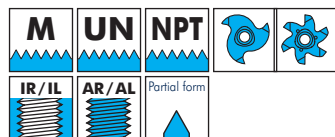
 Connectable in accordance with
BLUECOMPETENCE » mimatic mi
 » Driven Tool Holders

Thread Milling

- Cutting Insert Holder Page 26-28
- Cutting Data Page 31



Typ		Pitch mm	D mm	t mm	Thread	Number of teeth	Order No. TINAMATIC
P12	P1210	1,00	9,6			3	171875
	P1210	1,50	9,6			3	171876
	P1210	1,75	9,6		only M12	3	175479
	P1211	2,00	10,5			3	171877
P16	P1616	1,00	16,0			6	107240
	P1616	1,50	16,0			6	142569
	P1616	2,00	16,0			6	142570
	P1616	2,50	16,0			6	142543
	P1616	2,50	16,0		only M20	6	142534
	P1616	3,00	16,0			6	142575
	P20	P2020	1,50	20,0			6
	P2020	2,00	20,0			6	168684
	P2020	3,00	20,0		only M24	6	168685
P25	P2526	1,50	26,0	0,864		6	142617
	P2526	2,00	26,0	1,159		6	142644
	P2526	3,00	26,0	1,728		6	142599
	P2524	3,50	24,0	2,023	only M30	6	142671
	P2526	3,50	26,0	2,023		6	142623
	P2526	4,00	26,0	2,308		6	142624
	P2526	4,00	26,0	2,308	only M36	6	169675
	P2526	4,50	26,0	2,602		6	142638
	P2526	5,00	26,0	2,887		6	107275



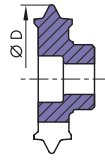
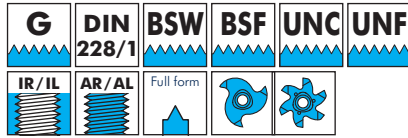
Type		Pitch mm	D mm	G mm	Number of teeth	Order No. TINAMATIC
P12	P1212	1-3	11,7	0,10	3	171911
P16	P1616	1-4*	16,0	0,10	6	142580
	P1616	2,5-4	16,0	0,25	6	142544
P20	P1618	1-3	17,7	0,10	6	171954
	P2020	1-3	20,0	0,10	6	168686
	P2022	1-2	21,7	0,10	6	171972
	P2022	2-4	21,7	0,15	6	171973
P25	P2526	1-3	26,0	0,10	6	142647
	P2526	2,5-5	26,0	0,25	6	142592
	P2526	3,5-6	26,0	0,40	6	175936

* Not suited for pitch 4,0 mm with the cutters 123588 and 123590

Connectable in accordance with
BLUECOMPETENCE » mimatic mi
 » Driven Tool Holders

Thread Milling

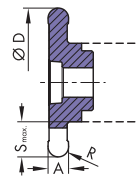
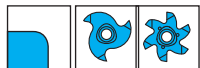
- Cutting Insert Holder Page 26-28
- Cutting Data Page 31



Type	Pitch / "	D mm	Thread	Number of teeth	Order No. TINAMATIC
UNC					
P12	P1210	12	9,6	3	171883
	P1211	11	10,5	3	171880
	P1212	10	11,7	3	171879
P16	P1616	9	16,0	6	172148
P20	P2018	8	18,0	6	172149
	P2020	7	20,0	6	172150
P25	P2524	6	24,0	6	172151
	P2526	5	26,0	6	172152
	P2526	4,5	26,0	6	172153
UNF					
P12	P1210	1/2-20	9,6	3	171884
	P1211	9/16-18	10,5	3	171885
	P1212	3/4-16	11,7	3	171900
P16	P1618	7/8-14	17,7	6	171950
P20	P2020	1-12	20,0	6	171951
G,BSW, BSF					
P12	P1210	19	9,6	3	171912
P16	P1616	11	16,0	6	142549
	P1616	14	16,0	6	142576
	P1616	10	16,0	6	167014
	P1618	14	17,7	6	171949
P20	P2020	11	20,0	6	168687
	P2020	14	20,0	6	168688
P25	P2526	11	26,0	6	142600
			all threads > 1"		

Radius Milling

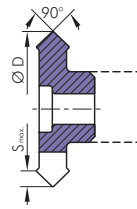
- Cutting Insert Holder Page 26-28
- Cutting Data Page 31



Type	D mm	A mm	R mm	Smax. mm	Number of teeth	Order No. TINAMATIC
P12	P1210	9,6	2,2	1,1	1,20	171924
	P1212	11,7	2,2	1,1	2,25	171874
P16	P1618	17,7	2,2	1,1	4,20	171953
P20	P2022	21,7	2,0	1,0	5,00	171975
	P2022	21,7	2,4	1,2	5,00	171976
	P2022	21,7	2,8	1,4	5,00	171977
	P2022	21,7	3,0	1,5	5,00	171978
P25	P2526	26,0	5,0	2,5	6,20	175075

Chamfering and Deburring

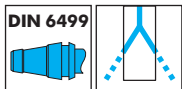
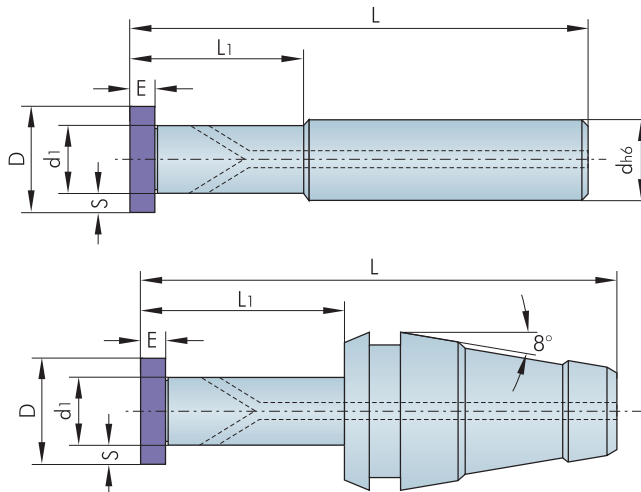
- Cutting Insert Holder Page 26-28
- Cutting Data Page 31



Type	D mm	Smax. x 45° mm	Number of teeth	Order No. TINAMATIC
P12	P1210	9,6	1,2	171914
	P1212	11,7	1,5	171913
P16	P1616	16,0	1,9	142521
	P1618	17,7	1,3	171955
P20	P2020	20,0	1,9	168689
	P2022	21,7	1,6	171979
P25	P2526	26,0	2,1	142676

Circular Milling Tools with Polygonal Insert Seat

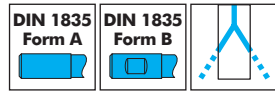
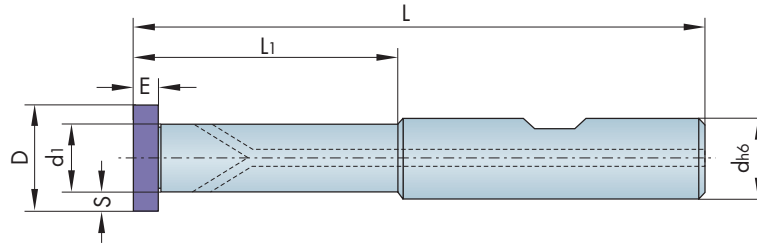
- Inserts Page 22-26
- Cutting Data Page 31



Type	Order No.	Form	Bore Ø min.	dh6 mm	d1 mm	Smax. mm	E mm	L* mm	L1* mm	Shaft	Spare part No.	
											Screw-driver	Screw
P12	177170	A	12	10	7,0	2,25	2,0	57,0	10,0	Steel	T8 IP 111656	M2,5x7 107596 (1,0 Nm)
	177172	ER 16	12		7,0	2,25	2,0		10,0	Steel		
	177173	ER 20	12		7,0	2,25	2,0		15,0	Steel		
P16	177174	A	18	10	9,0	4,00	3,5	64,0	15,0	Steel	T8 IP 111656	M3x12 143158 (1,1 Nm)
	177176	ER 16	18		9,0	4,00	3,5		15,0	Steel		
	177177	ER 20	18		9,0	4,00	3,5		20,0	Steel		
P20	177178	A	22	12	11,5	5,00	5,0	68,0	20,0	Steel	T15 IP 111671	M4x13 107597 (3,8 Nm)
	177180	ER 20	22		11,5	5,00	5,0		20,0	Steel		
	177181	ER 25	22		11,5	5,00	5,0		25,6	Steel		
P25	177182	A	28	16	13,6	6,80	4,0	74,2	25,0	Steel	T20 IP 111594	M5x13,5 107529 (5,5 Nm)
	177184	ER 25	28		13,6	6,80	4,0		25,0	Steel		
	177185	ER 32	28		13,6	6,80	4,0		35,0	Steel		

Circular Milling Tools with Polygonal Insert Seat

- Inserts Page 22-26
- Cutting Data Page 31



Type	Order No.	Form	Bore Ø min.	dh6 mm	d1 mm	Smax. mm	E mm	L* mm	L1* mm	Shaft	Spare part No.	
											Screw-driver	Screw
P12	123619	B	12	12	7,0	2,25	2,0	69,5	22,0	Steel	T8 IP 111656	M2,5x7 107596 (1,0 Nm)
	100228	B	12	12	7,0	2,25	2,0	69,5	22,0	Carbide		
	171778	A	12	12	7,0	2,25	2,0	69,5	22,0	Carbide		
	171780	B	12	12	7,0	2,25	2,0	82,0	32,0	Carbide		
	171781	A	12	12	7,0	2,25	2,0	82,0	32,0	Carbide		
	171783	B	12	12	7,0	2,25	2,0	102,0	42,0	Carbide		
P16	123573	B	18	12	9,0	4,00	3,5	71,5	25,0	Steel	T8 IP 111656	M3x12 143158 (1,1 Nm)
	123577	B	18	12	9,0	4,00	3,5	71,5	25,0	Carbide		
	171787	A	18	12	9,0	4,00	3,5	71,5	25,0	Carbide		
	123580	B	18	12	9,0	4,00	3,5	86,5	40,0	Carbide		
	171789	A	18	12	9,0	4,00	3,5	86,5	40,0	Carbide		
	123584	A	18	12	9,0	4,00	3,5	104,0	34,0	Carbide		
	123588	A	18	12	12,0	2,70	3,5	86,5	-	Carbide		
	123590	A	18	12	12,0	2,70	3,5	126,6	-	Carbide		
P20	123615	B	22	16	11,5	5,00	5,0	85,6	35,6	Steel	T15 IP 111671	M4x13 107597 (3,8 Nm)
	123616	B	22	16	11,5	5,00	5,0	85,6	35,6	Carbide		
	171794	A	22	16	11,5	5,00	5,0	85,6	35,6	Carbide		
	123617	B	22	16	11,5	5,00	5,0	105,6	55,6	Carbide		
	171796	A	22	16	11,5	5,00	5,0	105,6	55,6	Carbide		
	174314	A	22	16	16,0	2,70	5,0	111,0	-	Carbide		
P25	123592	B	28	16	13,6	6,80	4,0	84,2	35,0	Steel	T20 IP 111594	M5x13,5 107529 (5,5 Nm)
	123598	B	28	16	13,6	6,80	4,0	84,2	35,0	Carbide		
	171855	A	28	16	13,6	6,80	4,0	84,2	35,0	Carbide		
	123600	B	28	16	13,6	6,80	4,0	99,2	50,0	Carbide		
	171857	A	28	16	13,6	6,80	4,0	99,2	50,0	Carbide		
	123603	B	28	16	13,6	6,80	4,0	114,2	65,0	Carbide		
	171859	A	28	16	13,6	6,80	4,0	114,2	65,0	Carbide		
	123609	A	28	16	16,0	5,70	4,0	109,6	-	Carbide		
	123611	A	28	16	15,5	6,80	4,0	154,3	-	Carbide		
	123613	A	28	20	15,5	5,70	4,0	180,0	25,0	Carbide		

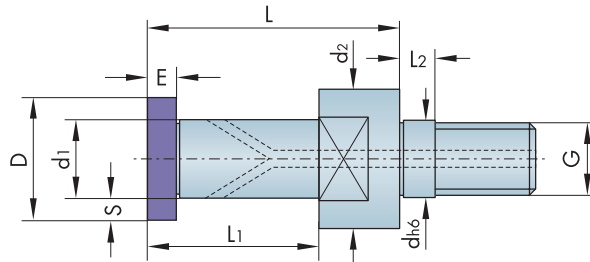
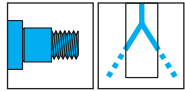
* If inserts width <> dimension E are used, dimensions L and L₁ change accordingly.
** without coolant

Circular Milling Tools with Polygonal Insert Seat

- Inserts Page 22-26
- Cutting Data Page 31



Please adapt cutting data to overhangs length



Type	Order No.	Bore Ø min.	D mm	dh6 mm	d1 mm	d2 mm	Smax. mm	E mm	L* mm	L1* mm	L2 mm	G	Shaft	Spare part No.	
														Screwdriver	Screw
P16	123586	18	16	8,5	9	14,4	3,5	3,5	29,5	19,5	5,5	M8	Steel	111656	143158
P20	123618	22	20	10,5	11,5	18,0	4,2	5	35,0	25,0	5,5	M10	Steel	111671	107597
P25	123605	27	25	12,5	13,6	22,5	5,7	4	42,5	29,5	5,0	M12	Steel	111594	107529

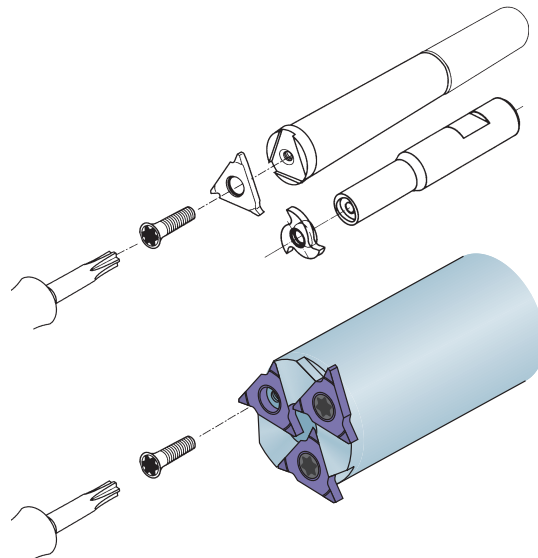
* If inserts width <> 4,0 mm are used, dimensions L and L₁ change accordingly.

Screw torques		
143158	T8 IP	1,1 Nm
107597	T15 IP	3,8 Nm
107529	T20 IP	5,5 Nm

Assembling Instructions

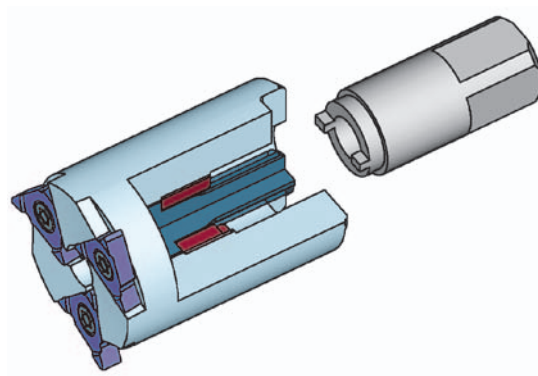
Changing Inserts

Clamp cutter before changing insert. Loosen insert screw. Remove used insert and clean the insert pocket before clamping new insert. Please use the appropriate TIP hex key for the tightening of the inserts.



Changing Clamping Screws

Only for circular milling cutter no. 123464



Calculation Formula for the Circular Milling

$$n = \frac{V_c \cdot 1000}{d \cdot \pi} \quad V_c = \frac{d \cdot \pi \cdot n}{1000}$$

$$Vf_2 = f_z \cdot z \cdot n \quad n = \frac{Vf_2}{f_z \cdot z} \quad f_d = \frac{Vf_2}{z \cdot n}$$

$$Vf_3 = \frac{Vf_2 \cdot (D + d)}{D} \quad \text{Cutting external}$$

$$Vf_2 = \frac{D \cdot Vf_f}{(D + d)}$$

$$Vf_f = \frac{Vf_2 \cdot (D - d)}{D} \quad \text{Cutting internal}$$

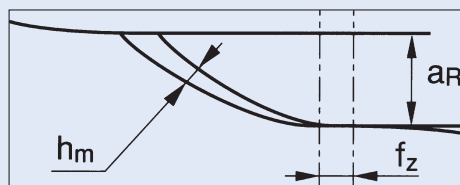
$$Vf_2 = \frac{D \cdot Vf_f}{(D - d)}$$

$$V_f = 0,25 \cdot Vf_f \quad \text{Plunge in straight}$$

$$V_f = Vf_f \quad \text{Plunge in with a circle}$$

$$h_m = \frac{f_z}{\sqrt{\frac{d}{a_R}}}$$

$$f_z = h_m \cdot \sqrt{\frac{d}{a_R}}$$



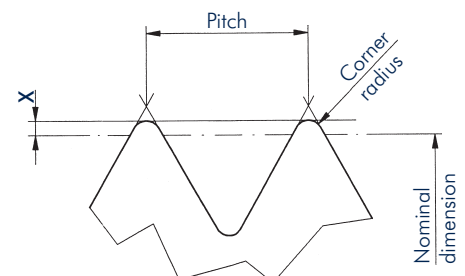
Middle chip thickness
 $h_m \approx 0,05 \text{ mm/rev.}$

Symbols

n (rpm)	= spindle speed
V_c (m/min)	= cutting speed
d (mm)	= cutter diameter
D (mm)	= shaft or bore \varnothing
Vf_2 (mm/min)	= eff. feed speed
h_m (mm/rev.)	= middle chip thickness
Vf_f (mm/min)	= programmed feed speed
Vf (mm/min)	= programmed plunge feed
f_z (mm)	= feed per insert
z	= number of inserts
a_r (mm)	= chip depth, radial

Correction Values for Internal Thread Milling

Pitch	Correction Value X
0,50	0,017
0,75	0,031
0,80	0,035
1,00	0,036
1,25	0,045
1,50	0,052
1,75	0,059
2,00	0,076
2,50	0,091
3,00	0,104
3,50	0,129
4,00	0,143
4,50	0,166
5,00	0,181
5,50	0,205
6,00	0,219

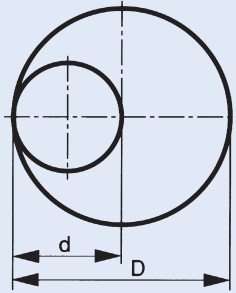


Note

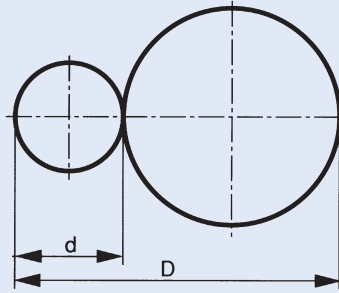
Internal threads are programmed to the nominal dimension.
 In order to achieve the exact thread size desired, there is a correction value for any given pitch. This correction value must be deducted from the radius of the cutter when programming.

Information about Circular Milling

Internal milling

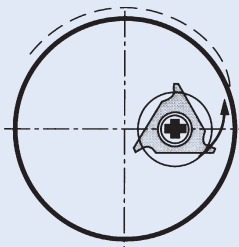


External milling

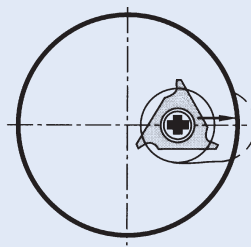


The best diameter relation is reached if the bore diameter to the cutter diameter is 2:1. **Climb milling is recommended.**

Plunge in with a circle

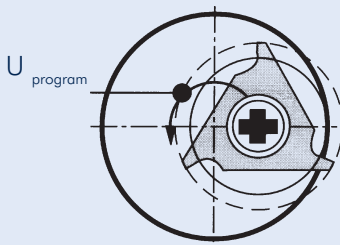


Straight plunge in

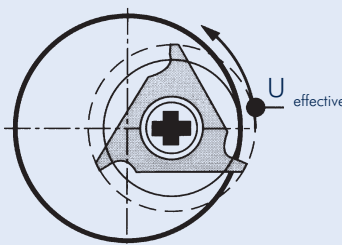


If possible, always plunge in with a circle. If plunging in straight, only use 1/3 of the feed. After having reached the plunge depth, move with full speed.

Programmed feed regarding to cutter center



Effective feed regarding to cutter O.D.



Always check the real feed speed at cutter O.D.

Carbide Grades

K

Uncoated universal grade for turning unalloyed grey cast iron, black heart castings, alloys and non-ferrous metals with stable machining conditions. High wear resistance.

FKN

Uncoated grade with fine grain, specifically for titanium and other alloys as well as non-ferrous metals. The homogeneous structure ensures good edge toughness and resistance to wear at high cutting speeds.



TINAMATIC

Grade with multi-layer wear-resistant coating for dry and high-speed machining. Very high thermal and chemical resistance in combination with long service life.

P

Uncoated universal grade for turning steel. Good resistance to thermal and mechanical stress with high wear resistance and edge toughness.

Cutting Data Reference Values: Circular-, Linear- and Thread Milling as well as Cutting with Polygonal Insert Seat

Material to be machined	Strength N/mm ²	Cutting Speed V _c (m/min.)	Feed per tooth fz* mm	
				
General construction steels	< 500	250	0,05 - 0,12	0,05 - 0,25
	500 - 800	180	0,05 - 0,12	0,05 - 0,25
Free cutting steels	< 850	180	0,05 - 0,12	0,05 - 0,25
	850 - 1000	120	0,05 - 0,12	0,05 - 0,25
Unalloyed heat-treatable steels	< 700	250	0,05 - 0,12	0,05 - 0,25
	700 - 850	180	0,05 - 0,12	0,05 - 0,25
	850 - 1000	120	0,05 - 0,12	0,05 - 0,25
Alloyed heat-treatable steels	850 - 1000	180	0,05 - 0,12	0,05 - 0,25
	1000 - 1200	100	0,05 - 0,12	0,05 - 0,25
Unalloyed cementation steels	< 750	120	0,05 - 0,12	0,05 - 0,25
Alloyed cementation steels	< 1000	120	0,05 - 0,12	0,05 - 0,25
	> 1000	100	0,05 - 0,12	0,05 - 0,25
Nitriding steels	< 1000	120	0,05 - 0,12	0,05 - 0,25
Cast Steel	> 1000	100	0,05 - 0,12	0,05 - 0,25
Tool steels	< 850	180	0,05 - 0,12	0,05 - 0,25
	850 - 1100	120	0,05 - 0,12	0,05 - 0,25
	1100 - 1400	100	0,05 - 0,12	0,05 - 0,25
Rapid steels	830 - 1200	120	0,05 - 0,12	0,05 - 0,25
Nonwearing construction steels	< 1350	120	0,05 - 0,12	0,05 - 0,15
	< 1850	100	0,05 - 0,12	0,05 - 0,15
Spring steels	< 1500	80	0,05 - 0,08	0,05 - 0,15
Stainless steel, sulphured	< 700	250	0,05 - 0,12	0,05 - 0,15
Stainless steel, austenitic	< 700	180	0,05 - 0,12	0,05 - 0,15
Stainless steel, martensitic	< 1100	120	0,05 - 0,12	0,05 - 0,15
Hardened steels	48 - 55 HRC	100	0,05 - 0,10	0,05 - 0,15
	55 - 60 HRC	100	0,05 - 0,08	0,05 - 0,10
Cast Iron	60 - 67 HRC	100	0,05 - 0,08	0,05 - 0,08
Cast iron (GG)	< 180 HB	180	0,05 - 0,12	0,05 - 0,25
	> 180 HB	120	0,05 - 0,12	0,05 - 0,25
Cast iron (GGG, GT)	> 180 HB	120	0,05 - 0,12	0,05 - 0,25
	> 260 HB	100	0,05 - 0,12	0,05 - 0,25
Aluminium, aluminium alloys	< 530	400	0,05 - 0,25	0,15 - 0,40
Aluminium cast alloys	< 10% Si	< 600	300	0,05 - 0,25
	> 10% Si	< 600	250	0,05 - 0,25
Magnesium, magnesium alloys	< 280	400	0,05 - 0,25	0,15 - 0,40
Copper, low alloyed	< 400	500	0,05 - 0,25	0,15 - 0,40
Cooper Alloys	< 850	120	0,05 - 0,12	0,05 - 0,15
Brass, short-chipping	< 600	400	0,05 - 0,25	0,15 - 0,40
Brass, long-chipping	< 600	400	0,05 - 0,25	0,15 - 0,40
Bronze, short-chipping	< 600	400	0,05 - 0,25	0,15 - 0,40
	650 - 850	400	0,05 - 0,25	0,15 - 0,40
Bronze, long-chipping	< 850	300	0,05 - 0,25	0,15 - 0,40
	850 - 1200	500	0,05 - 0,25	0,15 - 0,40
Graphite	-	500		0,15 - 0,40
Thermosetting- and Thermoplastics	-	500		
GFK and CFK	-	400		
Titanium, titanium alloys	< 850	80	0,01 - 0,05	0,01 - 0,08
	850 - 1200	60	0,01 - 0,05	0,01 - 0,08
Special alloys	< 1200	120	0,05 - 0,12	0,05 - 0,15

* The indicated feed values apply only with circular bringing in loop. During linear bringing in movement the feed motion amounts to max. 30%